# Supplementary System Documentation

**TELEPERM M**

**AS 388/TM and AS 488/TM**

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Safety Guidelines

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:

![Danger]

**Danger**

indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

![Warning]

**Warning**

indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

![Caution]

**Caution**

indicates that minor personal injury or property damage can result if proper precautions are not taken.

![Note]

**Note**

draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

Qualified Personnel

The device/system may only be set up and operated in conjunction with this manual.

Only qualified personnel should be allowed to install and work on this equipment. Qualified persons are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Correct Usage

Note the following:

![Warning]

**Warning**

This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

Trademarks

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Disclaimer of Liability

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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Technical data subject to change.
Notes on the CE Symbol for SIMATIC

EC Directive EMC 89/336/EWG

The following applies to the SIMATIC products described in this manual:

Products which carry the CE symbol fulfil the requirements of the EMC law valid from 01.01.96. The EMC law is based on the EC Directive 89/336/EEC "Electromagnetic compatibility" and on the Harmonized European Standards mentioned there.

The EC declaration of conformity are available to the authorities concerned, according to the above–mentioned EC Directive, Article 10, from:

Siemens Aktiengesellschaft
Automation Group
A&D AS RD4
Postfach 1963
D-92209 Amberg

Application in the Industry

The SIMATIC products are designed for use in the industrial field of application and meet the following requirements.

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<tr>
<td></td>
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</table>

Application in residential buildings

The SIMATIC products may be used in residential buildings (residential, commercial and trade buildings, small scale enterprises) with an individual approval.

<table>
<thead>
<tr>
<th>Field of application</th>
<th>Requirement for</th>
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<tr>
<td></td>
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The individual approval must be obtained from an administrative body or an inspection office. In Germany the individual approval is issued by the Federal Post and Telecommunication Office.

Compliance with the EC Directive

The SIMATIC products only meet the requirements when the installation and operation comply with the Installation Guidelines described in the Manuals.
TELEPERM M/ME
Safety—Related Guidelines for the User

1 General
This manual provides the information required for the intended use of the particular product. The documentation is written for technically qualified personnel such as engineers, programmers or maintenance specialists who have been specially trained and who have the specialized knowledge required in the field of instrumentation and control.

A knowledge of the safety instructions and warnings contained in this manual and their appropriate application are prerequisites for safe installation, commissioning and maintenance as well as safe and proper operation of the product described. Only qualified personnel as defined in section 2 have the specialized knowledge that is necessary to correctly interpret the general danger notices and warnings contained in this documentation and implement them in each particular case.

This manual is an inherent part of the scope of supply even if, for logistic reasons, it has to be ordered separately. For the sake of clarity, not all details of all versions of the product are described in the documentation, nor can it cover all conceivable cases regarding installation, operation and maintenance. Should you require further information or face special problems that have not been dealt with in sufficient detail in this documentation, please contact your local Siemens office.

We would also point out that the contents of this product documentation shall not become a part of or modify any prior or existing agreement, commitment or legal relationship. The Purchase Agreement contains the complete and exclusive obligations of Siemens. Any statements contained in this documentation do not create new warranties or restrict the existing warranty.

2 Qualified Personnel
Persons who are not qualified should not be allowed to handle the equipment/system. Non-compliance with the warnings contained in this manual or appearing on the equipment itself can result in severe personal injury or damage to property. Only qualified personnel should be allowed to work on this equipment/system.

Qualified persons as referred to in the safety guidelines in this manual as well as on the product itself are defined as follows:

- System planning and design engineers who are familiar with the safety concepts of automation equipment;
- Operating personnel who have been trained to work with automation equipment and are conversant with the contents of the manual in as far as it is connected with the actual operation of the plant;
- Commissioning and service personnel who are trained to repair such automation equipment and who are authorized to energize, deenergize, clear, ground and tag circuits, equipment and systems in accordance with established safety practices.
3 Danger Notices

The notices and guidelines that follow are intended to ensure personal safety, as well as protecting the product and connected equipment against damage.

The safety notices and warnings for protection against loss of life (the users or service personnel) or for protection against damage to property are highlighted in this manual by the terms and pictograms defined here. The terms used in this manual and marked on the equipment itself have the following significance:

**Danger**
indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

**Warning**
indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

**Caution**
indicates that minor personal injury or property damage can result if proper precautions are not taken.

**Note**
is an important information about the product, its operation or a part of the manual to which special attention is drawn.

4 Proper Usage

- The equipment/system or the system components may only be used for the applications described in the catalog or the manual, and only in combination with the equipment, components and devices of other manufacturers as far as this is recommended or permitted by Siemens.

- The product described has been developed, manufactured, tested and the documentation compiled in keeping with the relevant safety standards. Consequently, if the described handling instructions and safety guidelines described for planning, installation, proper operation and maintenance are adhered to, the product, under normal conditions, will not be a source of danger to property or life.

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**Warning**

- After opening the housing or the protective cover or after opening the system cabinet, certain parts of this equipment/system will be accessible, which could have a dangerously high voltage level.

- Only suitably qualified personnel should be allowed access to this equipment/system.

- These persons must be fully conversant with any potential sources of danger and maintenance measures as set out in the instructions contained in this manual.

- It is assumed that this product be transported, stored and installed as intended, and maintained and operated with care to ensure that the product functions correctly and safely.
5 Guidelines for the Planning and Installation of the Product

The product generally forms a part of larger systems or plants. These guidelines are intended to help integrate the product into its environment without it constituting a source of danger.

The following facts require particular attention:

### Note

Even when a high degree of safety—related reliability has been designed into an item of automation equipment by means of multichannel configuration, it is still imperative that the instructions contained in this manual be exactly adhered to. Incorrect handling can render ineffective the preventive measures incorporated into the system to protect it against dangerous process states, and even create new sources of danger.

The following advice regarding installation and commissioning of the product should — in specific cases — also be noted.

### Warning

- Follow strictly the safety and accident prevention rules that apply in each particular case.
- Units which are designed as built—in units may only be operated as such, and table—mounted or portable equipment only with its casing closed.
- In the case of equipment with a permanent power connection which is not provided with an isolating switch and/or fuses which disconnect all poles, a suitable isolating switch or fuses must be provided in the building wiring system (distribution board). Furthermore, the equipment must be connected to a protective ground (PE) conductor.
- For equipment or systems with a fixed connecting cable but no isolating switch which disconnects all poles, the power socket with the grounding pin must be installed close to the unit and must be easily accessible.
- Before switching on the equipment, make sure that the voltage range setting on the equipment corresponds to the local power system voltage.
- In the case of equipment operating on 24 V DC, make sure that proper electrical isolation is provided between the mains supply and the 24 V supply. Only use power supply units to IEC 364—4—41 or HD 384.04.41 (VDE 0100 Part 410).
- The I/O modules are designed for operation with safety extra—low voltage acc. to IEC 950 / EN 60950/VDE 0805. Therefore only components whose connection points are separated in a safe manner (by means of the protective measure “Protective separation”) from voltages (e.g. mains) may be connected to the inputs/outputs of these modules.
- Fluctuations or deviations of the power supply voltage from the rated value should not exceed the tolerances specified in the technical specifications. Otherwise, functional failures or dangerous conditions can occur in the electronic modules/equipment.
- Suitable measures must be taken to ensure that programs that are interrupted by a voltage dip or power supply failure resume proper operation when the power supply is restored. Care must be taken to ensure that dangerous operating conditions do not occur even momentarily. If necessary, the equipment must be forced into the “emergency off” state.
- Emergency tripping devices in accordance with EN 60204/IEC 204 (VDE 0113) must be effective in all operating modes of the automation equipment. Resetting the emergency off device must not result in any uncontrolled or undefined restart of the equipment.

### Caution

- Install the power supply and signal cables in such a manner as to prevent inductive and capacitive interference voltages from affecting the automation functions.
- Automation equipment and its operating elements must be installed in such a manner as to prevent unintentional operation.
- Automation equipment can assume an undefined state in the case of a wire break in the signal lines. To prevent this, suitable hardware and software measures must be taken when interfacing the inputs and outputs of the automation equipment.
6 Active and Passive Faults in Automation Equipment

- Depending on the particular task for which the electronic automation equipment is used, both active as well as passive faults can result in a dangerous situation. For example, in actuator control (e.g. press control), an active fault is generally dangerous because it can result in an unauthorized startup of the actuator. On the other hand, a passive fault in a signalling function (alarm signalling system) can result in a dangerous, command—blocking operating state not being reported to the operator.

- This differentiation of the possible faults and their classification into dangerous and non—dangerous faults, depending on the particular task, is important for all safety considerations in respect of the product supplied and the its interaction with the process to be controlled.

---

**Warning**

In all cases where a fault in an automation equipment can result in severe personal injury or substantial damage to property, i.e. where a dangerous fault can occur, safety—related and fail—safe systems (in general prototype—tested by the German Technical Inspectorate (TÜV)) must be used or additional external measures be taken or equipment provided to ensure or force safe operating conditions even in the event of a fault (e.g. by means of independent limit monitors, mechanical interlocks etc.).

---

7 Procedures for Maintenance and Repair

If measurement or testing work is to be carried out on an active unit, the rules and regulations contained in the "VBG 4.0 Accident prevention regulations" of the German employers liability assurance association (Berufsgenossenschaften) must be observed. Particular attention is drawn to paragraph 8 "Permissible exceptions when working on live parts". Use only suitable electrical tools.

---

**Warning**

- Repairs to an item of automation equipment may only be carried out by Siemens service personnel or an authorized Siemens repair center. For replacement purposes, use only parts or components that are contained in the spare parts list or listed in the "Spare parts" section of this manual. Unauthorized opening of equipment and improper repairs can result in loss of life or severe personal injury as well as substantial property damage.

- Before opening the equipment, always remove the power plug or open the disconnecting switch.

- Only use the fuse types specified in the technical specifications or the maintenance instructions of this manual.

- Do not throw batteries into an open fire and do not carry out any soldering work on batteries (danger of explosion). Maximum ambient temperature 100°C. Lithium batteries or batteries containing mercury should not be opened or recharged. Make sure that the same type is used when replacing batteries.

- Batteries and accumulators must be disposed of as classified waste.

- The following points require attention when using monitors:
  Improper handling, especially the readjustment of the high voltage or fitting of another tube type can result in excessive X—ray radiation from the unit. The license to operate such a modified unit automatically lapses and the unit must not be operated at all.

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Guidelines for Handling Electrostatically Sensitive Devices (ESD)

1 What is ESD?
VLSI chips (MOS technology) are used in practically all SIMATIC S5 and TELEPERM M modules. These VLSI components are, by their nature, very sensitive to overvoltages and thus to electrostatic discharge:

They are therefore defined as

"Electrostatically Sensitive Devices"

"ESD" is the abbreviation used internationally.

The following warning label on the cabinets, subracks and packing indicates that electrostatically sensitive components have been used and that the modules concerned are susceptible to touch:

![Warning Label]

ESDs can be destroyed by voltage and energy levels which are far below the level perceptible to human beings. Such voltages already occur when a component or a module is touched by a person who has not been electrostatically discharged. Components which have been subjected to such overvoltages cannot, in most cases, be immediately detected as faulty; the fault occurs only after a long period in operation.

An electrostatic discharge
– of 3500 V can be felt
– of 4500 V can be heard
– must take place at a minimum of 5000 V to be seen.

But just a fraction of this voltage can already damage or destroy an electronic component.

The typical data of a component can suffer due to damage, overstressing or weakening caused by electrostatic discharge; this can result in temporary fault behavior, e.g. in the case of
– temperature variations,
– mechanical shocks,
– vibrations,
– change of load.

Only the consequent use of protective equipment and careful observance of the precautions for handling such components can effectively prevent functional disturbances and failures of ESD modules.
2 When is a Static Charge Formed?

One can never be sure whether the human body or the material and tools which one is using are not electrostatically charged.

Small charges of 100 V are very common; these can, however, very quickly rise up to 35 000 V.

Examples of static charge:

– Walking on a carpet up to 35 000 V
– Walking on a PVC flooring up to 12 000 V
– Sitting on a cushioned chair up to 18 000 V
– Plastic desoldering unit up to 8 000 V
– Plastic coffee cup up to 5 000 V
– Plastic bags up to 5 000 V
– Books, etc. with a plastic binding up to 8 000 V

3 Important Protective Measures against Static Charge

– Most plastic materials are highly susceptible to static charge and must therefore be kept as far away as possible from ESDs.
– Personnel who handle ESDs, the work table and the packing must all be carefully grounded.

4 Handling of ESD Modules

– One basic rule to be observed is that electronic modules should be touched by hand only if this is necessary for any work required to be done on them. Do not touch the component pins or the conductors.
– Touch components only if
  - the person is grounded at all times by means of a wrist strap
  or
  - the person is wearing special anti-static shoes or shoes with a grounding strip.
– Before touching an electronic module, the person concerned must ensure that (s)he is not carrying any static charge. The simplest way is to touch a conductive, grounded item of equipment (e.g. a blank metallic cabinet part, water pipe, etc.) before touching the module.
– Modules should not be brought into contact with insulating materials or materials which take up a static charge, e.g. plastic foil, insulating table tops, synthetic clothing, etc.
– Modules should only be placed on conductive surfaces (table with anti-static table top, conductive foam material, anti-static plastic bag, anti-static transport container).
– Modules should not be placed in the vicinity of monitors, TV sets (minimum distance from screen > 10 cm).
The diagram below shows the required protective measures against electrostatic discharge.

5 Measurements and Modification to ESD Modules
- Measurements on modules may only be carried out under the following conditions:
  - The measuring equipment is grounded (e.g. via the PE conductor of the power supply system) or
  - when electrically isolated measuring equipment is used, the probe must be discharged (e.g. by touching the metallic casing of the equipment) before beginning measurements.
- Only grounded soldering irons may be used.

6 Shipping of ESD Modules
Anti-static packing material must always be used for modules and components, e.g. metalized plastic boxes, metal boxes, etc. for storing and dispatch of modules and components.
If the container itself is not conductive, the modules must be wrapped in a conductive material such as conductive foam, anti-static plastic bag, aluminium foil or paper. Normal plastic bags or foils should not be used under any circumstances.
For modules with built-in batteries ensure that the conductive packing does not touch or short-circuit the battery connections; if necessary cover the connections with insulating tape or material.
SIEMENS

TELEPERM M

AS 388/TM and 488/TM
Automation Systems

Technical Description

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1 Product Overview
2 Application
3 Configuration
4 Method of Operation
5 Installation and Commissioning
6 Functional Differences Between AS 235 and AS x88/TM
7 Ordering Information

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B Applicable Documents
C Specifications
D I & C Signals on the Digital I/O Module

Glossary of Terms, Index
Safety instructions

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

![Danger]

Danger

Failure to observe a Danger note will cause death, severe personal injury or severe damage to the equipment.

![Warning]

Warning

Failure to observe a Warning note may cause death, severe personal injury or severe damage to the equipment.

![Caution]

Caution

Failure to observe a Caution note may cause personal injury or damage to the equipment.

Note

Notes contain important information regarding the product, product handling or a specific part of the document that requires special attention.

Qualified personnel

The unit may only be commissioned and used on the basis of the information contained in this Manual. Only qualified personnel are authorized to perform any work inside the unit. Qualified personnel in the sense of the safety instructions in this Manual are persons who have been authorized to commission, ground and label units, systems and circuits according to the safety-relevant standards.

Normal use

Please observe the following instructions:

![Warning]

Warning

The unit may only be used for the applications mentioned in the Catalogue and the Technical Description. It may only be used together with third-party equipment or components that have been recommended or released by Siemens.

Faultless and safe operation of the product requires proper transport, storage, installation and commissioning, and careful handling and maintenance.

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Siemens AG
Bereich Automatisierungs- und Antriebstechnik
Geschäftsgebiet Systems Engineering
D-76181 Karlsruhe

Exclusion of liability

Although we have checked the contents of this document against the hardware and software described herein, the information contained in this document may not cover all details. We can therefore not assume any liability for completeness. The information in this document is checked at regular intervals and necessary corrections will be included in the next revisions. We are grateful for any suggestions.

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Siemens Aktiengesellschaft
Order No. C79000-T8076-C706
Preface

Purpose of the description
The information from this technical description enables you to
• commission an AS 388/TM or AS 488/TM automation system
• create user structures
• look up function descriptions and technical specifications.

Contents of the description
This document describes the system-related functions of the AS 388/TM and AS 488/TM automation systems.
As this document is based on the Manual ”AS 235 Automation Systems, System Software Variant G”, it merely describes new functions and/or modifications (such as the packaging design).
The description contains the following topics:
• Product overview
• Application, design, method of operation
• Installation and commissioning
• New/modified functions
  – AS 388/TM functions
  – AS 488/TM functions
  – Bussystem PROFIBUS–TM
  – Connecting the field devices
  – I/O bus PROFIBUS–DP
  – IBS terminal for commissioning and diagnosis
  – Indication and diagnosis
• System interfaces
• Ordering information
• Appendix: Brief instruction, applicable documents, specifications

Audience
This Technical description is directed to commissioning, design and service personnel, and users.
Depending on the task, the following knowledge is required:

- for design, installation and configuration
  - Working knowledge of the SIMATIC M7-300 and M7-400 automation computer
  - Knowledge of the TELEPERM M process control system and, in particular, of the AS 235 component.
  - Knowledge of the PROGRAF AS+ configuration system
  - Knowledge of the BATCH X-TM program package

- for process control
  - Knowledge of the handling of the OS 525 or PCS 7/TM–OS operator communication and visualization system

- for communications
  - Working knowledge of the CS 275 bus system including configuration
  - Working knowledge of the bus system PROFIBUS–TM including configuration

There are various Technical Descriptions and Manuals available that provide additional information (see Applicable Documents in Appendix A).

This manual will not be updated continuously. Instead of this the statements in the current product informations and in the TELEPERM M aktuell publications are binding.

The term WinCC/TM has been replaced by PCS 7/TM–OS.

All statements concerning the configuration tool PROGRAF AS+ are also valid for the successor product PROGRAF AS+/NT. This can be used under Windows NT 4.0, 2000 or XP.
To design, install, and commission an AS 388/TM or AS 488/TM system, you may need some of the following Technical Descriptions and Manuals (depends on your configuration). “Applicable Documents” in Appendix A tells you the order numbers of these documents and from where you can order them.

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<tr>
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**Note**

The documents /2/, /3/, /4/ and /6/ are included in the “TELEPERM M, Additional System Documents” Manual (Order No. C79000-G8076-C700, to be ordered from Lieferzentrum Nürnberg (LZN)).
Conventions

The following convention is used for swift and easy identification of important information. It defines the different keyboard input methods.

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<thead>
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<th>Convention</th>
<th>Used for</th>
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<tbody>
<tr>
<td><strong>BOLD</strong></td>
<td>Instruction names, switches and text strings that must be entered exactly as they are shown.</td>
</tr>
</tbody>
</table>

Scope of delivery

The documents are delivered independent of the automation system AS 388/TM or AS 488/TM components.

The AS 388/TM and AS 488/TM automation systems consist of the hardware of the SIMATIC M7-300 and/or M7-400 product family of automation computers. The hardware is therefore not discussed in this Description. Please refer to the applicable SIMATIC documents or the Installation Guidelines if you need more information.

The system software of the AS 388/TM and AS 488/TM system is based on the AS 235 system software variant G, and consequently, on the related documents (see "Necessary documents"). The following restrictions apply, however:

- "Peculiarities of the system software in the AS 235 H system" is not applicable.
- "Redundancy" specifications are not applicable.

Applicable documents

Appendix B contains a list of the applicable documents and specifies the documents' order numbers and the places from where they can be ordered.

Catalogs

The catalogs contain information and ordering data of the hardware and software components. They also inform about the current configuration capabilities of the system components that may be used in TELEPERM M.

Inquiries

Please contact your sales partner if you need more information about the AS 388/TM and AS 488/TM automation systems, or more literature.

Please return a completed correction sheet if you have any suggestions or corrections for the description. The correction sheet is contained in the mailbox of the "TELEPERM M, Additional System Documents" Manual.

Note

Wherever this document describes features that are common to both systems, AS 388/TM and AS 488/TM will be referred to as AS x88/TM.
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Product Overview

Contents

The brief information in this chapter gives you a swift orientation of the AS 388/TM and AS488/TM automation systems.
The AS x88/TM automation system is a product that combines the benefits of the modern SIMATIC M7/S7 packaging design with the functionality of the system software of the proven AS 235 automation system from the TELEPERM M world, that has been employed in a large number of applications (see Fig. 1-1).

The powerful and compact AS x88/TM automation system provides the solution of medium to large process control tasks.

**Blocks**

The object-oriented and individually structured functions are defined in blocks. These blocks execute in three basic cycles (125 ms, 1 s, and background level) or in a multiple thereof. Process alarms can be processed acyclically.

**Process languages**

As before in the AS 235, the spectrum of the compatible standard function blocks can be enhanced by user-oriented additional functions. The TML process language and/or the STEP M control language are used for individually programmed closed- and open-loop control functions.
**Communication**

The PROFIBUS–TM standard bus is the new bus system of the innovated TELEPERM M process control system. It supplements the previously used CS 275 bus system. I&C and process communications between automation systems, configuration systems and operator communication and visualization systems take place via this bus system. The communication mechanisms are the same as in the CS 275 bus system. For example:

- AKS/AKE, BKS/BKE block links
- Parameter links (write/read message frames)
- Links between automation system and operator communication and visualization system
- Links between automation system and configuration system

A Bridge CS-L2 unit permits access to previously installed systems that have been connected to the CS 275 bus system.

**Field devices**

In the standard configuration, the field devices are connected via the PROFIBUS–DP and the distributed ET 200M/U/B I/O system of the SIMATIC ET 200 remote I/O system. This system provides a large spectrum of I/O modules. In particular, it includes the I/O modules of the remote ET 200M I/O unit that have been tailored for utilization in process engineering systems. Some of these components provide direct connections for hazardous areas. The remote ET 200U and ET200B I/O units can also be connected to the PROFIBUS–DP.

The I/O modules are the interfaces between the automation system and the process. The central module employs this process interface to map current process data in a process image, and actively influences the process with output values. The arrangement of the I/O modules and the definition of the module addresses are described by configuration. The utilization of field devices from existing TELEPERM M systems is supported by additional hardware and software.

**Local commissioning and diagnosis (option)**

The system has an interface for commissioning and diagnosing the AS x88/TM system. An operator input program permits local commissioning and diagnosis to be performed via this interface. The operator input program executes on any AT-Compatible personal computer.
The AS x88/TM system software is delivered on a memory card (plug-in memory module). It may be purchased independently of the hardware. The system software consists of:

- The TML execution system with the following components:
  - RMOS32 real time basis operating system
  - Tasks of the AS 235 emulation as stand-alone program elements and the RMO32 basis operating system. These tasks perform specific jobs (such as TML command processing).
  - Drivers (blocks) are program elements. They can be used, for example, for linking SIMATIC M7/S7 I/O elements.

- The proven standard function blocks and system subroutines of the AS 235 automation system, and the TML and STEP M programming languages.

Once the system software has been loaded, user structures may be saved on the system module, and can be loaded from there.

The utilization of the PROFIBUS–DP bus requires previously created user structures to be re-configured. After re-configuration, the following user structures that have been created under the following system variants may directly be saved in a memory card and be used in an upwards compatible way:

- AS 230 variants C, D, E and F
- AS 235 variants A, F, G.

An AS x88/TM is an automation system that is based on the packaging system of the SIMATIC M7 automation computer product families M7-300 and M7-400. The software of the AS x88/TM consists of a TML execution system that contains the proven system functions of variant G of the AS 235 automation system from the TELEPERM M world.
Utilization of the AS x88/TM

The following utilization is possible:

- To satisfy different requirements in setting up new plants, the system is available in two performance levels:
  - The AS 388/TM is a compact entry configuration for smaller systems. It is built in the SIMATIC M7-300 packaging structure.
  - The AS 488/TM is the powerful automation system for larger applications. It is built in the SIMATIC M7-400 packaging structure.

Either performance level has a large spectrum of remote field device I/O modules and the standard PROFIBUS–DP bus system available.

- Existing TELEPERM M systems may be expanded using the AS 400/TM system in the M7-400 packaging structure:
  - Connection to the CS 275 bus system and/or
  - Connection of previously installed TELEPERM M field devices

- Replacement of existing AS 235 automation systems.

The base unit in an AS 230/235 cabinet is replaced with a pre-assembled rack (migration rack) that accommodates an AS 488/TM system in M7-400 packaging structure.
AS x88/TM structure

An AS x88/TM system can be composed of various components and thus matched to the size of the automation task. Expanding the system is possible, too.

M7-300 components

The base structure of an AS 388/TM in M7-300 design consists of the following components:

- Rack (profile section)
- Central module with interface for the connection of an IBS terminal for local commissioning and diagnosis.
- Memory card with AS 388/TM system software and/or user structures
- Extension units that accommodate up to two or three interface modules.
- Interface modules for
  - connecting to the PROFIBUS–DP
  - connecting to the PROFIBUS–TM
  - input and output of I&C signals

Fig. 1-2 shows the basic structure of the AS 388/TM in M7-300 design.
The base unit of the AS 488/TM in M7-400 design consists of the following components:

- Rack
- Power supply module
- Central module with module slots for interface modules
- Memory card with AS 488/TM system software and/or user structures
- Extension module for interface modules
- Interface modules for:
  - connecting to the PROFIBUS–DP
  - connecting to the PROFIBUS–TM
  - input and output of I&C signals
  - connecting an IBS terminal for local commissioning and diagnosis

The following optional extensions are possible:

- Use a TPM 478 interface module to connect the AS 488/TM system to the CS 275 bus system via a TPM 478
- Use a TBX 478 I/O bus interface module and a TPM 478 interface module to connect previously installed TELEPERM I/O units and/or the CS 275 bus system.

Migration racks enable an existing AS 220/230/235 systems to be converted into an innovated AS 488/TM system.

Fig. 1-3 shows the basic structure of the AS 488/TM in M7-400 design.
Figure 1-3  AS 488/TM base structure in M7-400 design

Note

Please refer to the Manuals /7/ to /10/ for further information about SIMATIC M7/S7 components.
The TPM 478 interface module and the TBX 478 I/O bus interface module can only be used in the M7-400 packaging structure.
Product features

An AS x88 automation system provides the following features:

- AS 235-compatible functionality, such as utilization of
  - existing user structures
  - the proven TML process language
  - the standard function blocks
  - previously installed field devices
- Central operator communication and visualization with the OS 525 resp. PCS 7/TM–OS operator communication and visualization system.
- Central configuration and documentation using PROGRAF AS+
- Stable hardware basis of the SIMATIC S7 and SIMATIC M7 product families
- Two performance levels for different requirements:
  - M7-300 design for small and medium systems
  - M7-400 design for medium and large systems
- Introduction of modern communication standards:
  - PROFIBUS–TM bus system for communication with other devices of the TELEPERM M process control system
  - Connection of field devices via the PROFIBUS–DP
- Large selection of I/O modules of the distributed I/O system ET 200
- New distributed ET 200M I/O unit with I/O modules that are particularly suitable for the requirements of process engineering applications:
  - Simple (module-related) or advanced (signal-related) diagnosis quality
  - Function modules
  - Modules for hazardous areas
- Optional connection to the CS 275 bus system (local bus)
- Optional connection of existing TELEPERM M I/O
- Conversion of existing AS 220/230/235 systems
- SW–package AG/AG–link optional
- Processing measuring datas from scales with SIWAREX M optional
Application

This chapter tells you

- the tasks and fields the automation system is suitable for
- the utilization and performance range of the automation system
- the features and benefits of the automation system
Tasks

The AS x88/TM can be used in many different fields. It is able to solve complex process engineering automation tasks. These tasks include:

- Program execution
  - measured value processing (e.g. closed-loop control, computation, monitoring, process data acquisition)
  - open-loop control (e.g. sequencing control, batch control)
- Event-controlled and cyclic processing
- Process interface for I&C, signalling and process status image
- Process interfaces for operator communication and visualization
- Communication with other automation systems (e.g. AS 235 of the TELEPERM M process control system).

Process languages and blocks

The spectrum of the standard function blocks that are included in the system software delivery can be expanded by additional functions. The TML (TELEPERM-M-Language) and STEP M process languages permit individually programmed functions to be added to the standard spectrum. This enables function blocks to be defined that are tailored to the individual process conditions. This is particularly suitable for complex open- and closed-loop control sequences that are represented as a combination of binary logic and measured value arithmetic (in batch processes or recipe processing, for example).

Process I/O modules

The ET 200 I/O system of the SIMATIC product family permits a large number of input and output modules to be connected.

Performance

The program memory of the AS x88/TM system has a capacity of 4096 kBytes. A single system is thus suitable for implementing larger automation projects.
Applications

The AS x88/TM system is suitable for all industry branches, in particular in areas that demand a high degree of I&C functionality, flexibility and expansibility to exist in the system for continuous processes and discontinuous batch processes.

The major fields where the system can be employed include:

- Glass
- Food and paper
- Petrochemical and biochemical plants
- Power plants
- Water and sewage treatment plants
- Pharmaceutical industry

AS x88/TM packaging structures

Depending on the automation task, different requirements are placed upon the automation system. The AS x88/TM system is therefore available in two different packaging structures:

- SIMATIC M7-300
- SIMATIC M7-400.

It consists of SIMATIC M7/S7 components and additional SIMATIC–NET– and TELEPERM– components.

Note

In this Description, the innovated automation system is called AS 388/TM or AS 488/TM.
AS 388/TM always means M7-300 design, AS 488/TM means M7-400 design.
AS x88/TM is used for the description of features that are common to both systems.

Benefits of the AS 488/TM system in M7-400 design

The structure of the two packaging systems is different. The following are the benefits of an AS 488/TM in M7-400 design:

- Optional connection to CS 275 instead of PROFIBUS–TM
- Optional connection of previously installed TELEPERM M I/O
- Program execution is faster than in M7-300
- More powerful PROFIBUS–TM connection via EXM 478 communications processor IF964–DP.
Table 2-1 compares utilization and performance of the AS x88/TM packaging structures.

Table 2-1 Utilization and performance of AS x88/TM

<table>
<thead>
<tr>
<th>Packaging system</th>
<th>Name</th>
<th>Performance</th>
<th>Suitable for</th>
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<tr>
<td>M7-300</td>
<td>AS 388/TM</td>
<td>small and medium systems</td>
<td>automation tasks with short execution times</td>
</tr>
<tr>
<td>M7-400</td>
<td>AS 488/TM</td>
<td>medium and large systems</td>
<td>demanding automation tasks with extremely short execution times and connection to CS 275 and existing TELEPERM M I/O</td>
</tr>
</tbody>
</table>

Thus, the AS 388/TM in M7-300 design is the homogeneous solution of automation tasks in the lower performance range.
Table 2-2 shows the features of both automation system packaging structures.

<table>
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<th>Features of AS x88/TM in packaging system</th>
<th>M7-300</th>
<th>M7-400</th>
</tr>
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<tr>
<td>Name</td>
<td>AS 388/TM</td>
<td>AS 488/TM</td>
</tr>
<tr>
<td>Processor</td>
<td>80486SX</td>
<td>Pentium</td>
</tr>
<tr>
<td>User memory</td>
<td>4096 kBytes</td>
<td></td>
</tr>
<tr>
<td>Execution cycle</td>
<td>125 ms/1 s</td>
<td></td>
</tr>
<tr>
<td>Processing performance compared with AS 235</td>
<td>approx. 0.75 × AS 235</td>
<td>approx. 1.5 to 3 × AS 235 (according to the CPU type)</td>
</tr>
<tr>
<td>20 ... 50</td>
<td>45 ... 120</td>
<td></td>
</tr>
<tr>
<td>30 ... 80</td>
<td>45 ... 180</td>
<td></td>
</tr>
<tr>
<td>3 ... 10</td>
<td>8 ... 20</td>
<td></td>
</tr>
<tr>
<td>70 ... 150</td>
<td>150 ... 370</td>
<td></td>
</tr>
<tr>
<td>Serial interface</td>
<td>yes, for local commissioning and diagnosis of the AS x88/TM with IBS terminal</td>
<td></td>
</tr>
<tr>
<td>Programmer interface MPI</td>
<td>possible only for specific functions of the SIMATIC M7 product family that are required for commissioning the hardware</td>
<td></td>
</tr>
<tr>
<td>ISA bus extension (internal bus)</td>
<td>yes, via EXM 378 extension module</td>
<td>yes, via ATM 478 extension module</td>
</tr>
<tr>
<td>Integrated functions</td>
<td>Standard function blocks for measurement and open- or closed-loop control, system subroutine, TPM process language and STEP M control language</td>
<td></td>
</tr>
<tr>
<td>Event-controlled and cyclic alarm processing</td>
<td>yes (alarm collector module )</td>
<td></td>
</tr>
<tr>
<td>Cyclic and acyclic program execution</td>
<td>yes,</td>
<td>yes,</td>
</tr>
<tr>
<td>via interface module on PROFIBUS–TM</td>
<td>via interface module on PROFIBUS–TM</td>
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<tr>
<td>via interface module on PROFIBUS–DP</td>
<td>via interface module on PROFIBUS–TM</td>
<td></td>
</tr>
<tr>
<td>via interface module on PROFIBUS–AG/AG (option)</td>
<td>optionally via TPM 478 interface module on CS 275 instead of PROFIBUS–TM</td>
<td></td>
</tr>
<tr>
<td>via interface module on PROFIBUS–AG/AG (option)</td>
<td>optionally via TPM 478 and TBX 478 to existing TELEPERM M I/O</td>
<td></td>
</tr>
<tr>
<td>via interface module on PROFIBUS–AG/AG (option)</td>
<td>via interface module on PROFIBUS–AG/AG (option)</td>
<td></td>
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</table>
## Advantage over AS 235

The AS x88/TM is a product with the advantages of the AS 235 automation system (such as the TML process language). Its features include:

- Modular and space-saving design
- Small, compact, encapsulated modules that are suitable for fanless operation
- No cabinet installation required (if SIMATIC modules only)
- Consistent, homogeneous and compatible features of M7-300 and M7-400
- Low-cost PROFIBUS–TM bus system for communications with other devices
- Utilization in the lower performance range thanks to the inexpensive packaging system of the M7-300 design. The M7-400 design covers the upper performance range.
- Connection of the remote ET 200M/U/B I/O units via the PROFIBUS–DP.
- Optional:
Configuration

This chapter tells you

- the components an AS x88/TM can communicate with
- the individual components and their functionality
- the extension levels and the interfaces of the AS x88/TM.

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<tr>
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3.1 System Configuration

Fig. 3-1 shows the basic system configuration of the AS x88/TM system.

**AS x88/TM in its system environment**

Figure 3-1 AS x88/TM in its system environment
Introduction

The components of Fig. 3-1 are briefly explained here. A detailed description will be given in the next chapters.

AS x88/TM

Automation system of the TELEPERM M process control system, based on the SIMATIC components of the M7-300 or M7-400 product families, on additional TELEPERM components, and on the proven software of the AS 235 automation system.

AS 235

Automation system of the TELEPERM M process control system. AS 235 is delivered as a complete system that is contained in cabinets (base cabinet, extension cabinet). Please refer to Manual /12/ for details about the AS 235 system.

Note

Unless the text refers to a specific system, AS 235 also stands for the AS 230/AS 230K automation systems from system software variant F onwards, and for AS 235 K as well as AS 235H.
The standard bus system PROFIBUS–TM with TELEPERM M bus protocols is the new bus system of the innovated TELEPERM M process control system.

The AS x88/TM automation systems use the PROFIBUS–TM for communication. Communication is possible with the following devices:

- OS 525 from version V.3.01 onwards
- PCS 7/TM–OS from Version V.1.0 onwards
- PROGRAF AS+ from version V.3.00 onwards
- PROGRAF AS+ /NT from version V.4.00 onwards
- AS x88/TM
- AS 235 via the Bridge CS-L2 unit
- AS 488/TM on CS 275 (migration rack) via the Bridge CS-L2 unit

The system software of the bus devices has been enhanced by a PROFIBUS driver and a special program package that converts the CS 275 message frames.

Depending on the bus load, the major limits of PROFIBUS–TM are:

- Number of bus devices: \( \leq 99 \)
- Number of bus devices on a PROFIBUS segment \( \leq 32 \)
- Number of interlinkable buses: \( \leq 8 \)
- Baudrate: 1.5 MBd

You receive more informations about PROFIBUS by the manuals /17/ and /18/.

**Note**

Communication with PROFIBUS–TM is equivalent to PROFIBUS with an TELEPERM M–orientated protocol.

According to the bus configuration “unfamiliar” PROFIBUS user are able to connect in peaceful coexistence; the evidence of compatibility takes place by each project specifically.

“Unfamiliar” user – like SIMATIC S7 – aren’t able to communicate with TELEPERM M–user directly.

The components of the remote ET 200 process I/O can be connected via the bus variant of PROFIBUS–DP.
CS 275 "local bus" The CS 275 bus is the established TELEPERM M bus system. The Bridge CS-L2 unit permits both bus systems CS 275 and PROFIBUS–TM to be interconnected.

An AS x88/TM employs the following procedure to communicate with other components of the TELEPERM M process control system via the CS 275 bus system "local bus":

- Using the TPM 478 interface module in M7-400 design. The AS 488/TM must not be connected to the PROFIBUS–TM (cf. Chapter 3.2.4).
- Bridge CS-L2 unit (cf. Chapter 3.2.4).

Please refer to the Manual /22/ for more information about the CS 275 bus system.

OS 525 on PROFIBUS–TM The OS 525 operator communication and visualization system is used for central operator communication and visualization of processes. From version V.3.01 onwards, OS 525 can be linked to more than one automation system via the PROFIBUS–TM bus system (see/14/). This permits process malfunctions and their causes to be swiftly detected and eliminated by operator prompting.

A TELEPERM M automation system on the CS 275 bus system can be monitored and controlled via the Bridge CS-L2 unit.

OS 525, OS 520, OS 265 on CS 275 and PCS 7/TM–OS All devices on the CS 275 bus system may communicate with an OS 525/520/265 or PCS 7/TM–OS operator communication and visualization system on the CS 275 bus. Communication with a PROFIBUS–TM device via the Bridge CS-L2 unit is possible.

Please refer to the Manual /14/ and /34/ for details.

Note Required software version in the OS 525 on the PROFIBUS–TM: Communication is possible from version V.3.01 onwards. These versions contain the CP 5412 (A1) PROFIBUS interface and the PROFIBUS–TM drivers that convert CS 275 message frames.
The PROGRAF AS+ configuration system is used for central configuration, parameter setting and commissioning of automation systems. From version V.3.00 onwards, PROGRAF AS+ can be linked with an automation system also via the PROFIBUS–TM bus system.

**Note**

The PROGRAF AS+ configuration system is a program package for AT-compatible computers. The new variant PROGRAF AS+/NT can also run under MS Windows NT 4.0, 200 and XP.

All TELEPERM M automation systems connected to the PROFIBUS–TM bus system can be handled.

A TELEPERM M automation system connected to the CS 275 bus system may also be handled via the Bridge CS-L2 unit.

PROGRAF AS+ provides the following functions:

- Graphic function plan editor that enables the designer/configuring engineer to define, interconnect and configure the function blocks and to integrate them into the execution sequence.
- Editors for creating user function blocks and program modules (TML programs, ORPA data)
- Graphic LAYOUT editor for creating process displays
- STEP editor for creating STEP M programs
- Complete and updated documentation of the automation structure
- Central on line commissioning

Please refer to the Manual /13/ for details.

**Note**

Required PROGRAF AS+ software version on the PROFIBUS–TM bus: Communication is possible from version V.3.00 onwards. These versions contain the CP 5412 (A1) PROFIBUS interface and the PROFIBUS–TM drivers that convert CS 275 message frames.

PROGRAF AS+ is able to run with CS 275 as well as PROFIBUS–TM. PROGRAF AS+ at PROFIBUS–TM can communicate with a user at CS 275 via Bridge CS–L2. Configuration parameters for limit values of the bus system and AS have to be considered.

The same is valid for the direction from CS 275 via Bridge CS–L2 to a PROFIBUS–TM user.
### Process I/O modules

The I/O modules of the AS x88/TM automation systems should possibly be connected via the SIMATIC ET 200 distributed I/O system.

#### ET 200

The ET 200 unit permits the I/O modules to be relocated from the automation system to the I/O units in the process on site. The sensors and actuators connect via two or four wires to the inputs or outputs of the I/O unit. The I/O units are connected with the automation system via the PROFIBUS–DP bus. The COM ET 200 / COM PROFIBUS configuration software is used for configuration, setting the parameter values, commissioning and diagnosis. The following distributed I/O units may be used in the TELEPERM M process control system:

- ET 200M
- ET 200U
- ET 200B
- ET 200X
- ET 200S / ET 200iS.

#### ET 200M

ET 200M is an I/O unit that contains standard modules and modules for hazardous areas. It is a part of the SIMATIC S7-300 product family. Its modules are particularly suitable for process engineering applications.

#### ET 200U

ET 200U is a general purpose I/O unit with a large selection of modules. It is a part of the SIMATIC product family. Its modules can be used for various individual solutions.

#### ET 200B

ET 200B is a compact I/O unit.

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**Note**

Please refer to the Manuals /23/ to/26/ for details about the I/O units and their programming.

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**Bridge CS-L2**

The Bridge CS-L2 unit links the PROFIBUS–TM and CS 275 bus systems with each other. The components used in the AS 488/TM system form the basis of the hardware and operating system (M7-400 packaging structure).
The TPM 478 interface module permits two optional tasks to be performed:

- Linking the AS 488/TM to the CS 275 bus system.
  Requirement: The AS 477/TM unit is not connected to the SINEC L2/L2FO bus system.

- Connecting the TELEPERM M I/O bus via a TBX 478 I/O bus interface module.
  The I/O modules of the base and extension cabinet can be connected.
  The TPM 478 module maintains the process image.

TPM 478 is also employed in the Bridge CS-L2 unit for the connection to the CS 275 bus system.

The TBX 478 I/O bus interface module provides the connection between the I/O units of previously installed AS 253 systems on the I/O bus and the AS 488/TM system via the TPM 478 interface module.

This permits existing installation in vicinity of the process to be used and to benefit of the advantages of the new automation system. The TELEPERM I/O buses A and B of AS 230/235 base and extension cabinets can be connected.
3.2 Hardware Configuration

Contents
This chapter describes hardware, packaging structures, and interfaces of the AS x88/TM system.

3.2.1 Configuration in M7-300 Design

Standard
The standard version of the AS 388/TM automation system in M7-300 design consists of the following components:

- **Profile section:**
  The profile section is the rack of an AS 388/TM system in M7-300 design. The profile sections can be ordered in different lengths.

- **CPU 388-4 central module with**
  - serial RS 232 interface to connect a remote terminal for local commissioning and diagnosis (/6/)
  - MPI programmer interface (interface for specific SIMATIC M7 commissioning functions)
  - module slot for memory card

- **EXM 378-2 extension unit with internal power supply unit and two slots for interface modules:**
  - IF 964–DP; for the connection to PROFIBUS–TM
  - IF 964_DP; for the connection to PROFIBUS–DP

- **EXM 378-3 extension unit with three slots for interface modules:**
  - IF 961–DIO; for input and output of I/C signals (e.g. cabinet lamp)

- **Memory card with AS 388/TM system software and user archive memory with a capacity of up to 4096 kBytes.**

Option
The following optional components are available:

- **Power supply module PS 307, 10 A:**
  AC 120 V or 230 V/DC 24 V

- **Interface module IF964–DP for a second PROFIBUS–DP path**

- **Interface module IF964–DP for PROFIBUS–AG/AG link**

- **Uninterruptible power supply SITOP POWER DC–USV 40 A**
Fig. 3-2 shows the configuration of an AS 388/TM system in M7-300 design.

1. Profile section
2. Power supply module (option)
3. CPU 388-4
4. Serial RS 232 interface
5. MPI interface
6. Module slot for memory card
7. EXM 378-2 extension unit
8. EXM 378-3 extension unit
9. IF 964–DP interface module for PROFIBUS-DP
10. IF 964–DP interface module for PROFIBUS–TM
11. IF 961–DIO interface module for I&C signals
12. PROFIBUS-DP connection
13. Reserved for second PROFIBUS-DP path
14. Reserved for AG/AG connection via PROFIBUS-DP

Figure 3-2   AS 388/TM configuration in M7-300 design

Note
Chapter 7 lists the order numbers of the modules and components
Please refer to the Manuals /7/ and /9/ for details.
An AS 388/TM system in M7-300 design possesses the following interfaces:

- Interface to the PROFIFUS–TM bus system via the IF 964–DP interface module
- Interface to the PROFIBUS–DP bus system via the IF 964–DP interface module
- Interface for input and output of I&C signals (such as cabinet lamp, audible signal, overtemperature, door contact, fan contact, acknowledgement of audible signal) and bus status from an LS-OLM via the IF 961–DIO interface module.
- Interface for the connection of a remote terminal for local commissioning and diagnosis.
- Optional interface to a second bus system PROFIBUS–DP with interface module IF 964–DP
- Optional interface bus system PROFIBUS–AG/AG–link

**Note**

Existing MPI interface isn’t useful in applications AS 388/TM.
3.2.2 Configuration in M7-400 Design

**Standard**

The standard version of the AS 488/TM automation system in M7-400 design consists of the following components:

- Rack with nine or eighteen slots
- Power supply module PS 405 (10A) or PS 407 (20A)
- CPU 486–3 or CPU 488–3 central module with
  - IF 961–DIO interface module for input and output of I&C signals (such as cabinet lamp or bus communications)
  - IF 962–COM interface module to connect a remote terminal for local commissioning and diagnosis (/6/)
  - module slot for memory card
- EXM 478 extension module with interface modules for the connection of PROFIBUS–TM, PROFIBUS–DP, PROFIBUS–AG/AG bus systems.

**Note**

The allocated IF 964 module for PROFIBUS–TM is not required if the "TPM 478 interface module for the connection of the CS 275 bus” option is used, as both bus systems cannot be connected at the same time.

- Memory card with AS 488/TM system software and user archive memory with a capacity of up to 4096 kBytes.

**Option**

The following optional components are available:

- TPM 478 interface module to connect the CS 275 bus system instead of PROFIBUS–TM, and to connect previously installed TELEPERM M I/O via the TBX 478 I/O bus interface module
- TBX 478 I/O bus interface module for the connection of previously installed TELEPERM M I/O of AS 220/AS 230/AS 235 systems. The TELEPERM I/O buses A and B of AS 235 base and extension cabinets can be connected.
- Interface module IF964–DP for a second PROFIBUS–DP path
- Interface module IF964–DP for PROFIBUS–AG/AG link
- Uninterruptible power supply SITOP POWER DC–USV 40 A
## Interfaces

An AS 488/TM system in M7-400 design possesses the following interfaces:

- Interface to the PROFIBUS–TM bus system with IF964–DP interface module
- Interface to the PROFIBUS–DP bus system with IF 964–DP interface module
- Interface for input and output of I&C signals (such as cabinet lamp, overtemperature and bus status) with IF 961–DIO interface module
- Interface for the connection of a remote terminal for local commissioning and diagnosis with IF 962–COM interface module.
- Interface for an optional connection to the CS 275 bus system instead of PROFIBUS–TM and/or with TBX 478 to connect previously installed TELEPERM M I/O of AS 235 systems via the TPM 478 interface module.
- Interface for the connection to existing I/O buses A or B of AS 235 systems via the TBX 478 I/O bus interface module and the TPM 478 interface module.
- Optional interface to a second bus system PROFIBUS–DP with interface module IF 964–DP
- Optional interface bus system PROFIBUS–AG/AG–link

### Note

Existing MPI–interface isn’t useful in application AS 488/TM.
Fig. 3-3 shows the standard configuration of an AS 488/TM in M7-400 design

1 Rack
2 Power supply module
   – DC 24 V/DC 24 V or
   – AC 120 V or 230 V/DC 24 V
3 Module slot for memory card
4 EXM 478 extension module for interface module:
   – Connection to a first PROFIBUS–DP path
   – Connection to a second PROFIBUS–DP path (optional)
   – Connection to a PROFIBUS AG/AG link (optional)
5 Central module with module slots for interface modules:
   – Input and output of I&C signals
   – Serial RS 232 interface
6 EXM 478 extension module for interface module:
   – Connection to PROFIBUS–TM

Figure 3-3 AS 488/TM configuration (M7-400)

Note
Chapter 7 lists the order numbers of the modules and components. Please refer to the Manuals /8/ and /10/ for details.
Initializing

To operate CPU 486–3 or CPU 488–3 depending on configuration different initializations must be set.

The configuring files DP1.INI, DP2.INI, L2AMPRO.INI as well as GAG_RUN.INI (optional) contains the slot assignments of IF964 depending on its configuration. Default settings are listed in the table 3–1 below.

In the configuring files (above) the values of ‘slot’ and ‘receptacle module slot’ have to be adjusted to the real configuration.

---

Table 3-1 Slot assignment and receptacle submodule slot assignment

<table>
<thead>
<tr>
<th>slot</th>
<th>receptacle submodule slot</th>
<th>module</th>
<th>interface module</th>
<th>Utilization</th>
<th>configuring file</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3</td>
<td>–</td>
<td>PS 407 DC24V,20A</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>4</td>
<td>–</td>
<td>TBX 478</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>5 1</td>
<td>CPU 486–3/</td>
<td>IF 961 – DIO</td>
<td>Cabinet signal</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>CPU 488–3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 1</td>
<td>CPU 486–3/</td>
<td>IF 962 – COM</td>
<td>IBS–Terminal</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>CPU 488–3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 1</td>
<td>EXM 478</td>
<td>IF 964 – DP</td>
<td>PROFIBUS–DP (2)</td>
<td>–</td>
<td>DP2.INI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IF 964 – DP</td>
<td>PROFIBUS–DP (1)</td>
<td></td>
<td>DP1.INI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IF 964 – DP</td>
<td>PROFIBUS–AG/AG</td>
<td></td>
<td>AGAG_RUN.INI</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td>PROFIBUS–DP (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>–</td>
<td>TPM 478</td>
<td>–</td>
<td>CS275 , TM–E/A</td>
<td>AS_KOM.INI</td>
</tr>
</tbody>
</table>
Figure 3-5 Migration rack AS 488/TM with CPU 486–3 and TM–E/A as well as PROFIBUS interfaces

Table 3-2 Slot assignment and receptacle submodule slot assignment

<table>
<thead>
<tr>
<th>slot</th>
<th>receptacle submodule slot</th>
<th>module</th>
<th>interface module</th>
<th>Utilization</th>
<th>configuring file</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>PS 407</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>DC 24V, 20A</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>TBX 478</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>CPU 486–3/ CPU 488–3</td>
<td>IF 961 – DIO</td>
<td>Cabinet signal</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>CPU 486–3/ CPU 488–3</td>
<td>IF 962 – COM</td>
<td>IBS–Terminal</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>EXM 478</td>
<td>IF 964 – DP</td>
<td>PROFIBUS–DP (2)</td>
<td>DP2.INI, DP1.INI, AGAG_RUN.INI</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>IF 964 – DP</td>
<td>PROFIBUS–DP (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td>IF 964 – DP</td>
<td>PROFIBUS–AG/AG</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>EXM 478</td>
<td>IF 964 – DP</td>
<td>bus system PROFIBUS–TM</td>
<td>L2AMPRO.INI, AS_KOM.INI</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td>TPM 478</td>
<td>–</td>
<td>TM–E/A</td>
<td></td>
</tr>
</tbody>
</table>
Figure 3-6 AS 488/TM with CPU 486–3 and PROFIBUS interfaces

Table 3-3 Slot assignment and receptacle submodule slot assignment

<table>
<thead>
<tr>
<th>slot</th>
<th>receptacle submodule slot</th>
<th>module</th>
<th>interface module</th>
<th>Utilization</th>
<th>configuring file</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2</td>
<td>–</td>
<td>PS 407 10A</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>CPU 486–3/ CPU 488–3</td>
<td>IF 961 – DIO</td>
<td>Cabinet signal</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>CPU 486–3/ CPU 488–3</td>
<td>IF 962 – DIO</td>
<td>IBS–Terminal</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td>EXM 478</td>
<td>IF 964 – DP</td>
<td>PROFINET-DP (2)</td>
<td>DP2.INI, DP1.INI, AGAG_RUN.INI</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>IF 964 – DP</td>
<td>PROFINET-DP (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td></td>
<td>IF 964 – DP</td>
<td>PROFINET-AG/AG</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>EXM 478</td>
<td>IF 964 – DP</td>
<td>system bus PROFIBUS–TM</td>
<td>L2AMPRO.INI, AS_KOM.INI</td>
</tr>
</tbody>
</table>

Note

Valid for all configurations:

The CPU 486–3 or CPU 488–3 module slots must not be equipped with interface module IF 964 at AS 488/TM. Placed there an IF 964 module cannot be addressed by AS 488/TM system software and prevents at the same time other IF 964 modules from being addressed by EXM modules, when using adequate memory in CPU 486–3.
3.2.3 Process I/O Modules on the PROFIBUS–DP

Fig. 3-7 shows how process I/O modules can be connected via the distributed SIMATIC ET 200 I/O system. PROFIBUS-DP links the ET 200 components with the higher-level AS x88/TM automation system. The remote I/O units ET 200M, ET 200U and ET 200B of the distributed ET 200 I/O system are used. The remote I/O can be located at a maximum distance of 23 km from the AS x88/TM unit. Distance values see bus documentation PROFIBUS.

The module spectrum of the ET 200 system is particularly suitable for the process engineering requirements. The I/O units possess the following features:

- The remote ET 200M unit:
  - Standard signal modules with module-related diagnosis quality
  - Standard signal modules with channel-related diagnosis quality
  - Function modules with stand-alone processing capability (counting, for example)
  - Signal modules for hazardous areas for connecting intrinsically safe sensors and actuators in zone 1 or 2 of hazardous plants
  - Using special racks permits I/O modules to be removed or inserted
  - S7-300 packaging structure

- The remote ET 200U unit:
  - Large range of modules of the SIMATIC S5-100U product family
  - Closed–loop controle moduls
  - Up to 32 I/O modules can be connected to one I/O unit
  - Ex(i) signal moduls
  - Modular structure

- The remote ET 200B unit:
  - Small installation depth
  - Compact and flat structure
  - Various electronics modules with digital and analog inputs and outputs available

Up to 62 devices (I/O units) can be connected in any sequence to the PROFIBUS–DP. This means that a maximum of 496 I/O modules can be connected to this bus.

It is possible to pursue 124 user with two PROFIBUS–DP.

Configuration, setting of the parameter values, commissioning and diagnosis of the ET 200 are performed using the COM PROFIBUS configuration software.

**Note**

Please refer to the Manuals /23/ to /26/ for more information about the PROFIBUS–DP bus system and the ET 200 unit.
Figure 3-7   I/O modules on the PROFIBUS-DP bus
3.2.4 Options of the AS 488/TM Automation System in M7-400 Design

Extension of AS 488/TM

The TPM 478 interface module and the TBX 478 I/O bus interface module permits an AS 488/TM in M7-400 design to be significantly enhanced with TELEPERM M components.

CS 275 connection

The TPM 478 interface module connects the AS 488/TM to the CS 275 bus system. Please refer to the Description /3/ for details.

Note

This configuration requires that the AS 488/TM is not connected to the PROFIBUS–TM bus system.

Connecting previously installed TELEPERM M I/O

A pre-assembled rack (migration rack) and the TPM 478 and TBX 478 interfaces permit an existing AS 230/235 system to be upgraded to an AS 488/TM. Previously installed TELEPERM I/O can be used in the new system. Additional process I/O modules may be connected via the PROFIBUS–DP and the ET 200M/U/B I/O units. The TBX 478 I/O bus interface module connects the AS 488/TM with previously installed field devices (AS 235 systems, for example). TELEPERM I/O bus A and B may be connected with basic and extension cabinet of an AS 230/235.

Please refer to the Description /3/ for details.

Connecting CS 275 and TELEPERM M I/O

The connection of CS 275 and previously installed TELEPERM M I/O is described in the previous section. Merely the CS 275 bus system is connected to the TPM 478 interface module. This configuration requires that the AS 488/TM is not connected to the PROFIBUS–TM bus system.

Please refer to the Description /4/ for details about this topic.

Fig. 3-8 shows the connection of the options to the AS 488/TM.
Figure 3-8  Options of the AS 488/TM in M7-400 design

1  TPM 478 interface module
2  TBX 478 I/O bus interface module
3  Migration rack
3.2.5 Bridge CS-L2

The CS-L2 Bridge unit interconnects the CS 275 bus system and the PROFIBUS–TM bus system. This permits new system components to be used with the PROFIBUS–TM bus system and still be able to communicate with existing components on the CS 275 bus system. The functionality is provided by software that is supplied on a memory card. The Bridge CS-L2 units permits the following communications between PROFIBUS–TM and CS 275 devices:

- AS 230/235 (on CS 275) <-> AS x88/TM
- AS 235 (on CS 275) <-> OS 525 (on PROFIBUS–TM)
- AS 230 and 235 (on CS 275) <-> PROGRAF AS+ (on PROFIBUS–TM)
- AS 488/TM (on CS 275) <-> AS x88/TM, OS 525 and PROGRAF AS+ (on PROFIBUS–TM)
- OS 525 (on CS 275) <-> AS x88/TM (on PROFIBUS–TM)
- PROGRAF AS+ (on CS 275) <-> AS x88/TM (on PROFIBUS–TM)

From the perspective of an automation system, all devices on CS 275 and PROFIBUS–TM behave according to the bus conventions of the CS 275 bus system.

The Bridge CS-L2 unit consists of the following SIMATIC S7/M7 and additional TELEPERM M and SINEC components:

- Power supply module 230 V AC or 24 V DC/24 V DC
- CPU 486–3
- Memory card with Bridge CS-L2 software
- EXM 478 extension module with interface module IF 964–DP
- TPM 478 interface module.

Note

Communication with PROFIBUS–TM is equivalent to PROFIBUS with an TELEPERM M–orientated protocol.

According to the bus configuration “unfamiliar” PROFIBUS user are able to connect in peaceful coexistence; the evidence of compatibility takes place by each project specifically.

“Unfamiliar” user – like SIMATIC S7 – aren’t able to communicate with TELEPERM M–user directly.
Fig. 3-9 shows the utilization of the Bridge CS-L2 unit.

Figure 3-9  Bridge CS-L2 link between PROFIBUS–TM and CS 275

The functionality of the Bridge CS-L2 unit is discussed in the Technical Description /2/. The Technical Description /2/ also states the components that can communicate via the Bridge CS-L2 unit.
3.3 Software Configuration

Introduction

Basically, the utilization of the software is not different from the utilization of the AS 235 automation system software (variant G). Due to the new hardware and software of the central module and the enhanced I/O, the structure of several drivers in the system software has been adapted to future requirements. The system software of the AS x88/TM systems are delivered on plug-in memory cards. The memory card contains the entire software together with static configuration data.

Basic structure

The AS x88/TM software always consists of the following two components:

- User structure
- System software.

User structure

The user structure performs your automation task. It is configured by the definition and task-related interconnection of the input and output data of process-related blocks.

User structure on system memory card

Using loaded system software, you may archive your user structure on the memory card. From here, you can load the user structure in the automation system. After a power failure, the user structure is automatically loaded from the memory card.

User structure in PC archive

To archive different user structures, the IBS terminal software is available on a personal computer that must be connected to the IBS interface. You may download a user structure from the PC to the automation system or upload and archive a user structure in the PC. This makes configured data mobile and portable.
The system software of the AS x88/TM automation system provides the base functions that are required for configuration, programming and execution of the user structures. The system software consists of:

- TML execution system
- Base programs and function blocks (according to system software variant G in the AS 235 automation system).

The system software is loaded from the memory card into the system memory of the central module.

Fig. 3-10 shows the software configuration.

From M01.00 onwards, the AS x88/TM system software displays variant and version during startup.
In function and dynamic behavior, the user structure interface of the AS x88/TM corresponds to the one of the AS 235 system. The following proven functions of the AS 235 system software variant G have directly been transferred to the AS x88/TM system software:

- Standard function blocks. They are the basis of defining and interconnecting your automation task using process-related function blocks.
- System subroutines. They provide repetitive functions in your TML or STEP M programs.
- TML programming language. It permits free programming of special functions and creation of user-related blocks.
- STEP M control language. It permits sequencing and interlocking controls to be formulated.

Please refer to the Manual /1/ for a detailed description of these functions.

The TML execution system is the operating system for block processing. It is based on the RMOS32 real time operating system with tasks and drivers that control the AS x88/TM functionality. Like in AS 235, the TML execution system is written in the TML programming language. Micro execution of the TML commands is performed by a standard processor.

Tasks, that handle all CPU-oriented base functions and map the specific interface to the employed hardware.

The term "AS 235 emulation" stands for several tasks that execute under RMOS32 such that functional and dynamic behavior of the AS 235 are mapped identically and exactly to the TML commands.

Tasks and RMOS32 drivers used to fulfil the AS 235-compatible communications functions on the PROFIBUS–TM bus system and to perform communications with the remote terminal for local commissioning and diagnosis.

Tasks and RMOS32 drivers used to map the process I/O signals on the AS 235 process interface at the user side. Different drivers enable future process interfaces of the SIMATIC S7 DP I/O to be integrated.

RMOS32 is a modern multi-tasking real time operating system with excellent real-time features. It permits accurate and optimized control of the individual tasks of the TML execution system.
The global data interfaces, that have been disclosed for the AS 235 user structures, are the same in the AS x88/TM systems. The same applies to the interfaces to the signal area (process I/O) at the driver blocks of the system software variant G (provided that no functionally different I/O modules to TELEPERM M have been used). As far as this is expedient, new functionally different I/O modules of the S7/M7 system family are mapped in the driver blocks such that the data is compatible for further processing in the user software 8interconnected blocks).

User structures that have been created with system software from variants F and G onwards are executable on an AS x88/TM system. Provided that the process I/O interface has not been modified by using new modules, the user structure of an AS 235 executes with the same functions after it has been converted from 5.25-in diskettes onto an AS x88/TM memory card. The adaptation to the process I/O modules can simply be performed by re-configuring the process interface in the user structure using PROGRAF AS+ or the remote terminal (cf. Chapter 4.2).

Like the AS 235, the AS x88/TM features several internal memory areas:

- The user memory of a standard size of 4096 kBytes. It cannot be configured and is fully available to the user structure.
- The system memory contains the system blocks on the basis of system software variant G, adapted to the overall AS x88/TM functionality.
- The protected internal memory for data and system programs of the TML execution system.

The user memory contains all blocks and data of the configured block program. It can be loaded and archived like in the AS 235 system. Memory cards with Flash EPROMS are available as data medium. The user memory is mapped contiguously in a DOS-compatible file on the memory card.

After the SIMATIC M7 central module has been switched on, the software is transferred from the system memory card that has been delivered together with the AS x88/TM system: The system memory is loaded with the software on the basis of system variant G, and the internal memory is loaded with the TML execution system. As long as the AS x88/TM remains switched on, the software remains operational in the RAM on the central module. The system RAM can neither be archived nor read.
Method of Operation

This chapter

This chapter merely describes the functions that are different from the system software variant G (/1/) and from the AS 235 automation system (/12/). It also explains the function of additional components.

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4.1 Software Functions of the AS x88/TM System

Fig. 4-1 shows the functions of the AS x88/TM system in a simplified block diagram.

Method of operation of AS x88/TM

Figure 4-1 AS x88/TM method of operation
### Hardware basis

The components of the SIMATIC M7-300 and/or M7-400 automation computer families form the hardware basis of the AS x88/TM system. The standardized AT architecture of M7-300 and M7-400 and the utilization of RMOS32 and the related development tools open a programmable expansion of the automation platform. We used these features for providing you with a stable automation system that is based on the proven AS 235 software.

### What is RMOS32?

RMOS32 is a pre-configured real-time multi-tasking system for components of the SIMATIC M7 automation computer family. The 32-bit real-time multi-tasking operating system RMOS3 forms the operating basis of RMOS32. RMOS32 provides support in the form of multi-programming and multi-tasking functions that permit a complex problem to be subdivided into small and easily understandable subfunctions.

The way RMOS32 utilizes the TML execution system is such that accurate and optimized control of the individual tasks of the TML execution system is possible. The user cannot access RMOS32, its functions are hidden and used via the AS x88/TM functionality.

#### Note

Please refer to Chapter 3.3 and the Manual /1/ for details of the TML execution system.

### Structure of RMOS32

Basically, the RMOS32 executing in the AS x88/TM system consists of the RMOS32 kernel and the M7 server that is used for linking the tasks of the TML execution system to the M7 and TELEPERM M world.

### RMOS3 kernel

The RMOS32 kernel performs the multi-tasking. This means that it controls the program execution and handles the hardware-oriented functions.

The tasks of the TML execution system have access to the following functions via RMOS-API, a component of the RMOS32 kernel:

- Task management and control
- Task co-ordination and communication
- Resource administration
- Timing
**M7 server**

Several M7 servers perform the individual functions required for communicating with other components of the AS x88/TM system, and for linking the process I/O.

Via the M7-server the tasks of the TML execution system are able to access the following functions and services:

- Access to the process I/O
- Communication with other modules via ISA bus
- Communication with other AS x88/TM systems
- Communication with PROGRAF AS+ and OS 525
- Response to process and diagnosis alarms, operating states, mode transitions or timer events.

**Tasks of RMOS32**

The main tasks of the RMOS32 operating system in the AS x88/TM system include:

- Controlling the tasks for the emulation of the AS 235 functionalities
  - Timing the tasks
  - TML processing
  - Execution system, timing the cycles
  - Block management
  - Configuration with PROGRAF AS+
  - Operator communication and visualization using OS 525 and PCS 7/TM–OS.
  - Access for the IBS terminal
- Data exchange with SIMATIC M7/S7 components
- Communications via CS 275/PROFIBUS–TM
- Adaptation:
  - M7-300/M7-400 design
  - Communication interface to the PROFIBUS–TM bus system
  - Communications interface (driver) to the IBS terminal for local commissioning and diagnosis
  - Integration of the process I/O modules of the ET 200M/U/B remote I/O units via PROFIBUS–DP
  - Interface to the IF 961–DIO interface module for input and output of I/C signals.

**Tasks and drivers**

Tasks and drivers are program elements of the TML execution system that perform different functions (such as communications).
Like in AS 235, there are several priority levels (= execution levels) in the TML execution system that are used for processing the entire automation task. Due to the definition and installation of blocks in the level’s execution list, each level represents a self-contained program. The programs execute on execution levels 7 and 9 through 15. Level 7 has the highest priority allocated, level 15 the lowest. Levels 7 through 10 are reserved for the TML execution system. The TML execution system implicitly processes communications and operator input functions of TML user and standard blocks. Processing of a level is started by external or internal requests/events. The familiar “/C0090/C0089/C0075/C0044/C0099/C0121/C0099/C0108/C0101/C0110/C0111/C0059” command of the AS 235 system is used for setting an execution level of the user program. Levels 2 through 6 and 8 of the AS 235 system are not used here as they address AS 235 hardware addresses. The related functions are now handled via tasks and drivers. Like in the AS 235 system, level 0 is reserved for initialization, startup and error handling.

<table>
<thead>
<tr>
<th>Level</th>
<th>Function</th>
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<tr>
<td>0</td>
<td>Startup, error handling, TML execution system</td>
</tr>
<tr>
<td>7</td>
<td>Communications CS 275/PROFIBUS—TML execution system</td>
</tr>
<tr>
<td>9</td>
<td>Resource control/TML execution system</td>
</tr>
<tr>
<td>10</td>
<td>Operator input/TML execution system</td>
</tr>
<tr>
<td>11/ZYK1</td>
<td>Alarm level, acyclic processing of blocks; cyclic processing every 8 seconds</td>
</tr>
<tr>
<td>12/ZYK2</td>
<td>cyclic block processing; central status frame output; timer processing, 1/8 s</td>
</tr>
<tr>
<td>13/ZYK3</td>
<td>cyclic block processing, 1 s</td>
</tr>
<tr>
<td>14/ZYK4</td>
<td>cyclic processing of SG/protocol blocks, NEMO operator input program, 1 s</td>
</tr>
<tr>
<td>15/ZYK5</td>
<td>acyclic processing &quot;background/remaining time&quot; with repetitive start every 8 s</td>
</tr>
</tbody>
</table>
## 4.1.1 Startup of the System

### Memory card

The AS x88/TM system software comes on a copy-protected system memory card. User structures of up to 4096 kBytes may also be saved on the memory card.

There are functions of IBS terminal and system software that can be used for archiving different user structures.

A memory card emulates a floppy disk drive. Only SIEMENS memory cards of the AS x88/TM system are supported.

### Note

The AS x88/TM system uses memory cards instead of floppy disks. Consequently, all diskette-related configuration commands of the AS 235 system apply to the memory card when they are used in the AS x88/TM system.

Use the PROGRAF AS+ configuration system or the IBS terminal for entering configuration commands and operator input commands in an AS x88/TM system.

### Startup behavior

The following operating states are distinguished in the startup behavior of the AS x88/TM system:

- First installation (cf. Chapter "Commissioning")
- Installation of a new software version
- Startup after a power failure
- Loading user structures
- Resetting the AS x88/TM system
- Clearing the user memory

### First installation

Upon the first installation of the system, the system software of the AS x88/TM system is automatically loaded from the memory card into the system memory and the internal memory when the power supply is switched on.

Installation has successfully been completed when the green "RUNS status indicator is ON or blinking.

If you have connected the IBS terminal to the serial interface of the AS x88/TM system or if an OS 525 operator communication and visualization system is connected to the AS x88/TM via the PROFIBUS–TM bus system, a system message S 300 additionally shows that installation has successfully been completed. The user memory of 4096 kBytes is reset.

The first installation is now terminated. A user structure may now be loaded or local configuration can be performed in IBS terminal mode.
**Installing a new software version**

If you wish to reuse the user structure that has been stored under the old software version in the user memory of the AS x88/TM system, you must archive it on the system memory card before you start the new installation. This requires the command "AR, archivingname" to be entered via PROGRAF AS+ or IBS terminal. To install the new software version, use e.g. the IBS terminal and follow the Installation Instructions that are supplied together with the new software version (see added product information). After the power supply has been cycled off and back on or the system has been booted through the CPU key switch, the new system software is automatically loaded from the memory card into the system memory and the internal memory. The user structure is processed when the mode selector switch is in RUN position. Installation has successfully been completed when the green "RUN" status LED is ON.

The user structure is not processed when the mode selector switch is in STOP position. The green "RUN" status indicator blinks at approximately 0.5 Hz in this case.

If you have connected the IBS terminal to the serial interface of the AS x88/TM system or if an OS operator communication and visualization system is connected to the AS x88/TM via CS 275 or PROFIBUS–TM bus system, a system message S 301 additionally shows that installation has successfully been completed.

---

**Startup after power failure**

Since they are not battery-backed, all memories on the central module will be cleared in the event of a power failure. If the memory card has been inserted, the AS x88/TM automatically starts up after the power supply has been switched on. The system software is automatically loaded into the system memory and the internal memory. Having been saved several user structures, only the last archives resp. recently loaded structure will be loaded. The user structure will be edited, when the operation switch is on RUN–position. Installation has successfully been completed when the green "RUN" status LED is ON.

The user structure is not processed when the mode selector switch is in STOP position. The green "RUN" status indicator blinks at approximately 0.5 Hz in this case.

If you have connected the IBS terminal to the serial interface of the AS x88/TM system or if an OS operator communication and visualization system is connected to the AS x88/TM via CS 275 or PROFIBUS–TM bus system, a system message S 301 additionally shows that the startup has successfully been completed.

---

**Loading user structures**

A user structure can only be loaded after processing in the AS x88/TM system has been terminated (either by entering the "STO" command or by setting the mode selector switch to STOP). Enter "LA, archivingname;" in PROGRAF AS+ or via the IBS terminal to load the nominated user structure from the memory card into the central module’s user memory. This is followed by an "operator-controlled startup". Any user structures in the user memory will be overwritten by this procedure. The user memory on the central module is compressed after loading.

If you have connected the IBS terminal to the serial interface of the AS x88/TM system or if an OS operator communication and visualization system is connected to the AS x88/TM via CS 275 or PROFIBUS–TM bus system, a system message S 316 additionally shows that loading has successfully been completed.
Method of Operation

Resetting the AS x88/TM

The user program is only reset after processing in the AS x88/TM system has been terminated (either by entering the "STO;" command or by setting the mode selector switch to STOP). Enter "RSOF;" in PROGRAF AS+ or via the IBS terminal or set the CPU’s mode selector switch to MRES to re-organize the user memory on the central module. All gaps that have been produced by configuration are cleared when the memory is compressed. This is followed by an "operator-controlled startup".

The position (RUN or STOP) to which the mode selector switch is set after it has been held at MRES defines whether or not the user program will be executed after the reset has been completed (See chap. 4.1.2).

If you have connected the IBS terminal to the serial interface of the AS x88/TM system or if an OS operator communication and visualization system is connected to the AS x88/TM via CS 275 or PROFIBUS–TM bus system, a system message S 317 additionally shows that resetting has successfully been completed.

Clearing user structures

Clearing the user memory is only possible after processing in the AS x88/TM system has been terminated (either by entering the "STO;" command or by setting the mode selector switch to STOP). Enter "LOES;" in PROGRAF AS+ or via the IBS terminal to clear and reset the central module’s user memory. A user structure is not loaded automatically.

If you have connected the IBS terminal to the serial interface of the AS x88/TM system or if an OS 525 operator communication and visualization system is connected to the AS x88/TM via CS 275 or PROFIBUS–TM bus system, a system message S 318 additionally shows that clearing has successfully been completed.
4.1.2 Mode Selector Switch

Key switch

The key switch on the CPU 388 or CPU 488 central module is used for selecting the modes required for the execution of the AS software.

Fig. 4-2 shows the key switch on the front panel of the AS388/TM or AS488/TM CPU module with its four different positions.

![CPU key switch diagram](image)

Figure 4-2 CPU key switch

The key switch has three rest positions: RUN-P, RUN, and STOP. The key can be removed in the RUN or STOP position. It cannot be removed in RUN-P. MRES is a momentary position.

Selecting the mode via the key switch corresponds to the AS 235 selections “STA”, “STO”, “RSOF” by operator input and “ZRS” via the reset button on the AS 235 central module. It is done for operator input via the PROGRAF AS+ configuration system of the IBS terminal to the same degree as the change of the key switch, and corresponds to the time effect of the mode change.

Key switch in position RUN–P corresponds to the operator input "STA”.

Key switch in position RUN corresponds to a neutral position, in which last operated modus is kept.

Key switch in position STOP corresponds to the operator input "STO”.

When you operate the key switch, the ASx88/TM system recognizes the change in the switch position and filters it chronologically. The system accepts the request for a new mode if it lasts invariably for at least 3 seconds and if it is different from the previous mode selection via key switch or operator input to the system.

The following selections or changes in the switch position lead to the AS modes:
MRES is a momentary function. This means that the key switch only remains in this position as long as it is held there.

If the MRES pushbutton function is activated once within 3 seconds in STO mode, the AS execution system and the user program will be reset (corresponds to the AS 235 operator input "RSOF").

The green RUN LED goes OFF when the AS x88/TM detects the MRES request. Set the key switch to the mode (RUN or STOP or RUN–P) in which you wish the system to execute after the user program has been reset.

- The AS execution system returns to its initial position and performs a warm restart.
- The AS user memory is compressed.
- The user program returns to its initial position. the RESTART programs are executed.
- The process interface is reset.
- After restart, the TML execution system solves the user program in the user memory according to the position in which the key switch was brought after MRES (transition to STA or STO mode).
- During reset, the green RUN LED blinks at approximately 2 Hz.
- After resetting has been completed, the green RUN LED is ON or blinks at 0.5 Hz (depends on the selected mode STA or STO).

Important:
Irrespective of switch position or last operation STO mode must be reached before operation RSOF.

= RUN–LED blinks.

If necessary switch must be set from STOP to RUN and back to reach STO mode before RSOF!

If the MRES pushbutton function is activated twice within 3 seconds (i.e. if you release the switch before the green RUN LED goes OFF and turn it back to the MRES position), the entire AS software will be reloaded from the memory card (like after switching on the power supply). Set the key switch to the mode (RUN or STOP or RUN–P) in which you wish the system to execute after the user program has been reset.

- The CPU interfaces are reset.
- The AS execution system is loaded (booted) from the memory card, and performs a restart.
- The last archived respectively at last loaded user structure of AS (user program) is loaded from the memory card and compressed. If a user memory has not been activated, the user memory is reset according to the AS 235 "LOES" operator input function.
• Process interface and I/O interfaces are reset, newly initialized, and their parameter values are set.

• After restart, the TML execution system solves the user program in the user memory according to the position in which the key switch was brought after MRES (transition to STA or STO mode, irrespective of the selected mode of the archived user program).

• During reset, the green RUN LED blinks at approximately 2 Hz.

• After resetting has been completed, the green RUN LED is ON or blinks depending on the selected mode – STA or STO.

**Important:**
Irrespective of switch position or last operation it is recommended to set system to STO operation modus before using RESET.

= RUN–LED blinks.
If necessary the switch must switched on RUN and back to STOP to reach the STO–operation condition. By it a synchronized resetting with STO–modus takes place. Disregarding will arise not–equidistant series of transitional cycles.

The TML execution system goes to STO mode after the key switch has been turned to MRES or, following RUN or RUN-P mode, after the switch has been set to STOP. The switch position STOP is accepted and valid if it remains static for at least 1.5 seconds.

Irrespective of the key switch position, STOP mode can be attained by the operator input “STO” in PROGRAF AS+ or via the IBS terminal.

• The TML execution system is active. According to the AS 235 operator input “STO”, it does not process any blocks or only the blocks of user program cycle 5 (presetting in GB.ORPA.232)

• The process image between I/O modules on the PROFIBUS–DP and the AS x88/TM system is updated according to the configured image cycle.

• The process image between TELEPERM M I/O modules (in the case of migration) and the AS 488/TM system (TPM/TBX 488) is updated according to the configured image cycle.

• The I&C monitoring watchdog is triggered.

• In STO mode, the green RUN LED blinks at approximately 0.5 Hz

• If I&C messages are pending in the AS x88/TM system, this status is indicated by the yellow “USR(1)” LED that blinks at approximately 0.5 Hz.
“STA” mode is assumed after the key switch has been turned to MRES or, following “STO” and key switch position “RUN” mode, after the switch has been set to RUN–P. The switch position RUN–P is accepted and valid if it remains static for at least 1.5 seconds. Regardless the key–operated switch, operation modus STA can be reached by operating STA” from PROGRAF AS+ or IBS–terminal.

Irrespective of the key switch position, STA mode can be attained by the operator input “STA” in PROGRAF AS+ or via the IBS terminal.

- The TML execution system is active. According to the AS 235 operator input ”STA”, it processes all blocks of the user structure cycles 1 through 5.
- The process image between I/O modules on the PROFIBUS–DP and the AS x88/TM system is updated according to the configured image cycle.
- The process image between TELEPERM M I/O modules (in the case of migration) and the AS 488/TM system (TPM/TBX 488) is updated according to the configured image cycle.
- The I&C monitoring watchdog is triggered.
- In STA mode, the green RUN LED is ON.
- If I&C messages are pending in the system, this status is indicated by the yellow “USR(1)” LED that blinks at approximately 0.5 Hz.

In RUN mode it is possible to take out the key, with the same conditions.
• **green “RUN” LED is ON** = AS is operational, blocks are processed = operating state “STA”.

• **green “RUN” LED blinks slowly** = AS block processing in STOP mode = operating state “STO”

• **green “RUN” LED blinks rapidly (2 Hz)** = TML execution system performs loading or resetting procedures

• **yellow “USR(1)” LED blinks slowly** = I&C messages are pending in the AS

• **yellow ”STOP” LED is ON** = the entire AS is in a hard STOP mode. This corresponds to the HALT mode of the AS 235.

• **yellow ”STOP” LED blinks slowly** = the AS execution system is in STOP mode. With respect to the execution system, this mode corresponds to the AS 235 HALT mode. It may be possible, however, that diagnosis handling can be performed via the local IBS terminal.

---

**Note**

Entering the instructions “RSOF”, “STA” or “STO” via PROGRAF AS+ or IBS terminal has the same effect as setting the mode selector switch to “MRES”, “RUN” or “STOP”. The operator-controlled modes STA and STO are not privileged. The last mode transition is executed.

After the power supply has been switched on, the mode is entered that corresponds to the switch position.
4.1.3 Memory Card

**Setup**
You can only store user data on a memory card after you have initialized the card with the "**FORM,diskettename;**" command. This command assigns the memory card a name and creates a directory.

**Directory**
Enter "**DI;**" to output the memory card directory. The directory contains the following information:
- Load and archive name
- Archiving date
- Size of the file in bytes

When a screen page is not sufficient, to show all the files, you may scroll with "**F;**".

**Loading**
Enter "**LA,archivingname;**" to load a user structure, that has previously been archived under the specified name, from the memory card into the user memory of the central module. Any existing user structures in the user memory will be overwritten by this procedure.

If you have connected the IBS terminal to the serial interface of the AS x88/TM system or if an OS operator communication and visualization system is connected via bus system CS 275 or PROFIBUS–TM to the AS x88/TM, a system message S 316 additionally shows that loading has successfully been completed.

**Archiving**
Enter "**AR,archivingname;**" to archive a user structure from the user memory of the central unit onto the memory card. Provided that the space available on the card proves sufficient, more than one user structure may be archived on a memory card. Only the currently allocated user memory is archived. An existing archive name can be overwritten with "**AR,name: U;**".

**Clearing**
Enter "**DEL,archivingname;**" to clear a user structure from the memory card.
4.1.4 Block Processing

Overview

The operation of the AS x88/TM automation system is essential chiefly determined by blocks and their configuration. As you know from the As 235 automation system, there is a large number of preconfigured blocks (the standard function blocks) available. If the standard function blocks prove insufficient for solving your automation problem, further help is provided by the TML and STEP M programming languages. Use these programming languages for defining your own blocks, the user function blocks. This procedure has not changed in the new automation system.

Functional differences

Compared with the AS 235 automation system, the following functional differences must be taken into consideration (see also Chapter 6):

- As replacement for the central operator position of an AS 235 system, the IBS terminal (= commissioning terminal) exists now, which is coupled serially to the AS x88/TM. Its operator interface provides the same functionality as a local AS 235 operator position (i.e. coloured picture transmission, PBT buttons incl. inscription, PBT authorization keys), with additional commissioning and diagnosis functions for service tasks.
  But there are restrictions in comparison to the process operation via process communication keyboard (PBT) and configuration keyboard concerning the noise immunity.
  Especially you have to count with delayed reaction time, as the AS system software and the operating console software on the external PC are running asynchronously to each other.
  To allow undisturbed permanent operation of the IBS terminal following is necessary:
    - The PC is connected on the same grounding potential as the AS x88/TM.
    - The serial data line should be connected metallically isolated to the AS if possible.
    - On the PC no further programs besides ASBEDIEN are running (above all no Office).

- For logging your applications please use the PROGRAF AS+ configuration system or an operating system.
  For local reporting functions optionally a printer may be connected to the AS 488/TM (see also TELEPERM M aktuell 2002/021).

- Due to the integration of new process I/O and the PROFIBUS–DP bus system, blocks have been modified or enhanced such that the access to the process is possible. Existing structures must therefore be reconfigured before they can be used.
Method of Operation

**PROFIBUS–TM**

Via the PROFIBUS–TM bus system, there is a homogeneous communication between the AS x88/TM automation system and AS x88/TM, PROGRAF AS+ or OS 525 systems and, via the Bridge CS-L2 unit, with AS x88/TM, AS 235 or AS 235H. The data exchange does not require any new interface blocks.

