SIEMENS

SIMATIC HMI

WinCC flexible 2008 Communication Part 2

User's Manual

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This user manual is part of the documentation package with the order number 6AV6691-1CA01-3AB0.

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Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

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⚠ CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

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indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

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The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Siemens AG
Industry Sector
Postfach 48 48
90327 NÜRNBERG
GERMANY

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Preface

Purpose of this manual

This user manual is part of the WinCC flexible documentation..

The purpose of the "WinCC flexible Communication" user manual is to explain:

- which communications protocols can be used for communication between a SIEMENS HMI device and a controller,
- which SIEMENS HMI devices can be used for communication,
- which controllers can be connected to a selected SIEMENS HMI device,
- which settings are required in the controller program for the connection, and
- which user data areas must be set up for communication.

Separate sections therefore explain the size, structure, and function of the user data areas and the assigned area pointers.

The manual is intended for newcomers, operators and configuration engineers involved in configuration, commissioning, installation and service with WinCC flexible.

The help integrated in WinCC flexible, the WinCC flexible Information System, contains detailed information. The information system contains instructions, examples and reference information in electronic form.

Basic Knowledge Requirements

General knowledge in the field of automation engineering is required to understand this manual.

You should also have experience of using PCs running under the Windows 2000 or Windows XP operating systems. A knowledge of VBA or VBS is required for advanced configuration by using scripts.

Scope of the manual

This manual is valid for the WinCC flexible 2008 software package.

Position in the information scheme

This manual is part of the SIMATIC HMI documentation. The information below presents an overview of the information landscape of SIMATIC HMI.

User manual

- WinCC flexible Micro
  - describes the engineering basics based on the WinCC flexible Micro engineering system (ES)
- WinCC flexible Compact/ Standard/ Advanced
  - describes the engineering basics based on the WinCC flexible Compact, WinCC flexible Standard and WinCC flexible Advanced engineering systems (ES)
- WinCC flexible Runtime:
  - Describes how to commission and operate your Runtime project on a PC.
- WinCC flexible Migration:
  - Describes how to convert an existing ProTool project to WinCC flexible.
  - Describes how to convert an existing WinCC project to WinCC flexible.
  - Describes how to migrate ProTool projects with an HMI migration from OP3 to OP 73 or OP 73 micro.
  - Describes how to migrate ProTool projects with an HMI migration from OP7 to OP 77B or OP 77A.
  - Describes how to migrate ProTool projects with an HMI migration from OP17 to OP 177B.
  - describes how to migrate ProTool projects with HMI migration from RMOS graphic devices to Windows CE devices.
- Communication:
  - Communication Part 1 describes the connection of the HMI device to SIMATIC PLCs.
  - Communication Part 2 describes the connection of the HMI device to third-party PLCs.

Operating Instructions

- Operating instructions for SIMATIC HMI devices:
  - OP 73, OP 77A, OP 77B
  - TP 170micro, TP 170A, TP 170B, OP 170B
  - OP 73micro, TP 177micro
  - TP 177A, TP 177B, OP 177B
  - TP 270, OP 270
  - MP 270B
  - MP 370
- Operating instructions for mobile SIMATIC HMI devices:
  - Mobile Panel 170
- Operating instructions (compact) for SIMATIC HMI devices:
  - OP 77B
  - Mobile Panel 170

Getting Started

- WinCC flexible for first time users:
  - Based on a sample project, this is a step-by-step introduction to the basics of configuring screens, alarms, and recipes, and screen navigation.
- WinCC flexible for advanced users:
  - Based on a sample project, this is a step-by-step introduction to the basics of configuring logs, project reports, scripts, user management, and multilingual projects, and integration into STEP 7.
- WinCC flexible options:
  - Based on a sample project, this is a step-by-step introduction to the basics of configuring the WinCC flexible Audit, Sm@rtServices, Sm@rtAccess and OPC Server options.

Online availability

The following link actively guides you to technical documentation for SIMATIC products and systems in different languages.

- SIMATIC Guide Technical Documentation:

http://www.automation.siemens.com/simatic/portal/html_76/techdoku.htm

Guide

The user manual consists of Parts 1 and 2. Part 2 is organized as follows:

- the connection to Allen-Bradley controllers,
- the connection to GE Fanuc Automation controllers,
- the connection to LG Industrial Systems/IMO controllers,
- the connection to Mitsubishi Electric controllers,
- the connection to Schneider Automation (Modicon) controllers,
- the connection to OMRON controllers.

Part 1 contains the descriptions of

- the connection to SIEMENS SIMATIC controllers (S7, S5, 500/505)
- the connection via the HMI HTTP protocol
- the connection via OLE for Process Control (OPC)
- the connection to SIMOTION controllers
- the connection to WinAC controllers

Conventions

A distinction is made in the naming conventions for the configuration and runtime software:

- "WinCC flexible 2008" refers to the configuration software.
- "Runtime" designates the runtime software running on the HMI devices.
- "WinCC flexible Runtime" designates the visualization product for use on standard PCs or panel PCs.

The term "WinCC flexible" is used in the general context. A version name such as "WinCC flexible 2008" is used whenever it is necessary to distinguish it from other versions.

The following formatting is used to facilitate reading of the manual:

Notation	Scope
"Add screen"	• Terminology that occurs in the user interface, e.g., dialog names, tabs, buttons, menu commands. • Inputs required, e.g., limit values, tag values • Path information
"File > Edit"	Operational sequences, e.g., menu commands/shortcut menu commands.
<F1>, <Alt>+<P>	Keyboard inputs

Please observe notes labeled as follows:

Note

Notes containing important information about the product and its use or a specific section of the documentation to which you should pay particular attention.

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Representatives and offices

If you have questions concerning the use of the described product which are not answered in this manual, please contact the Siemens representative in your area.

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A guide to the technical documentation for the various SIMATIC products and systems is available at:

http://www.siemens.com/simatic-tech-doku-portal

The online catalog and the online ordering system is available at:

http://mall.automation.siemens.com

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Phone: +49 (911) 895-3200

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via the support request form on the web:

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Phone: + 49 180 5050 222

Fax: + 49 180 5050 223

Additional information about our technical support is available in the Internet at:

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There you will find:

- The newsletter which provides the latest information on your products.
- Relevant documentation for your application, which you can access via the search function in our service & support database.
- A forum where users and experts from all over ther world exchange ideas.
- You local Automation & Drives representative.
- Information about on-site service, repairs, spare parts. Much more can be found on our "Services" pages.

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1 Working with connections

1.1 Basics

1.1.1 Communication basics

Introduction

The data exchange between two communication partners is known as communication. The communication partners can be interconnected via direct cable connection or network.

Communication partners

A communication partner can be any node which is capable of communicating and exchanging data with other nodes on the network. In the WinCC flexible environment, the following nodes can be communication partners:

- Central modules and communication modules in the automation system
- can be HMI devices and communication processors in the PC.

Data transferred between the communication partners may serve different purposes:

- process control
- process data acquisition
- reporting states in a process
- process data logging

1.1.2 Principles of communication

Introduction

WinCC flexible controls communication between the HMI and the PLC by means of tags and area pointers.

Communication using tags

In WinCC flexible, tags are centrally managed in the "Tag" editor. There are external and internal tags. External tags are used for communication, and represent the image of defined memory locations on the PLC. The HMI and the PLC both have read and write access to this storage location. Those read and write operations may cyclic or event-triggered.

In your configuration, create tags that point to specific PLC addresses. The HMI reads the value from the defined address, and then displays it. The operator may also enter values on the HMI device which will be written to the relevant PLC address.

Communication using area pointers

Area pointers are used to exchange data of specific user data areas. Area pointers are parameter fields. WinCC flexible receives from these parameter fields in runtime the information about the location and size of data areas in the PLC. During communication, the PLC and the HMI device alternately access those data areas for read and write operations. Based on the evaluation of data stored in the data areas, the PLC and HMI device trigger defined actions.

WinCC flexible uses the following area pointers:

- Control request
- Project ID
- Screen number
- Data record
- Date/time
- Date/time PLC
- Coordination

The availability of the various area pointers is determined by the HMI used.

Communication between WinCC flexible and automation systems

Industrial communication using WinCC flexible means that data are exchanged using tags and area pointers. To acquire the data, the HMI sends request messages to the automation system using a communication driver. The automation system (AS) returns the requested data to the HMI in a response frame.

Communication drivers

A communication driver is a software component that develops a connection between an automation system and an HMI device. The communication driver hence enables the tags in WinCC flexible to be supplied with process values. WinCC flexible supports the interconnection of different automation systems with various communication drivers.

Users can select the interface, the profile and the transmission speed for each specific communication partner.

Communication between HMIs

The SIMATIC HMI HTTP Protocol is available for the communication between HMIs. This protocol is a component of the "Sm@rtAccess" option. The protocol can be used on PCs with WinCC flexible Runtime and on Panels as of the 270 series. For detailed information, refer to the SIMATIC HMI HTTP Protocol documentation.

Communication via uniform and manufacturer-independent interface

WinCC flexible provides a uniform and manufacturer-independent software interface using OPC (OLE for Process Control). This interface allows a standardized data exchange between applications for industry, office, and production. For detailed information, refer to the OPC documentation.

1.2 Elements and basic settings

1.2.1 Connections Editor

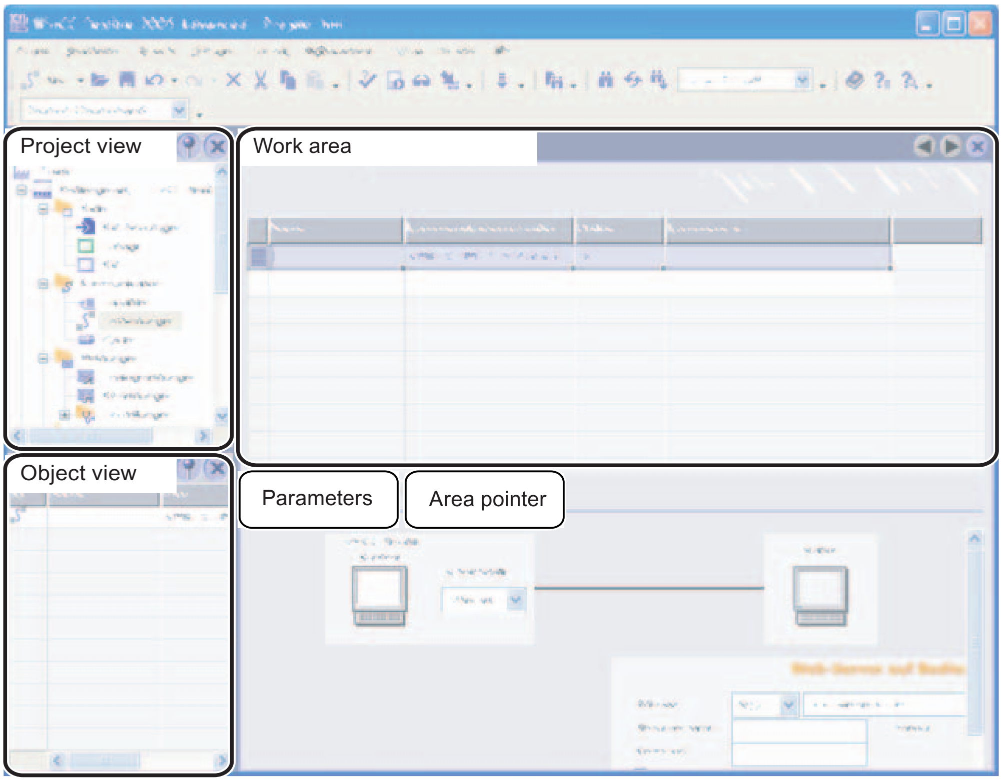
Introduction

In the "Connections" editor, you create and configure connections.

Open

Select "Connections" from the project view, and then open the shortcut menu. Select "New connection" from in this shortcut menu. The new connection will be created and opened in the work area.

Structure



Menu bar

The menu bar contains all commands required for operating WinCC flexible. Available key combinations are indicated next to the menu command.

Toolbars

The toolbars contain the most frequently used buttons.

Select "View > Toolbars" to show or hide the specific toolbars. The button of a toolbar can be used to show or hide specific buttons of this toolbar.

Work area

All connections are visualized in the work area in tabular format. You select the communication drivers from the table cells, and edit the relevant connection properties. To sort the table by its column entries, simply click the column header.

"Parameters" tab

Using the "Parameters" tab you can configure the settings for the communication drivers selected in the table. Select the settings for the HMI, the network and for the PLC.

"Area pointer" tab

Using the "Area pointers" tab you can configure the area pointers of the connections.