**PROFIBUS–DP**

In the standard configuration, the process I/O modules of the SIMATIC ET 200 I/O system are connected via the PROFIBUS–DP. The TELEPERM M standard driver blocks and the new analog and digital input and output blocks and controll driver, that have been optimized for PROFIBUS–DP, address the process image of these modules.

**New blocks**

In addition to the proven and well-known blocks of software variant G, there are new blocks for the AS x88/TM system. These blocks are chiefly used for optimized processing of the I/O units that are connected to the PROFIBUS–DP.

Register 6 of this description lists the blocks that are included in the AS x888/TM standard software, and the current revision level.

Your SIEMENS sales partner and/or TELEPERM M–aktuell will keep you informed of additional blocks that will be included in the standard delivery package, and of process-related block packages.
4.2 Functions of the Other Components

Introduction

This chapter describes the functions of the other components that are used in the AS x88/TM system:

- PROGRAF AS+ configuration system
- OS 525 operator communication and visualization system
- PCS 7/TM–OS operator communication and visualization system
- IBS terminal for local commissioning and diagnosis
- PROFIBUS–TM bus system
- PROFIBUS–DP
- ET 200 distributed I/O system
- TBX 478
- TPM 478
4.2.1 PROGRAF AS+ Configuration System

Overview
The PROGRAF AS+ is a major element of the TELEPERM M process control system. It is required for configuring, structuring, commissioning and documenting I&C tasks. The configuration system can be connected at any point of the CS 275 or PROFIBUS–TM bus system, thus providing access to all stations on the network.

Method of operation
The AS x88/TM is centrally structured via the convenient PROGRAF AS+ configuration system. The function it provides include:

- Creating programs for the automation systems in graphic function chart representation
- Transferring this data to the target station
- Testing the application software
- Configuring the database of the connected stations

PROGRAF AS+ on PROFIBUS–TM
The PROGRAF AS+ configuration system on the PROFIBUS–TM bus is able to perform homogeneous and unrestricted communication with stations that are connected to PROFIBUS–TM or CS 275 via the Bridge CS-L2 unit.

The example in Fig. 4-3 shows the communication between the PROGRAF AS+ configuration system and an AS x88/TM station.

![Figure 4-3 PROGRAF AS+ on PROFIBUS–TM](image)

Note
Please refer to the Operating Instructions /13/ for further information.
Via the Bridge CS-L2 unit, a PROGRAF AS+ unit on a PROFIBUS–TM bus system is able to communicate with automation systems that are connected to the CS 275 bus.

**Note**

An existing installation of the PROGRAF AS+ on the CS 275 bus system can communicate with stations that are connected to the CS 275 bus, as well as Bridge CS–L2 with AS x88/TM.

Fig. 4-4 shows how an AS 235/AS 235H and an upgraded AS 488/TM system on the CS 275 bus communicate with PROGRAF AS+.

---

**Figure 4-4**  PROGRAF AS+ via CS 275 bus system
### Modules/devices required
The PROGRAF AS+ configuration system executes on an AT-compatible personal computer. It contains the drivers required for CS 275 and PROFIBUS–TM.
A connection to the PROFIBUS–TM bus system requires the CP 5412 or CP 5613 communications processor (see Fig. 4-4).

---

**Note**
From version V.3.00 of the PROGRAF AS+ configuration system onwards, the related PROFIBUS drivers for the PROFIBUS connection are included.
The PROGRAF AS+ configuration system is a program package for AT compatible personal computers.
The order numbers of the above-mentioned modules and components are listed in Chapter 7.

### User structures
PROGRAF AS+ enables existing user structures of AS 235 systems to be directly transferred to an AS x88/TM system. Modification configuration can then be performed from there using PROGRAF AS+.
4.2.2 OS 525 Operator Communication and Visualization System

Overview

The OS 525 operator communication and visualization system provides a uniform, convenient and modern operator desktop for process control. It enables you to detect process malfunctions and their causes within a short time. The OS 525 can be connected at any point of the CS 275 or PROFIBUS–TM bus system and is thus able to access all stations on the network. The operator communication and visualization tasks are defined with the OS 525 system during the design phase.

OS 525 as single- or multi-position system

One or more OS 525 operator communication and visualization systems can be linked with several automation systems via the PROFIBUS–TM bus system. This permits large systems to be controlled from a central location. Operator communication and visualization of the process is done in the same way as in TELEPERM M. The OS 525 systems can be used as single-position or as multi-position systems with up to six associated OS terminals. The OS terminals are interconnected via a SINEC H1 terminal bus.

Method of operation

The process control functions of the OS 525 system include:

- Graphics system for graphical plant displays and curves
- Signalling and reporting system
- Process data storage system for user data, and measured value and message archives
- Graphic desktop of the BIPRO configuration system
Homogeneous and unrestricted communication is possible between the OS 525 on the PROFIBUS–TM and stations that are connected to the PROFIBUS–TM bus or, via the Bridge CS-L2 unit, to the CS 275 bus system. Fig. 4-5 shows the communication between the OS 525 and an AS x88/TM system.

**Note**

Please refer to the Operating Instructions /14/ for details of the OS 525 system.
OS 525 via/on CS 275

An OS 525 system on the PROFIBUS–TM bus can also communicate via the Bridge CS-L2 unit with previously installed automation systems that are connected to the CS 275 bus system.

Note

A previously installed OS 525 system on the CS 275 bus system is able to communicate with stations that are connected to the CS 275 bus system or, via the Bridge CS-L2 unit, with AS x88/TM system.

The example in Fig. 4-6 shows the communication between an OS 525 system and an AS 235/AS 235H system and an upgraded AS 488/TM system that are both connected to a CS 275 bus system.

Figure 4-6  OS 525 via CS 275
The OS 525 operator communication and visualization system is based on an AT-compatible personal computer. It contains the CP 5412 communications processor and the PROFIBUS drivers necessary for the connection to the PROFIBUS–TM bus system (see Fig. 4-6).

**Note**

From version V.3.01 onwards, the operator communication and visualization system contains the related PROFIBUS drivers for the PROFIBUS connection.

The order numbers of the above-mentioned modules and products are listed in Chapter 7.
4.2.3 Operating and monitoring system PCS 7/TM–OS

WinCC/TM

With PCS 7/TM–OS you get an additional MS–Windows–based possibility for your process control.

PCS 7/TM–OS consists of a basic package of PCS 7 OS and TELEPERM M–orientated channel software as well as special display blocks (OCX).

Please refer to the independent documentation.

Bus interface

You get PCS 7/TM–OS alternatively with an interface to bus–system CS275 or bus–system PROFIBUS–TM.

Documentation

Technical Description
Migration TELEPERM M – SIMATIC PCS7
PCS 7/TM
Best Nr.: C79000–T8000–C740

and

Technical Description
Migration TELEPERM M – SIMATIC PCS7
PCS 7/TM–OCX(NORA)
Best Nr.: C79000–T8000–C741
4.2.4 IBS Terminal for Local Commissioning and Diagnosis

**What is the IBS terminal?**

The IBS terminal is used for local commissioning and diagnosis of the AS x88/TM. It is intended to be employed by trained service personnel. It emulates the functions you know from the configuring keyboard and the operator-process communication keyboard of the AS 235 system. In addition, the IBS terminal provides the following functions:

- The last 8 (to 255) operator inputs that have been transferred to the AS 235-M7 unit are saved. They can be edited and re-transmitted to the AS x88/TM system.
- Transferring an ASCII file to the AS x88/TM system
- Logging the operator inputs in a file or on a printer
- Utilization of the RESI function (external configuration ON, "GE,6,6;")
- Acquisition and output of the AS printout to a PC file or on the PC printer (separately for logging and event printer)
- Help screen field for special functions
- Clear text for error messages
- Archiving user configurations
- File transfer for initializing and updating

**Requirements**

The following is required to install the software:

- AT-compatible personal computer with MS-DOS operating system from version 5.0 onwards or Windows 3.x or Windows 95
- VGA module for monitor connection
- Serial RS 232 COM interface for the connection to the AS x88/TM system at a baud rate of 19.2 kbits/s.
- ASBEDIEN software
- Cabel connector (V24 zero modem)

**Scope of delivery**

The IBS terminal software is contained on a 3.5-in diskette that is included in each AS x88/TM software delivery. It contains the communication programs, the terminal program proper, and installation and invocation utilities. A document file contains a description of the functions.

**ASBEDIEN/NT**

For use with Windows NT 4.0, 2000, or XP up from version M02.02 of the AS 488/TM system software the ASBEDIEN/NT program is delivered additionally.
**Connections**

Fig. 4-7 shows the connection of the IBS terminal to an AS x88/TM system in M7-300 or M7-400 design.

![Diagram of IBS terminal connection](image)

**Connecting cable**

The IBS terminal is connected via a connecting cable (max. length 10 m) to an RS 232 interface (standard PC cable for interconnecting PCs; zero modem).

**Note**

Please refer to the description on the diskette provided with the delivery and in register 8 within this manual for more information about the IBS terminal.
4.2.5 PROFIBUS–TM Bus System

Definition
The PROFIBUS–TM bus system is a standard PROFIBUS bus system with specific TELEPERM M application protocols. This bus system is used for system bus communications.

Communications
The PROFIBUS–TM bus system is used for communicating with other system components of the TELEPERM M process control system. It supplements the CS 275 bus system. Data exchange is performed via an IF 964–DP interface module in the same way as you know it from the CS 275 bus system. The original CS 275 message frames are based on the PROFIBUS–TM transport system (to DIN 19245 part 1).

Baud rate
1.5 Mbaud

Method of operation
The PROFIBUS–TM bus system shows the proven communication behavior of the automation system. The automation system adapts the bus message frames to the new bus system. The bus system merely acts as the transport medium. The following must be observed:

Services
The TELEPERM M tasks are transferred using PROFIBUS-FDL services.

Message frames
The PROFIBUS–TM message frames comply with the standard DIN 19245, part 1.

Configuration
The configuration of the bus structure at PROFIBUS–TM is discussed in Register 6 within this manual.

Redundancy
With the PROFIBUS–TM fiber optic system, the transfer medium is redundant in its standard configuration.

Advantages of SINEC L2/L2FO
The PROFIBUS–TM bus system offers the following benefits:

- New low-cost technology
- Saving costs due to inexpensive bus cables
- Saving costs due to simple connections
- Alternative transfer media
  - PROFIBUS: Two-wire line → inexpensive network
  - PROFIBUS FO: Fiber optics made from glass or plastic → long distances, isolation
Connectable systems

The following systems are able to participate in the communications compound:

- AS 388/TM in M7-300 design
- AS 488/TM in M7-400 design
- PROGRAF AS+ from version V 3.00 onwards
- OS 525 from version V 3.01 onwards
- PCS 7/TM–OS
- Bridge CS-L2 unit

Fig. 4-8 shows a typical communications compound.

Figure 4-8  Typical PROFIBUS–TM communications compound
**Information flow**

Data exchange is possible between the following components:

- AS x88/TM – AS x88/TM
- AS x88/TM – OS 525 from version V.3.01 onwards
- AS x88/TM – PCS 7/TM–OS from version V.1.0
- PROGRAF AS+ from version V.3.00 onwards – AS 230/AS 235/AS 235H/AS x88/TM
- OS 252/26x

Fig. 4-9 shows the PROFIBUS–TM bus system, the possible information flow of the system components, and the necessary interfaces.

---

**Figure 4-9**  Information flow in the PROFIBUS–TM bus system
**Interfaces required**

The system components need the following interfaces in order to be able to communicate via the PROFIBUS–TM bus system:

Table 4-2 Interfaces of the system components

<table>
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<tr>
<th>System component</th>
<th>Interface</th>
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<td>AS 388/TM</td>
<td>IF 964 interface module</td>
</tr>
<tr>
<td>AS 488/TM</td>
<td>IF 964–DP interface module</td>
</tr>
<tr>
<td>OS 525 on PROFIBUS–TM</td>
<td>CP 5412 (A1) communications processor</td>
</tr>
<tr>
<td>PROCRAF AS+ on PROFIBUS–TM</td>
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</tr>
<tr>
<td>Bridge CS-L2</td>
<td>IF 964–DP interface module plus TPM 478 module</td>
</tr>
<tr>
<td>PCS 7/TM–OS on PROFIBUS–TM</td>
<td>CP 5613 communication processor</td>
</tr>
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**Note**

Please refer to the Manuals /17/ to /21/ for details about the PROFIBUS–TM bus system.
4.2.6 PROFIBUS–DP Bus

Utilization of PROFIBUS–DP

To achieve a high flexibility of a system, complex automation tasks (such as process signal acquisition) must be split into several subsystems.

The PROFIBUS–DP bus permits a decentralization of the process I/O. This is used in the ET 200 distributed I/O system of the SIMATIC product family. The PROFIBUS–DP bus links the distributed ET 200M/U/B I/O units with the AS x88/TM system. The IF 964–DP interface module is used as the interface to the automation system (see Fig. 4-10).

![Figure 4-10 PROFIBUS-DP bus](image-url)
Benefits

Linking the distributed I/O units with the PROFIBUS-DP bus system yields various benefits, such as:

- flexible and modular structure of the AS x88/TM system
- reduced cabling work due to the lack of marshalling and signal-oriented cables
- easy installation and commissioning
- autonomous central and remote fault diagnosis

Possible connections

The following distributed I/O units of the ET 200 distributed I/O system can be connected to the AS x88/TM system via the PROFIBUS-DP bus:

- ET 200M
- ET 200U
- ET 200B
- ET 200X
- ET 200S / ET 200iS.

Address setting

The PROFIBUS-DP bus permits up to 62 devices (I/O units) to be connected in any sequence. This means that up to 496 I/O modules can be connected to this bus.

Note

It is possible to operate PROFIBUS–DP and TELEPERM M–I/O simultaneous at AS 488/TM.

Please refer to the Manuals /17/18/23/ to /26/ for details about the PROFIBUS–DP bus.
4.2.7 Distributed I/O System ET 200

Introduction

Longer distances between process (sensors) and automation system can make the wiring bulky and confusing. Electromagnetic interference reduces the reliability of the system. The process I/O modules of the AS x88/TM systems are therefore arranged in distributed structures. This means that the process I/O modules are relocated to the field devices (e.g. process sensors). This is done using the distributed I/O system SIMATIC ET 200.

ET 200

The distributed I/O system SIMATIC ET 200 consists of the distributed I/O units ET 200M/U/B and the PROFIBUS-DP bus. The ET 200 system also contains the COM ET 200 respectively COM PROFIBUS configuration software that permits the distributed structure to be configured and commissioned.

With respect to the AS x88/TM, the distributed I/O with the process I/O modules and the field devices respond in the same way as the central modules of the AS 235 system. The process I/O modules are the interfaces of the AS x88/TM to the process.

ET 200 features

The major features of the distributed I/O system ET 200 include:

- Central control by the AS x88/TM system
- High data throughput due to a simple transfer protocol
- Cyclic transmission of the process image in the direction of input and output
- Simple and inexpensive connections
- Optional data transfer via 2-wire lines (RS 485) or fiber optics.
- Fault detection through on line diagnosis

ET 200M

ET 200M is an I/O unit with standard modules and module for hazardous areas. It is a part of the SIMATIC S7-300 product family that has specifically been designed to satisfy the requirements of process engineering.

The control program in the AS x88/TM can access the I/O modules of the ET 200M unit in the same way as it can access the I/O modules of the TELEPERM M-I/O modules. The complete communication via the PROFIBUS-DP bus is performed by the master interface in the central unit and by the IM 153 interface in the ET 200M unit.
ET 200U

ET 200U is a modular I/O unit in IP 20 rating. It is a part of the SIMATIC S5 product family for general purpose applications. Via the PROFIBUS-DP bus, the ET 200U I/O unit permits a maximum distance of 23.8 km between the I/O modules and the AS x88/TM. It accommodates up to 32 I/O modules. The control program in the AS x88/TM can access the I/O modules of the ET 200U unit in the same way as it can access the TELEPERM M–I/O modules. The complete communication via the PROFIBUS-DP bus is performed by the master interface in the central unit and by the interface in the ET 200U unit.

With peripheral unit ET 200U also the function modules IP 262, continual closed-loop control modules and sequence closed-loop control modules resp. pulse/pause are operable.

Additional diagnosis functions check the impeccable working of each inserted module.

ET 200B

ET 200B I/O is a small compact unit in IP 20 rating. Its small size make is suitable for use in control cabinets on or near machines. It is available in several variants.

The control program in the AS x88/TM can access the inputs and outputs of the ET 200B unit in the same way as it can access the inputs and outputs of the AS 235 central unit. The complete communication via the PROFIBUS-DP bus is performed by the master interface in the central unit and by the integrated PROFIBUS-DP interface in the ET 200B unit.

Two decimal switches are used for selecting the address of the ET 200B.

Diagnostics functions check the proper operation of the ET 200B unit.
Via the process interface (process I/O module), the central module of the AS x88/TM system maps the current process data in a process image and issues output values that actively influence the process (see Fig. 4-11). The configuration describes the arrangement of the process I/O modules and the definition of the module addresses. Like in the AS 235 system, the parameter values of the associated driver block are set with the "module number" via the process image.

The COM ET 200 respectively COM PROFIBUS configurator software is used for configuring, setting the parameters, commissioning, and diagnosing the ET 200 unit.

Figure 4-11 Process image of the AS x88/TM unit

Note

Please refer to the Manuals /23/ to /26/ for details of the distributed I/O system ET 200.
4.2.8 Optional Connection of TELEPERM M I/O Modules

**TELEPERM M I/O modules in AS 488/TM**

The base unit of the central unit in an existing AS 220/230/235 cabinet is replaced with a pre-assembled rack (migration rack). The migration rack accommodates an AS x88/TM system. Installing the TPM 478 and TBX 478 in the migration rack permits the I/O modules of existing TELEPERM M process I/O to be connected and used. Data exchange takes place via the I/O buses A and B of the TBX 478 module (see Fig. 4-12).

Two different migration racks are available, please refer to /4/ and /32/.

**TBX 478**

The TBX 478 I/O bus interface module enables two TELEPERM M I/O buses to be connected to the AS 488/TM system. The configuration list tells you the modules that may be connected to the AS 488/TM system.

---

**Note**

The TELEPERM M Catalog PLT 112 contains a current list of I/O modules. Please refer to the Description /3/ for further information about the TBX 478 module.

---

![Optional connection of TELEPERM M I/O modules](image_url)
4.2.9 Optional Connection of the CS 275 Bus System

**AS 488/TM on CS 275**

An alternative of connecting the AS 488/TM in M7-400 design to the PROFIBUS–TM bus system is the connection to the CS 275 bus system. From the AS or OS application’s perspective, the communications via PROFIBUS–TM is identical to the communication via CS 27.

**TPM 478**

The TPM 478 interface module links the AS 488/TM system with the CS 275 bus system (see Fig. 4-13). It is homogeneously integrated into the innovated TELEPERM M world. The communication functions and the handling are the same as for the local bus interfaces (e.g. N-AS).

---

**Note**

It is required that the AS 488/TM is not connected to the PROFIBUS–TM bus system at the same time.

Please refer to the Description /3/ for details of the TPM 478 module.

Please refer to the Manuals /22/ and /30/ for more information about the connection to CS 275.

---

**Figure 4-13 AS 488/TM on CS 275**
Installation and Commissioning

This chapter

This chapter tells you

- how to install the extension modules on the central module
- how you install the modules on the rail
- how you put an AS x88/TM system into operation

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5.1 Installing the AS 388/TM System in M7-300 Design

Introduction

An AS 388/TM in M7-300 design is installed in the same way as the M7-300 automation computers of the SIMATIC product family.

Note

The installation of the M7-300 automation computers of the SIMATIC product family is explained in the Manuals /7/ and /9/.

Installing the M7-300 unit

The following is a brief summary of the major steps required for installing an AS 388/TM system in M7-300 design:

Mounting the rail

Mount the rail.

Grounding the rail

Ground the rail (see Fig. 5-4).

Connector covers

Remove the covers from the extension connectors on the EXM 378-2 and EXM 378-3 extension modules (see Fig. 5-1).

Socket covers

Remove the covers from the sockets on the EXM 378-3 extension module (see Fig. 5-1).

Figure 5-1 Location of male and female extension connectors and cover
Interconnecting the modules

Place the modules on a flat surface and interconnect them carefully (see Fig. 5-2).

Bus connecting elements

Install all bus connecting elements except the one of the EXM 378-3 extension module (see Fig. 5-2).
**Interface modules**

Install the interface modules in the extension modules (see Fig. 5-3).

- EXM 378-2: IF 964 for PROFIBUS–TM
- EXM 378-2: IF 964 for PROFIBUS-DP
- EXM 378-3: IF 961 for input and output of I&C signals (e.g. cabinet lamp)

Figure 5-3 Installing an interface module

To insert an interface module:

- Grasp the module firmly at the sides of the front panel
- Insert the p.c.b. end of the interface module into the upper and lower guide rails of the slot.
- Slowly push the module into the slot until the front panel of the interface module rests on the frame of the module slot.
- Tighten the screws of the interface module.

**Warning**

The power to the interface module must be switched off before the module is inserted or removed.

There is no cover on the bottom of the module. The rules for static sensitive elements must therefore be observed when the modules are handled.
PS 307, option

Mount and secure the 120 V or 230 V AC/24 V DC power supply module if there is no 24 V supply on site.

Mounting the modules on the rail

Mount and secure the central module and the extension modules (see Fig. 5-4).

Insert the key in the central module in switch position STOP.

Do not install yet the memory card in the central module (see Chapter 5.3).
Wiring

The following modules must be wired (see Fig. 5–5):

- PS 307 power supply module (option)
- CPU 388-4 central module
- EXM 378-2 extension module

![Power supply connections diagram]

Power supply connections of the CPU 388-4 central module and the EXM 378-2 extension module:

Power supply connections with the optional PS 307 power supply module:

![Power supply connections diagram with PS 307]

Figure 5-5  Module connections

**IF 961–DIO front connector**

Wire the pre-wired front connector of the IF 961–DIO interface module as it is required by the application, and insert it.
Backup battery

Install the backup battery in the power supply module (time).

Connection of PROFIBUS–TM and PROFIBUS-DP

Connect the PROFIBUS–TM bus system and the PROFIBUS-DP bus (see Fig. 5-6).

Figure 5-6  Connecting PROFIBUS–TM and PROFIBUS-DP

Note

Please refer to the Manuals /17/ and /18/ for more information about the PROFIBUS–TM and PROFIBUS-DP bus systems.
5.2 Installing the AS 488/TM System in M7-400 Design

Introduction

An AS 488/TM automation system in M7-400 design is installed in the same way as the M7-400 automation computers of the SIMATIC product family.

Note

The installation of the M7-400 automation computers of the SIMATIC product family is explained in the Manuals /8/ and /10/.

Installing the M7-400 unit

The major steps in installing an AS 488/TM in M7-400 design are:

Mounting the rack

Mount the rack on the wall, in a framework or in a cabinet.

Grounding the rack

Ground the rack.

Removing the covers

Remove the covers from power supply module and central module.

Installing the interface modules

Remove the covers and plug the interface modules in the central module (cf. Fig. 5-8):

- IF 961–DIO for input and output of I&C signals (e.g. cabinet lamp)
- IF 962–COM for the remote terminal for local commissioning and diagnosis

To insert an interface module:

- Grasp the module firmly at the sides of the front panel
- Insert the p.c.b. end of the interface module into the upper and lower guide rails of the slot.
- Slowly push the module into the slot until the front panel of the interface module rests on the frame of the module slot.
- Tighten the screws of the interface module.

Warning

The power to the interface module must be switched off before the module is inserted or removed.

There is no cover on the bottom of the module. The rules for static sensitive elements must therefore be observed when the modules are handled.
Installing the CP 5412 communications processor

Install the CP 5412 communications processor on the ATM 478 extension module (see Fig. 5-7).

![Diagram of CP 5412 installation](image)

1. ATM 478 extension module
2. CP 5412 communications processor
3 ... 9 To install the CP 5412:
   - Remove the cover (3)
   - Remove the bracket (4)
   - Insert the CP 5412 (6) from the front into the module slot
   (5) Press downwards through the lateral opening and at the front until the module locks home in the ISA bus connector (7)
   - Secure bracket on CP 5412 and ATM 478 (8)
   - Install the cover (9)

Figure 5-7 Installing the CP 5412 communications processor in the ATM 478 extension module

**Warning**

Never install or remove the CP 5412 communications module when power is applied to the module. Switch off the standby switch of the power supply unit. Observe the rules for handling static sensitive components.

**Expansion module EXM 478**

On principle expansion module EXM478 is installed like mentioned above. Installation of IF–modules in an EXM 478 takes place in the same way like the installation in a CPU486–4.
Removing the connector covers

Remove the cover from the male extension connector on the ATM 478 extension module and the cover from the female extension connector on the CPU 486 central module (see Fig. 5-8).

Figure 5-8  Location of male and female extension connectors and covers; slot arrangement for interface modules

Figure 5-9  Positions of female extension connector and male extension connector with its cover; slot arrangement for IF–modules
**Interconnecting the modules**

Place CPU 486–3 central module and EXM 478 extension module on a flat surface and interconnect them carefully. The connecting brackets provided must lock home at the top and bottom of the modules.

![Interconnecting central module and extension module](image)

**Blanking plates**

Remove the blanking plates from the slots of the rack that are required for installing the modules.
PS 405/407

Install the power supply module (DC 24 V/DC 24 V, AC 120 V or 230 V/DC 24 V) in the first slot at the left-hand side (slot 1) and secure it with the screws provided. Set the voltage selector switch on the module (see Fig. 5-11) to the mains voltage to which your system is connected.

Hooking in the module compound

Hook in the module compound at the right of the power supply module (1) and tilt it downwards (2). See Fig. 5-11.

Securing the module compound

Secure the module compound (central module and extension module) with the screws provided.

Memory card

Do not install yet the memory card in the central module (see Chapter 5.3).
Inserting the key switch: Insert the key in the central module in switch position STOP.

Backup battery: Install the two backup batteries in the power supply module (time).

PS 405/407 mains plug: Insert the pre-wired mains plug into the power supply module (cf. Fig. 5-11).

IF 961–DIO front connector: Wire the pre-wired front connector of the IF 961–DIO interface module according to the requirements of your application, and plug it in.

Connection of PROFIBUS–TM and PROFIBUS-DP: Connect the PROFIBUS–TM and PROFIBUS-DP systems.

Figure 5-12 Connecting PROFIBUS–TM and PROFIBUS-DP

Note
Please refer to the Manuals /17/ through /21/ for more information about the PROFIBUS–TM and PROFIBUS-DP bus systems.
5.3 Commissioning AS x88/TM

Requirements

The following requirements must be satisfied before the AS x88/TM system software can be installed:

- AS 388/TM or AS 488/TM system memory card with the licensed TELEPERM M system.

The following additional equipment is required for the first installation of the AS x88/TM system:

- On line configuration position: PROGRAF AS+ program package for creating your user structure, and, if necessary,
- IBS terminal for local commissioning and diagnosis of the application.
The IBS terminal connects to the serial RS 232 interface of the central module.

Fig. 5-13 shows the connections between an PROGRAF AS+, an IBS terminal, and the AS x88/TM system.

![Diagram of system software installation]

Figure 5-13 System software installation
**Installation of AS x88/TM**

In this way install the system software of an AS x88/TM system in M7-300 or M7-400 design:

**Inserting the memory card**

Insert the system memory card for AS 388/TM or AS 488/TM in the module slot on the central module (see Fig. 5-14).

---

**Figure 5-14** Inserting the memory card

---

**Note**

The memory card must always be inserted during operation. The following must be observed when the memory card is replaced:

The AS x88/TM system cyclically checks for the presence of a licensed memory card. If the card cannot be found, the AS x88/TM goes to HALT after approximately 1 minute and can only be restarted after it has been reset.

---

**Warning**

The memory card has to be considered as a CPU part. If it is removed inadvertently during operation and if AS goes to STOP, than all the modifications configured since the last saving are lost. I/O modules can thereby be set into the initial state.
Switch on the AS x88/TM system (power supply module).

The AS 235-M7 system software is automatically loaded. The following happens if the mode selector switch on the central module is in STOP position:

- All status/fault indicators on the central module light up briefly.
- The STOP status/fault indicator lights up approximately 2 seconds later. It goes OFF after another eleven seconds.
- The RMOS32 basic operating system and the TML execution system have now been loaded. The RUN status indicator blinks at approximately 0.5 Hz if the software has successfully been loaded. Installation is then completed. Cyclic user program execution is disabled (corresponds to STO mode).

If the mode selector switch on the central module is in RUN–P position, the cyclic execution of the user program is activated according to STA mode after the execution system has been loaded.

If the mode selector switch on the central module is in RUN position, the cyclic execution of the user program is activated in the last archived mode. Further details about operating state and key switch position see chapter 4.1.2.

Note

If the status/fault indicator LED “STOP” lights up repeat installation resp. inform your SIEMENS service partner.

If you have an IBS terminal connected to the serial interface of the AS x88/TM system, or if an OS operator communication and visualization system is connected to the AS x88/TM via the PROFIBUS–TM bus system, the system message S300 is issued to indicate successful installation. In the event of faults please evaluate the fault messages.
5.4 Supply Concept

Overview

Power supply of AS resp. Bridge CS–L2 is either DC 24 V or AC 230 V (in AS 388/TM with superposed SITOP power supply). With start–up (power recovery or resetting) the last archived version of the application will be loaded from memory submodule (permanent stored in FLASH–module).

The lithium cell within the CPU maintains time and date.

In case of voltage dips by power recovery you should bumpless use the last operations, the last recognized states, the last called steps, therefore it is advisable to use protected supplies within the AS surrounding resp. bridge surrounding. Even if the load distribution fails including supply of DP–stations and/or TM–I/O extension units, the continued supplied AS enables communication with OS, control system failure messages and specific projected failure strategies resp. resumption strategies. With the continued supplied bridge the whole functionality will survive.

You can distinguish between:

- Redundant fed DC 24 V with two parallel arranged diodes which are superposed the AS module rack of basic unit AS 388/TM or AS 488/TM or Bridge CS–L2.

- Uninterruptable power supply with distributed back–up battery. For that purpose the low cost model SITOP power DC–USV 40A is available. See catalog Kombinationstechnik KT10, Stromversorgung SITOP power, Systemverkabelung SITOP connection.

This USV (uninterruptable power supply) allows an uninterruptable transition from power supply to back–up battery. With the help of parallel switching accumulator modules you can adjust the required performance to the system. If the USV will be designed for the basic unit you can get over the failure time for example with the smallest 7Ah accumulator module: 4 h with AS 388/TM, 4,5 h with AS 488/TM and Bridge CS–L2 and 1,6 h with migration by TM–I/O busses.

Structure of battery backup

Neither programs nor data are buffered in the event of a power failure. When power is restored, there is always a restart with the system and user data from the system memory card.

To avoid a restart after a voltage dip in the power supply, the automation system can be fed via two diodes from two different power supply lines. One line may be a battery, for example. This structure buffers the last mode and operator input states during a voltage breakdown, irrespective of the I/O system’s power supply, and permits continuation after voltage recovery (see Fig. 5-15).
Backup battery  The backup battery buffers the clock (time and date).
This chapter gives you a summary of the valid version, new respectively changed functions of AS 388/488/TM system in comparison with AS 235.

A detailed description of the functions can be found in the previous chapters.

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6.1 System Software

Data carrier
AS x88/TM system software comes on a special system memory card. In contrast to AS 235 systems, both AS 388/TM and AS 488/TM have no system disk. Both AS systems need their own system memory card. During operation the system memory card must be inserted in the CPU. The system memory card of the AS 488/TM system does not execute in an AS 388/TM system and vice versa. Datas are permanently stored in Flash memories. It is the permanent storage in Flash modules that need not be battery-backed. Every time system is switched on or reset, system software is booted again. The special system memory card becomes plant-related object as soon as bus configuration and I/O configuration are stored in the system.

System startup
Whenever AS 388/TM or AS 488/TM system is switched on, software is loaded from memory card first. Startup is based on last archived state or last loaded structure, not on last backed system status. Startup-modus RUN or STOP are dependent on key switch status and can be set by the user directly. Irrespective of possible operator inputs, the reset function (RSOF) and the start/stop states (STA, STO) can be selected via CPU key switch. Actuating the key switch permits a cold restart with system startup, booting the system software, and loading the user data to be selected. Operator inputs RSOF, STA and STO may also be entered via IBS terminal.

Down time
Measuring the down time between power failure and power recovery is no longer possible (→ FSA.ORPA).

Cycle 5
In contrast to AS 235, cycle 5 is started at time intervals of 1 second. Remaining parts of less than 1 second are processed at the next 1-second interval. Parts that require more than 1 second are processed in residual time, as before.

Performance
Both system variants, AS 388/TM and AS 488/TM, feature different performances. With respect to AS 235 systems, both variants have 100% communications performance. The computing performance is 75% with AS 388/TM and 150% to 300% with AS 488/TM. Occasionally used method of AS 235 to project available time by 100ms when not using the 2nd operation communication station is not applicable for AS x88/TM (not dependent from the operating IBS-terminal).

Coded disk
Some applications use a so-called coded disk, e.g. the no more supported product BATCH AS. This kind of applications do not work any longer until modified. Please contact expert group system engineering when using applications with BATCH AS on an AS x88/TM system.
6.2 User Structures

Configuration

By default the comfortable PROGRAF AS+ configurator system is used for configuring (i.e. defining, setting the parameter values, and interconnecting blocks) and creating new blocks. PROGRAF AS+ enables your user structures to be loaded and archived.

Archiving

In first priority, the user application is saved on the system memory card and loaded from there when the system is switched on or reset. The necessary handling is performed now with PROGRAF AS+. For archiving purposes, the user data can, as before, in the standard configuration be acquired, saved and administered in a database (diskette, hard disk) via PROGRAF AS+. For archiving purposes, the user data may also be archived or saved via the IBS terminal onto PC diskettes.

Loading

In contrast to AS 235, loading the last user structure to have been archived on the system memory card is performed automatically, immediately after voltage recovery and together with the automatic booting. Existing user structures are typically loaded via the PROGRAF AS+ configuration system. Loading existing user structures from an AS 235 system, that is used as structuring AS, via the CS 275 bus system into an AS 388/TM or AS 488/TM remains possible.

Reloading

Reloading reloadable structures on reloadable 5,25–in disks via the CS 275 bus system from an AS 235 system, that is used as structuring AS, remains possible. Loading and reloading user structures can be performed via the IBS terminal. There are 3,5–in diskettes for the SIGRID TM, BATCH X, FUZZY TM, and OPTI user packages. Using the IBS terminal, these packages can be reloaded in an AS x88/TM and/or its memory card. Only executable with an AS licence. Reloadable structures, that have been created by the user, on reloadable 5,25–in disks must first be converted into a DOS format. The identification (load/reload) stored on the original diskette will also be converted and taken into account when the software is loaded. Performing the conversion is offered as a service to be done by the Department published in TELEPERM M–Aktuell.

SYST.WART

Selecting the baud rate of printer interfaces is irrelevant. Hardware configuration of the I/O units and AG/AG–coupling have been added as additional functions. PROGRAF AS+ can therefore be used for configuring the I/O hardware.
6.3 Process I/O

Process image
Processing the process I/O unit has been modified. It is done via a cyclically updated process image. The process image is updated in the background. There is no direct access from the AS standard function drivers to the hardware.

Distributed I/O
In the default configuration, PROFIBUS_DP stations of the distributed I/O with I/O–modules of the ET 200 M, ET 200 U, ET 200 B system components can be connected to the AS 388/TM or AS 488/TM system. Access to the process image data is still performed with standard driver blocks. Please refer to paragraph "driver modules".

TELEPERM M I/O
The migration rack permits TELEPERM I/O modules to be used with an AS 488/TM system.
Please refer to the manuals /3/, /4/, /5/ and /32/ for additional information about migration rack, TPM 478 and TBX 478.
The PLT 112 catalog contains the current configuration list of authorized I/O modules. Please refer to /5/.
Supplements are published in "TELEPERM M aktuell" (at the moment only in German available).
The always current configuration list is also available in Internet: http://www.siemens.com/teleperm → Support → Brochures & Printed material → I/O configuration lists
The following applies for the AS 488/TM system:
Distributed I/O with PROFIBUS–DP can be connected in addition to the TELEPERM M I/O modules.
I/O modules that have not been implemented in the scope of the migration with AS 488/TM and are consequently not part of the delivery scope. This include the TELEPERM ME modules 6DS1408, –1410, –1411, –1412, and the modules 6DS1325, 6DS1715 and partly even CP 581TM.

Configuring the I/O
The IBS terminal must be used for setting up the I/O–hardware configuration (modules, module numbers BGNR of PROFIBUS–DP–stations resp. TELEPERM M– I/O –modules, system parameter) before operation of the AS. Compared with AS 235, this means additional configuration. The newest manual (in English) is available as PDF–document on enclosed disk "IBS–TOOLS + COMMENTS" as well as in register 6 of this manual.
To adopt existing user configuration structures, TELEPERM M–I/O–modules must be reconfigured.
Diagnosis

The current delivery achieves the usual diagnosis functionality for the TELEPERM M I/O and the station-/module-oriented diagnosis functionality for PROFIBUS–DP (irrespective of the diagnose classes that have been allocated to the individual modules).

Diagnosis informations of connected PROFIBUS–DP stations are available on a separate diagnosis-interface.

Module numbers, drivers

255 module numbers will be administered. The additional module numbers (64...99, 164 ... 255) are reserved for PROFIBUS–DP I/O with so-called DP-drivers.

With PROFIBUS–DP the module number BGNR may start from 2. We recommend to use the same number as module number and hardware address (as far as possible).

Individual module numbers are inadmissible in I/O (61–63, 161–163).

For maintenance it is possible to remove and insert configured I/O modules under voltage, if the used ET 200 subrack variant support this.

Driver blocks

The drivers DPAE, DPAA, DPBE, DPBA have newly been introduced for the PROFIBUS–DP I/O.

Note

Special drivers of the same name from CP 581 TM applications have to be eliminated before.

ZE block:
The block is function-compatible. As before, it does not allow time-related (frequency) measurement and/or dosing.
The displayed value represents the accumulated value of the preceding cycle.

DZ/proportioning counter module:
In hardware configuration, a new parameter must be specified for this module.

6DS1717–8AA/–8RR arithmetic module; 6DS1318 and 6DS1333 interface modules:
The time required by the process image in the TPM 478 module is higher that the time required by the AS drivers. There is only a limited number of complex interface modules that can be processed in the faster cycles. They should possibly be processed in the 1–s cycle.

To use the modul 6DS1333 there is also an optional SW-alternative in ASx88/TM for PROFIBUS–AG/AG with 32 users available.
### PROFIBUS–DP I/O–addresses

Please note: When configuring with COM ET200 WIN (resp. COM PROFIBUS for ET200M) and external systems with standard DP–interface, a DP–station can only use up to 122 bytes for process images. As a consequence, e.g. with an ET 200M only 7 AI (with 8 inputs) can be configured.

Theoretically a mapping of 128 byte is possible, but not supported, because a consistant process mapping can not be ensured. The implemented possibility of the SIMATIC–tool ET200 WIN to calculate I/O–byte addresses cannot be used for TELEPERM M–applications.

Please manage your own PROFIBUS–DP–I/O–address list – as before at SIMATIC S5 to TELEPERM M. Every station begins with the relative address BADR=0.

### Central I/O

The AS x88TM application does not permit the operation of central I/O units (via P bus).

The 6 I/O slots of AS 235 resp. AS 220 basic unit are no more available in the standard version of migration rack I, because they can be replaced by PROFIBUS–DP stations.

Alternatively a different migration rack II is available with 5 integrated sockets for TELEPERM M–I/O, specially for AS220–applications.

Please see "Process alarms" for a description of the SF 61 module.

### Process alarms

As before, the AS 488/TM process interrupts will be counted via the SF 61 module and TELEPERM M I/O (with 6DS1 601–8BA). The data from the SF 61 interrupt module are stored in the TPM 478 process image. The AS process alarm system is activated synchronously to the execution of the TML instructions. As before, it causes the binary data from the SF 61 to be entered in the GB.ORPA, and activates cycle 1. The activation time for process alarm processing and start of cycle 1 is 4 ms average and 8 ms maximum. As before, the execution time of other blocks in cycle 1 and the system load times up to the time stamp proper must be added.

If also "0"–states should be imaged, the jumper on the common alarm module must also be set on the negative pulse edge. Besides in SYST.WART for SF61 a cycle >1 must be registered.

Process alarm acquisition via PROFIBUS–DP distributed I/O has not been implemented.

This means that process alarm acquisition with the AS 388/TM system or AS 488/TM is not supported at the moment, if they are exclusively used with PROFIBUS–DP.
6.4 System Functions

Operator communication and visualization

Operator communication and visualization is available via bus connected operating and monitoring systems OS 525 and PCS 7/TM–OS. Local connection via PROFIBUS–TM or CS 275 local bus is possible, too. The user data is configured with PROGRAF AS+ also via the system bus.

Local operator communication and visualization of a process via an operator-process communication keyboard and an operator input channel that is directly connected to the AS is no longer possible. This means that PICTURE or LAYOUT blocks (as you know them from the AS 235 system) can no longer be mapped. Blocks of this type that have been defined and are contained in the structure are tolerated and are not harmful.

Local operator positions, keyboard, screens

As replacement for the central operator position of an AS 235 system, the IBS terminal (= commissioning terminal) exists now, which is coupled serially to the AS x88/TM. Its operator interface provides the same functionality as a local AS 235 operator position (i.e. coloured picture transmission, PBT buttons incl. inscription, PBT authorization keys), with additional commissioning and diagnosis functions for service tasks.

But there are restrictions in comparison to the process operation via process communication keyboard (PBT) and configuration keyboard concerning the noise immunity.

Especially you have to count with delayed reaction time, as the AS system software and the operating console software on the external PC are running asynchronously to each other.

To allow undisturbed permanent operation of the IBS terminal following is necessary:

- The PC is connected on the same grounding potential as the AS x88/TM.
- The serial data line should be connected metallically isolated to the AS if possible.
- On the PC no further programs besides ASBEDIEN are running (above all no Office).
Printers

For logging your applications please use the PROGRAF AS+ configuration system or an operating system. From version M02.02/M02.12b an optional printer driver has been integrated in the AS 488/TM system software, which copies the printer interface PDR1 (protocol printer) alone, or together with MDR1 (message printer). This driver passes the AS 488/TM printer outputs to a printer connected via the COM2 interface of the IF 964–COM serial interface module, dependent on the settings within the STARTER.INI file. The printer driver is inactive by default. For activating, the line of the 'BEDIEN task' has to be extended by a calling parameter in the STARTER.INI file:

- PDR1 protocol printer alone: calling parameter PDR
- PDR1 protocol printer and MDR1 message printer together: calling parameter DR

Dependent on the CPU of the AS 488/TM following baud rates can be set:

- CPU 486–3: 300 or 600 baud
- CPU 488–3: 300, 600 or 1200 baud

But there is a restriction concerning the recognition of paper finish.

Local IBS handling

The basic handling required for commissioning and diagnostics can be performed with the usual syntax via an IBS terminal. The IBS procedures may also be logged locally on the PC printer via logging printer channel 1.

Bus operating console

As replacement for the central operator position of an AS 235 system, up from version M02.02 an additionally bus operating console BUS_BEDI_E exists now. Its operator interface provides a similar functionality as a local AS 235 operator position (i.e. coloured picture transmission, PBT buttons incl. inscription, but no PBT authorization keys).

But there are also restrictions in comparison to the process operation via process communication keyboard (PBT) and configuration keyboard concerning the noise immunity.

Especially you have to count with delayed reaction time, as the AS system software and the bus operating console software on the external PC are running asynchronously to each other.

To allow undisturbed operation of the bus operating console following is necessary:

- The PC is connected to the CS 275 bus according to the TELEPERM installation instructions.
- On the PC no further programs besides BUS_BEDI_E are running (above all no Office).

RESI link

The serial interface RESI/KOPAS is no longer available with AS x88/TM. The functions of this interface will be substituted by similar functions of the IBS terminal or by link via system bus.
**STRUK-AS 220 EA**

STRUK-AS 220 EA is furthermore available for configuring I/O modules of TELEPERM ME.
PC/PG with STRUK-AS 220 EA have to be connected via front connector of the individual I/O module.
The use of STRUK-AS 220 EA with AS x88/TM via PROFIBUS–TM or CS 275 is not planned.

**Configuring I/O**

Configuring datas will be archived on the system memory card of the AS.
Please note, that after adding I/O modules in the TELEPERM M I/O area as well as adding modules or stations to PROFIBUS–DP an initialization by RSOF is necessary.

**Time accuracy**

As before, the clock is synchronized by an OS system that is connected to the system bus. The time difference in the AS is caused by the external system rather than by the local clock or the local quartz frequency. As before, the time resolution via the system bus is 4 ms (= 1/256 s).
Dependent on communication load the Bridge CS–L2 has different telegram running times. Therefore in case of high load the running time can be delayed up to 100 ms.

**Startup behavior, Battery backup**

The user memory cannot be backed.
If you wish the system to start up with the last process state instead of the last states to have been archived, you should feed the AS from a redundant power supply or an UPS.
The AS will then continue its operation in the event of a power failure and be able to maintain the data exchange with the OS and other AS systems.

**I&C monitoring interface/I&C monitoring**

AS 388/TM and AS 488/TM have an I&C monitoring interface for monitoring door contact, temperature sensor and heat exchanger and to produce I&C alarms. Only one cabinet is monitored. An additional signal input enables the bus status of an SIMATIC NET-OLM to be monitored.
The I&C monitoring interface outputs a binary signal that is equivalent to the previously used cabinet lamp signal.
Please note: The binary signal is an electronic signal, no relay contact.
Beyond it an audible indicator output and an audible indicator acknowledgement contact are available.
The previously used minute synchronization via a binary signal (RES input) no longer exists.

**TELEPERM M cabinet**

In the case of migration, the signals of the extension cabinet must be connected in series with the signals of the base cabinet.
Installation
In standard delivery, AS x88/TM and ET 200M/U components in profile rail structure are used. The SIMATIC S7/M7 Installation Guidelines must be followed in this case.
In the delivery form migration or TELEPERM M, there is a migration rack in 19-in design for the AS 488/TM system. The migration rack is installed instead of an AS 220/AS 230/AS 235 rack.
If TELEPERM M I/O modules are used the TELEPERM M Installation Guidelines must be followed in this case.

AS 488 K
With the AS 488 K migration package also the automation systems AS 230 K and AS 235 K may be migrated to AS 488/TM by a mounting compatible, space and costs saving compact assembly system.

System bus/Communication interface
System bus communication interfaces:
The AS 488/TM can be used either on the CS 275 bus or on PROFIBUS–TM with CS protocol.
AS 388/TM has a connection for the PROFIBUS–TM system bus (with CS protocol).
The Bridge CS-L2 unit enables the two system buses to be connected with each other.

Hardware configuration of the buses
Hardware configuration, IBS terminal:
Before the AS is commissioned, the hardware configuration of the system bus, together with bus and device number (on CS 275 and on PROFIBUS–TM) must be configured using an IBS terminal.
The configuring datas are stored on the system memory card of the AS.
The current description of the hardware configuration is contained in the BUS–INI file on the system diskette that is delivered together with the IBS terminal as well as in register 6 in this manual.
Ordering Information

Ordering Information

This chapter contains the order numbers of the products mentioned or discussed in the description. They are subdivided into the following sections:

- Components
- Spare parts and accessories

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<td>Spare parts and accessories</td>
<td>7-10</td>
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7.1 Components

Components of the AS 388/TM system

Table 7-1 lists all the components that are used in the AS 388/TM system in M7–300 design.

Table 7-1 Components of the AS 388/TM in M7-300 design

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<tr>
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<td>Rail with accessories</td>
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<td></td>
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<tr>
<td>PS 307; 5 A</td>
<td>Power supply module, 5 A</td>
<td>6ES7307-1EA00-0AA0</td>
</tr>
<tr>
<td>PS 307; 10 A</td>
<td>Power supply module, 10 A</td>
<td>6ES7307-1KA00-0AA0</td>
</tr>
<tr>
<td>CPU 388–4</td>
<td>Central module</td>
<td>6ES7356-4BN00-0AC0</td>
</tr>
<tr>
<td>AS 388/TM SW</td>
<td>Memory card for AS 388/TM standard system software</td>
<td>6DS2310–0XX00–0XA0</td>
</tr>
<tr>
<td>EXM 378–2</td>
<td>Extension module for two IF–interface modules</td>
<td>6ES7378-2AB00-0AC0</td>
</tr>
<tr>
<td>EXM 378–3</td>
<td>Extension module for three IF–interface modules</td>
<td>6ES7378-2AC00-0AC0</td>
</tr>
<tr>
<td>IF 961–DIO</td>
<td>DIO–interface module for input and output of I&amp;C signals</td>
<td>6ES7961-1AA00-0AC0</td>
</tr>
<tr>
<td>IF 964–DP</td>
<td>Interface module as PROFIBUS–TM interface (system bus)</td>
<td>6ES7964–2AA00–0AC0</td>
</tr>
<tr>
<td>IF 964–DP</td>
<td>Interface module as PROFIBUS–DP-interface 1</td>
<td>6ES7964–2AA00–0AC0</td>
</tr>
<tr>
<td>IF 964–DP</td>
<td>Interface module as PROFIBUS–DP-interface 2</td>
<td>6ES7964–2AA00–0AC0</td>
</tr>
<tr>
<td>IF 964–DP</td>
<td>Interface module as PROFIBUS–AG/AG-interface 1</td>
<td>6ES7964–2AA00–0AC0</td>
</tr>
</tbody>
</table>

**Ordering Information**
Table 7-2 lists all components that can be used in the AS 488/TM system in M7-400 design.

Table 7-2 Components of the AS 488/TM as well as BRIDGE CS–L2 in M7-400 design

<table>
<thead>
<tr>
<th>Product</th>
<th>Name</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S7–back plane</td>
<td>Rack with accessories</td>
<td>6ES7400–1JA00–0AA0</td>
</tr>
<tr>
<td></td>
<td>• 9 slots</td>
<td>6ES7400–1TA00–0AA0</td>
</tr>
<tr>
<td></td>
<td>• 18 slots</td>
<td></td>
</tr>
<tr>
<td>PS 405</td>
<td>Power supply module, 10 or 20 A 24 V DC /</td>
<td>6ES7405–0KA00–0AA0</td>
</tr>
<tr>
<td></td>
<td>10 A</td>
<td>6ES7405–0RA00–0AA0</td>
</tr>
<tr>
<td></td>
<td>24 V DC / 20 A (MIG)</td>
<td></td>
</tr>
<tr>
<td>PS 407</td>
<td>Power supply module, 10 A 115 or 230 V AC</td>
<td>6ES7407–0KA00–0AA0</td>
</tr>
<tr>
<td></td>
<td>/ 10 A (not at MIG 1/2)</td>
<td></td>
</tr>
<tr>
<td>CPU 486–3</td>
<td>Central module, Pentium 75MHz</td>
<td>6ES7 486–3AA00–0AB0</td>
</tr>
<tr>
<td>CPU 488–3</td>
<td>Central module, Pentium 120MHz</td>
<td>6ES7 488–3AA00–0AB0</td>
</tr>
<tr>
<td>RAM</td>
<td>Memory module for CPU 496–3 RAM (2x8 MB):</td>
<td>6ES7 791–0EP00–0XA0</td>
</tr>
<tr>
<td></td>
<td>3.3V EDO</td>
<td></td>
</tr>
<tr>
<td>AS 488/TM SW</td>
<td>Memory card for ASD 488/TM standard system</td>
<td>6DS24100XX00–0XA0</td>
</tr>
<tr>
<td></td>
<td>software</td>
<td></td>
</tr>
<tr>
<td>IF 961–DIO</td>
<td>DIO–interface module for input and output</td>
<td>6ES7 961–1AA00–0AC0</td>
</tr>
<tr>
<td></td>
<td>of I&amp;C signals</td>
<td></td>
</tr>
<tr>
<td>IF 962–COM</td>
<td>Interface module to connect remote</td>
<td>6ES7 962–1AA00–0AC0</td>
</tr>
<tr>
<td></td>
<td>terminal for lokal operation and diagnosis.</td>
<td></td>
</tr>
<tr>
<td>EXM 478</td>
<td>expansion module EXM 478 for three IF–module</td>
<td>6ES7 478–2AC00–0AC0</td>
</tr>
<tr>
<td>IF 964–DP</td>
<td>Interface module as PROFIBUS–TM interface</td>
<td>6ES7964–2AA00–0AC0</td>
</tr>
<tr>
<td></td>
<td>(system bus)</td>
<td></td>
</tr>
<tr>
<td>IF 964–DP</td>
<td>Interface module as PROFIBUS–DP-interface 1</td>
<td>6ES7964–2AA00–0AC0</td>
</tr>
<tr>
<td>IF 964–DP</td>
<td>Interface module as PROFIBUS–DP-interface 2</td>
<td>6ES7964–2AA00–0AC0</td>
</tr>
<tr>
<td>IF 964–DP</td>
<td>Interface module as PROFIBUS–AG/AG-interface 1</td>
<td>6ES7964–2AA00–0AC0</td>
</tr>
<tr>
<td>TPM 478</td>
<td>TPM 478 interface for CS 275 and/or TPM I/O</td>
<td>6ES7478–2DA00–0AC0</td>
</tr>
<tr>
<td>TPM 478–1</td>
<td>TPM478–1 interface for CS 275 and/or TELEPERM I/O</td>
<td>6ES7478–2DA01–0AC0</td>
</tr>
<tr>
<td>TBX 478</td>
<td>TPX 478 interface for two I/O busses</td>
<td>6ES7478–2DX00–0AA0</td>
</tr>
<tr>
<td>MIG I</td>
<td>AS 488/TM migration rack I AS</td>
<td>6DS2410–0XX00–2XX0</td>
</tr>
</tbody>
</table>
### Table 7-2 Components of the AS 488/TM as well as BRIDGE CS–L2 in M7-400 design

<table>
<thead>
<tr>
<th>Product</th>
<th>Name</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIGII</td>
<td>AS 488/TM migration rack II AS</td>
<td>6DS2410–0XX00–4XX0</td>
</tr>
<tr>
<td>MIG BRIDGE</td>
<td>Bridge CS–L2 migration rack</td>
<td>6DS2510–0XX00–3XX0</td>
</tr>
</tbody>
</table>

![Figure 7-1](image1.png)  
**Figure 7-1** AS 488/TM for CPU 486–3 and connection to system bus CS275 and 3 PROFIBUS–interfaces

![Figure 7-2](image2.png)  
**Figure 7-2** Migration AS 488/TM with migration rack , CPU 486–3, connection to system bus CS275, TELEPERM M–E/A– and peripheral interface 3 PROFIBUS–interfaces
Figure 7-3  Bridge CS–L2 with CPU 486–3, connection to system bus CS 275 and connection to system bus PROFIBUS–TM
Table 7-3 lists all the system components that may be used in an AS x88/TM system.

### Table 7-3  System components of the AS x88/TM

<table>
<thead>
<tr>
<th>Product</th>
<th>Name</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROGRAF AS+</td>
<td>Configuration system TELEPERM M V.3.01</td>
<td>see PLT 150</td>
</tr>
<tr>
<td>PROGRAF AS+/NT</td>
<td>Engineering system TELEPERM M V.4.02</td>
<td>see Interactive Catalog CA01</td>
</tr>
<tr>
<td>CP 5412 (A1)</td>
<td>Communications processor, contained in the PROGRAF AS+ configurator system from version V.3.00 onwards (connection to PROFIBUS–TM)</td>
<td>6GK1541–0AC00</td>
</tr>
<tr>
<td>OS 525</td>
<td>OS 525 operator communication and visualization system</td>
<td>see PLT 122</td>
</tr>
<tr>
<td>CP 5412 (A1)</td>
<td>Communications processor, contained in the OS 525 operator communication and visualization system from version V.3.01 onwards (connection to PROFIBUS–TM)</td>
<td>6GK1541–0AC00</td>
</tr>
<tr>
<td>PCS 7/TM–OS</td>
<td>communication and visualization system PCS 7/TM–OS, options—</td>
<td>6DS5 125–1AX, 6DS5 126–1AX, 6DS5 130–1AX</td>
</tr>
<tr>
<td></td>
<td>– CS 275</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– PROFIBUS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>– OCX (NORA)</td>
<td></td>
</tr>
<tr>
<td>Bridge CS-L2</td>
<td>Link between the two bus systems CS 275 and PROFIBUS</td>
<td>see PLT 112</td>
</tr>
<tr>
<td>TPM 478 or TPM 478–1</td>
<td>TPM 478 connection for CS 275, contained in the Bridge CS-L2 unit</td>
<td>6ES7478–2DA00–0AC0, 6ES7478–2DA01–0AC0</td>
</tr>
</tbody>
</table>
**PROFIBUS components**

Table 7-4 lists all PROFIBUS components that can be used in the AS x88/TM system.

<table>
<thead>
<tr>
<th>Name</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROFIBUS bus line</td>
<td>6XV1 830-0AH10</td>
</tr>
<tr>
<td>PROFIBUS cable for underground laying</td>
<td>6XV1 830-3AH10</td>
</tr>
<tr>
<td>PROFIBUS trailing cable</td>
<td>6XV1 830-3BH10</td>
</tr>
<tr>
<td>PROFIBUS bus terminal RS 485 with connecting cable</td>
<td></td>
</tr>
<tr>
<td>• 1.5 m long</td>
<td>6GK1 500-0AA00</td>
</tr>
<tr>
<td>• 3.0 m long</td>
<td>6GK1 500-0AB00</td>
</tr>
<tr>
<td>PROFIBUS repeater RS 485</td>
<td></td>
</tr>
<tr>
<td>• IP 20</td>
<td>6GK1 510-0AC00</td>
</tr>
<tr>
<td>• IP 65</td>
<td>6GK1 510-0AD00</td>
</tr>
<tr>
<td>PROFIBUS*-DP repeater RS 485</td>
<td></td>
</tr>
<tr>
<td>• IP 20</td>
<td>6ES7 972-0AA00-0XA0</td>
</tr>
<tr>
<td>PROFIBUS*-DP repeater adapter</td>
<td>6GK1 510-1AB00</td>
</tr>
<tr>
<td>PROFIBUS fiber optics cable</td>
<td></td>
</tr>
<tr>
<td>• Outdoor cable type 1, –25°C ... +60°C</td>
<td>6XV1 820-1AH10</td>
</tr>
<tr>
<td>• Duplex cable type 2, –5°C ... +60°C</td>
<td>6XV1 820-2AH10</td>
</tr>
<tr>
<td>• Indoor cable</td>
<td>6XV1 820-1BH10</td>
</tr>
<tr>
<td>PROFIBUS fiber optics connector ST</td>
<td>6XV1 820-1EA00</td>
</tr>
<tr>
<td>PROFIBUS bus terminal ST</td>
<td>6GK1 500-1AB00</td>
</tr>
<tr>
<td>PROFIBUS active star coupler</td>
<td></td>
</tr>
<tr>
<td>• with one power supply unit</td>
<td>6GK1 501-0AA00</td>
</tr>
<tr>
<td>• with two power supply units</td>
<td>6GK1 501-0AB00</td>
</tr>
<tr>
<td>PROFIBUS-channel insert OSM</td>
<td>6GK1 501-1AB00</td>
</tr>
<tr>
<td>PROFIBUS-DP bus connector for</td>
<td></td>
</tr>
<tr>
<td>• ET 200U</td>
<td>6XV1 830-3BH10</td>
</tr>
<tr>
<td>• ET 200B</td>
<td>6ES7 972-0BA00-0XA0</td>
</tr>
<tr>
<td>• ET 200M</td>
<td></td>
</tr>
</tbody>
</table>
Table 7-5 lists all the I/O components that may be used in the AS x88/TM.

### Table 7-5 Standard I/O components – ET 200 M

<table>
<thead>
<tr>
<th>Bezeichnung</th>
<th>Bestell-Nr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete–input, 8 channels, AC 230V</td>
<td>6ES7321–1FF01–0AA0</td>
</tr>
<tr>
<td>Discrete–input, 16 channels, DC 24 V</td>
<td>6ES7321–1BH01–0AA0</td>
</tr>
<tr>
<td>Discrete–input, 16 channels, DC 24 V, ‘M’</td>
<td>6ES7321–1BH50–0AA0</td>
</tr>
<tr>
<td>Discrete–input, 16 channels, DC 24 V</td>
<td>6ES7321–7BH00–0AB0</td>
</tr>
<tr>
<td>Discrete–input, 16 channels, AC 120V</td>
<td>6ES7321–1EH01–0AA0</td>
</tr>
<tr>
<td>Discrete–input, 32 channels, DC</td>
<td>6ES7321–1BL00–0AA0</td>
</tr>
<tr>
<td>Discrete–output, 8 channels, short-circuit- and overload-proof, load voltage DC 24 V</td>
<td>6ES7322–1BF01–0AA0</td>
</tr>
<tr>
<td>Discrete–output, 8 channels, short-circuit- and overload-proof, load voltage DC 24 V</td>
<td>6ES7322–8BF00–0AB0</td>
</tr>
<tr>
<td>Discrete–output, 16 channels, load voltage DC 24 V</td>
<td>6ES7322–1BH01–0AA0</td>
</tr>
<tr>
<td>Discrete–output, 32 channels, load voltage DC 24 V</td>
<td>6ES7322–1BL00–0AA0</td>
</tr>
<tr>
<td>Discrete–output, 8 channels, load voltage AC 230 V</td>
<td>6ES7322–1EH01–0AA0</td>
</tr>
<tr>
<td>Discrete–output, 8 channels, load voltage AC/DC</td>
<td>6ES7322–1HF01–0AA0</td>
</tr>
<tr>
<td>Analog–input, 2 channels, 14 Bit</td>
<td>6ES7331–7KB01–0AB0</td>
</tr>
<tr>
<td>Analog–input, 8 channels, 14 Bit</td>
<td>6ES7331–7KF00–0AB0</td>
</tr>
<tr>
<td>Analog–output, 2 channels, 12 Bit</td>
<td>6ES7332–5HB00–0AB0</td>
</tr>
<tr>
<td>Analog–output, 4 channels, 12 Bit</td>
<td>6ES7332–5HD01–0AB0</td>
</tr>
<tr>
<td>Zählimpulsinput, 1 channel, FM 350–1 (SW–driver auf Anfrage)</td>
<td>6ES7 350–1AH01–0AE0</td>
</tr>
<tr>
<td>Wäge– und Dosiersystem SIWAREX M (Option Treiber SIWA)</td>
<td>7MH4 553–1AA41</td>
</tr>
</tbody>
</table>

### Table 7-6 I/O components for hazardous areas – ET 200M

<table>
<thead>
<tr>
<th>Name</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete input, 4 channels, short-circuit-proof</td>
<td>6ES7321–7RD00–0AB0</td>
</tr>
<tr>
<td>Discrete output, 4 channels, short-circuit-proof, DC, 10mA</td>
<td>6ES7322–5SD00–0AB0</td>
</tr>
<tr>
<td>Discrete input, 4 channels, short-circuit-proof, DC 15V –20mA</td>
<td>6ES7322–5RD00–0AB0</td>
</tr>
<tr>
<td>Analog input, 4 channels, 14 bits, 20mA</td>
<td>6ES7331–7RD00–0AB0</td>
</tr>
<tr>
<td>Analog input, 4 channels for Pt 100, 8 channels for thermocouples</td>
<td>6ES7331–7SF00–0AB0</td>
</tr>
<tr>
<td>Analog output, 4 channels, 14 bits, 20mA</td>
<td>6ES7332–5RD00–0AB0</td>
</tr>
</tbody>
</table>
Table 7-7  Standard I/O components – ET 200U

<table>
<thead>
<tr>
<th>Name</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete input/output, 4/8/16 channels</td>
<td>various, ST50 catalog, ET 200</td>
</tr>
<tr>
<td>Relay output, 4/8 channels</td>
<td>various, ST50 catalog, ET 200</td>
</tr>
<tr>
<td>Analog input/output, 2/4 channels</td>
<td>various, ST50 catalog, ET 200</td>
</tr>
</tbody>
</table>

Table 7-8  I/O components for hazardous areas – ET 200U

<table>
<thead>
<tr>
<th>Name</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete input/output</td>
<td>various, ST50 catalog, ET 200</td>
</tr>
<tr>
<td>Analog input/output</td>
<td>various, ST50 catalog, ET 200</td>
</tr>
</tbody>
</table>

Table 7-9  Funktionsbaugruppen ET 200U

<table>
<thead>
<tr>
<th>Bezeichnung</th>
<th>Bestell-Nr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closed loop control module</td>
<td>ST50 catalog, ET 200</td>
</tr>
<tr>
<td>– continuous (analog) IP 262</td>
<td>6ES5 262–8MA12</td>
</tr>
<tr>
<td>– pulse/pause closed–loop control module IP 262</td>
<td>6ES5 262–8MB12</td>
</tr>
</tbody>
</table>

Table 7-10  Electronics modules – ET 200B

<table>
<thead>
<tr>
<th>Name</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete input, 16/32-channels, non-floating</td>
<td>various, ST50 catalog, ET 200</td>
</tr>
<tr>
<td>Discrete output, 16/32-channels, DC 24 V,</td>
<td>various, ST50 catalog, ET 200</td>
</tr>
<tr>
<td>non-floating/isolated</td>
<td></td>
</tr>
<tr>
<td>Rely output, 8 outputs, DC 24 V/60 V, isolated</td>
<td>various, ST50 catalog, ET 200</td>
</tr>
<tr>
<td>Analog input, 4/8 channels, non-floating, for Pt 100/thermocouple, ± 1.25 V, ± 2.5 V, ± 5 V, ± 10 V, 0(4) ... 20 mA</td>
<td>various, ST50 catalog, ET 200</td>
</tr>
<tr>
<td>Analog output, 4 channels, ± 10 V, 10 V, ± 20 mA, 0(4) ... 20 mA</td>
<td>various, ST50 catalog, ET 200</td>
</tr>
</tbody>
</table>
### 7.2 Spare Parts and Accessories

Table 7-11 lists all the AS x88/TM parts that can additionally be ordered.

<table>
<thead>
<tr>
<th>Name</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus connecting element (for ET200M)</td>
<td>6ES7 390-0AA00-0AA0</td>
</tr>
<tr>
<td>Jumper</td>
<td>6ES7 390-7BA00-0AA0</td>
</tr>
<tr>
<td>Key for CPU/FM (mode selector switch)</td>
<td>6ES7 911-0AA00-0AA0</td>
</tr>
<tr>
<td>Backup battery (for time / date)</td>
<td>6ES7 971-1AA00-0AA0</td>
</tr>
<tr>
<td>ASBEDIEN software package</td>
<td>standard delivery range replacement upon request</td>
</tr>
<tr>
<td>SIMATIC S7/M7–cable connector for point-to-point link RS 232C–RS232C, ”zero modem”, 5 m 9-way female sub D connectors at both ends</td>
<td>6RS7 902–1AB00–0AA0</td>
</tr>
<tr>
<td>SIMATIC S7/M7–cable connector for point-to-point link RS 232C–RS232C, ”zero–modem”, 10m, 9-way female sub D connectors at both ends</td>
<td>6RS7 902–1AC00–0AA0</td>
</tr>
<tr>
<td>SITOP POWER DC–USV 40A, USV with backup</td>
<td>see catalog KT 10, power supply SITOP Power</td>
</tr>
</tbody>
</table>
Pocket guide

Place to enclose your pocket guide

ord. no. C79000–N8000–C001.

If necessary the pocket guide can be put in this flap.
Applicable Documents
The following Manuals and Instructions are available from your Sales Partner:

<table>
<thead>
<tr>
<th>Number</th>
<th>Titel</th>
<th>available from</th>
<th>Bestell-Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>/1/</td>
<td>Description TELEPERM M Automation System AS 235 System software variant G</td>
<td>KA</td>
<td>C79000-G8076-C416</td>
</tr>
<tr>
<td>/2/</td>
<td>Description TELEPERM M &quot;Bridge CS-L2&quot;</td>
<td>KA</td>
<td>C79000-T8076-C707</td>
</tr>
<tr>
<td>/3/</td>
<td>Description TELEPERM M Interface Modules TPM 478 und TBX 478</td>
<td>KA</td>
<td>C79000-T8076-C708</td>
</tr>
<tr>
<td>/4/</td>
<td>Description TELEPERM M Migration Rack I for AS 488/TM and Bridge CS–L2</td>
<td>KA</td>
<td>C79000-T8076-C710</td>
</tr>
<tr>
<td>/5/</td>
<td>configuring instructions TELEPERM M I/O module on I/O–bus TELEPERM M</td>
<td>KA</td>
<td>C79000-P8076-C703</td>
</tr>
<tr>
<td>/6/</td>
<td>Description TELEPERM M IBS–Terminal for Local Commissioning and Diagnosis of AS x88/TM</td>
<td>KA</td>
<td>C79000-T8076-C733</td>
</tr>
<tr>
<td>/7/</td>
<td>Description Automation System M7-300</td>
<td></td>
<td>6ES7398-8BA00-8AA0</td>
</tr>
<tr>
<td>/8/</td>
<td>reference description Automation System SIMATIC S7-400, M7–400 module dates</td>
<td></td>
<td>C79000–G7076–C411 Bestandteil von 6ES7498-8AA01-8AA0</td>
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<tr>
<td>/9/</td>
<td>Description SIMATIC S7 Automation System S7-300 Assemble of a S7-300, I/O-module</td>
<td></td>
<td>EWA 4NEB 710 6040</td>
</tr>
<tr>
<td>/10/</td>
<td>Description Automation System SIMATIC S7-400, M7–400</td>
<td></td>
<td>6ES7498-8AA01-8AA0</td>
</tr>
<tr>
<td>/11/</td>
<td>Description TELEPERM M I/O-modules: (function module signal module coupling module and calculation modul)</td>
<td></td>
<td>C79000–G8076–C030 C79000–G8076–C031 C79000–G8076–C032</td>
</tr>
<tr>
<td>/12/</td>
<td>Description TELEPERM M Automation System AS 235</td>
<td></td>
<td>C79000-G8076-C295</td>
</tr>
</tbody>
</table>

**Note**

The documents /2/, /3/, and /5/ are a part of the "TELEPERM M, Additional System Documents" Manual; Order no. C79000-G8076-C700; to be ordered from Lieferzentrum Nürnberg (LZN).
<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>Order No.</th>
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</thead>
<tbody>
<tr>
<td>/13/</td>
<td>Operating Instructions TELEPERM M PROGRAF AS+</td>
<td>C79000-G8076-C450</td>
</tr>
<tr>
<td>/14/</td>
<td>Operating Instructions TELEPERM M OS 525</td>
<td>C79000-G8076-C522</td>
</tr>
<tr>
<td>/15/</td>
<td>Pocket guide TELEPERM M AS 235/AS 235H/AS 235K AS</td>
<td>C79000-N8076-C001</td>
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<tr>
<td>/16/</td>
<td>Manual TELEPERM M BATCH X-TM</td>
<td>C79000-G8076-C525</td>
</tr>
<tr>
<td>/17/</td>
<td>Description of PROFIBUS–Net (architecture, installation, configuring, component))</td>
<td>6GK1 970-5CA10-0AA0</td>
</tr>
<tr>
<td>/18/</td>
<td>Short description PROFIBUS</td>
<td>6ZB5 530-0AQ01-0BA7</td>
</tr>
<tr>
<td>/22/</td>
<td>Description TELEPERM M Bus system CS 275</td>
<td>C79000-G8076-C006</td>
</tr>
<tr>
<td>/23/</td>
<td>Device manual Distributed I/O device ET 200U</td>
<td>6ES5 998-3ES12</td>
</tr>
<tr>
<td>/24/</td>
<td>Device manual Distributed I/O device ET 200B</td>
<td>6ES5 998-4ET11</td>
</tr>
<tr>
<td>/25/</td>
<td>Device manual Distributed I/O device ET 200M (mit Signalbaugr.)</td>
<td>6ES7 153-1AA00-8AA0</td>
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<td>/26/</td>
<td>Parametriersoftware COM PROFIBUS</td>
<td>6ES5 895-6SE12</td>
</tr>
<tr>
<td>/30/</td>
<td>Description TELEPERM M Working Guideline for the Installation of the Instructions and Guidelines for Planning</td>
<td>C79000–G8076–C417</td>
</tr>
<tr>
<td>/31/</td>
<td>Installation manual AS S7–400, M7–400 assemble</td>
<td>LZN</td>
</tr>
<tr>
<td>/32/</td>
<td>Description TELEPERM M Migration Rack II for AS 488/TM (configuration+interfaces)</td>
<td>KA</td>
</tr>
<tr>
<td>/33/</td>
<td>Description TELEPERM M Supplementary system documentation</td>
<td>KA</td>
</tr>
<tr>
<td>/34/</td>
<td>Technical Descriptions Migration TELEPERM M – SIMATIC PCS7 PCS 7/TM–OS PCS 7/TM–OCX(NORA)</td>
<td>KA, KA</td>
</tr>
</tbody>
</table>
Specifications

This Appendix

This Appendix contains the technical specifications of the AS x88/TM systems.

Contents

The sections are on the following pages:

<table>
<thead>
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<th>Section</th>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
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<td>AS 388/TM in M7-300 design</td>
<td>C-2</td>
</tr>
<tr>
<td>C.2</td>
<td>AS 488/TM in M7-400 design</td>
<td>C-3</td>
</tr>
<tr>
<td>C.3</td>
<td>Process I/O modules</td>
<td>C-4</td>
</tr>
<tr>
<td>C.4</td>
<td>Cable connector to connect the IBS–terminal to AS x88/TM</td>
<td>C-6</td>
</tr>
</tbody>
</table>
C.1  AS 388/TM in M7-300 Design

Basis
SIMATIC M7-300 with CPU 388-4.

Extensions
Extensions:
- EXM 378-2 for 2 interface modules
- EXM 378-3 for 3 interface modules

Power supply
DC 24 V,
Option: AC 115 V / 60 Hz or AC 230 V / 50 Hz (PS 307).

Ambient conditions
Ambient conditions:
- Temperature range: 0 ... +60 °C
- Protection rating: IP 20.

Interfaces
Interfaces:
- to OS 525, PCS 7/TM–OS and PROGRAF AS+ via PROFIBUS–TM
- to the I/O via PROFIBUS–DP
- to I&C components via IF 961–DIO interface module
- to AG/AG link via PROFIBUS–AG/AG

Typical quantities
Typical quantities:
- 20 ... 50 closed-loop control circuits per second
- 30 ... 80 additional analog monitor functions per second
- 3 ... 10 sequencing controls per second
- 70 ... 150 logic controls per second.
## C.2 AS 488/TM in M7-400 Design

### Basis
SIMATIC M7-400 with CPU 488-4 or CPU 488-3.

### Extensions
Extensions:
- TPM 478 for the connection of the CS 275 bus
- TBX 478 for existing TELEPERM M I/O
- IF 962–COM interface module for local commissioning and diagnosis
- EXM 478 extension module for PROFIBUS interfaces

### Power supply module
DC 24 V, Option: AC 115 V / 60 Hz or AC 230 V / 50 Hz (without TM–I/O).

### Ambient conditions
Ambient conditions:
- Temperature range: 0 ... +60 °C
- Protection rating: IP 20.

### Interfaces
Interfaces:
- to OS 525, PCS 7/TM–OS and PROGRAF AS+ via PROFIBUS–TM
- to the CS 275 bus system via Bridge CS-LS or TPM 478
- to I/O via PROFIBUS-DP (2)
- to I/O via TELEPERM M I/O bus
- to I&C components via IF 961–DIO interface module
- to AG/AG–link via PROFIBUS–AG/AG

### Typical quantities
Typical quantities:
- 45 ... 120 closed-loop control circuits per second
- 45 ... 180 additional analog monitor functions per second
- 8 ... 20 sequencing controls per second
- 150 ... 370 logic controls per second.
C.3 Process I/O Modules

**Drivers**

The driver blocks support the following I/O modules for the distributed I/O units ET 200M/U/B:

**ET 200M**

Distributed I/O on the basis of ET 200M (S7-300 I/O modules):

- Standard modules for
  - Discrete input, 16 channels, load voltage DC 24 V
  - Discrete input, 32 channels, load voltage DC 24 V
  - Discrete input, 8 channels, load voltage DC 24 V
  - Discrete output, 8 channels, short-circuit- and overload-proof, load voltage DC 24 V, redundancy capabilities
  - Discrete output, 16 channels, load voltage DC 24 V
  - Discrete output, 32 channels, load voltage DC 24 V
  - Analog input, 8 channels, 14 bits
  - Analog input, 2 channels, 14 bits
  - Analog output, 4 channels, 12 bits
  - Analog output, 2 channels, 12 bits
  - Closed-loop controller modules for K- and S-type controllers, 4 individual controllers

- Modules for hazardous areas, isolated, for
  - Discrete input, 4 channels, short-circuit-proof, for NAMUR sensors
  - Discrete output, 4 channels, short-circuit-proof, DC 10mA
  - Discrete output, 4 channels, short-circuit-proof, DC 15 V, 20mA
  - Analog input, 4 channels, 14 bits
  - Analog input, 4 channels for Pt 100, 8 channels for thermocouples
  - Analog output, 4 channels, 14 bits.

**ET 200U**

Distributed I/O on the basis of ET 200U:

- Standard modules for
  - Discrete input/output, 4/8/16 channels
  - Relay output, 4/8 channels
  - Analog input/output, 2/4 channels

- Modules for hazardous areas, isolated, for
  - Discrete input/output
  - Analog input/output
• Function modules
  – closed-loop control, continuous
  – closed-loop control, pulse/pause resp. step

**ET 200B**

Distributed I/O on the basis of ET 200B:

• Electronics modules
  – Discrete input, 16/32-channels, non-floating
  – Discrete output, 16/32-channels, DC 24 V, non-floating/isolated
  – Relay output, 8 outputs, DC 24 V/60 V, isolated
  – Analog input, 4/8 channels, non-floating, for Pt 100/thermocouple,
    ± 1.25 V, ± 2.5 V, ± 5 V, ± 10 V, 0(4) ... 20 mA
  – Analog output, 4 channels, ± 10 V, 10 V, ± 20 mA, 0(4) ... 20 mA.
C.4 Connections for connecting the IBS–terminal to AS x88/TM

Connection between the IBS–terminal (PC) to the COM interface port of a AS x88/TM via 0–modem V24–cable (TxD and RxD are crossed). The interface port of the AS 488/TM is always the interface port COM1 of IF962–COM (9–pole Sub–D) PC’s normally use 9–pole and 25–pole Sub–D–plugs.

**Cable connector and control lines**

Sub–D 9pole, screw–decrease

Sub–D 9pole, screw–decrease

MLFB

6ES7 902–1Ax00–0AA0 x B = 5m
(from store) C = 10m

<table>
<thead>
<tr>
<th>Signal</th>
<th>Pin</th>
<th>connection</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1/GND</td>
<td>G</td>
<td>screen</td>
<td>G</td>
<td>E1/GND</td>
</tr>
<tr>
<td>M5/DCD</td>
<td>1</td>
<td>–</td>
<td>1</td>
<td>M5/DCD</td>
</tr>
<tr>
<td>D2/RxD</td>
<td>2</td>
<td>connected with</td>
<td>3</td>
<td>D1/TxD</td>
</tr>
<tr>
<td>D1/TxD</td>
<td>3</td>
<td>connected with</td>
<td>2</td>
<td>D2/RxD</td>
</tr>
<tr>
<td>S1/DTR</td>
<td>4</td>
<td>connected with</td>
<td>6</td>
<td>M1/DSR</td>
</tr>
<tr>
<td>E2/GND</td>
<td>5</td>
<td>connected with</td>
<td>5</td>
<td>E2/GND</td>
</tr>
<tr>
<td>M1/DSR</td>
<td>6</td>
<td>connected with</td>
<td>4</td>
<td>S1/DTR</td>
</tr>
<tr>
<td>S2/RTS</td>
<td>7</td>
<td>connected with</td>
<td>8</td>
<td>M2/CTS</td>
</tr>
<tr>
<td>M2/CTS</td>
<td>8</td>
<td>connected with</td>
<td>7</td>
<td>S2/RTS</td>
</tr>
<tr>
<td>M3/R1</td>
<td>9</td>
<td>–</td>
<td>9</td>
<td>M3/R1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signal</th>
<th>Pin</th>
<th>Connection</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>G = case max 10m</td>
<td>9 pole Sub–D (socket) COM1 IF962–COM</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Cable connector and control lines**

Sub–D 9pole, screw–decrease

Sub–D 25pole, screw–decrease

MLFB

6ES7 902–1Cx00–0AA0 x B = 5m
(production according to demand) C = 10m

<table>
<thead>
<tr>
<th>Signal</th>
<th>Pin</th>
<th>Connection</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1/GND</td>
<td>G</td>
<td>screen</td>
<td>G</td>
<td>E1/GND</td>
</tr>
<tr>
<td>M5/DCD</td>
<td>1</td>
<td>–</td>
<td>8</td>
<td>M5/DCD</td>
</tr>
<tr>
<td>D2/RxD</td>
<td>2</td>
<td>connected with</td>
<td>2</td>
<td>D1/TxD</td>
</tr>
<tr>
<td>D1/TxD</td>
<td>3</td>
<td>connected with</td>
<td>3</td>
<td>D2/RxD</td>
</tr>
<tr>
<td>S1/DTR</td>
<td>4</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>E2/GND</td>
<td>5</td>
<td>connected with</td>
<td>7</td>
<td>E2/GND</td>
</tr>
<tr>
<td>M1/DSR</td>
<td>6</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>M2/CTS</td>
<td>8</td>
<td>connected with</td>
<td>20</td>
<td>S1/DTR</td>
</tr>
<tr>
<td>M3/R1</td>
<td>9</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>–</td>
<td>short–circuit with</td>
<td>5</td>
<td>M2/CTS</td>
</tr>
<tr>
<td></td>
<td>–</td>
<td>kurzgeschl. mit 5</td>
<td>4</td>
<td>S2/RTS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signal</th>
<th>Pin</th>
<th>Connection</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>G = case max 10m</td>
<td>9 pole Sub–D (socket) COM1 IF962–COM</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

25 pole Sub–D (socket) COMx IBS–Term.
This Appendix informs about I & O signals of AS x88/TM systems.

Contents

<table>
<thead>
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<th>Topic</th>
<th>Page</th>
</tr>
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<td>I &amp; C Signals with AS 388/TM and AS 488/TM</td>
<td>D–2</td>
</tr>
<tr>
<td>D.2</td>
<td>Signal Assignments with AS x88/TM</td>
<td>D–3</td>
</tr>
<tr>
<td>D.3</td>
<td>Cabling in Cabinets with Migration Rack I</td>
<td>D–5</td>
</tr>
<tr>
<td>D.4</td>
<td>Connection to TELEPERM M cabinets with migrations carrier II</td>
<td>D–6</td>
</tr>
</tbody>
</table>
D.1 I & C Signals with AS 388/TM and AS 488/TM

A digital I/O interface module (in IF slot of CPU 488 or of EXM 378–3 extension unit with AS 388/TM) is provided as standard with one byte each for input and output.

The signals present in the AS 235 for central cabinet and extension cabinet on the respective I/O coupling boards are only present once with the AS x88/TM.

If several cabinets are present, an external wired–OR must be provided.

The signals which are not used as standard by the system in the input and output bytes (EM1, EM2, AM1–AM3) are available to the user. They are read into the associated GB in the 125ms cycle, or output from there.

The redundancy display of the redundant L2 bus (from OLM) is interpreted in the system and converted into corresponding I & C displays. If an interruption in the bus is detected by the AS x88/TM, this status is set in GB143 corresponding to the CS 275 status display "Plug disconnected" in addition to the I & C standard processing, and transmitted to the I & C output byte in the next cycle.

With the AS 235, the watchdog is activated in cyclic/acyclic mode by certain load states on the I/O coupling module by writing an ‘1’. With the AS x88/TM, this monitoring function is carried out for generating the I/O signal PCPKL using the trigger bit in the emulator method assigned to the I/O addresses by means of a ”Soft command“ to the TPM 478. In the I & C output byte of the AS x88/TM, the associated signal in the output byte is inverted each time the watchdog bit is written. A signal thus results with an asynchronous 0–1 changeover which can be used if applicable to trigger an external watchdog. With irregular operation of the AS x88/TM, the change in signal ceases, or the pulse lengths become too large.

The common horn signal is connected to an I & C output signal for local signalling. Acknowledgment of the "local" horn is possible via a contact (pushbutton) as an I & C input signal. The horn block of the AS x88/TM scans this input (GB240) during cyclic processing and reacts, with a set "1", like a QH input, i.e. the acknowledgment input is effective as long as the contact is closed.
## D.2 Signal Assignments with AS x88/TM

### I & C Input Signals:

<table>
<thead>
<tr>
<th>Bit</th>
<th>DIO input signal</th>
<th>Signal on DIO plug</th>
<th>Remark</th>
<th>PCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2^0</td>
<td>Signal input (GB235) Reserve system</td>
<td>DI 0 (common M with DI 1)</td>
<td>No minutes pulse implemented</td>
<td></td>
</tr>
<tr>
<td>2^1</td>
<td>Signal input (GB236) Fan function</td>
<td>DI 1 (common M with DI 0)</td>
<td>With several cabinets, must be externally wired–ORed</td>
<td>S 346</td>
</tr>
<tr>
<td>2^2</td>
<td>Signal input (GB237) Excess temperature</td>
<td>DI 2 (common M with DI 3)</td>
<td>With several cabinets, must be externally wired–ORed</td>
<td>S 340</td>
</tr>
<tr>
<td>2^3</td>
<td>Signal input (GB238) Door contact</td>
<td>DI 3 (common M with DI 2)</td>
<td>With several cabinets, must be externally wired–ORed</td>
<td>S 343</td>
</tr>
<tr>
<td>2^4</td>
<td>Signal input (GB239) Bus redundancy display</td>
<td>DI 4 (common M with DI 5)</td>
<td>Redundancy signal from OLM</td>
<td></td>
</tr>
<tr>
<td>2^5</td>
<td>Signal input (GB240) Acknowledgment for horn block</td>
<td>DI 5 (common M with DI 4)</td>
<td>Horn acknowledgment new with AS</td>
<td></td>
</tr>
<tr>
<td>2^6</td>
<td>Signal input (GB241) Application, EM1 user</td>
<td>DI 6 (common M with DI 7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2^7</td>
<td>Signal input (GB242) Application, EM2 user</td>
<td>DI 7 (common M with DI 6)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### I & C Output Signals:

<table>
<thead>
<tr>
<th>Bit</th>
<th>DIO output signal</th>
<th>Signal on DIO plug</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>2^0</td>
<td>Signal output Reserve system</td>
<td>DO 0 (common M and L+ for DO 1 – DO 3)</td>
<td></td>
</tr>
<tr>
<td>2^1</td>
<td>Signal output (GB20) Common I &amp; C signal</td>
<td>DO 1 (common M and L+ for DO 1 – DO 3)</td>
<td></td>
</tr>
<tr>
<td>2^2</td>
<td>Signal output (GB142) Common horn block signal</td>
<td>DO 2 (common M and L+ for DO 1 – DO 3)</td>
<td>Horn new as I &amp; C signal</td>
</tr>
<tr>
<td>2^3</td>
<td>Signal output (GB143) Bus connection open–circuited</td>
<td>DO 3 (common M and L+ for DO 1 – DO 3)</td>
<td>Bus status new</td>
</tr>
<tr>
<td>2^4</td>
<td>Signal output (GB 245) Application, AM1 user</td>
<td>DO 4 (common M and L+ for DO 4 – DO 7)</td>
<td></td>
</tr>
<tr>
<td>2^5</td>
<td>Signal output (GB 246) Application, AM2 user</td>
<td>DO 5 (common M and L+ for DO 4 – DO 7)</td>
<td></td>
</tr>
<tr>
<td>2^6</td>
<td>Signal output (system) Watchdog trigger signal</td>
<td>DO 6 (common M and L+ for DO 4 – DO 7)</td>
<td>Watchdog is inverted each time it is written. This signals that AS x88/TM is still alive (from M01.04)</td>
</tr>
<tr>
<td>2^7</td>
<td>Signal output (GB 247) Application, AM3 user</td>
<td>DO 7 (common M and L+ for DO 4 – DO 7)</td>
<td></td>
</tr>
</tbody>
</table>
Parameterisation in the I&C signals of the DIO module

SYS_PAR.INI

In the basic settings mode a logical “0” of the AS system at an output from the DIO module is also formed with log “0” and a logical “0” at an input to the DIO module is equally entered in the AS with log “0”. The polarity of the DIO signals can, however, be parameterised by the user. To do this, set the following parameters in the file SYS_PAR.INI:

DIO_MASKE_EIN = “value” for the input byte
DIO_MASKE_AUS = “value” for the output byte

DIO_MASKE

A decimal integer between 0 and 255 must be entered as “value”. Here, the inversion of the diagram for the allocated DIO bit stands for each bit set to “1” in the dual representation.

For an application with identical signal meanings to an AS 230/235, the default settings in SYS_PAR.INI should be selected with " DIO_MASKE_EIN = 255 " for inputs and with " DIO_MASKE_AUS = 0 " for outputs (as they are typically set for migration conversions).

The result of this is that no LTM is registered in OK mode for the I&C message inputs that are switched on (= status “high”) for door contact, fan contact and heat sensor. Outputs are then actively switched with the corresponding bit in GB.ORPA is also set to active.

The condition laid down for AS 230/235, that unused message inputs should be wired at 24V, is also applicable in this case.

With this in mind, migrations from AS 220 system to AS 488/TM are treated according to the connection principle of the AS 235.

Default settings for the inversion screen:

<table>
<thead>
<tr>
<th>DIO_MASKE_xxx = value</th>
<th>Input signal</th>
<th>GB.ORPA.nnn (nnn=235...242)</th>
<th>GB.ORPA.xxx = 20 (SL), DO 0...7</th>
</tr>
</thead>
<tbody>
<tr>
<td>DI 0...7</td>
<td>142, 143, 245, 246, 247</td>
<td></td>
<td></td>
</tr>
<tr>
<td>value = 0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>value = 255</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: At output DO 1 of the DIO module, a diode is built into the standard plug of the plug connection for migration extensions for the cabinet lamp, in order to stop cross currents when there are differences in the voltage at the DIO output and signal transmitters connected in parallel.
## D.3 Cabling in Cabinets with Migration Rack

### Wiring of the PS

In connection with the power supply of the AS 488/TM you need a PS cable with following assignment:

- **DC24V connector of the PS (delivered)**
- **Wire end ferrule DIN 46228 A6–12–SN** connection to **W line DC24V connector** of the PS (delivered)
- **Wire end ferrule DIN 46228 A2,5–7–CUSN** plug connector
- **Plug connector DIN 46230 6–SN** connected to PSU
- **M 24 terminal with LG 1 x 6–HO7V–K6 BL I=3800**
- **Push-on receptacle DIN 462456,3–2,5 SN** connection to automatic circuit-breaker in MIG rack
- **Push-on receptacle DIN 462456,3–2,5 SN** +24V
- **LG 1 x 2,5–/2,80 LI7Y SW** 0V
- **LG 1 x 6–SO7V–K6SW DIN 46228 A2,5–7 CUSN**

### I & C Signal Connection

The cable from IF–DIO to the I & C signals (in the W row) has the assignment below (in parts):

<table>
<thead>
<tr>
<th>Pin</th>
<th>Color</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>blue–brown</td>
<td>OUTPUT: I &amp; C signal <strong>Cabinet light</strong> = GB 20</td>
</tr>
<tr>
<td>12</td>
<td>gray–brown</td>
<td><strong>L+</strong>, DC24V power supply for output 10</td>
</tr>
<tr>
<td>13</td>
<td>yellow–brown</td>
<td>GND for output 10</td>
</tr>
<tr>
<td>16</td>
<td>black</td>
<td>INPUT: Fan monitoring contact (with cabinet ventilation) = LK 1</td>
</tr>
<tr>
<td>18</td>
<td>gray</td>
<td>INPUT: Excess temperature contact = ÜT 1 (cabinet)</td>
</tr>
<tr>
<td>19</td>
<td>brown</td>
<td>INPUT: Door contact = TK 1</td>
</tr>
<tr>
<td>14</td>
<td>green–brown</td>
<td>GND for input PIN 16 (on M24)</td>
</tr>
<tr>
<td>17</td>
<td>red</td>
<td>GND for input PIN 18, 19 (on M24)</td>
</tr>
</tbody>
</table>

Please leave the isolation at the end of all other lines of this drop cable.

### +5–BUS

+5V and 0V are connected to the front panel of the module TBX 478. The lines are fed via the front cable duct through the right migration box (fixed) to the rear side and via the cable duct of the ribbon cable (or directly) as for AS 235 to the EE1.
D.4 Connection to TELEPERM M cabinets with migration carrier II

SV wiring Migration carrier II has a connection panel on the back with individual screw connections for connecting the L+, M24, MZ, and BS supply inputs and the PM output (see diagram “Migration carrier connection panel”). See figure D-1 “Migration carrier connection panel”.

LTM connections Migration carrier II also has a connection panel on the back with individual screw connections for the interfaces of the I&C signals. This signals are transferred from the TBX 478 via plug X30 and represented as screw clips (see diagram “Migration carrier connection panel”). See figure D-1 “Migration carrier connection panel”.

+5V BUS The +5V– and 0V connections (outputs) for the I/O BUS of the expansion units are offered via screw clips (see diagram “Migration carrier connection panel”). See figure D-1 “Migration carrier connection panel”.

Table D-1 Pin meanings X30, 25 pin. Sub–D plug, I&C messages

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Meaning</th>
<th>Pin</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>free</td>
<td></td>
<td>2</td>
<td>DO 7</td>
<td>AM 3</td>
</tr>
<tr>
<td>3</td>
<td>DO 6</td>
<td>WatchDog Trigger</td>
<td>4</td>
<td>DO 5</td>
<td>AM 2</td>
</tr>
<tr>
<td>5</td>
<td>DO 4</td>
<td>AM 1</td>
<td>6</td>
<td>L+</td>
<td>= DC24V for DO 4...DO 7</td>
</tr>
<tr>
<td>7</td>
<td>M24</td>
<td>= M24 for DO 4...DO 7</td>
<td>8</td>
<td>DO 3</td>
<td>Bus status message output</td>
</tr>
<tr>
<td>9</td>
<td>DO 2</td>
<td>Horn message output</td>
<td>10</td>
<td>DO 1</td>
<td>I&amp;C signal OUTPUT cabinet light SL</td>
</tr>
<tr>
<td>11</td>
<td>DO 0</td>
<td>Reserve message output</td>
<td>12</td>
<td>L+</td>
<td>= DC24V load supply for DO 0...DO 3, fused</td>
</tr>
<tr>
<td>13</td>
<td>M24</td>
<td>= M24 for DO 0...DO 3</td>
<td>14</td>
<td>M24</td>
<td>= M24 for DI 0 und DI 1</td>
</tr>
<tr>
<td>15</td>
<td>DI 0</td>
<td>GB235 message input</td>
<td>16</td>
<td>DI 1</td>
<td>INPUT LK 1</td>
</tr>
<tr>
<td>17</td>
<td>M24</td>
<td>= M24 for DI 2, DI 3</td>
<td>18</td>
<td>DI 2</td>
<td>INPUT ÜT 1</td>
</tr>
<tr>
<td>19</td>
<td>DI 3</td>
<td>INPUT TK 1</td>
<td>20</td>
<td>M24</td>
<td>= M24 for DI 4 und DI 5</td>
</tr>
<tr>
<td>21</td>
<td>DI 4</td>
<td>OLM message input</td>
<td>22</td>
<td>DI 5</td>
<td>Acknowledge horn</td>
</tr>
<tr>
<td>23</td>
<td>M24</td>
<td>= M24 for DI 6 und DI 7</td>
<td>24</td>
<td>DI 6</td>
<td>EM 1</td>
</tr>
<tr>
<td>25</td>
<td>DI 7</td>
<td>EM 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For signal diagram, see X31 ... X33, X35 ... X37 in diagram below

Note: Pins 6, 7, 12, 13, 14, 17, 20, and 23 are wired at the factory.
I & C Signals

Figure D-1  Migration carrier connection panel

For signals for X31 ... X33, X35 ... X37: see above table

Note: Connections X33–M24 and X37–M24 are general purpose outputs.
Glossary of Terms
Glossary of Terms

A

AS 235  Automation system of the TELEPERM M process control system. An AS 235 is delivered as a complete system in the TELEPERM standard cabinet.

AS 388/TM  Automation system of the TELEPERM M process control system on the basis of SIMATIC M7-300 and SINEC components. An AS 388/TM can be installed on the wall, in a rack or in a cabinet.

AS 488/TM  Automation system of the TELEPERM M process control system on the basis of SIMATIC M7-400 and SINEC components and additional TELEPERM M components. An AS 488/TM can be installed on the wall, in a rack or in a cabinet.

B

Bridge  Link between two bus systems (Local Area Network) on layer 2b of the ISO/OSI (International Standards Organization/Open Systems Interconnection) reference model. Layers 1 and 2a may be different. The bridge is transparent to the user.

Bridge CS-L2  Bridge CS-L2 interconnects the CS 275 and PROFIBUS–TM system buses of TELEPERM and performs protocol conversion. The components used for AS 488/TM in M7-400 design are also used as the basis of hardware and operating system.

C

CPU 388  Central processing module of AS 388/TM (AT-compatible computer unit)

CPU 488  Central processing module of AS 488/TM (AT-compatible computer unit)

CP 5412 (A1)  The CP 5412 (A1) communications processor is used for linking OS 525, PROGRAF AS+ (and AS 488/TM) at PROFIBUS–TM.

CS 275  TELEPERM M bus system. In the innovated TELEPERM M system, it is supplemented by PROFIBUS–TM.
### Glossary of Terms

#### E

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<thead>
<tr>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ET 200</strong></td>
<td>Distributed I/O system of the SIMATIC product family. ET 200 consists of the remote I/O units ET 200M, ET 200U, and ET 200B, and of the PROFIBUS-DP bus.</td>
</tr>
<tr>
<td><strong>ET 200M</strong></td>
<td>Remote I/O unit with standard and Ex(i) modules of the SIMATIC M7-300 product family.</td>
</tr>
<tr>
<td><strong>ET 200U</strong></td>
<td>Remote I/O unit with modules of the SIMATIC S5 product family.</td>
</tr>
<tr>
<td><strong>ET 200B</strong></td>
<td>Remote I/O unit with a large number of electronics modules for discrete and analog inputs and outputs.</td>
</tr>
<tr>
<td><strong>EXM 378</strong></td>
<td>EXM 378 extension module of the AS 388/TM system. It is able to accommodate two (EXM 378-2) or three (EXM 378-3) interface modules.</td>
</tr>
<tr>
<td><strong>EXM 478</strong></td>
<td>EXM 478 extension module of the AS 488/TM system. It is able to accommodate one through three PROFIBUS interfaces.</td>
</tr>
</tbody>
</table>

#### F

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td><strong>FDL</strong></td>
<td>Fieldbus Data Link, layer 2 of SINEC L2 (PROFIBUS).</td>
</tr>
</tbody>
</table>

#### I

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td><strong>IBS Terminal</strong></td>
<td>AT-compatible personal computer with specific software packages for commissioning, test and diagnosis of the AS x88/TM respectively the Bridge CS-I2 unit.</td>
</tr>
<tr>
<td><strong>IF ...</strong></td>
<td>Interface module</td>
</tr>
<tr>
<td><strong>IF 961-DIO</strong></td>
<td>The IF 961-DIO interface module is used for the input and output of I&amp;C signals.</td>
</tr>
<tr>
<td><strong>IF 962-COM</strong></td>
<td>The IF 962-COM interface module is used for connecting a PC for local commissioning and diagnosis.</td>
</tr>
</tbody>
</table>
The IF 964-DP interface module is used for connecting the AS 488/TM system to PROFIBUS–TM, PROFIBUS-DP and PROFIBUS–AG/AG.

ISA bus
Industry Standard Architecture Bus. The ISA bus is the standard bus of AT-compatible personal computers.

Memory Card
The memory card is a plug-in memory module. It accommodates parts of or the entire software of a central or function module and static data.

MPI
"MPI" stands for "Multi Point Interface". The interface is used for connecting a programmer to the automation system. Several systems can be connected. MPI is in AS x88 systems not available.

M7-300
M7-300 is an AT-compatible automation computer of the SIMATIC product family. It is made as an encapsulated modular system in the SIMATIC S7-400 packaging design.

M7-400
M7-400 is an AT-compatible automation computer of the SIMATIC product family. It is made in the SIMATIC S7-400 packaging design.

OS 525
Operator communication and visualization system for central handling and monitoring of processes. From version V.3.00 onwards, communication is possible via the PROFIBUS–TM bus system.

PCS 7/TM–OS
Operator communication and visualization system for central OC&V of processors. With TELEPERM M–channel DLL both for CS 275 and for PROFIBUS–TM alternative.

PROFIBUS
PROcess FIeld BUS, German Field Bus Standard DIN 19245 parts 1 through 3.
| **PROFIBUS–DP** | Standard (SINIC/SIMATIC--) field bus to connect distributed I/O with DP–norm–record, based on PROFIBUS. |
| **PROFIBUS–TM** | Standard (SINIC--) bus system. The FDL–records (Fieldbus Data Link: layer 2 of the bus system) of the bus system are used for the TELEPERM–application, based on PROFIBUS. |
| **PROGRAF AS+** | Configuration system for convenient automation system configuration with graphical input of the structure. From version V.3.00 onwards, communication is possible via the PROFIBUS–TM bus system. |
| **PS ...** | Power supply module from the SIMATIC product family. |
| **R** | RMOS32 is a multitasking operating system with real-time features. It permits accurate and optimized control of the individual tasks of the TML execution system. |
| **RS 232** | Serial interface to the RS232 standard. |
| **S** | SIGRID TM is a base application of the TELEPERM M process control system. It contains function blocks for process-related base functions (such as tempering or dosing) and for device-related elements (such as actuators or motors). |
| **STEP M** | STEP M is a control language that is used for formulating large and complex control tasks. |
| **SDA** | Send Data with Acknowledgement. SDA is an FDL service of PROFIBUS. |
| **SDN** | Send Data with No acknowledgement; SDN is an FDL service of PROFIBUS. |
### Glossary of Terms

**T**

**TBX 478**
Together with the TPM 478 interface module, the TBX 478 links the AS 488/TM with the process I/O of existing AS 220, AS 230 or AS 235 systems.

**Tasks**
Program units that execute under an operating system (here: RMOS32) in a time-, event- and priority-controlled manner.

**TML**
**TELEPERM M Language**: programming language of the TELEPERM M process control system. It permits specific function blocks to be created and complex functions to be implemented.

**TML execution system**
Execution system of AS x88/TM in the TML programming language.

**TPM 478**
The TPM 478 interface module is used for linking the AS 488/TM with the CS 275 bus system or, via the TBX 478 interface module, with the TELEPERM M I/O bus. I/O modules of the base or extension cabinet may be connected.
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## Bridge CS-L2

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C79000–T8076-C707-04
Safety instructions

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

![Danger]

**Danger**

Failure to observe a Danger note will cause death, severe personal injury or severe damage to the equipment.

![Warning]

**Warning**

Failure to observe a Warning note may cause death, severe personal injury or severe damage to the equipment.

![Caution]

**Caution**

Failure to observe a Caution note may cause personal injury or damage to the equipment.

Note

Notes contain important information regarding the product, product handling or a specific part of the document that requires special attention.

Qualified personnel

The unit may only be commissioned and used on the basis of the information contained in this Manual. Only qualified personnel are authorized to perform any work inside the unit. Qualified personnel in the sense of the safety instructions in this Manual are persons who have been authorized to commission, ground and label units, systems and circuits according to the safety-relevant standards.

Normal use

Please observe the following instructions:

![Warning]

**Warning**

The unit may only be used for the applications mentioned in the Catalogue and the Technical Description. It may only be used together with third-party equipment or components that have been recommended or released by Siemens.

Faultless and safe operation of the product requires proper transport, storage, installation and commissioning, and careful handling and maintenance.

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Bereich Automatisierungs- und Antriebstechnik
Geschäftsgebiet Systems Engineering
D-76181 Karlsruhe

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Order No. C79000-T8076-707
Preface

**Purpose of the description**  The information from this technical description enables you to
- commission a Bridge CS-L2 unit
- configure a Bridge CS-L2 unit
- use a Bridge CS-L2 unit

**Contents of the description**  The description contains the following topics:
- Product overview
- Application, design, method of operation
- Installation and commissioning
- Parameter setting
- Ordering information
- Appendix: Applicable documents, specifications

**Audience**  This Technical description is directed to commissioning, design and service personnel.
Depending on the task, the following knowledge is required:

- **For commissioning:**
  - Knowledge of the TELEPERM M process control system and, in particular, of the AS 488/TM component.
  - Knowledge of the IBS terminal for local commissioning and diagnosis, including the supporting software (part of the delivered system software).
  - Knowledge of the CS 275 bus system.
  - Knowledge of the PROFIBUS–TM bus system, and the IF964–DP interface module.

- **For parameter setting and configuration**
  - Knowledge of the PROGRAF AS+ configuration system and the IBS terminal.

- **For service**
  - Knowledge of the IBS terminal for local commissioning and diagnosis.

There are various Technical Descriptions and Manuals available that provide additional information (see Applicable Documents in Appendix A).
To install, commission and use a Bridge CS-L2 unit, you may need some of the following Technical Descriptions and Manuals (depends on your configuration). "Applicable Documents" in Appendix A tells you the order numbers of these documents and from where you can order them.

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<td>• Application, configuration, operation method</td>
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</tr>
<tr>
<td></td>
<td>• Application, configuration, operation method</td>
<td>• if the installed TECHPERM M I/O is directly connected to the AS 488/TM system, or</td>
</tr>
<tr>
<td></td>
<td>• Installation and commissioning</td>
<td>• if the AS 488/TM system is connected to the CS 275 bus system</td>
</tr>
<tr>
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<td>• Configuration</td>
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<tr>
<td>TECHPERM M Migration rack for AS 488/TM and Bridge CS-L2 unit</td>
<td>• Product overview</td>
<td>installation, commissioning and operation</td>
</tr>
<tr>
<td></td>
<td>• Application, configuration, operation method</td>
<td>• upgrading existing AS 220/AS 230 and AS 235 systems</td>
</tr>
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<td>• Installation and commissioning</td>
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<td></td>
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<td>• Ordering information</td>
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</tr>
<tr>
<td>TECHPERM M IBS terminal for local commissioning and diagnosis of AS 388/488/TM and Bridge CS-L2</td>
<td>• Product overview</td>
<td>commissioning and diagnosis. Contains in the delivery of the system software (memory card) of AS or Bridge CS-L2</td>
</tr>
<tr>
<td></td>
<td>• Application, design, method of operation</td>
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<tr>
<td></td>
<td>• Installation and commissioning</td>
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</tr>
<tr>
<td></td>
<td>• Messages and diagnosis</td>
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<tr>
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<td>• CS 275 configuration guideline (bus load computation)</td>
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<td>Manual SIMATIC S7–400, M7–400 Automation System</td>
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</tr>
<tr>
<td>Manual TELEPERM M Instructions and Guidelines</td>
<td>• TELEPERM M installation guidelines</td>
<td>Installation of AS 488/TM or Bridge CS–L2</td>
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</tbody>
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Note
The documents /2/, /3/, /4/ and /6/ are included in the “TELEPERM M, Additional System Documents” Manual (Order No. C79000–G8076–C700, to be ordered from Lieferzentrum Nürnberg (LZN)).

Conventions
The following convention is used for swift and easy identification of important information. It defines the different keyboard input methods.

<table>
<thead>
<tr>
<th>Convention</th>
<th>Used for</th>
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<tr>
<td>BOLD</td>
<td>Instruction names, switches and text strings that must be entered exactly as they are shown.</td>
</tr>
</tbody>
</table>

Scope of delivery
The document is a part of the “Additional System Documents” Manual.

Applicable documents
Appendix A contains a list of the applicable documents and specifies the documents’ order numbers and the places from where they can be ordered.

Catalogs
The catalogs contain information and ordering data of the hardware and software components. They also inform about the current configuration capabilities of the system components that may be used in TELEPERM M.

Inquiries
Please contact your sales partner if you need more information about the Bridge CS-L2 unit.

Please return a completed correction sheet if you have any suggestions or corrections for the description. The correction sheet is contained in the mailbox of the “TELEPERM M, Additional System Documents” Manual.
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Product Overview

Contents

The brief information in this chapter gives you a swift orientation of the Bridge CS–L2 unit.
What is a Bridge CS–L2 unit?

A Bridge CS-L2 unit enables existing system components that are interconnected via the CS 275 bus system to be connected to new system components on the basis of the PROFIBUS–TM bus system. System components that have been converted and/or upgraded by migration rack and software conversion may also be expanded by the new PROFIBUS–TM bus system. The Bridge CS-L2 unit connects the CS 275 bus system and the PROFIBUS–TM bus system, and converts the different protocols as required. Thus, an AS 235 automation system that is connected to the CS 275 bus system may also be controlled from the central OS 525 operator communication and visualization system on the PROFIBUS–TM bus system. The automation systems on the buses are able to exchange analog and digital values. The hardware consists of SIMATIC M7-400 elements and additional TELEPERM and PROFIBUS components. The Bridge software is delivered on a memory card; it is loaded into the central unit when the system of the Bridge CS-L2 unit starts up. The memory card contains the system communication software and the bus configuration parameters.

The Bridge CS-L2 unit has its own device address under which it is displayed in the system configuration of the OS.

Fig. 1-1 shows the interconnection of the bus systems via the Bridge CS-L2 unit.

![Image of bus systems interconnection via Bridge CS-L2 unit]

Figure 1-1 TELEPERM M Bridge CS-L2 unit
The TELEPERM M communications mechanisms and the TELEPERM M protocols on the PROFIBUS–TM bus system are the same as the ones on the CS 275 bus system. The Bridge CS-L2 unit supplements and/or removes the PROFIBUS protocol elements that are required for the transformation to PROFIBUS.

Fig. 1-2 shows a simplified block diagram of the method of operation/protocol conversion of the Bridge CS-L2 unit.

Figure 1-2  Bridge CS-L2 – method of operation/protocol conversion
The Bridge CS-L2 unit is used for expanding existing TELEPERM M systems that are interconnected via the CS 275 bus system. The Bridge CS-L2 unit connects the CS 275 bus system with the PROFIBUS–TM bus system, and automatically converts the different protocols. The Bridge CS-L2 unit can only be used in the TELEPERM M process control system.

A minimum amount of parameters must be set if the Bridge CS-L2 unit is used:

- System parameters (default values)
- Communications parameters for the PROFIBUS–TM bus system
  (BA, bus address; TA, device address, and RANGE=address range).

With IBS terminal the parameters will be stored on memory card of Bridge CS–L2.

Note

IBS terminal means a PC with commissioning software that is connected to the serial COM interface of the AS 488/TM system. The software is included in the system software delivery (memory card) of the Bridge CS-L2 unit.

The connectable systems are distinguished as follows:

- Systems that are used on the same bus system (not via the Bridge CS-L2 unit). For example:
  - AS 230/235 on CS 275 with AS 235H on CS 275
  - AS 230/235 on CS 275 with PROGRAF AS+ on CS 275
  - AS 388/TM + AS 488/TM on PROFIBUS–TM with PROGRAF AS+ on PROFIBUS–TM
  - AS 388/488/TM on PROFIBUS–TM with OS 525 on PROFIBUS–TM

- Systems that are able to communicate via the Bridge CS-L2 unit. For example:
  - AS 220 on CS 275 with AS 388/TM and AS 488/TM on PROFIBUS–TM
  - AS 230 on CS 275 with AS 388/TM on PROFIBUS–TM
  - AS 230K on CS 275 with AS 488/TM on PROFIBUS–TM
  - AS 235 on CS 275 with OS 525 respectively PCS 7/TM–OS on PROFIBUS–TM
  - AS 23x on CS 275 with PROGRAF AS+ on PROFIBUS–TM
A Bridge CS-L2 unit consists of the following SIMATIC M7-400 elements and additional TELEPERM M and PROFIBUS components:

- Rack
- Power supply module, 10 A
- Central module with one slot for the memory card and three slots for interface modules.
- Memory card with Bridge software
- Interface module for
  - connecting an IBS terminal for local commissioning and diagnosis
  - input and output of the I&C signals
- Extension module with EXM 478 for IF 964 interface module to connect the PROFIBUS–TM bus system
- TPM 478 interface module for connecting the CS 275 bus system
- Connecting cables

Please refer to the IK 10 Catalog for PROFIBUS media components.

There is a migration rack available that permits installation in a TELEPERM M cabinet.

Please refer to the Technical Description "TELEPERM M, Migration Rack for AS 488/TM and Bridge CS-L2" /4/ for details.

The Bridge CS-L2 unit provides the following functions:

- Extension of existing systems
- Compatible transmission of the CS 275 message frames, such as
  - operator messages
  - startup messages
  - status and alarm messages
  - time messages
  - write parameters and read parameters message frames
  - data messages (AKS, BKS, ZKS, MKS)
- Central operator communication and visualization of automation systems that are connected to the CS 275 bus system. Operator communication and visualization is performed with the OS 525 or PCS 7/TM–OS operator communication and visualization system via the Bridge CS-L2 unit.

Like with the TELEPERM M bus coupler module, CD jobs cannot be linked via the Bridge CS-L2 unit.
Application

This chapter tells you

- what tasks the Bridge CS-L2 unit is suitable for
- where the Bridge CS-L2 unit may be used
- the features of the Bridge CS-L2 unit
The Bridge CS-L2 unit links the CS 275 and PROFIBUS–TM bus systems with each other and autonomously performs protocol conversion. The following transfer methods are possible:

- Transfer of analog and binary values between automation systems on either bus system (such as receiving/transmitting AKS, BKS or MKS message frames in both directions).
- The devices on the CS 275 bus system send status and I&C messages to the OS 525 and PCS 7/TM–OS operator communication and visualization systems on the PROFIBUS–TM bus system.
- Time messages are transferred with high priority in both directions.
- Message frames for read and write parameter functions are sent from the OS 525 or PCS 7/TM–OS operator communication and visualization systems on the PROFIBUS–TM bus system to the devices on the CS 275 bus system.

Note

Please refer to the Manuals /10/ through /13/ (see Appendix[A]) for further information about the PROFIBUS–TM bus system. The Manuals /1/ and /14/ contain more information about the CS 275 bus system.

The Bridge CS-L2 unit is intended to be used in the TELEPERM M process control system. It is able to handle the communication mechanisms and the CS 275 message frames of TELEPERM M.

The Bridge CS-L2 unit connects the CS 275 bus system with the PROFIBUS (or the fiber optic variant) bus system.
Table 2-1 shows the major features of the Bridge CS-L2 unit.

Table 2-1 Features of the Bridge CS-L2 unit

<table>
<thead>
<tr>
<th>Features</th>
<th>Bridge CS-L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on</td>
<td>SIMATIC M7-400 with CPU 488-4</td>
</tr>
<tr>
<td>Processor</td>
<td>Pentium 75 MHz</td>
</tr>
<tr>
<td>Main memory (RAM)</td>
<td>2x8 MBytes</td>
</tr>
<tr>
<td>Functions</td>
<td></td>
</tr>
<tr>
<td>• Protocol conversion CS 275 – PROFIBUS</td>
<td>yes</td>
</tr>
<tr>
<td>• Processing multiple address tasks</td>
<td>yes</td>
</tr>
<tr>
<td>• Processing CD tasks</td>
<td>no</td>
</tr>
<tr>
<td>Connections</td>
<td>via interface modules (on CPU 488)</td>
</tr>
<tr>
<td>• to the IBS terminal</td>
<td>• IF 962-COM, for local commissioning and diagnosis of the Bridge CS-L2 unit</td>
</tr>
<tr>
<td>• to the I&amp;C system</td>
<td>• IF 961-DIO; input and output of I&amp;C signals</td>
</tr>
<tr>
<td>Bus connections</td>
<td>via</td>
</tr>
<tr>
<td>• to the PROFIBUS–TM bus system</td>
<td>IF 964–DP interface module</td>
</tr>
<tr>
<td>• to the CS 275 bus system</td>
<td>TPM 478 interface module</td>
</tr>
<tr>
<td>Max. number of devices</td>
<td>99 (CS 275 and PROFIBUS together)</td>
</tr>
<tr>
<td>Quantities (total of both directions)</td>
<td></td>
</tr>
<tr>
<td>• Data throughput (max. cyclic load 70 %)</td>
<td>30 to 60 message frames per second (depends on length)</td>
</tr>
<tr>
<td>• Message burst processing (acyclic reserve 30 %)</td>
<td>75 message frames per second during a 10-s cycle *)</td>
</tr>
<tr>
<td>Delay caused by Bridge CS-L2 (typical)</td>
<td>( \leq 100 \text{ ms} )</td>
</tr>
</tbody>
</table>

*) Assumption: 5 messages per MKS/status message frame
Configuration

This chapter

This chapter tells you

- the components the Bridge CS-L2 unit can communicate with
- the functionality of the individual components
- the interfaces of the Bridge CS-L2 unit

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<td>Communication links of the Bridge CS-L2 unit</td>
<td>3-6</td>
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<tr>
<td>3.3</td>
<td>Hardware configuration</td>
<td>3-8</td>
</tr>
<tr>
<td>3.4</td>
<td>Software configuration</td>
<td>3-10</td>
</tr>
</tbody>
</table>
3.1 System Configuration

The Bridge CS-L2 unit in its system environment

Fig. 3-1 shows the Bridge CS-L2 unit in its system environment.

Figure 3-1 The Bridge CS-L2 unit in its system environment
### Introduction
The system components shown in Fig. 3-1 are briefly discussed here. The following chapters will give you more information about the Bridge CS-L2 unit.

### AS 388/TM and AS 488/TM
Automation systems of the TELEPERM M process control system on the basis of SIMATIC components of the M7-300 or M7-400 product families, additional SINEC and TELEPERM components and the software of the AS 235 automation system.

### AS 235
Automation system of the TELEPERM M process control system. It is delivered as a complete system installed in cabinets (base cabinet/extension cabinet). Please refer to the Manual /12/ for details about the AS 235 system.

### Note
As long as the text does not refer expressively to a specific system, "AS 235" also stands for AS 235K and the AS 230/AS 230K automation systems from system software variant F onwards.

### PROFIBUS–TM bus system
The SINEC bus system PROFIBUS–TM with the TELEPERM M bus protocols is the new bus system of the TELEPERM M process control system.

The AS 388/TM and AS 488/TM automation systems use the PROFIBUS–TM bus system for communication. Communication is possible with the following devices:

- OS 525 from version V3.01 onwards
- PCS 7/TM–OS
- PROGRAF AS+ from version V3.00 onwards
- AS 388/TM and AS 488/TM
- AS 235 via Bridge CS-L2
- AS 488/TM in migration rack on CS 275 via Bridge CS-L2.

The major limits of the PROFIBUS–TM bus system are (depending on the bus load):

- bus device address space: \( \leq 99 \)
- Number of bus devices on a PROFIBUS–TM segment: \( \leq 31 \)
- Number bridge ever CS 275: 1

### CS 275 local bus
The CS 275 bus is the TELEPERM M bus system. It is supplemented with the PROFIBUS–TM bus system. The Bridge CS-L2 unit interconnects the two bus systems.

Communication between an AS 488/TM system and other components of the TELEPERM M process control system via the CS 275 bus system is performed as follows:

- Using the TPM 478 interface module
- Bridge CS-L2.
The major limits of the CS 275 bus system are (depending on the bus load):

- bus device address space: \( \leq 99 \)
- Number of bus devices on a CS 275 segment: \( \leq 99 \)
- Number of buses that may be linked with each other: \( \leq 8 \).

Please refer to the Manual /22/ for details.

### OS 525 resp. PCS 7/TM–OS on PROFIBUS–TM

The OS 525 or PCS 7/TM–OS operator communication and visualization system enables you to handle the processes centrally from one single point. From version V.3.01 onwards, the OS 525 may be linked via the PROFIBUS–TM bus system (/14/). A TELEPERM M automation system on the CS 275 bus system may be controlled and monitored via the Bridge CS-L2 unit.

### OS 525, OS 520, OS 265, PCS 7/TM–OS on CS 275

All devices connected to the CS 275 bus system are able to communicate with an OS 525/520/265 or PCS 7/TM–OS operator communication and visualization system that is linked with the S 275 bus. A communication with a PROFIBUS–TM user via Bridge CS–L2 is allowed. According to the configuring parameters you have to consider the load limits on the bus system and on the AS.

---

**Note**

Required OS 525 software version on PROFIBUS–TM: Communication is possible from version V.3.01 onwards, as these versions contain the required PROFIBUS interface CP 5412 (A1) and the PROFIBUS drivers that convert the CS 275 message frames.

---

**PROGRAF AS+**

PROGRAF AS+ configuration system is used for configuring, structuring and commissioning automation systems centrally. From version V.3.00 onwards, PROGRAF AS+ can be linked via the PROFIBUS–TM bus system.

---

**Note**

Required PROGRAF AS+ software version on PROFIBUS–TM
Communication is possible from version V.3.00 onwards, as these versions contain the required PROFIBUS interface CP 5412 (A2) and the PROFIBUS drivers that convert the CS 275 message frames.

---

**Restrictions**

Dependent on the configuration PROGRAF AS will be connected to the bus, the participants have to be configured. Communication between AS and PROGRAF AS via Bridge CS-L2 is allowed. According to the configuring parameters you have to consider the load limits on the bus system and on the AS. Configuring an AS via a Bridge CS-L2 unit would cause loading conditions that would seriously affect on line communications.
Bridge CS-L2

The Bridge CS-L2 unit interconnects the PROFIBUS–TM and CS 275 bus systems. Data exchanged between PROFIBUS–TM and CS 275 devices is performed on the basis of the TELEPERM M protocols. The same components that are used in the AS 488/TM are used as the basis of hardware and operating system.
3.2 Communication Links of the Bridge CS-L2 Unit

Connectable systems

The system components of the TELEPERM M process control system exchange data via the Bridge CS-L2 unit. The two bus systems CS 275 and PROFIBUS–TM form a common bus in this structure (see Fig. 3-2).

Communication links via Bridge CS–L2

The following systems are only used either on the CS 275 bus or on the PROFIBUS–TM.

- AS 220/230/235 on CS 275 with AS x88/TM on CS 275 and on PROFIBUS–TM.
- AS 388/488/TM on PROFIBUS–TM with PROGRAF AS+/OS 525 on PROFIBUS–TM and OS252/26x/520/525 as well as PCS 7/TM–OS on CS 275.

![Figure 3-2 Communication links](image-url)
Note

Devices of other manufacturers on the PROFIBUS–TM bus system may produce load situations and conditions that can significantly disturb the system response of the PROFIBUS–TM process control system. You should therefore examine the behavior of devices of other manufacturers before you allow them to participate in the data traffic via the SINEC L2/L2FO bus system.
3.3 Hardware Configuration

### Bridge CS-L2 components

The Bridge CS-L2 unit consists of SIMATIC S7/M7 elements and additional TELEPERM M and SINEC components.

The packaging structure follows the SIMATIC S7/M7 design.

- Rack with 9 slots
- Monitored and battery-backed power supply module
  - PS 407 for AC 230 V/10 A or
  - PS 405 for DC 24 V/10 A
- CPU 486–3 central module
  - Module slots for interface modules
  - Module slot for memory card
  - Mode selector switch (key switch)
  - Indicator elements (LED)
- IF 962-COM interface module to connect the IBS terminal for local commissioning and diagnosis.
- IF 961-DIO interface module for the input and output of I&C signals
- EXM 478 extension module with IF 964–DP PROFIBUS interface module for connection to the PROFIBUS–TM bus system.
- TELEPERM M interface module TPM 478 for the connection to the CS 275 local bus
- Memory card with Bridge-software (communications software and system/communication parameters)

### Interfaces

The Bridge CS-L2 unit features the following interfaces:

- Medium connection to the PROFIBUS–TM via IF 964–DP communication processor
- Medium connection to the CS 275 bus system via TPM 478 interface module
- Serial interface for the connection of an IBS terminal for local commissioning and diagnosis via the IF 962-COM interface module
- Binary signal interface for the input and output of I&C signals via the IF 961-DIO interface module
Fig. 3-3 shows the configuration of the Bridge CS-L2 unit.

1 TPM 478 interface module
2 IF964–DP interface module
3 Rack
4 CPU 488-4
5 Power supply module
6 IF 962-COM interface module
7 IF 961-DIO interface module
8 Memory card with Bridge software
9 Extension EXM 478

Figure 3-3 Configuration of the Bridge CS-L2 unit

Note
Chapter 7 contains a list of the order numbers of the components. Please refer to the Manuals /9/, /10/ as well as /17/ to /18/ for details of the SIMATIC and PROFIBUS components. The Manual /22/ informs of the CS 275 bus system. Please refer to the Description /3/ for detailed information of the TPM 478 interface module.
3.4 Software Configuration

Introduction
The Bridge software is compatible with the hardware configuration discussed in Chapter 3.3.

Memory card
The Bridge software is delivered on a SIMATIC S7 memory card. The card contains the entire software and the configuration data. Due to a software protection mechanism and an installation identification, the software only executes on this system.

Memory structure
The Bridge CS-L2 unit features 2x8 MB of program memory. When the Bridge CS-L2 is switched on, the software and the system parameters are read from the memory card provided into the program memory. The data remains operational in the program memory of the Bridge CS-L2 unit (RAM of the CPU 486 central module) as long as the Bridge CS-L2 unit remains switched on. This RAM can neither be read nor archived.

System configuration
In normal operation, the Bridge CS-L2 unit does not require any handling. The Bridge CS-L2 unit autonomously performs the data exchange between the bus systems. Merely a system configuration is required during commissioning. System and communication parameters (such as bus and device address) are entered here.

Modifying the system configuration
Copy the configuration files with system parameters on the memory card. The software and the new configuration data are loaded from the memory card in the program memory when rebooted.

Software for Bridge CS-L2
The software of the Bridge CS-L2 unit is subdivided into:

- RMOS32 operating system, including drivers
- Bridge functions
- Operator input program
- Configuration files

Fig. 3-4 shows a simplified block diagram of the software configuration of the Bridge CS-L2 memory card. Please refer to Chapter 4.1 for more information about the individual function blocks.
RMOS32 operating system

RMOS32 is a multi-tasking operating system with real-time features. It permits time-accurate and optimized control of the individual tasks of the Bridge CS-L2 unit.

Bridge functions

The Bridge functions include all program elements that are required for interconnecting the buses.

Operator input program

The operator input program permits communication with the IBS terminal.

Configuration files

The configuration data is created with the IBS terminal, and saved on the memory card. This data is used for configuring the Bridge CS-L2 unit during startup.
Method of Operation

This chapter informs you of the operation method of the Bridge L2-CS unit and the necessary prerequisites. It explains the external appearance of the hardware and software interface to the extent that is important to your application.

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</tbody>
</table>
4.1 Method of Operation of the Bridge CS-L2 Unit

Overview

The Bridge CS-L2 unit provides the communication link between TELEPERM M systems that are connected to the CS 275 and PROFIBUS–TM bus systems.

TPM 478 interface module connects with CS 275, the IF964–DP module within EXM 478 connects with PROFIBUS–TM.

Communication throughout the system follows the TELEPERM M protocols.

Figure 4-1  Configuration of the Bridge CS-L2 unit
Fig. 4-1 is a simplified block diagram of the Bridge CS-L2 unit’s structure. The hardware configuration is discussed in Chapter 3.3. The functional interrelationship of the Bridge CS-L2 components is explained below.

**Interface module PROFIBUS**

The PROFIBUS interface module IF 964–DP provides the connection of the Bridge CS-L2 unit to the PROFIBUS–TM bus system. The EXM 478 module integrates the IF module unit into the M7-400 packaging structure.

The module connects to the electric bus line via a bus terminal or a bus connector. The connection to an optical bus line is established via an OLM.

When the Bridge CS-L2 unit is started, the firmware is loaded from the memory card into the program memory of the CPU unit, and the IF module provided with the parameters.

Data exchange between the IF964–DP unit and the CPU’s interface drivers is performed via a dual-port RAM.

**L2 driver**

This driver makes the services of the IF964–DP communications processor available under the RMOS 32 operating system. The driver installation is automatically initiated during startup. Productive services and management service are both routed via the L2 driver.

**L2-KOM**

The TELEPERM M communications mechanisms and the CS 275 message frames are retained and transparently transmitted via the PROFIBUS–TM bus system using the FDL services SDA or SDN/SDN broadcast. In the case of multi-address tasks (several target addresses), the tasks are transmitted as singular tasks via the PROFIBUS–TM bus system.

The following are the tasks of the L2-KOM software module:

- Handling individual tasks
- Handling multi-address tasks
- Handling the flag words and acknowledgements
- Address conversion
- Producing the status image of the L2 devices
- Announcing the address range

The communication tasks are transferred to the Bridge KOM in the form of transmit and receive tasks.
TPM 478  
The TPM 478 interface is used for connecting the Bridge CS-L2 unit to the CS 275 local bus. The connection to the remote bus is established via the usual bus converter units you know from the TELEPERM standard spectrum. The TPM 478 is homogeneously integrated into the M7-400 system design and system technology.  
The firmware is stored in an EPROM on the PTM 478 interface. Data is exchanged between the TPM 478 interface module and the CPU interface driver via a 4-kB dual-port RAM.  
Analogous to the TELEPERM M local bus interfaces, the TPM 478 interface module analyzes the CS 275 message frames, produces the brief acknowledgements, and transfers the processed message frames to the Bridge KOM. In this procedure, the interface module processes all message frames that are sent for devices that are interconnected via the Bridge CS-L2 unit. The interface module is also able to analyze and transmit multi-address tasks.

CS - KOM  
The CS communication layer adapts the interface of the local bus interface TPM 478 to the interface functions that are generally valid inside the Bridge CS-L2 unit. Communication tasks are checked for conformity.

Bridge - KOM  
The Software module "Bridge communication" receives the communication tasks and converts them for the other side of the medium. The medium-related transmission characteristics are transformed and the multi-address tasks are adapted accordingly.  
The Bridge CS-L2 unit processes the management tasks as a representative of the devices connected to the PROFIBUS-TM. The Bridge CS-L2 unit employs a management task to tell the L2 devices its address.

3964(R)  
The 3964(R) procedure is integrated in the operating system. It is used for communicating with the IBS terminal via the COM interface.

IF962 COM  
This interface module is used for connecting units with a serial interface (RS 232). With the Bridge CS-L2 unit, this interface module is used for connecting the IBS terminal to COM 1.

IF961 DIO  
This interface module is used for the output of diagnostic signals (option).

RMOS 32  
RMOS 32 is a REAL-TIME operating system that has been designed to satisfy the specific requirements of the automation and process control systems. Real-time features and multi-tasking capability are the major requirements of this field that can be satisfied by RMOS 32.
4.2 System Start / Restart

The system start of the Bridge CS-L2 unit adapts itself to the AS 488/TM system start.

4.2.1 System Start

Memory card

The BRIDGE CS-L2 system software is delivered on the system memory card. The card is copy-protected.

A memory card emulates a floppy disk drive. Only genuine SIEMENS Memory Cards of the BRIDGE CS-L2 system are supported.

Note

The Bridge CS-L2 unit exclusively employs the memory card as a program memory. Mechanical drives (HD, FD) are not necessary. Use the IBS terminal for entering the configuration.

Startup behavior

The startup behavior distinguishes the following modes:

- Restart (see Chapter “Commissioning”)
- Restart after a power failure
- Resetting the Bridge CS-L2 unit
- Installation of a new system software version

Restart

With the restart, the system software of the Bridge CS-L2 unit is automatically loaded from the memory card into the system memory (RAM) when power is switched on.

The configuration files L2AMPRO.INI and BRI_SYS.INI must exist on the memory card (see Chapter “Parameter Setting”). The green RUN LED blinks as long as the restart procedure is in progress, and remains ON when the installation has successfully been completed.

Restart after power failure

The components of the Bridge CS-L2 unit are reset and their program memories (RAM) are cleared in the event of a power failure. When power is restored, the system is automatically loaded from the memory card and the parameter values of the Bridge CS-L2 unit are set according to the stored initialization files.

If the mode selector switch is in RUN position, CS-L2 on line operation starts immediately. This is signalled by the green RUN LED.

In STOP position, the system is loaded, too. It remains in standby function.

Resetting the Bridge CS-L2 unit

The Bridge CS-L2 unit is reset through the mode selector switch (Softreset, Masterreset) or by cycling the power supply (mains switch) off and back on.
4.3 Control and Indicator Elements

The Bridge CS-L2 unit employs LEDs on the module front panels to indicate its operating state. The modes must be activated by switch/pushbutton functions.

- PS 407 10A power supply module, see S7-400, M7-400 Reference Manual /z/
- CPU 488-4, see Chapters 4.3.1 and 4.3.2
- TPM 478 interface module, see Description /3/

4.3.1 Modes

The mode selector switch on the central module is a key switch. Fig. 4-2 below shows the positions of the mode selector switch.

The key position MRES corresponds to a pushbutton function. This means that the switch only remains in this position as long as it is held there.
Table 4-1  Mode selector switch – meaning of the switch positions

<table>
<thead>
<tr>
<th>Mode</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft Reset</td>
<td>Turn the mode selector switch to the MRES position and hold it there for at least 3 seconds.</td>
</tr>
<tr>
<td></td>
<td>Reaction: The data in the buffers is cleared. Communication (TPM478, CP5412–A1) is restarted.</td>
</tr>
<tr>
<td>Master Reset</td>
<td>Turn the mode selector switch within 3 seconds twice to the MRES position.</td>
</tr>
<tr>
<td></td>
<td>Reaction: The systemssoftware resets the hardware. Output disable (ODIS) is activated. The contents of the Bridge CS-L2 memory card is loaded into the system memory. The communication interfaces are reloaded and its parameters set. The data in the buffers is cleared.</td>
</tr>
<tr>
<td>Stop</td>
<td>Turn the mode selector switch to the STOP position. The key can be removed in this position to prevent an unauthorized change of the mode.</td>
</tr>
<tr>
<td></td>
<td>Reaction: The Bridge function is stopped; tasks are no longer handled via the Bridge CS-L2 unit. Possibly existing message frame are canceled. The bus interface modules are not reset and continue the token communication.</td>
</tr>
<tr>
<td>Run</td>
<td>Turn the mode selector switch to the RUN position. The key can be removed in this position to prevent an unauthorized change of the mode.</td>
</tr>
<tr>
<td></td>
<td>Reaction: The Bridge CS-L2 unit processes the communication tasks according to the software and configuration data in the program memory.</td>
</tr>
<tr>
<td>Run-P</td>
<td>Identical with RUN.</td>
</tr>
</tbody>
</table>

The system software controls the reset procedure that is initiated by activating MRES. The Bridge CS-L2 unit must be reset by cycling the power supply off and back on if the system software has not yet been started or is in an illegal state.
4.3.2 Status and Fault Indicators

There are the following status and fault indicators on the central module of the Bridge CS-L2 unit:

![Status and fault indicators diagram](image)

Figure 4-3 Status and fault indicators
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Meaning</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTF (red)</td>
<td>Internal error message</td>
<td>The indicator is ON when the Bridge CS-L2 unit has detected an internal fault.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Hardware fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Firmware fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Parameter fault</td>
</tr>
<tr>
<td>EXTF (red)</td>
<td>External error message</td>
<td>n/a with Bridge CS-L2</td>
</tr>
<tr>
<td>SD (green)</td>
<td>Access to memory card</td>
<td>The indicator is ON during a read or write access to the memory card.</td>
</tr>
<tr>
<td>HD (green)</td>
<td>Access to hard disk</td>
<td>n/a with Bridge CS-L2</td>
</tr>
<tr>
<td>USR1 (yellow)</td>
<td>User LED 1</td>
<td>flashing fast: automatical restart of TPM478</td>
</tr>
<tr>
<td>USR2 (yellow)</td>
<td>User LED 2</td>
<td>flashing fast: automatical restart of CP5412–A1 resp. IF964–DP</td>
</tr>
<tr>
<td>RUN</td>
<td>Status indicator “RUN”</td>
<td>When the Bridge CS-L2 unit is being initialized, the indicator blinks at a frequency of approximately 4 Hz:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• after power on</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• after MRES</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• after a parameter fault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The indicator remains in this mode if the parameter setting data cannot be found or is incorrect. In addition, the INTF indicator is ON.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The indicator is ON as long as the Bridge CS-L2 unit is properly working. This means</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• system software loaded</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• configuration performed</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• system startup completed</td>
</tr>
<tr>
<td>STOP</td>
<td>Status indicator “STOP”</td>
<td>The indicator is ON if the key switch has been set to STOP position. After power on and MRES, the indicator is ON until the Bridge CS-L2 unit has started up.</td>
</tr>
<tr>
<td>Lamp test</td>
<td>All indicators ON</td>
<td>Immediately after power on or MRES, the indicators are ON for approximately 2 seconds.</td>
</tr>
</tbody>
</table>
### 4.4 I&C Signals

#### Signalling

To complete the “status and fault indicators” on the central module the Bridge CS–L2 can further send diagnostic signals via DIO module (IF 961–DIO).

Four output signal bits are reserved to display the send and receive proceedings. They are good for diagnosis in case of faults.

The Inputs are reserved for diagnostic purposes in the direction of cabinet lamp, input 3 is used for door contact.

#### Control system messages

Bridge CS–L2 is not any automation system and makes no control system messages of its own.

#### Specifications

Please refer to Module Specifications in the SIMATIC Reference Manual S7-400, M7-400 /32/ for detailed information of the interface module IF961-DIO.

#### Connector pin assignments

The connector pin assignments are described in Appendix B.
Installation and Commissioning

This chapter tells you

- how to install the extension modules on the central module
- how you install the modules on the subrack
- how you put a Bridge CS-L2 unit into operation

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<td>5.3</td>
<td>Power supply</td>
<td>5–11</td>
</tr>
</tbody>
</table>
5.1 Installing the Bridge CS-L2 Unit

Introduction
A Bridge CS-L2 is installed in the same way as the M7-400 automation computers of the SIMATIC product family.

Note
The installation of the M7-400 automation computers of the SIMATIC product family is explained in the Manuals /8/ and /10/.

Installation in M7-400 design
The major steps in installing the Bridge CS-L2 unit are:

Rack mounting
Mount the rack on the wall, in a framework or in a cabinet.

Rack grounding
Ground the rack as shown in Fig. 5-4.

Removing the covers
Remove the covers from power supply module and central module.

Installing the interface modules
Remove the covers and plug the interface modules in the central module (cf. Fig.5–1):

- IF 962-COM for the connection of the IBS terminal for local commissioning and diagnosis.
- IF 961-DIO for input and output of I&C signals (e.g. cabinet lamp) via the Bridge CS-L2 unit.(option)

To insert an interface module:

- Grasp the module firmly at the sides of the front panel
- Insert the p.c.b. end of the interface module into the upper and lower guide rails of the slot.
- Slowly push the module into the slot until the front panel of the interface module rests on the frame of the module slot.
- Tighten the screws of the interface module.
- If you insert the IF–964–DP interface module in an EXM 478 you have to take into account the same conditions like the installation in a CPU 486–3.

Warning
The power to the interface module must be switched off before the module is inserted or removed.

There is no cover on the bottom of the module. The rules for static sensitive elements must therefore be observed when the modules are handled.
Removing the connector covers

Remove the cover from the male extension connector on the ATM 478 extension module and the cover from the female extension connector on the CPU 486–3 central module. Fig. 5-1 shows the locations of the male and female extension connectors on the CPU 486–3 central module and on the EXM 478 extension module.

Next, remove the cover of the female connector on the EXM 478 extension module and the cover of the male extension connector on the TPM 478 interface module.

![Diagram of CPU 486-3 and EXM 478 with labeled connectors](image-url)

**Figure 5-1** Location of male and female extension connectors and covers

---

**Note**

Please refer to Chapter 7 for a list of the modules and components.
Place 486-3 central module, EXM 478 extension module with IF 964–DIO interface module and TPM 478 interface module on a flat surface and interconnect them carefully.

![Interconnecting central module, extension module and interface module](image)

**Figure 5-2** Interconnecting central module, extension module and interface module

**Blanking plates**

Remove the blanking plates from the slots of the rack that are required for installing the modules.

**PS 405/407**

Install the power supply module (DC 24 V/DC 24 V, AC 120 V or 230 V/DC 24 V) in the first slot at the left-hand side (slot 1) and secure it with the screws provided. Set the voltage selector switch on the module (see Fig. 5-3) to the mains voltage to which your system is connected.
Installing the module compound

Hook the module compound (1) to the rail, push it to the left (2), and tilt it downwards (3). See Fig. 5-3.

![Diagram](image_url)

- 1 Mains plug
- 2 Voltage selector switch
- 3 Key switch
- 4 Grounding point at the rack
- 5 Blanking plate

Figure 5-3 Hooking in the module compound

Securing the module compound

Secure the module compound (central module, extension module and interface module) with the screws provided.

Memory card

Do not install yet the memory card in the central module (see Chapter 5.2).

Inserting the key

Insert the key in the central module and set it to STOP.

Backup battery

Install the backup battery in the power supply module.
Insert the pre-wired mains plug into the power supply module (cf. Fig. 5-3).

Wire the front connector of the IF 961-DIO according to the requirements of your application, and plug it in.

Plug in the connecting cable for the IF 962-COM interface module to connect the IBS terminal (see Fig. 5-5).

Connect the PROFIBUS–TM and CS 275 bus systems (see Fig. 5-4).

**Note**

Please refer to the Manuals /17/ through /33/ for more information about the PROFIBUS–TM and CS 275 bus systems.
5.2 Commissioning the Bridge CS-L2 Unit

**First function check**

The following function check must be performed when the Bridge CS-L2 unit or a new central module is commissioned for the first time:

- Remove memory card
- Switch on the Bridge CS-L2 unit
- After lighting up all LED’s the STOP LED keeps light up. If the INTF LED keeps light up also there is a fault on the CPU (see manual SIMATIC S7/M7 /32/).

**Requirements**

The following requirements must be satisfied before the Bridge software can be installed:

- The Bridge C2-L2 unit has been installed and wired according to the description in Chapter 5.1.
- The Bridge CS-L2 unit has been switched off.
- The memory card with the licensed TELEPERM M and SIMATIC M7/S7 system is available.
- Personal computer with the following hardware and software features (IBS terminal):
  - PC with hard disk and 3½-in floppy disk drive
  - MS-DOS operating system and text editor (e.g. EDLIN)
  - At least 512 kB free main memory
  - ASCII editor configuration tools

Fig. 5-5 shows the connections between IBS terminal and Bridge CS-L2 unit.
Use a personal computer with text editor for creating the configuration datas. With it create configuration files which are transferred via IBS terminal to the memory card of the Bridge CS-L2 unit. This configuration tool is included in the scope of delivery of the Bridge CS-L2 unit.

**Configuration tool**

**IBS-Terminal**

The IBS terminal configuration tool is a TELEPERM M installation tool that is used for setting the parameters of the Bridge CS-L2 unit.

**NETINST**

The NETINST configuration tool is a PROFIBUS installation tool that is used for setting the parameters of the CP 5412 communications processor. It is a part of the PROFIBUS package TF-5412/MS-DOS, Windows (for configuration with Bridge software version V.1.0).

**Note**

Please refer to Chapter 6 for more information about configuration.
To install the Bridge software, use the following procedure:

Insert the memory card in the module slot on the central module (see Fig. 5-6).

**Figure 5-6  Inserting the memory card**

**Note**

The memory card must always be inserted during operation. The central module must be in STOP mode when the memory card is inserted or removed.
Switching on  
Switch on the Bridge CS-L2 unit (standby switch on the power supply module).

Mode selector switch in STOP position  
The Bridge software is automatically loaded from the memory card into the program memory of the central module. The following happens if the mode selector switch on the central module is in STOP position:

- All status/fault indicators on the central module light up briefly.
- The STOP status/fault indicator lights up approximately 2 seconds later. The SD status/fault indicator lights up after another eleven seconds. During the bridge starts up the RUN LED shows flashing light. About 20 seconds after switched on the start–up is finished, the RUN LED goes out, and the STOP LED keeps light up.
- Set the mode selector switch of the central module to RUN. The STOP status/fault indicator goes OFF, and the RUN status/fault indicator goes ON.

Mode selector switch in RUN position  
The following happens if the mode selector switch on the central module is in RUN position:

- All status/fault indicators on the central module light up briefly.
- The RUN status/fault indicator blinks for approximately seven seconds before it goes OFF. The software has successfully been loaded and the installation is terminated.

Note  
Repeat installation and/or notify your SIEMENS partner in a Service Department if the STOP status/fault indicator goes ON.

Diagnosis  
Start–up conditions are described in chapter 4. Normally Bridge CS–L2 passes direct into communication mode. In case of error see chapter 4.
5.3 Power Supply

The Bridge CS-L2 unit is powered from DC 24V or AC 230V (with a SITOP-Power power supply in the incoming line). In a restart (voltage recovery or reset), the system software is always loaded from the last permanent storage on the memory card.

The Lithium battery in the CPU merely maintains date and time.

To avoid a link breakdown in the event of a power failure, the central environment of the Bridge CS-L2 unit should be fed from an uninterruptible power supply.

The following distinction is made:

a) Redundant DC 24 V supply with two parallel diodes in series with the rack of the Bridge CS-L2 unit in DC 24V version. In most applications, the assured power supply rail is centrally arranged at the system side.

b) Uninterruptible power supply with distributed buffer operation. The low-cost **SITOP power DC-USV 40 A** version may be used for this purpose. Please refer to the Catalog **KT 10 Combination Technique, SITOP power power supply unit, SITOP connection system wiring**.

This UPS system permits interrupt-free transition from supply to buffer operation. Rechargeable batteries that may be connected in parallel permit the power to be adapted to the system. With an UPS designed for the base unit, the smallest 7-Ah rechargeable battery module is able to cover power failures of approximately 4.5 hours.
Parameter Setting

This chapter tells you the selections and parameter settings that are required before a Bridge CS-L2 can be put into operation.

- Configurable features and the valid ranges
- Means or elements for configuration.

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<th>Topic</th>
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<td>6–2</td>
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<td>6.2</td>
<td>Setting the parameters of the Bridge CS-L2 unit</td>
<td>6–5</td>
</tr>
<tr>
<td>6.3</td>
<td>IBS terminal commands</td>
<td>6–8</td>
</tr>
<tr>
<td>6.4</td>
<td>Rack assignments of Bridge CS–L2</td>
<td>6–9</td>
</tr>
</tbody>
</table>
## 6.1 Communication Parameters

<table>
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<tr>
<th>Parameter</th>
<th>Range</th>
<th>Default</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINEC L2 device address (TA)</td>
<td>1–99 (don’t use address 0)</td>
<td>100 (invalid)</td>
<td>The Bridge CS-L2 unit can only be operational after valid device addresses have been specified for the CS 275 bus and for the SINEC L2 bus.</td>
</tr>
<tr>
<td>CS 275 device address (TA)</td>
<td>1–99 (don’t use address 0)</td>
<td>100 (invalid)</td>
<td></td>
</tr>
<tr>
<td>Range (number TA L2 (Tln))</td>
<td>2–32</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Definition</td>
<td>1st address is always the Bridge address</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Default</td>
<td>32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>See Chapter 6.1.1 for further details</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SINEC L2 / CS275 Bus address (BA)</td>
<td>0–7</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
6.1.1 Address Range

The address range defines, which device addresses the CS 275 bus can access on the PROFIBUS–TM via the Bridge CS-L2 unit. From the perspective of the PROFIBUS–TM, all devices whose addresses are outside the range must be CS 275 devices. The first address of the range is always the device address of the Bridge CS-L2 unit (on the CS 275 bus and on the PROFIBUS–TM).

![Device addresses/range](image)

**Example:**

To connect up to 20 devices with the device addresses 40 through 59 to a PROFIBUS–TM, the following configuration is required for the Bridge CS-L2 unit:

<table>
<thead>
<tr>
<th>Bridge-CS 275 device address (TA)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>39</td>
<td>21</td>
</tr>
</tbody>
</table>

**Caution**

A maximum number of 31 devices on the PROFIBUS–TM requires 32 free device addresses in ascending order to be available on the CS 275 bus. Double assignment of device addresses on CS 275 and PROFIBUS–TM is not permitted.
6.1.2 Definition of Bus / Segment

The CS 275 bus system may consist of up to 8 buses that are separated by bus coupler units (BK). When a Bridge CS-L2 is connected, the PROFIBUS–TM segment that is connected via this Bridge obtains the identical bus number. The total number of addresses on a bus that is connected via a Bridge CS-L2 unit may not exceed the maximum number of 99 devices.

![Figure 6-2 Definition of a segment](image_url)
6.2 Setting the Parameters of the Bridge CS-L2 Unit

The parameter values of the Bridge CS-L2 unit are set via the IBS terminal. The IBS terminal is connected via a connecting cable with the COM 1 interface of the Bridge CS-L2 unit.

The parameters of the Bridge CS-L2 unit are entered in the IBS terminal and transferred to the Bridge CS-L2 unit (command COPY_TM).

The configuration files for the Bridge CS-L2 unit are created with an ASCII editor.

The Bridge system parameters contain the bus and device addresses that are also used in the TELEPERM M systems. In addition, they contain the configuration and address parameters for the hardware structure of the SINEC/SIMATIC and TELEPERM components. The hardware structure of the defined configuration is fixed and has been saved in the bri_sys.def file. Within this file you can also activate the diagnostic signals of the IF 961–DIO module.

New installation/change of parameters:

Use the COPY_PC command to transfer the bri_sys.def file from the memory card of the Bridge CS-L2 unit to the IBS terminal. Use an editor to modify the parameters (such as bus address/participant address ”BATA”). Use the COPY_TM command to transfer the modified file to the memory card of the Bridge CS-L2 unit.
Additional to file BR_SYS.INI you need also the configuration file L2AMPRO.INI. In this file you have to insert the coordinates of the IF964 module as well as the bus parameter of PROFIBUS–TM.

Parameters of configuration file L2AMPRO.INI:

1) Parameters of slot addressing

Parameter `slot` = Slot number, counting according to SIMATIC M7–300/400, system setting for Bridge CS–L2: 5

Parameter `modulbox` = Module box number, counting according to SIMATIC M7–300/400, system setting for Bridge CS–L2: 1

For the coordinates of the IF964 module a standard configuration setting is prescribed, therefore you should accept it. To change these parameter you should have a good knowledge of slot addressing with SIMATIC M7, a faulty entry can lead to bad system errors.

2) Bus parameters

Parameter `l2_ts` = Participant number at PROFIBUS–TM (Decimal number)

This number has to be identical with the participant number in BATA of BR_SYS.INI. With different addresses parameter `l2_ts` will be accepted.

Remark:
The participant numbers should be placed without gaps. This can intensify the performance.

Parameter `l2_hsa` = Highest participant number at PROFIBUS–TM (Presetting: 32)

Remark:
If you set the highest participant number you can intensify the performance. To have reserves it is good to configure a higher participant number as the real existing

Parameter `l2_trt` = Token–Rotation–Time (Presetting: 90000)

Presetting is valid for maximum 10 active participants at bus. If there are more than 10 participants at PROFIBUS–TM you have to compute the parameter with the following formula:

\[ l2_trt = 9000 \times [\text{numbedr of active PROFIBUS–TM participants}] \]

Remark:
Factor 9000 is only valid for a baud rate with 1,5 MBaud.
All bus parameters are adjusted to the transfer rate 1.5 MBaud. To optimize this rate requires profound knowledges of the PROFIBUS standard, part 1, DIN 19245. Choosing an other transfer rate is not allowed because of leading to malfunctions.

Example of a configuration file L2AMPRO.INI for Bridge CS-L2:

```
# ********** Beginn L2AMPRO - INI-Datei ************
#       ---> fuer BRIDGE CS-L2 <---
# ********** IF964 - Parameter **********************
boardtyp     = IF964
slot         = 5
modulbox     = 1
# ********** L2-Bus - Parameter **********************
l2_ts         = 32
l2_hsa        = 42
l2_baud_rate  = 7
l2_tsl        = 3000
l2_tqui       = 0
l2_tset       = 240
l2_max_tsdr   = 980
l2_min_tsdr   = 150
l2_ttr        = 90000
l2_g          = 30
# ********** Ende L2AMPRO - INI-Datei **************
```
6.3 IBS Terminal Commands

The following commands are available for the communication between the IBS terminal and the Bridge CS-L2 unit.

**Read file from Bridge memory card**

**COPY_PC** filename [path]<return>

Example: **COPY_PC** br_sys.ini c:\temp

Use this command for loading a file from a drive of the Bridge CS-L2 unit (memory card) in the IBS terminal (PC).

**Write file from IBS terminal to the Bridge memory card**

**COPY_TM** [path] filename <return>

Example: **COPY_TM** c:\bri_sys.ini

Use this command to write a new or modified file to a drive of the Bridge CS-L2 unit (memory card).

**Clear file from Bridge memory card**

**DEL_TM** filename <return>

Example: **DEL_TM** dos_conf.dat

Use this command to clear a file from a drive of the Bridge CS-L2 unit (memory card).

**Read the directory of the memory card into a PC file**

**DIR_TM** [path][filename]<return>

Example: **DIR_TM** d:\bridge.dir

Use this command to read the directory of a drive of the Bridge CS-L2 unit (memory card). Subdirectories are displayed, but not processed.

If you specify no file the directory will be stored as ASx88TM.DIR in the working directory.
6.4 Rack Assignments of the Bridge CS-L2 Unit

The Bridge CS-L2 unit consists of TELEPERM M and SIMATIC standard components. The system software takes standard rack assignments and a default parameter setting into account.

Module slot | 1 | 2 | 3 | 4 | 5 | 6
---|---|---|---|---|---|---
Module | PS | PS | CPU | CPU | EXM | TPM
Slot | S1 | S2 | S3 | | | |
for | – | – | Diagnose | IDS–T. | PROFIBUS–TM | CS 275
configuring file | | | | | L2AMPRO.INI | BR_SYS.INI
Ordering Information

This chapter gives you the order numbers of the products that are discussed or mentioned in the Description.

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<td>7.2</td>
<td>Bus components</td>
<td>7–4</td>
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<td>7.3</td>
<td>Spare parts</td>
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</tr>
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</table>
## 7.1 Ordering Data of the Bridge CS-L2 Unit

### Components

<table>
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<tr>
<th>Bridge CS–L2</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Order No.</td>
<td></td>
</tr>
<tr>
<td>Central unit</td>
<td></td>
</tr>
<tr>
<td>with extension modules and interface modules:</td>
<td></td>
</tr>
<tr>
<td>• CPU 486–3</td>
<td>6ES7486–3AA00–0AB0</td>
</tr>
<tr>
<td>with pentium, frequency 75 MHz,</td>
<td></td>
</tr>
<tr>
<td>with 2 slots for interface modules (2 standard slots)</td>
<td></td>
</tr>
<tr>
<td>• Memory module for CPU 486–3 (working directory)</td>
<td>6ES7791–0EP00–0XA0</td>
</tr>
<tr>
<td>2 x 8 Mbyte; 3.3 V</td>
<td></td>
</tr>
<tr>
<td>• IF961–DIO interface module</td>
<td>6ES7961–1AA00–0AC0</td>
</tr>
<tr>
<td>Digital input/output for I&amp;C monitoring</td>
<td></td>
</tr>
<tr>
<td>• IF962–COM interface module</td>
<td>6ES7962–3AA00–0AC0</td>
</tr>
<tr>
<td>for commissioning terminal, with 2 RS 232 interfaces</td>
<td></td>
</tr>
<tr>
<td>Power supply modules</td>
<td></td>
</tr>
<tr>
<td>• PS 405 power supply module: 10 A</td>
<td>6ES7405–0KA00–0AA0</td>
</tr>
<tr>
<td>DC 24 V --&gt; DC 24 V / 5 V (2 standard slots)</td>
<td></td>
</tr>
<tr>
<td>• PS 407 power supply module: 10 A</td>
<td>6ES7407–0KA00–0AA0</td>
</tr>
<tr>
<td>AC 120 / 230 V --&gt; DC 24 V / 5 V (2 standard slots)</td>
<td></td>
</tr>
<tr>
<td>Connection to PROFIBUS–TM system bus</td>
<td></td>
</tr>
<tr>
<td>• EXM 478 extension module</td>
<td>6ES7478–2CA00–0AC0</td>
</tr>
<tr>
<td>to insert 3 interface modules</td>
<td></td>
</tr>
<tr>
<td>• With electrical type of PROFIBUS–TM:</td>
<td></td>
</tr>
<tr>
<td>– IF964–DP interface module</td>
<td>6ES7964–2AA00–0AB0</td>
</tr>
<tr>
<td>• With OLM of PROFIBUS–TM (redundant) 1):</td>
<td></td>
</tr>
<tr>
<td>– IF964–DP interface module</td>
<td>6ES7964–2AA00–0AB0</td>
</tr>
<tr>
<td>– Optical Link Module OLM/S4</td>
<td>6GK1502–4AB10</td>
</tr>
<tr>
<td>– Cable connector 830–1 for PROFIBUS; 3 m</td>
<td>6XY1830–1BH30</td>
</tr>
<tr>
<td>Further PROFIBUS components see catalog IK 10!</td>
<td></td>
</tr>
<tr>
<td>Connection to CS 275 system bus</td>
<td></td>
</tr>
<tr>
<td>• TPM478 interface module</td>
<td>6ES7478–2DA01–0AC0</td>
</tr>
<tr>
<td>for connection with CS 275 and TELEPERM M I/O</td>
<td></td>
</tr>
<tr>
<td>Cable connector for connection with 20 m local bus see catalog PLT 112, side 8/6</td>
<td></td>
</tr>
<tr>
<td>Mechanical design</td>
<td></td>
</tr>
<tr>
<td>• UR2 subrack</td>
<td>6ES7400–1JA00–0AA0</td>
</tr>
<tr>
<td>For installation of Bridge CS–L2, 9 slots</td>
<td></td>
</tr>
<tr>
<td>For installation of Bridge CS–L2 in a TELEPERM M cabinet:</td>
<td></td>
</tr>
<tr>
<td>• Migration rack for Bridge CS–L2</td>
<td>6DS2510–0XX00–3XX0</td>
</tr>
<tr>
<td>with prepared subrack UR2 19”</td>
<td></td>
</tr>
</tbody>
</table>

1) Mainly with redundancy, EMC problems or large ranges
System configuration of Bridge CS–L2 mit CPU 486–3

Figure 7-1  Bridge CS–L2 with CPU 486–3, connection to CS 275 system bus and connection to PROFIBUS–TM system bus
7.2 Bus Components

Please refer to the following catalogs and information about possible bus configurations:

PROFIBUS  
IK10 Catalog, SINEC Industrial Communication, 1996,  
Order no. E86060-K6710-A101

CS 275  
PLT 130 Catalog, TELEPERM M  
Order no. E86060-K3813-A100

7.3 Spare Parts

Table 7-2 lists the spare parts that are a part of a delivery unit and may be required for repair or in case of a loss.

Table 7-2  Spare parts and accessories

<table>
<thead>
<tr>
<th>Marking</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key for CPUFM (mode selector switch)</td>
<td>6ES7911–0AA00–0AA0</td>
</tr>
<tr>
<td>Software package ASBEDIEN</td>
<td>Scope of delivery, Exchanges per inquiry</td>
</tr>
<tr>
<td>SIMATIC S7/M7 cable connectors for point-to-point connection RS 232C–RS232C, 5m, 9–pin sub–D socket on both sides</td>
<td>6RS7 902–1AB00–0AA0</td>
</tr>
<tr>
<td>SIMATIC S7/M7 cable connectors for point-to-point connection RS 232C–RS232C, 10m, 9–pin sub–D socket on both sides</td>
<td>6RS7 902–1AC00–0AA0</td>
</tr>
<tr>
<td>SITOP POWER DC–USV 40A, UPS with backup</td>
<td>see catalog KT 10, power supply SITOP Power</td>
</tr>
</tbody>
</table>
Applicable Documents
The following Manuals are available from your Sales Partner:

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>available from</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>/1/</td>
<td>Manual TELEPERM M AS 235 Automation system System software, variant G</td>
<td>KA</td>
<td>C79000-G8076-C416</td>
</tr>
<tr>
<td>/2/</td>
<td>Description TELEPERM M &quot;Bridge CS-L2&quot;</td>
<td>KA</td>
<td>C79000-T8076-C707</td>
</tr>
<tr>
<td>/3/</td>
<td>Description TELEPERM M TPM 478 and TBX 478 interface modules</td>
<td>KA</td>
<td>C79000-T8076-C708</td>
</tr>
<tr>
<td>/4/</td>
<td>Description TELEPERM M Migration rack I for AS 488/TM and Bridge CS–L2</td>
<td>KA</td>
<td>C79000-T8076-C710</td>
</tr>
<tr>
<td>/5/</td>
<td>Configuration manual TELEPERM M Input/Output Modules on I/O bus TELEPERM M</td>
<td>KA</td>
<td>C79000-P8000-C703</td>
</tr>
<tr>
<td>/6/</td>
<td>Description TELEPERM M IBS–Terminal for commissioning and Diagnosis of. AS x88/TM</td>
<td>KA</td>
<td>C79000–T8000–C733</td>
</tr>
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<td>/7/</td>
<td>Manual M7-300 Automation system</td>
<td></td>
<td>6ES7398-8BA00-8AA0</td>
</tr>
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<td>/8/</td>
<td>Reference Manual SIMATIC S7-400, M7–400 Automation system Module datas</td>
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<td>C79000–G7000–C411 Bestandteil von 6ES7498-8AA01-8AA0</td>
</tr>
<tr>
<td>/9/</td>
<td>Manual SIMATIC S7 S7-300 Automation system Installation of S7-300, I/O</td>
<td>EWA 4NEB 710 6040</td>
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<td>/10/</td>
<td>Manual SIMATIC S7-400, M7–400 Automation system</td>
<td></td>
<td>6ES7498-8AA01-8AA0</td>
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<td>/11/</td>
<td>Manual TELEPERM M I/O modules</td>
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<td>C79000–G8000–C030 C79000–G8000–C031 C79000–G8000–C032</td>
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<td>/12/</td>
<td>Manual TELEPERM M AS 235 Automation system</td>
<td></td>
<td>C79000-G8000-C295</td>
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</table>

**Note**
Documents /2/, /3/, /4/, /5/, /6/ and /32/ are part of manual "TELEPERM M, supplementary System Documentation", Best. Nr.: C79000–G8076–C700, to be ordered from Lieferzentrum Nürnberg (LZN).
<table>
<thead>
<tr>
<th>Nummer</th>
<th>Titel</th>
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<tr>
<td>/13/</td>
<td>Operating Instructions TELEPERM M PROGRAF AS+</td>
<td>C79000-G8076-C450</td>
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<tr>
<td>/14/</td>
<td>Operating Instructions TELEPERM M OS 525</td>
<td>C79000-G8076-C522</td>
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<td>/15/</td>
<td>Pocket guide TELEPERM M AS 235/AS 235H/AS 235K</td>
<td>C79000-N8076-C001</td>
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<td>/16/</td>
<td>Manual TELEPERM M BATCH X-TM</td>
<td>C79000-G8076-C525</td>
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<tr>
<td>/17/</td>
<td>Description of PROFIBUS–Net (architecture, installation, configuring, components)</td>
<td>6GK1 970-5CA10-0AA0</td>
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<td>/18/</td>
<td>Brief description PROFIBUS</td>
<td>6ZB5 530-0AQ01-0BA7</td>
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<td>/22/</td>
<td>Manual TELEPERM M CS 275 bus system</td>
<td>C79000-G8076-C006</td>
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<td>/23/</td>
<td>Device manual Distributed I/O device ET 200U</td>
<td>6ES5 998-3ES12</td>
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<tr>
<td>/24/</td>
<td>Device manual Distributed I/O device ET 200B</td>
<td>6ES5 998-4ET11</td>
</tr>
<tr>
<td>/25/</td>
<td>Device manual Distributed I/O device ET 200M (with signal module)</td>
<td>6ES7 153–1AA00–8AA0</td>
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<tr>
<td>/26/</td>
<td>Parameterize software COM PROFIBUS (ST50)</td>
<td>6ES5 895–6SE12</td>
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<tr>
<td>/30/</td>
<td>Handbuch TELEPERM M Hinweise und Richtlinien für Planung Installation und Betrieb</td>
<td>C79000–G8076–C417</td>
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<tr>
<td>/31/</td>
<td>Installation manual S7–400, M7–400 Automation System</td>
<td>LZN C79000–G7076–C410, Bestandteil von 6ES7498–8AA01–8AA0</td>
</tr>
<tr>
<td>/32/</td>
<td>Description TELEPERM M Migration rack II for AS 488/TM (configuration+ interfaces)</td>
<td>KA C79000–T8076–C711</td>
</tr>
<tr>
<td>/33/</td>
<td>Manual TELEPERM M Supplementars system documentation</td>
<td>KA C79000–G8076–C700</td>
</tr>
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</table>
Specifications

**This Appendix**

This Appendix contains the technical specifications of the Bridge CVS-L2 unit and the connector pin assignments of the connecting cables.