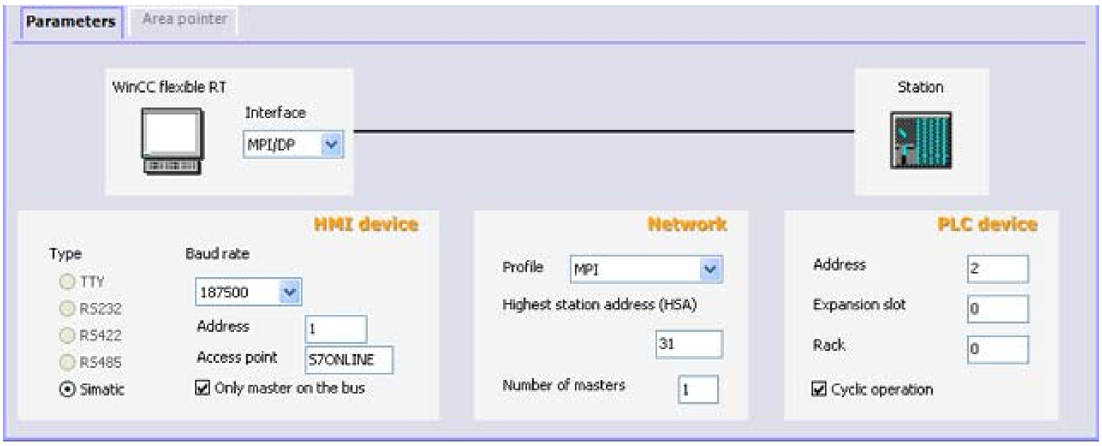
1.2.2 Parameters for connections

Introduction

Select the "Parameters" tab of the "Connections" editor to configure the properties of a connection between the HMI and the communication partner.

Structure

The communication partners are visualized schematically on the "Parameters" tab. This tab provides the "HMI device", "Network" and "PLC" areas where you can declare the parameters of the relevant interface used.



The system sets default parameters. Always ensure consistency on the network whenever you edit parameters. For detailed information on configurable parameters, refer to the description of the supported protocols.

1.2.3 Area pointers for connections

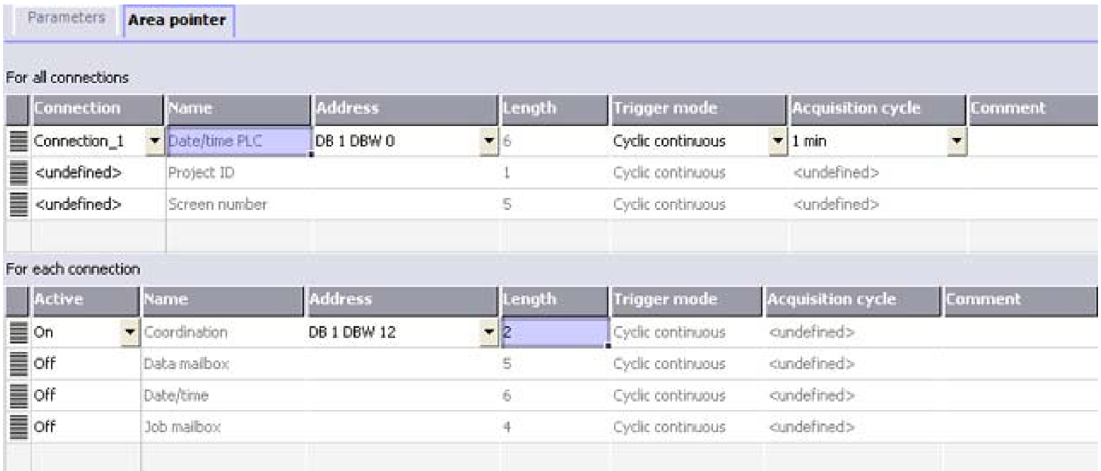
Introduction

Using the "Area pointer" tab of the "Connections" editor, you can configure the usage of the available area pointers.

Structure

The "Area pointer" tab contains two tables of area pointers. The "For all connections" table contains those area pointers which are created only once in the project and can be used for only one connection.

The "For each connection" table contains the area pointers you can set separately for each available connection.



The availability of the various area pointers is determined by the HMI device used. For detailed information on area pointers and their configuration, refer to the description of the supported protocols.

1.3 Configuring the connection

Introduction

You create a new connection using the Connections editor.

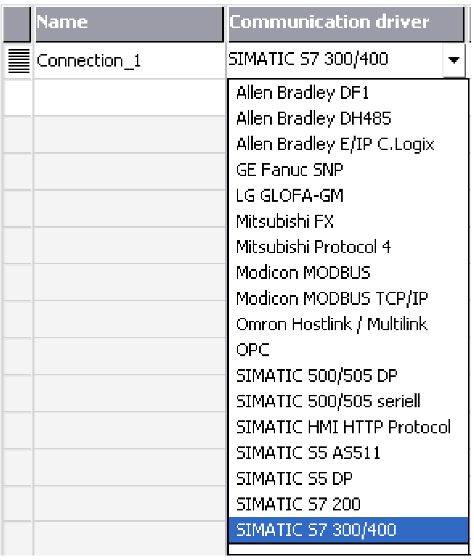
Requirements

A project is open.

Procedure

1. In the project view, open the "Communication" group.
2. Select "New connection" from the "Connections" shortcut menu.

   The "Connections" editor opens and shows a new connection.
3. Rename the connection in the "Name" column as required.
4. From the "Communication driver" column, select a communication driver that is suitable for the PLC being used.

   Only those drivers that are supported by the selected HMI device will be displayed.
5. The system automatically sets suitable values for the communication partner in the "Parameters" tab.
6. Check the parameters, and edit these as required.
7. Save the project.

Alternative procedure

Select "Insert > New item > Connection" from the menu bar. The "Connections" editor opens and shows a new connection. Edit the connection as described in steps 2 through 7.

You can drag-and-drop existing connections directly from HMI_1 or via an interim station in the library to HMI_2. The output view shows the following information: "The interface used for the connection has been adapted to the device". A device change is performed for this connection. The system does not verify whether or not the HMI_2 supports the communications driver.

Open the "Connections" editor on HMI_2 to check the connections. Faulty entries are marked in orange.

Result

A new connection was created. The connection parameters are configured.

1.4 Connections and protocols

HMI functionality

The HMI is used to read, save and record alarms and tags. In addition, the HMI can be used to intervene in the process.

> ⚠ CAUTION
>
> **Ethernet communication**
>
> In Ethernet-based communication, such as PROFINET IO, HTTP, Sm@rtAccess, Sm@rtService and OPC, it is the end user who is responsible for the security of his data network. The proper functioning of the device cannot be guaranteed in all circumstances; targeted attacks, for example, can lead to an overloading of the device.