**Contents**

The individual sections are on the following pages:

<table>
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<th>Section</th>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
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<td>B.1</td>
<td>Specifications</td>
<td>B–2</td>
</tr>
<tr>
<td>B.2</td>
<td>Connecting cables for connecting the IBS terminal to the Bridge</td>
<td>B–4</td>
</tr>
<tr>
<td>B.3</td>
<td>IF961-DIO connector pin assignments</td>
<td>B–5</td>
</tr>
</tbody>
</table>
## B.1 Specifications

### Base units

<table>
<thead>
<tr>
<th>Base system</th>
<th>Current consumption [mA]</th>
<th>Power loss [W]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMATIC M7-400 with CPU 486-3</td>
<td>2,750</td>
<td>16.25</td>
</tr>
</tbody>
</table>

### Extensions

<table>
<thead>
<tr>
<th></th>
<th>Current consumption</th>
<th>Power loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface modules: IF962-COM</td>
<td>100</td>
<td>0.50</td>
</tr>
<tr>
<td>Interface modules: IF961-DIO</td>
<td>100</td>
<td>0.50</td>
</tr>
<tr>
<td>ATM478</td>
<td>200</td>
<td>0.50</td>
</tr>
<tr>
<td>CP5412</td>
<td>450</td>
<td>2.00</td>
</tr>
<tr>
<td>TPM478</td>
<td>1,200</td>
<td>6.00</td>
</tr>
<tr>
<td>MEM_Card</td>
<td>120</td>
<td>0.60</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,920</strong></td>
<td><strong>26.35</strong></td>
</tr>
</tbody>
</table>

### Power supply

<table>
<thead>
<tr>
<th>Input voltage</th>
<th>Current consumption</th>
<th>Power loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC 120V– max</td>
<td>1.14 A</td>
<td>22.4 W</td>
</tr>
<tr>
<td>AC 230V– max</td>
<td>0.57 A</td>
<td>22.4 W</td>
</tr>
<tr>
<td>DC24V– max</td>
<td>4.50 A</td>
<td>33.0 W</td>
</tr>
</tbody>
</table>

| Backup battery 2x Lithium AA 3.6V/1.9 Ah at 25 C | Battery backup time (backup operation) | approx. 2 years |
| Battery backup time (mains operation) | approx. 4 years |
| Service interval | 2 years |

### Ambient conditions

<table>
<thead>
<tr>
<th>Protection rating to VDE 0106 part 1 (IEC 536)</th>
<th>Safety class 1 with PE conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible ambient temperature for operation</td>
<td>0 ... +60 C</td>
</tr>
<tr>
<td>for transport and storage</td>
<td>–40 ... +70 C</td>
</tr>
<tr>
<td>Permissible relative humidity to DIN IEC 721 part 3-3 class 3K3</td>
<td>0 ... +60 C, 95 %</td>
</tr>
<tr>
<td>fan-less operation</td>
<td>yes</td>
</tr>
<tr>
<td>Isolation on the bus</td>
<td>yes</td>
</tr>
<tr>
<td>Bridge CS–L2</td>
<td>yes</td>
</tr>
</tbody>
</table>

### Structure

<table>
<thead>
<tr>
<th>Dimensions with SIMATIC rack UR2</th>
<th>on CS 275</th>
<th>on PROFIBUS</th>
<th>Bridge CS–L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>b=24 cm h=29 cm t=22 cm (add. conn.)</td>
<td>/</td>
<td>/</td>
<td>see AS488</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dimensions with migration rack</th>
<th>on CS 275</th>
<th>on PROFIBUS</th>
<th>Bridge CS–L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
</tbody>
</table>
## Specifications

### Quantity framework

<table>
<thead>
<tr>
<th></th>
<th>on CS 275</th>
<th>on SINEC L2</th>
<th>Bridge CS-L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data throughput [message frames/s]; total in both directions (max. cyclic load 70 %)</td>
<td>/</td>
<td>/</td>
<td>30 long mess. frames or 60 short message frames</td>
</tr>
<tr>
<td>Message burst processing (acyclic reserve 30 %)</td>
<td>/</td>
<td>/</td>
<td>750 messages/10s *) 75 messages/s **)</td>
</tr>
<tr>
<td>Delay caused by the Bridge CS-L2 unit</td>
<td>/</td>
<td>/</td>
<td>max. 100 ms</td>
</tr>
<tr>
<td>Baud rate on the buses</td>
<td>250 kbit/s</td>
<td>1.5 Mbits/s fix</td>
<td>/</td>
</tr>
<tr>
<td>Number of devices</td>
<td>99 (minus L2 devices)</td>
<td>max. 32</td>
<td>/</td>
</tr>
<tr>
<td>Cable length at maximum baud rate) better: max. expansion</td>
<td>local bus 20 m</td>
<td>el. max. 200 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>remote bus max. 4 km</td>
<td>op. max. 15 km</td>
<td>/</td>
</tr>
<tr>
<td>Number of links</td>
<td>/</td>
<td>max. 32</td>
<td>/</td>
</tr>
<tr>
<td>Number of bridges in series</td>
<td>/</td>
<td>/</td>
<td>1</td>
</tr>
</tbody>
</table>

*) Assumption: 5 messages per MKS/status message frame

### Redundancy

<table>
<thead>
<tr>
<th></th>
<th>Bridge CS-L2 unit</th>
<th>CS275 bus medium</th>
<th>SINEC L2 (el.) bus medium</th>
<th>SINEC L2 (opt.) bus medium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>/</td>
<td>yes, local and remote bus</td>
<td>/</td>
<td>no</td>
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</table>

### Configuration

<table>
<thead>
<tr>
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<th>on CS 275</th>
<th>on SINEC L2</th>
<th>Bridge CS-L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>see Bridge CS-L2</td>
<td>see Bridge CS-L2</td>
<td>IBS terminal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>SINEC NETINST</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ASCII editor</td>
</tr>
<tr>
<td>Connection</td>
<td>/</td>
<td>/</td>
<td>IF962-COM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9-way zero-modem cable</td>
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### Interfaces

<table>
<thead>
<tr>
<th></th>
<th>on CS 275</th>
<th>on SINEC L2</th>
<th>Bridge CS-L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>IF962-COM</td>
<td>/</td>
<td>/</td>
<td>RS 232</td>
</tr>
<tr>
<td>IF961-DIO</td>
<td>/</td>
<td>/</td>
<td>message indicator</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>OLM contact</td>
</tr>
<tr>
<td>IF964–DP</td>
<td>/</td>
<td>RS 485</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Profibus part 1</td>
<td></td>
</tr>
<tr>
<td>TPM 478</td>
<td>CS 275</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>local bus</td>
<td></td>
<td></td>
</tr>
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</table>
### B.2 Connecting Cables for Connecting the IBS Terminals to the Bridge CS-L2 Unit

The connection between the IBS terminal (PC) and the COM interface of the Bridge CS-L2 unit is established via a V24 cable with crossed TxD and RxD lines (0-modem cable).

The interface of the Bridge CS-L2 unit is always the COM1 interface of the IF962-COM unit (9-way subminiature "D"). 9-way and 25-way subminiature "D" connectors are common at the PC.

**Connecting cable with control lines**

- 9-way sub "D" with screw lock
- 9-way sub "D" with screw lock

**MLFB**

6ES7 902-1Ax00-0AA0

(from stock)

<table>
<thead>
<tr>
<th>Signal</th>
<th>Pin</th>
<th>Connection</th>
<th>Pin</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1/GND</td>
<td>G</td>
<td>screen</td>
<td>G</td>
<td>E1/GND</td>
</tr>
<tr>
<td>M5/DCD</td>
<td>1</td>
<td>–</td>
<td>1</td>
<td>M5/DCD</td>
</tr>
<tr>
<td>D2/RxD</td>
<td>2</td>
<td>connected</td>
<td>3</td>
<td>D1/TxD</td>
</tr>
<tr>
<td>D1/TxD</td>
<td>3</td>
<td>connected</td>
<td>2</td>
<td>D2/RxD</td>
</tr>
<tr>
<td>S1/DTR</td>
<td>4</td>
<td>connected</td>
<td>6</td>
<td>M1/DSR</td>
</tr>
<tr>
<td>E2/GND</td>
<td>5</td>
<td>connected</td>
<td>5</td>
<td>E2/GND</td>
</tr>
<tr>
<td>M1/DSR</td>
<td>6</td>
<td>connected</td>
<td>4</td>
<td>S1/DTR</td>
</tr>
<tr>
<td>S2/RTS</td>
<td>7</td>
<td>connected</td>
<td>8</td>
<td>M2/CTS</td>
</tr>
<tr>
<td>M2/CTS</td>
<td>8</td>
<td>connected</td>
<td>7</td>
<td>S2/RTS</td>
</tr>
<tr>
<td>M3/R1</td>
<td>9</td>
<td>–</td>
<td>9</td>
<td>M3/R1</td>
</tr>
</tbody>
</table>

**Connecting cable with control lines**

- 9-way sub "D" with screw lock
- 9-way sub "D" with screw lock

**MLFB**

6ES7 902-1Cx00-0AA0

(manufactured upon request)

<table>
<thead>
<tr>
<th>Signal</th>
<th>Pin</th>
<th>Connection</th>
<th>Pin</th>
<th>Signal</th>
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</thead>
<tbody>
<tr>
<td>E1/GND</td>
<td>G</td>
<td>screen</td>
<td>G</td>
<td>E1/GND</td>
</tr>
<tr>
<td>M5/DCD</td>
<td>1</td>
<td>–</td>
<td>8</td>
<td>M5/DCD</td>
</tr>
<tr>
<td>D2/RxD</td>
<td>2</td>
<td>connected</td>
<td>2</td>
<td>D1/TxD</td>
</tr>
<tr>
<td>D1/TxD</td>
<td>3</td>
<td>connected</td>
<td>3</td>
<td>D2/RxD</td>
</tr>
<tr>
<td>S1/DTR</td>
<td>4</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>E2/GND</td>
<td>5</td>
<td>connected</td>
<td>7</td>
<td>E2/GND</td>
</tr>
<tr>
<td>M1/DSR</td>
<td>6</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>M2/CTS</td>
<td>8</td>
<td>connected</td>
<td>20</td>
<td>S1/DTR</td>
</tr>
<tr>
<td>M3/R1</td>
<td>9</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>–</td>
<td>–</td>
<td>shorted with 4</td>
<td>5</td>
<td>M2/CTS</td>
</tr>
<tr>
<td>–</td>
<td>–</td>
<td>shorted with 5</td>
<td>4</td>
<td>S2/RTS</td>
</tr>
</tbody>
</table>

**9-way**

- Sub D (female)
- COM1 IF962-COM

**25-way**

- Sub D (female)
- COMx IBS term.
## B.3 Connector Pin Assignments of IF961-DIO

### Table B-1  Function assignments of the outputs

<table>
<thead>
<tr>
<th>Output</th>
<th>Alarm output</th>
<th>Utilization</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>DO 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO 1</td>
<td>I&amp;C group alarm</td>
<td>Cabinet lamp</td>
<td>max. 100 mΩ</td>
</tr>
<tr>
<td>DO 2</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO 3</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO 4</td>
<td>Receive on PROFIBUS</td>
<td></td>
<td>reserved for diagnosis informations</td>
</tr>
<tr>
<td>DO 5</td>
<td>Send on CS 275</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO 6</td>
<td>Receive on CS 275</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DO 7</td>
<td>Send on PROFIBUS</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table B-2  Function assignments of the inputs

<table>
<thead>
<tr>
<th>Output</th>
<th>Alarm input</th>
<th>Utilization</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>DI 0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DI 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DI 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DI 3</td>
<td>Door contact</td>
<td>Door contact</td>
<td></td>
</tr>
<tr>
<td>DI 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DI 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DI 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DI 7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Glossary of Terms
A

**AS 235**
Automation system of the TELEPERM M process control system. An AS 235 is delivered as a complete system in the TELEPERM standard cabinet.

**AS 388/TM**
Automation system of the TELEPERM M process control system on the basis of SIMATIC M7-300 and SINEC components.
An AS 388/TM can be installed on the wall, in a rack or in a cabinet.

**AS 488/TM**
Automation system of the TELEPERM M process control system on the basis of SIMATIC M7-300/M7-400 and SINEC components and additional TELEPERM M components.
An AS 488/TM can be installed on the wall, in a rack or in a cabinet.

B

**Bridge**
Link between two bus systems (Local Area Network) on layer 2b of the ISO/OSI (International Standards Organization/Open Systems Interconnection) reference model. Layers 1 and 2a may be different. The bridge is transparent to the user.

**Bridge CS-L2**
Bridge CS-L2 interconnects the CS 275 and PROFIBUS –TM system buses of TELEPERM and performs protocol conversion. The components used for AS 488/TM are also used as the basis of hardware and operating system.

C

**CMOS**
Abbreviation of Complementary Metal Oxide Semiconductor. Permits low power loss and large-scale integration, is insensitive to interference and variations of voltage and temperature.

**CPU 488-4**
Central processing module of AS 488/TM (AT-compatible computer unit).

**CP 5412 (A1)**
The CP 5412 (A1) communications processor is used for linking AS 488/TM to PROFIBUS –TM.

**CS 275**
TELEPERM M bus system.
### Glossary of Terms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ET 200</strong></td>
<td>Distributed I/O system of the SIMATIC product family. ET 200 consists of the remote I/O units ET 200M, ET 200U, and ET 200B and of the PROFIBUS –DP bus.</td>
</tr>
<tr>
<td><strong>ET 200M</strong></td>
<td>Remote I/O unit with standard and Ex(i) modules of the SIMATIC M7-300 product family.</td>
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<tr>
<td><strong>ET 200U</strong></td>
<td>Remote I/O unit with modules of the SIMATIC S5 product family.</td>
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<tr>
<td><strong>ET 200B</strong></td>
<td>Remote I/O unit with electronics modules for digital and analog inputs and outputs.</td>
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<td><strong>FO</strong></td>
<td>Fiber Optics</td>
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<tr>
<td><strong>IFS Terminal</strong></td>
<td>AT-compatible personal computer with specific software packages for commissioning, test and diagnosis of the Bridge CS-L2 unit.</td>
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<td><strong>IF ...</strong></td>
<td>Interface module</td>
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<td><strong>IF 961–DIO</strong></td>
<td>The IF 961 interface module is used for the input and output of I&amp;C signals.</td>
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<tr>
<td><strong>IF 962–COM</strong></td>
<td>The IF 962 interface module is used for connecting a PC for local commissioning and diagnosis.</td>
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<td><strong>IF 964–DP</strong></td>
<td>The IF 964 interface module is used for connecting the AS 388/TM and AS 488/TM as well as Bridge CS–L2 to PROFIBUS –TM, PROFIBUS –DP and PROFIBUS–AG/AG.</td>
</tr>
<tr>
<td><strong>ISA bus</strong></td>
<td>Industry Standard Architecture Bus. The ISA bus is the standard bus of AT-compatible personal computers.</td>
</tr>
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### Glossary of Terms

#### L

**LED**  
Light Emitting Diode

#### M

**Memory Card**  
The memory card is a plug-in memory module. It accommodates parts of or the entire software of a central or function module and static data.

**M7-400**  
M7-400 is an AT-compatible automation computer of the SIMATIC product family. It is made in the SIMATIC S7-400 packaging design.

#### O

**OLM**  
Optical Link Module for Profibus/SINeC L2. The OLM enables two devices to be connected to an optical network. It also permits a connection between an electrical and an optical network to be established.

**OS 525**  
Operator communication and visualization system for central handling and monitoring of processes.

#### P

**PROFIBUS**  
PROcess FIeld BUS, German Field Bus Standard DIN 19245 parts 1 through 3.

**PROFIBUS–DP**  
Standard SINeC/SIMATIC field bus to connect decentralized periphery with DP record; based on PROFIBUS

**PROFIBUS–TM**  
Standard bus system according to DIN 19245 (PROFIBUS) with TELEPERM record

**PROGRAF AS+**  
Configuration system for convenient automation system configuration with graphical input of the structure.
| **Protocol** | A formally specified set of conventions governing message format and data flow of data transmission (e.g. transmitting/receiving AKS, BKS, or MKS message frames). |
| **PS ...** | Power supply module from the SIMATIC product family. |
| **R** | |
| **RAM** | Random Access Memory |
| **RMOS32** | RMOS32 is a multitasking operating system with real-time features. |
| **RS 232** | Serial interface to the DIN 66020 standard. |
| **S** | |
| **SDA** | Send Data with Acknowledgement. SDA is an FDL service. |
| **SDN** | Send Data with No acknowledgement; SDN is an FDL service. |
| **T** | |
| **Tasks** | Program units that execute under an operating system (here: RMOS32) in a time-, event- and priority-controlled manner. |
| **TML** | TELEPERM M Language; programming language of the TELEPERM M process control system. It permits specific function blocks to be created and complex functions to be implemented. |
| **TPM 478** | The TPM 478 interface module is used for linking the Bridge CS-L2 unit with the CS 275 bus system. |
TELEPERM M

TPM 478 and TBX 478 Interface Modules

Technical Description

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Safety Instructions

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

- **Danger**
  Failure to observe a Danger note will cause death, severe personal injury or severe damage to the equipment.

- **Warning**
  Failure to observe a Warning note may cause death, severe personal injury or severe damage to the equipment.

- **Caution**
  Failure to observe a Caution note may cause personal injury or damage to the equipment.

- **Note**
  Notes contain important information regarding the product, product handling or a specific part of the document that requires special attention.

Qualified Personnel

The unit may only be commissioned and used on the basis of the information contained in this Manual. Only qualified personnel are authorized to perform any work inside the unit. Qualified personnel in the sense of the safety instructions in this Manual are persons who have been authorized to commission, ground and label units, systems and circuits according to the safety-relevant standards.

Normal Use

Please observe the following instructions:

- **Warning**
  The unit may only be used for the applications mentioned in the Catalogue and the Technical Description. It may only be used together with third-party equipment or components that have been recommended or released by Siemens.
  Faultless and safe operation of the product requires proper transport, storage, installation and commissioning, and careful handling and maintenance.

Trademarks

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Third parties using for their own purposes any other names in this document which refer to trademarks might infringe upon the rights of the trademark owners.

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Exclusion of Liability

Although we have checked the contents of this document against the hardware and software described herein, the information contained in this document may not cover all details. We can therefore not assume any liability for completeness. The information in this document is checked at regular intervals and necessary corrections will be included in the next revisions. We are grateful for any suggestions.

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Subject to technical modifications without notice
Preface

**Purpose of the description**

The information from this technical description enables you to

- commission the TPM 478 and TBX 478 interface modules
- look up descriptions of functions and technical specifications

**Contents of the description**

This document describes the system-related functions of the TPM 478 and TBX 478 interface modules.

The description contains the following topics:

- Product overview
- Application, design, method of operation
- Installation and commissioning
- Parameter setting
- Ordering information
  - I/O modules, applicable documents, glossary of terms, index

**Audience**

This Technical description is directed to commissioning, design and service personnel.
Depending on the task, the following knowledge is required:

- For commissioning:
  - You are supposed to be familiar with the TELEPERM M process control system, in particular with the AS 488/TM and Bridge CS-L2 components.
  - Knowledge of the IBS terminal including the supporting software (part of the delivered system software)
  - Working knowledge of the CS 275 bus system
  - Working knowledge of the PROFIBUS–TM bus system and the CP 5412 communications processor

- For parameter setting and configuration
  - Knowledge of the PROGRAF AS+ configuration system and the IBS terminal
  - NETINST configuration package for the CP 5412

- For service
  - Knowledge of the IBS terminal for local commissioning and diagnosis.

There are various Technical Descriptions and Manuals available that provide additional information (see Applicable Documents in Appendix A).
To install, commission and use the TPM 478 and TBX 478 interface modules, you may need some of the following Technical Descriptions and Manuals (depends on your configuration). "Applicable Documents" in Appendix A tells you the order numbers of these documents and from where you can order them.

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<td></td>
<td>• System subroutines</td>
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</tr>
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<td></td>
<td>• Handling and configuration instructions (configuration languages TML and STEP M)</td>
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<td></td>
<td>• Signalling and diagnosis structure (system and error messages)</td>
<td></td>
</tr>
<tr>
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<td><strong>TELEPERM M AS 388/TM and AS 488/TM Automation Systems</strong></td>
<td>installing, commissioning and configuring AS 388/TM and AS 488/TM</td>
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<tr>
<td>Tech. Description</td>
<td><strong>TELEPERM M Bridge CS-L2</strong></td>
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<tr>
<td>Tech. Description</td>
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<td>installation, commissioning and operation</td>
</tr>
<tr>
<td></td>
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<tr>
<td>Tech. Description</td>
<td><strong>TELEPERM M Terminal for local commissioning of AS 388/488/TM and Bridge CS-L2</strong></td>
<td>commissioning and diagnosis. Contained in the delivery of the system software (memory card) of AS or Bridge</td>
</tr>
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<tr>
<td>Manual</td>
<td><strong>SIMATIC S7–400, M7–400 Automation System</strong></td>
<td>installing and commissioning AS 488/TM or Bridge CS–L2</td>
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<tr>
<td></td>
<td>• Installing the M7–400</td>
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### Note

The documents /2/, /3/, /4/ and /5/ are included in the "TELEPERM M, Additional System Documents" Manual (Order No. C79000–G8076–C700, to be ordered from Lieferzentrum Nürnberg (LZN)).
Conventions

The following convention is used for swift and easy identification of important information. The convention defines the different keyboard input methods.

<table>
<thead>
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<th>Convention</th>
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<tr>
<td><strong>BOLD</strong></td>
<td>Instruction names, switches and text strings that must be entered exactly as they are shown.</td>
</tr>
</tbody>
</table>

Scope of delivery

The document is a part of the "Additional System Documents" Manual.

Applicable documents

Appendix A contains a list of the applicable documents and specifies the documents’ order numbers and the places from where they can be ordered.

Catalogs

The catalogs contain information and ordering data of the hardware and software components. They also inform about the current configuration capabilities of the system components that may be used in TELEPERM M.

Inquiries

Please contact your sales partner if you need more information about the TPM 478 and TBX 478 interface modules.

Please return a completed correction sheet if you have any suggestions or corrections for the description. The correction sheet is contained in the mailbox of the "TELEPERM M, Additional System Documents" Manual.
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Product Overview

Contents

The brief information in this chapter gives you a swift orientation of the TPM 478 and TBX 478 interface modules.
A TPM 478 is an interface module in the M7-400 design of the SIMATIC M7 product family. It is used as an extension of the CPU 486-3 central module in the AS 488/TM automation system or in the Bridge CS-L2 unit of the innovated TELEPERM M process control system.

Two independent functions have been implemented in the TPM 478 interface module:

- **CS 275 functionality**
  A powerful processor handles the communication functions towards the CS 275 bus system.
  The CS 275 functionality of the TPM 478 in the AS 488/TM system corresponds to the functionality of the N-AS standard local bus interface in an AS 235 system.

- **TELEPERM M I/O functionality**
  Here, a powerful processor handles the access functions to the TELEPERM M I/O modules via a cyclically updated process image.
  The process data from the inputs and to the outputs of the field devices is stored in the process image.
  Mapping the process data from the TPM 478 process image into the application program is still done via driver blocks (as in the AS 235 system).

A TBX 478 is an interface module in the M7-400 design of the SIMATIC M7 product family. Together with the TPM 478 interface module it is used in AS 488/TM automation systems with migration racks for linking the TELEPERM I/O modules.

The TBX 478 interface module is used as an extension of the TPM 478 module and implements the following functions:

- Two I/O bus interfaces for the TELEPERM M base and extension cabinet
- I/O bus logic power supply with +5 V bus
The following examples explain the utilization of the interface modules:

**Example 1: Connecting the AS 488/TM to CS 275**

Fig. 1-1 shows, how you can use the TPM 478 interface module for connecting the AS 488/TM automation system to the CS 275 bus system. The automation system must not simultaneously be connected to the PROFIBUS–TM bus system.

Figure 1-1 TPM 478 provides the connection to the CS 275 bus system
Together with the TBX 478 interface module, the TPM 478 interface module is used for connecting existing TELEPERM M I/O units of the base and extension cabinet of an AS 220/230/235 system. The base unit of the central unit is replaced with a pre-assembled rack (the migration rack). The migration rack contains an AS 488/TM system that has been enhanced by the TPM 478 and TBX 478 components, and provides the two I/O bus connections A and B for the existing extension units.

Data exchange with the existing extension units takes place via the I/O buses A and B of the TPM 478. Fig. 1-2 shows this application.

**Example 2:**
**Connecting the TELEPERM M I/O**

Figure 1-2  TPM 478 provides the connections to TELEPERM M I/O modules

**Note**

Alternatively, the AS 488/TM may be connected to the CS 275 bus via TPM 478. The PROFIBUS–TM interface is not required in this case. Simultaneous connection to PROFIBUS–TM and CS 275 in AS 488/TM is not possible.
Example 3: Utilization in the Bridge CS-L2

In the Bridge CS-L2, the TPM 478 interface module provides the link to the CS 275 bus system. The TPM 478 unit receives the CS 275 message frames and transfers them to the Bridge CS-L2 software for further processing.

Figure 1-3  TPM 478 in the Bridge CS-L2
All connections and indicators of the TPM 478 and TBX 478 interface modules are located on the module’s front panel (see Fig. 1–4).

Figure 1-4  Location of the connectors and indicators of the TPM 478 and TBX 478 interface modules
Configuration, general

Configuration is always performed for the system in which the module(s) is (are) to be used:

- in the AS 488/TM or
- in the Bridge CS-L2.

The TPM 478 module requires various parameters to be set. These parameters include system parameters, such as bus and device address, and parameters that describe the standard TELEPERM I/O hardware configuration that exists for the automation task. The TBX 478 module does not require any parameters as it obtains its data from the TPM 478 module. The system parameters are locally set via the IBS terminal.

The configuration parameters of the I/O area are specified using PROGRAF AS+ and the SYST.WART service block. A transfer file of the IBS terminal permits the modified configuration data to be transferred from the system memory to the system memory card. The updated system parameters will then be loaded when the system is restarted.

Setting the TPM 478 parameters

The parameters of the TPM 478 unit are automatically set by the AS or Bridge software when the system is started.

Note
The system parameters are configured using the IBS terminal. IBS terminal means a PC with commissioning software that is connected to the serial COM interface of the AS 488/TM system. The software is included in the system software delivery (memory card) of AS or Bridge.

I/O busses

I/O bus A and B correspond to both I/O busses of basic and extension cabinet resp. both busses of a K system (for two lines with ES 100K). I/O bus B comes from bus A via repeater, this means that an interruption of bus A has an effect on bus B.
The TPM 478 and TBX 478 interface modules provide the following functions:

- Interfaces:
  - Local bus interface to the CS 275 bus system
  - I/O bus interface to the TELEPERM M I/O units

- Communications functions of the TPM 478 are compatible with CS 275

- I/O functions of TPM 478 and TBX 478 are compatible with the TELEPERM M I/O bus interface

- Stable hardware and software based on the SIMATIC M7 product family:
  - Uniform M7-400 design
  - Uniform interface specifications of the CPU 486-3 (ISA bus / backplane bus)
  - SMD technology

- Increased noise immunity by isolation of the CS 275

- Low power losses due to power-saving technologies

- Fan-less operation

The standards the module complies with include:

- CE
- UL/CSA
- FM.
This chapter tells you

- the tasks and applications the TPM 478 and TBX 478 interface modules are suitable for:
- the features of the TPM 478 and TBX 478 interface modules.
The following is a brief description of the tasks that can be solved with the TPM 478 and TBX 478 modules. Both modules are optional components of the AS 488/TM automation system. The TPM 478 is a general component of the Bridge CS-L2 unit. These modules enable you to solve three different problems:

- Connecting the AS 488/TM to the CS 275 bus (via TPM 478)
- Connecting the Bridge CS-L2 to the CS 275 bus (via TPM 478)
- Connecting the TELEPERM M I/O field devices (via TBX 478 and TPM 478 and migration rack).

If you want to use the AS 488/TM automation system directly on the TELEPERM M CS 275 bus system, you add the TPM 478 interface module to the CPU 486-3 central module. The CP 5412 must not be installed in this case. The following definitions must be made through configuration via the IBS terminal:

- CS 275 instead of PROFIBUS–TM
- Bus and device address

Using the IBS terminal, the data is transferred via a transfer file to the system memory card. When the system is restarted, the current system parameters will be loaded into the CPU’s system memory and the AS automatically starts up on the CS 275 bus.

With the Bridge CS-L2 unit, the TPM 478 module is a part of the basic system configuration. Using the IBS terminal, define the bus and device address on the CS 275 bus, and the address range via which the device can be reached on the PROFIBUS–TM bus. In the address range, you must define the allocation of the participating bus devices on the PROFIBUS–TM bus. From the bridge’s device address onwards, these devices will then act as devices on the CS 275 bus.
You need the TPM 478 and TBX 478 modules if you wish to use the automation system together with TELEPERM M I/O field devices. The modules must be installed in the migration rack.

The TPM 478 on the TELEPERM M I/O bus writes data to the process image of the configured I/O modules. For the TPM 478 module, the TBX 478 module implements the two I/O bus interfaces to connect the TELEPERM M base and extension cabinets, and provides the connection of the +5 V bus.

The migration rack has been designed such that the arrangement of the interfaces of the two modules satisfies the TELEPERM M requirements to an optimum. The migration rack is installed as a direct replacement of the old AS base unit in the cabinet.

It is particularly useful that all mechanical fittings have been pre-assembled and everything is ready for installation in the cabinet.

---

**Note**

The AS 488/TM in the migration rack cannot be used as a replacement of the redundant AS 220H or AS 235H systems.

Please refer to the Description /4/ for details of the migration rack.
**Features of TPM 478**
The TPM 478 interface module has the following features:
- Local bus interface to the CS 275 bus system
- Communications functions that are compatible with the N-AS interface module
- Interface to the TELEPERM M I/O bus via TBX 478
- I/O functions that are compatible with the TELEPERM M I/O interface.
- Increased noise immunity due to isolation of the local bus on the CS 275 bus
- Interface to the ISA bus of the CPU 486-3
- Diagnostics indicators for local bus and TELEPERM M I/O modules
- Maintaining the process image

**Features of TBX 478**
The TBX 478 interface module has the following features:
- Interface to the TPM 478 module to implement the two TELEPERM M I/O buses A and B.
- Interface connections via connecting cables for the TELEPERM M I/O buses of the base and extension cabinets.
- Interface for +5 V bus to feed the TELEPERM M extension units (cabinet connections).
- Interface to the backplane bus to feed the +5 V bus from the power supply module of the automation system.

**Common features**
The TPM 478 and TBX 478 interface modules have the following features:
- Stable hardware and software based on the SIMATIC M7 product family:
  - Uniform M7-400 design
  - Uniform interface specifications of the CPU 486-3 (ISA bus / backplane bus)
  - Modern SMD technology
- Low power losses due to power-saving technologies
- The standards the modules comply with include:
  - CE
  - UL/CSA
  - FM.
This chapter gives you general information about the configuration of the TPM 478 and TBX 478 interface modules. It also tells you how to configure the TPM 478 and TBX 478 interface modules according to their utilization:

- in the AS 488/TM
  - connection to CS 275
  - connection to the TELEPERM M I/O
- in the Bridge CS-L2 unit.

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</table>
The TPM 478 and TBX 478 modules are interface modules of the CPU 486-3 that provide the connections to the CS 275 bus system and to the TELEPERM M I/O (see Fig. 3-1).

The TPM 488 connects to the CPU 486-3 via the ISA bus connector at the side of the module. The system software of the AS 488/TM or the Bridge CS-L2 unit employ this bus for exchanging their data with the TPM478 module.

Two TELEPERM M I/O buses (A and B) connect to the two connectors of the TBX 478. The logic power supply (+5 V) from the central power supply unit of the CPU 486-3 is connected separately via the backplane bus.

The TBX 478 and the TPM 478 are connected with each other via a connecting cable. The cyclically transmitted input and output data to and from the two buses is transmitted via this cable. The TPM 478 maintains these values in a process image.

Figure 3-1  Configuration, general

Note
You may connect the TPM 478 to the CS 275 bus system and the TELEPERM M I/O at the same time, Or, you can use only one connection.
3.1 Configuring AS 488/TM on CS 275

Fig. 3-2 shows how you can use the TPM 478 interface module to connect the AS 488/TM to the CS 275 bus system. Connecting the AS 488/TM at the same time to the PROFIBUS –TM bus system is not permitted.

![Figure 3-2 Configuration of the TPM 478 module in AS 488/TM](image-url)
3.2 Configuring AS 488/TM on TELEPERM M I/O

Figs. 3–3 and 3–4 show two major configurations of the TPM 478 and TBX 478 interface modules in the AS 488/TM:

- Fig. 3–3: AS 488/TM on SINEC L2/L2FO and TELEPERM M I/O
- Fig. 3–4: AS 488/TM on CS 275 and TELEPERM M I/O

Cable routing from the TBX 478 module to the I/O bus and to the TPM 478 module requires special measures that have already been solved and implemented in the migration rack (see Fig. 3-5). A maximum of 42 TELEPERM M I/O modules per I/O bus and cabinet are permitted. Each I/O bus may be expanded by an ES 100 K (12 additional I/O modules).

![Diagram of TPM 478 and TBX 478 in AS 488/TM on SINEC L2/L2FO]

Figure 3-3 TPM 478 and TBX 478 in AS 488/TM on SINEC L2/L2FO
Fig. 3–4 shows the configuration of the TPM 478 and TBX 478 interface modules in the AS 488/TM that provide the connections to CS 275 and TELEPERM M I/O.

![Diagram of TPM 478 and TBX 478 in AS 488/TM on CS 275]

1. TPM 478 interface module
2. TBX 478 interface module
3. I/O bus B
4. I/O bus A
5. +5 V Logic power supply
6. Connecting cable between TBX 478 and TPM 478
7. Rack with nine slots

Figure 3-4 TPM 478 and TBX 478 in AS 488/TM on CS 275

**Note**

In this application, you must install, wire, and fuse the AS 488/TM yourself. The migration rack (see next section) will assist you in installing the modules. Please refer to the Descriptions /2/ and /4/ for details of AS 488/TM, migration rack, and the process I/O modules that may be connected.
Migration rack

The migration rack is a pre-assembled rack with integrated SIMATIC S7/M7-400 backplane bus. It has the dimensions of the ES 902 packaging system that has been used in the previous TELEPERM M automation systems. It is able to accommodate one of the two configurations shown in Figs. 3-3 and 3-4., and contains a suitable guidance of pre-assembled cables and an integrated fuse for L+ 24 V/16 A.

There are two connectors at the rear of the migration rack that provide the connections for the I/O buses A and B via the existing ribbon cables. Through the TBX 478 module, the TPM 478 in the migration rack processes up to two I/O buses, each with up to 3 racks, and up to 42 TELEPERM M E/O modules per I/O bus. The racks on I/O bus A or B may consist of the following systems:

- Three extension racks and one ES 100K unit
- At least one extension unit and up to three ES 100K units
- Together with TBX 478, one base cabinet and one extension cabinet, each with up to three extension units of an AS 230 or AS 235 system (see Fig. 3-5).

Additional modules may be connected via the ES 100K extension system.

---

**Figure 3-5 Migration rack**
3.3 Configuration Bridge CS-L2

TPM 478 in the Bridge CS-L2 unit

The TPM 478 interface module is a part of the Bridge CS-L2 unit. It provides the connection to the CS 275 local bus system.

Fig. 3–6 shows the configuration of the TPM 478 interface module in the Bridge CS-L2 unit.

__Figure 3-6  Configuration of Bridge CS-L2 unit__

__Note__

Please refer to the Description /3/ for details of the Bridge CS-L2 unit.
Method of Operation

This chapter describes the functions of the TPM 478 and TBX 478 interface modules. In its first part you will find general information regarding the module’s function and parameter setting. The subsequent chapters give you specific information related to their utilization in the AS 488/TM or Bridge CS-L2 unit.

Contents

The sections are on the following pages:

<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Using AS 488/TM on CS 275</td>
<td>4-7</td>
</tr>
<tr>
<td>4.2</td>
<td>Using AS 488/TM with TELEPERM M I/O</td>
<td>4-11</td>
</tr>
<tr>
<td>4.3</td>
<td>Utilization in the Bridge CS-L2 unit</td>
<td>4-14</td>
</tr>
</tbody>
</table>
Function, general

Depending on its utilization, the TPM 478 interface module integrates the following TELEPERM M-related functions into the AS 488/TM or the Bridge CS-L2 unit:

- Connection to the TELEPERM M bus system CS 275 (local bus)
- Connection to the TELEPERM M I/O (via TBX 478 interface module).

The general functions of both interface modules are explained in the following paragraphs.

Function of TPM 478

Fig. 4-1 shows in a simplified form the function of the TPM 478 interface module. The individual function blocks are explained below.

![Method of operation of the TPM 478 module](image-url)
The interface to the ISA bus is independent of the backplane bus. It establishes the connection with the CPU 486-3, and includes the data transfer interface. The interface logic controls the memory access in the RAM address area of the CPU 486-3. All data access and parameter setting operations of the TPM 478 module are performed via this interface.

The bus processor consists of an 80C188 microprocessor and RAM and Flash EPROM modules. It interconnects the ISA bus and bus interface logic interfaces.

Major functions are:
- Reading the data that has been fetched via the interface logic
- Setting up a bus message frame
- Transferring the bus message frame to the bus interface logic
- Processing the received message frames from the local bus
- Performing plausibility checks
- Transferring the data to the interface logic

The bus interface logic handles the lower layers of the CS 275 bus protocol and controls the access procedure of the CS 275 bus.

Major functions are:
- Serial/parallel conversion of the received message frames
- Performing plausibility checks
- Parallel/serial conversion of the transmitted message frames of the bus processor
- Receiving and transmitting CS 275 message frames
- Isolating the local bus signals
- Handling the token procedure

The I/O processor consists of an 80C186 microprocessor, the I/O bus logic, and RAM and Flash EPROM modules. It interconnects the ISA bus and the I/O bus interfaces.

The interface to the TBX 478 module establishes the connection between TPM 478 and TBX 478. The TPM 478 interface module maintains the process image which is updated in every scan. The TBX 478 module separates the two I/O buses into I/O bus A and I/O bus B.
Fig. 4–2 shows in a simplified form the function of the TBX 478 interface module. The individual function blocks are explained below.

**Function of TBX 478**

The interface to the I/O bus establishes the connection between TPM 478 and TBX 478. The TPM 478 interface module maintains the process image and executes the individual input/output commands to the TELEPERM M I/O modules that are necessary for producing the process image. These input/output commands are separated by the TBX 478 module and transferred via I/O buses A and B to the I/O modules.

**Bus driver**

The bus driver amplifies the signals for the I/O bus B.

**Power supply of I/O buses A and B**

From the power supply via the system’s backplane bus, the TBX 478 interface module produces the 5 V power supply for the extension units of the related TELEPERM M I/O buses A and B and provides it at two connecting points.

---

**Figure 4-2** Method of operation of the TBX 478 module
### Addressing/setting the parameters

Each device on the bus system possesses its own unique address. The address consists of the bus address and the device address (BA/TA). Parameters and address of the TPM 478 interface module are set automatically during the startup of the individual systems. The following parameters must be entered via IBS terminal when the AS 488/TM or the Bridge CS-L2 unit is configured:

- System parameters, such as bus address and device address
- System parameters for the bus system (PROFIBUS–TM and/or CS 275)
- Configuration parameters for the TELEPERM I/O (in AS 488/TM).

The TBX 478 module receives data exclusively from the TPM 478 module; parameters need not be set here.

### System parameters

Use the IBS terminal for entering or modifying system parameters.

- Bus address: $0 \leq BA \leq 7$
- Device address: $0 \leq TA \leq 99$

### Configuration parameters

Use the following procedure to enter the configuration parameters:

<table>
<thead>
<tr>
<th>Configuration parameters for TELEPERM M I/O</th>
<th>Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBS terminal or PROGRAF AS+: SYST.WART service tool</td>
<td></td>
</tr>
</tbody>
</table>
**Normal operation** During operation, TPM 478 control and transmission or reception of message frames are performed:

- via the TML or Bridge CS-L2 execution system (e.g. read parameter message frames)
- via function blocks (e.g. AKS)
- via the SYST.WART test and service block (definition and configuration of the TELEPERM M I/O)

Operator input is not required. The TPM 478 processes the tasks cyclically. Use the SYST.WART test and service block in PROGRAF AS+ or the IBS terminal to perform modifications (see Fig. 4-3).

![TPM 478 access methods](image-url)
4.1 Using AS 488/TM on CS 275

Function of TPM 478

The TPM 478 interface module provides the connection of the AS 488/TM automation system to the CS 275 bus system.

Fig. 4-1 shows the general method of operation of the TPM 478 module.

Startup behavior of CS 275

An initialization and self-test routine executes in the TPM 478 software whenever the AS 488/TM is switched on or reset (see Fig. 4-4).

![Diagram of startup behavior of the TPM 478 module in AS 488/TM: CS 275]

Co-ordination

First of all, slot addresses, module IDs and system parameters of the TPM 478 module are set to the default values from the AS software.
The default values are read and interpreted before the TPM 478 firmware is started. Distinction is made between two different startup methods (see Fig. 4-5).

**Hardware reset**

After a hardware reset (such as cycling power off and back on), an internal compressed test of processor, RAM and EPROM is performed, followed by the actual startup. The seven LEDs on the TPM 478 front panel keep you informed of operation and startup activities and permit swift diagnosis in the event of a malfunction. When startup has successfully been terminated, the bus LEDs show the following pattern:

<table>
<thead>
<tr>
<th>LED</th>
<th>LED display</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCS</td>
<td>weak cyclic flashing (no malfunction)</td>
</tr>
<tr>
<td>T</td>
<td>nearly steady weak indication</td>
</tr>
<tr>
<td>D,M</td>
<td>are blinking</td>
</tr>
<tr>
<td>A,B</td>
<td>LED ON: active bus</td>
</tr>
<tr>
<td></td>
<td>brief blinking: passive bus</td>
</tr>
</tbody>
</table>

**Note**

Not every deviation from this pattern shows a malfunction of the TPM 478 module.

The next section informs you of the meaning of the individual LEDs.

**Software reset**

The processor initialization is retained. The AS/Bridge software sets new parameter values. The rest of the startup is the same as in a hardware reset.
Table 4-3 explains the status and fault indications that are significant for the CS 275 behavior. They are listed in the sequence in which they are arranged on the TPM 478 interface module. The TPM 478 module features the following status and fault indicators:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Meaning</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCS (red)</td>
<td>Fault</td>
<td>ON for hardware and software faults: CS 275 communications</td>
</tr>
<tr>
<td>FEA (red)</td>
<td>see Table 4-6</td>
<td></td>
</tr>
<tr>
<td>PAA (yellow)</td>
<td>see Table 4-6</td>
<td></td>
</tr>
<tr>
<td>PAB (yellow)</td>
<td>see Table 4-6</td>
<td></td>
</tr>
<tr>
<td>RUN (green)</td>
<td>see Table 4-6</td>
<td></td>
</tr>
<tr>
<td>A (green)</td>
<td>Bus A active</td>
<td>ON: bus active; brief blinking: bus passive</td>
</tr>
<tr>
<td>B (green)</td>
<td>Bus B active</td>
<td>ON: bus active; brief blinking: bus passive</td>
</tr>
<tr>
<td>T (green)</td>
<td>Busy</td>
<td>Bus processor performs read cycles</td>
</tr>
<tr>
<td>M (green)</td>
<td>Master</td>
<td>TPM 478 is bus master. The M LED is ON as long as the bus is master.</td>
</tr>
<tr>
<td>D (green)</td>
<td>Data (receiving activities)</td>
<td>General data transfer. The D LED is ON when user data message frames are transmitted via the bus.</td>
</tr>
</tbody>
</table>
The status and fault indicators of the TPM 478 module and the CPU must be interpreted in the event of a malfunction.

Check the selected bus and device address if the F LED is permanently ON:
A device address must be unique in the bus system.
A hardware fault exists if the F LED is permanently ON and the T LED permanently OFF. Replace the TPM module in this case.

There is an error in the local bus protocol if the LEDs of all interface modules of a bus segment are blinking. Disconnect the local bus connector from the TPM 478 module to check whether or not the module is the cause of the malfunction. The TPM 478 module is defective and must be replaced if the F indicator continues blinking at the same frequency and brightness.

Remember that the F LED cyclically flashes weakly in faultless operation.

In the event of a communication fault, you should reset the bus interface module with the "TPER;" command via commissioning terminal. All inductive bus converter modules must then be reset by pressing the RESET button. Check the function of the bus converter (UI) and all bus cables if the fault persists.
Reseting “TPER” with a configuring instruction via PROGRAF AS+ leads to a temporary communication fault.
If you have a fundamental breakdown of communication you should use the commissioning terminal.

The AS 488/TM or Bridge CS-L2 unit must be re-commissioned after the TPM 478 module has been replaced. Return any defective modules (together with a description of the defect) to Elektronikwerk Karlsruhe (EWK) for repair.
4.2 Using AS 488/TM with TELEPERM M I/O

Function of TPM 478 and TBX 478

The TPM 478 interface module provides the connections for the TELEPERM M I/O.

Fig. LEERER MERKER shows the general method of operation.

Startup behavior of TELEPERM M I/O

The TPM 478 module produces a cyclic process image of the TELEPERM M I/O that is connected to it. To do this, the configuration parameters are read from the system memory (system memory card) during the startup process of the AS 488/TM, and cyclically processed by the TPM 478 module.

You have created the configuration parameters using the SYST.WART test and service block. Please refer to the Technical Description /2/ for further information. The "RUN" LED on the TPM 478 module lights up when the startup sequence has successfully been completed.

If any problems have occurred see table 4-4 and 4-5.

Figure 4-6 Startup behavior TELEPERM M I/O
TPM 478: I/O communication diagnostics

Whenever the AS 488/TM is switched on or reset, the software of the TPM 478 module performs an initialization and self-test routine. The LEDs 6–10 on the TPM 478 front panel inform of the operation and the startup behavior of I/O communications and permit swift diagnosis in the event of a malfunction. Table 4-4 shows the I/O startup behavior (chronological sequence from left to right).

The table shows only some important phases. Dependent on the version of AS software resp. application program there are times without flashing LEDs. Once the I/O buses have been started, only the RUN LED remains ON (cyclic operation).

Table 4-4 TPM 478 I/O startup

<table>
<thead>
<tr>
<th>LED</th>
<th>Co-ordination</th>
<th>Initialization/Self-test</th>
<th>Startup of I/O buses</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEA (red)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>PAA (yellow)</td>
<td>0</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>PAB (yellow)</td>
<td>0</td>
<td>0</td>
<td>x</td>
</tr>
<tr>
<td>RUN (green)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

0 LED is OFF  
x LED is ON

Co-ordination

The co-ordination phase executes swiftly and is hardly perceptible.

Initialization and self-test

The TPM 478 module performs the startup of the I/O buses after the initialization/self-test phase has successfully been completed. The TPM 478 stops the startup process and transitions to STOP (red FEA LED is ON) if a fault is detected. The module is defective if the module remains in STOP after several resets have been attempted. Please specify the fault indication pattern (see Table 4-5) when you return the module for repair to Elektronikwerk Karlsruhe (EWK).

Table 4-5 Fault indication during startup

<table>
<thead>
<tr>
<th>LED</th>
<th>Fault in local RAM</th>
<th>Fault in DPRAM</th>
<th>Address bus fault</th>
<th>Program memory fault</th>
<th>Watchdog fault</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEA (red)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>PAA (yellow)</td>
<td>x</td>
<td>0</td>
<td>x</td>
<td>0</td>
<td>x</td>
</tr>
<tr>
<td>PAB (yellow)</td>
<td>0</td>
<td>x</td>
<td>x</td>
<td>0</td>
<td>x</td>
</tr>
<tr>
<td>RUN (green)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>x</td>
</tr>
</tbody>
</table>

0 LED OFF  
x LED ON
The green RUN LED indicates a successful startup. The I/O buses operate cyclically, i.e. the process image is cyclically updated.

Table 4–6 explains the status and fault indicators that are significant to the I/O behavior. They are listed in the sequence in which they are arranged on the TPM 478 module. The TPM 478 module has the following status and fault indicators:

Table 4-6  Status and fault indicators - I/O communications

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Meaning</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCS (red)</td>
<td></td>
<td>see Table 4-3</td>
</tr>
<tr>
<td>FEA (red)</td>
<td>Reserve</td>
<td></td>
</tr>
<tr>
<td>PAA (yellow)</td>
<td>Reserve</td>
<td></td>
</tr>
<tr>
<td>PAB (yellow)</td>
<td>Reserve</td>
<td></td>
</tr>
<tr>
<td>RUN (green)</td>
<td>Busy</td>
<td>Cyclic operation; process image is updated during every cycle</td>
</tr>
<tr>
<td>A (green)</td>
<td></td>
<td>see Table 4-3</td>
</tr>
<tr>
<td>B (green)</td>
<td></td>
<td>see Table 4-3</td>
</tr>
<tr>
<td>T (green)</td>
<td></td>
<td>see Table 4-3</td>
</tr>
<tr>
<td>M (green)</td>
<td></td>
<td>see Table 4-3</td>
</tr>
<tr>
<td>D (green)</td>
<td></td>
<td>see Table 4-3</td>
</tr>
</tbody>
</table>
4.3 Utilization in the Bridge CS-L2 Unit

The simplified block diagram in Fig. 4-7 shows the method of operation of the TPM 478 interface module in the Bridge CS-L2 unit. The module autonomously handles the data traffic via the CS 275 bus system. The I/O section is not active in this process. This relieves the Bridge CS-L2 unit of communication tasks and protocol handling. Communications functions and handling are the same as for the previous N-AS standard local bus interface.

Fig. 4-1 shows the general operation of the TPM 478 module.

Figure 4-7  Method of operation of the TPM 478 module in the Bridge CS-L2 unit
The software of the TPM 478 module performs an initialization and self-test routine whenever the Bridge CS-L2 unit is switched on or reset (see Fig. 4-8).

**Co-ordination (slot address and module ID)**

**Transfer of system and communications parameters**

**TPM 478 software:**

- Startup of the TPM 478 software:
  - Self-test
  - Initialization of the processor
  - Reading parameter settings
  - Setting variables to default values
  - Setting up transmit and receive list

First of all, slot addresses, module IDs and system parameters of the TPM 478 module are set to the default values from the bridge software.

The default values are read and interpreted before the TPM 478 firmware is started. Distinction is made between two different startup methods (see Fig. 4-9).

**TPM 478:**

**Bridge CS-L2**

- Startup of the TPM 478 software:
  - Read and interpret the default values
  - Startup by hardware reset
  - Startup by software reset

Figure 4-8  Startup behavior of the TPM 478 module: Bridge CS-L2

Figure 4-9  Startup methods of the TPM 478 module: Bridge CS-L2
Hardware reset

After a hardware reset (such as cycling power off and back on), an internal compressed test of processor, RAM and EPROM is performed, followed by the actual startup. The seven LEDs on the TPM 478 front panel keep you informed of operation and the startup activities of the CS 275 communications, and permit swift diagnosis in the event of a malfunction. When startup has successfully been terminated, the bus LEDs show the following pattern:

Table 4-7  LED indication after startup

<table>
<thead>
<tr>
<th>LED</th>
<th>LED display</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCS</td>
<td>weak cyclic flashing (no malfunction)</td>
</tr>
<tr>
<td>T</td>
<td>nearly steady weak indication</td>
</tr>
<tr>
<td>D,M</td>
<td>are blinking</td>
</tr>
<tr>
<td>A,B</td>
<td>LED ON: active bus</td>
</tr>
<tr>
<td></td>
<td>brief blinking: passive bus</td>
</tr>
</tbody>
</table>

Note

Not every deviation from this pattern shows a malfunction of the TPM 478 module.

<table>
<thead>
<tr>
<th>Method of Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware reset</td>
</tr>
<tr>
<td>Software reset</td>
</tr>
</tbody>
</table>

The next section informs you of the meaning of the individual LEDs.

Software reset

The processor initialization is retained after a software reset (per key–operated switch). The Bridge software sets new parameter values. The rest of the startup is the same as in a hardware reset.
Table 4-8 explains the status and fault indications that are significant for the Bridge CS-L2 communication behavior. They are listed in the sequence in which they are arranged on the TPM 478 interface module. The TPM 478 module features the following status and fault indicators:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Meaning</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCS (red)</td>
<td>Fault</td>
<td>ON for</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• hardware and software faults: CS 275 communications</td>
</tr>
<tr>
<td>FEA (red)</td>
<td></td>
<td>see Table 4-6</td>
</tr>
<tr>
<td>PAA (yellow)</td>
<td></td>
<td>see Table 4-6</td>
</tr>
<tr>
<td>PAB (yellow)</td>
<td></td>
<td>see Table 4-6</td>
</tr>
<tr>
<td>RUN (green)</td>
<td></td>
<td>see Table 4-6</td>
</tr>
<tr>
<td>A (green)</td>
<td>Bus A active</td>
<td>ON: bus active</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>brief blinking</strong>: bus passive</td>
</tr>
<tr>
<td>B (green)</td>
<td>Bus B active</td>
<td>ON: bus active</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>brief blinking</strong>: bus passive</td>
</tr>
<tr>
<td>T (green)</td>
<td>Busy</td>
<td>Bus processor performs read cycles</td>
</tr>
<tr>
<td>M (green)</td>
<td>Master</td>
<td>TPM 478 is bus master. The M LED is ON as long as the bus is master.</td>
</tr>
<tr>
<td>D (green)</td>
<td>Data (receiving activities)</td>
<td>General data transfer. The D LED is ON when user data message frames are transmitted via the bus.</td>
</tr>
</tbody>
</table>

**Note**

Please refer to the Description /3/ for details about the method of operation of the Bridge CS-L2 unit.
Installation and Commissioning

Please refer to the following Technical Descriptions for details about installation and commissioning of the TPM 478 and TBX 478 interface modules:

- AS 388/488/TM /2/
- Bridge CS-L2 /3/.

Please refer to the Manuals /7/ and /8/ for more information about the connection to the CS 275 bus system.
Parameter Setting

The parameters of the TPM 478 and TBX 478 modules need not be set separately. This is done by the AS 488/TM or Bridge CS-L2 unit. The parameters of the TPM 478 module are set automatically when the system starts up. The TBX 478 module receives its data from the TPM 478 module; setting parameters is not necessary.

Please refer to the following Technical Description for further information about parameter setting:

- AS 388/488/TM /2/
- Bridge CS-L2 /3/.
Ordering Information

This chapter

This chapter contains the order numbers of the products discussed in this Description.
The TPM 478 and TBX 478 are an optional component of the AS 488/TM system. The TPM 478 module is always required in the Bridge CS–L2 unit.

Table 7-1 lists the order numbers of the individual modules.

<table>
<thead>
<tr>
<th>Product</th>
<th>Name</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPM 478</td>
<td>TPM 478 interface module</td>
<td>6ES7478-2DA00-0AC0</td>
</tr>
<tr>
<td>TBM 478–1</td>
<td>TBM 478–1 interface module</td>
<td>6ES7478-2DA01-0AC0</td>
</tr>
<tr>
<td>TBX 478</td>
<td>TBX 478 interface module</td>
<td>6ES7478-2DX00-0AA0</td>
</tr>
</tbody>
</table>
Applicable Documents
### The following Manuals are available from your Sales Partner:

<table>
<thead>
<tr>
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<th>Titel</th>
<th>available from</th>
<th>Bestell-Number</th>
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<tr>
<td>/1/</td>
<td>Description TELEPERM M Automation System AS 235 System software variant G</td>
<td>KA</td>
<td>C79000-G8076-C416</td>
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<tr>
<td>/2/</td>
<td>Description TELEPERM M “Bridge CS-L2”</td>
<td>KA</td>
<td>C79000-T8076-C707</td>
</tr>
<tr>
<td>/3/</td>
<td>Description TELEPERM M Interface Modules TPM 478 und TBX 478</td>
<td>KA</td>
<td>C79000-T8076-C708</td>
</tr>
<tr>
<td>/4/</td>
<td>Description TELEPERM M Migration Rack I for AS 488/TM and Bridge CS–L2</td>
<td>KA</td>
<td>C79000-T8076-C710</td>
</tr>
<tr>
<td>/5/</td>
<td>configuring instructions TELEPERM M I/O module on I/O–bus TELEPERM M</td>
<td>KA</td>
<td>C79000-P8076-C703</td>
</tr>
<tr>
<td>/6/</td>
<td>Description TELEPERM M IBS–Terminal for Local Commissioning and Diagnosis of AS x88/TM</td>
<td>KA</td>
<td>C79000-T8076-C733</td>
</tr>
<tr>
<td>/7/</td>
<td>Description Automation System M7-300</td>
<td></td>
<td>6ES7398-8BA00-8AA0</td>
</tr>
<tr>
<td>/8/</td>
<td>reference description Automation System SIMATIC S7-400, M7–400 module dates</td>
<td></td>
<td>C79000–G7076–C411 Bestandteil von 6ES7498-8AA01-8AA0</td>
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<tr>
<td>/9/</td>
<td>Description SIMATIC S7 Automation System S7-300 Assembly of a S7-300, I/O-module</td>
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<td>EWA 4NEB 710 6040</td>
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<tr>
<td>/10/</td>
<td>Description Automation System SIMATIC S7-400, M7–400</td>
<td></td>
<td>6ES7498-8AA01-8AA0</td>
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<td>/11/</td>
<td>Description TELEPERM M I/O-modules: (function module signal module coupling module and calculation modul)</td>
<td></td>
<td>C79000–G8076–C030 C79000–G8076–C031 C79000–G8076–C032</td>
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<tr>
<td>/12/</td>
<td>Description TELEPERM M Automation System AS 235</td>
<td></td>
<td>C79000–G8076–C295</td>
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</table>

**Note**

The documents /2/, /3/, /4/, /5/, /6/ and /32/ are a part of the “TELEPERM M, Additional System Documents” Manual; Order no. C79000-G8076-C700; to be ordered from Lieferzentrum Nürnberg (LZN).
<table>
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<th>Order No.</th>
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<tbody>
<tr>
<td>/13/</td>
<td>Operating Instructions TELEPERM M PROGRAF AS+</td>
<td>C79000-G8076-C450</td>
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<td>/14/</td>
<td>Operating Instructions TELEPERM M OS 525</td>
<td>C79000-G8076-C522</td>
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<td>/15/</td>
<td>Pocket guide TELEPERM M AS 235/AS 235H/AS 235K AS</td>
<td>C79000-N8076-C001</td>
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<td>/16/</td>
<td>Manual TELEPERM M BATCH X-TM</td>
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<td>/17/</td>
<td>Description of PROFIBUS–Net (architecture, installation, configuring, component))</td>
<td>6GK1 970-5CA10-0AA0</td>
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<tr>
<td>/18/</td>
<td>Short description PROFIBUS</td>
<td>6ZB5 530-0AQ01-0BA7</td>
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<tr>
<td>/22/</td>
<td>Description TELEPERM M Bus system CS 275</td>
<td>C79000-G8076-C006</td>
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<tr>
<td>/23/</td>
<td>Device manual Distributed I/O device ET 200U</td>
<td>6ES5 998-3ES12</td>
<td></td>
</tr>
<tr>
<td>/24/</td>
<td>Device manual Distributed I/O device ET 200B</td>
<td>6ES5 998-4ET11</td>
<td></td>
</tr>
<tr>
<td>/25/</td>
<td>Device manual Distributed I/O device ET 200M (mit Signalbaugr.)</td>
<td>6ES7 153-1AA00–8AA0</td>
<td></td>
</tr>
<tr>
<td>/26/</td>
<td>Parametriersoftware COM PROFIBUS (ST50)</td>
<td>6ES5 895–6SE12</td>
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<tr>
<td>/30/</td>
<td>Description TELEPERM M Working Guideline for the Installation of the Instructions and Guidelines for Planning</td>
<td>C79000–G8076–C417</td>
<td></td>
</tr>
<tr>
<td>/31/</td>
<td>Installation manual AS S7–400, M7–400 assemble</td>
<td>LZN C79000–G7076–C410, component of 6ES7498–8AA01–8AA0</td>
<td></td>
</tr>
<tr>
<td>/32/</td>
<td>Description TELEPERM M Migration Rack II for AS 488/TM (configuration+interfaces)</td>
<td>KA C79000–T8076–C711</td>
<td></td>
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<tr>
<td>/33/</td>
<td>Description TELEPERM M Supplementary system documentation</td>
<td>KA C79000–G8076–C700</td>
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<td>/34/</td>
<td>Technical Descriptions Migration TELEPERM M – SIMATIC PCS7 PCS 7/TM–OS PCS 7/TM–OCX(NORA)</td>
<td>KA C79000–T8076–C740</td>
<td></td>
</tr>
</tbody>
</table>

Applicable Documents
This Appendix

This Appendix contains a list of the I/O modules that can be connected to the TPM 478 and TBX 478 modules.
Table B-1 contains all TELEPERM I/O modules that may be used in a TELEPERM M extension unit of the AS 488/TM system.

**Table B-1**

Available TELEPERM M I/O modules (LST0)

<table>
<thead>
<tr>
<th>Name</th>
<th>Reference no. for configuration</th>
<th>Compatible, valid variants</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Closed-loop controller modules</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S-type controller, 1 channel</td>
<td>6DS1400–8BA</td>
<td>...–8AA</td>
</tr>
<tr>
<td>K-type controller, 1 channel</td>
<td>6DS1401–8BA</td>
<td>...–8AA</td>
</tr>
<tr>
<td>S-type controller, 2 channels</td>
<td>6DS1402–8BA</td>
<td>...–8AA</td>
</tr>
<tr>
<td>K-type controller, 2 channels</td>
<td>6DS1403–8CA</td>
<td>...–8AA; ...–8BA; ...–8CB</td>
</tr>
<tr>
<td><strong>Open-loop controller modules</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 motor or 1 solenoid valve</td>
<td>6DS1500–8BA</td>
<td>...–8AA</td>
</tr>
<tr>
<td>1 actuator without feedback</td>
<td>6DS1501–8BA</td>
<td>...–8AA</td>
</tr>
<tr>
<td>1 actuator with feedback</td>
<td>6DS1501–8BB</td>
<td>...–8AB</td>
</tr>
<tr>
<td>Motors/sol. valves, 3 channels</td>
<td>6DS1502–8BA</td>
<td>...–8AA</td>
</tr>
<tr>
<td>Actuators, 3 channels</td>
<td>6DS1503–8BA</td>
<td>...–8AA</td>
</tr>
<tr>
<td>4 actuators + 1 home position</td>
<td>6DS1504–8AA</td>
<td></td>
</tr>
<tr>
<td>8/4 actuators + 2 home positions</td>
<td>6DS1505–8AA</td>
<td></td>
</tr>
<tr>
<td><strong>Arithmetic modules</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Binary arithmetic module</td>
<td>6DS1717–8AA</td>
<td>...–8RR</td>
</tr>
<tr>
<td>Binary extension module</td>
<td>6DS1719–8AA</td>
<td>...–8RR</td>
</tr>
<tr>
<td>Analog extension module</td>
<td>6DS1720–8AA</td>
<td></td>
</tr>
<tr>
<td><strong>Signal modules/discrete input</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16 discrete inputs</td>
<td>6DS1600–8AA</td>
<td></td>
</tr>
<tr>
<td>48 discrete inputs</td>
<td>6DS1601–8BA</td>
<td>...–8AA; ...–8AC</td>
</tr>
<tr>
<td>32 discrete inputs</td>
<td>6DS1602–8BA</td>
<td>...–8AA</td>
</tr>
<tr>
<td>48 dis. inputs, DC24V/48V</td>
<td>6DS1615–8AA</td>
<td></td>
</tr>
<tr>
<td>8 changeover contacts</td>
<td>6DS1620–8AA</td>
<td></td>
</tr>
<tr>
<td>8 proximity switches</td>
<td>6DS1621–8AA</td>
<td></td>
</tr>
<tr>
<td><strong>Signal modules/discrete output</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 discrete outputs</td>
<td>6DS1603–8BA</td>
<td>...–8AA; ...–8AB; ...–8RR</td>
</tr>
<tr>
<td>16 discrete outputs</td>
<td>6DS1604–8AA</td>
<td></td>
</tr>
<tr>
<td>16 relay outputs</td>
<td>6DS1605–8BA</td>
<td>...–8AA</td>
</tr>
<tr>
<td><strong>Signal modules/analog input</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Table B-1  Available TELEPERM M I/O modules (LST0)

<table>
<thead>
<tr>
<th>Name</th>
<th>Reference no. for configuration</th>
<th>Compatible, valid variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 analog inputs, isolated</td>
<td>6DS1700–8BA</td>
<td>...–8AA;...–8AB;...–8BB; 6DS1701–8AA;...–8AB</td>
</tr>
<tr>
<td>8 analog inputs, non-floating</td>
<td>6DS1730–8AA</td>
<td></td>
</tr>
<tr>
<td>4 analog inputs</td>
<td>6DS1731–8AA</td>
<td>...–8RR</td>
</tr>
<tr>
<td>4 analog inputs, +</td>
<td>6DS1731–8BA</td>
<td>...–8RR</td>
</tr>
<tr>
<td>4 EEPROM</td>
<td>6DS1731–8EA</td>
<td>...–8RR</td>
</tr>
<tr>
<td>4 + EEPROM</td>
<td>6DS1731–8FA</td>
<td>...–8RR; 6DS1713–8AB</td>
</tr>
<tr>
<td>14 thermocouples</td>
<td>6DS1703–8AB</td>
<td>...–8RR</td>
</tr>
<tr>
<td>4 analog inputs</td>
<td>6DS1731–8RR</td>
<td></td>
</tr>
</tbody>
</table>

**Signal modules/analog output**

<table>
<thead>
<tr>
<th>Name</th>
<th>Reference no. for configuration</th>
<th>Compatible, valid variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 analog outputs</td>
<td>6DS1702–8AA</td>
<td>...–8RR</td>
</tr>
</tbody>
</table>

**Counter modules**

<table>
<thead>
<tr>
<th>Name</th>
<th>Reference no. for configuration</th>
<th>Compatible, valid variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 channels</td>
<td>6DS1607–8AB</td>
<td></td>
</tr>
</tbody>
</table>

**Proportion counter modules**

<table>
<thead>
<tr>
<th>Name</th>
<th>Reference no. for configuration</th>
<th>Compatible, valid variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 or 4 channels</td>
<td>6DS1613–8BB</td>
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</tr>
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</table>

**Interface modules**

<table>
<thead>
<tr>
<th>Name</th>
<th>Reference no. for configuration</th>
<th>Compatible, valid variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>S5–110A 4 channels</td>
<td>6DS1310–8AA</td>
<td></td>
</tr>
<tr>
<td>S5–110A 1 channel</td>
<td>6DS1310–8AB</td>
<td></td>
</tr>
<tr>
<td>S5–115/135/150 2 channels</td>
<td>6DS1321–8AA</td>
<td></td>
</tr>
<tr>
<td>S5 central cabinet, 2 channels</td>
<td>6DS1318–8AB</td>
<td>6DS1333–8AB</td>
</tr>
<tr>
<td>transparent, 2 channels</td>
<td>6DS1327–8AA</td>
<td></td>
</tr>
<tr>
<td>ES 100K on TM I/O bus</td>
<td>6DS1322–8AA</td>
<td></td>
</tr>
<tr>
<td>CP 581 TM</td>
<td>6DS1318–8AB</td>
<td>6DS1341–1AD; 6DS1337–1AD</td>
</tr>
</tbody>
</table>

Not available:
- ME modules
- Field multiplexer, FM driver
- Testable discrete inputs/outputs; DR; SIPART

Specifications

This Appendix contains the specifications of the TPM 478 and TBX 478 interface modules.

Contents

The individual sections are on the following pages:

<table>
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<th>Section</th>
<th>Topic</th>
<th>Page</th>
</tr>
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<tbody>
<tr>
<td>C.1</td>
<td>Specifications of the TPM 478 interface module</td>
<td>C-2</td>
</tr>
<tr>
<td>C.2</td>
<td>Specifications of the TBX 478 interface module</td>
<td>C-4</td>
</tr>
<tr>
<td>C.3</td>
<td>Connector pin assignments of the TPM 478 and TBX 478 modules</td>
<td>C-5</td>
</tr>
</tbody>
</table>
C.1 Specifications of the TPM 478 Interface Modules

### Logical characteristics

Circuitry:
- Microprocessors
  - Bus processor: 80C188
  - I/O processor: 80C186

Memory configuration:
- RAM: 32 k Bytes
- Flash EPROM: 256 k Bytes

Interfaces:
- ISA bus
  - parallel
  - 16-Bit data bus
  - 24-bit address bus
- CS 275 local bus
  - redundant 20-m local bus output
  - serial
  - isolated
  - Baud rate: 250 kbits/s
  - up to 9 devices on the local bus (the UI counts as a device)
- I/O bus
  - parallel 8-bit data bus
  - Baud rate approximately 300 k bytes/s
  - up to 42 devices on each bus (A/B)
  - Address conflict monitoring by one-out-of-n check (EANK)
  - Access monitoring by RDY
  - External power supply of the module bus logic (5-V bus)

### Electrical specifications

Operating values:
- Power supply: + 5 V ± 5 %
- Nominal current: 0.6 A
- Power loss: 3 W
Dimensions:
- Installation width: 1 slot (25 mm)
- Height 290 mm
- Depth 210 mm.
Weight: 0.75 kg

Ambient conditions:
- Temperature range: 0 ... +60 °C
- Storage temperature: –40 ... +85 °C.
Protection rating: IP 20 to IEC 536

Standards:
The standards the module complies with include:
- CE
- UL/CSA
- FM
## C.2 Specifications of the TBX 478 Interface Module

### Logical characteristics

Circuitry:
- Four 74BCT244 bus drivers
- Two EPM 5016 buffers

Interfaces:
- I/O bus A
- I/O bus B
- I/O bus to the TPM 478 module
- +5 V I/O bus

### Electrical specifications

Operating values:
- Power supply: +5 V ± 5%
- Nominal current: 210 mA
- Power loss: 1.05 W

### Mechanical specifications

Dimensions:
- Installation depth: 25 mm
- Height: 290 mm
- Depth: 210 mm

Weight: 0.75 kg

### Ambient conditions

Ambient conditions:
- Temperature range: 0 ... +60 °C
- Storage temperature: −40 ... +85 °C

Protection rating: IP 20 to IEC 536

### Standards

The standards the module complies with include:
- CE
- UL/CSA
- FM
C.3 Connector Pin Assignments of the TPM 478 and TBX 478 Modules

Pin assignments

There are a 25-way male subminiature "D" connector and a 50-way female subminiature "D" connector on the front panel of the TPM 478 module. The 25-way connector provides the connection for the cable of the CS 275 bus system; and the 50-way socket accepts the connecting cable of the I/O bus. The TBX 478 module features two 50-way female subminiature "D" connectors for the I/O buses A and B.

The connector pin assignments are listed in Tables C-1 through C-4.

Table C-1 Cable assignments for connection of the TPM 478 module to the CS 275 local bus

<table>
<thead>
<tr>
<th>Pin</th>
<th>Meaning in cable</th>
<th>Signal in cable/module</th>
<th>Color</th>
<th>ES 902 (48-way fem. con.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>clock signal bus A</td>
<td>AT1</td>
<td>br 3</td>
<td>b 28</td>
</tr>
<tr>
<td>2</td>
<td>qualifier signal bus A</td>
<td>AB1</td>
<td>rd 3</td>
<td>b 20</td>
</tr>
<tr>
<td>3</td>
<td>data signal bus A</td>
<td>AD1</td>
<td>br 2</td>
<td>b 12</td>
</tr>
<tr>
<td>4</td>
<td>not connected</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>5</td>
<td>insertion control</td>
<td>EK_N</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>6</td>
<td>jumper</td>
<td>GNDAB</td>
<td>*)</td>
<td>*)</td>
</tr>
<tr>
<td>7</td>
<td>not connected</td>
<td>GNDAB</td>
<td>*)</td>
<td>*)</td>
</tr>
<tr>
<td>8</td>
<td>not connected</td>
<td>GNDAB</td>
<td>*)</td>
<td>*)</td>
</tr>
<tr>
<td>9</td>
<td>not connected</td>
<td>GNDAB</td>
<td>*)</td>
<td>*)</td>
</tr>
<tr>
<td>10</td>
<td>clock signal bus B</td>
<td>BT1</td>
<td>bl 3</td>
<td>b 32</td>
</tr>
<tr>
<td>11</td>
<td>qualifier signal bus B</td>
<td>BB1</td>
<td>ye 3</td>
<td>b 24</td>
</tr>
<tr>
<td>12</td>
<td>data signal bus B</td>
<td>BD1</td>
<td>bl 2</td>
<td>b 16</td>
</tr>
<tr>
<td>13</td>
<td>not connected</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>14</td>
<td>clock signal bus A</td>
<td>AT0</td>
<td>gn 3</td>
<td>b 26</td>
</tr>
<tr>
<td>15</td>
<td>qualifier signal bus A</td>
<td>AB0</td>
<td>bl 3</td>
<td>b 18</td>
</tr>
<tr>
<td>16</td>
<td>data signal bus A</td>
<td>AD0</td>
<td>gn 2</td>
<td>b 10</td>
</tr>
<tr>
<td>17</td>
<td>not connected</td>
<td>GNDAB</td>
<td>*)</td>
<td>*)</td>
</tr>
<tr>
<td>18</td>
<td>not connected</td>
<td>GNDAB</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>19</td>
<td>not connected</td>
<td>GNDAB</td>
<td>*)</td>
<td>*)</td>
</tr>
<tr>
<td>20</td>
<td>not connected</td>
<td>GNDAB</td>
<td>*)</td>
<td>*)</td>
</tr>
<tr>
<td>21</td>
<td>not connected</td>
<td>GNDAB</td>
<td>*)</td>
<td>*)</td>
</tr>
<tr>
<td>22</td>
<td>clock signal bus B</td>
<td>BT0</td>
<td>wh 3</td>
<td>b 30</td>
</tr>
<tr>
<td>23</td>
<td>qualifier signal bus B</td>
<td>BB0</td>
<td>gr 3</td>
<td>b 22</td>
</tr>
<tr>
<td>24</td>
<td>data signal bus B</td>
<td>BD0</td>
<td>wh 2</td>
<td>b 14</td>
</tr>
<tr>
<td>25</td>
<td>not connected</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

1 = Signal line
0 = Signal return line (reference ground 0 V)

*) Pins 6–9, 17 and 19–21 are connected on the module with each other and with the cable screen.

**) Pins 5 and 6 are linked with a jumper.
Table C-2  Connector pin assignments of the 50-way female subminiature "D" connector on the TPM 478 module; connection to the I/O bus

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0 V</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0 V</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>+5 V bus</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>+5 V bus</td>
<td></td>
</tr>
<tr>
<td>5</td>
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Glossary of Terms
Glossary of Terms

A

**AS 235**
Automation system of the TELEPERM M process control system. An AS 235 is delivered as a complete system in the TELEPERM standard cabinet.

**AS 488/TM**
Automation system of the TELEPERM M process control system on the basis of SIMATIC M7-300/M7-400 and SINEC components and additional TELEPERM M components. An AS 488/TM can be installed on the wall, in a rack or in a cabinet.

B

**Bridge CS-L2**
The Bridge CS-L2 unit links the CS 275 bus system with the PROFIBUS–TM bus system, and performs protocol conversion. The components used for AS 488/TM are also used as the basis of hardware and operating system.

C

**CPU 488**
Central processing module of AS 488/TM (AT-compatible computer unit).

**CP 5412 (A1)**
The CP 5412 (A1) communications processor is used for linking AS 488/TM to PROFIBUS–TM.

**CS 275**
TELEPERM M bus system.

I

**IBS–Terminal**
AT-compatible personal computer with specific software packages for
- commissioning (part of the AS system software and Bridge software)
- test and diagnosis

**ISA bus**
Industry Standard Architecture Bus. The ISA bus is the standard bus of AT-compatible personal computers.
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<td><strong>TBX 478</strong></td>
<td>I/O bus interface module. Together with the TPM 478 interface module, it links the AS 488/TM with the field devices of installed AS 220, AS 230, or AS 235 systems.</td>
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<td><strong>TML execution system</strong></td>
<td>Execution system of AS 388/TM and AS 488/TM in the TML programming language.</td>
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<td><strong>TPM 478</strong></td>
<td>The TPM 478 interface module is used for linking the AS 488/TM with the CS 275 bus system or, via the TBX 478 module, the TELEPERM M I/O bus.</td>
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C79000–T8076-C710-04
**Safety instructions**

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

---

**Danger**

Failure to observe a Danger note **will** cause death, severe personal injury or severe damage to the equipment.

---

**Warning**

Failure to observe a Warning note **may** cause death, severe personal injury or severe damage to the equipment.

---

**Caution**

Failure to observe a Caution note may cause personal injury or damage to the equipment.

---

**Note**

Notes contain important information regarding the product, product handling or a specific part of the document that requires special attention.

---

**Qualified personnel**

The unit may only be commissioned and used on the basis of the information contained in this Manual. Only qualified personnel are authorized to perform any work inside the unit. Qualified personnel in the sense of the safety instructions in this Manual are persons who have been authorized to commission, ground and label units, systems and circuits according to the safety-relevant standards.

---

**Normal use**

Please observe the following instructions:

---

**Warning**

The unit may only be used for the applications mentioned in the Catalogue and the Technical Description. It may only be used together with third-party equipment or components that have been recommended or released by Siemens.

Faultless and safe operation of the product requires proper transport, storage, installation and commissioning, and careful handling and maintenance.

---

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**Exclusion of liability**

Although we have checked the contents of this document against the hardware and software described herein, the information contained in this document may not cover all details. We can therefore not assume any liability for completeness. The information in this document is checked at regular intervals and necessary corrections will be included in the next revisions. We are grateful for any suggestions.

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Preface

Purpose of the description
This Technical Description provides the information you need to use the migration rack together with the AS 488/TM or the CS-L2 Bridge.

Contents of the description
The description contains the following topics:
- Product overview
- Application, design, method of operation
- Installation
- Ordering information
  Dimensions, applicable documents, glossary of terms, index

Audience
This description is directed to commissioning and service personnel who employ the migration rack.

What knowledge is required?
You are supposed to be familiar with the TELEPERM M process control system, in particular with the AS 488/TM and CS-L2 Bridge components for which the migration rack is intended.

There are various Technical Descriptions and Manuals available that provide additional information (see Applicable Documents in the Appendix).
Further descriptions
To use the AS 488/TM and/or CS-L2 Bridge, you will need the "Supplementary System Documents for AS 388/TM, AS488/TM and CS-L2 Bridge" /2/ and the TELEPERM M "Installation Instructions" /30/. "Applicable Documents" in the Appendix tells you the order numbers of these documents and from where you can order them.

Upgrading instructions
The migration rack permits an existing automation system (e.g. AS 220/AS 230) to be upgraded to the new AS 488/TM automation system. Upgrading is a service that may be order via your sales partner.

Conventions
The following convention is used for swift and easy identification of important information. The convention defines the different keyboard input methods.

<table>
<thead>
<tr>
<th>Convention</th>
<th>Used for</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOLD</td>
<td>Instruction names, switches and text strings that must be entered exactly as they are shown.</td>
</tr>
</tbody>
</table>

Scope of delivery
Documents and migration rack as described in the Catalog.

Applicable documents
Appendix A contains a list of the applicable documents and specifies the documents’ order numbers and the places from where the documents can be ordered.

Catalogs
The catalogs contain information and ordering data of the hardware and software components. They also inform about the current configuration capabilities of the system components that may be used in TELEPERM M.

Inquiries
Please contact your sales partner if you need more information about the migration rack or additional literature.
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5 Installation and Commissioning .......................................... 5-1
6 Operating Conditions ........................................................ 6-1
7 Ordering Information .......................................................... 7-1
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Product Overview

Contents

The brief information in this chapter gives you a swift orientation of the migration rack.
| **What is a migration rack?** | A migration rack is a pre-assembled rack with an integrated SIMATIC S7/M7 backplane bus. It has the same mounting dimensions as the ES 902 packaging system. The ES 902 system has been used in previous automation systems of the TELEPERM M distributed control system.

There are two variants of the migration rack available. The only difference is in the utilization of the wiring:

- Migration rack for AS 488/TM
- Migration rack for CS-L2 bridge. |

| **Utilization in AS 488/TM** | The migration rack enables the AS 488/TM to be used instead of an AS base unit in a TELEPERM M standard cabinet. A particularly economic upgrading is offered as a service for the following existing automation systems:

- AS 220, including software conversion
- AS 230.

The installed field devices and the proven CS 275 bus system may further be used without modifications. |

| **Utilization in the CS-L2 bridge** | The migration rack enables the CS-L2 bridge to be used in an existing or new TELEPERM standard cabinet.

An existing system part with the CS 275 bus system can thus be enhanced by a new one with the PROFIBUS–TM bus system.

This introduces PROFIBUS–TM as an additional bus system and a new communication basis in TELEPERM M. |
Fig. 1-1 shows the individual components of the migration rack.

![Diagram of migration rack components](image)

**Features**

The migration rack has the following features:

- Replacing the base unit permits economic upgrading of existing TELEPERM M systems
- Further utilization of
  - the installed TELEPERM M field devices
  - the CS 275 system bus
- Modernizing the hardware by replacing the AS base unit with AS 488/TM
  - Installing additional automation power
  - Using OS 525 or PCS 7/TM–OS for operator communication and visualization of an upgraded AS 220
- Pre-assembled cables for:
  - The migration rack for AS 488/TM contains I/O bus 1 and 2 and +5 V bus power supply.
  - +24 V power supply
  - Input and output of the I&C signals
  - Integrated fusing of L+ 24 V/16 A
  - SIMATIC S7/M7 backplane bus with nine standard slots
Application

This chapter tells you

- the tasks and fields the migration rack is suitable for;
- the features of the migration rack.
**Task**

Use the migration rack to
- install an AS 488/TM in a TELEPERM M standard cabinet
- install a CS-L2 bridge in a TELEPERM M standard cabinet

This permits low-cost replacement of an existing automation system (e.g. AS 230) with an AS 488/M system. The CS 275 bus system and existing extension systems with installed I/O modules can also be used in the new system.

The CS-L2 bridge can be used for extending existing TELEPERM M systems (see Fig. 2-1)

![Block diagram of a typical system](image)

Figure 2-1  Block diagram of a typical system
User structures
The user structures must be converted to a memory card of the AS 488/TM system.
Additional conversion is required for the AS 220 software.

Use the IBS terminal that is included in the AS 488/TM system software delivery for informing the AS 488/TM of the installed TELEPERM M modules. Please refer to the related Manual for details (see /1/ and /33/ in "Applicable Documents" in Appendix A).

Additional field devices may be connected via the PROFIBUS-DP bus. The user structure must then be re-configured.

Software conversion with AS 220
The AS 220 requires software conversion. This is available as a service.

Note
The migration rack cannot be used with AS 220H and AS 235H systems.
For AS 220H a special solution is available to get a non-redundant operating mode with AS 488/TM.

Features
The dimensions are compatible with the base unit of the AS 220, AS 230 and AS 235 central unit.
This chapter informs you of the physical structure of the migration rack.
Migration rack structure

Fig. 3-1 shows the structure of the migration rack. The migration rack is the carrier system for the AS 488/TM and CS-L2 bridge components. It contains a suitable guidance of pre-assembled cables and an integrated fuse for the L+ 24 V/16 A power supply. The only difference between migration racks for different applications is in the additional wiring for the I/O buses A and B.

1 Rack in ES 902 format
2 Backplane bus
3 Fuse module
4 Wiring
5 Cable duct

Figure 3-1 Migration rack, physical structure

Rack

The migration rack has the same dimensions as the ES 902 packaging system (DIN 41494). This makes it easy to replace an AS base unit (see Chapter 1) with the migration rack.

Backplane bus

The S7/M7 backplane bus is installed on the rack. It accommodates the AS 488/TM and/or CS-L2 bridge components.

Fuse module

The fuse module contains a circuit breaker that protects the +24 V power supply. The cables run in the cable duct from the AS 488/TM and/or CS-L2 bridge components to the fuse module (cf Chapter 4).
According to the application, the following distinction is made:

- **AS 488/TM**
  - I/O bus 1 and 2 including +5 V bus power supply (for base and extension cabinet)
  - +24 V power supply
  - Input and output of the I&C signals
- **CS-L2 bridge**
  - +24 V power supply
  - Input and output of the I&C signals

**Grounding plan reference**

If you use AS 488/TM within the migration rack, even if TELEPERM M I/O modules are used or TELEPERM M AS systems are used in the same cabinet the following guidelines are valid:

“TELEPERM M Instructions and Guidelines for Planning, Installation, and Operation”: Chapter 7.2 “Grounding and Screening Several Cabinets”, ordering number C79000–M8076–C417,

as well as:


**Protective grounding**

This means that screens and protective grounding connections are connected with the local ground potential. And M24 is connected once with the central grounding point (CGP) which is good for all TELEPERM M systems within the plant and connected with the local ground potential. According to DIN VDE 0150, paragraph 3.2.1, multiple groundings are inadmissible in plants with DC because of stray corrosion.

For this reason **only one** galvanic connection between the local ground potential and M24 is allowed in these migration systems. According to the description in the installation manual “S7–400/M7–400 Automation Systems”, chapter 4.6 and 4.7m, you have to cut the preassembled connection between M24 and local ground potential relate to the cabinet, and you have to realize an assembly free of grounding.

**Grounding shackle**

The shackle to connect M24 and local ground potential is located on the left side of the module rack UR2.
Connection with rack section
Grounding shackle to remove
M24 reference potential

Figure 3-2  Grounding shackle

Note
Chapter 7 contains the order numbers of the above-mentioned components. Please refer to the "Additional System Documents" Manual (see /33/ in "Applicable Documents" in Appendix A) for details of the migration rack configuration.
Method of Operation

This chapter informs you about the functional structure of the migration rack.
The migration rack’s mode of operation is explained on the basis of an upgraded AS 230. The central base unit in an existing AS 230 cabinet has been replaced with the migration rack. The migration rack contains an AS 488/TM system with additional TPM 478 and TBX 478 components (see Fig. 4-1).