Data exchange

The prerequisite for the operating and monitoring functions is the connection of the HMI device to a PLC. Data exchange between the HMI and the PLC is controlled by a connection-specific protocol. Each connection requires a separate protocol.

Criteria for selecting the connection

Criteria for selecting the connection between the HMI and the PLC are, for example:

- PLC type
- CPU in the PLC
- HMI device type
- Number of HMI devices per PLC
- Structure and any bus systems of an existing plant
- Amount of components additionally required

Protocols

Protocols are available for the following PLCs:

PLC	Protocol
SIMATIC S7	• PPI • MPI [1)] • PROFIBUS DP • TCP/IP (Ethernet)
SIMATIC S5	• AS 511 • PROFIBUS DP
SIMATIC 500/505	• NITP • PROFIBUS DP
SIMATIC HMI HTTP Protocol	• HTTP/HTTPS (Ethernet)
SIMOTION	• MPI • PROFIBUS DP • TCP/IP (Ethernet)
OPC	• DCOM
Allen-Bradley	PLC series SLC500, SLC501, SLC502, SLC503, SLC504, SLC505, MicroLogix and PLC5/11, PLC5/20, PLC5/30, PLC5/40, PLC5/60, PLC5/80 • DF1 [2)] • DH+ via KF2 module [3)] • DH485 via KF3 module [4)] • DH485 [4)] PLC series ControlLogix 5500 (with 1756-ENBT) and CompactLogix 5300 (1769-L32E and 1769-L35E) • Ethernet
GE Fanuc Automation	SPS series 90–30, 90–70, VersaMax Micro • SNP
LG Industrial Systems (Lucky Goldstar) / IMO	PLC series GLOFA GM (GM4, GM6 and GM7) / Series G4, G6 and G7 • Dedicated communication
Mitsubishi Electric	PLC series MELSEC FX and MELSEC FX0 • FX (Mitsubishi PG)
Mitsubishi Electric	PLC series MELSEC FX0, FX1n, FX2n, AnA, AnN, AnS, AnU, QnA and QnAS • Protocol 4
OMRON	PLC series SYSMAC C, SYSMAC CV, SYSMAC CS1, SYSMAC alpha, CJ and CP • Hostlink/Multilink (SYSMAC Way)
Modicon (Schneider Automation)	PLC series Modicon 984, TSX Quantum and TSX Compact • Modbus RTU SPS series Quantum, Momentum, Premium and Micro SPS series Compact and 984 via Ethernet bridge • Modbus TCP/IP (Ethernet)

PLC	Protocol
Telemecanique	PLC series TSX 7 with P47 411, TSX 7 with P47/67/87/107 420, TSX 7 with P47/67/87/107 425, module TSX SCM 21.6 with the specified TSX 7 CPUs, TSX 17 with module SCG 1161, TSX 37 (Micro), TSX 57 (Premium) • Uni-Telway

1) Not possible when connected to S7-212.

2) Applies to controllers SLC503, SLC504, SLC505, PLC5, MicroLogix

3) Applies to controllers SLC504, PLC5 over DF1

4) Applies to controllers SLC500 to SLC 505 and MicroLogix

1.5 Device-based dependency

1.5.1 Device-dependency of the protocols

Availability of the communication protocols

Communication between the HMI and the PLC is controlled using a network-specific protocol. The following tables show the availability of the communication protocols on the HMI devices.

Overview

Micro Panels

	OP 73micro 1)	TP 170micro 1)	TP 177micro 1)
SIMATIC S7 - PPI 1)	Yes	Yes	Yes
SIMATIC S7 - MPI 1)	Yes	Yes	Yes
SIMATIC S7 - PROFIBUS-DP 1)	Yes	Yes	Yes
SIMATIC S7 - PROFINET	No	No	No
SIMATIC S5 - AS511	No	No	No
SIMATIC S5 - PROFIBUS DP	No	No	No
SIMATIC 500/505 - NITP	No	No	No
SIMATIC 500/505 - PROFIBUS DP	No	No	No
SIMATIC HMI HTTP Protocol	No	No	No
OPC	No	No	No
SIMOTION	No	No	No

	OP 73micro 1)	TP 170micro 1)	TP 177micro 1)
Allen-Bradley DF1	No	No	No
Allen-Bradley DH 485	No	No	No
Allen-Bradley Ethernet IP	No	No	No
GE Fanuc	No	No	No
LG GLOFA-GM	No	No	No
Mitsubishi FX	No	No	No
Mitsubishi P4	No	No	No
Modicon Modbus RTU	No	No	No
Modicon Modbus TCP/IP	No	No	No
Omron	No	No	No
Telemecanique	No	No	No

Mobile Panels

	Mobile Panel 170	Mobile Panel 177 DP	Mobile Panel 177 PN	Mobile Panel 277 4)	Mobile Panel 277 IWLAN Mobile Panel 277F IWLAN
SIMATIC S7 - PPI 1)	Yes	Yes	No	Yes	No
SIMATIC S7 - MPI	Yes	Yes	No	Yes	No
SIMATIC S7 - PROFIBUS DP	Yes	Yes	No	Yes	No
SIMATIC S7 - PROFINET	No	No	Yes	Yes	Yes
SIMATIC S5 - AS511	Yes	No	No	yes 3)	No
SIMATIC S5 - PROFIBUS DP	Yes	Yes	No	Yes	No
SIMATIC 500/505 - NITP	Yes	Yes	No	Yes	No
SIMATIC 500/505 - PROFIBUS DP	Yes	Yes	No	Yes	No
SIMATIC HMI HTTP Protocol	No	No	Yes	Yes	Yes
OPC	No	No	No	Yes	Yes
SIMOTION	Yes	Yes	Yes	Yes	No
Allen-Bradley DF1	Yes	Yes 7) 8)	No	Yes 7) 8)	No
Allen-Bradley DH 485	Yes	Yes 7) 8)	No	Yes 7) 8)	No
Allen-Bradley Ethernet IP	No	No	Yes 7)	Yes 7) 8)	Yes 7)
GE Fanuc	Yes	Yes 7) 8)	No	Yes 7) 8)	No
LG GLOFA-GM	Yes	Yes 7) 8)	No	Yes 7) 8)	No
Mitsubishi FX	Yes	Yes 7) 8)	No	Yes 7) 8)	No
Mitsubishi P4	Yes	Yes 7) 8)	No	Yes 7) 8)	No
Modicon Modbus RTU	Yes	Yes 7) 8)	No	Yes 7) 8)	No