![Diagram of migration rack, mode of operation](image-url)
The cable connectors of the I/O buses 1 and 2 are fixed to the rear of the fuse module. Use the existing ribbon cables to connect the I/O buses A and B to these connectors from the rear or the migration rack. The +24 V power supply cables, the +5 V I/O bus cables, and the cables for the I&C signals are routed downwards through the fuse module.

**Cable overview**

The migration rack provides the functional connection of the TELEPERM M I/O buses. There are two interfaces at the rear of the migration rack, labelled I/O bus A and B. The existing ribbon cable of the TELEPERM M base cabinet connects to I/O bus A. The existing ribbon cable of the TELEPERM M extension cabinet option) can be connected to I/O bus B. The ribbon cables must be routed inside the metallic cable duct of the TELEPERM M cabinet.

**Connecting the I/O bus 1 and 2**

The migration rack is fed via the power supply rail of the TELEPERM M base cabinet. The connections are at the rear of the power supply tier.

**Connecting the +24 V power supply**

To feed the I/O bus, the EU extension units of the TELEPERM M cabinets need a +5 V logic power supply. Like with the old AS systems, this power supply is called +5 V bus. Its connections are on the TBX 478 front panel. The pre-assembled cables of the migration rack run along the cable duct and through the fuse module to the rear (strain relief) where they are connected to the EU1 of the base cabinet. Each additional extension unit receives the +5 V power from the EU above it. The same wiring is required for the extension cabinet (option). The minimum cross-section of each wire is 4 mm. The +5 V power supply comes from the second screw terminal (+5 V-BUS and 0 V) of the TBX 478 unit. It is routed to the topmost extension unit of the extension cabinet. As before, the extension units below are fed from the extension units above them.

**Connecting the extension units**

In contrast to AS 220 and AS 230 systems migration rack I has no connection between M24 and 0 V. This connection is necessary for chassis ground. We recommend to insert this dutiful connection (M24 with 0 V) in the first extension unit (EU1).

**Chassis ground**

- **Caution**
  
  If there is no connection to chassis ground undefined conditions are possible at the I/O bus.
Connecting the I&C monitoring line

Use the pre-assembled I&C monitoring cable of the migration rack to connect the I&C signals in a TELEPERM M cabinet. One end of the cable is fitted with a connector that is plugged into the IF 961-DIO interface module. There is no connector at the other end; the I&C signals can be connected to the related terminal strips of the power supply tier. Table 4-1 shows the connector pin assignments of the I&C monitoring cable.

Table 4-1 Connector pin assignments of the I&C monitoring cable

<table>
<thead>
<tr>
<th>Pin</th>
<th>Color (op. end)</th>
<th>Signal at IF</th>
<th>Function</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>bl wh</td>
<td>DO7</td>
<td>I&amp;C output signal: signalling output (GB 248) application, user AM3</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>rd wh</td>
<td>DO6</td>
<td>I&amp;C output signal: signalling output (system) watchdog trigger signal Watchdog inverted upon each writing</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>gr wh</td>
<td>DO5</td>
<td>I&amp;C output signal: signalling output (GB 247) application, user AM2</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>ye wh</td>
<td>DO4</td>
<td>I&amp;C output signal: signalling output (GB 246) application, user AM1</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>gn wh</td>
<td>6L+</td>
<td>L+</td>
<td>L+ for DO4 through DO7</td>
</tr>
<tr>
<td>7</td>
<td>br wh</td>
<td>6M</td>
<td>Ground</td>
<td>Ground for DO4 through DO7</td>
</tr>
<tr>
<td>8</td>
<td>pk wh</td>
<td>DO3</td>
<td>I&amp;C output signal: signalling output (GB 143) bus link interrupted Bus state new</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>bk wh</td>
<td>DO2</td>
<td>I&amp;C output signal: signalling output (GB 142) hooter block, common alarm Hooter new on I&amp;C signal</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>bl br</td>
<td>DO1</td>
<td>I&amp;C output signal: signalling output (GB 20) I&amp;C common alarm</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>rd br</td>
<td>DO0</td>
<td>I&amp;C output signal: backup system</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>gr br</td>
<td>5L+</td>
<td>L+</td>
<td>L+ for DO1 through DO3</td>
</tr>
<tr>
<td>13</td>
<td>ye br</td>
<td>5M</td>
<td>Ground</td>
<td>Ground for DO1 through DO3</td>
</tr>
<tr>
<td>14</td>
<td>gn br</td>
<td>1M</td>
<td>Ground</td>
<td>Ground for DI0 and DI1</td>
</tr>
</tbody>
</table>
Table 4-1  Connector pin assignments of the I&C monitoring cable

<table>
<thead>
<tr>
<th>Pin (connector)</th>
<th>Color (op. end)</th>
<th>Signal at IF</th>
<th>Function</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>pk br</td>
<td>DI0</td>
<td>I&amp;C input signal: signalling input (GB 235) backup System</td>
<td>No minute impulse implemented</td>
</tr>
<tr>
<td>16</td>
<td>bk (jumper)</td>
<td></td>
<td>I&amp;C input signal: signalling input (GB 236) fan function</td>
<td>External ORing required if there is more than one cabinet</td>
</tr>
<tr>
<td>17</td>
<td>rd</td>
<td>2M</td>
<td>Ground</td>
<td>Ground for DI2 and DI3</td>
</tr>
<tr>
<td>18</td>
<td>gr (jumper)</td>
<td>DI2</td>
<td>I&amp;C input signal: signalling input (GB 237) excessive temperature</td>
<td>External ORing required if there is more than one cabinet</td>
</tr>
<tr>
<td>19</td>
<td>br (jumper)</td>
<td>DI3</td>
<td>I&amp;C input signal: signalling input (GB 238) door contact</td>
<td>External ORing required if there is more than one cabinet</td>
</tr>
<tr>
<td>20</td>
<td>gn</td>
<td>3M</td>
<td>Ground</td>
<td>Ground for DI4 and DI5</td>
</tr>
<tr>
<td>21</td>
<td>ye</td>
<td>DI4</td>
<td>I&amp;C input signal: signalling input (GB 239) bus redundancy indication</td>
<td>Redundancy signal from OLM</td>
</tr>
<tr>
<td>22</td>
<td>wh</td>
<td>DI5</td>
<td>I&amp;C input signal: signalling input (GB 240) acknowledgement for hooter block</td>
<td>Hooter acknowledgement new in AS</td>
</tr>
<tr>
<td>23</td>
<td>bl</td>
<td>4M</td>
<td>Ground</td>
<td>Ground for DI6 and DI7</td>
</tr>
<tr>
<td>24</td>
<td>pk</td>
<td>DI6</td>
<td>I&amp;C input signal: signalling input (GB 241) application, user EM1</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>vio</td>
<td>DI7</td>
<td>I&amp;C input signal: signalling input (GB 242) application, user EM2</td>
<td></td>
</tr>
</tbody>
</table>
Cables

Fig. 4-2 shows the connection of pre-assembled cables in the fuse module of the migration rack.

1. Fuse module without cover
2. Front panel
3. I/O bus 1 cable
4. I/O bus 2 cable
5. +24 V power supply cable
6. +5 V I/O bus 1 power supply cable
7. +5 V I/O bus 2 power supply cable (option)
8. I&C monitoring line
9. Circuit breaker

Figure 4-2  Wiring of the fuse module in the migration rack
Installation and Commissioning

This chapter tells you how to install and commission the migration rack.
Installing the migration rack

**Introduction**

As we have already mentioned, the migration rack is available in two different pre-assembled versions.

**Installation**

To install the migration rack in an existing TELEPERM M system, you should always use the following procedure:

- **Shut down the AS cabinet that is to be upgraded**
  - Terminate the process sequence
  - Switch off the power supply to the cabinet
  - Switch off all power supply switches (circuit breakers) in the cabinet

- **Remove the existing AS base unit**
  - Disconnect all electrical connections (connectors/cables of local bus, printer, process control keyboard, I&C monitor, I/O bus, extension cabinet, +5 V, +24 V from power supply) from the base unit.
  - Remove the AS rack
    (loosen four screws at either side of the mounting rail)

- **Install the migration rack**
  - Install the pre-assembled migration rack (at the location of the previously installed AS rack)
    (four screws at either side of the mounting rail)
  - Establish the electrical connections to the migration rack
    - Connect the +24 V and +5 V cables from the migration rack’s fuse module to the power supply tier or the 1st extension unit (remove the old +24 V and +5 V cables from the base unit). Connect the I&C monitoring line to the module and the power supply tier; the IO/O bus 1 and/or 2 to the module and at the rear; and the local bus cable to the modules (interface and U/I).

- **Grounding** according to chapter 3.

- **6DS 1000**

  The PS (power supply) 6DS1000 within the EU (extension unit) serves two purposes:

  Supply of one or more EUs with protected L+ and PM as well as supply of the modules with +5 V bus.

  After installation of AS 488/TM the +5 V busses of the 6DS1000 have to be switched off with the switches on the front. The allocated LED “Stör” is irrelevant (cover up).
Caution
Before you switch on the power supplies (from outside and inside the TELEPERM cabinet), you should verify that the polarity of the +5 V and +24 V voltages at the connection points of the migration rack is correct. Additional you should verify that the connection between 0 V and M24 is existing.

Note
Observe the TELEPERM M installation guidelines (see /30/ in ”Applicable Documents” in Appendix A) when you install the migration rack.

Commissioning

To commission the migration rack together with the AS 488/TM or CS-L2 bridge unit, use the related Technical Description in the following Manual:

TELEPERM M
"Additional System Documents for AS 388/TM, AS 488/TM and CS–L2 Bridge”,
(see /33/ in ”Applicable Documents” in Appendix A).
This chapter informs you about the operating conditions of the migration rack I.
Operating conditions

AS 488/TM with TELEPERM M peripherals
You can use all I/O modules which are listed in “Supplementary System Documentation AS 388/TM and AS 488/TM”, C79000–G8076–C700 resp. Catalog PLT112 resp. “TELEPERM M – aktuell”.

Special notes:

Extension units
Migration rack I + II will be released together with TPM 478, version 5. You can operate with them up to seven extension units, three within the basic cabinet, four within extension cabinet.
The ribbon cable has to be accordingly adjusted (e.g. with AS 230).
The maximum number of addressable I/O subracks is further defined with 2 x 4 (including ES 100K).

CP 581–TM
Module CP 581–TM is only usable in AS 488/TM with the driver S5Kx.
Per whole configuration (migration rack and basic cabinet and extension cabinet) only one module CP 581–TM is allowed (5 V supply conditions).
N–V.24 cannot be used additional.

N–V.24
Per whole configuration (migration rack and basic cabinet and extension cabinet) only one module N–V.24 is allowed (5 V supply conditions).
CP 581–TM cannot be used additional.

LED
In TPM 478 faults/failures/defects of I/O busses are not displayed per LED.
You can recognize this (e.g.) by the failure messages of the drivers.

SYST.WART
The configuring functions of SYST.WART are extended with version M01.04. (See product information M01.04/M01.05 and assigned documentations.)
Ordering Information

This chapter contains the order numbers of the products mentioned or discussed in the description. They are subdivided into the following sections:

- Components
- Spare parts and accessories
Components

Table 7-1 lists the order numbers of the discussed components.

Table 7-1  Order numbers of the components

<table>
<thead>
<tr>
<th>Product</th>
<th>MLFB No.</th>
<th>C No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Migration rack for AS 488/TM</td>
<td>6DS2410-0XX00-2XX0</td>
<td>C79451–A3496–A1</td>
</tr>
<tr>
<td>Migration rack for CS-L2 bridge</td>
<td>6DS2510-0XX00-2XX0</td>
<td>C79451–A3496–A2</td>
</tr>
</tbody>
</table>

Spare parts and accessories

Table 7-2 lists all parts of the migration rack that may additionally be ordered.

Table 7-2  Order numbers of the accessories and spare parts

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Order no.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecting cable for I&amp;C monitoring</td>
<td>I&amp;C monitoring cable (2.7 m)</td>
<td>6DS8320–8LC</td>
</tr>
<tr>
<td>Connecting cable 20 m–local bus type 1</td>
<td>C 275 local bus type 1 (2.5 m)</td>
<td>6DS8213–8KC</td>
</tr>
<tr>
<td>Connecting cable 20 m–local bus type 2</td>
<td>C 275 local bus type 2 (3.6 m)</td>
<td>6DS8214–8PC</td>
</tr>
<tr>
<td>Connecting cable 20 m–local bus type 3</td>
<td>C 275 local bus type 3 (5 m)</td>
<td>6DS8215–8SC</td>
</tr>
</tbody>
</table>
Applicable Documents
The following Manuals are available from your Sales Partner:

<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>available from</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>/1/</td>
<td>Manual TELEPERM M AS 235 Automation System System software, variant G</td>
<td>KA</td>
<td>C79000-G8076-C416</td>
</tr>
<tr>
<td>/2/</td>
<td>Description TELEPERM M &quot;Bridge CS-L2&quot;</td>
<td>KA</td>
<td>C79000-T8076-C707</td>
</tr>
<tr>
<td>/3/</td>
<td>Description TELEPERM M TPM 478 and TBX 478 Interface modules</td>
<td>KA</td>
<td>C79000-T8076-C708</td>
</tr>
<tr>
<td>/4/</td>
<td>Description TELEPERM M Migration rack I for AS 488/TM and Bridge CS–L2</td>
<td>KA</td>
<td>C79000-T8076-C710</td>
</tr>
<tr>
<td>/5/</td>
<td>Configuring Instructions TELEPERM M Input/Output Modules on TELEPERM M I/O Bus</td>
<td>KA</td>
<td>C79000-P8076-C703</td>
</tr>
<tr>
<td>/6/</td>
<td>Description TELEPERM M Commissioning Terminal for AS 388/TM &amp; AS 488/TM and Bridge CS–L</td>
<td>KA</td>
<td>C79000-T8076-C733</td>
</tr>
<tr>
<td>/7/</td>
<td>Manual M7-300 Automation system</td>
<td></td>
<td>6ES7398-8BA00-8AA0</td>
</tr>
<tr>
<td>/8/</td>
<td>Reference Manual SIMATIC S7-400, M7–400 Module datas</td>
<td></td>
<td>C79000-G7076–C411 Part of 6ES7498-8AA01-8AA0</td>
</tr>
<tr>
<td>/9/</td>
<td>Manual SIMATIC S7 S7-300 Automation system</td>
<td></td>
<td>EWA 4NEB 710 6040</td>
</tr>
<tr>
<td>/10/</td>
<td>Manual SIMATIC S7-400, M7–400</td>
<td></td>
<td>6ES7498-8AA01-8AA0</td>
</tr>
<tr>
<td>/11/</td>
<td>Manual TELEPERM M I/O modules</td>
<td></td>
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</tr>
<tr>
<td>/12/</td>
<td>Manual TELEPERM M AS 235 Automation System</td>
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<td>C79000-G8076-C295</td>
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</tbody>
</table>

**Note**

The documents /2/, /3/, /4/, /5/, /6/ and /32/ are parts of the manual “TELEPERM M, Supplementary System Documentation”, order no. C79000–G8076–C700, to be ordered from Lieferzentrum Nürnberg (LZN).
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<th>Order No.</th>
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</tr>
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<td></td>
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<td></td>
<td>6GK1 970-5CA10-0AA0</td>
</tr>
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<td></td>
<td>6ZB5 530-0AQ01-0BA7</td>
</tr>
<tr>
<td>/22/</td>
<td>Description TELEPERM M Bus system CS 275</td>
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<tr>
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<td>Device manual Distributed I/O device ET 200U</td>
<td></td>
<td>6ES5 998-3ES12</td>
</tr>
<tr>
<td>/24/</td>
<td>Device manual Distributed I/O device ET 200B</td>
<td></td>
<td>6ES5 998-4ET11</td>
</tr>
<tr>
<td>/25/</td>
<td>Device manual Distributed I/O device ET 200M (mit Signalbaugr.)</td>
<td></td>
<td>6ES7 153-1AA00–8AA0</td>
</tr>
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<td>/26/</td>
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<td>(ST50)</td>
<td>6ES5 895–6SE12</td>
</tr>
<tr>
<td>/30/</td>
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<td></td>
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</tr>
<tr>
<td>/31/</td>
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<td>LZN</td>
<td>C79000–G7076–C410, component of 6ES7498–8AA01–8AA0</td>
</tr>
<tr>
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<td>KA</td>
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</tr>
</tbody>
</table>
Dimensions

Introduction

The drawings in this Appendix give you the dimensions of the migration racks. Take these dimensions into account when you install the racks in TELEPERM M cabinets.
Migration rack for AS 488/TM

Fig. B-1 shows the dimensions of the migration rack for AS 488/TM.

---

**Dimensions**

---

**Front view**

**Side view**

**Top view**

*) Installation depth with I/O bus cable

**Rear view**

---

Figure B-1  Migration rack for AS 488/TM, dimensions
Fig. B-2 shows the dimensions of the migration rack for the CS-L2 bridge.

Figure B-2  Migration rack for CS-L2 bridge, dimensions
Glossary of Terms
### Glossary of Terms

#### A

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AS 235</strong></td>
<td>Automation system of the TELEPERM M process control system. An AS 235 is available as a complete system in the TELEPERM standard cabinet.</td>
</tr>
</tbody>
</table>

#### AS 388/TM and AS 488/TM

Automation system of the TELEPERM M process control system on the basis of SIMATIC M7-300/M7-400 and SINEC components and additional TELEPERM M components. An AS 388/TM or AS 488/TM can be installed according to the SIMATIC S7/M7 Installation Guidelines on the wall, in a rack or in a cabinet.

#### B

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bridge</strong></td>
<td>Link between two bus systems (Local Area Network) on layer 2b of the ISO/OSI (International Standards Organization/Open Systems Interconnection) reference model. Layers 1 and 2a may be different. The bridge is transparent to the user.</td>
</tr>
</tbody>
</table>

**Bridge CS-L2** Bridge CS-L2 interconnects the CS 275 and PROFIBUS–TM system buses and performs protocol conversion. The components used for AS 488/TM are also used as the basis of hardware and operating system.

#### C

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU 488</strong></td>
<td>Central processing module of AS 488/TM (AT-compatible computer unit).</td>
</tr>
</tbody>
</table>

**CP 5412 (A1)** The CP 5412 (A1) communications processor is used for linking AS 488/TM and/or Bridge CS-L2 to PROFIBUS–TM.

**CS 275** TELEPERM M bus system.

#### E

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ET 200</strong></td>
<td>Distributed I/O system of the SIMATIC product family. ET 200 consists of the remote I/O units ET 200M, ET 200U, and ET 200B and of the PROFIBUS-DP bus.</td>
</tr>
</tbody>
</table>
### Glossary of Terms

#### I

**IF ...**  
**Interface module**

**ISA bus**  
**Industry Standard Architecture Bus. The ISA bus is the standard bus of AT-compatible personal computers.**

#### M

**M7-300**  
**M7-300 is an AT-compatible automation computer of the SIMATIC product family. It is an encapsulated modular system in SIMATIC S7-300 packaging design.**

**M7-400**  
**M7-400 is an AT-compatible automation computer of the SIMATIC product family. It is made in the SIMATIC S7-300 packaging design.**

#### O

**OS 525**  
**Operator communication and visualization system for central handling and monitoring of processes.**

#### P

**PROFIBUS**  
**PROcess FIeld BUS, German Field Bus Standard DIN 19245 parts 1 through 3.**

**PROFIBUS–TM**  
**Standard bus system according to DIN 19245 (PROFIBUS)**

**PROGRAF AS+**  
**Configuration system for convenient automation system configuration with graphical input of the structure.**

**P bus**  
**I/O bus for controlling the signal modules. It is a part of the AS 488/TM backplane bus.**
Glossary of Terms

R

**RS 232**
Serial interface to the DIN 66020 standard.

T

**TBX 478**
I/O bus interface module. Together with the TPM 478 interface module, it links the AS 488/TM with the field devices of installed AS 220, AS 230, or AS 235 systems.

**TPM 478**
The TPM 478 interface module is used for linking the AS 488/TM with the CS 275 bus system or the TELEPERM M I/O bus. The I/O modules of the base and extension cabinet may be connected.
TELEPERM M

Migration Rack II
6DS2410–0XX00–4XX0
for AS 488/TM
(Configuration and Interfaces)

Technical Description

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Product Overview 1
Wiring 2
I/O Buses 3
Connector Pin Assignments 4
Operating Conditions 5
Safety instructions

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

### Danger

Failure to observe a Danger note will cause death, severe personal injury or severe damage to the equipment.

### Warning

Failure to observe a Warning note may cause death, severe personal injury or severe damage to the equipment.

### Caution

Failure to observe a Caution note may cause personal injury or damage to the equipment.

### Note

Notes contain important information regarding the product, product handling or a specific part of the document that requires special attention.

Qualified personnel

The unit may only be commissioned and used on the basis of the information contained in this Manual. Only qualified personnel are authorized to perform any work inside the unit. Qualified personnel in the sense of the safety instructions in this Manual are persons who have been authorized to commission, ground and label units, systems and circuits according to the safety-relevant standards.

Normal use

Please observe the following instructions:

### Warning

The unit may only be used for the applications mentioned in the Catalogue and the Technical Description. It may only be used together with third-party equipment or components that have been recommended or released by Siemens.

Faultless and safe operation of the product requires proper transport, storage, installation and commissioning, and careful handling and maintenance.

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Bereich Automatisierungs- und Antriebstechnik
Geschäftsgebiet Systems Engineering
D-76181 Karlsruhe

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Siemens Aktiengesellschaft
Order No. C79000-T8076-C711
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4 **Connector Pin Assignments** ..................................................... 4-1
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Product Overview

This chapter

This Chapter gives information about migration rack II and its use in TELEPERM M.

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<td>1–2</td>
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</tbody>
</table>
1.1 Use of migration rack II in TELEPERM M

What is migration rack II?

Migration rack II is an engineering pre-assembled variant to run an AS 488/TM system in a TELEPERM M cabinet.

All system components like CPU, DC power supply, CS 275 interface connection and I/O interface connection can be operated with the short backplane.

Features

This migration rack extension makes available five TELEPERM I/O slots for AS 488/TM systems. These slots can be used with I/O bus A or with I/O bus A and B too in a ratio of 3 to 2.

Compared with migration rack I the simplification of cabling (supply and control system messages) is a further quality of the migration rack II and beyond it the possibility of changing something mechanical components (like plugs) in case of faults.

Compared with migration rack I the cabling of migration rack II has fixed ends, i.e. there is an engineering adjustment in the direction of AS 230/235.

The integrated backplane serves as distributor of signals and voltages. For feeding DC 24 V are insert nuts planned with hexagon bolts as with AS 235, the DC 5 V supply of the I/O bus is integrated within the backplane and it is able to continue the wiring. The I&C monitoring signal cables are fixed with terminal screws on the backplane as with AS 235. The old cabinet wiring can almost complete be accepted.

In case of faults the fuses for L+ (16 A) and PM (4 A) on the front panels can be replaced from the front. Because of lateral fixing also the I/O plugs can be replaced without dismantle the migration rack.

To derive interferences the voltages L+, PM, M24 and MZ are provided with capacitors; the capacitors derive the interferences to the shield grounding and with it to the sheet housing.

Furthermore the adress range of each slot has a filter.
Figure 1-1 View of migration rack II from the front
Figure 1-2 View of migration rack II from the back
Wiring

This chapter

This chapter tells you

• how to connect power supply and signal cables
• something about the grounding plan.

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The sections are on the following pages:

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</tr>
<tr>
<td>2.2</td>
<td>Grounding</td>
<td>2–3</td>
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</tbody>
</table>
2.1 Supply and signals

**Power supply**

The voltage feeding with L+ and M24 out of the W–line (incoming unit) will be screwed on to clamp 1L+ and clamp M24. The second connection of 1L+ is connected with both fuses (16 A and 4 A). The voltages PM (4 A) and L+ (16 A) are protected by fuses and will be screwed on to the corresponding insert nuts. Here is also the connection for the round cable which leads to the M7 power supply.

At the connection points 5 V and 0 V the 5 V bus supply from TBX478 is connected.

Here is also made the connection between 0 V and M24, if it is not existing at another place (0 V grounding). (Absolute connection!)

An existing MZ or BS can also be connected with the corresponding insert nuts.

See also figure 2.2 and “Grounding plan” in chapter 2.2.

**I&C monitoring signals**

The I&C monitoring signals will be connected with the slot X30 via line with sub–d–plugs on both ends.

Because of decoupling the system from DIO in case of faults (for example short circuit at DIO plug) the L+ feeding of the DIO module will passed through a “multi–fuse”.

The outputs are available at the screw–type terminals X31, X32, and X33, the inputs at X35, X36 and X37.

**Cable routing**

All cables will be led in cable ducts on the front resp. on the back and tied up at appropriate places if necessary.

**6DS1000**

The PS (power supply) 6DS1000 within the EU (extension unit) serves two purposes:

Supply of one or more EUs with protected L+ and PM as well as supply of the modules with +5 V bus.

After installation of AS 488/TM the +5 V busses of the 6DS1000 have to be switched off with the switches on the front. The allocated LED “Stör” is irrelevant (cover up).
2.2 Grounding

Grounding plan reference

If you use AS 488/TM within the migration rack, even if TELEPERM M I/O modules are used or TELEPERM M AS systems are used in the same cabinet the following guidelines are valid:

“TELEPERM M Instructions and Guidelines for Planning, Installation, and Operation”: Chapter 7.2 “Grounding and Screening Several Cabinets”, ordering number C79000–M8076–C417,

as well as:


Protective grounding

This means that screens and protective grounding connections are connected with the local ground potential. And M24 is connected once with the central grounding point (CGP) which is good for all TELEPERM M systems within the plant and connected with the local ground potential. According to DIN VDE 0150, paragraph 3.2.1, multiple groundings are inadmissible in plants with DC because of stray corrosion.

For this reason only one galvanic connection between the local ground potential and M24 is allowed in these migration systems. According to the description in the installation manual “S7–400/M7–400 Automation Systems”, chapter 4.6 and 4.7m, you have to cut the preassembled connection between M24 and local ground potential relate to the cabinet, and you have to realize an assembly free of grounding.

Grounding shackle

The shackle to connect M24 and local ground potential is located on the left side of the module rack UR2.

Figure 2-1  Grounding shackle
I/O Busses

This chapter informs you about

- configuration of I/O busses
- configuration of I/O slots.

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<td>3–2</td>
</tr>
<tr>
<td>3.2</td>
<td>Configuration of I/O slots</td>
<td>3–3</td>
</tr>
</tbody>
</table>
3.1 Configuration of I/O busses

I/O busses A, B

According to the requests connection and fixing of the 50–pin ribbon cables are variable:

- **Variant 1:** bus A with 5 slots
- **Variant 2:** bus A with 3 slots and bus B with 2 slots
- **Variant 3:** bus A with 2 slots and bus B with 3 slots
- **Variant 4:** bus B with 5 slots

Only important are variant 1 and 2 which are easy to realize with suitable ribbon cable connectors.

**Variant 1:**
- Fixing of the ribbon cable plug bus A on the upper fixing point.
- Connection of the ribbon cable plug with X34 and X12 using cable C79451–A3496–D1 with 4 ribbon cable connectors (for stand alone use too) or
  2 additional ribbon cable connectors pressed on an existing cable (system replacement)
  (see figure 4-2).

**Variant 2:**
- Fixing of the ribbon cable plug bus B on the upper fixing point.
- Connection of the ribbon cable plug bus B with X34 using as a first cable C79451–A3496–D2 with 3 ribbon cable connectors (for stand alone use too) or
  1 additional ribbon cable connectors pressed on an existing cable (system replacement of extension cabinet).
- Fixing of the ribbon cable plug bus A on the lower fixing point.
- Connection of the ribbon cable plug bus B with X12 using as a second cable C79451–A3496–D2 with 3 ribbon cable connectors (for stand alone use too) or
  1 additional ribbon cable connectors pressed on an existing cable (system replacement of basic cabinet).

**Attention!** Ribbon cables have to be folded twice.

**Remember:** C79451–A3496–D2 consists of 2 ribbon cables.

**To variant 3:**
- Analogous to 2.

**To variant 4:**
- Analogous to 1.

**Note**

The specified ribbon cable sets C79451–A3496–D1 resp. C79451–A3496–D2 are not components of the migration rack.
3.2 Configuration of I/O slots

**Terminator**

The electric I/O slots and the signal I/O slots are separated in a ratio of 3 to 2. Therefore they may be configured separately. This means the setting of the slot addresses as well as switching on pull-up-resistors in stand alone use.

The slots 1, 2 and 3 (bus A) work with ribbon cable plug X12 and the slots 4 and 5 (bus B) work with ribbon cable plug X343.

To switch on the pull-up-resistors in stand alone use you have to insert the plug-in jumpers according to the following table:

<table>
<thead>
<tr>
<th>Plug-in jumper</th>
<th>Pull-Up</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>X52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 – 3</td>
<td>On</td>
<td>PMEMR_N_A</td>
</tr>
<tr>
<td>3 – 5</td>
<td>Off</td>
<td></td>
</tr>
<tr>
<td>X52</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 – 4</td>
<td>On</td>
<td>PMEMW_N_A</td>
</tr>
<tr>
<td>4 – 6</td>
<td>Off</td>
<td></td>
</tr>
</tbody>
</table>

The plug-in jumpers are within reach from the front (see figure 4-3). In delivery state pull-up-resistors are switched off.

**Note**

The assigned pull-up-resistors must **not** switched on if an extension device is connected!
Slot addresses

If TME modules are used two plug-in jumpers are available for each bus, with them you can set the slot addresses. Please take the corresponding address of the slot out of the following table.

The plug-in jumpers are within reach from the front too.

### Bus A

<table>
<thead>
<tr>
<th>Location address</th>
<th>Slot address</th>
<th>Slot address</th>
<th>Slot address</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10</td>
<td>A11</td>
<td>SP 1</td>
<td>SP2</td>
</tr>
<tr>
<td>x</td>
<td>x</td>
<td>13</td>
<td>14</td>
</tr>
<tr>
<td>0</td>
<td>x</td>
<td>29</td>
<td>30</td>
</tr>
<tr>
<td>x</td>
<td>0</td>
<td>45</td>
<td>46</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>61</td>
<td>(62)</td>
</tr>
</tbody>
</table>

### BUS A / Bus B

<table>
<thead>
<tr>
<th>Location address</th>
<th>Slot address</th>
<th>Slot address</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10</td>
<td>A11</td>
<td>SP 4</td>
</tr>
<tr>
<td>x</td>
<td>x</td>
<td>14/114</td>
</tr>
<tr>
<td>0</td>
<td>x</td>
<td>30/130</td>
</tr>
<tr>
<td>x</td>
<td>0</td>
<td>45/145</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>(62/162)</td>
</tr>
</tbody>
</table>

x = plug-in jumper inserted
0 = plug-in jumper not inserted
(62/162) = useless or inadmissible combination, SP with jumper address useful.

---

**Note**

According to setting several slots with the same adress are possible. Double address setting has to be prevented by configuring.
Connector Pin Assignments

This chapter informs you about the connector pin assignments of the migration rack.

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<tr>
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<tr>
<td>4.3</td>
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<tr>
<td>4.4</td>
<td>View of bus board from the back</td>
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<tr>
<td>4.5</td>
<td>View of bus board from the front</td>
<td>4–4</td>
</tr>
</tbody>
</table>
4.1 Pin assignment of the 64–pin “D” connector, all slots

<table>
<thead>
<tr>
<th>Pin</th>
<th>f</th>
<th>d</th>
<th>b</th>
<th>z</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>not used</td>
<td>BS</td>
<td>PM</td>
<td>MZ</td>
</tr>
<tr>
<td>32</td>
<td>L+</td>
<td>L+</td>
<td>M24</td>
<td>M24</td>
</tr>
</tbody>
</table>

4.2 Pin assignment X30, 25–pin sub “D” connector, control system messages

<table>
<thead>
<tr>
<th>Pin</th>
<th>Signal</th>
<th>Meaning</th>
<th>Pin</th>
<th>Signal</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>not used</td>
<td></td>
<td>2</td>
<td>DO7</td>
<td>AM 3</td>
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Signal mapping see X31 ... X33, X35 ... X37 in paragraph 4.3

Note: Pins 6, 7, 12, 13, 14, 17, 20, 23 are wired

4.3 Connection panel of migration rack

![Connection panel of migration rack](image)

Signals X31 ... X33, X35 ... X37: see paragraph 4.2

Note: Connections X33–M24 and X37–M24 are outputs for general use
4.4 View of bus board from the back

Figure 4-2 View of bus board from the back
4.5 View of bus board from the front

Migration rack II

View of bus board from the front
Jumper default setting TM for I/O bus A and I/O bus B

Figure 4-3  View of bus board from the front
This chapter informs you about the operating conditions of the migration rack II.
Operating conditions

**AS 488/TM with TELEPERM M peripherals**
You can use all I/O modules which are listed in
Catalog PLT112 resp.
“TELEPERM M – aktuell”.

**Special notes:**

**Extension units**
Migration rack I + II will be released together with TPM 478, version 5. You can operate with them up to seven extension units, three within the basic cabinet, four within extension cabinet.
The ribbon cable has to be accordingly adjusted (e.g. with AS 230).
The maximum number of addressable I/O subracks is further defined with 2 x 4 (including ES 100K).

**CP 581–TM**
Module CP 581–TM is only usable in AS 488/TM with the driver S5Kx.
Per whole configuration (migration rack and basic cabinet and extension cabinet) only one module CP 581–TM is allowed (5 V supply conditions).
N–V.24 cannot be used additional.

**N–V.24**
Per whole configuration (migration rack and basic cabinet and extension cabinet) only one module N–V.24 is allowed (5 V supply conditions).
CP 581–TM cannot be used additional.

**LED**
In TPM 478 faults/failures/defects of I/O busses are not displayed per LED.
You can recognize this (e.g.) by the failure messages of the drivers.

**SYST.WART**
The configuring functions of SYST.WART are extended with version M01.04. (See product information M01.04/M01.05 and assigned documentations.)

**Note about the pilot lot**
Relating to slot addresses and connections the standard series is different to the pilot lot. The differences are described within the enclosed documentation. Please pay attention to the enclosed documentation in each case.
# Preface

# Contents

## Product Overview

## Room Planning and Room Outfit

## Modules of the PNK Structure

## Installation Instructions

## Appendix

### Applicable Documents

### Glossary of Terms, Index
Safety instructions

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

Danger

Failure to observe a Danger note will cause death, severe personal injury or severe damage to the equipment.

Warning

Failure to observe a Warning note may cause death, severe personal injury or severe damage to the equipment.

Caution

Failure to observe a Caution note may cause personal injury or damage to the equipment.

Note

Notes contain important information regarding the product, product handling or a specific part of the document that requires special attention.

Qualified personnel

The unit may only be commissioned and used on the basis of the information contained in this Manual. Only qualified personnel are authorized to perform any work inside the unit. Qualified personnel in the sense of the safety instructions in this Manual are persons who have been authorized to commission, ground and label units, systems and circuits according to the safety-relevant standards.

Normal use

Please observe the following instructions:

Warning

The unit may only be used for the applications mentioned in the Catalogue and the Technical Description. It may only be used together with third-party equipment or components that have been recommended or released by Siemens.

Faultless and safe operation of the product requires proper transport, storage, installation and commissioning, and careful handling and maintenance.

Trademarks

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Bereich Automatisierungs- und Antriebstechnik
Geschäftsbetrieb Systems Engineering
D-76181 Karlsruhe

Exclusion of liability

Although we have checked the contents of this document against the hardware and software described herein, the information contained in this document may not cover all details. We can therefore not assume any liability for completeness. The information in this document is checked at regular intervals and necessary corrections will be included in the next revisions. We are grateful for any suggestions.

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Order No. C79000-T8076-C713
Preface

Purpose of the description
This Technical Description provides you with the information about the mechanical design you need for installing the AS 388/TM and AS 488/TM systems.

Contents of the description
The descriptions contain the following topics:
- Overview
- Room planning and room outfit
- Modules of the PNK structure
- Installation instructions
- Applicable documents, glossary of terms

Audience
This Technical Description is directed to commissioning and service personnel who employ AS 388/TM and AS 488/TM systems.

What knowledge is required?
Knowledge of the TELEPERM M process control system and, in particular, of the AS 388/TM and AS 488/TM components.

There are various Technical Descriptions and Manuals that provide additional information (see Applicable Documents in Appendix A).

Further utilization
This packaging structure is also valid for the SIMATIC process control system (SIMATIC PCS 7).

Necessary documents
The ‘Supplementary System Documentation for AS 388/TM, AS488/TM and Bridge CS-L2’ is required for the operation of the AS x88/TM system.

‘Applicable Documents’ in Appendix A tells you the order numbers of these documents and from where you can order them.

Scope of delivery
Documentation and components according to the catalog.

Applicable documents
Appendix A contains a list of the applicable documents and specifies the documents’ order number and the places from where they can be ordered.
### Catalogs

The catalogs contain information and ordering data of the hardware and software components. They also inform about the current configuration capabilities of the system components that may be used in TELEPERM M.

### Inquiries

Please contact your sales partner if you need more information about the packaging structure, or more literature.
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Product Overview

This Chapter

The information in this Chapter shows:

- the performance structure of the AS388/TM and AS488/TM process control systems.
- the AS488/TM design variants that are possible when certain technical requirements are taken into account.

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1.1 AS388/TM and AS488/TM – some Highlights

| The next generation | AS388/TM and AS488/TM provide a completely innovated system platform that is able to cope with the requirements placed upon the automation systems of the future. For the user, this means increased convenience for the operator and more powerful process control systems. |
| Consistency | Emphasis has been laid on the consistency of the systems with respect to programming, configuration, data storage, communications, documentation, and operator communication and visualization. |
| Certified quality | For us, quality goes without saying. Thorough work and continual inspections ensure a consistently high quality. Our quality management complies with DIN ISO 9000. This has been confirmed by the Deutsche Gesellschaft für Qualitätssicherung (DQS). |
| Products comply with standards | Already today, AS388/TM and AS488/TM fulfil tomorrow’s requirements. IEC 1131 is the basis of our hardware and software development. IEC 1131 describes the product standards for programmable controllers of the future. |
| Environmentally compatible product design | The compact design of AS388/TM and AS488/TM saves material, weight and packaging. No polluting components are used. The employed materials are marked and may be recycled. |
| Two graduated systems | The systems consist of two automation systems of graded performance spectrum: |
| | • AS388/TM is the small modular controller for smaller applications in the lower range. |
| | • The high-end AS488/TM has been designed for the medium and upper range. |
| CE compatible | The cabinet design with the system-related units fulfils the requirements of the EMC regulations of January 1996. |
| Ex(i) | The cabinet design takes the requirements placed upon the installation of hazardous components (Ex(i)) into account. |
Depending on the size of the automation task, a system may be composed of components of the AS388 or AS488 systems.

The base structure of an AS388/TM system consists of the following components:

- Rack (profile section)
- Central module with interface for the connection of an IBS terminal for local commissioning and diagnosis.
- Memory card with AS 388/TM system software and/or user structures
- Extension units that accommodate up to two or three interface modules.
- Interface modules for
  - connecting to the PROFIBUS–DP
  - connecting to the PROFIBUS–TM
  - input and output of I&C signals

![Base structure of the AS388/TM automation structure](image_url)

Figure 1-1 Base structure of the AS388/TM automation structure
Components of AS488/TM

The base structure of an AS488/TM system consists of the following components:

- Rack (9 slots)
- Power supply module
- Central module with module slots for interface modules
- Memory card with AS 488/TM system software and/or user structures
- Interface modules for:
  - connecting to the PROFIBUS–DP
  - connecting to the PROFIBUS–TM
  - input and output of I&C signals
  - connecting an IBS terminal for local commissioning and diagnosis
- Extension module with SINEC communication processor to connect the SINEC L2/L2FO bus system.

![Base structure of the AS488/TM automation structure](image)

Figure 1-2  Base structure of the AS488/TM automation structure
Room Planning and Room Outfit

This Chapter

This Chapter tells you

• the room layout and
• the protective measures required for using the described process control system.

The room that accommodates the components of the process control system (AS, OS, or ES) must be equipped such that if satisfies the operating conditions for the installed equipment and the working conditions for the personnel.

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2.1 Room Size

Arrangement
Working procedures and device-related requirements determine the optimum arrangement of the equipment. Precise and thorough planning avoids problems during installation, operation and service.

Max. cable length
Layout planning must always take the maximum length cable of the connecting cables into account. Depending on the equipment configuration, there may be certain maximum distances. In order to ensure optimum condition for future equipment, system expansion should be considered in room planning.

Work areas
The dimensions of the units are specified in the brief equipment descriptions. In addition to the space occupied by the unit, sufficient work area must be provided for the operators in order to ensure undisturbed work around the unit.

Traffic and storage areas
In addition, sufficient traffic and storage areas must be provided. Storage space for data carriers and special packaging materials (such as shock-proof pallets that may be required for a future transport of the system), and sufficient space for tables, cabinets, etc. must be provided.

Service area
A service area is required for service work. There should be a distance of approximately 1 meter between the equipment and the walls or neighboring objects.

Room height
Sufficient air space is required for the ventilation of heat-producing equipment and for avoiding heat accumulation. A vertical clearance of 3 meters is sufficient. The raw height of the room must be increased if a false floor is to be installed.

Transport ways
Ensuring adequate transport ways for the units via corridors, stairs and lifts up to their installation place is an important aspect of room planning. The necessary clearances and load carrying capacity depends on the dimensions and weights specified in the brief equipment descriptions.

Switchgear cabinets
Particularly important are the transport ways to the switchroom and/or the room that accommodates the components of the PNK system (local process components). These components are delivered in switching cabinets of 2000x800x400 mm (hxwxd) (2200 mm with base). The units are delivered in an upright position on pallets.
2.2 Room Layout

Load carrying capacity of the floor

The load carrying capacity of the floor depends on the individual weights and their distribution across the room. Components of the process control system in the cabinet version require a load carrying capacity of at least 5000 N/m² (approximately 500 kg/m²). Smaller units need less. The weights of the individual units are specified in the device descriptions.

Installation floor

A false floor (at least 15 cm clear height and a load carrying capacity of at least 5000 N/m²) proves expedient for installing the data and power cables. It seems to be the ideal solution with respect to appearance, installation and future extensions.

If the false floor is used as a ventilation floor for an air conditioning unit, the surfaces of the raw floor and the cutouts in the air stream must be sealed such that dust particles cannot be dragged along and cause damages to magnetic storage units or other delicate units. It must be ensured that air circulation is not disturbed by cable accumulations.

The supporting structure of a false floor (metal struts) must be included in equipotential bonding.

If a false floor is not available, a skirting duct of 200 mm height is expedient for the cabling to the process control system (AS).

Floor covering

The floor covering must permanently be antistatic and feature a leakage resistance of \(< 10^5 \ ... \ 10^7\) ohms to CECC 00-015 (measured to DIN 51953). An abrasion-proof, easy-to-maintain hard cover with a smooth surface is recommended. To avoid impressions from rollers, the impression hardness should be 80 \(\ldots\) 100 N/mm².

If fitting carpets cannot be avoided, the electrostatic characteristics of the material should be confirmed as binding (leakage resistance \(<10^6\) ohms to ZH 1/200 BG Chemie). This must be guaranteed as a permanent value. If a false floor cannot be installed, suitable measures must ensure that the cables to the units are protected by cable ducts, installation pipes, cable trays, etc. and that permissible minimum bending radii are observed.

Walls and ceilings

The paint on walls and ceilings must be dust-free and abrasion-proof. Concrete surfaces must be sealed. Curtains should be of anti-static materials and frequently be cleaned.

Outfit

Furniture (castor chairs, table tops) and garments (shoes, working overalls) should also be made from antistatic material. Flame-retardant materials should always be used for the room outfit.
Light
Non-blinding light is recommended that is arranged on the ceiling such that the light is equally distributed and throws only little shadows. Anti-glare lamps should be employed when screens are in use. The illumination of the whole area should be at least 500 lux.
The rear of the units should be accessible for service work.
The regulation for screen working places must be observed.

Sun protection
Direct sunlight should be avoided to to its heating and blinding effect. Rooms at the shadow side of the building are particularly suitable as computer rooms. Sunlight may also be reduced by special sun-protective insulation glass and adjustable louvres.

Room climate
The components of the process control system produce heat that must be removed from the room. Many units contain fans that take in air from the room. The dust and pollution contents of the air should therefore not exceed certain limits. Larger components of the process control system, in particular, may require an air conditioning system to be installed in order to maintain the permissible environmental conditions.
Tobacco smoke, ashes, drinks, food, etc. may never get into contact with the components of the process control system. A ’recreation area’ (tables, chairs, mini kitchen, ashtrays, garbage cans, plants, etc.) in the vicinity, but outside of the rooms that accommodate the process control system components make it easier to observe these requirements.

Construction work
Any construction work and any work that releases dust, solvent vapors, etc. must be completed before the process control system is installed. If this is not possible, special measures are required that protect the equipment from harmful effects.
2.3 Protective Measures

Sound insulation

The average sound level of an operating component of the process control system is approximately 55 dB (A). The noise level is higher if more than one unit is working.

According to the regulations for production and office areas, the noise at a working position must not be higher than 70 dB (A), measured to DIN 45635. Adequate sound insulation may therefore be required in certain cases.

The sound level can be reduced by reducing the amount of sound-hard walls and glass surfaces and by covering the remaining surfaces with sound-absorbing material.

Particularly noisy equipment should be installed in a separate room.

Lightning protection

A lightning protection system to VDE 0185, parts 1 and 2, protects the system against lightning effects. Distributed computer systems may require additional measures for preventing damages from lightnings, in particular, if cables run outside of or between buildings. The internal equipotential bonding in the building must be consistent.

EMERGENCY STOP

The Siemens components of the process control system do not require a central EMERGENCY STOP circuit to be installed. If customer-related operating conditions, however, require such a circuit to exist, an installation can be provided that disconnects the entire plant, including the fans (important in the event of a fire), from the mains. It must be ensured that an EMERGENCY STOP circuit includes all electric installations, except emergency lighting. The EMERGENCY STOP buttons should be in the vicinity of the doors and be installed such that inadvertent actuation is not possible.

The EMERGENCY STOP buttons should be locking. They must not automatically re-establish the connection to the mains after they have been released.

Fire protection

A large process control system represents a high concentration of values, and therefore requires special fire-protecting measures (e.g., smoke detectors). The association of German insurance companies (Verband der Sachversicherer e.V.), in co-operation with the federal association of German industry (Bundesverband der deutschen Industrie e.V.), have issued a leaflet 'Electronic Data Processing Systems' (VdS 2007 of 5.88) that summarized the points that must be taken into consideration.

In this context, we point out that the applicable safety and damage prevention requirements from the individual authorities must duly be observed.

A sufficient number of fire extinguishers should be installed.

The regulations of the data protection acts must be observed if personnel data is processed (in PCs, for example) in the area where the automation systems are installed. In addition to access locks in the software, there may be certain equipment required in the computer hardware (such as code card readers) and in the room installation (access control, protected data carrier storage, etc.).
2.4 Cleaning

Floor
Floors with a smooth surface can easily be swept with a damp cloth. **Never use a broom; using a broom whirls up a lot of dust in the air.** Use a vacuum cleaner for carpets.
The room underneath a false floor must be cleaned at regular intervals, in particular, if it is used as a ventilation area.

Equipment
Use a damp lint-free cloth for dusting the units and other furniture. Only use cleansers that are suitable for this type of equipment.

Cleanser
Never use cleanser that contains silicone. They may soil the contacts and cause malfunctions.
Never use any cleanser sprays. The sprayed liquid may be sucked in by the cooling fans and condensate in the units.
This Chapter

This Chapter informs you of

- system components
- installation and commissioning

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<td>3.4</td>
<td>AS388/TM (6DS2903...) System Unit</td>
<td>3-24</td>
</tr>
<tr>
<td>3.5</td>
<td>ET 200 M I/O Unit</td>
<td>3-25</td>
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<td>3.8</td>
<td>Removing and Inserting Components of the ET 200 M Product Family</td>
<td>3-29</td>
</tr>
</tbody>
</table>
3.1  SIEMENS 8MC (6DS2900-4AA...) Base Cabinet and Rittal Base Cabinet (6DS2900-5BA...)

There are two cabinet types from different manufacturers available as base units for the AS388/TM and AS488/TM automation systems and for the SIMATIC PCS 7 (SIMATIC Process Control S7) process control system. The SIEMENS 8MC... cabinet in IP40 rating is the recommended preferred type. The cabinet from Messrs Rittal is an alternative in the same mechanical design. Only the SIEMENS 8MC... cabinet is described in the following mechanical Chapter.

3.1.1 Base Cabinet and Inner Mechanical System

**Base cabinet (enclosure)**

The base cabinet is a closed sheet-steel cabinet that can be installed on its own, in a row or at the wall. Its open base permits cable entry from below. IP40 rating and Ergogray color.

Scope of delivery:
- Welded steel frame
- Rear panel
- Closed top cover
- Full-sized door that opens from the left
- Side panel / partition (option)
- Lifting eyes (enclosed)
- Mounting kit for side-by-side installation (not for single cabinets)
- 2 cable trunking and screen bars, installed at the bottom right-hand side (use PUK cable clamps)

**Inner mechanical system**

The inner mechanical structure is used for accommodating the system units, the incoming power distribution units and the cable ducts.

Scope of delivery:
- 19” frame to accommodate the system units
- Carrying profile to attach the 19” frames
- Cable bracket to guide the process cables (right-hand side)
- Cable duct for bus and power cables (left-hand side)
- Central grounding stud for connecting the local ground
### Specifications

**Table 3-1**  
SIEMENS 8MC cabinet – specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (h x w x d):</td>
<td>2000 x 800 x 400 mm</td>
</tr>
</tbody>
</table>
| Frame (completely welded): | 2 mm sheet steel  
vertical frame profile, 10-times folded  
horizontal frame profile, 5-times folded |
| Rear panel: | 1.5 mm sheet steel, folded |
| Top cover (closed): | 1.5 mm sheet steel, folded |
| Side panel (option): | 1.5 mm sheet steel, folded |
| Partition (option): | 1.5 mm sheet steel |
| Full-sized door (opens from the left): | 1.5 mm sheet steel, opening angle approx. 180° (single-cabinet installation); including bar locking system with lock insert (3 mm mandrel diameter) and double-bit key to DIN 43 668 |
| Protection rating: (single-cabinet installation or together with cabinets of the same type) | IP 40 with bottom plate (option) |
| Color: | ERGOGRAY - SN 30 920-C611-B13 |
| Finish: | Powder finish with epoxy-polyester powder; surface in fine structure; damp location climate F1 to DIN 40 040 for indoor installation |
| Weight: | approximately 75 kg (without system units) |
| Max. permissible ambient temperature: | 40 °C |

---

**Figure 3-1**  
Standard cabinet – enclosure and inner mechanical system
### Table 3-1 SIEMENS 8MC cabinet – specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. permissible inside temperature:</td>
<td>55 °C</td>
</tr>
<tr>
<td>Max. permissible thermal load $P_{\text{max}}$,</td>
<td>350 W</td>
</tr>
<tr>
<td>without fan: (related to maximum values of ambient and inner</td>
<td></td>
</tr>
<tr>
<td>temperature)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3-2 Rittal cabinet – specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions (h x w x d):</td>
<td>2000 x 800 x 400 mm</td>
</tr>
<tr>
<td>Frame (completely welded):</td>
<td>2 mm sheet steel, 9-times shaped</td>
</tr>
<tr>
<td>Rear panel:</td>
<td>1.5 mm sheet steel, folded</td>
</tr>
<tr>
<td>Top cover (closed):</td>
<td>1.5 mm sheet steel, folded</td>
</tr>
<tr>
<td>Side panel (option):</td>
<td>1.5 mm sheet steel, folded</td>
</tr>
<tr>
<td>Partition (option):</td>
<td>1.5 mm sheet steel</td>
</tr>
<tr>
<td>Full-sized door (opens from the left)</td>
<td>2 mm sheet steel, opening angle approx.</td>
</tr>
</tbody>
</table>
| Protection rating:                                 | 180° (single-cabinet installation); double-
|                                                    | bit lock insert                           |
| Protection rating: (single-cabinet installation or | IP 40 with bottom plate (option)           |
| together with cabinets of the same type)           |                                           |
| Color:                                             | RAL 7032                                  |
| Finish:                                            | Dipping priming and powder coating         |
| Weight:                                            | Approximately 75 kg (without system units) |
| Max. permissible ambient temperature:              | 40 °C                                     |
| Max. permissible inside temperature:               | 55 °C                                     |
| Max. permissible thermal load $P_{\text{max}}$,     | 350 W                                     |
| without fan: (related to maximum values of ambient and |                         |
| inner temperature)                                 |                                           |
The following figure shows the location codes of the installed components.

Figure 3-2 Location code of the components
Fig. 3-3 shows the configuration of a cabinet with AS488/TM central unit and ET200M I/O. The same configuration is possible with SIMATIC PCS 7.
Cabinet configuration:

- AS488/TM central unit
  - UR2 rack (9 slots)
  - PS405/PS407 power supply unit
  - CPU-AS 486-3
  - Components for the connection to PROFIBUS–TM and PROFIBUS–DP
- I/O units
  - 5 x profile section for 19” installation
  - 5 x IM153 interface module
  - 40 x ET200M I/O modules (maximum configuration)
  - DC 24V incoming unit
3.1.2 Incoming Units and Fuses

The incoming units are used for feeding the power supply voltages into the cabinet. The power supply voltages to the AS488/TM, AS388/TM, ET200M, and SIMATIC PCS 7 system units, and the load power supply to the I/O modules are protected by 1-pole circuit breakers and fed to the units via two-tier terminals.

The incoming units are installed on a 35-mm standard profile section to EN 50022 at the bottom of the preferred cabinet.

There are three different variants possible:

- 24 V DC, simple version
- 24 V DC, redundant version
- 115/230V AC, simple version

Due to the modular design and the flexible allocation of the fuse, the circuit breakers are not contained in the scope of delivery. They must be ordered separately in the required quantity and rating.

Circuit breakers of 4 A or 16 A are available. The required value must be determined according to the device configuration.

The nominal current of the circuit breaker must not exceed 50 A if the cabinet is fused externally.

In a system with DC 24 V mains it must be ensured that the supply voltage is produced as electrically safely isolated extra-low voltage.
3.1.3 **DC 24V Incoming Unit (Simple)**

**Components of the DC 24V incoming unit**
- Profile section 35 mm
- 2 end holders
- 2 modular terminal blocks up to 50 mm² to connect the cabinet power supply
- 6 circuit breaker sockets to accommodate the circuit breakers
- 6 two-tier terminals to distribute L and M

**Options:**
- Circuit breaker
- Two-tier terminals and circuit breaker sockets to expand the incoming unit
- I&C monitoring unit

![Diagram of DC 24V incoming unit](image)

Figure 3-4 **DC 24V incoming unit (simple)**
3.1.4 DC 24V Incoming Unit (Redundant)

Components of the DC 24V incoming unit

- Profile section 35 mm
- 2 end holders
- 2 x 2 modular terminal blocks up to 50 mm² to connect the redundant cabinet power supplies
- Diode OR to isolate the DC 24 V incoming units
- 6 circuit breaker sockets to accommodate the circuit breakers
- 6 two-tier terminals to distribute L and M

Options:

- Circuit breaker
- Two-tier terminals and circuit breaker sockets to expand the incoming unit
- I&C monitoring unit

Figure 3-5 DC 24V incoming unit (redundant)
3.1.5 AC 230V Incoming Unit

Components of the AC 230V incoming unit:

- Profile section 35 mm
- 2 end holders
- 2 modular terminal blocks up to 6 mm$^2$ to connect the cabinet power supply
- 4 modular terminal blocks up to 6 mm$^2$ to connect and distribute protective ground
- 6 circuit breaker sockets to accommodate the circuit breakers
- 6 two-tier terminals to distribute L and N
- Touch guard

Options:

- Circuit breaker
- Two-tier terminals and circuit breaker sockets to expand the incoming unit
- I&C monitoring unit

Figure 3-6 AC 230V incoming unit
3.1.6 I&C Monitoring Option

**I&C monitoring**

The base configuration of the cabinet does not contain any I&C monitoring equipment. I&C can be ordered as an option for the base cabinet. The option consists of monitoring terminals, a cabinet lamp, an additional circuit breaker, and terminals for signal routing.

Overtemperature (Th), door contacts (Tk) and tripping of the circuit breaker (Si-Üb) are monitored. The cabinet lamp is used for indication. Thus, the I&C monitoring variant can be used in the management system without any further processing.

If fiber optics are used for system and/or I/O bus, the signalling contact(s) of the optical link module (OLM) is (are) also included in the I&C message.

**Differences between ASx88/TM and SIMATIC process control**

- In the ASx88/TM automation system, the I&C monitoring signals are connected to the corresponding inputs of the interface module.

- With the SIMATIC PCS 7 automation system, the option additionally contains a digital input and a digital output module from the 6ES74xx product family. The module is installed and wired next to the CPU. The digital input module is used for signalling the I&C signals to the OS. The digital output module can be used for triggering an audible indicator and/or the cabinet lamp.
3.1.7 **Load Power Supply**

The load power supply installation kit is required for feeding the I/O signals with DC 24 V. A load power supply installation kit consists of the following components:

- 15 mm standard profile section
- 8 x 2-way socket connector
- 8 x 2-way plug connector with connecting cables
- 2 bus bars

![Cable routing with load power supply for I/O modules](image)

**Figure 3-7** Cable routing with load power supply for I/O modules
3.1.8 Internal Cabinet Wiring

The cabinet comes as a pre-wired unit. This means that the cabinet is pre-wired internally but for the I/O signals of the I/O modules. All power supply cables to the SIMATIC components and the bus connections between central unit and the interface modules of the S7-300 and ET 200M system units are pre-wired.

The cables are routed in a cable duct that is installed vertically at the left-hand side of the cabinet.

The cables are routed in separate cable ducts according to the VDE requirements if DC 24 V and AC 230 V components are used in the same cabinet.

**Power supply/load**

**Power supply**

Cable routing and cross sections:

- DC 24 V wiring of the S7-400 power supply module with 2 x 1,5 mm²
- DC 24 V wiring of the IM153 with 2 x 1,5 mm² (up to 5 units)
- AC 230 V wiring to the S7-300/ET 200M power supply with 2 x 1,5 mm²
- DC 24 V wiring of the load current bus bars with 2 x 1,5 mm² (up to 5 units)

When AC 230 V systems are used, the load power bus bars are fed with DC 24 V from the power supply modules of the S7-300/ET 200 systems.

![Figure 3-8 DC 24 V wiring](image-url)
Figure 3-9  Redundant DC 24 V wiring

Figure 3-10  AC 230 V wiring
Bus links

The possibilities of PROFIBUS are consistently used as bus links.
PROFIBUS–TM is used as system bus. Using an optical link modules (OLM), this bus can be employed in a redundant structure via optical cables.
PROFIBUS–DP is used as process bus.
All conditions, rules and requirements are valid according to the MTUs of the PROFIBUS components.

Overview:

Figure 3-11  Bus connections and optical link module (OLM)
Cable routing

The cables of the bus links are routed in the wiring duct beneath the AS x88/TM unit and the vertical wiring duct at the left-hand side of the cabinet. The cables of bus links to the field devices and to neighboring cabinets should be routed in the same manner.

Figure 3-12   Cable routing

**Ex(i) applications**

The cabinet can be used for Ex(i) applications without any major mechanical modifications.

In Ex(i) applications it must be ensured that the circuits of the area that is not intrinsically safe and the circuits of the intrinsically safe area are separated. This means that the related cables and lines must be laid in different cable ducts. The mechanical structure discussed here always provides for separate routing of process cables and internal cabinet wiring, even in non-Ex(i) applications.

When a cabinet is to be used in an Ex(i) system, the gray covers of the wiring ducts underneath the I/O modules must be replaced with blue covers.

Only the process cables may be laid in these blue ducts. Furthermore, only the process cables may be routed in the cable clamps at the right-hand cabinet side if the cabinet is used in an Ex(i) system.
I&C monitoring

The base structure does not contain I&C monitoring. The following components can optionally be monitored:

- Overtemperature (Th)
- Door contact (Tk)
- Tripped circuit breaker (Si-Üb)
- Optical link module (only with a fibre optics bus system)

The messages are indicated via the cabinet lamp (SL) or transferred to the OS via a digital input module.

Figure 3-14  I&C monitoring circuits
The scope of delivery of the AS 488/TM system unit is variable. It is defined by an order-related classified order number.

An AS 488/TM system unit chiefly consists of the following components:

- Mounting plate to accommodate the UR2 rack
- Mounting plate for cable duct and load power supply of the I/O signals
- Cable duct
- Profile section (35 mm) for optical link module (OLM) or BT777
- Load power supply
- UR2 rack for SIMATIC S7/M7-400 (9 slots)
- S7-400 power supply unit PS 405/PS 407
- AS 488/TM central unit (SIMATIC M7 CPU488-4 with extension and interface modules)
- Components for the connection to the PROFIBUS-TM system bus and the PROFIBUS-DP (depending on the system configuration).
- AS 488/TM system software
- Installation and wiring of the components

**Option packages for AS 488/TM system unit:**

- I&C monitoring wiring to optional interface module
The OLM needs a DC 24 V voltage. With DC 24 V supplied to the cabinet, this voltage is fused together with the AS388/AS488 power supply unit. With AC 230 V supplied to the cabinet, the OLM is also fused via the AS388/488 circuit breaker. As the power supply modules of the ASx88 product family do not possess a DC 24 V output, an additional 230/24V power supply for the OLM must be included in the planning when AC 230 V is used (e.g. PS 307-2A, 6ES7 307-1BA00-0AA0 and adapter for standard profile section 6ES7 390-6AB00-AA0).

If you use AS 488/TM within SIMATIC configuration without TELEPERM M I/O modules the mechanical design guidelines of SIMATIC S7/M7 are valid. Please note that according to DIN VDE 0150, paragraph 3.2.1, multiple groundings are inadmissible in plants with DC because of stray corrosion. See also the description in “S7/400, M7/400 Installation manual”, chapter 4.6 and 4.7, order number C79000–G7000–C410.

The shackle to connect M24 and local ground potential is located on the left side of the module rack UR2.

Connection with rack section
Grounding shackle to remove
M24 reference potential

Figure 3-16  Grounding shackle
3.3 SIMATIC Process Control S7 System Unit

The structure of the SIMATIC PCS 7 and the structure of the AS 488/TM system are the same.

Option package: Digital input/digital output module to I&C monitoring including wiring.

Figure 3-17 AS 488/TM system unit
3.4 AS 388/TM (6DS2903...) System Unit

The scope of delivery of the AS 388/TM system unit is variable. It is defined by an order-related classified order number.

An AS 388/TM system unit chiefly consists of the following components:

- Mounting plate for cable duct and load power supply
- Cable duct
- Load power supply
- Profile section for S7/M7-300 modules
- S7-300 power supply unit PS 307 (not with DC 24 V; only with AC 120/230 V)
- AS 388/TM central unit (SIMATIC M7 CPU388-4 with extension and interface modules)
- Components for the connection to the PROFIBUS–TM and the PROFIBUS–DP (depending on the system configuration).
- Installation and wiring of the components

Option packages for AS 388 I/O unit:
- SIMATIC S7-300 I/O modules
- Blue cable duct cover for Ex(i) applications

![](image.png)
### 3.5 ET 200 M I/O Unit

The scope of delivery of the I/O unit is variable and is defined per order. The related I/O modules must additionally be ordered as an option package.

An I/O unit chiefly consists of the following components:
- Mounting plate for cable duct and load power supply
- Cable duct
- Load power supply
- Profile section for S7-300 modules
- S7-300 power supply unit PS 307 (not with DC 24 V; only with AC 120/230 V)
- IM 153 interface module for PROFIBUS–DP
- Mains filter for IM 153 power supply (DC 24 V only)
- Installation and wiring of the components

The ET 200 M system unit is available in a variant ‘removing and inserting’. This function requires a different S7-300 profile section and, in addition, the following bus module:
- ‘Removing and inserting’ profile section
- Type 1 bus module for IM153
- Type 2 bus module for 2x40 mm I/O modules
- Type 3 bus module for 1x80 mm I/O modules
- Backplane bus cover, bus module cover

#### Option packages for ET 200 M I/O unit:
- SIMATIC S7-300 I/O modules for ET 200 M
- Blue cable duct cover for Ex(i) applications
Figure 3-19 ET 200 M I/O unit
3.6 Auxiliary Units and Options

- Side panel (for single or end-of-row cabinets)
- Partition (with installation in a row)
- 200 mm or 100 mm base
- Door with ventilation slots and perforated top cover with IP20
- Trim section
- Door handle with lock
- Pocket for circuit diagrams
- Interior cabinet lighting
- Base cover (with IP54)
- AC 230V appliance socket outlet
- I&C monitoring installation kit (cabinet lamp, door contact, temperature monitor, OLM auxiliary contact).
- S7-300 I/O modules for ET200M
- Additional options upon request
3.7 Installation and Commissioning

3.8 Removing and Inserting Components of the ET 200 M Product Family

Removing and inserting modules

S7-300 modules may be inserted or removed while the IM 153-1 is in operation. In order to maintain the continuity of the backplane bus, the ET 200M must then be installed on a special profile section with bus modules. These functions should only be used with an S7-400 CPU as the DP master. Only these CPUs are able to interpret the removing/inserting alarms.

In the ‘removing and inserting’ function, the IM 153-1 issues a ‘removing’ alarm (OB 83) to the OB master when a module is removed. If the same module as before is inserted, the IM 153-1 issues an ‘inserting’ alarm and sets the module parameters according to the saved configuration. If a different module is inserted, the IM 153 ignores the new module. Please refer to the STEP 7 documentation and the Manual of the employed DP master for further information.

FM/CP with MP communication

The IM 153-1 (order no 153-1AA02-...) permits function modules and/or communication processors to be installed in an ET 200 M configuration that can be addressed via the MPI interface. This means that the IM 153 module routes the MPI data traffic from this FM/CP via the PROFIBUS D interface to the DP master. The DP master organizes further data exchange via the MPI. The parameter values of the data traffic via the MPI are set via STEP 7 (see STEP 7 documentation and the manuals of the individual FMs/CPs for details).
Components of an ET 200 M

Various components are available for installing and commissioning an ET 200M. Table 3-3 summarizes the major components and their functions:

<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile section</td>
<td>Rack of the ET 200 M.</td>
<td><img src="image1" alt="Figure" /></td>
</tr>
<tr>
<td>Profile section of the 'removing and inserting' function</td>
<td>Special rack for the ET 200 M with an IM 153 for the function 'removing and inserting S7-300 modules while the IM 153 is in RUN mode'.</td>
<td><img src="image2" alt="Figure" /></td>
</tr>
<tr>
<td>Power supply (PS)</td>
<td>Converts the mains voltage (AC 120/230 V) into the DC 24 V operating voltage for the ET 200 M. It may be used as load power supply for the DC 24 V load current circuits.</td>
<td><img src="image3" alt="Figure" /></td>
</tr>
<tr>
<td>IM 153-1</td>
<td>The slave interface. Links the S7-300 modules to the PROFIBUS-DP field bus, and provides the backplane bus with operating power.</td>
<td><img src="image4" alt="Figure" /></td>
</tr>
<tr>
<td>PROFIBUS cable with bus connector</td>
<td>Interconnects the devices of a PROFIBUS-DP configuration.</td>
<td><img src="image5" alt="Figure" /></td>
</tr>
<tr>
<td>Signal modules (SM)</td>
<td>Adapt different signal levels.</td>
<td><img src="image6" alt="Figure" /></td>
</tr>
</tbody>
</table>

Table 3-3 Components of an ET 200M
<table>
<thead>
<tr>
<th>Component</th>
<th>Function</th>
<th>Figure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function modules (FM) that are not addressed via an MPI address</td>
<td>For time-critical and memory-intensive process signal processing tasks (such as positioning or closed-loop control).</td>
<td><img src="image1" alt="Image" /></td>
</tr>
<tr>
<td>Accessories:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Front connector&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Bus connector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication processor (CP)</td>
<td>Relieves the CPU from communication tasks.</td>
<td><img src="image2" alt="Image" /></td>
</tr>
<tr>
<td>Accessories:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Connecting cable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIMATIC TOP connect</td>
<td>Used for connecting the digital modules, or for 1-, 2- or 3-wire connections.</td>
<td><img src="image3" alt="Image" /></td>
</tr>
<tr>
<td>Accessories:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Front connector with ribbon cable connection&lt;sup&gt;1&lt;/sup&gt;</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>1</sup> These accessories can be ordered
3.8.1 ‘Removing and Inserting’ Function: Arranging the Modules in an ET 200 M Configuration

Rules

When you configure an ET 200M structure for the ‘removing and inserting’ function, you must observe the following rules:

1. Define the configuration of the ET 200 M.

Note

Some S7-300 modules cannot be used for the ‘removing and inserting’ function (see Table 3-4).

2. Depending on the configured structure of the ET 200 M, you need the following bus modules:
   – for the power supply and the IM 153-1 the bus module 1 with the order no. ...7HA

Note

The PS 307/10 A module is too wide for the bus module 1. If you need the PS 307/10 A power supply module, you must install it on a separate S7 standard profile section.

   – for 40-mm-wide modules the bus module 2 (...7HB)
   – for 80-mm-wide modules the bus module 3 (...7HC)

3. Select the profile section according to the number of bus modules:
   – up to 5 bus modules: take the 483-mm profile section
   – more than 5 bus modules: currently, there is no profile section available

4. Close unused slots with the backplane bus cover. The last bus module is terminated with the bus module cover.

Example:
Bus module 2 (...7HB)

5. Use the partition for hazardous areas if the ET 200 M is to be used in the intrinsically safe area. The partition should possibly be used between the modules in the intrinsically safe area and the modules in the non-intrinsically safe area.
Exceptions

Some S7-300 modules cannot be used with the ‘removing and inserting’ function. The following table lists the modules that can be used with this function.

Table 3-4 Modules that can be used with the ‘removing and inserting’ function

<table>
<thead>
<tr>
<th>Module</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM 321; DI 16 × DC 24 V</td>
<td>6ES7 321-1BH01-0AA0</td>
</tr>
<tr>
<td>SM 321; DI 16 × AC 120 V</td>
<td>6ES7 321-1EH01-0AA0</td>
</tr>
<tr>
<td>SM 321; DI 8 × AC 120/230 V</td>
<td>6ES7 321-1FF01-0AA0</td>
</tr>
<tr>
<td>SM 322; DO 8 × DC 24 V/2 A</td>
<td>6ES7 322-1BF01-0AA0</td>
</tr>
<tr>
<td>SM 322; DO 16 × DC 24 V/0,5 A</td>
<td>6ES7 322-1BH01-0AA0</td>
</tr>
<tr>
<td>SM 322; DO 16 × AC 120 V/0,5 A</td>
<td>6ES7 322-1EH01-0AA0</td>
</tr>
<tr>
<td>SM 322; DO 8 × AC 120/230 V/1 A</td>
<td>6ES7 322-1FF01-0AA0</td>
</tr>
<tr>
<td>SM 322; DO 8 × Rel. AC 230 V</td>
<td>6ES7 322-1HF01-0AA0</td>
</tr>
<tr>
<td>SM 374; IN/OUT 16</td>
<td>6ES7 374-2XH01-0AA0</td>
</tr>
<tr>
<td>DM 370</td>
<td>6ES7 370-0AA01-0AA0</td>
</tr>
<tr>
<td>SM 331; AI 8 × 12 Bit</td>
<td>6ES7 331-7KF01-0AB0</td>
</tr>
<tr>
<td>SM 331; AI 2 × 12 Bit</td>
<td>6ES7 331-7KB01-0AB0</td>
</tr>
<tr>
<td>SM 332; AO 4 × 12 Bit</td>
<td>6ES7 332-5HD01-0AB0</td>
</tr>
<tr>
<td>SM 332; AO 2 × 12 Bit</td>
<td>6ES7 332-5HB01-0AB0</td>
</tr>
<tr>
<td>SM 334; AI 4/AO 2 × 8/8 Bit</td>
<td>6ES7 334-0CE01-0AB0</td>
</tr>
<tr>
<td>SM 335; AI 4/AO 4 × 12/14 Bit</td>
<td>6ES7 335-7HG01-0AB0</td>
</tr>
<tr>
<td>FM 350 Zähler</td>
<td>6ES7 350-1AH01-0AE0</td>
</tr>
<tr>
<td>FM 351 Position.</td>
<td>6ES7 351-1AH01-0AE0</td>
</tr>
<tr>
<td>FM 352 Nocke</td>
<td>6ES7 352-1AH01-0AE0</td>
</tr>
</tbody>
</table>
3.8.2 Installing the Modules on the Profile Section with the 'Removing and Inserting' Function

Introduction
To set up an ET 200 M with the 'removing and inserting' function you must use the profile section with the order number 6ES7 195-1GA00-0XA0. Only this profile section is able to accommodate the required bus modules.

Installing the profile section
The profile section is installed in the same way as the standard profile section.

Installing bus module and modules
To install the bus modules and the modules, use the following procedure:
1. Hook the bottom of bus module 1 into the profile section. Press the module into the profile section (a) and push it to the left until it locks home (b).

![Diagram](image)

2. Hook in the next bus module (2 or 3) and press it into the profile section. Push it towards the left-hand bus module such that the contact of the module connection is established.

3. Hook the modules in the profile section and tilt them downwards. Use the lateral guides of the bus modules in this movement. Tighten the module screws (torque between 80 and 110 Ncm required). When you tighten the screws of the modules you fix the bus module on the profile section.

4. Plug the bus module cover onto the last bus module. Plug the backplane cover on unused slots, if there are any.

Partition for hazardous areas?
Do you want to install the ET 200M in an intrinsically safe area? If this is the case, install the partition for hazardous areas between the modules in the intrinsically safe area and the modules in the non-intrinsically safe area. Simply plug the partition for hazardous areas onto the guide at the right-hand side of the bus module.
3.8.3 Replacing Modules with 'Removing and Inserting' Function

Replacement during operation

You may replace a module while the ET 200M is in operation if you have set up the ET 200M
- with an IM 153-1-1 from order no. 6ES7-153-1AA02-0X00 onwards, and
- on the profile section with bus modules that are suitable for the 'removing and inserting' function.

Removing a module

To remove the module, use the following procedure:

Table 3-5 Removing a module with 'removing and inserting'

<table>
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<th>Step</th>
<th>20-way front connector</th>
<th>40-way front connector</th>
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<tr>
<td>1.</td>
<td>Remove the retaining screw(s) of the module.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Tilt the module outwards.</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Open the front door.</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Unlock the front connector and remove it.</td>
<td>Remove the retaining screw in the middle of the front connector. Pull the front connector at the grip surfaces.</td>
</tr>
<tr>
<td></td>
<td>Press the unlocking lever with one hand and pull the front connector at the grip surfaces with the other hand.</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Pull the annotation label out of the module</td>
<td></td>
</tr>
</tbody>
</table>

Removing the front plug key

Before you can install a new module you must remove the upper part of the front connector keying on the module.

Reason: This part of the key is already installed in the wired front connector.

Installing a new module

To install a new module of the same type, use the following procedure:

1. Plug the front connector into the module and bring it in operating position.
2. Hook in the new module and tilt it downwards.
3. Tighten the module screws.
4. Insert the annotation label of the removed module into the newly installed module.

Response of the ET 200M after module replacement

After the module has been replaced, the IM 153-1 transitions to RUN mode if there is no fault. If the IM 153-1 remains in STOP mode, use STEP 5 or STEP 7 to have the cause of the malfunction displayed.
3.8.4 Replacing a Bus Module

Removing a bus module

Remove the bus modules only when there is no power applied.

To remove a bus module, use the following procedure:

1. Turn the ON/OFF switch on the power supply module to position 0 (output voltages = 0 V).
2. Remove the modules from the bus module you wish to replace, from all bus modules to the right and from the adjacent module to the left.
3. The bus modules are interlocked. On the module you wish to replace press the lock of the right-hand bus module and shift the bus module(s) at the right-hand side to the right. Next, on the bus module to the left press the lock of the bus module you wish to replace and push the latter to the right.
4. Use a screwdriver to press the lock on the profile section down and lift the bus module from the profile section. Alternatively, you may push the bus modules to the right and out of the profile section.

Installing a new bus module

Follow the instructions in Chapter 3.8.2 to install the new bus module.
This Chapter informs you about the installation of an AS388/TM, AS488/TM and SIMATIC PCS 7 system.

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<td>4.6</td>
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<td>4–8</td>
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</tbody>
</table>
4.1 Basics

The applicable regulations of VDE 0100 and the technical terminal markings of the local authorities must always be observed when the units and components of the process control system are connected to the mains. In addition, the applicable regulations for occupational safety and health and for the prevention of accidents must be observed.

**Mains connection**

With the exception of the cabinet versions, all units of the Siemens process control system components are delivered with power cord and mains connector and are ready for connection. With the cabinet versions, power is supplied via a cable that is firmly connected to terminals inside the cabinet. For reasons of interference immunity and operational reliability, the units of the process control system should be connected to separate circuits.

**Mains distribution**

A separate mains distribution unit with its own feeder line from the main distribution unit should always be used for large and concentrated systems (room that contains the components of the process control system and control room). If a three–phase distribution unit is employed, the load on the three phases should equally be balanced.

To protect the operator and service staff, an adequately dimensioned residual current device should be installed.

**Fuses**

Each outgoing feeder must be protected by a fuse. The rated current of the fuse depends on the cross–section of the cables used (VDE 0298 part 4). This must also be observed for the 24 V distribution.

**Reserve**

Sufficient reserve for future extensions should be considered when the power distribution system is planned.

**Screen bar**

Screened mains cables must be used for permanent connections of cabinet versions, for example. Installing a bus bar in the mains distribution unit in the vicinity of the cable entries is helpful. The bus bar is permanently connected with protective ground and permits low–impedance connections of the screens of the outgoing cables to be established with suitable cable clamps.

**Appliance socket outlets**

Except for the cabinet versions, a socket outlet should be installed for each unit of the process control system components. The socket outlets should be arranged such that they can easily be accessed (isolation from the mains, VDE 0805) and can directly and without extension cables be reached from the unit that is to be connected. The power cords of the units are between 1.5 meters (data stations) and 2 meters (device containers) long.
Service socket outlets

To be able to connect test and service equipment, some socket outlets from the computer system mains distribution unit should be installed in the vicinity of the units. The cabinet version can optionally be equipped with a socket outlet installed in the cabinet.

Grounding

The grounding required for protecting persons and for providing the necessary interference immunity and operational reliability is ensured by the incoming protective ground conductor. It must be ensured that there is no potential difference between the protective ground conductor of the process control system component and the protective ground conductors of neighboring circuits and/or the local ground.

Equipotential bonding

Equipotential bonding is required to prevent potential differences between distributed components of the process control system. The impedance of the connection must be as low as possible and cover a large surface (meshing) in order to efficiently prevent low- and high-frequency potential differences. This can be achieved by frequently connecting all electrically conductive parts of the structure (steel reinforcement, pipes, cable trays, grounding systems, lightning protection systems, equipotential bonding conductors, etc.; cf. 'Surge protection').
### 4.2 Cables

| **Socket outlets for computer system equipment** | The type of the signal cables that are to be used depends on the type of the connected device, the method of data transmission, and the distance. |
| **Bus lines** | Bus cables with accessories for the installation are used for interconnecting the components of the system and/or I/O bus. The cables are installed  
  - inside of cabinets  
  - inside of buildings  
  Cables with various additional armours that increase the tensile strength (up to 25 000 N) or protect against mechanical damages or rodents are also available. |
| **Marshalling blocks** | Depending on the requirements, one (or more) marshalling units can be installed between the automation systems and the field devices. The cable screens must always be connected when the connecting cables between marshalling unit and automation system are installed. |
| **Cable routing** | The power and signal cables must be protected against mechanical damage. This can be achieved by laying the cables in a false floor, in cable ducts, on cable racks, in conduits, or on cable trays.  
  Signal lines must always be laid separately from power and control cables. The minimum distance should be 0.2 meters. Crossings are permitted. The signal lines inside the enclosures should be as short as possible. Excessive lengths of such cables should be accommodated outside of the enclosure. |
| **Screen connection** | In order to be able to discharge parasitic current in the most efficient way possible, cable screens must always be connected with the grounded enclosure of the unit at a large surface and on the shortest way possible. At connecting points in the cable (such as data sockets, marshalling units, etc.), the connection between the screens of the incoming and outgoing cables must also be at a large surface and on the shortest way possible (using conductive metallic connector shells, for example). |
| **Surge protection** | Usually, signal lines outside of buildings are more likely to be affected by surge voltage or lightning effects. Cables with a current–carrying outer screen should be used here. At the entry points of the buildings, the screen must be connected to the local grounding system. Depending on the risk level, surge suppressing equipment should be installed at the signal wires. |
4.3 Interfaces to Power Electronics

With interfaces to the power electronics, the power electronics components and the systems must properly be decoupled. Here, too, the existence of an equipotential bonding system is important in order to be able to discharge any interference current without affecting the system. There must be sufficient distance between units with strong low–frequency interference radiation (such as transformers or contactors) and the components of a process control system. The distance depends on the intensity of the electromagnetic interference field.
4.4  Notes on Using Non–Standard Components

---

Caution

The requirements formulated by SIEMENS for the individual interfaces must be fulfilled if non–standard components are used in a process control system. If necessary, the connection of such a component must be clarified. Please note that a non–standard component may change the interference radiation of a system. It must be ensured that the permissible limit values are not exceeded in such a case.

---

To avoid a malfunction of the process control system components that may be caused by connecting non–standard components, the connecting cables to the process control system must have a braided screen and be included in the equipotential bonding system.
### 4.5 Cabinet Cooling

**Cooling by natural convection**

The cabinets should possibly be cooled without fans, by natural convection.

An average cabinet installation produces a power loss between 200 W and 300 W. At a temperature difference of 15 °C between inside and outside, the cabinet is able to dissipate up to 350 W power loss by natural convection. Thus, no additional cooling measures are required for the standard cabinet in IP40 rating.

**Special structure: Cooling by cell fan**

If necessary, a tier fan may be installed beneath the S7-400 rack. A cabinet of IP20 rating (ventilation slots in the door and in the ventilation top) must be used if a tier fan is employed.

**Special design: Cooling by heat exchanger**

In special cases, a heat exchanger can be used for cooling.

The heat exchanger employs two completely separated air circulations (outside circuit and inside circuit). All cabinet openings can be sealed which prevents the interior from being polluted. A heat exchanger and a completely sealed cabinet enable the cabinet to reach IP54 rating.

The heat exchanger is installed at the outside.

Usually, this cooling structure permits a power loss of up to 1200 W at an ambient temperature of up to 40 °C to be dissipated.
4.6 Grounding and EMC Measures

Grounding system components shall discharge interference current, short-circuit current and lightning current to ground and prevent excessive touch voltages. The factory-provided grounding concept is based on the surface grounding principle.

Cabinet grounding

All components and attached parts of the cabinet are connected with the cabinet frame:

- The cabinet door via flexible copper wires.
- Fixing screws provide for the electrical connection between components (such as modules, side panels, etc.) and the cabinet frame.

There is a central grounding point in the cabinet that permits the cabinet to be connected to the local ground.

4.6.1 CE Compliance

Cabinets that are set up with system-related (system and I/O units) and system-neutral modules (base cabinets, incoming units, and option packages) comply with the CE regulation. This means that they satisfy the EMC compatibility requirements that are laid down in the EMC regulations.