	Mobile Panel 170	Mobile Panel 177 DP	Mobile Panel 177 PN	Mobile Panel 277 [4]	Mobile Panel 277 IWLAN Mobile Panel 277F IWLAN
Modicon Modbus TCP/IP	No	No	Yes [7]	Yes [7) 8)]	No
Omron	Yes	Yes [7) 8)]	No	Yes [7) 8)]	No
Telemecanique	Yes	Yes [7) 8)]	No	Yes [7) 8)]	No

Basic Panels

	KTP400 Basic PN	KTP600 Basic DP	KTP600 Basic PN [11]	KTP1000 Basic DP	KTP1000 Basic PN	TP1500 Basic PN
SIMATIC S7 - PPI [1]	No	Yes	No	Yes	No	No
SIMATIC S7 - MPI	No	Yes	No	Yes	No	No
SIMATIC S7 - PROFIBUS DP	No	Yes	No	Yes	No	No
SIMATIC S7 - PROFINET	Yes	No	Yes	No	Yes	Yes
SIMATIC S5 - AS511	No	No	No	No	No	No
SIMATIC S5 - PROFIBUS DP	No	No	No	No	No	No
SIMATIC 500/505 - NITP	No	No	No	No	No	No
SIMATIC 500/505 - PROFIBUS DP	No	No	No	No	No	No
SIMATIC HMI HTTP Protocol	No	No	No	No	No	No
OPC	No	No	No	No	No	No
SIMOTION	No	No	No	No	No	No
Allen-Bradley DF1	No	Yes [10]	No	Yes [10]	No	No
Allen-Bradley DH 485	No	No	No	No	No	No
Allen-Bradley Ethernet IP	No	No	No	No	No	No
GE Fanuc	No	No	No	No	No	No
LG GLOFA-GM	No	No	No	No	No	No
Mitsubishi FX	No	No	No	No	No	No
Mitsubishi P4	No	No	No	No	No	No
Modicon Modbus RTU	No	Yes [5]	No	Yes [5]	No	No
Modicon Modbus TCP/IP	No	No	No	No	No	No
Omron	No	No	No	No	No	No
Telemecanique	No	No	No	No	No	No

Panels

	OP 73	OP 77A	OP 77B 9)	TP 170A 9)	TP 170B OP 170B	TP 177A	TP 177B 9) OP 177B 9)	TP 270 OP 270	TP 277 9) OP 277 9)
SIMATIC S7 - PPI 1)	Yes	Yes	Yes 8)	Yes	Yes	Yes	Yes	Yes	Yes
SIMATIC S7 - MPI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SIMATIC S7 - PROFIBUS DP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SIMATIC S7 - PROFINET	No	No	No	No	Yes	No	Yes 6)	Yes	Yes
SIMATIC S5 - AS511	No	No	Yes	Yes	Yes	No	No	Yes	No
SIMATIC S5 - PROFIBUS DP	No	No	Yes	No	Yes	No	Yes	Yes	Yes
SIMATIC 500/505 - NITP	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes
SIMATIC 500/505 - PROFIBUS DP	No	No	Yes	No	Yes	No	Yes	Yes	Yes
SIMATIC HMI HTTP Protocol	No	No	No	No	No	No	Yes 6)	Yes	Yes
OPC	No	No	No	No	No	No	No	No	No
SIMOTION	No	No	No	No	Yes	No	Yes	Yes	Yes
Allen-Bradley DF1	No	Yes 10)	Yes 9)	Yes 9)	Yes	Yes 10)	Yes 7) 9) 10)	Yes	Yes 7) 9) 10)
Allen-Bradley DH 485	No	No	Yes 9)	Yes 9)	Yes	No	Yes 7) 9)	Yes	Yes 7) 9)
Allen-Bradley Ethernet IP	No	No	No	No	No	No	Yes 6) 7)	No	Yes 7)
GE Fanuc	No	No	Yes 9)	Yes 9)	Yes	No	Yes 7) 9)	Yes	Yes 7) 9)
LG GLOFA-GM	No	No	Yes 9)	Yes 9)	Yes	No	Yes 7) 9)	Yes	Yes 7) 9)
Mitsubishi FX	No	No	Yes 9)	Yes 9)	Yes	No	Yes 7) 9)	Yes	Yes 7) 9)
Mitsubishi P4	No	No	Yes 9)	Yes 9)	Yes	No	Yes 7) 9)	Yes	Yes 7) 9)
Modicon Modbus RTU	No	Yes 5)	Yes 9)	Yes 9)	Yes	Yes 5)	Yes 5) 7) 9)	Yes	Yes 5) 7) 9)
Modicon Modbus TCP/IP	No	No	No	No	No	No	Yes 6) 7)	Yes	Yes 7)
Omron	No	No	Yes 9)	Yes 9)	Yes	No	Yes 7) 9)	Yes	Yes 7) 9)
Telemecanique	No	No	Yes 9)	Yes 9)	Yes	No	Yes 7) 9)	Yes	Yes 7) 9)

Multi Panels

	MP 177 9)	MP 270B	MP 277 9)	MP 370	MP377 9)
SIMATIC S7 - PPI 1)	Yes	Yes	Yes	Yes	Yes
SIMATIC S7 - MPI	Yes	Yes	Yes	Yes	Yes
SIMATIC S7 - PROFIBUS DP	Yes	Yes	Yes	Yes	Yes

	MP 177 [9)]	MP 270B	MP 277 [9)]	MP 370	MP377 [9)]
SIMATIC S7 - PROFINET	Yes	Yes	Yes	Yes	Yes
SIMATIC S5 - AS511	No	Yes	No	Yes	No
SIMATIC S5 - PROFIBUS DP	Yes	Yes	Yes	Yes	Yes
SIMATIC 500/505 - NITP	Yes	Yes	Yes	Yes	Yes
SIMATIC 500/505 - PROFIBUS DP	Yes	Yes	Yes	Yes	Yes
SIMATIC HMI HTTP Protocol	Yes	Yes	Yes	Yes	Yes
OPC	No	Yes	Yes	Yes	Yes
SIMOTION	No	Yes	Yes	Yes	Yes
Allen-Bradley DF1	Yes [7) 9) 10)]	Yes	Yes [7) 9) 10)]	Yes	Yes [7) 9) 10)]
Allen-Bradley DH 485	Yes [7) 9)]	Yes	Yes [7) 9)]	Yes	Yes [7) 9)]
Allen-Bradley Ethernet IP	Yes [7) 9)]	Yes	Yes [7) 9)]	Yes	Yes [7) 9)]
GE Fanuc	Yes [7) 9)]	Yes	Yes [7) 9)]	Yes	Yes [7) 9)]
LG GLOFA-GM	Yes [7) 9)]	Yes	Yes [7) 9)]	Yes	Yes [7) 9)]
Mitsubishi FX	Yes [7) 9)]	Yes	Yes [7) 9)]	Yes	Yes [7) 9)]
Mitsubishi P4	Yes [7) 9)]	Yes	Yes [7) 9)]	Yes	Yes [7) 9)]
Modicon Modbus RTU	Yes [5) 7) 9)]	Yes	Yes [5) 7) 9)]	Yes	Yes [5) 7) 9)]
Modicon Modbus TCP/IP	Yes [7) 9)]	Yes	Yes [7) 9)]	Yes	Yes [7) 9)]
Omron	Yes [7) 9)]	Yes	Yes [7) 9)]	Yes	Yes [7) 9)]
Telemecanique	Yes [7) 9)]	Yes	Yes [7) 9)]	Yes	Yes [7) 9)]