4.6.2 Measures for Installations Without Cabinet

The Simatic S7/M7 Installation Instructions must be observed when a system is set up without a cabinet.
Applicable Documents
The following Manuals and Instructions are available from your Sales Partner:

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<th>Title</th>
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<td>(ST50)</td>
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**Note**

The documents /2/, /3/, /4/, /5/, /6/, and /32/ are a part of the "TELEPERM M, Additional System Documents" Manual; Order no. C79000-G8076-C700; to be ordered from Lieferzentrum Nürnberg (LZN).
Glossary of Terms

A

ADC
Analog-to-digital conversion

AG
Automation device

AI
Analog input

AO
Analog output

AS 388/TM
Automation system of the TELEPERM M process control system on the basis of SIMATIC M7-300 and SINEC components. An AS 388/TM can be installed on the wall, in a rack or in a cabinet.

AS 488/TM
Automation system of the TELEPERM M process control system on the basis of SIMATIC M7-400 and SINEC components and additional TELEPERM M components. An AS 488/TM can be installed on the wall, in a rack or in a cabinet.

C

CFC
Continuous Function Chart

CP
Communication processor

CPU 388
Central processing module of AS 388/TM (AT-compatible computer unit)

CPU 488
Central processing module of AS 488/TM (AT-compatible computer unit)
| **CP 5412 (A1)** | The CP 5412 (A1) communications processor is used for linking AS 488/TM to SINEC L2/L2FO. |
| **CS** | Communication system |
| **CS 275** | TELEPERM M bus system. In the innovated TELEPERM M system, it is supplemented by SINEC L2/L2FO. |
| **D** |  |
| **DI** | Digital input |
| **DO** | Digital output |
| **E** |  |
| **ES** | Engineering system |
| **ET 200** | Distributed I/O system of the SIMATIC product family. ET 200 consists of the remote I/O units ET 200M, ET 200U, and ET 200B, and of the SINEC L2-DP bus. |
| **ET 200M** | Remote I/O unit with standard and Ex(i) modules of the SIMATIC M7-300 product family. |
| **ET 200U** | Remote I/O unit with modules of the SIMATIC S5 product family. |
| **ET 200B** | Remote I/O unit with a large number of electronics modules for discrete and analog inputs and outputs. |
| **EXM 378** | EXM 378 extension module of the AS 388/TM system. It is able to accommodate two (EXM 378-2) or three (EXM 378-3) interface modules. |
| **Ex** | Operation in an environment that contains hazardous gases or dusts. |
| **Ex(i)** | Ex with intrinsically safe sensor/actuator circuits |
F

FDA  Food and drug administration

FDL  Fieldbus Data Link, layer 2 in PROFIBUS–TM

FT  Fault tolerance

H

HW  Hardware

I

IBS Terminal  AT-compatible personal computer with specific software packages for commissioning, test and diagnosis of AS x88/TM and Bridge CS-12.

IF.../IM...  Interface module

IF 961-DIO  The IF 961-DIO interface module is used for the input and output of I&C signals.

IF 962-COM  The IF 962-COM interface module is used for connecting a PC for local commissioning and diagnosis.

IF 964-DP  The IF 964-DP interface module is used for connecting the AS x88/TM system to PROFIBUS–TM or PROFIBUS-DP. With AS 488/TM, it merely connects to the SINEC L2-DP.

ISA bus  Industry Standard Architecture Bus. The ISA bus is the standard bus of AT-compatible personal computers.

L

LED  Light emitting diode
<table>
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<tr>
<th><strong>LR</strong></th>
<th>Host computer</th>
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<td><strong>L2</strong></td>
<td>SINEC L2 (PROFIBUS)</td>
</tr>
<tr>
<td><strong>L2 R</strong></td>
<td>L2 with medium and interface redundancy</td>
</tr>
<tr>
<td><strong>M</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Memory Card</strong></td>
<td>The memory card is a plug-in memory module. It accommodates parts of or the entire software of a central or function module and static data.</td>
</tr>
<tr>
<td><strong>MPI</strong></td>
<td>”MPI” stands for &quot;Multi Point Interface”. the interface is used for connecting a programmer to the automation system. Several systems can be connected.</td>
</tr>
<tr>
<td><strong>MTP</strong></td>
<td>Maxi-Termi-Point (technique used for connecting cables to and from field devices)</td>
</tr>
<tr>
<td><strong>M7-300</strong></td>
<td>M7-300 is an AT-compatible automation computer of the SIMATIC product family. It is made as an encapsulated modular system in the SIMATIC S7-400 packaging design.</td>
</tr>
<tr>
<td><strong>M7-400</strong></td>
<td>M7-400 is an AT-compatible automation computer of the SIMATIC product family. It is made in the SIMATIC S7-400 packaging design.</td>
</tr>
<tr>
<td><strong>O</strong></td>
<td></td>
</tr>
<tr>
<td><strong>OLM</strong></td>
<td>Optical Link Module</td>
</tr>
<tr>
<td><strong>OP</strong></td>
<td>Operator panel</td>
</tr>
<tr>
<td><strong>OS</strong></td>
<td>Operator station</td>
</tr>
<tr>
<td><strong>OS 525</strong></td>
<td>Operator communication and visualization system for central handling and monitoring of processes. From version V.3.01 onwards, communication is possible via the PROFIBUS–TM bus system.</td>
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</table>
P

PG Programming unit (for SIMATIC–SPS with local access to the individual PLCs)

PNK Components local to the process

PROFIBUS PROFess FIELd BUS, German Field Bus Standard DIN 19245 parts 1 through 3.

PROFIBUS–DP Standard (SINIC/SIMATIC–) field bus to connect distributed I/O with DP–norm–record, based on PROFIBUS.

PROFIBUS–TM Standard (SINIC–) bus system. The FDL–records (Fieldbus Data Link: layer 2 of the bus system) of the bus system are used for the TELEPERM–application, based on PROFIBUS.

PROGraf AS+ Configuration system for convenient automation system configuration with graphical input of the structure. From version V.3.00 onwards, communication is possible via the PROFIBUS–TM bus system.

PS ... Power supply module from the SIMATIC product family.

R

RAM Random access memory

RMOS32 RMOS32 is a multitasking operating system with real-time features. It permits accurate and optimized control of the individual tasks of the TML execution system.

RS 232 Serial interface to the RS232 standard.

S

SCL Structured Control Language
### Glossar

<table>
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<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<td>SDA</td>
<td>Send Data with Acknowledgement. SDA is an FDL service.</td>
</tr>
<tr>
<td>SDN</td>
<td>Send Data with No acknowledgement; SDN is an FDL service.</td>
</tr>
<tr>
<td>SFC</td>
<td>Sequential Function Chart (IEC 1131 DIS–Begriff)</td>
</tr>
<tr>
<td>SIA</td>
<td>Siemens Industrial Automation</td>
</tr>
<tr>
<td>SIGRID TM</td>
<td>SIGRID TM is a base application of the TELEPERM M process control system. It contains function blocks for process-related base functions (such as tempering or dosing) and for device-related elements (such as actuators or motors).</td>
</tr>
<tr>
<td>SIMATIC NET</td>
<td>Standard SIMATIC bus system. The FDL protocols (Fieldbus Data Link: Layer 2 of the bus system) of the bus system are used for the TELEPERM M applications. Based on PROFIBUS.</td>
</tr>
<tr>
<td>PROFIBUS</td>
<td>SIMATIC NET PROFIBUS</td>
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<tr>
<td>PROFIBUS DP</td>
<td>SIMATIC NET PROFIBUS DP</td>
</tr>
<tr>
<td>SIMATIC PCS</td>
<td>SIMATIC–Prozess–Control S 7</td>
</tr>
<tr>
<td>7</td>
<td>STEP M is a control language that is used for formulating large and complex control tasks.</td>
</tr>
<tr>
<td>SW</td>
<td>Software</td>
</tr>
<tr>
<td>T</td>
<td></td>
</tr>
<tr>
<td>TBX 478</td>
<td>Together with the TPM 478 interface module, the TBX 478 links the AS 488/TM with the process I/O of existing AS 220, AS 230 or AS 235 systems.</td>
</tr>
<tr>
<td>Tasks</td>
<td>Program units that execute under an operating system (here: RMOS32) in a time-, event- and priority-controlled manner.</td>
</tr>
<tr>
<td>TML</td>
<td>TELEPERM M Language; programming language of the TELEPERM M process control system. It permits specific function blocks to be created and complex functions to be implemented.</td>
</tr>
<tr>
<td>Term</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>TML execution system</td>
<td>Execution system of AS x88/TM in the TML programming language.</td>
</tr>
<tr>
<td>TPM 478</td>
<td>The TPM 478 interface module is used for linking the AS 488/TM with the CS 275 bus system or, via the TBX 478 interface module, with the TELEPERM M I/O bus. I/O modules of the base or extension cabinet may be connected.</td>
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TELEPERM M

System Bus
CS 275 and PROFIBUS–TM

Configuring Instructions
Safety instructions

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

**Danger**

Failure to observe a Danger note **will** cause death, severe personal injury or severe damage to the equipment.

**Warning**

Failure to observe a Warning note **may** cause death, severe personal injury or severe damage to the equipment.

**Caution**

Failure to observe a Caution note may cause personal injury or damage to the equipment.

**Note**

Notes contain important information regarding the product, product handling or a specific part of the document that requires special attention.

Qualified personnel

The unit may only be commissioned and used on the basis of the information contained in this Manual. Only qualified personnel are authorized to perform any work inside the unit. Qualified personnel in the sense of the safety instructions in this Manual are persons who have been authorized to commission, ground and label units, systems and circuits according to the safety-relevant standards.

Normal use

Please observe the following instructions:

**Warning**

The unit may only be used for the applications mentioned in the Catalogue and the Technical Description. It may only be used together with third-party equipment or components that have been recommended or released by Siemens. Faultless and safe operation of the product requires proper transport, storage, installation and commissioning, and careful handling and maintenance.

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System Bus

Contents

The brief information in this chapter gives you an orientation which bus you can use in AS 388/TM and AS 488/TM automation system.
1.1 Configuring the System Bus

**AS 488/TM**

With the automation system AS 488/TM it is possible to choose between two different bus systems for the system bus, through the AS communicates with other systems (AS, OS, PROGRAF AS, etc.):

- CS 275 with the interface module TPM 478
- PROFIBUS–TM (former SINEC L2 [TM]) with the interface module CP 5412–A1 or alternatively with the interface module IF964–DP

**AS 388/TM**

With the automation system AS 388/TM only exists one bus system:

- PROFIBUS–TM (former SINEC L2 [TM]) with the interface module IF964–DP
Configuration

This chapter tells you how to configure the various bus systems.

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2.1 Configuration of the bus connection with AS 388/TM and AS 488/TM

The Configuration file AS_KOM.INI is used to set the type of bus interface, the address of the AS on the bus and optionally the redundancy mode of the CS 275 bus.

Parameters of configuration file AS_KOM.INI:

Parameter CP = Selection of bus: TM = CS 275 bus
L2 = PROFIBUS–TM

Parameter BATA = Definition of bus address of AS in hexadecimal representation
XXYY : XX = bus No. on CS 275 (hexadecimal)
YY = station No. on CS or PB–TM (hexadecimal)

Parameter REDUNDANZ = Selection of CS 275 redundancy mode
1: redundant operating of CS 275 bus
0: non redundant operating of CS 275 bus
Is the parameter REDUNDANZ missing in the configuration file, the CS 275 bus operates redundant (default setting).

Examples:

a) Configuration of CS 275 bus with bus address BA = 0 und station address TA = 26

# *********** Start AS_KOM – INI file ************
CP= TM
BATA=001A
REDUNDANZ=1
# *********** End   AS_KOM – INI file *************

b) Configuration of PROFIBUS–TM with bus address BA = 3 und station address TA = 26

# *********** Start AS_KOM – INI file ************
CP= L2
BATA=031A
# *********** End   AS_KOM – INI file *************
2.2 Configuration of CS 275 System Bus for AS 488/TM

The parameters of the CS275 are already completely defined by the parameters of the file AS_KOM.INI.

Informations for installation of the bus system CS 275 are included in the manuals below:

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2.3 Configuration of PROFIBUS–TM bus for AS 488/TM with CP5412–A1

If the L2 bus is selected, the configuration file DOS_CONF.DAT must be present on the memory card additional to the file AS_KOM.INI. This file includes the PROFIBUS–TM parameters. A specification of slot coordinates of the interface module CP 5412–A1 is not necessary, because those are determined automatically at the start of the AS.

Parameters of configuration file DOS_CONF.DAT:

Parameter \( l2\_ts \) = Station No. on PROFIBUS–TM (dezimal representation)
Must be identical to the station address in ATA from AS_KOM.INI.
If different addresses are entered, the parameter ‘\( l2\_ts \)’ is used.
Note: The station addresses should be assigned without gaps if possible. This may increase the performance.

Parameter \( l2\_hsa \) = Highest station address on PROFIBUS–TM; default setting is 32.
Note: If the actual highest station address is entered exactly, this may increase the performance. However, to retain a reserve, it is also advisable when configuring to set a higher station address than that actually present.

Parameter \( l2\_ttr \) = Token rotation time; default setting is 90000.
The default setting applies to a maximum of 10 active stations on the bus. If more than 10 stations are present on the PROFIBUS–TM, the parameter must be calculated according to the following equation and entered:
\[
l2\_ttr = 9000 * \text{[number of active PROFIBUS–TM stations]}.\]
Note: The factor 9000 in the equation only applies to a baud rate of 1.5 MBaud.

All bus parameters are matched to a transmission rate of 1.5 MBaud. Optimization requires detailed knowledge of the PROFIBUS standard, Part 1, DIN 19245. Selection of a different transmission rate is illegal, and may result in faulty functioning. The bus parameters are described in the SIMATIC NET ManualTF5412/MS–DOS, WINDOWS, C79000–G8976–C031.

Caution
Apart from the bus parameters, the configuration file DOS_CONF.DAT also contains system parameters for handling AS communication tasks. Unauthorized modifications to these usually result in major faults in the AS.
The parameter assignments 'int_vector=12' and 'dpram_adr=0xD0000', with which the interrupt and DPRAM address range are set, agree with the default settings of the bridges and the DIP switches on the interface module CP5412 A1 which are already factory-set when delivered.

Example of a configuration file DOS_CONF.DAT:

# *********** Start DOS_CONF.DAT file ***********
#
# FILE FOR INSTALLING TF/IHI DRIVER
#
# INSTTOOL VERSION = V 2.20 02.11.93

numboards = 1

boardtyp = 5412
SCP_device = CP_L2_1:
12_hsa = 32
12_ts = 32
12_physical_layer = 0
12_lock_sap = NONE
num_channel = 4
numproc = 2,5,5,0
channel_name = ADM,IHI,FLC,SCP
channel_type = SCP,IHI,IHI,SCP
element_size = 384
numhostbuffer = 2,75,75,2
numboardbuffer = 2,1,1,2
dpram_adr = 0xD0000
dpram_size = 0x10000
12_station_type = 1
12_baud_rate = 7
12_medium_red = 0
12_retry_ctr = 1
12_default_sap = 10
12_network_connection_sap = 37
12_tsl = 3000
12_tqui = 0
12_tset = 240
12_max_tsdcr = 980
12_min_tsdcr = 150
12_trt = 90000
12_g = 30
12_in_ring_desired = 1
int_vector = 12
server_id = CPADMI
window_size = 8
Download = \FW5412
Vendor = SIEMENS
HW_device = PC

# *********** End  DOS_CONF.DAT file ***********
Caution
If the configuration file L2AMPRO.INI is also stored on the memory card, this configuration takes precedence, i.e. an existing configuration file DOS_CONF.DAT with bus interface module CP5412-A1 are looked upon as not existing.
2.4 Configuration of PROFIBUS–TM bus for AS 388/TM and AS 488/TM with module IF964–DP

The configuration file L2AMPRO.INI must be present on the memory card additional to the file AS_KOM.INI. This file includes the slot coordinates of the IF964 module and the PROFIBUS–TM parameters.

Parameters of configuration file L2AMPRO.INI:

1) Parameters for slot addressing

Parameter slot = Slot No. according to incrementing of SIMATIC M7–300/400
- System setting for AS 388/TM: 3
- System setting for AS 488/TM without migration rack: 5
- System setting for AS 488/TM with migration rack: 7

Parameter modulbox = Module slot No. according to incrementing of SIMATIC M7–300/400
- System setting for AS 388/TM: 3
- System setting for AS 488/TM: 1

The settings which correspond to the standard system configuration have been preselected for the coordinates of the module IF964–DP and should therefore be used unchanged. Any changes to these parameters require knowledge of the slot addressing for SIMATIC M7, and incorrect entries may result in major system faults.

2) Bus parameters

Parameter l2_ts = Station No. on PROFIBUS–TM (decimal representation)
- Must be identical to the station address in BATA from AS_KOM.INI. If different addresses are entered, the parameter ‘l2_ts’ is used.
- Note: The station addresses should be assigned without gaps if possible. This may increase the performance.
Parameter \( l_2_{\text{ttr}} \) = Token rotation time; default setting is 90000. The default setting applies to a maximum of 10 active stations on the bus. If more than 10 stations are present on the PROFIBUS–TM, the parameter must be calculated according to the following equation and entered:

\[ l_2_{\text{ttr}} = 9000 \times \text{[number of active PROFIBUS–TM stations]} \]

All bus parameters are matched to a transmission rate of 1.5 MBaud. Optimization requires detailed knowledge of the PROFIBUS standard, Part 1, DIN 19245. Selection of a different transmission rate is illegal, and may result in faulty functioning.

Example of a configuration file L2AMPRO.INI:

**a) for AS 388/TM:**

```ini
# *********** Start L2AMPRO – INI file ***********
# --> for AS 388 <---
# *********** IF964 parameters ***********
boardtyp = IF964
slot = 3
modulbox = 3

# *********** L2 bus parameters ***********
l2_ts = 01
l2_hsa = 32
l2_baud_rate = 7
l2_tsl = 3000
l2_tqui = 0
l2_tset = 240
l2_max_tsdr = 980
l2_min_tsdr = 150
l2_ttr = 90000
l2_g = 30

# *********** End L2AMPRO – INI file ***********
```


b) for AS 488/TM **without** migration rack:

```ini
# ************** Start L2AMPRO – INI file **************
#       ---> for A S 4 8 8 <---
# ************** IF964 parameters **************
boardtyp = IF964
slot = 6
modulbox = 1

# ************** L2 bus parameters **************
l2_ts = 01
l2_hsa = 32
l2_baud_rate = 7
l2_tsl = 3000
l2_tqui = 0
l2_tset = 240
l2_max_tsd = 980
l2_min_tsd = 150
l2_ttr = 90000
l2_g = 30

# ************** End L2AMPRO – INI file **************
```

c) for AS 488/TM **with** migration rack:

```ini
# ************** Start L2AMPRO – INI file **************
#       ---> for A S 4 8 8 <---
# ************** IF964 parameters **************
boardtyp = IF964
slot = 8
modulbox = 1

# ************** L2 bus parameters **************
l2_ts = 01
l2_hsa = 32
l2_baud_rate = 7
l2_tsl = 3000
l2_tqui = 0
l2_tset = 240
l2_max_tsd = 980
l2_min_tsd = 150
l2_ttr = 90000
l2_g = 30

# ************** End L2AMPRO – INI file **************
```

---

**Caution**

If the bus interface module CP5412–A1 is inserted in the AS 488/TM in parallel with the IF964 module for the station bus, a severe system error can occur due to a double interrupt assignment.
Supplementary configuring for TELEPERM M I/O modules
Safety instructions

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

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Supplementary configuring for TELEPERM M I/O modules

This chapter shows the supplementary configuring for TELEPERM M I/O modules.

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1.1 General

In the AS 488/TM automation systems, exchange of process values between the AS automation unit and the process I/O modules is always handled via a process image (map).

In the AS 235 automation system, data exchange is carried out by means of direct access to the I/O modules during the runtime of the driver block.

The disadvantages associated with direct access, e.g. extremely long acknowledgment and settling times with a "long" I/O bus or remote I/O subracks at a long distance from the AS 235, are improved with the AS 488/TM and the TPM 478 I/O communications module to the TELEPERM M I/O bus by the autonomous, processor–controlled mapping of the I/O values on the TPM 478.

The standard driver blocks, e.g. system version G of the AS 235, address the TELEPERM M I/O modules via the hierarchical addresses "Module number" and "Channel number". These are entered into the block parameter lists during configuring of the driver blocks. Correct assignment between the TELEPERM M I/O module and the drivers is implicitly assumed during configuring.

This implicit module assignment is no longer present in the process image of the application when mapping the image by the TPM 478, or is only rudimentary and contradictory.

Supplementary configuring is therefore required.
1.2 Input of supplementary configuring

This supplementary configuring is carried out menu–based with the SYST.WART system program. Examples of the individual input steps are shown below on the desktop of the local commissioning terminal.

Supplementary configuring for the interface to the TELEPERM M I/O bus is limited

- to the assignment of the module identification (MLFB) to the module number (slot number) in the TELEPERM M I/O subrack,
- to the processing cycle for cyclic repetition of the process image.

The information arising during extension configuration of the IO peripherals are saved to a system list in the user storage of the AS. During menu guided operation with SYST.WART, these can be entered and modified for every module number. They are not simultaneously activated with the entry.

The definitions of the system list are activated by resetting the AS system via the "RSOF" function or with the key switch (MRES).

1.3 Saving of supplementary configuring

The information resulting when carrying out supplementary configuring of the I/Os is stored as a system list in the user memory of the AS. When saving with the input instruction

- AR, file name;

this list is stored together with the configured user data on the memory card inserted in the AS, and these are automatically present again when loading.
1.4 Menu examples of I/O configuring with SYST.WART:

The examples shown below indicate the basic steps required for supplementary configuring.

The menu inputs are checked to determine whether they are permissible, and rejected if applicable.

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<thead>
<tr>
<th>TEST– UND WARTUNGSFUNKTIONEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 STARTBAUSTEINE XB SCHALTEN</td>
</tr>
<tr>
<td>2 KOPPELAUSKUNFT</td>
</tr>
<tr>
<td>3 SYSTEM–SCHALTER</td>
</tr>
<tr>
<td>4 NEMO–AUSGABE MIT PASSWORT</td>
</tr>
<tr>
<td>5 PROGRAMM–KOPIE VERWALTEN</td>
</tr>
<tr>
<td>6 NAMEN / KENNUNGEN AENDERN</td>
</tr>
<tr>
<td>7 SL.CTML REGENERIEREN</td>
</tr>
<tr>
<td>8 BAUSTEINE NACHLADEN</td>
</tr>
<tr>
<td>9 SELEKTIV ARCHIVIEREN</td>
</tr>
<tr>
<td>10 TYPENVORGABE AUF PBT</td>
</tr>
<tr>
<td>11 ZYKLUS VERTAUSCHEN</td>
</tr>
<tr>
<td>12 KOPPLUNGEN LOESCHEN</td>
</tr>
<tr>
<td>13 PERIPHERIE PROJEKTIEREN</td>
</tr>
<tr>
<td>14 BAUSTEIN–VERSION</td>
</tr>
</tbody>
</table>

Overview display following input "SYST,WART;"

Explanation:

TEST AND MAINTENANCE FUNCTIONS:

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 SWITCH STARTUP BLOCK XB</td>
<td>8</td>
</tr>
<tr>
<td>2 COUPLING INFORMATION</td>
<td>9</td>
</tr>
<tr>
<td>3 SYSTEM SWITCH</td>
<td>10</td>
</tr>
<tr>
<td>4 NEMO OUTPUT WITH PASSWORD</td>
<td>11</td>
</tr>
<tr>
<td>5 ADMINISTER PROGRAM COPY</td>
<td>12</td>
</tr>
<tr>
<td>6 CHANGE NAME/CODES</td>
<td>13</td>
</tr>
<tr>
<td>7 REGENERATE SL.CTML</td>
<td>14</td>
</tr>
</tbody>
</table>

When entering the command "BE", the menu control enters input mode (this can be left again by entering "BR").

The function is selected in this example with the input "MP = 13".

Note

The function number for MP may result depending on the system.
The input sequences of the following example screen forms are listed in each case following the "Display".

The screen forms and their permissible input parameters are extended as the inputs are made. For example, the inner field which depends on the input for "AN=x" has a different design for L2DP or TELEPERM M I/O, as well as the further permissible input commands associated with this.

**Note**

The connection function AN=3 is a system–dependent dummy value and is not implemented in AS 388/TM and AS 488/TM.
The input "L=1;" can always be used to delete at the position of the mark "L=1".

By entering "TY=<space>;" a module entered for this NR can be deleted, regardless of the position of the "L=1" marking (including cycle). At transparent coupling modules (6DS1310–..., 1321–..., 1327–...) all configured subordinate S5 modules are also completely deleted. This subordinate modules are also deleted if another type of module is configured with "TY=xxx;".

For the parameter "NR", the permissible range in TELEPERM M is accepted:

<table>
<thead>
<tr>
<th>0</th>
<th>to</th>
<th>61</th>
<th>and</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>to</td>
<td>160</td>
<td></td>
</tr>
</tbody>
</table>

All other inputs will be rejected with F410.

Caution

For NR=61, it is only possible to configure an interrupt collecting module 6DS1601–8AC/–8BA or 6DS1615–8AA. Other module types are not rejected, but does not work correctly for BGNR=61.

Setting of ZY= for cyclical working modules

The processing cycle is used to set updating of the process image on the TPM 478.

The following cycles can be set:

<table>
<thead>
<tr>
<th>ZY</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>10 ms</td>
</tr>
<tr>
<td>4</td>
<td>50 ms</td>
</tr>
<tr>
<td>8</td>
<td>100 ms</td>
</tr>
<tr>
<td>16</td>
<td>500 ms</td>
</tr>
<tr>
<td>32</td>
<td>1 s</td>
</tr>
<tr>
<td>64</td>
<td>Free cycle (= remaining time)</td>
</tr>
</tbody>
</table>

It is usually meaningful and necessary for some modules (see table) to select a smaller cycle time for updating of the process image than that configured for the driver block in the AS processing level (e.g. half).

However, to limit the load in the TPM 478, you should not use faster cycles than necessary, and modules which are no longer required should be removed again using SYST.WART. With inappropriate configuring of the TPM 478 (overload), note that faster cycles are processed with a higher priority than slower cycles. If all modules are intentionally assigned to the 100ms cycle, although competition between cycles is negated, the corresponding cycle could be overloaded. If such an "overload configuration" is selected (e.g. to achieve fast processing with no competing processes), it must be ensured that the processing time for this cycle is correspondingly lengthened.
ZY=1 must be entered for the module "SF61" generating the collected interrupt (master). If this module is to be monitored cyclically in addition (e.g. on S305), an above cycle +1 must be selected for this module. It is then meaningful to enter e.g. ZY=33 resp. ZY=65 for interrupt + monitoring cycle.

If inputs of the master module should also be read in the AS cycle, it should be ensured that the interrupt trigger on the module SF61 is released for both positive and negative edges (jumper X3 for 6DS1601–8BA). Please note, that an interrupt will be generated only by the positive edge nevertheless. This may be desirable, if process signals are wired to the master module.

But usually process signals are only wired to the group interrupt modules (slave modules). Therefore both edges have to be released on these slave modules with signal groups including cyclically read signals.

Up from AS software release M01.06/M02.00 – in combination with TPM478 module issue ≥ 9 or TPM 478–1 from issue 1 – following formula applies to the configuration of ZY with slave modules:

\[
ZY = (2 \times \text{BE-No.}) + 1 \quad (=3, 5, 7, 9, \ldots, 97)
\]

In this connection BE–No. (1...48) is the number of the input of the master module, the PINT signal of the respective slave module is wired to. In this case the slave modules were read together with the master, if they give an interrupt.

The slaves configured in this way may additional be monitored cyclically, if a monitoring cycle is configured for the master module. This cycle applies to all slave modules.
Example for slave configuration:

```
+--------------------------------------------------+
| PERIPHERIE–BAUGRUPPEN PROJEKTIEREN ASX88/TM       |
| ANSCHLUSS: AN=1 AG–AG–Kopplung                   |
| AN=2 S7–L2DP                                     |
| AN=3 M7–IF–MODUL                                  |
| AN=4 TELEPERM M EA                               |
| AN=5 ALLE BAUGRUPPEN LOESCHEN (BEI AN=0)         |
| AN=4 TELEPERM M EA                               |
| BAUGRUPPEN–NR. (STECKPLATZ) NR= 56 L=1           |
| BAUGRUPPEN–TYP (MLFB–NR.) TY=6DS1601–8BA         |
| KANAL–ANZAHL                                      |
| BEARBEITUNGSZYKLUS ZY= 7                         |
|                                      +-----------+
|                     L= BAUGRUPPE LOESCHEN           |
| PROTOKOLL AUF: DR. 1 GE,1,0;                     |
| PR=1 MONITOR GE,5,0; *                          |
| BLAETTERN F=1 PC/PG GE,7,6;                      |
| UEBERSICHT : MP = 0                              |
+--------------------------------------------------+
```

Display shown after following inputs:

"BE;" Input mode
"MP=14;" Display selection
"AN=4;" TELEPERM M module
"NR=56;" Slot number (BAUGRUPPEN–NR.)
"TY=6DS1602–8BA;” Module (BAUGRUPPEN–TYP)
"ZY=7;” Processing cycle (BEARBEITUNGSZYKLUS)
for the interrupt slave with PINT at BE3
of the master (= 2\*3 + 1)
Existing configurations behave as before. There is no force for changing the configuration, if the reaction was satisfactory so far.

---

**Note**

After inserting a new master or slave module, an (active) edge should be given to a free input of this module, if the next edge from the process cannot be waited for. By this the process image will be updated immediately.

---

**Protocol function**

For protocolling the I/O configuration the output device has to be set first:

- With "GE,1,0;" the protocol will be send to printer channel 1, i.e. to the print target set on the IBS terminal ASBEDIEN (file or printer).
- With "GE,5,0;" the protocol will be shown on the monitor page for page (default).
- With "GE,7,6;" the output will be written into a file opened on the IBS terminal before (command "Esc R name").

The asterisk shows the actual adjusted device.

The protocolling is started with the operation "PR=1;".

When writing on the monitor you can scroll forward with "F=1;".

If the protocol is finished (i.e. the 3 asterisks have disappeared), the output should be switched back to the monitor with "GE,5,0;".

**Example protocol:**

```
PROTOKOLL DER PERIPHERIE–BAUGRUPPEN ASX88/TM P: 1
AN=4 NR= 12 TY=6DS1600–8AA Y= 8 KANAL–ANZAHL 16
AN=2 NR= 80 TN= 5 BB= 2
    NR= 81 TN= 5 BB= 1 FOLGE–BAUGRUPPE
PROTOKOLL DER PERIPHERIE–BAUGRUPPEN ASX88/TM P: 2
AN=4 NR=112 TY=6DS1310–8AB ZY= 8 KANAL–ANZAHL 1
EA=0 KA= 0 BG=DE8 EA=1 KA= 2 BG=AA1
```

**Translation:**

```
PROTOKOLL DER PERIPHERIE–BAUGRUPPEN
KANAL–ANZAHL
FOLGE–BAUGRUPPE

protocol of the peripherals (I/O modules)
number of channels
second occupied module no.
```
1.5 Extended module configuring

For transparent SIMATIC coupling modules (see table), configuring of the subordinate input/output modules is required in addition to the coupling module. The extension is displayed following input of the module type (TY=...):

- **EIN-/AUSGABE** EA= 0 (Input/Output)
- **S5–BAUGRUPPE (KANAL–NR.)** KA= 0 (S5 Module, Channel No.)
- **BAUGRUPPEN–KENNUNG** BG= (Module Code)

The following inputs are used:

- **EA** = to enter the I/O direction
- **KA** = to enter the byte address
- **BG** = to enter the module code.

**Caution**

The following sequence must be observed!

All input modules must be entered first, and then all output modules.

---

**Configure input modules**

- **EA = 0** This input sets the I/O direction for inputs.
- **KA = nr** This input sets the byte address for the input area of the S5 module.
- **BG = xy** This input sets the module code of the S5 module.

The following values can be entered for x and y:

- x = DE Digital input module
- x = AE Analog–value input module
- y = 1 .. 16 Input for 1 to 16 bytes with digital input or 1 to 16 channels with analog input (corresponds to 2 to 32 bytes)

Be careful when entering the byte address with KA=nr!
## Configure output modules

| EA = 1 | This input sets the I/O direction for outputs. |
| KA = nr | This input sets the byte address for the output area of the S5 module. |
| BG = xy | This input sets the module code of the S5 module. The following values can be entered for x and y: |
| x = DE | Digital input module |
| x = AE | Analog–value input module |
| y = 1 ... 16 | Input for 1 to 16 bytes with digital input or 1 to 16 channels with analog input (corresponds to 2 to 32 bytes) |

Be careful when entering the byte address with KA=nr!

---

## Deletion of modules with extended configuring

The input "L=1;" can always be used to delete the entry of the S5 module (= channel number and module code) at the position of the mark "L=1". "TY=〈space>;" must be entered to delete the TELEPERM M slot (i.e. the coupling module); this also deletes all subordinate S5 modules.
Supplementary configuring for TELEPERM M I/O modules

<table>
<thead>
<tr>
<th>PERIPHERIE-BAUGRUPPEN PROJEKTIEREN</th>
<th>ASX88/TM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSCHLUSS:</td>
<td></td>
</tr>
<tr>
<td>AN=1 AG-AG-Kopplung</td>
<td></td>
</tr>
<tr>
<td>AN=2 S7-L2DP</td>
<td></td>
</tr>
<tr>
<td>AN=3 M7-IF-MODUL</td>
<td></td>
</tr>
<tr>
<td>AN=4 TELEPERM M EA</td>
<td></td>
</tr>
<tr>
<td>AN=5 ALLE BAUGRUPPEN LOESCHEN (BEI AN=0)</td>
<td></td>
</tr>
<tr>
<td>AN=4 TELEPERM M EA</td>
<td></td>
</tr>
<tr>
<td>BAUGRUPPEN-NR. (STECKPLATZ)</td>
<td>NR= 2</td>
</tr>
<tr>
<td>BAUGRUPPEN-TYP (MLFB-NR.)</td>
<td>TY=6DS1310–8AA</td>
</tr>
<tr>
<td>KANAL–ANZAHL</td>
<td>4</td>
</tr>
<tr>
<td>BEARBEITUNGSZYGKLUS</td>
<td>ZY= 16</td>
</tr>
<tr>
<td>EIN-/AUSGABE</td>
<td>EA=0</td>
</tr>
<tr>
<td>S5–BAUGRUPPE (KANAL-NR.)</td>
<td>KA= 0</td>
</tr>
<tr>
<td>BAUGRUPPEN–KENNUNG</td>
<td>BG=DE2</td>
</tr>
<tr>
<td>L= BAUGRUPPE LOESCHEN</td>
<td></td>
</tr>
</tbody>
</table>

Display shown after following inputs:

"BE;" Input mode
"MP=14;" Display selection
"AN=4;" TELEPERM M module
"NR=2;" Slot number
"TY=6DS1310–8AA;" Module
"ZY=16;" Processing cycle
"EA=0; I/O direction = input
"KA=0; Byte address for input area of S5 module
"BG=DE2;" Module code for S5 module
Supplementary configuring for TELEPERM M I/O modules

**PERIPHERIE–BAUGRUPPEN PROJEKTIEREN**  ASX88/TM

**ANSCHLUSS:**  AN=1  AG–AG–Kopplung
AN=2  S7–L2DP
AN=3  M7–IF–MODUL
AN=4  TELEPERM M EA
AN=5  ALLE BAUGRUPPEN LOESCHEN (BEI AN=0)

**AN=4**  TELEPERM M EA

<table>
<thead>
<tr>
<th>BAUGRUPPEN–NR. (STECKPLATZ)</th>
<th>NR= 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAUGRUPPEN–TYP (MLFB–NR.)</td>
<td>TY=6DS1310–8AA</td>
</tr>
<tr>
<td>KANAL–ANZAHL</td>
<td>4</td>
</tr>
<tr>
<td>BEARBEITUNGSZYKLUS</td>
<td>ZY=16</td>
</tr>
<tr>
<td>EIN–/AUSGABE</td>
<td>EA=1</td>
</tr>
<tr>
<td>S5–BAUGRUPPE (KANAL–NR.)</td>
<td>KA=1</td>
</tr>
<tr>
<td>BAUGRUPPEN–KENNUNG</td>
<td>BG=DA2</td>
</tr>
</tbody>
</table>

**PROTOKOLL AUF:**  DR. 1 GE,1,0;
PR=1  MONITOR GE,5,0; *
BLAETTERN F=1  PC/PG GE,7,6;
UEBERSICHT : MP = 0

Display shown after following inputs:

"BE;"  Input mode
"MP=14;"  Display selection
"AN=4;"  TELEPERM M module
"NR=2;"  Slot number
"TY=6DS1310–8AA;"  Module
"ZY=16;"  Processing cycle
"EA=1;"  I/O direction = output
"KA=1;"  Byte address for output area of S5 module
"BG=DA2;"  Module code for S5 module
1.6 Performing a Configuration Using a Loading Sequence

In order to reduce the time required for reconfiguration, for example for configuration errors, the operation sequence for SYST.WART can be written into a loading–sequence file.

This file can either be loaded via the IBS terminal (load command "L"), or it can be loaded with PROGRAF AS+ into the AS.

Existing configurations can be logged in SYST.WART in a file, and then modified accordingly (see Product Information M01.04/M01.05):

```plaintext
Esc R file
PR=1;
Esc R END
```

**Exception**

Because PROGRAF AS+ normally rejects the "BE;" command, it must instead be entered as " BE ;" (with a space).

**Caution**

Automatic operation of the SYST.WART is first supported from the software version ASx88/TM Version M01.05 onwards.

**Example:**

```plaintext
;SYST.WART CONFIGURING
BR;
SYST,WART;
BE ;
MF=13;

;*** DELETE ALL MODULES
AN=0;
AN=5;

;*** INPUT MODULES
AN=4;

NR=0;
TY=6DS1327-8AA;
ZY=16;
EA=0;
KA=4;
BG=DE2;
KA=32;
BG=AE16;
KA=64;
BG=AE16
EA=1;
KA=4;
```

Supplementary configuring for TELEPERM M I/O modules
BG=DA2;
KA=16;
BG=DA4;
KA=224;
BG=AA8

NR=24;
TY=6DS1604-8AA;
ZY=8;

NR=25;
TY=6DS1603-8AA;
ZY=8;

;*** EXIT
BR;
1.7 Special features for configuring transparent link interface modules

For transparent SIMATIC interface modules (6DS1310, 6DS1321 and 6DS1327), the following points must be observed:

- If the modules 6DS1321–8AA and 6DS1327–8AA are directly configured with these MLFBs, they occupy 8 or 16 subsequent module numbers (BGNR) each. In this case, the module number must start with BGNR= n*8 or n*16 (or for IO bus B, these numbers + 100). Here, “n” = 0,1,2,...7 or 15 is the block number of the interface modules according to the numbering system in the manuals.

- Additional entry of further TM modules in this assigned range from 8 or 16 module numbers are accepted, however, have no effect, i.e. these modules are not addressed.

- For an interface module configured BGNR=32, the entry of a byte address KA=3*64=192 leads to the beginning of BGNR=35 and KA=194 to a module with the byte address KA=2 within BGNR=35.

  Caution: “KA” is always a byte address (also for analog modules).

- For direct configuration of 6DS1321–8AA, the start BGNR 56 and 156 are illegal, for 6DS1327–8AA the numbers 48 and 148 – otherwise the illegal ranges (BGNR=61,.. or 161, ..) would be covered. Here, the needed BGNR must explicitly be defined with the substitute configuration 6DS1310–8AA, i.e. a 6DS1310–8AA must be configured for every BGNR allocated by the interface module.

- A BGNR–specific composition of TM and SIMATIC modules for 6DS1327–8 also requires the substitute configuration. For 6DS1321–8AA, such overlapping areas are currently not accepted and must be removed.

- For the 6DS1321–8AA, the coding switch 6 must be set to OFF (EANK active), otherwise the control system fault message S313 is issued.

- The following order must be strictly observed in the configuration of the mentioned modules: first all inputs, then all outputs, and within these areas ascending channel number (KA). Here, the new value is always first entered for IO, then for KA. For this reason, a reconfiguration generally requires first deleting of the link interface module. If this is not observed, the process image might be affected. With the report function PR=1 (from M01.04) on, the input sequence can be checked. The processing cycle, however, can be reconfigured at any time. By observing the above rules with respect to EA and KA, further modules can also be inserted at the end of the list.

- Because the configuration tool does not reliably prevent overlapping process images for the mentioned modules or only indicates the allocation without signalling an explicit error, please be especially careful during the entry; e.g. for 6DS1310, the engineer must observe the limited number of channels (maximum = 63).

- With configuration errors, e.g. if a driver block accesses a subordinate I/O module which has not been configured and is therefore not existing because of a wrong configured channel number, possibly no acknowledgement error S305 will be signaled.
• In principle the corresponding module width has to be configured for each S5 module with the command BG= as far as possible. Especially combining several modules has to be avoided.

Example:
- 2 byte binary input: BG = DE2;
- 4 byte binary output: BG = DA4;
1.8 Configuring the 6DS1310 coupling module

With the 6DS1310, the inputs and outputs must have their own module number configured for them, i.e. for one BGNR only input modules may be configured, while for the other, only output modules may be configured.

For the subordinate S5 modules on a 6DS1310, only word-wise access with DE2 or DA2 should be configured in SYST.WART, since all accesses to the 1310 module end with an odd address. This means that either 1 or 2 modules are addressed for each access. Every configured access (DE2, DA2) must begin with an even address, regardless of the module configuration. In this case, overlapping of the input and output addresses is permitted.

Any existing cycle cells must be made inoperative, i.e. the bridge J7/5–12 must be removed from the module, and BA2 ≠ 3 must be configured in the A110 drivers.

All running, configured couplings do not need to be modified.

Existing configurations can be migrated without modification.

---

Note

The above preferred configuration (word operation) must not be applied to S5 peripherals of modules 6DS1321 or 6DS1327 (also not for a so-called "replacement configuration" of a '6DS1310' for a 6DS1321 or 6DS1327)!

The configuration guidelines mentioned previously still apply in this case.
1.9 Configuration notes for the coupling modules 6DS1333–8AB, 6DS1318–8AB

Among the module operating manuals and the driver documentation S5KS/S5KE in the AS235 system software (var. G) function description, the notes described below are relevant for configuring the coupling modules.

A migration from AS230 / AS235 to AS 488/TM is possible, if the links within the system configuration and its structure meets the following standard configuration:

Standard configuration, quantified project scope:

- Settings relating to the number of coupling modules:

<table>
<thead>
<tr>
<th>Number of coupling mod.</th>
<th>Number transmit channels / mod.</th>
<th>Number receive channels / mod</th>
<th>S5KS/S5KE driver cycle</th>
<th>SYST.WART cycle</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>ZYK=3 (1 s)</td>
<td>ZY=16 (500 ms)</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>0</td>
<td>ZYK=3 (1 s)</td>
<td>ZY=16 (500 ms)</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>1</td>
<td>ZYK=3, AP&gt;2 (2 s)</td>
<td>ZY=32 (1 s)</td>
</tr>
</tbody>
</table>

- Up to 6 S5KS driver per channel KNR can send to a single module. The partner device transmits no more than 12 telegrams per S5KE cycle.
- With acyclic stress by process alarms from module SF 61 or ZYK=1, and by transmission times of I/O modules behind coupling modules 6DS1322–8AA (AS 488K), the number of coupling modules which can be used in the same cycle, may be reduced (recommendation: slot for the coupling module immediately in the migration rack II).

If a system departs from this standard scope (e.g. a larger number of coupling modules or more driver blocks), such couplings often can be replaceable nevertheless. But sometimes changing the configuration may be necessary (e.g. parameter adjustment, extension of S5KE cycle).

Common settings:

- All S5KS of a module have to be installed in the same cycle.
- It is recommended, to set MAXT = 12 (receiving 12 telegrams per cycle) at the assigned S5KE block.
- The SYST.WART cycle for these coupling modules has always to be set faster than the assigned S5KE block.
The 6DS1333–8AB interface module works with high priority, on the partner side ‘low priority’ has to be set; 1 stop bit, even parity, same baudrate. ED telegrams can be initiated only by AS x88/TM.

For reading data from a partner device (with FETCH), and for monitoring a S5KE has to be configured in the AS 488/TM coupled with SIMATIC S5/S7. Only one S5KE is used for each module, which has been installed in the cycle list only once.

Protocol 3964(R) and RK512 procedure.
The RK512 procedure is essential required. The 3964 or 3964R protocol is open selectable. The X5/11–12 jumper has to be set like configured on the partner side [optional parameter for (R)].

S7 protocol parameter = ‘Standard settings’.
When coupling to SIMATIC S7, the setting ‘RK512’ includes the ‘3964’ protocol. Using 3964R is recommended because of the improved communication in disturbed environment.

Coupling to SIMATIC S7:
On 6DS1333–8AB the X5/13–14 jumper has to be set for disabling the function ‘check telegram’. This is also necessary for other devices without check function.

Coupling to SIMATIC S7–300:
If the X5/13–14 jumper has been installed, the 6DS1333–8AB sends the data type DAAR=n (S5KS block) for the coordination flag within the telegram array. The P_RCV_RK S7 block then sets the flag with this number (e.g. M 0.1 for DAAR=1) after each receiving. The next telegram can be received only, after the S7 software has reset this flag. This enabling has to be done quickly.

The 6DS1318–8AB module has to be treated in the same manner as the 6DS1333–8AB.
1.10 Replacement configuration for 6DS1504 and 6DS1505

The signals ‘Enable Manual’ (FH) and ‘Enable Automatic’ (FA) are only present once in the modules 6DS1504–8AA and 6DS1505–8AA; this means that, according to the manual (system software AS235, function blocks, EG), adjustments must always be made in the same way to the connections as appropriate in all EG drivers defined for a module. If this is not the case, the function is not guaranteed. In addition, full software control can only be achieved if a state is not forced using the signal ‘Enable Manual’ (plug X2) by means of hardware (see operating instructions on the 6DS1504–8AA or 6DS1505–8AA).

For AS 488/TM, the result is the following SYST.WART configuration for 6DS1504 / 6DS1505:

```
AN=4;
NR=...;
TY=6DS1310–8AA; Replacement configuration (always enter 1310–8AA!)
ZY=...; The cycle absolutely must be faster than the fastest cycle of the EG blocks allocated to this module.
EA=0;
KA=8;
BG=DE2;
EA=1;
KA=0; Only enter if the type 0, 1 or 2 EG driver, with KNR=0, is running.
BG=DA1; Only enter if the type 0, 1 or 2 EG driver, with KNR=0, is running.
KA=1; Only enter if the type 0 or 1 EG driver is running with KNR=1 or type 2 with KNR=0.
BG=DA1; Only enter if the type 0 or 1 EG driver is running with KNR=1 or type 2 with KNR=0.
KA=2; Only enter if the type 0, 1 or 2 EG driver, with KNR=2, is running.
BG=DA1; Only enter if the type 0, 1 or 2 EG driver, with KNR=2, is running.
KA=3; Only enter if the type 0 or 1 EG driver is running with KNR=3 or type 2 with KNR=2.
BG=DA1; Only enter if the type 0 or 1 EG driver is running with KNR=3 or type 2 with KNR=2.
```

Supplementary configuring for TELEPERM M I/O modules
Supplementary configuring for TELEPERM M I/O modules

The remaining entries are only for 6DS1505–8AA:

- **KA=4;** Only enter if the type 1 or 2 EG driver, with KNR=4, is running.
- **BG=DA1;** Only enter if the type 1 or 2 EG driver, with KNR=4, is running.
- **KA=5;** Only enter if the type 1 EG driver is running with KNR=5 or type 2 with KNR=4.
- **BG=DA1;** Only enter if the type 1 EG driver is running with KNR=5 or type 2 with KNR=4.
- **KA=6;** Only enter if the type 1 or 2 EG driver, with KNR=6, is running.
- **BG=DA1;** Only enter if the type 1 or 2 EG driver, with KNR=6, is running.
- **KA=7;** Only enter if the type 1 EG driver is running with KNR=7 or type 2 with KNR=6.
- **BG=DA1;** Only enter if the type 1 EG driver is running with KNR=7 or type 2 with KNR=6.

Each time a driver is built in or out, the configuration must be adjusted (RSOF!). However, as an alternative it is possible to configure and drive all channels from the beginning, and to source the unused drivers such that they switch manually or automatically at the same time as the other drivers.

**Summary of Configuration lines:**

- For 6DS1505–8AA it is recommended that, for dual systems, the two DA1 configurations are summarised as one DA2 configuration; e.g. the sequence "KA=0; BG=DA1; KA=1; BG=DA1;" then becomes "KA=0; BG=DA2;".
- If all 4 channels are driven in the 6DS1504–8AA, the output part can be replaced by "EA=1; KA=0; BG=DA4;".

**Limitation of functionality:**

If the EG driver allocated to one module is processed in different AS cycles or is even behind different XB blocks, manual or automatic switching using the software can, under unfavourable circumstances, result in fluctuating outputs. This lasts (calculated from the first throughput of a driver in this block after the switch) until all the drivers of this block have been throughput for the first time.

**New TPM 478 firmware:**

Using a TPM 478 with module issue ≥ 9 or a TPM 478–1 from issue 1, the configuration instruction below becomes effective:

If the application uses process alarm signals via interrupt master module, the word configuration is imperative for 6DS1310 and 6DS1505 (for dual systems).
## 1.11 Table of TELEPERM M modules for input with "TY=

<table>
<thead>
<tr>
<th>Input text for module type (usually = MLFB No.)</th>
<th>Module function</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6DS1310–8AA</td>
<td>S5–110 interface module, serial</td>
<td>1)</td>
</tr>
<tr>
<td>6DS1310–8AB</td>
<td>S5–110 interface module, serial</td>
<td>1)</td>
</tr>
<tr>
<td>6DS1318–8AB</td>
<td>S5 coupling, EU, serial</td>
<td>4) 5)</td>
</tr>
<tr>
<td>6DS1321–8AA</td>
<td>S5–EU interface module, parallel</td>
<td>1) 2)</td>
</tr>
<tr>
<td>6DS1322–8AA</td>
<td>Interface module for ES100K</td>
<td></td>
</tr>
<tr>
<td>6DS1327–8AA</td>
<td>Coupling to S5 I/O, ET100</td>
<td>1) 2)</td>
</tr>
<tr>
<td>6DS1333–8AB</td>
<td>S5–CC interface module, serial</td>
<td>4) 5)</td>
</tr>
<tr>
<td>6DS1400–8AA</td>
<td>S closed–loop controller, 1 channel</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1400–8BA</td>
<td>S closed–loop controller, 1 channel</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1401–8AA</td>
<td>K closed–loop controller, 1 channel</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1401–8BA</td>
<td>K closed–loop controller, 1 channel</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1402–8AA</td>
<td>S closed–loop controller, 2 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1402–8BA</td>
<td>S closed–loop controller, 2 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1403–8AA</td>
<td>K closed–loop controller, 2 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1403–8BA</td>
<td>K closed–loop controller, 2 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1403–8CA</td>
<td>K closed–loop controller, 2 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1403–8CB</td>
<td>K closed–loop controller, 2 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1500–8AA</td>
<td>Open–loop control module, motor, 1 channel</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1500–8BA</td>
<td>Open–loop control module, motor, 1 channel</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1501–8AA</td>
<td>Individual control drive module, 1 channel</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1501–8AB</td>
<td>Individual control drive module, 1 channel</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1501–8BB</td>
<td>Individual control drive module, 1 channel</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1502–8AA</td>
<td>Open–loop control module, motor, 3 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1502–8BA</td>
<td>Open–loop control module, motor, 3 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1503–8AA</td>
<td>Individual control drive module, 3 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1503–8BA</td>
<td>Individual control drive module, 3 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1504–8AA</td>
<td>Open–loop control module, valve, 4 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1505–8AA</td>
<td>Open–loop control module, valve, 8 channels</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1600–8AA</td>
<td>Binary input module, 16 NO contacts</td>
<td></td>
</tr>
<tr>
<td>6DS1601–8AA</td>
<td>Binary input module, 48 channels</td>
<td></td>
</tr>
<tr>
<td>6DS1601–8AC</td>
<td>Binary input module, 48 channels + INT</td>
<td></td>
</tr>
<tr>
<td>6DS1601–8BA</td>
<td>Binary input module, 48 channels + INT</td>
<td></td>
</tr>
<tr>
<td>6DS1602–8AA</td>
<td>Binary input module, 32 channels</td>
<td></td>
</tr>
<tr>
<td>6DS1602–8BA</td>
<td>Binary input module, 32 channels</td>
<td></td>
</tr>
<tr>
<td>6DS1603–8AA</td>
<td>Binary output module, 32 channels (100 mA)</td>
<td></td>
</tr>
<tr>
<td>6DS1603–8BA</td>
<td>Binary output module, 32 channels (100 mA)</td>
<td></td>
</tr>
<tr>
<td>6DS1603–8RR</td>
<td>Binary output module, 32 channels (100 mA)</td>
<td></td>
</tr>
<tr>
<td>6DS1604–8AA</td>
<td>Binary output module, 16 channels (400 mA)</td>
<td></td>
</tr>
<tr>
<td>6DS1605–8AA</td>
<td>Binary output module, 16 relays</td>
<td></td>
</tr>
<tr>
<td>6DS1605–8BA</td>
<td>Binary output module, 16 relays</td>
<td></td>
</tr>
<tr>
<td>6DS1607–8AB</td>
<td>Metered pulse input module, 8 PT</td>
<td>5)</td>
</tr>
<tr>
<td>6DS1613–8AB–2</td>
<td>Proportioning counter module, 2–channel mode</td>
<td>3) 5) 6)</td>
</tr>
<tr>
<td>6DS1613–8AB–4</td>
<td>Proportioning counter module, 4–channel mode</td>
<td>3) 5) 6)</td>
</tr>
<tr>
<td>6DS1613–8BB–2</td>
<td>Proportioning counter module, 2–channel mode</td>
<td>3) 5) 6)</td>
</tr>
<tr>
<td>6DS1613–8BB–4</td>
<td>Proportioning counter module, 4–channel mode</td>
<td>3) 5) 6)</td>
</tr>
</tbody>
</table>
Supplementary configuring for TELEPERM M I/O modules

<table>
<thead>
<tr>
<th>Input text for module type (usually = MLFB No.)</th>
<th>Module function</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6DS1615–8AA</td>
<td>Binary input module 48 24V/48V +INT (master, slave)</td>
<td>7)</td>
</tr>
<tr>
<td>6DS1620–8AA</td>
<td>Binary input module, 8 NO contacts</td>
<td></td>
</tr>
<tr>
<td>6DS1621–8AA</td>
<td>Binary input module, 8 BERO</td>
<td></td>
</tr>
<tr>
<td>6DS1700–8AA</td>
<td>Analog input module, 8 SV T</td>
<td></td>
</tr>
<tr>
<td>6DS1700–8AB</td>
<td>Analog input module, 8 SV T</td>
<td></td>
</tr>
<tr>
<td>6DS1700–8BA</td>
<td>Analog input module, 8 SV T</td>
<td></td>
</tr>
<tr>
<td>6DS1701–8AA</td>
<td>Analog input module, 8 HART</td>
<td></td>
</tr>
<tr>
<td>6DS1708–8AB</td>
<td>Analog input module, 8 HART</td>
<td></td>
</tr>
<tr>
<td>6DS1702–8AA</td>
<td>Analog output module, 4 PT</td>
<td></td>
</tr>
<tr>
<td>6DS1707–8RR</td>
<td>Analog output module, 4 PT</td>
<td></td>
</tr>
<tr>
<td>6DS1703–8AB</td>
<td>Measuring–point extension for 1731</td>
<td></td>
</tr>
<tr>
<td>6DS1703–8RR</td>
<td>Measuring–point extension for 1731</td>
<td></td>
</tr>
<tr>
<td>6DS1713–8AB</td>
<td>Analog input module, 4 channels</td>
<td></td>
</tr>
<tr>
<td>6DS1717–8AA</td>
<td>Binary calculation module, configurable</td>
<td>4) 5)</td>
</tr>
<tr>
<td>6DS1717–8RR</td>
<td>Binary calculation module, configurable</td>
<td>4) 5)</td>
</tr>
<tr>
<td>6DS1719–8AA</td>
<td>Extension for 1717</td>
<td></td>
</tr>
<tr>
<td>6DS1719–8RR</td>
<td>Extension for 1717</td>
<td></td>
</tr>
<tr>
<td>6DS1730–8AA</td>
<td>Analog input module, 8 channels</td>
<td></td>
</tr>
<tr>
<td>6DS1731–8AA</td>
<td>Analog input module, 4 channels</td>
<td></td>
</tr>
<tr>
<td>6DS1731–8BA</td>
<td>Analog input module, 4 thermoelectric channels</td>
<td></td>
</tr>
<tr>
<td>6DS1731–8EA</td>
<td>Analog input module, 4 thermoelectric channels</td>
<td></td>
</tr>
<tr>
<td>6DS1731–8FA</td>
<td>Analog input module, 4 thermoelectric channels</td>
<td></td>
</tr>
<tr>
<td>6DS1731–8RR</td>
<td>Analog input module, 4 thermoelectric channels</td>
<td></td>
</tr>
</tbody>
</table>

1) Transparent SIMATIC coupling module – extended configuring

2) These modules can also be configured window–by–window by entering ”6DS1310–8AA” for each BGNR (module number), i.e. ”Replacement Configuration”. The complete address area (512 or 1024 channels) can be covered in this manner.

3) The text to be entered differs from the MLFB (order no.).

4) Processing time in TPM 478 greater than that of driver (with 1717= 10 / 18 ms without / with analog values, even higher with 1318/1333 depending on load). Therefore use slow cycle (e.g. 1 sec).

   Alternative: ”Overload configuration” (see section on processing cycles).

5) With this modules it is absolutely necessary, that the processing cycle, configured in SYST.WART is faster than the AS cycle of the corresponding driver blocks.

6) Issue of module ≥ 6 !

7) 6DS1601–8AC : issue ≥ 4
    6DS1601–8BA : issue ≥ 2
    6DS1615–8AA : issue ≥ 4

The table applies to AS 488/TM from release version M01.02 onwards. Other modules which are compatible with those listed above can be configured by entering the corresponding text from the table.

**Example:** The module CP 581 TM can be configured as 6DS1333–8AB, because it’s interface is compatible to this coupling module.
**TELEPERM M**

**Configuration and functions of PROFIBUS–DP**

- Configuration of PROFIBUS–DP
- Diagnostics Data of PROFIBUS–DP
- Pulling and Plugging I/O Modules
- ODIS signal for DP Peripherals
- Initialization File DP1.INI
- Configuration of a second DP Line
- Master Type File for COM ET200 (WIN) / COM PROFIBUS

**Appendix**

- Applicable Documents

---

C79000–P8076-C702-02
Safety instructions

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

⚠️ Danger
Failure to observe a Danger note will cause death, severe personal injury or severe damage to the equipment.

⚠️ Warning
Failure to observe a Warning note may cause death, severe personal injury or severe damage to the equipment.

⚠️ Caution
Failure to observe a Caution note may cause personal injury or damage to the equipment.

Note
Notes contain important information regarding the product, product handling or a specific part of the document that requires special attention.

Qualified personnel

The unit may only be commissioned and used on the basis of the information contained in this Manual. Only qualified personnel are authorized to perform any work inside the unit. Qualified personnel in the sense of the safety instructions in this Manual are persons who have been authorized to commission, ground and label units, systems and circuits according to the safety-relevant standards.

Normal use

Please observe the following instructions:

⚠️ Warning
The unit may only be used for the applications mentioned in the Catalogue and the Technical Description. It may only be used together with third-party equipment or components that have been recommended or released by Siemens.

Faultless and safe operation of the product requires proper transport, storage, installation and commissioning, and careful handling and maintenance.

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Geschäftsbereich Systems Engineering
D-76181 Karlsruhe

Exclusion of liability
Although we have checked the contents of this document against the hardware and software described herein, the information contained in this document may not cover all details. We can therefore not assume any liability for completeness. The information in this document is checked at regular intervals and necessary corrections will be included in the next revisions. We are grateful for any suggestions.

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Order No. C79000-P8076-C702
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<td>1.2</td>
<td>Connecting 122 DP Slaves per DP Line</td>
<td>1-7</td>
</tr>
</tbody>
</table>
Imaging of the distributed peripherals to the process display

For the automation systems AS 388/TM and AS 488/TM, the process value exchange between the automation unit AS and the process I/O modules of the PROFIBUS–DP (L2DP) is generally handled via a process image.

The blocks for accessing the I/O data of the decentralized peripherals exclusively use this process image. An extension configuration is required for designing the process image.

1.1 Entering the Extension Configuration

Configuration with SYST.WART

The system program SYST.WART provides for menu–guided extension configuration. The individual operation steps are subsequently displayed on the user interface of the commissioning terminal with local connection.

In the configuration of the process image interface to the peripheral bus PROFIBUS–DP

- every DP station (L2 station number 3, ..., 126) is assigned a unique module number of a ‘virtual’ TM module. The downstream driver blocks access the I/O data of the process image area of a DP station with this module number.

- Access to the input/output of a DP station is provided either with the standard drivers for input/output (e.g. A110), depending on the SIMATIC data format, or with the DP drivers DPBA, DPBE, DPAA, and DPAE. The latter offer extended functionality compared to the standard drivers (e.g. module number range BGNR = 0...255 except for 60–63, 125–126, 160–163, 189–190, 254–255, analog values assigned to odd byte addresses, ...).

Restriction

Please note the following restrictions:

- The input and output data are handled separately in the process image and start with the relative address zero for every DP station.

- A DP station always occupies a pair of TM module numbers. However, the configuration is required for the first TM module number only. The following module number remains free and is used implicitly.

Note

During the assignment of the modules, the free module number in the configuration of the PROFIBUS–DP stations is not checked by the system. Deviations can cause a lack or manipulation of process data.

From version M02.01 or with the additional option ”AS x88/TM: Add-ons for PROFIBUS–DP” this rule is no longer relevant. See documentation /452/. 
The arrangement of the process data of an PROFIBUS–DP station in the process image is defined by the hardware configuration of the PB–DP station and specified with the configuration tool COM PROFIBUS or COM PROFIBUS (form Version V2.0 upwards). The result of a configuration session with COM ET200 is a binary parameter file with all parameters required for operating a DP line: master, bus, slave, and module parameters. The structure of the parameter file is identical with the parameter file IM308C.

**Note**

A decentralised peripheral unit of the AS x88/TM (e.g. on RSOF) is interrupted during start-up if the length of the parameter file *.2BF, which is generated using COM PROFIBUS, is too great. The maximum length of the binary parameter file *.2BF is 66 kb for the AS system software (Version ≤ M01.05). This is increased to 100 kb from Version M02.00. If this length is exceeded, the decentralised peripheral unit is not initialised. After renewed configuration to a permissible file length, the parameter file must be copied to the memory card and the AS x88/TM must then be rebooted.

**Configuration with COM PROFIBUS / COM ET200(Win)**

The information generated during the extension configuration of the DP peripherals are saved to a system list in the user storage of the AS. For menu operation with SYST.WART, these can be entered or changed for every module number, however, they do not become active immediately after the entry.

**Activating the configuration**

An activation of the definitions of the system list or of changes with COM PROFIBUS occurs by resetting the AS system via the "RSOF" operation, the key switch (MRES), or a boot procedure *). Prior to this action, the binary parameter file changed during the COM PROFIBUS configuration session is copied to a memory card with the function ‘COPY_TM’ of the commissioning terminal; the parameter file can be assigned any name which must be referenced in the initialization file DP1.INI.

**Archiving the extension configuration**

The information generated during the extension configuration of the I/O peripherals are saved as system list to the user storage of the AS. The archive command

```
AR, archive name;
```

writes the list and the associate user data to the memory card in the AS. This makes them available for a loading procedure.

**Configuration with SYST.WART**

The information generated during the extension configuration of the DP peripherals are saved to a system list in the user storage of the AS. For menu operation with SYST.WART, these can be entered or changed for every module number, however, they do not become active immediately after the entry.

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**Archiving the extension configuration**

The information generated during the extension configuration of the I/O peripherals are saved as system list to the user storage of the AS. The archive command

```
AR, archive name;
```

writes the list and the associate user data to the memory card in the AS. This makes them available for a loading procedure.
The following examples represent the principle steps of the extension configuration. If necessary, the menu entries are checked on correctness and are rejected if appropriate.

Figure 1-1 Overview display following input “SYST,WART;”

Explanation:

TEST AND MAINTENANCE FUNCTIONS:

1 SWITCH STARTUP BLOCK XB
2 COUPLING INFORMATION
3 SYSTEM SWITCH
4 NEMO OUTPUT WITH PASSWORD
5 ADMINISTER PROGRAM COPY
6 CHANGE NAME/CODES
7 REGENERATE SL.CTML
8 RELOAD BLOCKS
9 SELECTIVE SAVING
10 TYPE INPUT ON PBT
11 INTERCHANGE CYCLE
12 DELETE COUPLINGS
13 CONFIGURE I/O
14 VERSION OF BLOCK

When entering the command “BE” the menu control switches to operator input mode (this can be exited with “BR”).

In this example, the function is selected with the command “MP = 13”

Note

The function number for MP can change with the system.

The operator input sequences of the following example screens are listed according to the "display".
The screens and their admissible control parameters are built following the operator input sequence. For example, as a result of the command "AN=x", the inner work area is different for PROFIBUS–DP and TELEPERM M I/O, as well as the associate admissible commands of the screen.

**Note**

The terminal function AN=3 is a system–dependent wildcard and is not realized in AS 388/TM and AS 488/TM.

---

**PERIPHERIE–BAUGRUPPEN PROJEKTIEREN ASX88/TM**

ANSCHLUSS:  
AN=1 AG–AG–Kopplung  
AN=2 S7–L2DP  
AN=3 M7–IF–MODUL  
AN=4 TELEPERM M EA  
AN=5 ALLE BAUGRUPPEN LOESCHEN (BEI AN=0)

AN=2 S7–L2DP

| BAUGRUPPEN–NR. (STECKPLATZ) | NR= 20 | L=1 |
| TEILNEHMERNUMMER (SLAVE–NR.) | TN= 3 |
| Baugruppenbreite (1/2) | BB= 2 |

PROTOKOLL AUF:  
PR=1 MONITOR GE,5,0; *  
BLAETTERN F=1 PC/PG GE,7,6;  
UEBERSICHT : MP = 0

---

**Note:**

"L=1;" delete module (BAUGRUPPE LOESCHEN)  
"F=1;" scroll (BLAETTERN)

---

Figure 1-2  Display after the following operations:

"BE;" operator input mode  
"MP=13;" display selection  
"AN=2;" S7–L2DP module  
"NR=20;" slot number (STECKPLATZ–NR.)  
"TN=3;" station number on L2DP (TEILNEHMERNUMMER) (PROFIBUS–DP)
Notes

- From version M01.04 upwards, a list with the configured TM modules and references to the station numbers of the DP slave can be requested (cf. 2.14).
- The max. size of 122 byte for the process image of a DP slave has to be set with the parameter BB=2. The further use of the parameter "BB" is included in the documentation /452/.
- If the value TN=0 is set for a module number, no connection to a DP slave is existing for this module.
- The operation TN=0 is not allowed. For deleting the station number TN it is necessary to use the command "L=1".
1.2 Connecting 122 DP Slaves per DP Line

Cause for introduction of the parameter BB

Up to version M02.00 or M01.06 two TELEPERM module numbers were assigned to each DP slave when including a DP slave into AS x88/TM. Cause for this system feature was that a DP slave has an I/O range of 122 bytes, but a TELEPERM module only a length of 64 bytes.

But many DP slaves have less than 64 bytes of I/O data:

- Field devices with DP interface (e.g. FESTO valves),
- DP slaves with non-modular structure (e.g. ET200B), or
- DP slaves with modular structure (e.g. ET200M, ET200U), if their configuration doesn’t exceed the 64 bytes of I/O data.

DP slaves with max. 64 bytes of I/O data

Now exact one TELEPERM module number can be assigned to such DP slaves within the SYST.WART configuration. By this the amount of DP slaves connected to a DP line can increase up to 122. But that is only possible, if the data area is limited to 64 bytes for input data and 64 bytes for output data.

The size of the I/O data can be set for a DP slave with the parameter Baugruppen-Breite BB (module width):

- Value = 2: The DP slave occupies 2 TM module numbers, the I/O area is 122 bytes per direction. This value is the default furthermore.
- Value = 1: The DP slave occupies only 1 TM module number, the I/O area is 64 bytes per direction.

Compatibility to existing configuration

After upgrading the system software to version M02.01/M01.07 or higher, all DP slaves configured until then are shown with module width 2 in SYST.WART. This width can be set to 1 for qualified DP slaves later. By this the so far implicitly occupied second TM module no. will be released. This may then be used for assigning a new DP slave.

Like mentioned before, changes in the configuration list of SYST.WART will first take effect after a RSOF.

Protocol of the assigned peripheral modules

The configured module width of a DP slave is also shown in the protocol of the assigned peripheral modules.

In the display below, each DP slave with the addresses 2, 14, and 31 only one TM module has been assigned.
Example of a peripheral modules protocol
(FOLGE–BAUGRUPPE = sequel module)

<table>
<thead>
<tr>
<th>AN=2</th>
<th>NR= 0</th>
<th>TN= 11</th>
<th>BB= 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>NR= 1</td>
<td>TN= 11</td>
<td>BB= 1</td>
<td>FOLGE–BAUGRUPPE</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 2</td>
<td>TN= 18</td>
<td>BB= 1</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 3</td>
<td>TN= 3</td>
<td>BB= 2</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 4</td>
<td>TN= 3</td>
<td>BB= 1</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 6</td>
<td>TN= 10</td>
<td>BB= 2</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 7</td>
<td>TN= 10</td>
<td>BB= 1</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 8</td>
<td>TN= 100</td>
<td>BB= 2</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 9</td>
<td>TN= 100</td>
<td>BB= 1</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 10</td>
<td>TN= 133</td>
<td>BB= 2</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 11</td>
<td>TN= 133</td>
<td>BB= 1</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 12</td>
<td>TN= 49</td>
<td>BB= 2</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 13</td>
<td>TN= 49</td>
<td>BB= 1</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 14</td>
<td>TN= 15</td>
<td>BB= 1</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 16</td>
<td>TN= 9</td>
<td>BB= 2</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 17</td>
<td>TN= 9</td>
<td>BB= 1</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 18</td>
<td>TN= 6</td>
<td>BB= 2</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 19</td>
<td>TN= 6</td>
<td>BB= 1</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 20</td>
<td>TN= 48</td>
<td>BB= 2</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 21</td>
<td>TN= 48</td>
<td>BB= 1</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 31</td>
<td>TN= 31</td>
<td>BB= 1</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 32</td>
<td>TN= 32</td>
<td>BB= 2</td>
</tr>
<tr>
<td>AN=2</td>
<td>NR= 33</td>
<td>TN= 32</td>
<td>BB= 1</td>
</tr>
</tbody>
</table>

Note
A PROFIBUS station no. TN (> 0) has to be configured before setting the module width BB.

Maximum value of connectable DP slaves
If all DP slaves are configured with module width 1, up to 122 DP slaves can be connected to one DP line.

With each double–wide DP slave (2 TM module numbers) the maximum amount of 122 will be reduced by 1.

For configuration with COM PROFIBUS the addresses of the DP slaves must be set between 2 and 123.
This chapter gives informations about diagnostics data of PROFIBUS–DP.

The sections are on the following pages:

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<th>Topic</th>
<th>Page</th>
</tr>
</thead>
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<td>2–2</td>
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<tr>
<td>2.2</td>
<td>Evaluation of the Diagnostics Data in AS x88/TM</td>
<td>2–7</td>
</tr>
<tr>
<td>2.3</td>
<td>Evaluation of Pull/Plug Messages from ET 200M in the AS x88/TM</td>
<td>2–8</td>
</tr>
<tr>
<td>2.4</td>
<td>Evaluation of S7 Process Messages in the AS x88/TM</td>
<td>2–9</td>
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<td>2.5</td>
<td>Evaluation of the ID–Related Diagnostics via AS x88/TM</td>
<td>2–10</td>
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<td>2.6</td>
<td>Acquisition Cycle of the Diagnostics Data in the AS x88/TM</td>
<td>2–11</td>
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<td>2.7</td>
<td>Evaluation of the Diagnostics Data by the User</td>
<td>2–11</td>
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<td>2.8</td>
<td>M308C Properties of the AS x88/TM</td>
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<td>2.9</td>
<td>Deactivating the Diagnostics Functions via the Initialization File</td>
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<td>2.10</td>
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<tr>
<td>2.11</td>
<td>TML Blocks for Diagnostics Evaluation</td>
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<td>2.12</td>
<td>Special Situations</td>
<td>2–17</td>
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<tr>
<td>2.13</td>
<td>Information on Configuration with COM PROFIBUS /COM ET200 (Win)</td>
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<tr>
<td>2.14</td>
<td>Extensions of SYST.WART Operation for Commissioning</td>
<td>2–18</td>
</tr>
</tbody>
</table>
### 2.1 Types of DP Diagnostics Data

According to the standard description PROFIBUS DP and the description of the standard slaves of the series ET 200M/B/U by SIEMENS, DP slaves can supply DP masters with diagnostics data. The following types of diagnostics data are available:

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Station status</strong></td>
<td>Indicates an overview of the status of a DP slave. The structure of the status words is widely defined by the standard.</td>
</tr>
<tr>
<td><strong>ID–related diagnostics</strong></td>
<td>This information indicates for which module and on which slot diagnostics data are available. The structure of the diagnostics data is specified in the standard. The ID–related diagnostics data defined for S7 comply with the standard specifications.</td>
</tr>
<tr>
<td><strong>Device–specific diagnostics</strong></td>
<td>This data gives detailed information on a DP slave like open circuit, short circuit, missing sensor supply or on–load voltage, range violation, etc. The contents of this diagnostics is defined on a manufacturer–specific basis for every DP slave type (device–specific); this is not stated in the standard. The interpretation of the device–specific diagnostics data is given in the respective DP slave description. Example: documentation of ET 200M includes the description of the device–specific diagnostics data of the IM153. For ET 200M, the S7 process signals and the pull/plug alarm messages are also included.</td>
</tr>
<tr>
<td><strong>Channel–related diagnostics</strong></td>
<td>This information includes the diagnostics cause for the respective channels. The structure of this information is partially defined by the standard, however, also provides for manufacturer–dependent use.</td>
</tr>
</tbody>
</table>
2.1.1 Diagnostics Data of the DP Slave IM153–1/2 (ET 200M)

The DP slave IM153 provides the following diagnostics data:

- station status (2 of 3 bytes are relevant)
- ID–related diagnostics with contents according to standard definition (with identification of all permanently faulty I/O modules)
- device–specific diagnostics with the following classification
  - S7 diagnostics data (basically matches the SIMATIC S7 record1)
  - S7 process alarm (only new events)
  - pull alarm
  - plug alarm
- no channel–specific diagnostics messages (instead, S7 process signals in device–specific diagnostics data!)

Evaluation of the diagnostics data of ET 200M in the ASx88

Figure 2-1 Evaluation of the diagnostics data of ET 200M in the ASx88
Notes:

- The interfaces IM153–xAA00 (x=0,1) and IM153–1AA01 do not yet provide for pull and plug alarms.

- The ID–related diagnostics data of IM153–xAA00 (x=0,1) and IM153–1AA02 have a different value supply: for IM153–xAA00 (x=0,1), only one device at a time is selected.

- At the configuration with COM PROFIBUS of the module IM153–1 (6ES7 153–1AA03–0XB0) the parameter „Detailed diagnosis“ may not be set, because the DP driver blocks can’t evaluate the changed pull and plug alarms.
2.1.2 Diagnostics Data of the DP Slaves ET 200B

The standard DP Slave ET 200B delivers the following diagnostics data:

- station status (2 of 3 bytes are relevant)
- device–specific diagnostics with the following classification
  - S5 diagnostics data (digital modules: 1 byte with group diagnostics; analog modules: up to 18 bytes diagnostics data, channel–oriented arrangement)
- no channel–specific diagnostics signals

Figure 2-2  Evaluation of the diagnostics data of ET 200B in the ASx88
2.1.3 Diagnostics Data of the Standard DP Slave IM318 (ET 200U)

The standard DP Slave IM318 supplies the following diagnostics data:

- station status (2 of 3 bytes are relevant)
- ID–related diagnostics with contents according to standard specification
- device–specific diagnostics data (of 1 byte length)
- no channel–specific diagnostics messages

Since the IM318 does not release channel–specific process signals, but only generates diagnostics data in case of an I&C fault (HW), the ID–related diagnostics data contain the currently active, faulty I/O modules of an IM318.

![Diagram of ET 200U diagnostics data]

**Evaluation of the diagnostics data of ET 200U in the ASx88**

Figure 2-3 Evaluation of the diagnostics data of ET 200U in the ASx88
2.1.4 **Diagnostics Data of other Standard DP Slaves**

Other standard DP slaves can generally release the diagnostics data specified in the standard. Independent of device specifications, the following diagnostics data can be evaluated:

- station status (2 of 3 bytes are relevant)
- ID–related diagnostics with contents according to standard specifications
- channel–specific diagnostics messages with standard volume for channel events

Device–specific diagnostics are defined by the manufacturer and cannot be evaluated without this information. For frequently used DP slave types in plant–specific extensions, the device–specific diagnostics data can also be supplied.

**Other Standard Slaves**

- Station status
- ID–related diagnostics data
- Device–specific diagnostics data
- Process alarms (channel–specific diagnostics according to standard)

**Evaluation of the diagnostics data of other standard slaves in the ASx88**

![Diagram](image)

**DP add–ons**

With the software extension package “AS x88/TM: Add-ons for PROFIBUS–DP” /452/ further DP slaves were supported. The documentation belonging to this SW package includes in addition to the description of the additional DP driver blocks also informations about covering the diagnostics of these DP slaves.
### 2.2 Evaluation of the Diagnostics Data in AS x88/TM

<table>
<thead>
<tr>
<th>Demands to the version of the AS x88/TM – system software</th>
<th>For covering and providing the diagnostics from PROFIBUS–DP at least the version M01.04 of the AS x88/TM system software is required. With version M02.01 the diagnostic functions were supplemented once more.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station status</td>
<td>The contents of the entire station status (3 bytes) are acquired and written to a list element which is assigned to the DP slave (or the associate TM module number).</td>
</tr>
<tr>
<td>ID–related diagnostics</td>
<td>The contents of the ID–related diagnostics are acquired and written to a list element which is assigned to the DP slave (or the associate TM module). The information gives an overview of the I/O modules of a DP slave for which diagnostics data of a fault are present. From IM153–1AA02 upwards, this diagnostics information is used in order to derive a module–specific status display of the process image for every DP slave.</td>
</tr>
</tbody>
</table>
| Device–specific diagnostics | The contents of the device–specific diagnostics are acquired and written to a list element which is assigned to the DP slave (or the associate TM module). The data gives detailed information on a DP slave. In standard configuration, the DP slave types ET 200M, ET 200B, ET 200U, and ET 200S (up from M02.01) are supported.  
  **ET 200M (IM153):** In the device–specific diagnostics data, this module supplies the following alarm messages in addition to S7 diagnostics data: S7 process alarm, pull and plug alarm. For further evaluation by the user, these alarms must be relocated to an own cyclic storage. Together with the evaluation of the S7 diagnostics data, dynamic information on the modules can be transferred after the IM153, e.g. module fault, parameter fault, or channel fault. The length of a device–specific diagnostics data is 20 bytes maximum. The device–specific diagnostics data are pre–selected by the AS x88 with regard to the alarm messages. The S7 diagnostics data and the other standardized diagnostics data in the list STRT.DPGD in the AS x88 are provided for evaluation by the user.  
  **ET 200U (IM318–C):** This module delivers general information on the ET 200U. The length of the device–specific diagnostics data is 1 byte. |
**ET 200B:** This module provides device-specific diagnostics and distinguishes between digital and analog modules as follows:

Digital modules: 1 byte diagnostics information, sorted on channel groups and with contents of group signal quality.

Analog modules: up to 18 bytes diagnostics information of the following structure:

- byte 1 – 6: system-specific diagnostics
- byte 7: fixed (reserved)
- byte 8: number of channels
- byte 9: channel fault overview
- byte 10 – 17: channel-specific diagnostics per channel
- byte 18: free (reserved)

**Other slave types:** the diagnostics data are written to the lists STRT.DPGD and STRT.DPKD without further interpretation. They are available to the user for interpretation.

**Channel-specific diagnostics**

ET 200 M/B/U do not supply diagnostics messages of this type. An evaluation of channel-specific diagnostics data for any kind of standard slave is not performed in the step M01.04.

### 2.3 Evaluation of Pull/Plug Messages from ET 200M in the AS x88/TM

In the device-specific diagnostics data, ET 200M transmits device-specific alarm messages if modules are pulled from or plugged to the slave. The corresponding module number is indicated in the alarm message.

**Note**

Entry of the pull/plug message in the AS cyclic storage (STRT.DPGD) and updating of the device-specific diagnostics data occurs only if the AS is not in the STO mode.
2.4 Evaluation of S7 Process Messages in the AS x88/TM

S7 alarms
In the device-specific diagnostics data, ET 200M generates S7 process messages if the slave is configured accordingly with COM PROFIBUS. S7 process alarms received from S7 modules inform exclusively on new events: e.g. a new limit violation remains active until a new signal “back-to-normal” is received.

STRT.DPKD
The S7 process signals and pull&plug messages from ET 200M are collected in the cyclic storage STRT.DPKD by the AS x88/TM and made available to the user for diagnostics purposes and evaluation.

Restrictions
Some restrictions must be observed when using S7 process signals:

- Generally, the DP bus cycle is faster than the recording cycle of the AS x88/TM. Therefore the messages were buffered by the DP master of the AS x88/TM, before they are entered into the cyclic storage STRT.DPKD in the covering cycle. This can cause a loss of signals, if a large count of diagnostics arrive (more than 60 messages per 25 ms).
- If the user does not evaluate the cyclic storage fast enough, then the oldest messages are overwritten.
- The pull/plug message is entered in the AS cyclic storage and the device-specific diagnostics data are updated only if the AS is not in the STOP state.
- In the scope of the device-specific diagnostics telegram, the AS x88/TM receives only new – not back-to-normal – alarms (/320/) from the IM153.

Note
Due to these properties, the S7 process signals of the AS x88/TM feature the quality of diagnostics data acquired from the distributed peripherals and do not claim the quality of a protected alarm acquisition.
2.5 Evaluation of the ID–Related Diagnostics via AS x88/TM

The DP master of the AS x88/TM makes the ID–related diagnostics data available in an AS buffer for evaluation by the user. Additionally they are used for deriving the status of the process image. The ID–related diagnostics of the ET 200M/U can point out a faulty access to the associate I/O module. This causes a module–specific QVZ in the status trace of the process image. With ET 200M the pull&plug messages were also used for deriving the QVZ (time–out) for a module.

**ET200M with IM153–xAA00 (x=0,1)**

In the ID–related diagnostics data, the IM153–xAA00 head–end (x=0,1; first version) does not transfer information on permanently faulty I/O modules. The pull&plug function is not either available yet. The AS x88/TM therefore is not able to set QVZ bits into the status trace of the process image.

Suggestion: If this first version of the IM153 is exclusively used, the configuration variable should be set QVZ = 0 in order to reduce the CPU load.

**ET200M with IM153–1AA02**

In the ID–related diagnostics data, the IM153–1AA02 head–end transfers information on permanently faulty I/O modules. In addition, the I/O module is highlighted for which diagnostics are available (not necessarily a fault!). In this case, the AS x88/TM will interpret additionally the pull&plug messages in order to be able to detect the real module faults.

**ET200U with IM318**

Every active bit identifies a faulty I/O module. This is imaged 1:1 to the status trace of the process image.

**ET200B**

These devices do not transfer ID–related diagnostics.
2.6 Acquisition Cycle of the Diagnostics Data in the AS x88/TM

Updating the diagnostics data

With version M02.01 or M01.07 the coverage of the diagnostics data was improved. The diagnostic messages are collected event-controlled in a storage within the AS x88/TM by the DP master of the AS x88/TM. From there they are read, evaluated, and optionally written into the AS buffers STRT.DPKD and STRT.DPGD with the cycle of the DP system program (max after 25 msec).

2.7 Evaluation of the Diagnostics Data by the User

SYSTEM.DPKD

Into the AS cyclic storage STRT.DPKD are written either the
- ET 200M alarms/messages or
- absolutely the seized diagnostics telegrams of all DP slaves.

This storage can be read with the system program SYSTEM.DPKD. Selecting the alternative can be done by a setting in FSA.ORPA.

SYSTEM.DPGD

The storage STRT.DPGD contains always the newest device-specific diagnostics of the DP slave, and can be read with the TML system program SYSTEM.DPGD.

Visualization

With the selection "A,STRT,DPKD;" or "A,STRT,DPKD;", the contents of the buffer or list can be visualized.

2.8 M308C Properties of the AS x88/TM

With regard to processing of the distributed peripherals, the AS x88/TM acts similar to the master interface IM308C of SIMATIC S5.

This also applies basically to the statements in the description /320/ of ET 200M on the master interface module IM308C.
2.9 Deactivating the Diagnostics Functions via the Initialization File

The acquisition and evaluation of diagnostics data through the AS x88/TM requires CPU resources, configuration for user evaluation, diagnostics capable I/O modules, certain versions of the IM153, etc. which are not always available or desired. For this reason it is possible to deactivate the diagnostics function either entirely or only partially. For this purpose, the respective configuration variables in the initialization file DP1.INI or DP2.INI are set to zero:

<table>
<thead>
<tr>
<th>Configuration variable</th>
<th>Value</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREI</td>
<td>1</td>
<td>enable acquisition and evaluation of diagnostics</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>no acquisition and evaluation of diagnostics</td>
</tr>
<tr>
<td>ALARM</td>
<td>1</td>
<td>acquire alarms and write to AS cyclic storage STRT.DPKD</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>no alarm acquisition</td>
</tr>
<tr>
<td>GERAET</td>
<td>1</td>
<td>acquire device–specific diagnostics and write to STRT.DPGD</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>no acquisition of device–specific diagnostics data</td>
</tr>
<tr>
<td>QVZ</td>
<td>1</td>
<td>determination of QVZ via ID–related diagnostics data</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>no determination of QVZ via ID–related diagnostics data</td>
</tr>
</tbody>
</table>

Any combination of the configuration variables ALARM, GERAET, and QVZ can be set. If at least one of these configuration variables is set, the function is enabled with FREI = 1. FREI = 0 disables the entire diagnostics features of the AS x88/TM. In this case, the diagnostics functions of the I/O modules must be disabled with the configuration tool COM PROFIBUS.

In default mode, all configuration variables are set to ‘0’, i.e. the function is not active. This results in a continuous behavior of the operation mode when updating a plant.
2.10 User Interfaces

Introduction

For the acquisition of the diagnostics information, there are 2 buffers in the AS address area. The buffers are configured during AS startup only if at least one DP line (1 or 2) exists. The buffers are reset after every startup, except for RSOF. Two system subprograms are available to the user for reading out the information (SYST.DPKD and SYST.DPGD).

Buffer STRT.DPKD for alarm messages or all diagnostics

The buffer (STRT.DPKD / type 15 blk. 36) is meant for recording of alarm messages or all diagnostics. It is designed as cyclic storage and has a configurable size. The settings for the dimensions are stored in block FSA.ORPA element 30 and 31:

- FSA (30): contains the count of entries in the buffer STRT.DPKD; a minimum length of 100 is required.
  - Handling at FSA (30) = 0, ...., 99: A start value FSA (30) = 1000 is set. If the buffer size exceeds the available memory, a smaller buffer size will be tried to install. Installing the buffer will be rejected, if less than 100 elements are available, i.e. the function is not available.

- FSA (31): contains a even length for a single buffer element.
  - This value is determined by the maximum length LMAX (in bytes) of the diagnostics data of the connected DP devices: FSA (31) = 8 bytes + LMAX.
  - Handling at FSA (31) = 0, ..., 16: Setting these values will always cause the minimum value FSA (31) = 16 bytes. With this setting, the mode and buffer structure of the earlier versions (up to M02.00 or M01.06) will be set, i.e. only alarm messages and pull&plug messages from ET 200M will be stored.

According to chapter 2.9 entries into the cyclic storage STRT.DPKD are only done if the parameters ALARM = 1 and FREI = 1 are set in the start–up file DPx.INI.

Notes for sizing the buffer STRT.DPKD

- The size of the buffer must not exceed 63 Kbytes, i.e. there applies the following limit: FSA (30) * FSA (31) < 64513 bytes.
- If there is not enough storage for creating the buffer, this is tried by dividing the size by 2 down to the minimum length. A buffer with less than 100 entries is rejected (I&C message STRTDPKD * S 373). Changes of the length in FSA.ORPA become active only with the next startup (not after RSOF).
Example 1:
Out of ET 200M and ET 200B the diagnostics telegrams shall also be recorded for ET 200S. These have a maximum length of 64 bytes. As much diagnostic data as possible shall be stored. For this request following settings are necessary:

FSA(31) = 64 (bytes)
FSA (30) = 1008   ( = 64512 / 64 entries)

Additionally following parameters are set in the file DPx.INI at least:
FREI = 1 and ALARM = 1.

Example 2:
Further only the diagnostics of the standard peripherals ET 200M/U/B shall be recorded in the buffer STRT.DPKD. For all remaining devices at the DP bus no evaluation of the diagnostics shall happen. A buffer with minimum size shall be installed. For this request following settings are necessary:

FSA(31) = 100 (bytes)
FSA (30) = 0   (16 is entered implizite)

Additionally following parameters are set in the file DPx.INI at least:
FREI = 1 and ALARM = 1.

Example 3:
The diagnostic buffer STRT.DPKD will not be evaluated by the user. With this the saving of storage and the CPU performance for recording the diagnostics is unnecessary. For this request following setting is necessary:

The parameter ALARM = 0 has to be set in the start–up file DP1.INI or DP2.INI.

Buffer for device–specific diagnostics STRT.DPGD

The buffer (STRT.DPGD / type 15 blk. 37) for the device–specific diagnostics data together with the other diagnostics information defined in the standard has a fixed length of 66 bytes for each one of the 256 modules. If not enough storage is available for creating the buffer, no buffer is configured (I&C message STRT.DPGD S 373).
2.11 TML Blocks for Diagnostics Evaluation

For access to the list with the diagnostics data, the user is provided two TML system subprograms:

2.11.1 System Subprogram SYSTEM.DPKD

**SYSTEM.DPKD**

An alarm message (S7 process alarm, pull/plug alarm) is read out from the AS cyclic storage STRT.DPKD with the system subprogram SYSTEM.DPKD (type 1 / blk. 192). The message is copied to a freely selectable sink (e.g. global integer data block FC.anw) and the data buffer is updated. The diagnostics information is transferred according to the size of the entry (18 bytes or max 8 + FSA(31) bytes). The data are written to an integer field (target element; data type I:18 or I:n) of the specified record. The field length is checked.

**STRT.DPKD**

Every message can be read out only once. If the buffer structure is known, the AS buffer STRT.DPKD can be displayed in hexadecimals in the NEDA mode. The meaning of the data is stated in the user instructions of ET 200M.

**Call instruction**

CALL SYSTEM.DPKD;

GIVE p1, p2;

TAKE p3;

**Parameters**

p1 : SET address of the target data record (e.g. ANW.ABC)
p2 : target element number
p3 : error ID

= 0 : data are relocated.
= 1 : like 0, however, messages were lost.
= 2 : no messages available, buffer empty.
= 3 : wrong target record
= 4 : wrong or too small target element
= 5 : no PB–DP line / no diagnostics information available
<table>
<thead>
<tr>
<th>Byte no.</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>date: calendar year – 1900</td>
</tr>
<tr>
<td>1</td>
<td>date: month (1 .. 12)</td>
</tr>
<tr>
<td>2</td>
<td>date: day (1 .. 31)</td>
</tr>
<tr>
<td>3</td>
<td>time: hour (0 .. 23)</td>
</tr>
<tr>
<td>4</td>
<td>time: minute (0 .. 59)</td>
</tr>
<tr>
<td>5</td>
<td>time: second (0 .. 59)</td>
</tr>
<tr>
<td>6</td>
<td>module number of the DP slave</td>
</tr>
<tr>
<td>7</td>
<td>message type: 2 = S7 process alarm; 3 = S7 pull alarm; 4 = S7 plug alarm; 255 = reserved for standard channel diagnostics</td>
</tr>
<tr>
<td>8</td>
<td>length of the diagnostics data from byte 11 upwards</td>
</tr>
<tr>
<td>9</td>
<td>S7: 0 (empty); standard: octet 1 (ID number)</td>
</tr>
<tr>
<td>10</td>
<td>S7: slot; standard: octet 2 (channel number / I/O ID)</td>
</tr>
<tr>
<td>11</td>
<td>S7 process alarm: 4 bytes max. or</td>
</tr>
<tr>
<td>12</td>
<td>S7 pull alarm: 5 bytes max. or</td>
</tr>
<tr>
<td>13</td>
<td>S7 plug alarm: 5 bytes max. or</td>
</tr>
<tr>
<td>14</td>
<td>standard channel diag.: 1 byte (octet 3)</td>
</tr>
<tr>
<td>15</td>
<td>(assignment cf. manual of the respective slave module / for standard slave cf. PROFIBUS part 3)</td>
</tr>
<tr>
<td>16</td>
<td>reserve</td>
</tr>
<tr>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

Location of the diagnostics data, if FSA (31) < 17

<table>
<thead>
<tr>
<th>Byte no.</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>date: calendar year – 1900</td>
</tr>
<tr>
<td>1</td>
<td>date: month (1 .. 12)</td>
</tr>
<tr>
<td>2</td>
<td>date: day (1 .. 31)</td>
</tr>
<tr>
<td>3</td>
<td>time: hour (0 .. 23)</td>
</tr>
<tr>
<td>4</td>
<td>time: minute (0 .. 59)</td>
</tr>
<tr>
<td>5</td>
<td>time: second (0 .. 59)</td>
</tr>
<tr>
<td>6</td>
<td>module number of the DP slave</td>
</tr>
<tr>
<td>7</td>
<td>PROFIBUS station number of the DP slave</td>
</tr>
<tr>
<td>8</td>
<td>length of the diagnostics telegram</td>
</tr>
<tr>
<td>9</td>
<td>reserve</td>
</tr>
<tr>
<td>10</td>
<td>station status byte 1</td>
</tr>
<tr>
<td>11</td>
<td>station status byte 2</td>
</tr>
<tr>
<td>12</td>
<td>station status byte 3</td>
</tr>
<tr>
<td>13</td>
<td>master PROFIBUS address</td>
</tr>
<tr>
<td>14</td>
<td>manufacturer ID (high byte)</td>
</tr>
<tr>
<td>15</td>
<td>manufacturer ID (low byte)</td>
</tr>
<tr>
<td>16</td>
<td>Diagnostics data of the DP slave according to received telegram (if necessary the whole diagnostics telegram will be reduced to the size of one buffer element – 8 bytes)</td>
</tr>
<tr>
<td>. .</td>
<td>max. 255</td>
</tr>
</tbody>
</table>

Location of the diagnostics data, if FSA (31) > 16, i.e. complete diagnostics telegrams
2.11.2 System Subprogram SYSTEM.DPGD

SYSTEM.DPGD

The diagnostics data of the type station status, ID– and device–specific diagnostics, and other management data are read out from the AS list STRT.DPGD with the system subprogram SYSTEM.DPGD (type 1 / blk. 191). Exceptions to this are alarms, these are read out with SYSTEM.DPKD. The data are copied to a freely selectable sink (e.g. global integer data block FC.anw). The desired number of bytes (66 max.) of the diagnostics information of a module is relocated. The target must be a field (I:x) with the respective size. only data of PB–DP module numbers are relocated.

STRT.DPGD

The meaning of the data is listed in the user instructions of ET 200 M/B/U or partially in the standard specifications. Die AS list STRT.DPGD can also be indicated with hexadecimals in the NEDA mode. (Please note that the order of the bytes per word is switched due to the word representation of the buffer contents.)

Location of the diagnostics data

<table>
<thead>
<tr>
<th>Byte no.</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>BGNR module number</td>
</tr>
<tr>
<td>1</td>
<td>PROFIBUS address of the DP slave</td>
</tr>
<tr>
<td>2</td>
<td>station status byte 1</td>
</tr>
<tr>
<td>3</td>
<td>station status byte 2</td>
</tr>
<tr>
<td>4</td>
<td>station status byte 3</td>
</tr>
<tr>
<td>5</td>
<td>master PROFIBUS address</td>
</tr>
<tr>
<td>6</td>
<td>manufacturer ID (high byte)</td>
</tr>
<tr>
<td>7</td>
<td>manufacturer ID (low byte)</td>
</tr>
<tr>
<td>8</td>
<td>ID–related diagnostics (header)</td>
</tr>
<tr>
<td>9</td>
<td>ID–related diagnostics (byte 1)</td>
</tr>
<tr>
<td>10</td>
<td>ID–related diagnostics (byte 2)</td>
</tr>
<tr>
<td>11</td>
<td>ID–related diagnostics (byte 3)</td>
</tr>
<tr>
<td>12</td>
<td>ID–related diagnostics (byte 4)</td>
</tr>
<tr>
<td>13</td>
<td>ID–related diagnostics (byte 5) or for IM153–1: slot no. of byte 11</td>
</tr>
<tr>
<td>14</td>
<td>device–specific diagnostics data (header)</td>
</tr>
<tr>
<td>15 – 65</td>
<td>device–specific diagnostics data (data):</td>
</tr>
<tr>
<td></td>
<td>ET 200M (19 bytes max.); ET 200U (max. 1 Byte)</td>
</tr>
<tr>
<td></td>
<td>ET 200B (17 bytes max.); other standard slaves (51 bytes max.)</td>
</tr>
</tbody>
</table>

Call instruction

CALL SYSTEM.DPGD ;
GIVE p1, p2, p3, p4 ;
TAKE p5 ;
Parameters

- p1: module number (0 .. 255)
- p2: SET address of the target record (e.g. ANW.ABC)
- p3: target element number
- p4: number of bytes to be read (1 .. 66)
- p5: error ID
  - 0: data are relocated
  - 1: wrong module number
  - 2: wrong target record
  - 3: wrong or too small target element
  - 4: no PB–DP line/ no diagnostics information available
  - 5: no PB–DP module
### 2.12 Special Situations

<table>
<thead>
<tr>
<th>No diagnostics data on AS–STOP</th>
<th>If the AS is in STOP state, diagnostics acquisition does not occur. This applies even if the configuration defines that no ODIS output shall occur in the AS–STOP state.</th>
</tr>
</thead>
</table>
| Diagnostics telegram without extended diagnostics data | If only status information and no extended diagnostics data is transmitted within a diagnostics telegram, this is signaled by the DP slaves with bit 3 of the station status byte 0 according to the standard. This has to be considered when evaluating a diagnostics telegram from the storage STRT.DPGD:  
  Bit 3 ("Diag_ext_diag") = 1:  
  The extended diagnostics data in storage STRT.DPGD is valid.  
  Bit 3 ("Diag_ext_diag") = 0:  
  The extended diagnostics data in storage STRT.DPGD is invalid; the DP slave has only sent status information. |

### 2.13 Information on Configuration with COM PROFIBUS / (COM ET200 Win)

<table>
<thead>
<tr>
<th>Response monitoring time</th>
<th>Up to version M01.04 of the AS x88/TM, the monitoring time must match 0.2 sec minimum. If the monitoring time is too low, the outputs are not activated at the output modules of the decentralized peripherals. Up from version M02.00 or M01.06 the response monitoring time calculated by the configuration tool COM PROFIBUS (COM ET200 WIN) can be adopted unchanged.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum baud rate</td>
<td>The maximum baud rate of the DP bus for AS x88/TM is limited to 1.5 Mbauds up to version M02.00 or M01.06.</td>
</tr>
</tbody>
</table>
2.14 Extensions of SYST.WART Operation for Commissioning

Monitoring of process and status values

For test reasons, an add–on block FENS.NL is delivered with the AS x88/TM system software. This provides for visualization of the associate process image (length: 2 * 64 = 128 bytes) and the status values of the process image (length: 2 * 64 = 128 bytes) for a slave.

The input values, e.g., can be output cyclically in hexadecimal representation without using input drivers.

Operations

- NR=bgnr: selection of the module number
- FG=1: activation/deactivation of the module data output; values are indicated only if a module is configured
- PA=1: activation of the process image display
- ST=1: activation of the status trace display; in the status image, the status value of a byte in the process image for a non–addressable slave is marked ‘01’, a pulled module is marked ‘80’
- LO=1: removal / deletion of the block

Note

The indication ‘QVZ’ describes an acknowledgment delay in the associate window.

Process image

<table>
<thead>
<tr>
<th>Baugruppendaten Anzeigen</th>
<th>Module Data Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1= 0 F2= 1 F3= 2 F4= 3</td>
<td></td>
</tr>
<tr>
<td>0 16 F7B5 0000 1900 0000 81C9 0000 1900 0000</td>
<td></td>
</tr>
<tr>
<td>1 17 781E 0000 781E 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>2 18 701E 0000 701E 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>3 19 F8FF 0000 F8FF 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>4 20 F8FF 0000 F8FF 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>5 21 F8FF 0000 F8FF 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>6 22 F8FF 0000 F8FF 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>7 23 F8FF 0000 F8FF 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>8 24 F8FF 0000 F8FF 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>9 25 0000 0000 0000 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>10 26 0000 0000 0000 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>11 27 0000 0000 0000 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>12 28 0000 0000 0000 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>13 29 0000 0000 0000 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>14 30 4000 0000 4000 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
<tr>
<td>15 31 4003 0000 4003 0000 0000 0000 0000 0000</td>
<td></td>
</tr>
</tbody>
</table>

Note: The indication ‘QVZ’ describes an acknowledgment delay in the associate window.
Display in "SYST,WART;" after the following operations:

"BE;"      operator input mode
"MP=n;"    display selection
"NR=24;"   S7–L2DP module
"PA=1;"     process image
"FG=1;"     release

Status trace to the process image

<p>| | | | | | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>16</td>
<td>0000</td>
<td>0000</td>
<td>0900</td>
<td>0000</td>
<td>0808</td>
<td>0000</td>
<td>0900</td>
<td>0000</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>17</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
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<td>0000</td>
<td>0000</td>
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</tr>
<tr>
<td>3</td>
<td>19</td>
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<td>0000</td>
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</tr>
<tr>
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<td>0000</td>
<td>0000</td>
<td>0000</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>21</td>
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<td>0000</td>
<td>0000</td>
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<td>0000</td>
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</tr>
<tr>
<td>8</td>
<td>24</td>
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<td>0000</td>
<td>0000</td>
<td>0000</td>
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</tr>
<tr>
<td>9</td>
<td>25</td>
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<tr>
<td>10</td>
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<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>27</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>28</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
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<td>0000</td>
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<td></td>
</tr>
<tr>
<td>13</td>
<td>29</td>
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<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>30</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>31</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td>0000</td>
<td></td>
</tr>
</tbody>
</table>

QVZ          QVZ
NR : 8 FG  = 1 AKTIV STATUS – SPUR
IADR : H8200
PARAMETERSATZ: 0802 0109 0200 0080 0200 0080 0200 0084 0082
UEBERSICHT : MP = 0

Display in "SYST,WART;" after the following operations:

"BE;"      operator input mode
"MP=n;"    display selection
"NR=24;"   S7–L2DP module
"ST=1;"     status of the process image
"FG=1;"     release (required only once)
**List of all configured DP slaves**

A list of all the TM modules with DP slave assignment can be displayed on the commissioning screen. Per output line, the list contains the cross reference of a TM module to the station address of its allocated DP slave.

<table>
<thead>
<tr>
<th>PERIPHERIE–BAUGRUPPEN PROJEKTIEREN ASX88/TM</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANSCHLUSS: AN=1 AG–AG–Kopplung</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>AN=2 S7–L2DP</td>
</tr>
<tr>
<td>AN=3 M7–IF–MODUL</td>
</tr>
<tr>
<td>AN=4 TELEPERM M EA</td>
</tr>
<tr>
<td>AN=5 ALLE BAUGRUPPEN LOESCHEN (BEI AN=0)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PERIPHERIE–BAUGRUPPEN PROJEKTIEREN ASX88/TM</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN=2 S7–L2DP</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROTOTOKOLL AUF: DR. 1 GE,1,0; L= BAUGRUPPE LOESCHEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>PR=1 MONITOR GE,5,0; *</td>
</tr>
<tr>
<td>BLAETTERN F=1 PC/PG GE,7,6;</td>
</tr>
<tr>
<td>UEBERSICHT : MP = 0</td>
</tr>
</tbody>
</table>

**Display in ”SYST,WART;” after the following operations:**

"BE;" operator input mode
"MP=13;" display selection
"AN=2;" S7–L2DP module
"NR=3;" slot number
"TN=3;" station number at L2DP (PROFIBUS–DP)
"BB=2;" module width

<table>
<thead>
<tr>
<th>PROTOTOKOLL DER PERIPHERIE–BAUGRUPPEN ASX88/TM</th>
<th>P: 1 *</th>
</tr>
</thead>
<tbody>
<tr>
<td>AN=2 NR= 3 TN= 3</td>
<td></td>
</tr>
<tr>
<td>AN=2 NR= 8 TN= 8</td>
<td></td>
</tr>
<tr>
<td>AN=2 NR= 10 TN=133</td>
<td></td>
</tr>
<tr>
<td>AN=2 NR= 14 TN= 15</td>
<td></td>
</tr>
<tr>
<td>AN=2 NR= 16 TN= 0</td>
<td></td>
</tr>
<tr>
<td>AN=2 NR= 18 TN= 6</td>
<td></td>
</tr>
<tr>
<td>AN=2 NR= 20 TN= 30</td>
<td></td>
</tr>
<tr>
<td>AN=2 NR= 24 TN= 7</td>
<td></td>
</tr>
</tbody>
</table>

**Display of the peripheral module report**
This chapter gives informations about Pulling and Plugging I/O Modules.

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</tr>
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<td>3.2</td>
<td>Configuring D&amp;P with COM ET200 (Win) / COM PROFIBUS</td>
<td>3–2</td>
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</tbody>
</table>
3.1 Principles

Since 1/97, the function pull and plug is available for ET 200M. For this purpose, the firmware of the IM153 must match an appropriate version (IM153–1AA02) and be supported by an associate type file in COM PROFIBUS.

When pulling and plugging modules on the D&P bus, an alarm message is generated by the IM153–1AA02. A pulled I/O module is indicated in the process image and transferred to the driver blocks which access this module.

Note

In the process image, the IM153–1AA02 supplies the value 0 for pulled modules. The process value does not indicate if the module is faulty or not present.

Operation mode extension for the AS x88/TM

Compared to previous versions, the AS x88TM system software, version M1.04, was extended with the following functions:

- acquisition of the D&P alarm messages and entry in an AS cyclic buffer (cf. Chapter 2)
- evaluation of the ID–related diagnostics data and the pull/plug alarms for the auxiliary trace of the process image.

Effects of the firmware version of the IM153

The functionality of pull and plug depends on the firmware version of the IM153 (at least IM153–1AA02 with firmware version of 1/97). As the only one, it generates the expected D&P alarm messages and bares the required pull and plug properties.

3.2 Configuring D&P with COM PROFIBUS (COM ET200 Win)

Operation on the active rear panel bus

If the operability of the remaining I/O modules shall be maintained after pulling an I/O module, the operation mode of the DP slave IM153–1 must be configured "RUN – do not delete outputs" or "Start with target < > actual configuration" via COM ET200 or COM PROFIBUS.

Pull and plug alarm

If an alarm message shall be generated by the IM153–1AA02 when pulling or plugging an I/O module, the respective option must be selected in the configuration of the IM153–1AA02 via COM ET200 / COM PROFIBUS.
ODIS Signal for DP Peripherals

General
For DP slaves, the transfer of the output values to the output modules can be disabled with the control function ODIS of the DP master (output reset). With that the information CLEAR MODUS defined in the PROFIBUS DP standard is realized in the global control telegram.

The configuration variable 'odis' in DP1.INI or DP2.INI provides for specification whether the AS x88/TM in the STO state reads an ODIS signal to the DP slaves or if the current output values shall remain present.

Parameter 'odis'
Release of the ODIS functions (output disabled)
value = 1: ODIS functions enabled
value = 0: ODIS functions disabled
default setting for AS x88/TM: 0

Operation of the parameter ODIS
If ODIS = 0 (TELEPERM mode):
• If the AS x88/TM is set into the STO state (offline), the last values are hold and outputted to the DP slaves furthermore.
• The DP slaves do not hear about the STO state of the AS x88/TM.
• With modules able to back-up or DP slaves or PA devices has to be checked, wether the back-up ability is available also with this mode.
If ODIS = 1 (PROFIBUS DP mode):
• If the AS x88/TM is set in the STO state, the ODIS signal is send to the DP slaves cyclical. After this the DP slaves may enter the security state. This security state is defined device specific: The safety value is either adjusted at the device or configured with COM PROFIBUS (substitute value or holding the last value).
• So the DP slaves hear about the STO state of the AS x88/TM.
• DP links to PROFIBUS–PA and AS–i pass the ODIS signal to the subordinated bus system.

With both modes, the DP master and all slaves remain active at the DP bus in the STO state. When changing to the STA state (online), the DP slaves don’t need to be configured again.

Note
In AS x88/TM versions before Version M01.04, this selection was not available. The current output values remained present at the output modules of the distributed peripherals.
Initialization File DP1.INI

This chapter

This chapter gives informations about initialization file DP1.INI.

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<td>Parameters of the Configuration File DP1.INI</td>
<td>5–2</td>
</tr>
</tbody>
</table>
### Configuration of the DP bus interface

The slot coordinates of the module IF964–DP and the name of the binary parameter file which was created with the configuration tool COM PROFIBUS for Windowst are entered in the configuration file DP1.INI. From version M01.04 upwards, it also provides for activating the DP diagnostics functions and the ODIS process.

All other parameters which effect the DP master or the DP slave are set via the binary parameter file of COM PROFIBUS.

### 5.1 Parameters of the Configuration File DP1.INI

#### Slot coordinates of the IF964

The default slot coordinates of the IF964–DP complies with the recommended system configuration and should not be modified. Knowledge of the slot addressing of SIMATIC M7 is required to change these parameters. Incorrect entries can cause severe system faults.

Parameter `slot` = slot number

- (according to SIMATIC M7 300/400 numbering system)
- system setting for AS 388/TM: 3
- system setting for AS 488/TM: 5
- system setting for AS 488/TM with migration carrier: 7

Parameter `modulbox` = module box number

- (according to SIMATIC M7 300/400 numbering system)
- system setting for AS 388/TM: 2
- system setting for AS 488/TM: 2
- system setting for AS 488/TM with migration carrier: 2

#### Name of the parameter file

Parameter `database` = name of the binary parameter file created with COM PROFIBUS, version V2.0 upwards.

System default setting: tm0.2bf

Changing the file name is accepted if the project management requires respective identification measures.

For versions < M01.04, no parameter file `tm0.2bf` may be present on the memory card; an existing file `tm0.2bf` must be deleted.


**Releasing the diagnostics functions**

The acquisition and evaluation of the diagnostics data through the AS x88/TM can be released gradually. The diagnostics data are written to an AS cyclic storage and an AS list. For user–specific evaluation, they can be read out with the available TML system programs. In order to reduce the system load, functions which are not required should remain disabled.

Parameter ‘frei’ = general release of the diagnostics functions

1: acquisition of the diagnostics functions enabled
0: acquisition of the diagnostics functions disabled

(identical to ‘alarm’ = ‘geraet’ = ‘qvz’ = 0).

default setting for AS x88/TM: 0

Parameter ‘alarm’ = release of the AS buffer STRT.DPKD for diagnostics messages

1: acquisition of the pull/plug alarms enabled,
   if ‘frei’ = 1
   (S7 process alarms with restricted availability)
0: acquisition of the pull/plug alarms disabled

default setting for AS x88/TM: 0

Parameter ‘geraet’ = release of the AS list STRT.DPDGD for device–specific and standard diagnostics data

1: acquisition of the device–spec. diagnostics enabled,
   if ‘frei’ = 1
0: acquisition of the device–spec. diagnostics disabled

default setting for AS x88/TM: 0

Parameter ‘qvz’ = release of the I/O module specific QVZ

1: QVZ recognition enabled,
   if ‘frei’ = 1
0: QVZ recognition disabled

default setting for AS x88/TM: 0

**ODIS signal**

For ET 200M, the transfer of the output values to the output modules can be disabled with the control function of the DP master. The configuration variable ‘odis’ defines if the AS x88/TM sends an ODIS signal to the DP slaves in the STO state or if the current output values shall remain present.

Parameter ‘odis’ = release of the ODIS functions (output disabled)

1: ODIS functions enabled
0: ODIS functions disabled

default setting for AS x88/TM: 0

**Examples**

For the three standard configurations of the AS x88/TM, the contents of the initialization file DP1.INI is listed in the following. In the default mode, the diagnostics functions and the use of the ODIS signal are disabled. As a result, the same operation mode as for the versions prior to M01.04 are maintained without changing the initialization file DP1.INI.
Initialization File DP1.INI

a) Configuration of the DP bus for AS 388/TM:

```
# Configuration and functions of PROFIBUS–DP
# *************************************** DP1 – INI file ***************************************
#                   –––>  for  A S 3 8 8   <–––
# # *************************************** IF964 – parameters ***************************************
# slot            = 3
# modulbox        = 2
# database        = tm0.2bf
#
# # Release of diagnostics functions ***************
# frei            = 1: general diagnostics release
# freien                     = 0
# geraet         = 1: device–spec. diagnostics release
# geraet                     = 0
# qvz             = 1: evaluation ID diagnostics release
# qvz            = 0
# alarm          = 1: alarm acquisition release (incl. D&P)
# alarm                     = 0
# # Release of the ODIS function *********************
# odis           = 1: release ODIS for DP
# odis                     = 0
# # *************************************** End DP1 – INI file ***************************************
```

b) Configuration of the DP bus for AS 488/TM:

```
# Configuration and functions of PROFIBUS–DP
# *************************************** DP1 – INI file ***************************************
#                   –––>  for  A S 4 8 8   <–––
# # *************************************** IF964 – parameters ***************************************
# slot            = 3
# modulbox        = 2
# database        = tm0.2bf
#
# # Release of diagnostics functions ***************
# frei            = 1: general diagnostics release
# freien                     = 0
# geraet         = 1: device–spec. diagnostics release
# geraet                     = 0
# qvz             = 1: evaluation ID diagnostics release
# qvz            = 0
# alarm          = 1: alarm acquisition release (incl. D&P)
# alarm                     = 0
# # Release of the ODIS function *********************
# odis           = 1: release ODIS for DP
# odis                     = 0
# # *************************************** End DP1 – INI file ***************************************
```
c) Configuration of the DP bus for AS 488/TM in the migration carrier:

```
# ***************************************** DP1 – INI file *****************************************
#                        –––>  for A S 4 8 8 / migration carrier <–––
# ***************************************** IF964 – parameters *****************************************

slot             = 5
modulbox        = 2
database        = tm0.2bf

# *************** Release of diagnostics function ********************
# frei            = 1: general diagnostics release
frei             = 0
# geraet          = 1: device–spec. diagnostics release
geraet          = 0
# qvz             = 1: evaluation ID diagnostics release
qvz             = 0
# alarm           = 1: alarm acquisition release (incl. D&P)
alarm           = 0

# *************** Release of the ODIS function ********************
# odis            = 1: ODIS for DP release
odis            = 0

# ***************************************** End DP1 – INI file *****************************************
```
Configuration of a Second DP Line

This chapter tells you how to configure a second DP line.

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<td>6.5</td>
<td>Initialization File DP1.INI and DP2.IN</td>
<td>6-8</td>
</tr>
<tr>
<td>6.6</td>
<td>The File STARTER.INI</td>
<td>6-10</td>
</tr>
<tr>
<td>6.7</td>
<td>Resetting a DP Line</td>
<td>6-10</td>
</tr>
</tbody>
</table>
6.1 General

The following characteristics are provided by a second DP line:

- Additional capabilities for logically and geographically configuring the DP network of a plant and the use of different data rates.
- The prerequisites for increasing the availability of the distributed peripherals are matched.
- The quantified project scope is doubled from 122 DP slaves to 224 DP slaves.

AS x88/TM with two DP lines

![Diagram of two DP lines on AS x88/TM](image)

Figure 6-1 Two DP lines on AS x88/TM
Compatibility for the second DP line extension

The extension of an existing system with a second DP line is performed in a compatible and incremental manner:

- SYST.WART configurations are maintained
- Addressing in the DP driver blocks is maintained
- COM PROFIBUS parameter file is maintained
- Initialization file DP1.INI is maintained

Basic principle of the second DP line

- Every DP line has its own IF964 DP module, its own initialization file, and its own COM PROFIBUS parameter file.
- In the configuration branch of SYST.WART and in the TM blocks, the DP stations on the second DP line are addressed via their PROFIBUS station number plus an offset of 128.

Example

In the TM world (SYST.WART, DP driver blocks), the IM153–1 of ET 200M with the station number 5 (module setting, configuration with COM ET200 Win / COM PROFIBUS) on the second DP line is addressed with number 133 (= 128 + 5).
In the system status image, the second DP line is indicated as EA_DP2 for the I/O interfaces provided that the required resources (DP module IF964, binary COM PROFIBUS parameter file) are detected during startup of the peripherals.

**Prerequisites for the configuration of a second DP line**

- AS x88/TM software version: M01.04 onwards
- Second DP module IF964 present, possibly with an EXM 478 extension module.
6.2 Configuration of Two DP Lines with SYST.WART

Addressing the slaves on the second DP line

The allocation of virtual TM modules to DP slaves defined in the configuration of SYST.WART is extended according to the following:

- TM modules with slave allocation in the station range 2 – 123
  → Slave lies on the first line

- TM modules with slave allocation in the station range 131 – 254
  → Slave lies on the second line; the real station number of the DP slave is raised by 128. These represent the slaves 2 – 123 of the second DP line.

- The “illegal” TM module numbers described in Chapter 1.1 must be avoided.

Example configuration of two DP lines

![Diagram of DP slaves on two DP lines]

Figure 6-3 Addressing of the DP slaves on two DP lines
Example for the configuration of the DP slave no. 12 on the second DP line

+–––––––––––––––––––––––––––––––––––––––––––––––––––––––––––––––––+
| PERIPHERIE–BAUGRUPPEN PROJEKTIEREN   M7(235)                   |
| (configuration of peripheral modules) |
| ANSCHLUSS: AN=1 AG–AG–Kopplung (PLC/PLC Links)                |
| AN=2 S7–L2DP                                                 |
| AN=3 M7–IF–MODUL                                              |
| AN=4 TELEPERM M EA                                          |
| AN=5 ALLE BAUGRUPPEN LOESCHEN (BEI AN=0)                       |
| (delete all modules (for AN=0))                              |
| AN=2 S7–L2DP                                               |
| +––––––––––––––––––––––––––––––––––––––––––––––––––+           |
| | BAUGRUPPEN–NR. (STECKPLATZ) | NR= 47 (slot no.) | L=1 |
| | TEILNEHMERNUMMER (SLAVE–NR.) | TN= 140 (station no.) |
| | Baugruppenbreite (1/2) | BB= 2 (mod. width) |         |
| +––––––––––––––––––––––––––––––––––––––––––––––––––+           |
| PROTOKOLL AUF: DR. 1 GE,1,0; L= BAUGRUPPE LOESCHEN            |
| (delete Module)                                             |
| PR=1            MONITOR GE,5,0; *                         |
| BLAETTERN F=1 PC/PG GE,7,6;                                  |
| (scroll)                     UEBERSICHT : MP = 0 (overview) |
+–––––––––––––––––––––––––––––––––––––––––––––––––––––––––––––––+

Screen after the following operator controls:

"BE;"  Operator control mode
"MP=13;"  Image selection
"AN=2;"  S7–L2DP module
"NR=47;"  Slot number
"TN=140;"  Station number on the L2DP (PROFIBUS–DP)

Compatibility of the configuration with SYST.WART

Any existing DP configuration is fully retained. According to the above definition, these DP slaves are all allocated to the first line.

6.3 Configuration of the DP Driver Blocks

Compatibility of the DP module configuration

The existing configurations of the DP driver blocks are also maintained.
The value range of the slave stations was already limited to 0 – 255 in earlier versions of the AS x88/TM software.
Example: access to slave no. 5 on the second DP line with DPBA driver

<table>
<thead>
<tr>
<th>DPBA</th>
<th>4</th>
<th>P: 1 *</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 AB</td>
<td>BGF</td>
<td>44</td>
</tr>
<tr>
<td>2 AB</td>
<td>SF</td>
<td>45</td>
</tr>
<tr>
<td>1 EB</td>
<td>BI01</td>
<td>1</td>
</tr>
<tr>
<td>2 EB</td>
<td>BI02</td>
<td>P 2</td>
</tr>
<tr>
<td>3 EB</td>
<td>BI03</td>
<td>P 3</td>
</tr>
<tr>
<td>4 EB</td>
<td>BI04</td>
<td>P 4</td>
</tr>
<tr>
<td>5 EB</td>
<td>BI05</td>
<td>P 5</td>
</tr>
<tr>
<td>6 EB</td>
<td>BI06</td>
<td>1</td>
</tr>
<tr>
<td>7 EB</td>
<td>BI07</td>
<td>P 7</td>
</tr>
<tr>
<td>8 EB</td>
<td>BI08</td>
<td>P 8</td>
</tr>
<tr>
<td>9 EB</td>
<td>BI09</td>
<td>P 9</td>
</tr>
<tr>
<td>10 EB</td>
<td>BI10</td>
<td>P 10</td>
</tr>
<tr>
<td>11 EB</td>
<td>BI11</td>
<td>P 11</td>
</tr>
<tr>
<td>12 EB</td>
<td>BI12</td>
<td>P 12</td>
</tr>
<tr>
<td>13 EB</td>
<td>BI13</td>
<td>P 13</td>
</tr>
<tr>
<td>14 EB</td>
<td>BI14</td>
<td>P 14</td>
</tr>
<tr>
<td>15 EB</td>
<td>BI15</td>
<td>P 15</td>
</tr>
<tr>
<td>16 EB</td>
<td>BI16</td>
<td>P 16</td>
</tr>
<tr>
<td>17 EB</td>
<td>BI17</td>
<td>P 17</td>
</tr>
<tr>
<td>18 EB</td>
<td>BI18</td>
<td>P 18</td>
</tr>
<tr>
<td>19 EB</td>
<td>BI19</td>
<td>P 19</td>
</tr>
<tr>
<td>20 EB</td>
<td>BI20</td>
<td>P 20</td>
</tr>
<tr>
<td>21 EB</td>
<td>BI21</td>
<td>P 21</td>
</tr>
<tr>
<td>22 EB</td>
<td>BI22</td>
<td>P 22</td>
</tr>
<tr>
<td>23 EB</td>
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<td>P 23</td>
</tr>
<tr>
<td>24 EB</td>
<td>BI24</td>
<td>P 24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DPBA</th>
<th>4</th>
<th>P: 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 EB</td>
<td>BI25</td>
<td>P 25</td>
</tr>
<tr>
<td>26 EB</td>
<td>BI26</td>
<td>P 26</td>
</tr>
<tr>
<td>27 EB</td>
<td>BI27</td>
<td>P 27</td>
</tr>
<tr>
<td>28 EB</td>
<td>BI28</td>
<td>P 28</td>
</tr>
<tr>
<td>29 EB</td>
<td>BI29</td>
<td>P 29</td>
</tr>
<tr>
<td>30 EB</td>
<td>BI30</td>
<td>P 30</td>
</tr>
<tr>
<td>31 EB</td>
<td>BI31</td>
<td>P 31</td>
</tr>
<tr>
<td>32 EB</td>
<td>BI32</td>
<td>P 32</td>
</tr>
<tr>
<td>33 EB</td>
<td>GBGM</td>
<td>P  C Q 33</td>
</tr>
<tr>
<td>34 I</td>
<td>ANBY</td>
<td>2</td>
</tr>
<tr>
<td>35 I</td>
<td>BGNR</td>
<td>10</td>
</tr>
<tr>
<td>36 I</td>
<td>FENR</td>
<td>0</td>
</tr>
<tr>
<td>37 I</td>
<td>BADR</td>
<td>0</td>
</tr>
<tr>
<td>38</td>
<td>STNR</td>
<td>2</td>
</tr>
<tr>
<td>39 I</td>
<td>DPTY</td>
<td>1</td>
</tr>
<tr>
<td>40 S16 TX1</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>41 S16 TX2</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>42 S16 TX3</td>
<td>16</td>
<td></td>
</tr>
</tbody>
</table>
6.4 Configuration with COM ET200 WIN / COM PROFIBUS

The configuration of the DP master and the DP slaves with COM ET200 WIN or COM PROFIBUS is handled separately for every line. Individual binary parameter files are created for each DP line.

The engineer can either use the same station numbers for the DP slaves of both DP lines, or define disjuncted station numbers for further configuration.

The default name of the binary parameter file for the first DP line is still defined in the initialization file DP1.INI as "TM0.2BF". The default name stated in the file DP2.INI for the second DP line is "TM00.2BF". The names of the parameter files for both DP lines can and should be freely selected.

Both binary COM parameter files are copied to the memory card of the AS x88/TM after the COM configuration session.

6.5 Initialization File DP1.INI and DP2.INI

A further initialization file DP2.INI is needed for the second line in addition to the existing initialization file DP1.INI.

Here, the slot coordinates (slot, module position) of the DP module IF964, the file name of the binary COM PROFIBUS parameter file, the diagnostics operation mode, and the ODIS handling of the second DP line are saved.

Default values are entered for all parameters.

The names of the binary parameter files are usually defined by plant-specific specifications, so that their default names have no significance.
Example of an initialization file DP2.INI

```
# ************************** Beginn DP2 – INI–Datei **************************
# IF964 – Parameter
slot = 6
modulbox = 1

# ************* Name der COM ET200 – Parameterdatei***************
database = tm00.2bf

# **************** Freigabe von Diagnose-Funktionen ****************
# (enabled)
frei = 1: Freigabe Diagnose generell
frei = 1

# (device)
geraet = 1: Freigabe Geraetespez. Diagnose
geraet = 1

# qvz = 1: Freigabe Auswertung Kennungsdiagnose
qvz = 0

# alarm = 1: Freigabe der Alarm-Erfassung (Z&S)
alarm = 0

# **************** Freigabe der ODIS-Funktion **********************
odis = 1: Freigabe ODIS fuer DP
odis = 0

# *************************** Ende DP2 – INI–Datei **************************
```

**Initialization files DP2.INI on the installation diskette**

On the installation diskette for the second DP line, the following configuration variants of DP2.INI are delivered for the AS versions AS 388/TM and AS 488/TM:

**AS 388/TM:**
- a) Standard variant:
  IF964 in module EXM 378 in slot 4 / module position 2
- b) Variant with PLC/PLC Link:
  IF964 in module EXM 378 in slot 4 / module position 3

**AS 488/TM:**
- a) Standard variant:
  IF964 in module EXM 478 in slot 6 / module position 1
- b) Variant with PLC/PLC Link:
  IF964 in module EXM 478 in slot 6 / module position 2

If the configuration is interfaced to the TM peripherals with the two modules TPM 478 and TBX 478, the slot moves accordingly. The required file DP2.INI can be obtained by setting the parameter ‘slot’ with an ASCII editor in one of the two example variants.
6.6  The File STARTER.INI

Exchange file STARTER.INI for version M01.x4

For activating the system functions of the second DP line, the file STARTER.INI on the memory card must be exchanged if the software version M01.x4 is used.

Furthermore, if the extension function PLC–PLC Link is installed, this configuration requires a special version of the file STARTER.INI.

Information on the file STARTER.INI

Startup of the first DP line is initiated with the line:

M0:\EATASK.386 [PRIO=4] [CONSOL=1

Startup of the second DP line is initiated with the line:

M0:\EATASK.386 2 [PRIO=4] [CONSOL=1

Compared to version M1.04, the second invocation has been extended and the file STARTER.INI must include the following two lines:

M0:\EATASK.386 [PRIO=4] [CONSOL=1

M0:\EATASK.386 2 [PRIO=4] [CONSOL=1

The remaining entries in the file STARTER.INI remain unchanged.

6.7  Resetting a DP Line

Resetting a DP line

During the restart procedure of the AS x88/TM, and after the operator command RSOF, all peripherals are reset with both DP lines.

With version M02.01 or M01.07 the DP master of the AS x88/TM has been expanded with following functions: While reset is active, the DP slaves and their sub–modules take the security state (configured or default). The outputs to the peripherals take effect again after a single AS cycle at the earliest.

Example:

If DP slaves or modules are used configured for holding the last values as security state, these values remain valid during the RSOF procedure until the next cycle operation. To get this reaction after a restart, the last output values have to be outputted by the DP drivers in a restart program.

Resetting an individual DP line, as in a partial startup procedure of the DP peripherals, is not possible.
Master Type File for COM PROFIBUS
(COM ET200 Win)

DP master
The AS x88/TM contains an integrated DP master and uses the module IF964 as bus interface. With regard to the configuration, this DP master acts like the interface module IM308C of SIMATIC S5. COM PROFIBUS (former COM ET200 for Windows, version V2.0 upwards) is used as configuration tool.

Selection DP master and host
During the configuration session with COM PROFIBUS, the DP master and its higher-level host must be specified. The AS x88/TM has to be selected as DP master, and the AS 488/TM or AS 388/TM as host. If this selection is not presented at the configuration, the following replacement replies: IM308C is the DP master; the selection of the host usually is irrelevant. Merely the I/O modules with a higher consistency range partially require hosts of the upper performance range. The configuration of all admissible I/O modules is possible by selecting a substitute host from ‘S5–135U /CPU922’ upwards.

Master type file for AS x88/TM
From AS x88/TM version M01.05 on, the master type file ‘SI8050AX.2MH’ is included in the directory DOKU of the commissioning diskette. It specifies the AS x88/TM as host system and the module board IF964–DP as DP master.

In the case of COM PROFIBUS, these files are already supplied from V3.1 onwards.

Installation of the master type file
The master type file ‘SI8050AX.2MH’ is copied to the directory MASTERS of the installed software package COM PROFIBUS or COM ET200. After starting COM PROFIBUS or COM ET200, the function ‘Load type files’ or ‘Read GSD files’ is activated once in the menu ‘File’.

The following entries are made in the dialog "Master – Host selection":

Stations no.: 1
Master station type: ASx88/TM
Host station type: AS 388/TM (CPU 388) or AS 488/TM (CPU 488)
Applicable Documents

A.1 SIMATIC S7 / M7

/320/  Produkt Handbuch
Dezentrale Peripherie ET 200M
EWA 4NEB 780 6006–01a / Ausgabe 2
(Product Manual – Decentralized Peripherals ET 200M – ... / Issue 2)

/321/  Produkt Handbuch
Dezentrale Peripherie ET 200U
EWA 4NEB 812 6087–01b / Ausgabe 3
(Product Manual – Decentralized Peripherals ET 200U – ... / Issue 3)

/322/  Produkt Handbuch
Dezentrale Peripherie ET 200B
EWA eEB 812 6089–01b
(Product Manual – Decentralized Peripherals ET 200B – ...)

/330/  Normbeschreibung
PROFIBUS–DP DIN19245 Teil 3
(Standard Specifications – ... Part 3)

A.2 TELEPERM M AS x88/TM

Product Manual
AS 235 Software–Variant G
C79000–G8076–C416

Product Manual
Supplementary System Documentation AS 388/TM and AS 488/TM
C79000–G8000–C700

Instructions for Configuration of Input/Output Modules
on the TELEPERM M I/O Bus
PERPRO_E.doc

/452/  Software package "DP Add–ons for AS x88/TM"
Order no. C79451–A3496–D900
(sales release in TELEPERM M aktuell 1999/042)
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**TELEPERM M**

I/O Driver Blocks for the Input/Output of Analogue and Binary Values via the PROFIBUS–DP I/O Bus

Technical Description
Safety instructions

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

Danger
Failure to observe a Danger note will cause death, severe personal injury or severe damage to the equipment.

Warning
Failure to observe a Warning note may cause death, severe personal injury or severe damage to the equipment.

Caution
Failure to observe a Caution note may cause personal injury or damage to the equipment.

Note
Notes contain important information regarding the product, product handling or a specific part of the document that requires special attention.

Qualified personnel
The unit may only be commissioned and used on the basis of the information contained in this Manual. Only qualified personnel are authorized to perform any work inside the unit. Qualified personnel in the sense of the safety instructions in this Manual are persons who have been authorized to commission, ground and label units, systems and circuits according to the safety-relevant standards.

Normal use
Please observe the following instructions:

Warning
The unit may only be used for the applications mentioned in the Catalogue and the Technical Description. It may only be used together with third-party equipment or components that have been recommended or released by Siemens.

Faultless and safe operation of the product requires proper transport, storage, installation and commissioning, and careful handling and maintenance.

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Siemens AG
Bereich Automatisierungs- und Antriebstechnik
Geschäftsgebiet Systems Engineering
D-76181 Karlsruhe

Exclusion of liability
Although we have checked the contents of this document against the hardware and software described herein, the information contained in this document may not cover all details. We can therefore not assume any liability for completeness. The information in this document is checked at regular intervals and necessary corrections will be included in the next revisions. We are grateful for any suggestions.

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5. Channel Diagnosis DPCH ....................................................... [5-1]
Analogue input block DPAE

Contents

This chapter gives you informations about the analogue input block for PROFIBUS–DP I/Os (DPAE)
Application

Driver block to receive analogue values from SIMATIC DP stations (ET 200 M, ET 200 B, ET 200 U, ET 200 K, etc.) via the SINEC L2DP I/O bus (PROFIBUS DP).

Principle of operation

The driver block DPAE reads the digitized measured values from a DP station and outputs these as physical variables at analogue outputs according to the parameterized measuring ranges. A DPAE block can process up to 4 measured values from a DP station.

The first measured value is available as a physical variable at output X1. The rated range for the first measured value is parameterized at inputs XE1 and XA1. The output XF1 is set as a common indicator bit with each detected fault which concerns the output X1. The element TYP1 is used to define the manner in which the digitized measured value is to be converted into the physical variable X1. The corresponding elements Xi, XAi, XEi, XFi and TYPi exist for the other three measured values.

The parameters TYPi (TYP1 to TYP4) must be set matching the separate channels of the used analogue input module. If TYPi has a value of 1, 2 or 4, the measured value within the rated range of the module is converted into the freely-parameterizable range from XAi to XEi (for TYPi=4 see below). In the other cases, XAi and XEi are defined as fixed values and the dimension of the analogue output value is also fixed, e.g. Xi = temperature in °C with TYPi = 100 to 110.

A requirement in each case is that the measured value received from the DP station is linear throughout the rated range. Linearization, if necessary, must already be carried out on the DP module.

The parameters TYP1, TYP2, TYP3 and TYP4 must be assigned without gaps. A zero in one of the parameters means that the subsequent parameters are not processed either.

TYPi = 0 : No processing (complete block switched off with TYPi = 0)

TYPi = 1 : Bipolar

Xi = XAi at start of rated range, e.g.: –10V
Xi = XEi at end of rated range, e.g.: 10V
ET200 M module: SM331
ET200 B module: 4AI, 4/8AI

TYPi = 2 : Unipolar

Xi = XAi at start of rated range, e.g.: 4mA
Xi = XEi at end of rated range, e.g.: 20mA
ET200 U module: 464–8ME11
ET200 M module: SM331
ET200 B module: 4AI, 4/8AI

TYPi = 3 : Integer 1 byte

Xi = integer from 0 to 255
ET 200 U module: 466–8MC11
I/O Driver Blocks

C79000–T8076-C731-02

Analogue input block DPAE

TYPi = 4: Integer 15 bits + sign bit
\[ X_i = X_{Ai} + xxxx \times \frac{32768}{32768} \times \left(X_{Ei} - X_{Ai}\right) \]
which xxxx represents the measured value, read from the module (integer, 15+1=16 bits).
With \( X_{Ai} = 0 \) and \( X_{Ei} = 32768 \) supplies measurands read directly from the module without transformation (−32768 to +32767).
\[ X_i = X_{Ai} \text{ if } xxxx = 0, \text{i.e. in the center of the measuring range.} \]
ET200 U, M, B module

TYPi = 100: Pt 100 temperature sensor
\[ X_i = \text{temperature in } \degree \text{C} \]
ET 200 U module: 464–8MF21
ET 200 M module
ET 200 B module: 4/8 AI

TYPi = 101: Temperature sensor type J
\[ X_i = \text{temperature in } \degree \text{C} \]
ET 200 U module: 464–8MA21
ET 200 M module
ET 200 B module: 4/8 AI

TYPi = 102: Temperature sensor type K
\[ X_i = \text{temperature in } \degree \text{C} \]
ET 200 U module: 464–8MA21
ET 200 M module
ET 200 B module: 4/8 AI

TYPi = 103: Temperature sensor type L
\[ X_i = \text{temperature in } \degree \text{C} \]
ET 200 U module: 464–8MA21
ET 200 B module: 4/8 AI

TYPi = 105: Temperature sensor type N
\[ X_i = \text{temperature in } \degree \text{C} \]
ET 200 M module

TYPi = 106: Temperature sensor type E
\[ X_i = \text{temperature in } \degree \text{C} \]
ET 200 M module

TYPi = 110: Ni 100 temperature sensor
\[ X_i = \text{temperature in } \degree \text{C} \]
ET 200 M module

For operating other temperature sensors/characteristics, the types stated above can alternatively be used (from 101 on).

In order to balance errors of transducers, etc., an offset can be added to every measurand (from TYPi=100 on) by calling the corresponding block DPAE under NEDA (A.DPAE.name) and entering a value other than 0 for the corresponding parameter OFFi (OFF1...OFF4).

The element DPTY (DP type) is used to permit adaptation to the various formats of the measured values transmitted from DP modules.
Meaning of DPTY for the internal processing of measured analogue values:

\( \text{(0) or 1} \) = S5 format. ET200 U and ET200B (all issues)  
(rated range C000H – 4000H)

11 = S7 format. ET200 M and ET200B  
(rated range 9400H – 6C00H)

13 = S7 format. ET200 M, analogue input SM331 / PT100 with  
2 assigned channels per analogue value (4 bytes per  
analogue value, rated range 9400H – 6C00H)

For devices with data in reversed byte–ordering the following values are  
reserved for DPTY:

10: the same as 11, but without byte exchange  
12: the same as 13, but without byte exchange

If the S5 format is used for ET200B 4/8AI and PT100 is configured  
(DPTY=1, TYPi=100), then 2 channels are allocated per temperature value.  
For this purpose, every second one must be skipped with TYPi=4, Xai=Xei=0  
as long as it is not the last one in the DPAE block).

The following generally applies:

DPTY even = on PB–DP, the Low byte is transmitted before the  
High byte  
= without exchange

DPTY odd = on PB–DP, the High byte is transmitted before the  
Low byte  
= with exchange

**Error indicator bits**

With the setting ET200 U (DPTY = 0 or 1) and TYPi = 1 or 2, the DPAE  
block monitors the retention of a rated range extended by ca. 10% (ca. 5% at  
start and end). No limit monitoring is carried out in the DPAE block in the  
case of other settings, in this case the error indicator bits of the module are  
imported. In the event of errors, the error indicator bit XFi is set for each  
effected output Xi. The affected analogue output is not processed further, i.e.  
the last valid value entered is retained. The fault identification (status bit 3 =  
# ) is not set at the analogue output.

BGF = Module error.  
XFI, XF2, XF3 and XF4 are set at the same time as BGF.  
Possible causes:

1. The module number parameterized in BGNR is not  
assigned to the PROFIBUS–DPI/Os.  
I & C alarm: S 305  
Remedy: correct I/O configuration using SYST.WART  
or correct the parameter setting of BGNR.

2. The station number parameterized in STNR does not  
agree with the station number which is assigned  
according to the I/O configuration BGNR and which is  
present in STNR(1).  
I & C alarm: S 313  
Remedy: correct I/O configuration using SYST.WART  
or correct the parameter setting of STNR.

3. The addressed station does not send valid data.  
I & C alarm: S 305
SF = Station error.
A faulty configuration is indicated by SF at the error cases 1 (BGNR) and 2 (STNR).

XFi = Analogue value Xi faulty.
The following cause is present if BGF is not set:
Input module channel faulty (open-circuit or overflow of A/D converter), or the DPAE block does not recognize a limit violation.
I & C alarm: S 320

In the case of double addressing (2 slaves physically on the same station number), S305 is signalled from the DP driver blocks (instead of S313 as for TM I/O peripherals).

Note
Redundancy for the drivers has not yet been approved. The parameter RED is assigned 0 for this reason. The input elements 19 to 43 and the output elements 11 to 14 are thus invalid and identified by the name “— —”.

In the redundant case, the indicator bits BGFi, SFi and XFi are generated according to the same rules as in the non-redundant case BGF, SF and XF. The common indicator bits for the two transmission paths are generated as follows:

\[ \text{BGF} = \text{BGF1 AND BGF2} \]
\[ \text{SF} = \text{SF1 AND SF2} \]
\[ \text{XFi} = \text{XFi1 AND XFi2} \]

A redundancy fault, i.e. the failure of one or both sources for an analogue value Xi, is indicated by the corresponding output RFi.

\[ \text{RFi} = \text{XFi1 OR XFi2 OR percentage difference between Xi1 and Xi2 greater than MFi} \]

The common indicator bit SRF is set simultaneously with each output RFi, but is not reset by the DPAE block.
Addressing

A DP module is addressed using the two elements BGNR and BADR. The parameter settings of the two elements are referred to the I/O addresses configured elsewhere.

<table>
<thead>
<tr>
<th>Element</th>
<th>Configuring tool</th>
<th>Function in AS x88/TM</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGNR</td>
<td>SYST.WART: I/O configuring</td>
<td>AS–internal I/O number for the station number on the PB–DP bus</td>
</tr>
<tr>
<td>BADR</td>
<td>COM ET200 / COM PROFIBUS</td>
<td>Relative byte address within the address range of a station</td>
</tr>
</tbody>
</table>

The parameter STNR is used to check the station number set indirectly using BGNR. The number of the station to be addressed is parameterized in index 0 (STNR (0)). The block enters the actually recognized station number in index 1. The block only processes the station data if the two parameters (STNR (0) and STNR (1)) have the same value.

The data read by the block must be stored without gaps starting at the address set by BADR. The number of occupied bytes per measured value as well as the data format are defined by the parameter settings of TYPi and DPTY.
### List of elements

<table>
<thead>
<tr>
<th>Meaning</th>
<th>DPAE</th>
<th>I/O</th>
<th>Type</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st measured value</td>
<td>1</td>
<td>AA</td>
<td>X1</td>
<td></td>
</tr>
<tr>
<td>2nd measured value</td>
<td>2</td>
<td>AA</td>
<td>X2</td>
<td></td>
</tr>
<tr>
<td>3rd measured value</td>
<td>3</td>
<td>AA</td>
<td>X3</td>
<td></td>
</tr>
<tr>
<td>4th measured value</td>
<td>4</td>
<td>AA</td>
<td>X4</td>
<td></td>
</tr>
<tr>
<td>Error in 1st measured value</td>
<td>5</td>
<td>AB</td>
<td>XF1</td>
<td></td>
</tr>
<tr>
<td>Error in 2nd measured value</td>
<td>6</td>
<td>AB</td>
<td>XF2</td>
<td></td>
</tr>
<tr>
<td>Error in 3rd measured value</td>
<td>7</td>
<td>AB</td>
<td>XF3</td>
<td></td>
</tr>
<tr>
<td>Error in 4th measured value</td>
<td>8</td>
<td>AB</td>
<td>XF4</td>
<td></td>
</tr>
<tr>
<td>Module fault</td>
<td>9</td>
<td>AB</td>
<td>BGF</td>
<td></td>
</tr>
<tr>
<td>Station error (configuration error)</td>
<td>10</td>
<td>AB</td>
<td>SF</td>
<td></td>
</tr>
<tr>
<td>Redundancy error in measured value 1</td>
<td>11</td>
<td>AB</td>
<td>RF1</td>
<td></td>
</tr>
<tr>
<td>Redundancy error in measured value 2</td>
<td>12</td>
<td>AB</td>
<td>RF2</td>
<td></td>
</tr>
<tr>
<td>Redundancy error in measured value 3</td>
<td>13</td>
<td>AB</td>
<td>RF3</td>
<td></td>
</tr>
<tr>
<td>Redundancy error in measured value 4</td>
<td>14</td>
<td>AB</td>
<td>RF4</td>
<td></td>
</tr>
<tr>
<td>Sensor type for 1st measured value (live/dead zero)</td>
<td>1</td>
<td>I</td>
<td>TYP</td>
<td></td>
</tr>
<tr>
<td>Upper range limit for 1st measured value</td>
<td>2</td>
<td>EA</td>
<td>XE1</td>
<td></td>
</tr>
<tr>
<td>Lower range limit for 1st measured value</td>
<td>3</td>
<td>EA</td>
<td>XA1</td>
<td></td>
</tr>
<tr>
<td>Sensor type for 2nd measured value (live/dead zero)</td>
<td>4</td>
<td>I</td>
<td>TYP2</td>
<td></td>
</tr>
<tr>
<td>Upper range limit for 2nd measured value</td>
<td>5</td>
<td>EA</td>
<td>XE2</td>
<td></td>
</tr>
<tr>
<td>Lower range limit for 2nd measured value</td>
<td>6</td>
<td>EA</td>
<td>XA2</td>
<td></td>
</tr>
<tr>
<td>Sensor type for 3rd measured value (live/dead zero)</td>
<td>7</td>
<td>I</td>
<td>TYP3</td>
<td></td>
</tr>
<tr>
<td>Upper range limit for 3rd measured value</td>
<td>8</td>
<td>EA</td>
<td>XE3</td>
<td></td>
</tr>
<tr>
<td>Lower range limit for 3rd measured value</td>
<td>9</td>
<td>EA</td>
<td>XA3</td>
<td></td>
</tr>
<tr>
<td>Sensor type for 4th measured value (live/dead zero)</td>
<td>10</td>
<td>I</td>
<td>TYP4</td>
<td></td>
</tr>
<tr>
<td>Upper range limit for 4th measured value</td>
<td>11</td>
<td>EA</td>
<td>XE4</td>
<td></td>
</tr>
<tr>
<td>Lower range limit for 4th measured value</td>
<td>12</td>
<td>EA</td>
<td>XA4</td>
<td></td>
</tr>
<tr>
<td>Module number according to configuring of AS I/Os</td>
<td>13</td>
<td>I</td>
<td>BGNR</td>
<td></td>
</tr>
<tr>
<td>Not used</td>
<td>14</td>
<td>I</td>
<td>FENR</td>
<td></td>
</tr>
<tr>
<td>Relative byte address within data range of station</td>
<td>15</td>
<td>I</td>
<td>BADR</td>
<td></td>
</tr>
<tr>
<td>Station number (indices 0 and 1 must be identical)</td>
<td>16</td>
<td>I</td>
<td>STNR</td>
<td></td>
</tr>
<tr>
<td>Parameter setting of intended station number</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Automatic entry of station number by block</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Data format (type of DP station)</td>
<td>17</td>
<td>I</td>
<td>DPTY</td>
<td></td>
</tr>
<tr>
<td>Redundant transmission path present (0 = no redundancy)</td>
<td>18</td>
<td>PB</td>
<td>RED</td>
<td></td>
</tr>
<tr>
<td>2nd module number for redundant transmission path</td>
<td>19</td>
<td>I</td>
<td>BGN2</td>
<td></td>
</tr>
<tr>
<td>Not used</td>
<td>20</td>
<td>I</td>
<td>FEN2</td>
<td></td>
</tr>
<tr>
<td>Relative byte address within data range of 2nd station</td>
<td>21</td>
<td>I</td>
<td>BAD2</td>
<td></td>
</tr>
<tr>
<td>Parameter setting of intended station number</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Automatic entry of station number by block</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2nd station number (indices 0 and 1 must be identical)</td>
<td>22</td>
<td>I</td>
<td>STN2</td>
<td></td>
</tr>
<tr>
<td>Parameter setting of intended station number</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Automatic entry of station number by block</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Data format (type of 2nd DP station)</td>
<td>23</td>
<td>I</td>
<td>DPT2</td>
<td></td>
</tr>
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</table>
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<th>DPAE</th>
<th>Input</th>
<th>Type</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. permissible error (difference between redundant paths, % of 1st measuring range)</td>
<td>24</td>
<td>PA</td>
<td>MF1</td>
<td></td>
</tr>
<tr>
<td>Max. permissible error (difference between redundant paths, % of 2nd measuring range)</td>
<td>25</td>
<td>PA</td>
<td>MF2</td>
<td></td>
</tr>
<tr>
<td>Max. permissible error (difference between redundant paths, % of 3rd measuring range)</td>
<td>26</td>
<td>PA</td>
<td>MF3</td>
<td></td>
</tr>
<tr>
<td>Max. permissible error (difference between redundant paths, % of 4th measuring range)</td>
<td>27</td>
<td>PA</td>
<td>MF4</td>
<td></td>
</tr>
<tr>
<td>Preferred value for selection of measured value with correct transmission on both paths; 4 digits for 4 analogue values (0, 1, 2, and 3); 0 = smaller value; 1 = value of 1st path; 2 = value of 2nd path; 3 = larger value</td>
<td>28</td>
<td>S4</td>
<td>VZW</td>
<td></td>
</tr>
<tr>
<td>Error on violation of permissible difference, but error–free transmission on both paths. 4 digits for 4 analog values (0, 1); 0 = value according to VZW remains valid and RFi is set; 1 = no valid value, last valid value retained at output Xi, and XFi is set (i = 1, 2, 3 or 4) (e.g.: P, 29, 1111).</td>
<td>29</td>
<td>S4</td>
<td>FER</td>
<td></td>
</tr>
<tr>
<td>Indication of current transmission path. 4 digits for 4 analog values. 0 = no valid value, XFi is set; 1 = value comes from path 1; 2 = value comes from path 2</td>
<td>30</td>
<td>S4</td>
<td>XAW</td>
<td></td>
</tr>
<tr>
<td>Module number BGNR incorrect (1st transmission path)</td>
<td>31</td>
<td>PB</td>
<td>BGF1</td>
<td></td>
</tr>
<tr>
<td>Module number BGN2 incorrect (2nd transmission path)</td>
<td>32</td>
<td>PB</td>
<td>BGF2</td>
<td></td>
</tr>
<tr>
<td>Common indicator bit for address error / station error (1st path)</td>
<td>33</td>
<td>PB</td>
<td>SF1</td>
<td></td>
</tr>
<tr>
<td>Common indicator bit for address error / station error (2nd path)</td>
<td>34</td>
<td>PB</td>
<td>SF2</td>
<td></td>
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<tr>
<td>Error in 1st measured value of 1st transmission path</td>
<td>35</td>
<td>PB</td>
<td>XF1</td>
<td></td>
</tr>
<tr>
<td>Error in 2nd measured value of 1st transmission path</td>
<td>36</td>
<td>PB</td>
<td>XF2</td>
<td></td>
</tr>
<tr>
<td>Error in 3rd measured value of 1st transmission path</td>
<td>37</td>
<td>PB</td>
<td>XF3</td>
<td></td>
</tr>
<tr>
<td>Error in 4th measured value of 1st transmission path</td>
<td>38</td>
<td>PB</td>
<td>XF4</td>
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</tr>
<tr>
<td>Error in 1st measured value of 2nd transmission path</td>
<td>39</td>
<td>PB</td>
<td>XF12</td>
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<tr>
<td>Error in 2nd measured value of 2nd transmission path</td>
<td>40</td>
<td>PB</td>
<td>XF22</td>
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</tr>
<tr>
<td>Error in 3rd measured value of 2nd transmission path</td>
<td>41</td>
<td>PB</td>
<td>XF32</td>
<td></td>
</tr>
<tr>
<td>Error in 4th measured value of 2nd transmission path</td>
<td>42</td>
<td>PB</td>
<td>XF42</td>
<td></td>
</tr>
<tr>
<td>Stored common error, must be reset by user</td>
<td>43</td>
<td>PB</td>
<td>SRF</td>
<td></td>
</tr>
<tr>
<td>Vacant measuring–point name for 1st measured value</td>
<td>44</td>
<td>S16</td>
<td>TX1</td>
<td></td>
</tr>
<tr>
<td>Vacant measuring–point name for 2nd measured value</td>
<td>45</td>
<td>S16</td>
<td>TX2</td>
<td></td>
</tr>
<tr>
<td>Vacant measuring–point name for 3rd measured value</td>
<td>46</td>
<td>S16</td>
<td>TX3</td>
<td></td>
</tr>
<tr>
<td>Vacant measuring–point name for 4th measured value</td>
<td>47</td>
<td>S16</td>
<td>TX4</td>
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Analogue output block DPAA

Contents

This chapter gives you information about the analogue output block for PROFIBUS–DP I/Os (DPAA)
**Application**

Driver block to output analogue values to DP stations (ET 200 M, ET 200 B, ET 200 U, ET 200 K, etc.) via the SINEC L2DP bus (PROFIBUS DP).

**Principle of operation**

The driver block DPAA sends analogue values standardized according to the parameterized measuring ranges to DP stations. A DPAA block can process up to 4 analogue values.

The first analog value to be transmitted must be linked resp. parameterized at input X1. This analog value is standardized to the limits parameterized at inputs XE1 and XA1. Violation of these limits is not possible, i.e. the standardized analog value does not extend beyond 0% to 100% of the rated range, even if the output module accepts values in an overflow range outside the rated range. The elements TYP1 and DPTY define the manner in which the standardization of the first analog value is to be carried out.

The corresponding elements Xi, XAi, XEi and TYPi exist for the other three analog values.

The parameters TYPi (TYP1 to TYP4) must be set matching the separate channels of the used analog output module. The parameters TYP1, TYP2, TYP3 and TYP4 must be assigned without gaps. A zero in one of the parameters means that the subsequent parameters are not processed either.

- **TYPi = 0**: No processing (complete block switched off with TYP1 = 0)
- **TYPi = 1**: Bipolar
  - Start of rated range, e.g.: -10V, at Xi = Xai
  - End of rated range, e.g.: 10V, at Xi = Xei
  - ET 200 U / M / B module
- **TYPi = 2**: Unipolar
  - Start of rated range, e.g.: 4mA, at Xi = XAi
  - End of rated range, e.g.: 20mA, at Xi = XEi
  - ET 200 U / M / B module
- **TYPi = 4**: Integer 15 bits + sign bit
  - \((Xi – XAi) * 32768 / (XEi – XAi) = standardized\) analog value
  - With XAi = 0 and XEi = 32768, Xi is output as an integer with 15 bits + sign bit to the analog output module.
  - The center of the measuring range is set with Xi = 0.

The element DPTY (DP type) is used to permit adaptation to the various formats of the analog values transmitted to DP modules.

Meaning of DPTY for the internal processing of measured values:

- **(0) or 1**: = S5 format. ET200 U and ET200B (all issues)
  - (rated range C000H – 4000H)
- **11**: = S7 format. ET200 M and ET200B
  - (rated range 9400H – 6C00H)

For devices with data in reversed byte–ordering the following value is reserved for DPTY:

- **10**: the same as 11, but without byte exchange

The following generally applies:

- **DPTY even**: = on PB–DP, the Low byte is transmitted before the High byte = without exchange
- **DPTY odd**: = on PB–DP, the High byte is transmitted before the Low byte = with exchange
Error indicator bits

BGF = Module error.
Possible causes:

1. The module number parameterized in BGNR is not assigned to the PROFIBUS–DP I/Os.
   I & C alarm: S 305
   Remedy: correct I/O configuration using SYST.WART or correct the parameter setting of BGNR.

2. The station number parameterized in STNR does not agree with the station number which is assigned according to the I/O configuration BGNR and which is present in STNR(1).
   I & C alarm: S 313
   Remedy: correct I/O configuration using SYST.WART or correct the parameter setting of STNR.

3. The addressed station does not accept data.
   I & C alarm: S 305

SF = Station error.
A faulty configuration is indicated by SF at the error cases 1 (BGNR) and 2 (STNR).

In the case of double addressing (2 slaves physically on the same station number), S305 is signalled from the DP driver blocks (instead of S313 as for TM I/O peripherals).

Addressing
(see DPAE block)
## List of elements

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<td>AB</td>
<td></td>
<td>BGF</td>
</tr>
<tr>
<td>Station error (configuration error)</td>
<td>2</td>
<td>AB</td>
<td></td>
<td>SF</td>
</tr>
<tr>
<td>Sensor type for 1st analog value (live/dead zero)</td>
<td>1</td>
<td>I</td>
<td></td>
<td>TYP1</td>
</tr>
<tr>
<td>Upper output range limit for 1st analog value</td>
<td>2</td>
<td>EA</td>
<td></td>
<td>XE1</td>
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<tr>
<td>1st analog value</td>
<td>3</td>
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<td></td>
<td>X1</td>
</tr>
<tr>
<td>Lower output range limit for 1st analog value</td>
<td>4</td>
<td>EA</td>
<td></td>
<td>XA1</td>
</tr>
<tr>
<td>Sensor type for 2nd analog value (live/dead zero)</td>
<td>5</td>
<td>I</td>
<td></td>
<td>TYP2</td>
</tr>
<tr>
<td>Upper output range limit for 2nd analog value</td>
<td>6</td>
<td>EA</td>
<td></td>
<td>XE2</td>
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<tr>
<td>2nd analog value</td>
<td>7</td>
<td>EA</td>
<td></td>
<td>X2</td>
</tr>
<tr>
<td>Lower output range limit for 2nd analog value</td>
<td>8</td>
<td>EA</td>
<td></td>
<td>XA2</td>
</tr>
<tr>
<td>Sensor type for 3rd analog value (live/dead zero)</td>
<td>9</td>
<td>I</td>
<td></td>
<td>TYP3</td>
</tr>
<tr>
<td>Upper output range limit for 3rd analog value</td>
<td>10</td>
<td>EA</td>
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<td>XE3</td>
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<tr>
<td>3rd analog value</td>
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<td>X3</td>
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<tr>
<td>Lower output range limit for 3rd analog value</td>
<td>12</td>
<td>EA</td>
<td></td>
<td>XA3</td>
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<td>Sensor type for 4th analog value (live/dead zero)</td>
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<tr>
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<td>14</td>
<td>EA</td>
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<td>XE4</td>
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<tr>
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<td>EA</td>
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<td>X4</td>
</tr>
<tr>
<td>Lower output range limit for 4th analog value</td>
<td>16</td>
<td>EA</td>
<td></td>
<td>XA4</td>
</tr>
<tr>
<td>Module number according to configuring of AS I/Os</td>
<td>17</td>
<td>I</td>
<td></td>
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</tr>
<tr>
<td>Not used</td>
<td>18</td>
<td>I</td>
<td></td>
<td>FENR</td>
</tr>
<tr>
<td>Relative byte address within data range of station</td>
<td>19</td>
<td>I</td>
<td></td>
<td>BADR</td>
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<tr>
<td>Station number (indices 0 and 1 must be identical)</td>
<td></td>
<td></td>
<td>I</td>
<td>STNR</td>
</tr>
<tr>
<td>Parameter setting of intended station number</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Automatic entry of station number by block</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Data format (type of DP station)</td>
<td>21</td>
<td>I</td>
<td></td>
<td>DPTY</td>
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<tr>
<td>Vacant measuring–point name for 1st analog value</td>
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<td>S16</td>
<td></td>
<td>TX1</td>
</tr>
<tr>
<td>Vacant measuring–point name for 2nd analog value</td>
<td>23</td>
<td>S16</td>
<td></td>
<td>TX2</td>
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<tr>
<td>Vacant measuring–point name for 3rd analog value</td>
<td>24</td>
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<td></td>
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<tr>
<td>Vacant measuring–point name for 4th analog value</td>
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<td>S16</td>
<td></td>
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</table>
Binary input block DPBE

Contents

This chapter gives you informations about the binary input block for PROFIBUS–DP I/Os (DPBE).
Application

Driver block to receive binary values from DP stations (ET 200 M, ET 200 B, ET 200 U, ET 200 K, etc.) via the SINEC L2DP bus (PROFIBUS DP).

Principle of operation

The driver block DPBE reads binary values from a DP station. A block can transmit up to 32 binary values to own elements of type PB or up to 256 binary values to a linked field block (GB/GM field).

The binary values are transmitted to the elements BI01 to BI32 if input GBGM is not linked. If input GBGM is linked to a GB or GM block, the binary values are written into the GB/GM block starting at the linked element.

The number of bytes to be read in with 8 binary values each (max. 32 byte = 256 binary values) is parameterized using the element ANBY.

The element DPTY (DP type) is used to permit adaptation to the various formats of the measured values transmitted from DP modules.

Meaning of DPTY for working with binary data:

\[
\begin{align*}
\text{DPTY} & = 0, 2, ..., n \quad \text{(even): on PROFIBUS–DP, the Low byte is transmitted before the High byte} \\
& \quad = \text{without exchange} \\
\text{DPTY} & = 1, 3, ..., n \quad \text{(odd): on PROFIBUS–DP, the High byte is transmitted before the Low byte} \\
& \quad = \text{with exchange}
\end{align*}
\]

Error indicator bits

BGF = Module error.

Possible causes:

1. The module number parameterized in BGNR is not assigned to the PROFIBUS–DP I/Os.
   I & C alarm: S 305
   Remedy: correct I/O configuration using SYST.WART or correct the parameter setting of BGNR.

2. The station number parameterized in STNR does not agree with the station number which is assigned according to the I/O configuration BGNR and which is present in STNR(1).
   I & C alarm: S 313
   Remedy: correct I/O configuration using SYST.WART or correct the parameter setting of STNR

3. The addressed station does not send valid data.
   I & C alarm: S 305

SF = Station error.

A faulty configuration is indicated by SF at the error cases 1 (BGNR) and 2 (STNR).

In the case of double addressing (2 slaves physically on the same station number), S305 is signalled from the DP driver blocks (instead of S313 as for TM I/O peripherals).
Addressing

(see DPAE block)

Redundancy

Note

Redundancy for the drivers has not yet been approved. The parameter RED is assigned 0 for this reason. The input element 40 to 50 and the output element 3 are thus invalid and identified by the name “– – – –”.

In the redundant case, the indicator bits BGFi and SFi are generated according to the same rules as in the non–redundant case BGF and SF. The common indicator bits for the two transmission paths are generated as follows:

\[
\begin{align*}
BGF &= BGF1 \text{ AND } BGF2 \\
SF &= SF1 \text{ AND } SF2
\end{align*}
\]

A redundancy fault, i.e. the failure of one or both sources for a binary value Xi, is indicated by the output RF.

The common indicator bit SF is set simultaneously with the output RF, but is not reset by the DPBE block.
## List of elements

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<th>DPBE</th>
<th>I/O</th>
<th>Type</th>
<th>Abbreviation</th>
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</thead>
<tbody>
<tr>
<td>Module fault</td>
<td>1</td>
<td>AB</td>
<td>BGF</td>
<td></td>
</tr>
<tr>
<td>Station error (configuration error)</td>
<td>2</td>
<td>AB</td>
<td>SF</td>
<td></td>
</tr>
<tr>
<td>Redundancy error</td>
<td>3</td>
<td>AB</td>
<td>RF</td>
<td></td>
</tr>
<tr>
<td>1st binary value</td>
<td>1</td>
<td>EB</td>
<td>BI01</td>
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<tr>
<td>2nd binary value</td>
<td>2</td>
<td>EB</td>
<td>BI02</td>
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<tr>
<td>3rd binary value</td>
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<td>EB</td>
<td>BI03</td>
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<td>4th binary value</td>
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<td>EB</td>
<td>BI04</td>
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<td>5th binary value</td>
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<td>BI05</td>
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<td>BI07</td>
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<td>8th binary value</td>
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<td>EB</td>
<td>BI08</td>
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<td>9th binary value</td>
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<td>BI09</td>
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<td>10th binary value</td>
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<td>11th binary value</td>
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<td>EB</td>
<td>BI12</td>
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<tr>
<td>13th binary value</td>
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<td>EB</td>
<td>BI13</td>
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<td>EB</td>
<td>BI14</td>
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<td>15th binary value</td>
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<tr>
<td>16th binary value</td>
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<td>EB</td>
<td>BI16</td>
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<td>17th binary value</td>
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<tr>
<td>18th binary value</td>
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<td>EB</td>
<td>BI18</td>
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<td>23rd binary value</td>
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<td>32nd binary value</td>
<td>32</td>
<td>EB</td>
<td>BI32</td>
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<tr>
<td>Linking of a GB/GM field for transmission of max. 256 binary values</td>
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<td>EB</td>
<td>GBGM</td>
<td></td>
</tr>
<tr>
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<td>34</td>
<td>I</td>
<td>ANBY</td>
<td></td>
</tr>
<tr>
<td>Module number according to configuring of AS I/Os</td>
<td>35</td>
<td>I</td>
<td>BGNR</td>
<td></td>
</tr>
<tr>
<td>Not used</td>
<td>36</td>
<td>I</td>
<td>FENR</td>
<td></td>
</tr>
<tr>
<td>Relative byte address within data range of station</td>
<td>37</td>
<td>I</td>
<td>BADR</td>
<td></td>
</tr>
<tr>
<td>Station number (indices 0 and 1 must be identical)</td>
<td>38</td>
<td>I</td>
<td>STNR</td>
<td>0</td>
</tr>
<tr>
<td>Parameter setting of intended station number</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
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<tr>
<td>Automatic entry of station number by block</td>
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<th>Abbreviation</th>
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<td>I</td>
<td>DPTY</td>
<td></td>
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<td>40</td>
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<td>RED</td>
<td></td>
</tr>
<tr>
<td>2nd module number for redundant transmission path</td>
<td>41</td>
<td>I</td>
<td>BGN2</td>
<td></td>
</tr>
<tr>
<td>Not used</td>
<td>42</td>
<td>I</td>
<td>FEN2</td>
<td></td>
</tr>
<tr>
<td>Relative byte address within data range of 2nd station</td>
<td>43</td>
<td>I</td>
<td>BAD2</td>
<td></td>
</tr>
<tr>
<td>2nd station number (indices 0 and 1 must be identical)</td>
<td>44</td>
<td>I</td>
<td>STN2</td>
<td></td>
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<tr>
<td>Parameter setting of intended station number</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Automatic entry of station number by block</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data format on 2nd transmission path (type of DP station)</td>
<td>45</td>
<td>I</td>
<td>DPT2</td>
<td></td>
</tr>
<tr>
<td>Module number BGNR incorrect (1st transmission path)</td>
<td>46</td>
<td>PB</td>
<td>BGF1</td>
<td></td>
</tr>
<tr>
<td>Module number BGN2 incorrect (2nd transmission path)</td>
<td>47</td>
<td>PB</td>
<td>BGF2</td>
<td></td>
</tr>
<tr>
<td>Common indicator bit for address error / station error (1st path)</td>
<td>48</td>
<td>PB</td>
<td>SF1</td>
<td></td>
</tr>
<tr>
<td>Common indicator bit for address error / station error (2nd path)</td>
<td>49</td>
<td>PB</td>
<td>SF2</td>
<td></td>
</tr>
<tr>
<td>Binary values on transmission paths 1 and 2 not equal</td>
<td>50</td>
<td>PB</td>
<td>UNGL</td>
<td></td>
</tr>
<tr>
<td>Stored common error, must be reset by user</td>
<td>51</td>
<td>PB</td>
<td>SRF</td>
<td></td>
</tr>
<tr>
<td>Vacant measuring–point name</td>
<td>52</td>
<td>S16</td>
<td>TX1</td>
<td></td>
</tr>
<tr>
<td>Vacant measuring–point name</td>
<td>53</td>
<td>S16</td>
<td>TX2</td>
<td></td>
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<tr>
<td>Vacant measuring–point name</td>
<td>54</td>
<td>S16</td>
<td>TX3</td>
<td></td>
</tr>
<tr>
<td>Vacant measuring–point name</td>
<td>55</td>
<td>S16</td>
<td>TX4</td>
<td></td>
</tr>
</tbody>
</table>
Binary output block DPBA

Contents

This chapter gives you informations about the binary output block for PROFIBUS–DP I/Os (DPBA).
**Application**

Driver block for output of binary values to DP stations (ET 200 M, ET 200 B, ET 200 U, ET 200 K, etc.) via the SINEC L2DP bus (PROFIBUS DP).