WinCC flexible Runtime

	WinCC flexible Runtime
SIMATIC S7 - PPI [1)]	Yes
SIMATIC S7 - MPI	Yes
SIMATIC S7 - PROFIBUS DP	Yes
SIMATIC S7 - PROFINET	Yes
SIMATIC S5 - AS511	Yes
SIMATIC S5 - PROFIBUS DP	Yes
SIMATIC 500/505 - NITP	Yes
SIMATIC 500/505 - PROFIBUS DP	Yes
SIMATIC HMI HTTP Protocol	Yes
OPC	Yes
SIMOTION	Yes

	WinCC flexible Runtime
Allen-Bradley DF1	Yes
Allen-Bradley DH 485	Yes
Allen-Bradley Ethernet IP	Yes
GE Fanuc	Yes
LG GLOFA-GM	Yes
Mitsubishi FX	Yes
Mitsubishi P4	Yes
Modicon Modbus RTU	Yes
Modicon Modbus TCP/IP	Yes
Omron	Yes
Telemecanique	No

1) only with SIMATIC S7-200

2) only MP 270B

3) only with RS 232/TTY adapter 6ES5 734-1BD20 (option)

4) Depends on which connection box is used

5) only with converter RS 422-RS 232 6AV6 671-8XE00-0AX0 (option)

6) Applies only to TP 177B PN/DP and OP 177B PN/DP.

7) PROFINET IO Enabled must be deactivated

8) Up to four SIMATIC S7-200 connections via PPI network

9) For a series communication in the menu "File > Transfer > Options", clear "Remote Control" from "Channel 1".

10) Direct communication with PLC5 or KF2 module, otherwise approved only with converter RS 422-RS232 6AV6 671-8XE00-0AX0 (option)

11) KTP600 Basic PN color and KTP600 Basic PN mono.

1.5.2 Device-based dependency of the interfaces

Introduction

The PLC and HMI device use a communication connection for data exchange. You must ensure the interfaces are in concordance. Among others, the following parameters must be noted:

- The PLC and communication drivers must be in concordance
- The HMI device must support the required communication protocol
- Using the interface supported by the HMI device

The "Connections" editor is used to configure the parameters for the communication drivers.

Supported interfaces

The following tables show the hardware interfaces that are to be used on the HMI devices.

Overview

Micro Panels

	OP 73micro [1)]	TP 170micro [1)]	TP 177micro [1)]
SIMATIC S7 – PPI [1)]	IF1B	IF1B	IF1B
SIMATIC S7 - MPI [1)]	IF1B	IF1B	IF1B
SIMATIC S7 - PROFIBUS DP [1)]	IF1B	IF1B	IF1B
SIMATIC S7 - PROFINET	—	—	—
SIMATIC S5 - AS511	—	—	—
SIMATIC S5 - PROFIBUS DP	—	—	—
SIMATIC 500/505 - NITP	—	—	—
SIMATIC 500/505 - PROFIBUS DP	—	—	—
SIMATIC HMI HTTP Protocol	—	—	—
OPC	—	—	—
Allen-Bradley DF1	—	—	—
Allen-Bradley DH 485	—	—	—
Allen-Bradley Ethernet IP	—	—	—
GE Fanuc	—	—	—
LG GLOFA-GM	—	—	—
Mitsubishi FX	—	—	—
Mitsubishi P4	—	—	—
Modicon Modbus RTU	—	—	—
Modicon Modbus TCP/IP	—	—	—
Omron	—	—	—
Telemecanique	—	—	—

Mobile Panels

	Mobile Panel 170	Mobile Panel 177 DP [8)]	Mobile Panel 177 PN	Mobile Panel 277 [4) 8)]	Mobile Panel 277 IWLAN Mobile Panel 277F IWLAN
SIMATIC S7 - PPI [1)]	IF1B	IF1B	—	IF1B	—
SIMATIC S7 - MPI	IF1B	IF1B	—	IF1B	—
SIMATIC S7 - PROFIBUS DP	IF1B	IF1B	—	IF1B	—
SIMATIC S7 - PROFINET	—	—	Ethernet	Ethernet	Ethernet/Wireless
SIMATIC S5 - AS511	IF1A (connection box) [3)]	—	—	—	—
SIMATIC S5 - PROFIBUS DP	IF1A (connection box)	IF1B	—	IF1A (connection box)	—

	Mobile Panel 170	Mobile Panel 177 DP 8)	Mobile Panel 177 PN	Mobile Panel 277 4) 8)	Mobile Panel 277 IWLAN Mobile Panel 277F IWLAN
SIMATIC 500/505 - NITP	IF1A (RS232) IF1B (RS422) IF2 (RS232)	IF1A (RS232) IF1B (RS422)	—	IF1A (RS232) IF1B (RS422)	—
SIMATIC 500/505 - PROFIBUS DP	IF1B (connection box)	IF1B (connection box)	—	IF1B (connection box)	—
SIMATIC HMI HTTP Protocol	—	—	Ethernet	Ethernet	Ethernet/Wireless
OPC	—	—	—	—	OPC
Allen-Bradley DF1	IF1A, IF1B 9) (connection box), IF2 8)	IF1A 8), IF1B 8)9) (connection box)	—	IF1A 8), IF1B 8)9) (connection box)	—
Allen-Bradley DH 485	IF1A, IF1B (connection box), IF2 8)	IF1A 8), IF1B 8) (connection box)	—	IF1A 8), IF1B 8) (connection box)	—
Allen-Bradley Ethernet IP	—	---	Ethernet	Ethernet	Ethernet/Wireless
GE Fanuc	IF1A, IF1B (connection box), IF2 8)	IF1A 8), IF1B 8) (connection box)	—	IF1A 8), IF1B 8) (connection box)	—
LG GLOFA-GM	IF1A, IF1B (connection box), IF2 8)	IF1A 8), IF1B 8) (connection box)	—	IF1A 8), IF1B 8) (connection box)	—
Mitsubishi FX	IF1A, IF1B (connection box), IF2 8)	IF1A 8), IF1B 8) (connection box)	—	IF1A 8), IF1B 8) (connection box)	—
Mitsubishi P4	IF1A, IF1B (connection box), IF2 8)	IF1A 8), IF1B 8) (connection box)	—	IF1A 8), IF1B 8) (connection box)	—
Modicon Modbus RTU	IF1A, IF1B 12) (connection box), IF2 8)	IF1A 8), IF1B 8)12) (connection box)	—	IF1A 8), IF1B 8)12) (connection box)	—
Modicon Modbus TCP/IP	—	—	Ethernet	Ethernet	—
Omron	IF1A, IF1B (connection box), IF2 8)	IF1A 8), IF1B 8) (connection box)	—	IF1A 8), IF1B 8) (connection box)	—
Telemecanique	IF1B	IF1B 8)	—	IF1B 8)	—

Basic Panels

	KTP400 Basic PN	KTP600 Basic DP	KTP600 Basic PN	KTP1000 Basic DP	KTP1000 Basic PN	TP1500 Basic PN
SIMATIC S7 - PPI [1)]	—	IF1B	—	IF1B	—	—
SIMATIC S7 - MPI	—	IF1B	—	IF1B	—	—
SIMATIC S7 - PROFIBUS DP	—	IF1B	—	IF1B	—	—
SIMATIC S7 - PROFINET	Ethernet	—	Ethernet	—	Ethernet	Ethernet
SIMATIC S5 - AS511	—	—	—	—	—	—
SIMATIC S5 - PROFIBUS DP	—	—	—	—	—	—
SIMATIC 500/505 - NITP	—	—	—	—	—	—
SIMATIC 500/505 - PROFIBUS DP	—	—	—	—	—	—
SIMATIC HMI HTTP Protocol	—	—	—	—	—	—
OPC	—	—	—	—	—	—
Allen-Bradley DF1	—	IF1B [11)]	—	IF1B [11)]	—	—
Allen-Bradley DH 485	—	—	—	—	—	—
Allen-Bradley Ethernet IP	—	—	—	—	—	—
GE Fanuc	—	—	—	—	—	—
LG GLOFA-GM	—	—	—	—	—	—
Mitsubishi FX	—	—	—	—	—	—
Mitsubishi P4	—	—	—	—	—	—
Modicon Modbus RTU	—	IF1B [5)]	—	IF1B [5)]	—	—
Modicon Modbus TCP/IP	—	—	—	—	—	—
Omron	—	—	—	—	—	—
Telemecanique	—	—	—	—	—	—

Panels

	OP 73	OP 77A	OP 77B [8)]	TP 170A [8)]	TP 170B OP 170B	TP 177A	TP 177B [8)] OP 177B [8)]	TP 270 OP 270	TP 277 [8)] OP 277 [8)]
SIMATIC S7 - PPI [1)]	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B
SIMATIC S7 - MPI	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B
SIMATIC S7 - PROFIBUS DP	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B	IF1B

	OP 73	OP 77A	OP 77B 8)	TP 170A 8)	TP 170B OP 170B	TP 177A	TP 177B 8) OP 177B 8)	TP 270 OP 270	TP 277 8) OP 277 8)
SIMATIC S7 - PROFINET	—	—	—	—	Ethernet	—	Ethernet 6)	Ethernet	Ethernet 6)
SIMATIC S5 - AS511	—	—	IF1A	IF1A	IF1A, IF2	—	—	IF1A, IF2	—
SIMATIC S5 - PROFIBUS DP	—	—	IF1B	—	IF1B	—	IF1B	IF1B	IF1B
SIMATIC 500/505 - NITP	—	—	IF1A, IF1B	IF1A, IF1B	IF1A, IF1B, IF2	—	IF1B	IF1A, IF1B, IF2	IF1B
SIMATIC 500/505 - PROFIBUS DP	—	—	IF1B	—	IF1B	—	IF1B	IF1B	IF1B
SIMATIC HMI HTTP Protocol	—	—	—	—	—	—	Ethernet 6)	Ethernet	Ethernet
OPC	—	—	—	—	—	—	—	—	—
Allen-Bradley DF1	—	IF1B 11)	IF1A 8), IF1B 8)9)	IF1A 8), IF1B 8)9)	IF1A, IF1B 9), IF2 8)	IF1B 6) 11)	IF1B 8) 11)	IF1A, IF1B 11), IF2 8)	IF1B 8) 11)
Allen-Bradley DH 485	—	—	IF1A 8), IF1B 8)	IF1A 8), IF1B 8)	IF1A, IF1B, IF2 8)	—	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
Allen-Bradley Ethernet IP	—	—	—	—	—	—	Ethernet 6)	—	Ethernet
GE Fanuc	—	—	IF1A 8), IF1B 8)	IF1A 8), IF1B 8)	IF1A, IF1B, IF2 8)	—	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
LG GLOFA-GM	—	—	IF1A 8), IF1B 8)	IF1A 8), IF1B 8)	IF1A, IF1B, IF2 8)	—	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
Mitsubishi FX	—	—	IF1A 8), IF1B 8)	IF1A 8), IF1B 8)	IF1A, IF1B, IF2 8)	—	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
Mitsubishi P4	—	—	IF1A 8), IF1B 8)	IF1A 8), IF1B 8)	IF1A, IF1B, IF2 8)	—	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
Modicon Modbus RTU	—	IF1B 5)	IF1A 8), IF1B 5)8)12)	IF1A 8), IF1B 5)8)12)	IF1A, IF1B 5) 12) IF2 8)	IF1B 5)	IF1B 5) 8)	IF1A, IF1B 5) 12), IF2 8)	IF1B 5) 8)
Modicon Modbus TCP/IP	—	—	—	—	—	—	Ethernet 6)	Ethernet	Ethernet
Omron	—	—	IF1A 8), IF1B 8)	IF1A 8), IF1B 8)	IF1A, IF1B, IF2 8)	—	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
Telemecanique	—	—	IF1B 8)	IF1B 8)	IF1B	—	IF1B 8)	IF1B	IF1B 8)