**Principle of operation**

The driver block DPBA writes binary values into a DP station. A block can transmit up to 32 binary values from its own inputs or up to 256 binary values from a linked field block (GB/GM field).

The binary values are transmitted from the inputs BI01 to BI32 if input GBGM is not linked. If input GBGM is linked to a GB or GM block, the binary values are read from the GB/GM block starting at the linked element.

The number of bytes to be written with 8 binary values each (max. 32 byte = 256 binary values) is parameterized using the element ANBY.

Meaning of DPTY for working with binary data:

- **DPTY = 0, 2, ..., n (even):** on PROFIBUS–DP, the Low byte is transmitted before the High byte = without exchange
- **DPTY = 1, 3, ..., n (odd):** on PROFIBUS–DP, the High byte is transmitted before the Low byte = with exchange

**Error indicator bits**

- **BGF =** Module error.
  
  Possible causes:
  1. The module number parameterized in BGNR is not assigned to the PROFIBUS–DP I/Os.
     
     I & C alarm: S 305
     
     Remedy: correct I/O configuration using SYST.WART or correct the parameter setting of BGNR.
  2. The station number parameterized in STNR does not agree with the station number which is assigned according to the I/O configuration BGNR and which is present in STNR(1).
     
     I & C alarm: S 313
     
     Remedy: correct I/O configuration using SYST.WART or correct the parameter setting of STNR.
  3. The addressed station does not accept data.
     
     I & C alarm: S 305

- **SF =** Station error.
  
  A faulty configuration is indicated by SF at the error cases 1 (BGNR) and 2 (STNR).

In the case of double addressing (2 slaves physically on the same station number), S305 is signalled from the DP driver blocks (instead of S313 as for TM IO peripherals).

**Addressing**

(see DPAE block)
## List of elements

<table>
<thead>
<tr>
<th>Meaning</th>
<th>DPBA</th>
<th>I/O</th>
<th>Type</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module fault</td>
<td>1</td>
<td>AB</td>
<td>BGF</td>
<td></td>
</tr>
<tr>
<td>Station error (configuration error)</td>
<td>2</td>
<td>AB</td>
<td>SF</td>
<td></td>
</tr>
<tr>
<td>1st binary value</td>
<td>1</td>
<td>EB</td>
<td>BI01</td>
<td></td>
</tr>
<tr>
<td>2nd binary value</td>
<td>2</td>
<td>EB</td>
<td>BI02</td>
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<tr>
<td>3rd binary value</td>
<td>3</td>
<td>EB</td>
<td>BI03</td>
<td></td>
</tr>
<tr>
<td>4th binary value</td>
<td>4</td>
<td>EB</td>
<td>BI04</td>
<td></td>
</tr>
<tr>
<td>5th binary value</td>
<td>5</td>
<td>EB</td>
<td>BI05</td>
<td></td>
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<tr>
<td>6th binary value</td>
<td>6</td>
<td>EB</td>
<td>BI06</td>
<td></td>
</tr>
<tr>
<td>7th binary value</td>
<td>7</td>
<td>EB</td>
<td>BI07</td>
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<tr>
<td>8th binary value</td>
<td>8</td>
<td>EB</td>
<td>BI08</td>
<td></td>
</tr>
<tr>
<td>9th binary value</td>
<td>9</td>
<td>EB</td>
<td>BI09</td>
<td></td>
</tr>
<tr>
<td>10th binary value</td>
<td>10</td>
<td>EB</td>
<td>BI10</td>
<td></td>
</tr>
<tr>
<td>11th binary value</td>
<td>11</td>
<td>EB</td>
<td>BI11</td>
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<td>12th binary value</td>
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<td>EB</td>
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<td></td>
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<tr>
<td>13th binary value</td>
<td>13</td>
<td>EB</td>
<td>BI13</td>
<td></td>
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<tr>
<td>14th binary value</td>
<td>14</td>
<td>EB</td>
<td>BI14</td>
<td></td>
</tr>
<tr>
<td>15th binary value</td>
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<td>EB</td>
<td>BI15</td>
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<td>16th binary value</td>
<td>16</td>
<td>EB</td>
<td>BI16</td>
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<td>17th binary value</td>
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<td>BI18</td>
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<td>19th binary value</td>
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<td>EB</td>
<td>BI19</td>
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<tr>
<td>20th binary value</td>
<td>20</td>
<td>EB</td>
<td>BI20</td>
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<tr>
<td>21st binary value</td>
<td>21</td>
<td>EB</td>
<td>BI21</td>
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<tr>
<td>22nd binary value</td>
<td>22</td>
<td>EB</td>
<td>BI22</td>
<td></td>
</tr>
<tr>
<td>23rd binary value</td>
<td>23</td>
<td>EB</td>
<td>BI23</td>
<td></td>
</tr>
<tr>
<td>24th binary value</td>
<td>24</td>
<td>EB</td>
<td>BI24</td>
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<tr>
<td>25th binary value</td>
<td>25</td>
<td>EB</td>
<td>BI25</td>
<td></td>
</tr>
<tr>
<td>26th binary value</td>
<td>26</td>
<td>EB</td>
<td>BI26</td>
<td></td>
</tr>
<tr>
<td>27th binary value</td>
<td>27</td>
<td>EB</td>
<td>BI27</td>
<td></td>
</tr>
<tr>
<td>28th binary value</td>
<td>28</td>
<td>EB</td>
<td>BI28</td>
<td></td>
</tr>
<tr>
<td>29th binary value</td>
<td>29</td>
<td>EB</td>
<td>BI29</td>
<td></td>
</tr>
<tr>
<td>30th binary value</td>
<td>30</td>
<td>EB</td>
<td>BI30</td>
<td></td>
</tr>
<tr>
<td>31st binary value</td>
<td>31</td>
<td>EB</td>
<td>BI31</td>
<td></td>
</tr>
<tr>
<td>32nd binary value</td>
<td>32</td>
<td>EB</td>
<td>BI32</td>
<td></td>
</tr>
<tr>
<td>Linking of a GB/GM field for transmission of max. 256 binary values</td>
<td>33</td>
<td>EB</td>
<td>GBGM</td>
<td></td>
</tr>
<tr>
<td>Number of bytes to be output (max. 4 in the driver, max. 32 in the GBGM)</td>
<td>34</td>
<td>I</td>
<td>ANBY</td>
<td></td>
</tr>
<tr>
<td>Module number according to configuring of AS I/Os</td>
<td>35</td>
<td>I</td>
<td>BGNR</td>
<td></td>
</tr>
<tr>
<td>Not used</td>
<td>36</td>
<td>I</td>
<td>FENR</td>
<td></td>
</tr>
<tr>
<td>Relative byte address within data range of station</td>
<td>37</td>
<td>I</td>
<td>FENR</td>
<td></td>
</tr>
<tr>
<td>Station number (indices 0 and 1 must be identical)</td>
<td>38</td>
<td>I</td>
<td>STNR</td>
<td></td>
</tr>
<tr>
<td>Parameter setting of intended station number</td>
<td></td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Automatic entry of station number by block</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Data format (type of DP station)</td>
<td>39</td>
<td>I</td>
<td>DPTY</td>
<td></td>
</tr>
<tr>
<td>Vacant measuring–point name</td>
<td>40</td>
<td>S16</td>
<td>TX1</td>
<td></td>
</tr>
<tr>
<td>Vacant measuring–point name</td>
<td>41</td>
<td>S16</td>
<td>TX2</td>
<td></td>
</tr>
<tr>
<td>Vacant measuring–point name</td>
<td>42</td>
<td>S16</td>
<td>TX3</td>
<td></td>
</tr>
<tr>
<td>Vacant measuring–point name</td>
<td>43</td>
<td>S16</td>
<td>TX4</td>
<td></td>
</tr>
</tbody>
</table>
Channel Diagnosis DPCH

Contents

This chapter gives you informations about the binary output block for PROFIBUS–DP Peripherals (DPCH).
The DP driver block **DPCH** records the diagnostic interrupt of channel faults for max 8 channels of an ET 200M module at the DP thread of AS 488/TM, and displays them at its output bar. With that both a group bit and a byte with channel-specific faults (diagnostic byte) are shown for each channel. With this block faults as open circuit and short circuit of the S7–300 ET 200M modules can be monitored very easily. On condition that the diagnostic transmission to the DP master and the diagnostic receiving has been enabled at the configuration with COM PROFIBUS resp. in the DPx.INI configuration files on AS 488/TM.

The **DPCH** driver block reads the diagnostic data from an system internal diagnostic image. This diagnostic image contains the following channel-specific information from the ‘S7 Diagnosis’ diagnostic interrupt of the ET 200M modules:

- The channel fault bit information (data byte 20 of the diagnostic telegram), which is put to the **CHF0** to **CHF7** outputs.
- Channel-specific faults (data byte 21 – 28 of the diagnostic telegram), which are put to the **DIA0** bis **DIA7** outputs. Additional the channel-specific faults can be copied into a GB or GM data block.

For control or as information following additional outputs are set:

- **DIAG**
  With this binary output a diagnostic interrupt with channel events received from the module in the current cycle is signaled.

- **LOST**
  The LOST output is set if several diagnostic interrupt for the same module of the ET200M thread have been received within one block cycle. With this short–termed faults are signaled. The DPCH block in this case displays the last received channel event.

- **CNT**
  At this output the diagnostic interrupt from the module are counted. The counter is reset to zero when reaching 256, with RSOF, and with restart.

- **MTYP**
  At this output the module type 112 – 115 or 70H – 73H (DE, AE, DA, AA) of the module is shown. It indicates which interpretation of the byte information at the DIA0 to DIA7 outputs has to be used. As long as MTYP is 0, no diagnostic interrupt has been received. MTYP is set to zero with RSOF, restart, block definition, and with RES set to 1.

With RSOF and restart / boot

- the channel states CHFi and DIAi are reset to zero
- the binary output LOST is cleared
- the counter CNT is reset to zero
- MTYP is set to zero
Error indicator bits  

PAFE = Parameter assignment error  
Possible causes:  
1. The module number parameterized in BGNR is not assigned to the PROFIBUS–DP I/Os. If no DP slave is assigned in SYST.WART to the module number BGNR, additional the I&C alarm S305 is given.  
Remedy: correct I/O configuration using SYST.WART or correct the parameter setting of BGNR.  
2. The station number parameterized in STNR does not agree with the station number which is assigned according to the I/O configuration BGNR and which is present in STNR(1). In this case also the I&C alarm S313 is given.  
Remedy: correct I/O configuration using SYST.WART or correct the parameter setting of STNR.  
3. The addressed station does not accept data.  

ADFE = Address error  
Possible causes:  
Internal diagnostic buffer has not been established, because the necessary system program has not the required version.  
Internal diagnostic buffer has not been established, because the RAM memory is too small. This error can only appear with the previous CPU488–4.  
Additional the I&C alarm S311 is given.  

TYFE = Type error  
Possible causes:  
The STYP parameter has been set faulty (at present only ET 200M is allowed).  

Note to communication and module faults  
If a communication fault of the DP slave / ET 200M thread happens, or a module is taken away from the ET 200M thread this fault is not displayed at the DPCH channel diagnosis block. This fault is only shown at the DP driver blocks.  

Addressing  
An ET 200M module is addressed by using the elements module number BGNR, station number STNR, and slot number SLOT.  

<table>
<thead>
<tr>
<th>Element</th>
<th>Configuring tool</th>
<th>Function in AS x88/TM</th>
</tr>
</thead>
<tbody>
<tr>
<td>BGNR</td>
<td>SYST.WART: I/O configuring</td>
<td>AS–internal I/O number for the station number on the PB–DP bus</td>
</tr>
</tbody>
</table>

The parameter STNR is used to check the station number set indirectly using BGNR. The number of the station to be addressed is parameterized in index 0 (STNR (0)). The block enters the actually recognized station number in index 1. The block only processes the station data if the two parameters (STNR (0) and STNR (1)) have the same value.  
The slot number SLOT has to be taken from the COM PROFIBUS configuration of the module.
### List of elements

<table>
<thead>
<tr>
<th>Meaning</th>
<th>DPCH</th>
<th>I/O</th>
<th>Type</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel fault at channel 0</td>
<td>1</td>
<td>AB</td>
<td>CHF0</td>
<td></td>
</tr>
<tr>
<td>Channel fault at channel 1</td>
<td>2</td>
<td>AB</td>
<td>CHF1</td>
<td></td>
</tr>
<tr>
<td>Channel fault at channel 2</td>
<td>3</td>
<td>AB</td>
<td>CHF2</td>
<td></td>
</tr>
<tr>
<td>Channel fault at channel 3</td>
<td>4</td>
<td>AB</td>
<td>CHF3</td>
<td></td>
</tr>
<tr>
<td>Channel fault at channel 4</td>
<td>5</td>
<td>AB</td>
<td>CHF4</td>
<td></td>
</tr>
<tr>
<td>Channel fault at channel 5</td>
<td>6</td>
<td>AB</td>
<td>CHF5</td>
<td></td>
</tr>
<tr>
<td>Channel fault at channel 6</td>
<td>7</td>
<td>AB</td>
<td>CHF6</td>
<td></td>
</tr>
<tr>
<td>Channel fault at channel 7</td>
<td>8</td>
<td>AB</td>
<td>CHF7</td>
<td></td>
</tr>
<tr>
<td>Diagnostic byte for channel 0 (1)</td>
<td>9</td>
<td>AA</td>
<td>DIA0</td>
<td></td>
</tr>
<tr>
<td>Diagnostic byte for channel 1 (1)</td>
<td>10</td>
<td>AA</td>
<td>DIA1</td>
<td></td>
</tr>
<tr>
<td>Diagnostic byte for channel 2 (1)</td>
<td>11</td>
<td>AA</td>
<td>DIA2</td>
<td></td>
</tr>
<tr>
<td>Diagnostic byte for channel 3 (1)</td>
<td>12</td>
<td>AA</td>
<td>DIA3</td>
<td></td>
</tr>
<tr>
<td>Diagnostic byte for channel 4 (1)</td>
<td>13</td>
<td>AA</td>
<td>DIA4</td>
<td></td>
</tr>
<tr>
<td>Diagnostic byte for channel 5 (1)</td>
<td>14</td>
<td>AA</td>
<td>DIA5</td>
<td></td>
</tr>
<tr>
<td>Diagnostic byte for channel 6 (1)</td>
<td>15</td>
<td>AA</td>
<td>DIA6</td>
<td></td>
</tr>
<tr>
<td>Diagnostic byte for channel 7 (1)</td>
<td>16</td>
<td>AA</td>
<td>DIA7</td>
<td></td>
</tr>
<tr>
<td>Diagnostic interrupts received within the cycle</td>
<td>17</td>
<td>AB</td>
<td>DIAG</td>
<td></td>
</tr>
<tr>
<td>Several interrupts within the cycle</td>
<td>18</td>
<td>AB</td>
<td>LOST</td>
<td></td>
</tr>
<tr>
<td>Parameter assignment error</td>
<td>19</td>
<td>AB</td>
<td>PAFE</td>
<td></td>
</tr>
<tr>
<td>Address error</td>
<td>20</td>
<td>AB</td>
<td>ADFE</td>
<td></td>
</tr>
<tr>
<td>Type error</td>
<td>21</td>
<td>AB</td>
<td>TYFE</td>
<td></td>
</tr>
<tr>
<td>Module type (112 = DE, 114 = DA, 113 = AE, 115 = AA)</td>
<td>22</td>
<td>AA</td>
<td>MTYP</td>
<td></td>
</tr>
<tr>
<td>Number of received diagnostic interrupts since last restart/RSOF (cyclic counter from 0 to 255)</td>
<td>23</td>
<td>AA</td>
<td>CNT</td>
<td></td>
</tr>
<tr>
<td>Module number according to configuring of AS I/Os</td>
<td>1</td>
<td>I</td>
<td>BGNR</td>
<td></td>
</tr>
<tr>
<td>Station number (indices 0 and 1 must be identical)</td>
<td>2</td>
<td>I</td>
<td>STNR</td>
<td></td>
</tr>
<tr>
<td>Automatic entry of station number</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slot number (4, ..., 11)</td>
<td>3</td>
<td>I</td>
<td>SLOT</td>
<td></td>
</tr>
<tr>
<td>Slave type (1: ET200M with head–end IM153–1 and IM153–2; &gt; 1: reserve)</td>
<td>4</td>
<td>I</td>
<td>STYP</td>
<td></td>
</tr>
<tr>
<td>Interconnection of a GB/GM data block for the diagnostic bytes</td>
<td>5</td>
<td>EB</td>
<td>GBGM</td>
<td></td>
</tr>
<tr>
<td>Number of bytes to be written into the GB/GM data block</td>
<td>6</td>
<td>I</td>
<td>LAEN</td>
<td></td>
</tr>
<tr>
<td>Manual reset of the block’s diagnostic data (e.g. usable, if no message is given for going fault because of module exchange); operating is signaled with I&amp;C message S325.</td>
<td>7</td>
<td>PB</td>
<td>RES</td>
<td></td>
</tr>
<tr>
<td>Technological name of the block</td>
<td>8</td>
<td>S16</td>
<td>AT</td>
<td></td>
</tr>
</tbody>
</table>

1) Here the following values for single faults appear with ET200M according to the tables 7–17 and 7–18 as shown below.
### Channel-specific faults with ET 200M modules:

<table>
<thead>
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<th></th>
<th>ET 200M digital input module (MTYP = 112):</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Configuration/parameter assignment error</td>
</tr>
<tr>
<td>2</td>
<td>Ground fault</td>
</tr>
<tr>
<td>4</td>
<td>Short circuit to L+ (sensor)</td>
</tr>
<tr>
<td>8</td>
<td>Short circuit to M</td>
</tr>
<tr>
<td>16</td>
<td>Wire break</td>
</tr>
<tr>
<td>32</td>
<td>Sensor supply is missing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>ET 200M digital output module (MTYP = 114):</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Configuration/parameter assignment error</td>
</tr>
<tr>
<td>2</td>
<td>Ground fault</td>
</tr>
<tr>
<td>4</td>
<td>Short circuit to L+</td>
</tr>
<tr>
<td>8</td>
<td>Short circuit to M</td>
</tr>
<tr>
<td>16</td>
<td>Wire break</td>
</tr>
<tr>
<td>64</td>
<td>External load voltage is missing</td>
</tr>
<tr>
<td>128</td>
<td>Temperature rise</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>ET 200M analog input module (MTYP = 113):</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Configuration/parameter assignment error</td>
</tr>
<tr>
<td>2</td>
<td>Common–mode error</td>
</tr>
<tr>
<td>4</td>
<td>Short circuit to L+</td>
</tr>
<tr>
<td>8</td>
<td>Short circuit to M</td>
</tr>
<tr>
<td>16</td>
<td>Wire break</td>
</tr>
<tr>
<td>32</td>
<td>Reference channel error</td>
</tr>
<tr>
<td>64</td>
<td>Lower limit violation (&lt; 3 mA)</td>
</tr>
<tr>
<td>128</td>
<td>Upper limit violation (&gt; 22 mA)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>ET 200M analog output module (MTYP = 115):</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Configuration/parameter assignment error</td>
</tr>
<tr>
<td>2</td>
<td>Common–mode error</td>
</tr>
<tr>
<td>4</td>
<td>Short circuit to L+</td>
</tr>
<tr>
<td>8</td>
<td>Short circuit to M</td>
</tr>
<tr>
<td>16</td>
<td>Wire break</td>
</tr>
<tr>
<td>64</td>
<td>External load voltage is missing</td>
</tr>
</tbody>
</table>

If several faults are active on one module at the same time, the error values are added respectively.
The **DPCH** driver block utilizes an internal diagnostic image, which is derived from the STRT.DPKD buffer. For this settings have to be done in the way that the ET200M modules and their head–end IM153 send the selected diagnostic interrupts to the AS 488/TM DP master, and the AS 488/TM receives the diagnostic interrupts and put it into the diagnostic image:

1. In the configuration session with COM PROFIBUS, the wanted diagnostic functions have to be enabled when configuring the ET200M modules, and the sending of diagnostic interrupts have to be enabled when configuring the head–end IM153.
2. The function ‘extended diagnosis’ for ET200M must be disabled. The DPCH diagnostic block gets the data with diagnostic interrupts from the device–specific diagnosis.
3. The use of the DPCH diagnostic block requires either the first or both DP threads to be configured. If only the 2nd DP thread has been configured, this function is not available.
4. Additional at least following parameters have to be set in the DPx.INI file: FREI = 1 and ALARM = 1.
5. The buffer STRT.DPKD has to be installed according to chapter 2.10 of the supplementary documentation for the DP configuration (file DP_PRO_E.DOC). The size parameters are put down in the elements 30 and 31 of the FSA.ORPA data block:
   - FSA (30): contains the number of entries in the STRT.DPKD buffer
     - The minimum value of 100 has to be set.
   - FSA (31): contains the even length > 16 of a buffer element
     - If only ET200M is used as DP slave, or if no evaluation of the STRT.DPKD buffer is done by user function blocks or programs the length 38 has to be set. Otherwise the instructions from chapter 2.10 (see above) are valid.

---

**Note**

After changing FSA.ORPA, and after installing a new user structure a back–up and loading procedure is necessary.
Restriction

- When using the previous CPU488–4 of AS 488/TM, which has only 8 MB memory, memory location problems may occur, if 2 DP threads and a PROFIBUS–PLC/PLC link have been configured. With newer CPU types, CPU486–3 and CPU486–4, which always have 16 MB memory, no storage problems will occur.

- If a module includes different channel types, the DPCH block displays the last received diagnostic interrupt independent of the channel type.

- After a defective module with present fault has been exchanged, the replaced module doesn’t send always a going diagnostic interrupt. That causes the DPCH block to display an error state furthermore. With setting RES = 1 the block’s current channel faults are cleared. Alternatively a synchronization of the block state can be reached by creating and revoking a channel fault by force.
A S7 diagnostic telegram from ET200M has the following structure according to /2/: 

**Table 5-1 Structure and contents of the bytes 17 to 28 of the data record 1**

<table>
<thead>
<tr>
<th>Byte</th>
<th>Bit</th>
<th>Meaning</th>
<th>Abbreviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>0-6</td>
<td>Channel type</td>
<td>55H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>70H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>72H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>71H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>73H</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Another channel type existing?</td>
<td>0 no</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 yes</td>
</tr>
<tr>
<td>18</td>
<td>0-7</td>
<td>Number of diagnostic bits, given by the module for each channel</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>0-7</td>
<td>Number of channels per module</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>0</td>
<td>Diagnostic event on channel 0 or if 55H in byte 17, then event(^1) for module at slot 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Diagnostic event on channel 1 or if 55H in byte 17, then event(^1) for module at slot 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Diagnostic event on channel 2 or if 55H in byte 17, then event(^1) for module at slot 6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>Diagnostic event on channel 3 or if 55H in byte 17, then event(^1) for module at slot 7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Diagnostic event on channel 4 or if 55H in byte 17, then event(^1) for module at slot 8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>Diagnostic event on channel 5 or if 55H in byte 17, then event(^1) for module at slot 9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>Diagnostic event on channel 6 or if 55H in byte 17, then event(^1) for module at slot 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>Diagnostic event on channel 7 or if 55H in byte 17, then event(^1) for module at slot 11</td>
<td></td>
</tr>
<tr>
<td>21 to 28</td>
<td>–</td>
<td>channel–specific fault</td>
<td>Digital channel see table 7–17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Analog channel see table 7–18</td>
</tr>
</tbody>
</table>

\(^1\) not at module exchange during working
The data at byte addresses 17, 20 and 21–28 are evaluated by a system program, and given to the DPCH driver block for reading.

The configuration of the diagnostic bytes for the channel–specific faults of digital and analog modules is shown in the following both tables 5-2 and 5-3:

**Byte 21 and following (only with S7 diagnosis)**

Up from byte 21 the channel–specific faults of each channel of the module are shown. Below we show you the structure of the channel–specific diagnosis for the different channel types. For the bit configuration following is assumed:

- 1 = fault
- 0 = no fault

### Digital channel

Table 5-2  Diagnostic byte configuration for a digital input or output channel

<table>
<thead>
<tr>
<th>Byte from 21</th>
<th>Bit</th>
<th>Digital input channel</th>
<th>Digital output channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Configuration/parameter assignment error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Ground fault</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Short circuit to L+ (sensor)</td>
<td>Short circuit to L+</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Short circuit to M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Wire break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Sensor supply is missing</td>
<td>&quot;0&quot; (reserved)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>&quot;0&quot; (reserved)</td>
<td>External load voltage is missing</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>&quot;0&quot; (reserved)</td>
<td>Temperature rise</td>
<td></td>
</tr>
</tbody>
</table>

### Analog channel

Table 5-3  Diagnostic byte configuration for a analog input or output channel

<table>
<thead>
<tr>
<th>Byte from 21</th>
<th>Bit</th>
<th>Analog input channel</th>
<th>Analog output channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Configuration/parameter assignment error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Common–mode error</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Short circuit to L+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Short circuit to M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Wire break</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Reference channel error</td>
<td>&quot;0&quot; (reserved)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Lower limit violation (&lt; 3 mA)</td>
<td>External load voltage is missing</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Upper limit violation (&gt; 22 mA)</td>
<td>&quot;0&quot; (reserved)</td>
<td></td>
</tr>
</tbody>
</table>
## Memory allocation and execution time

<table>
<thead>
<tr>
<th>Block</th>
<th>Memory requirements (byte)</th>
<th>Run time (ms)</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Min.</td>
<td>+ Par.</td>
<td>Max.</td>
</tr>
<tr>
<td>DPAA</td>
<td>192</td>
<td>48</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPAE</td>
<td>420</td>
<td>33</td>
<td>453</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPBA</td>
<td>236</td>
<td>32</td>
<td>268</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPBE</td>
<td>242</td>
<td>–</td>
<td>242</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPCH</td>
<td>141</td>
<td>–</td>
<td>141</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The memory requirements specified in column ”+ Par.” are only needed, if interconnectable inputs (Q,...;) were parameterized (P,...;).
TELEPERM M

Driver Blocks RIP and KRIP

Connection of the Controller Module IP262 via the Peripheral Bus PROFIBUS–DP

Technical Instruction
Safety instructions

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

⚠️ Danger

Failure to observe a Danger note will cause death, severe personal injury or severe damage to the equipment.

⚠️ Warning

Failure to observe a Warning note may cause death, severe personal injury or severe damage to the equipment.

⚠️ Caution

Failure to observe a Caution note may cause personal injury or damage to the equipment.

Note

Notes contain important information regarding the product, product handling or a specific part of the document that requires special attention.

Qualified personnel

The unit may only be commissioned and used on the basis of the information contained in this Manual. Only qualified personnel are authorized to perform any work inside the unit. Qualified personnel in the sense of the safety instructions in this Manual are persons who have been authorized to commission, ground and label units, systems and circuits according to the safety-relevant standards.

Normal use

Please observe the following instructions:

⚠️ Warning

The unit may only be used for the applications mentioned in the Catalogue and the Technical Description. It may only be used together with third-party equipment or components that have been recommended or released by Siemens.

Faultless and safe operation of the product requires proper transport, storage, installation and commissioning, and careful handling and maintenance.

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Siemens AG
Bereich Automatisierungs- und Antriebstechnik
Geschäftsgebiet Systems Engineering
D-76181 Karlsruhe

Exclusion of liability

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Order No. C79000-T8076-C732
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Driver Blocks RIP and KRIP

This chapter describes the driver blocks RIP and KRIP.

Condition
This description builds on the contents of the equipment manual of the controller module IP262, order no. 6ES5 998–5SG11 (C73000–G8500–C5) and assumes its knowledge.

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<th>Topic</th>
<th>Page</th>
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</thead>
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<td>Required Settings in the Module IP262 for the Function of the Blocks RIP and KRIP</td>
<td>1-2</td>
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<td>1.3</td>
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<td>1-3</td>
</tr>
<tr>
<td>1.4</td>
<td>Configuration</td>
<td>1-4</td>
</tr>
<tr>
<td>1.5</td>
<td>Fault Indication of the RIP Block</td>
<td>1-6</td>
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<td>1.6</td>
<td>Assignment of the Status Word in the RIP Block</td>
<td>1-8</td>
</tr>
<tr>
<td>1.7</td>
<td>Data Elements</td>
<td>1-9</td>
</tr>
<tr>
<td>1.8</td>
<td>Installation of the Blocks RIP and KRIP in the AS x88/TM</td>
<td>1-13</td>
</tr>
</tbody>
</table>
1.1 Function of the Blocks RIP and KRIP

The block RIP includes the interface for user functions in the AS x88/TM to a controller in the controller module IP262. The block RIP reads or writes controlled variable, manipulated variable, master variable, and different parameters of a controller. Each configured controller in a module IP262 requires a RIP block. For processing, the data are available in the AS x88/TM and for OS operation in the data elements of the RIP block.

The block KRIP centralizes the driver functions for the communication of RIP blocks via the bus PROFIBUS–DP with their allocated controller in the controller module IP262 of the distributed peripheral system ET 200. A KRIP block supports up to 64 connected RIP blocks.

1.2 Required Settings in the Module IP262 for the Function of the Blocks RIP and KRIP

<table>
<thead>
<tr>
<th>ET 200 operation, not PLC operation: DB17 DW1 = 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master variable W from PLC/PU: DB15 DW30 = 0 for controller 1</td>
</tr>
<tr>
<td>DW31 = 0 for controller 2</td>
</tr>
<tr>
<td>DW32 = 0 for controller 3</td>
</tr>
<tr>
<td>DW33 = 0 for controller 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Control variable not from PLC/PU:</th>
</tr>
</thead>
<tbody>
<tr>
<td>DW34 &lt; 4 for controller 1</td>
</tr>
<tr>
<td>DW35 &lt; 4 for controller 2</td>
</tr>
<tr>
<td>DW36 &lt; 4 for controller 3</td>
</tr>
<tr>
<td>DW37 &lt; 4 for controller 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Controller is set value controller, not ratio controller:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(controller 3 and 4 never are ratio controllers) DW2 = 0 for controller 1</td>
</tr>
<tr>
<td>DW3 = 0 for controller 2</td>
</tr>
</tbody>
</table>

Note

The reaction of a controller to failure of the ET 200 station or the AS x88/TM is pre–set with the data words 73 to 76 of the data block 15 in the IP262.
1.3 Data Words in the Controller Module IP262 Written by the AS

The RIP block writes to the following data blocks in the IP262:
DB11 for controller 1, DB12 for controller 2, DB13 for controller 3, and DB14 for controller 4.
In each one of these data blocks, the same data words are written.

<table>
<thead>
<tr>
<th>Data word</th>
<th>Designation</th>
<th>Source in RIP block</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>proportional coefficient (K_p)</td>
<td>(KPI = 1000 \cdot KP)</td>
</tr>
<tr>
<td>01</td>
<td>integral action time (T_n)</td>
<td>(TNI = 10 \cdot TN)</td>
</tr>
<tr>
<td>02</td>
<td>derivative action time (T_v)</td>
<td>(TVI = 10 \cdot TV)</td>
</tr>
<tr>
<td>03</td>
<td>derivative action gain (V_v)</td>
<td>(VVI = 1000 \cdot VV)</td>
</tr>
<tr>
<td>04</td>
<td>filter time for system deviation (T_f)</td>
<td>(TFI)</td>
</tr>
<tr>
<td>05</td>
<td>ramp for master variable (T_w)</td>
<td>(TWI)</td>
</tr>
<tr>
<td>06</td>
<td>master variable start of limit (W_a)</td>
<td>(WAI = (WUG-b)/a)</td>
</tr>
<tr>
<td>07</td>
<td>master variable end of limit (W_e)</td>
<td>(WEI = (WOG-b)/a)</td>
</tr>
<tr>
<td>08</td>
<td>safety master variable (W_s)</td>
<td>(WSI)</td>
</tr>
<tr>
<td>09</td>
<td>manipulated variable start of limit (Y_a)</td>
<td>(YAI = YUG \cdot 10)</td>
</tr>
<tr>
<td>10</td>
<td>manipulated variable end of limit (Y_e)</td>
<td>(YEI = YOG \cdot 10)</td>
</tr>
<tr>
<td>11</td>
<td>safety manipulated variable (Y_s)</td>
<td>(YSI)</td>
</tr>
<tr>
<td>15</td>
<td>working point (y_0)</td>
<td>(Y0I)</td>
</tr>
<tr>
<td>16</td>
<td>constant 1</td>
<td>(C1I)</td>
</tr>
<tr>
<td>17</td>
<td>constant 2</td>
<td>(C2I)</td>
</tr>
<tr>
<td>27</td>
<td>master variable from PLC/PU (W)</td>
<td>((W-b)/a) or ((WEXT-b)/a)</td>
</tr>
<tr>
<td>28</td>
<td>controlled variable from PLC/PU (x_1)</td>
<td>0</td>
</tr>
<tr>
<td>29</td>
<td>aux. contr. variables from PLC/PU (x_2)</td>
<td>0</td>
</tr>
<tr>
<td>30</td>
<td>master variable from PLC/PU (W_v)</td>
<td>0</td>
</tr>
<tr>
<td>31</td>
<td>manipulated variable from PLC/PU (y)</td>
<td>(y \cdot 10) or (YNAF \cdot 10)</td>
</tr>
<tr>
<td>32</td>
<td>manipulated variable from PLC/PU (z)</td>
<td>0</td>
</tr>
<tr>
<td>43</td>
<td>operation modes</td>
<td>(8) at HDAC=0 or YNF=1, otherwise 0</td>
</tr>
</tbody>
</table>

\[a = (XEND - XANF) / 60000, \quad b = (XEND + XANF) / 2\]

The controller parameters \(KP\), \(TN\), \(TV\), and \(VV\) in the RIP block are controllable by the operator. They are converted to the integer format of the IP262 and written to the elements \(KPI, TNI, TVI,\) and \(VVI\) of the RIP block before transfer to the IP262. The limits \(WUG, WOG, YUG,\) and \(YOG\) are not controllable but can be configured. In the scope of a configuration, they are automatically converted to the integer format of the IP262 and written to the elements \(WAI, WEI, YAI,\) and \(YEI\). The remaining ID elements which the AS writes to the IP262 are available only as integer numbers in the RIP block: \(TFI, TWI, WSI, YSI, Y0I, C1I, C2I\).
1.4 Configuration

1.4.1 Configuration of the KRIP Block

A KRIP block processes a PROFIBUS–DP interface. At least one KRIP block is required per PB–DP interface. The link between the KRIP block and the PB–DP interface is generated via the only configurable element (BUSN) in the KRIP block.

In the version V1.0 of the block KRIP, the parameter BUSN is not yet assigned. The block operates with the first and currently only PB–DP interface in the AS 388/TM or AS 488/TM.

With more than 64 controllers in IP262 modules on one PROFIBUS–DP bus, several KRIP blocks can be defined for the same bus in the AS. For efficient processing of telegrams, IP262 modules in the same ET 200 station (same bus address) should be processed with the same KRIP block. Several controllers in the same IP262 module must not be distributed to different KRIP blocks; whether several controllers are located in the same module can only be recognized within the same KRIP block. In this case, the KRIP block coordinates access to the controllers. In this scope, a request cycle (request + answer) is subsequently carried out for every controller.

1.4.2 Configuration of the RIP Block

Just like the KRIP block, the RIP block contains an element with the name BUSN. This element has the type I/O and can not be configured. It serves the interconnection with the element BUSN of a KRIP block. The interconnection assigns a KRIP driver block to a RIP block. As a result, the RIP block adopts the bus number of the associate driver block KRIP.

Configuration instructions: A,RIP,name; or D,RIP,name;
Q,2,KRIP,name,1:E;

The following four elements in the RIP block serve addressing a controller in a controller module under the station name of an ET 200 (PROFIBUS address).

STNR: station number of the ET 200
LADR: read address; relative byte address within the station, from which the module IP262 occupies four analog values (8 bytes) upwards for reading via the AS x88/TM
SADR: write address; relative byte address within the station, from which the module IP262 occupies four analog values upwards for writing via the AS x88/TM
RGNR: number of the controller in a module IP262
Before the RIP block can operate in online mode, an I/O address of the AS x88/TM (module number) must be defined for the station number which is specified in the element STNR. This is carried out in the menu "CONFIGURE PERIPHERALS" after opening SYS.WART in the AS. The associate I/O address is not configured in the RIP block. The RIP block itself searches the I/O address which is assigned to the station number (= PROFIBUS–DP station number) in STNR.

The first 7 elements after the element EIAU are only configurable in the state EIAU = 0. This also includes the measuring range limits XANF and XEND in addition to the 5 address elements mentioned above. Online processing of a completed and installed RIP block is enabled with EIAU = 1.

A KRIP block cannot be deleted as long as a RIP block is connected. A RIP block cannot be deleted as long as an interconnection with a KRIP block exists. The interconnection can be removed with the instruction "Q,2,N;" in the RIP block.

The elements XANF and XEND contain the physical values of the master variable W and the control variable X at the ends of the internal number range of the module IP262 between –3000 and +3000. They serve the conversion of the physical values W, X, WOG, and WUG and the respective integer values in the IP262. Therefore, they must not necessarily match the actual measuring range limits.

\[
\begin{align*}
X_{[AS]} &= \frac{(XEND - XANF)}{60000} \times X_{[IP262]} + \frac{(XEND - XANF)}{2} \\
W_{[IP262]} &= \frac{60000}{(XEND - XANF)} \times (W_{[AS]} - \frac{(XEND - XANF)}{2})
\end{align*}
\]

The sampling time (sampling parameter in the XB block) of a RIP block must be at least \(n \times 4\) times the sampling time of the connected head driver KRIP, where \(n\) is the number of RIP blocks linked to controllers of the same controller module IP262.

**Example**

3 controllers in a module IP 262 are processed by RIP blocks. The common head driver KRIP is installed in ZYK 2 with a scanning time of 1/8 second. Then the scanning time of the RIP blocks must be at least 1.5 seconds, i.e. the scanning time of the AS must be configured at least 2 seconds (no values between 1 s and 2 s).

Please note that the scanning cycle of the RIP block acts like a dead time during data transmission. The data can be sent or received at a maximum delay of one scanning cycle.
1.5 Fault Indication of the RIP Block

The output STOE is a group indicator for every fault recognized by the RIP block, however, not for the indicators FX and FXD. The output FNR specifies a fault number for further details on the fault cause. Communication faults are indicated with fault numbers higher than 0. If the controller module IP262 indicates internal faults, the output FNR reads “0” at an active fault indicator SUST and group indicator STOE.

**Fault indicators at an active group indicator STOE = 1B**

<table>
<thead>
<tr>
<th>FNR</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>no communication fault but fault indicator of the IP262 (SUST=1)</td>
</tr>
<tr>
<td>1</td>
<td>no processing due to EIAU=0</td>
</tr>
<tr>
<td>2</td>
<td>no interconnection with KRIP block</td>
</tr>
<tr>
<td>3</td>
<td>KRIP block does not acknowledge interconnection with RIP block; possible cause: KRIP is not processed</td>
</tr>
<tr>
<td>4</td>
<td>station with number STNR not configured in the I/O range of the AS</td>
</tr>
<tr>
<td>6</td>
<td>station with number STNR not controllable on the bus L2DP</td>
</tr>
<tr>
<td>8</td>
<td>station number STNR not at original location in the I/O range of the AS</td>
</tr>
<tr>
<td>12</td>
<td>no response IP262 (waiting time expired)</td>
</tr>
<tr>
<td>13</td>
<td>KRIP block does not transfer jobs or transfers jobs too slowly</td>
</tr>
</tbody>
</table>

The faults 6 to 12 cause cancellation of the telegram transmission with the IP262 and immediate re-establishment of communication through the RIP block. The faults 8 to 12 are recognized after successful establishment of communication only. Faults 3 to 7 cause cancellation of the establishment of communication and trigger a restart of the procedure. The fault signals 12 and 13 can be displayed if the KRIP block is not active often enough in order to carry out the transferred jobs with the IP262 between processing times of the RIP block.

**Note**

If the scanning time of the RIP blocks is too small, a fault of a controller can cause other RIP blocks to signal fault 13.

**Remedy:** increase the scanning time for all RIP blocks.
The output SUST is relevant only if the communication is not faulty, i.e. the fault number equals 0 (FNR = 0). SUST is reset in the case of a communication fault. If no fault is active for the communication, the output SUST is configured as group indicator for the following signals of the IP262:

- fault indicator of the IP262 (bit 0 in the IP262 status word)
- transducer fault, output MUST=1
- PU has higher priority than AS or PLC, output VOR=1
- controller adapted, output ADA=1
- controller is blocked (state Bl, controlled with binary input 1)
- controller in tracking mode (state N, controlled with binary input 2)
- safety manipulated variable is indicated (state Si, controlled with binary input 3)

In STOE, the fault indicator SUST is read out as group fault.

The element UEX activates the monitoring function of the controlled variable XW. It monitors compliance with the limits XOG and XUG. A violation is indicated with FX = 1. A 5% hysteresis of the monitored range XOG – XUG applies for this fault indicator. It is reset only when the controlled variable XW lies within the range between XOG and XUG reduced by 5% at both limits. A violation of the limits is indicated with FX=1.

The element UEXD activates the monitoring of the system deviation XDWP in percent. It monitors compliance with the limits +XDPG and –XDPG. A violation of the limits is displayed with FXD=1. A 5% hysteresis of the monitored range 2*XDPG applies to the fault indicator.
### 1.6 Assignment of the Status Word in the RIP Block

<table>
<thead>
<tr>
<th>QS</th>
<th>SS</th>
<th>B8 = S</th>
<th>B7</th>
<th>B6</th>
<th>B5</th>
<th>B4</th>
<th>B3 = B</th>
<th>B2 = F</th>
<th>B1 = W</th>
<th>B0 = A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **QS**: status word acknowledgment
- **SS**: group fault, active for signals requiring acknowledgment: STOE, FXD, FX
- **S**: external fault
- **Bx**: bit number x in the status word without specification in the OS
- **B**: operator input request
- **F**: fault
- **W**: warning
- **A**: alarm
- **STOE**: 1 = fault (group indicator)  SUST = 0: communication fault  SUST = 1: IP262 fault
- **INEX**: 0 = W internal = setpoint definition via operator input  1 = W external = input WEXT supplies setpoint
- **HDAC**: 0 = manual mode = manipulated variable definition via operator input, if not YNF  1 = automatic mode, if not YNF
- **YNF**: 1 = input YNAF supplies manipulated variable independent of HDAC
- **FXD**: 1 = system deviation XW–WW outside range +/-XDPG
- **FX**: 1 = controlled variable XW outside range XUG, XOG
1.7 Data Elements

1.7.1 Data Elements of the RIP Block

Outputs

<table>
<thead>
<tr>
<th>Output no.</th>
<th>Type</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AB</td>
<td>STOE</td>
<td>fault (group fault communication or IP262)</td>
</tr>
<tr>
<td>2</td>
<td>AA</td>
<td>FNR</td>
<td>fault number: indication of the cause for STOE=1</td>
</tr>
<tr>
<td>3</td>
<td>AB</td>
<td>SF</td>
<td>station fault (station on the PB–DP not controllable)</td>
</tr>
<tr>
<td>4</td>
<td>AB</td>
<td>SUST</td>
<td>sum status IP262: OR operation IP262 status word Bit0, MUST, VOR, KB, ADA</td>
</tr>
<tr>
<td>5</td>
<td>AB</td>
<td>MUST</td>
<td>transducer fault</td>
</tr>
<tr>
<td>6</td>
<td>AB</td>
<td>VOR</td>
<td>IP262 status word bit 1: PU has higher priority than AS</td>
</tr>
<tr>
<td>7</td>
<td>AB</td>
<td>ADA</td>
<td>IP262 status word bit 3: controller adapted</td>
</tr>
<tr>
<td>8</td>
<td>AB</td>
<td>PRG</td>
<td>I content of the controller disabled (signal at binary input 4)</td>
</tr>
<tr>
<td>9</td>
<td>AA</td>
<td>WW</td>
<td>active master variable</td>
</tr>
<tr>
<td>10</td>
<td>AA</td>
<td>XW</td>
<td>active controlled variable</td>
</tr>
<tr>
<td>11</td>
<td>AA</td>
<td>XDWP</td>
<td>system deviation XW – WW in percent of measuring range</td>
</tr>
<tr>
<td>12</td>
<td>AA</td>
<td>YWP</td>
<td>active manipulated variable in %</td>
</tr>
<tr>
<td>13</td>
<td>AB</td>
<td>FX</td>
<td>indicator: XW outside range XUG, XOG</td>
</tr>
<tr>
<td>14</td>
<td>AB</td>
<td>FXD</td>
<td>indicator: XDWP outside range +/-XDPG</td>
</tr>
<tr>
<td>15</td>
<td>AB</td>
<td>INEX</td>
<td>control state: 1 = external, 0 = internal</td>
</tr>
<tr>
<td>16</td>
<td>AB</td>
<td>HDAC</td>
<td>controller state: 1 = automatic, 0 = manual</td>
</tr>
</tbody>
</table>
**Inputs**

<table>
<thead>
<tr>
<th>Input no.</th>
<th>Type</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I</td>
<td>EIAU</td>
<td>process state: 1 = on, 0 = off</td>
</tr>
<tr>
<td>2</td>
<td>EA</td>
<td>BUSN</td>
<td>bus number PB–DP = selection of PROFIBUS–DP interface</td>
</tr>
<tr>
<td>3</td>
<td>I</td>
<td>STNR</td>
<td>station number ET 200</td>
</tr>
<tr>
<td>4</td>
<td>I</td>
<td>LADR</td>
<td>relative byte address of the IP262 for reading (input)</td>
</tr>
<tr>
<td>5</td>
<td>I</td>
<td>SADR</td>
<td>relative byte address of the IP262 for writing (output)</td>
</tr>
<tr>
<td>6</td>
<td>I</td>
<td>RGNR</td>
<td>controller number in IP262 (value range 1,2,3,4)</td>
</tr>
<tr>
<td>7</td>
<td>PA</td>
<td>NRPL</td>
<td>number/position group display in the AS</td>
</tr>
<tr>
<td>8</td>
<td>PA</td>
<td>XEND</td>
<td>end of meas. range W, X (matches value +30000 in IP262)</td>
</tr>
<tr>
<td>9</td>
<td>PA</td>
<td>XANF</td>
<td>start of meas. range W, X (matches value −30000 in IP262)</td>
</tr>
<tr>
<td>10</td>
<td>EB</td>
<td>WNF</td>
<td>W tracking: 1B = W adopts XW, in manual mode</td>
</tr>
<tr>
<td>11</td>
<td>EB</td>
<td>YNF</td>
<td>Y tracking: 1B = Y adopts YNAF</td>
</tr>
<tr>
<td>12</td>
<td>EA</td>
<td>YNAF</td>
<td>tracking value Y, if YNF=1B</td>
</tr>
<tr>
<td>13</td>
<td>PA</td>
<td>WOG</td>
<td>upper limit W</td>
</tr>
<tr>
<td>14</td>
<td>PA</td>
<td>W</td>
<td>master variable (operator input W)</td>
</tr>
<tr>
<td>15</td>
<td>PA</td>
<td>WUG</td>
<td>lower limit W</td>
</tr>
<tr>
<td>16</td>
<td>S2</td>
<td>WTX</td>
<td>name of element W</td>
</tr>
<tr>
<td>17</td>
<td>S4</td>
<td>WTD</td>
<td>unit of W</td>
</tr>
<tr>
<td>18</td>
<td>EA</td>
<td>WEXT</td>
<td>W external for INEX=1B</td>
</tr>
<tr>
<td>19</td>
<td>PA</td>
<td>YOG</td>
<td>upper limit Y</td>
</tr>
<tr>
<td>20</td>
<td>PA</td>
<td>Y</td>
<td>manipulated variable (operator input Y)</td>
</tr>
<tr>
<td>21</td>
<td>PA</td>
<td>YUG</td>
<td>lower limit Y</td>
</tr>
<tr>
<td>22</td>
<td>S2</td>
<td>YTX</td>
<td>name of element Y</td>
</tr>
<tr>
<td>23</td>
<td>S4</td>
<td>YTD</td>
<td>unit of Y</td>
</tr>
<tr>
<td>24</td>
<td>PB</td>
<td>E</td>
<td>operator input &quot;External&quot;</td>
</tr>
<tr>
<td>25</td>
<td>S2</td>
<td>ETX</td>
<td>name of element E</td>
</tr>
<tr>
<td>26</td>
<td>PB</td>
<td>I</td>
<td>operator input &quot;Internal&quot;</td>
</tr>
<tr>
<td>27</td>
<td>S2</td>
<td>ITX</td>
<td>name of element I</td>
</tr>
<tr>
<td>28</td>
<td>PB</td>
<td>A</td>
<td>operator input &quot;Automatic&quot;</td>
</tr>
<tr>
<td>29</td>
<td>S2</td>
<td>ATX</td>
<td>name of element A</td>
</tr>
<tr>
<td>30</td>
<td>PB</td>
<td>H</td>
<td>operator input &quot;Manual&quot;</td>
</tr>
<tr>
<td>31</td>
<td>S2</td>
<td>HTX</td>
<td>name of element H</td>
</tr>
<tr>
<td>32</td>
<td>EB</td>
<td>EXAU</td>
<td>&quot;External&quot; forced by program</td>
</tr>
<tr>
<td>33</td>
<td>EB</td>
<td>INAU</td>
<td>&quot;Internal&quot; forced by program</td>
</tr>
<tr>
<td>34</td>
<td>EB</td>
<td>ACAU</td>
<td>&quot;Automatic&quot; forced by program</td>
</tr>
<tr>
<td>35</td>
<td>EB</td>
<td>HDAU</td>
<td>&quot;Manual&quot; forced by program</td>
</tr>
<tr>
<td>36</td>
<td>PA</td>
<td>KPOG</td>
<td>upper limit KP</td>
</tr>
<tr>
<td>37</td>
<td>PA</td>
<td>KP</td>
<td>proportional coefficient (operator input KP)</td>
</tr>
<tr>
<td>38</td>
<td>PA</td>
<td>KPU</td>
<td>lower limit KP</td>
</tr>
<tr>
<td>39</td>
<td>S2</td>
<td>KPTX</td>
<td>name of element KP</td>
</tr>
<tr>
<td>40</td>
<td>S4</td>
<td>KPTD</td>
<td>unit of KP</td>
</tr>
<tr>
<td>Input no.</td>
<td>Type</td>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>----------</td>
<td>------</td>
<td>------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>41</td>
<td>PA</td>
<td>TNOG</td>
<td>upper limit TN</td>
</tr>
<tr>
<td>42</td>
<td>PA</td>
<td>TN</td>
<td>integral action time (operator input TN)</td>
</tr>
<tr>
<td>43</td>
<td>PA</td>
<td>TNUG</td>
<td>lower limit TN</td>
</tr>
<tr>
<td>44</td>
<td>S2</td>
<td>TNTX</td>
<td>name of element TN</td>
</tr>
<tr>
<td>45</td>
<td>S4</td>
<td>TNTD</td>
<td>unit of TN</td>
</tr>
<tr>
<td>46</td>
<td>PA</td>
<td>TVOG</td>
<td>upper limit TV</td>
</tr>
<tr>
<td>47</td>
<td>PA</td>
<td>TV</td>
<td>derivative action time (operator input TV)</td>
</tr>
<tr>
<td>48</td>
<td>PA</td>
<td>TVUG</td>
<td>lower limit TV</td>
</tr>
<tr>
<td>49</td>
<td>S2</td>
<td>TVTX</td>
<td>name of element TV</td>
</tr>
<tr>
<td>50</td>
<td>S4</td>
<td>TVTD</td>
<td>unit of TV</td>
</tr>
<tr>
<td>51</td>
<td>PA</td>
<td>VVOG</td>
<td>upper limit VV</td>
</tr>
<tr>
<td>52</td>
<td>PA</td>
<td>VV</td>
<td>derivative action gain (operator input VV)</td>
</tr>
<tr>
<td>53</td>
<td>PA</td>
<td>VVUG</td>
<td>lower limit VV</td>
</tr>
<tr>
<td>54</td>
<td>S2</td>
<td>VVTX</td>
<td>name of element VV</td>
</tr>
<tr>
<td>55</td>
<td>S4</td>
<td>VVTD</td>
<td>unit of VV</td>
</tr>
<tr>
<td>56</td>
<td>PB</td>
<td>UEX</td>
<td>switch for monitoring XW: 1 = on</td>
</tr>
<tr>
<td>57</td>
<td>PA</td>
<td>OG</td>
<td>upper limit for monitoring XW</td>
</tr>
<tr>
<td>58</td>
<td>PA</td>
<td>XUG</td>
<td>lower limit for monitoring XW</td>
</tr>
<tr>
<td>59</td>
<td>PB</td>
<td>UEXD</td>
<td>switch for monitoring XDWP</td>
</tr>
<tr>
<td>60</td>
<td>PA</td>
<td>XDPG</td>
<td>limit for monitoring XDWP</td>
</tr>
<tr>
<td>61</td>
<td>ID</td>
<td>KPI</td>
<td>proportional coefficient IP262, integer</td>
</tr>
<tr>
<td>62</td>
<td>ID</td>
<td>TNI</td>
<td>integral action time, integer</td>
</tr>
<tr>
<td>63</td>
<td>ID</td>
<td>TVI</td>
<td>derivative action time, integer</td>
</tr>
<tr>
<td>64</td>
<td>ID</td>
<td>VVI</td>
<td>derivative action gain, integer</td>
</tr>
<tr>
<td>65</td>
<td>ID</td>
<td>TFI</td>
<td>filter time for system deviation, integer</td>
</tr>
<tr>
<td>66</td>
<td>ID</td>
<td>TWI</td>
<td>ramp for master variable, integer</td>
</tr>
<tr>
<td>67</td>
<td>ID</td>
<td>WAI</td>
<td>start limit master variable, integer</td>
</tr>
<tr>
<td>68</td>
<td>ID</td>
<td>WIE</td>
<td>end limit master variable, integer</td>
</tr>
<tr>
<td>69</td>
<td>ID</td>
<td>WSI</td>
<td>safety value master variable, integer</td>
</tr>
<tr>
<td>70</td>
<td>ID</td>
<td>YAI</td>
<td>start limit manipulated variable, integer</td>
</tr>
<tr>
<td>71</td>
<td>ID</td>
<td>YEI</td>
<td>end limit manipulated variable, integer</td>
</tr>
<tr>
<td>72</td>
<td>ID</td>
<td>YSI</td>
<td>safety manipulated variable, integer</td>
</tr>
<tr>
<td>73</td>
<td>ID</td>
<td>Y0I</td>
<td>working point for P(D) controller, integer</td>
</tr>
<tr>
<td>74</td>
<td>ID</td>
<td>C1I</td>
<td>constant 1, integer</td>
</tr>
<tr>
<td>75</td>
<td>ID</td>
<td>C2I</td>
<td>constant 2, integer</td>
</tr>
<tr>
<td>76</td>
<td>ID</td>
<td>RS1I</td>
<td>reserve</td>
</tr>
<tr>
<td>77</td>
<td>ID</td>
<td>RS2I</td>
<td>reserve</td>
</tr>
<tr>
<td>78</td>
<td>S16</td>
<td>AT</td>
<td>technological name</td>
</tr>
</tbody>
</table>
### 1.7.2 Data Elements of the KRIP Block

<table>
<thead>
<tr>
<th>Output no.</th>
<th>Type</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I</td>
<td>BUSN</td>
<td>bus number PB–DP = selection of PROFIBUS–DP interface</td>
</tr>
<tr>
<td>2</td>
<td>EA</td>
<td>IP01</td>
<td>display of the 1st interconnected RIP block</td>
</tr>
<tr>
<td>3</td>
<td>EA</td>
<td>IP02</td>
<td>display of the 2nd interconnected RIP block</td>
</tr>
<tr>
<td>4</td>
<td>EA</td>
<td>IP03</td>
<td>display of the 3rd interconnected RIP block</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>EA</td>
<td>IP62</td>
<td>display of the 62nd interconnected RIP block</td>
</tr>
<tr>
<td>64</td>
<td>EA</td>
<td>IP63</td>
<td>display of the 63rd interconnected RIP block</td>
</tr>
<tr>
<td>65</td>
<td>EA</td>
<td>IP64</td>
<td>display of the 64th interconnected RIP block</td>
</tr>
</tbody>
</table>
1.8 Installation of the Blocks RIP and KRIP in the AS x88/TM

The AS blocks RIP and KRIP can be loaded from the file IP262.NL.

From version M01.04 on, this file is part of the system software and included in the memory card.

If the file is not yet available, it must first be copied to the memory card of the AS x99/TM. The commissioning terminal can be used for copying with the following instructions in the program ASBEDIEN of the commissioning terminal:

\(<\text{ESC}>\) \(\Rightarrow\) switching to the command mode, "»" at the beginning of the input line

\(\text{»COPY_TM A:\ip262.nl}\)

If appropriate, "A:" must be replaced with the current drive and path string for the file IP262.NL.

The file IP262.NL on the memory card is copied to the end of the data structure in the user RAM of the AS x88/TM:

\(\text{STO;}\) \(\text{(loading possible only in the STO state!)}\)

\(\text{LA:\ip262.nl;}\)

Then the system software re–organizes the main memory of the AS x88/TM and releases the startup signal S318.

After loading the file IP262.NL, only an installation block is available which is required for correct installation of the blocks RIP and KRIP.

Invocation of the installation block with:

\(\text{BT,IP:@;}\)

Free type numbers for allocation of the blocks RIP and KRIP are entered in the elements TYP1 and TYP2 of the installation block:

\(\text{P,1, type number RIP;}\)

\(\text{P,3, type number KRIP;}\)

If the blocks RIP and KRIP are already available in the AS, the existing type numbers are adopted to the elements TYP1 and TYP2. In this case, the type numbers no longer can be changed.

If the type numbers in the elements TYP1 and TYP2 are admissible, the installation can be carried out with the element INST:

\(\text{P,5,1;}\)

During the installation, existing older versions of the re–loaded blocks in the AS are deleted and replaced by the new blocks.
Caution
For safety reasons, the installation should not be started on an online AS while older versions of the program to be installed in the AS are running. For this purpose, the AS is temporarily switched to the STO state before starting the installation or the concerned blocks must temporarily be removed from the cyclic process.

The installation block disappears after the installation.
The installation can be cancelled with the element ABBR and the installation block can be deleted before successful completion. To cancel the installation:
P,7,1;

Caution
An installation block must be deleted before re-loading the installation block.
Commissioning Terminal for AS 388/TM & AS 488/TM and Bridge CS–L

Technical Description
Safety instructions

This description contains instructions that must be observed in order to ensure personal safety and to avoid damage to the equipment. These instructions are marked by a triangular sign and exist in three different versions:

Danger

Failure to observe a Danger note **will** cause death, severe personal injury or severe damage to the equipment.

Warning

Failure to observe a Warning note **may** cause death, severe personal injury or severe damage to the equipment.

Caution

Failure to observe a Caution note may cause personal injury or damage to the equipment.

Note

Notes contain important information regarding the product, product handling or a specific part of the document that requires special attention.

Qualified personnel

The unit may only be commissioned and used on the basis of the information contained in this Manual. Only qualified personnel are authorized to perform any work inside the unit. Qualified personnel in the sense of the safety instructions in this Manual are persons who have been authorized to commission, ground and label units, systems and circuits according to the safety-relevant standards.

Normal use

Please observe the following instructions:

Warning

The unit may only be used for the applications mentioned in the Catalogue and the Technical Description. It may only be used together with third-party equipment or components that have been recommended or released by Siemens.

Faultless and safe operation of the product requires proper transport, storage, installation and commissioning, and careful handling and maintenance.

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Geschäftsgebiet Systems Engineering
D-76181 Karlsruhe

Exclusion of liability

Although we have checked the contents of this document against the hardware and software described herein, the information contained in this document may not cover all details. We can therefore not assume any liability for completeness. The information in this document is checked at regular intervals and necessary corrections will be included in the next revisions. We are grateful for any suggestions.

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Order No. C79000-T8076-C733
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   1.2 System requirements ............................................ 1-2
   1.3 System files ....................................................... 1-2

2 Commissioning Terminal configuring ............................... 2-1
   2.1 Configuration file ASBEDIEN.INI .................................. 2-2
      2.1.1 Interface assignment (console) ......................... 2-3
      2.1.2 Comment symbol ........................................... 2-3
      2.1.3 Input history ............................................... 2-3
      2.1.4 Screen saver ............................................... 2-3
   2.2 Division of screen ............................................... 2-4

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   5.1 Overview ............................................................ 5-2
   5.2 General functions ............................................... 5-3
      5.2.1 Set process operation keyboard keyswitch .............. 5-3
      5.2.2 Call operating system ................................... 5-3
      5.2.3 Call operating system ................................... 5-3
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Product Overview

This chapter

This chapter gives information about use and funktion, system requirements as well as system files.

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<tr>
<th>Section</th>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Use and funktion</td>
<td>1-2</td>
</tr>
<tr>
<td>1.2</td>
<td>System requirements</td>
<td>1-2</td>
</tr>
<tr>
<td>1.3</td>
<td>System files</td>
<td>1-2</td>
</tr>
</tbody>
</table>
1.1 Use and funktion

The ASBEDIEN.EXE program simulates the alphanumeric keyboard and the process operation keyboard of an ASx88/TM and provides the following additional functions:

- The last 8 to 255 operations transmitted to the AS are stored, can be edited, and subsequently transmitted to the ASx88/TM again.
- Transmission of an ASCII file to the ASx88/TM.
- Recording of operator inputs into a file or on a printer.
- The program can control up to 4 operation channels simultaneously.
- Utilization of RESI function.
- Recording and output of AS printer output into a PC file or on the PC printers (logging and message printers separately).
- Help screen field for special functions.

**Note**

When operating on a Bridge CS–L2, only the file transfer commands are available in command mode (COPY_PC, COPY_TM, DEL_TM, DIR_TM).

1.2 System requirements

- IBM AT–compatible PC with MS–DOS (for ASBEDIEN ≤ V1.09)
- PC with Windows NT 4.0 or Windows 2000 (for ASBEDIEN/NT)
- VGA card and multi–sync monitor
  (recommendation for ASBEDIEN/NT: resolution min 1152 x 864, ≥ 32768 colors)
- At least one vacant interface (RS232/V24)

1.3 System files

The commissioning terminal consists of the following files which must be present in the same directory:

<table>
<thead>
<tr>
<th>File</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASBEDIEN.EXE</td>
<td>Executable program</td>
</tr>
<tr>
<td>ASBEDIEN.INI</td>
<td>Configuration file (see overleaf)</td>
</tr>
<tr>
<td>ASBEDI_E.ERR</td>
<td>Clear text messages in English</td>
</tr>
<tr>
<td></td>
<td>In order to activate these, you must rename this file into ASBEDIEN.ERR</td>
</tr>
</tbody>
</table>
This chapter gives information about configuring the commissioning terminal.

The sections are on the following pages:

<table>
<thead>
<tr>
<th>Section</th>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Configuration file ASBEDIEN.INI</td>
<td>2-2</td>
</tr>
<tr>
<td>2.2</td>
<td>Division of screen</td>
<td>2-4</td>
</tr>
</tbody>
</table>
2.1 Configuration file ASBEDIEN.INI

All important data for the ASBEDIEN program are stored in the file ASBEDIEN.INI. If your configuration is changed (e.g. modification to interface assignments), the file can be adapted using an ASCII editor.

The file ASBEDIEN.INI is found in the same directory as the EXE file and contains the following entries:

a) Assignment of ASx88/TM to the PC interfaces
b) Target data for the AS printer logs
c) Definition of comment symbol for the LOAD function
d) Size of input memory (history)
e) Time for screen saver.

The file has the following configuration (example):

```
; Configuration file  ASx88/TM – operation program
;
PLATZ_1:   COM1        protokol.prn meld.prn
;PLATZ_2:  COM4        LPT3         LPT3
LOAD_Kommentar_Symbol: *
Bedienhistorie:  200
Bildschirmschoner:  0.0
```

A semicolon (;) as the first character identifies the corresponding line as a comment.

The individual keywords and settings must each be separated by spaces. Upper-case/lower-case letters are relevant!

The keywords can be in any sequence. If the same keywords are used, the last data in the file are applicable.

---

**Note**

If a printer with print buffer is used for the printer outputs (e.g. a laser printer), a page will be printed first after a formfeed. Because of this ASBEDIEN sends a formfeed to the printer before ending to output the print buffer.
2.1.1 Interface assignment (console)

**PLATZ\_n:**  
\( \text{COMx prot meld} \)

- \( n \) = Number of desired operating console (1...4 or 8 with /NT)
- \( \text{prot} \) = Destination data for AS logging printer
- \( \text{meld} \) = Destination data for AS matrix printer

The standard printer designations (PRN, LPT1) are permissible, or a file name together with the drive and path data.
The defined directory must be present.

Recommendation: Instead of using the console switch, ASBEDIEN/NT should be started several times (i.e. from an ASBEDIEN directory each with an INI file including the current used COM interface for PLATZ\_n).

2.1.2 Comment symbol

**LOAD\_Kommentar\_Symbol:**

With the automatic loading function, the comment symbol identifies the lines which are not to be transmitted to the AS. The symbol must be the first character in the line. Furthermore, all characters following a semicolon in a line are not transmitted, i.e. any comments can be positioned following the semicolon in every instruction line. Leading blanks are ignored.

2.1.3 Input history

**Bedienhistorie:**

Number of input lines stored in the input buffer.

The following is applicable:  
\[ 8 \leq \text{number} \leq 255. \]

2.1.4 Screen saver

**Bildschirmschoner:**

Time in seconds after which the PC screen is blanked.

0.0 seconds as the value switches off this function.
2.2 Division of screen

1. Number of current operating console
2. AS screen (64 * 32 characters)
3. Status displays of the load/receive functions
4. Diagnostic displays
5. Input line (AS input or command input »)
6. Process operation keyboard function keys (inscription from AS)
7. Keyswitch position
8. Plain text error message (following F xxx or error number on AS screen)
   - Help texts for keys or commands
   - Diagnostic outputs

Screen resolution

Both character sets needed for the correct screen display, which have to be copied into the Windows system directory FONTS during installation, can display the AS characters with two sizes. The selection small or big depends on the resolution of the used grafic module (min 1152 x 864 for the big display).
Start connection to the AS

The connection to the AS is checked when the program is started. During this check the following blinking message appears in the editing line:

Verbindungsaufbau Bedienplatz 1

this means: Starting connection on operating console 1

If the connection cannot be established, the following warning is output in the editing line:

AS meldet sich nicht ! Programm beenden ? J/N

this means: AS does not respond ! Terminate program ? Y/N

You can then decide whether you wish to abort the program (J) or not.

An error message may be due to the following:

1. The connection between the PC and AS is incorrect (wrong cable, wrong COM interface set, ...).
2. The AS has not yet run up completely. In this case, you can continue the program using 'N'. The program operates correctly once the AS has started up.
3. The AS is still in "RESI mode" (GE,6,6;). The program can also be continued in this case using 'N'. The connection can be established again by switching back to normal mode using the input ALT–A (GE,0,6;).

If the connection is established correctly, the assignments of the virtual keys of the AS are displayed in the last line.

Can this connection not been startet despite all settings are correct, the following procedure is recommended:

1. Close ASBEDIEN with Alt–X and wait about 1 minute. After that start the program again.
2. Till the task ASBEDIEN running under Windows via Ctrl–Alt–Del or via the Task Manager and start again.

With the message "AS does not respond!" the instructions "F;" and "GE,0,6;" are send alternating to the AS up from version V1.07. With this a AS picture is transmitted in any case resp. a still active PC coupling is switched off.

The AS picture transmitted during trying to couple possibly contains further informations, why no connection can be set up to the AS:

- STRUxyy indicates a still active bus coupling → input "ABMS;"
- NEMO/NEDA → input "AE;" or "DE;" and "END;"
- BE → switch off input mode with "BR;"
### Keyboard operations

The keys of the process operation keyboard are simulated and extended by the following PC key combinations:

<table>
<thead>
<tr>
<th>PC key</th>
<th>Key of process operation keyboard and meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALT–A</td>
<td>Switch off terminal mode (GE,0,6;)</td>
</tr>
<tr>
<td>ALT–B</td>
<td>BR,</td>
</tr>
<tr>
<td>ALT–D</td>
<td>Transmit PC date and time to AS</td>
</tr>
<tr>
<td>ALT–E or F11</td>
<td>BE;</td>
</tr>
<tr>
<td>ALT–F</td>
<td>QF;</td>
</tr>
<tr>
<td>ALT–G</td>
<td>GP;</td>
</tr>
<tr>
<td>ALT–I</td>
<td>BI;</td>
</tr>
<tr>
<td>ALT–M</td>
<td>QM;</td>
</tr>
<tr>
<td>ALT–N</td>
<td>QF,*;</td>
</tr>
<tr>
<td>ALT–P</td>
<td>GP;</td>
</tr>
<tr>
<td>ALT–R</td>
<td>BR;</td>
</tr>
<tr>
<td>ALT–S</td>
<td>QS;</td>
</tr>
<tr>
<td>ALT–T or F12</td>
<td>TE;</td>
</tr>
<tr>
<td>ALT–U</td>
<td>UB;</td>
</tr>
<tr>
<td>ALT–Y</td>
<td>Delete input line</td>
</tr>
<tr>
<td>ALT–X</td>
<td>Terminate program</td>
</tr>
<tr>
<td>ALT–1...4</td>
<td>Change operating console (if present)</td>
</tr>
<tr>
<td>F1–F10</td>
<td>Function keys of process operation keyboard</td>
</tr>
<tr>
<td></td>
<td>(according to inscription in bottom line on screen)</td>
</tr>
<tr>
<td>F9</td>
<td>BT,STAT:@;</td>
</tr>
<tr>
<td>ALT–F1 ... ALT–F10</td>
<td>FUTA function keys of the process operation keyboard (FT,1; ... FT,9; or FT,)</td>
</tr>
<tr>
<td>Return or ;</td>
<td>Execute</td>
</tr>
<tr>
<td>ESC</td>
<td>Select/leave command mode</td>
</tr>
<tr>
<td>TAB</td>
<td>Toggle between input line and diagnostic window</td>
</tr>
<tr>
<td>Cursor up (↑)</td>
<td>Scroll input history in direction “Older”</td>
</tr>
<tr>
<td>Cursor down (↓)</td>
<td>Scroll input history in direction “Newer”</td>
</tr>
<tr>
<td>Cursor right (→)</td>
<td>1 character to right in editing line</td>
</tr>
<tr>
<td>Cursor left (←)</td>
<td>1 character to left in editing line</td>
</tr>
</tbody>
</table>
### Keyboard operations

<table>
<thead>
<tr>
<th>Key Combination</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACKSPACE</td>
<td>Cancel an entered character</td>
</tr>
<tr>
<td>Cursor END</td>
<td>Position cursor to end of editing line</td>
</tr>
<tr>
<td>Cursor POS1/HOME</td>
<td>Position cursor to start of editing line</td>
</tr>
<tr>
<td>ENTF / DEL</td>
<td>Delete character above cursor</td>
</tr>
<tr>
<td>EINF</td>
<td>Toggle between insert and overwrite modes in the editing line (cursor as underline character or block)</td>
</tr>
<tr>
<td>Page up (↑)</td>
<td>Scroll in help pages</td>
</tr>
<tr>
<td>Page down (↓)</td>
<td>Scroll in help pages</td>
</tr>
<tr>
<td>CTRL + cursor up (↑)</td>
<td>Increase input value (&gt;; )</td>
</tr>
<tr>
<td>CTRL + cursor down (↓)</td>
<td>Decrease input value (&lt;; )</td>
</tr>
<tr>
<td>CTRL + page up (↑)</td>
<td>Fast increase of input value (&gt;&gt;; )</td>
</tr>
<tr>
<td>CTRL + page down (↓)</td>
<td>Fast decrease of input value (&lt;&lt;; )</td>
</tr>
<tr>
<td>PAGE(↑) / PAGE(↓)</td>
<td>Scroll in help window of command functions</td>
</tr>
</tbody>
</table>
Operating commands

This chapter gives information about Operating commands

Contents

The sections are on the following pages:

<table>
<thead>
<tr>
<th>Section</th>
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<tbody>
<tr>
<td>5.1</td>
<td>Overview</td>
<td>5–2</td>
</tr>
<tr>
<td>5.2</td>
<td>General functions</td>
<td>5–3</td>
</tr>
<tr>
<td>5.3</td>
<td>Functions for PC coupling</td>
<td>5–4</td>
</tr>
<tr>
<td>5.4</td>
<td>Commands for file transfer</td>
<td>5–5</td>
</tr>
</tbody>
</table>
5.1 Overview

The following commands are executed in the Command mode. Command mode is initiated or left using the ESC key and terminated using the Return key. This mode is indicated in the input line by a double arrow (»).

Picture 5-1 gives an view of the commands of the Commissioning Terminal for handling of files and user structures. These commands are described below.

![Diagram of Commissioning Terminal commands](image)

Figure 5-1 Commissioning Terminal commands for handling of files and user structures
5.2 General functions

5.2.1 Set process operation keyboard keyswitch

«SCHL»<return>

no corresponds to the desired switch position (0...3).

When entering this command, you will first be requested to enter a password with up to four digits (without <return>). Switching over is only valid if the input corresponds to the password stored in the ASx88/TM, and is displayed accordingly in the screen form.

The default settings of the passwords are as follows: 0000 1111 2222 3333 .

«SCHL»<return>

This can be used to change the password for this keyswitch position, i.e. the new password must be entered following input of the old password (each without <return>).

5.2.2 Call operating system

«DOS»<return>

This command is used to start the DOS command processor COMMAND.COM; you can then enter DOS commands. Return to ASBEDIEN by entering the statement EXIT<return>.

Note

ASBEDIEN is made inactive by this command.

Transmissions which are currently taking place are interrupted and may be distorted.

5.2.3 Call operating system

«F nr»<return>

This instruction can be used to display the message text belonging to a system message (Sxxx, Fxxx). The 3-digit message number without the letter F or S is expected as no, e.g. F 323 for S323 or F 461 for F461.
5.3 Functions for PC coupling

5.3.1 Load file into AS (loading sequence)

»L file [S]<return> e.g. ‘L c:\project\file1.str S’

Transmission of an ASCII file to the AS. If an S is entered after the file name, the transmission is stopped whenever an error occurs. You are then automatically in correction mode and can eliminate the error as desired or also enter several lines. Further transmission is continued using the key command ALT–C.

Since the handing of files becomes rather complex above a certain amount, it is possible to load several files in succession using a "Control file". The character "#" is used to identify this. If this is the first character of a data line, the line is interpreted as a file designation, and its contents inserted at this position. Such a line could be as follows:

"# C:\project\file2.lay"

If an S has not been entered, the transmission is also continued when errors occur.

The program creates an error file which lists the faulty line, the error number and the line number. The error file is stored in the directory of the source file under its name with the extension ".ERR".

The key command ALT–L can be used to interrupt the transmission at any time, and ALT–C to continue it again.

ALT–Q can be used to abort the transmission at any time.

5.3.2 Record inputs into a file

»W file<return> e.g. ‘W report.op’

Following this command, all subsequent inputs are written into a file. This is continued until recording is stopped using the command

»W END<return>

5.3.3 Read data from the AS

»R file<return> e.g. ‘R \temp\read.dat’

The AS input channel is switched over using "GE,7,6;", and you can then call the desired information in succession from the AS. All data sent from the AS are written into the defined file.

»R target_file source_file [S]<return>

e.g. ‘R c:\temp\result c:\project\structur.lse S’

In this case you are additionally able to transmit the input commands from a source file to the AS. The S has the same meaning as with the L command.

Following this command, the data are written into a file. This is continued until recording is stopped using the command

»R END<return>
5.4 Commands for file transfer

5.4.1 Load AS system software

» **LSYS file**<return>  
  e.g. 'LSYS c:\system.as'

You can use this instruction to load a new system software version into the system data memory of the ASx88/TM. This then carries out a restart.

5.4.2 Load AS user software

» **LANW file**<return>  
  e.g. 'LANW c:\project1\plant.001'

You can use this instruction to load new user software into the user memory of the ASx88/TM. This then carries out a restart.

5.4.3 Read file from AS drive

» **COPY_PC file_name [target_catalog]**<return>  
  e.g. 'COPY_PC AS_KOM.INI c:\as_conf'

You can use this instruction to load a file (e.g. a configuration file) from a drive of the ASx88/TM or the Bridge into the PC.

5.4.4 Write file on AS drive

» **COPY_TM file**<return>  
  e.g. 'COPY_TM c:\tmp\AS_KOM.INI'

You can use this instruction to load a new or modified file onto a drive of the ASx88/TM or the Bridge (i.e. onto the memory card).

5.4.5 Delete file on AS drive

» **DEL_TM file_name**<return>  
  e.g. 'DEL_TM DP1.BAK'

You can use this instruction to delete a configuration file on a drive of the ASx88/TM or the Bridge (i.e. on the memory card).

5.4.6 Read directory of an AS drive into a PC file

» **DIR_TM [file]**<return>  
  e.g. 'DIR_TM c:\tmp\AS123.DIR'

You can use this instruction to read the directory of a drive of the ASx88/TM or the Bridge. Subdirectories are displayed, but not processed further. If no file name is specified, the directory is stored under ASx88TM.DIR in the set working directory.
5.4.7 Read user structure from AS drive

```bash
AR_PC S16_AS_name [:file]<return>
```

- Example: `AR_PC TESTPLANT 1 :c:\project\TEST1.ANW`

You can use this instruction to save a user structure stored on a drive of the ASx88/TM (overview using DI;) on the PC. Since the AS name may contain any characters except `:`, the optional PC file name is separated by a colon. If no file name is specified, the structure is stored under STRUKTUR.ANW in the set working directory.

This ANW file can be loaded into the AS memory again using the LANW command or also processed further using PROGRAF AS+.

To do this, the file must be copied into the corresponding PROGRAF AS directory:

```
drv:\PROGRAF\AS_DATA\assystem.235\ASHSP
```

"assystem" must be replaced by the name selected in PROGRAF AS+ for the automation system.

The following inputs are necessary to decompile into PROGRAF AS+:
- Select automation system "assystem"
- Data transfer AS
- AS->PC / AS–RAM transfer
- Select AS–RAM (structure.ANW)
- Decompile AS–RAM
### 5.5 Messages

The following german messages mean:

<table>
<thead>
<tr>
<th>German Message</th>
<th>English Translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBS–Terminal V1.06</td>
<td>Service Terminal for Commissioning</td>
</tr>
<tr>
<td>Bedienplatz x</td>
<td>Console x</td>
</tr>
<tr>
<td>Paßwort für Schlüsselschalter x</td>
<td>Password for keyboard keyswitch x</td>
</tr>
<tr>
<td>neues Paßwort:</td>
<td>new password</td>
</tr>
<tr>
<td>ESC drücken !</td>
<td>press ESC !</td>
</tr>
<tr>
<td>LOAD–Funktion noch aktiv</td>
<td>LOAD function still active</td>
</tr>
<tr>
<td>WRITE–Funktion noch aktiv</td>
<td>WRITE function still active</td>
</tr>
<tr>
<td>RECEIVE–Funktion noch aktiv</td>
<td>RECEIVE function still active</td>
</tr>
<tr>
<td>andere Funktion noch aktiv</td>
<td>another function still active</td>
</tr>
<tr>
<td>RECEIVE abbrechen? J/N</td>
<td>Stop Receiving ? Y/N</td>
</tr>
<tr>
<td>LOAD abbrechen? J/N</td>
<td>Stop Loading ? Y/N</td>
</tr>
<tr>
<td>ANW–Datei kann nicht eröffnet werden</td>
<td>User data file can’t be opened</td>
</tr>
<tr>
<td>Datei enthält keine AS–Anwenderdaten</td>
<td>File doesn’t contain AS user data</td>
</tr>
<tr>
<td>AS nicht in STO–Zustand</td>
<td>AS not in STO state (offline)</td>
</tr>
<tr>
<td>AS–Anwenderspeicher zu klein</td>
<td>AS user data memory too small</td>
</tr>
<tr>
<td>SYS–Datei kann nicht eröffnet werden</td>
<td>System data file can’t be opened</td>
</tr>
<tr>
<td>Datei enthält keine AS–Systemdaten</td>
<td>File doesn’t contain AS system data</td>
</tr>
<tr>
<td>AS–Systemspeicher zu klein</td>
<td>AS system data memory too small</td>
</tr>
<tr>
<td>Datei nicht vorhanden</td>
<td>File not existing</td>
</tr>
<tr>
<td>Fehlerdatei kann nicht eröffnet werden</td>
<td>Error file can’t be opened</td>
</tr>
<tr>
<td>WRITE–Datei kann nicht eröffnet werden</td>
<td>Write file can’t be opened</td>
</tr>
<tr>
<td>RECEIVE–Datei kann nicht eröffnet werden</td>
<td>Receive file can’t be opened</td>
</tr>
<tr>
<td>LOAD–Datei nicht vorhanden</td>
<td>LOAD file not existing</td>
</tr>
<tr>
<td>Zielfdatei kann nicht eröffnet werden</td>
<td>Destination file can’t be opened</td>
</tr>
<tr>
<td>Datei nicht gefunden</td>
<td>File not found</td>
</tr>
<tr>
<td>Datei fehlerhaft übertragen</td>
<td>File transmitted faulty</td>
</tr>
<tr>
<td>Datei nicht eröffnet werden</td>
<td>File can’t be opened</td>
</tr>
<tr>
<td>Kein Platz mehr, Zielfdatei erst löschen</td>
<td>No more space, first delete destination file</td>
</tr>
<tr>
<td>Dateiübertragung war fehlerhaft</td>
<td>File transmission was faulty</td>
</tr>
<tr>
<td>Datei nicht gelöscht</td>
<td>File not deleted</td>
</tr>
<tr>
<td>Anwenderstruktur nicht gefunden</td>
<td>User structure not found</td>
</tr>
<tr>
<td>Anwenderstruktur fehlerhaft übertragen</td>
<td>User structure transmitted faulty</td>
</tr>
<tr>
<td>xxxxxxxxxx nicht vorhanden</td>
<td>xxxxxxxxxx not existing</td>
</tr>
<tr>
<td>Zeile : x</td>
<td>Line : x</td>
</tr>
<tr>
<td>Fehler: xxxx</td>
<td>Error: xxxx</td>
</tr>
<tr>
<td>Anz.Fehler: x</td>
<td>Number of errors: x</td>
</tr>
<tr>
<td>akt.Fehler:</td>
<td>Current error:</td>
</tr>
<tr>
<td>Fehler bei Diskettenzugriff!</td>
<td>Error during floppy access!</td>
</tr>
<tr>
<td>Fehler bei Druckerzugriff!</td>
<td>Error during printer access!</td>
</tr>
</tbody>
</table>