Multi Panels

	MP 177 8)	MP 270B	MP 277 8)	MP 370	MP 377 8)
SIMATIC S7 - PPI 1)	IF1B	IF1B	IF1B	IF1B	IF1B
SIMATIC S7 - MPI	IF1B	IF1B	IF1B	IF1B	IF1B
SIMATIC S7 - PROFIBUS DP	IF1B	IF1B	IF1B	IF1B	IF1B
SIMATIC S7 - PROFINET	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet
SIMATIC S5 - AS511	-	IF1A, IF2	-	IF1A, IF2	-
SIMATIC S5 - PROFIBUS DP	IF1B	IF1B	IF1B	IF1B	IF1B
SIMATIC 500/505 - NITP	IF1B	IF1A, IF1B, IF2	IF1B	IF1A, IF1B, IF2	IF1B
SIMATIC 500/505 - PROFIBUS DP	IF1B	IF1B	IF1B	IF1B	IF1B
SIMATIC HMI HTTP Protocol	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet
OPC	-	OPC	OPC	OPC	OPC
Allen-Bradley DF1	IF1B 8) 11)	IF1A, IF1B 9), IF2 8)	IF1B 8) 11)	IF1A, IF1B 9), IF2 8)	IF1B 8) 11)
Allen-Bradley DH 485	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
Allen-Bradley Ethernet IP	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet
GE Fanuc	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
LG GLOFA-GM	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
Mitsubishi FX	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
Mitsubishi P4	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
Modicon Modbus RTU	IF1B 5) 8)	IF1A, IF1B 12), IF2 8)	IF1B 5) 8)	IF1A, IF1B 12), IF2 8)	IF1B 5) 8)
Modicon Modbus TCP/IP	Ethernet	Ethernet	Ethernet	Ethernet	Ethernet
Omron	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)	IF1A, IF1B, IF2 8)	IF1B 8)
Telemecanique	IF1B 8)	IF1B	IF1B 8)	IF1B	IF1B 8)

WinCC flexible Runtime

	WinCC flexible Runtime on Panel PC	WinCC flexible Runtime on PC
SIMATIC S7 - PPI 1)	MPI/PROFIBUS DP	PROFIBUS DP card (e.g. CP5611)
SIMATIC S7 - MPI	MPI/PROFIBUS DP	PROFIBUS DP card (e.g. CP5611)
SIMATIC S7 - PROFIBUS DP	MPI/PROFIBUS DP	PROFIBUS DP card (e.g. CP5611)
SIMATIC S7 - PROFINET	Ethernet	Ethernet
SIMATIC S5 - AS511	COM1 to COM4 10)	COM1 through COM4 (depending on arrangement)
SIMATIC S5 - PROFIBUS DP	MPI/PROFIBUS DP	PROFIBUS DP card (e.g. CP5611)
SIMATIC 500/505 - NITP	COM1 to COM4 10)	COM1 through COM4 (depending on arrangement)

	WinCC flexible Runtime on Panel PC	WinCC flexible Runtime on PC
SIMATIC 500/505 - PROFIBUS DP	MPI/PROFIBUS DP	PROFIBUS DP card (e.g. CP5611)
SIMATIC HMI HTTP Protocol	Ethernet 7)	Ethernet 7)
OPC	Ethernet	Ethernet
Allen-Bradley DF1	COM1 to COM4 10)	COM1 through COM4 (depending on arrangement)
Allen-Bradley DH 485	COM1 to COM4 10)	COM1 through COM4 (depending on arrangement)
Allen-Bradley Ethernet IP	Ethernet	Ethernet
GE Fanuc	COM1 to COM4 10)	COM1 through COM4 (depending on arrangement)
LG GLOFA-GM	COM1 to COM4 10)	COM1 through COM4 (depending on arrangement)
Mitsubishi FX	COM1 to COM4 10)	COM1 through COM4 (depending on arrangement)
Mitsubishi P4	COM1 to COM4 10)	COM1 through COM4 (depending on arrangement)
Modicon Modbus RTU	COM1 to COM4 10)	COM1 through COM4 (depending on arrangement)
Modicon Modbus TCP/IP	Ethernet	Ethernet
Omron	COM1 to COM4 10)	COM1 through COM4 (depending on arrangement)
Telemecanique	—	—

— not supported
1) only with SIMATIC S7-200
2) only MP 270B
3) only with RS 232/TTY adapter 6ES5 734-1BD20 (option)
4) Depends on which connection box is used
5) only with converter RS 422-RS 232 6AV6 671-8XE00-0AX0 (option)
6) not cleared for TP 177B DP, OP 177B DP.
7) WinCC flexible Runtime must be installed on the devices
8) For a series communication in the menu "File > Transfer > Options", clear "Remote Control" from "Channel 1".
9) Only with PLC5 and KF2 module
10) COM2 is locked for PC 477.
11) Direct communication with PLC5 or KF2 module, otherwise approved only with converter RS422-RS232 6AV6 671-8XE00-0AX0 (option)
12) Can be selected and used but is not approved.

Note

Communication with SIMATIC 500/505 and with third-party PLCs

If you use the "IF1B" port, this must also be configured with the DIP switch on the back of the HMI device. In this case, the RS 422 received data and the RTS signal are interchanged.

1.5.3 Device/based dependency of area pointers

Introduction

Area pointers are parameter fields from which WinCC flexible Runtime obtains information about the location and size of data areas in the PLC. During communication, the PLC and the HMI device alternately access these data areas for read and write operations. Based on the evaluation of data stored in the data areas, the PLC and HMI device trigger defined actions.

WinCC flexible uses the following area pointers:

- Job mailbox
- Project ID
- Screen number
- Data record
- Date/time
- Date/time PLC
- Coordination

Availability of the area pointers

The following tables show the availability of the area pointers for the HMI devices. Note that the area pointers can be used only for available communication drivers.

Overview

Micro Panels

	OP 73micro 1)	TP 170micro 1)	TP 177micro 1)
Screen number	No	No	No
Data record	No	No	No
Date/time	No	No	No
Date/time PLC	Yes	Yes	Yes
Coordination	No	No	No
Project ID	No	No	No
Job mailbox	No	No	No

Mobile Panels

	Mobile Panel 170	Mobile Panel 177 DP	Mobile Panel 177 PN	Mobile Panel 277	Mobile Panel 277 IWLAN Mobile Panel 277F IWLAN
Screen number	Yes	Yes	Yes	Yes	Yes
Data record	Yes	Yes	Yes	Yes	Yes
Date/time	Yes	Yes	Yes	Yes	Yes

	Mobile Panel 170	Mobile Panel 177 DP	Mobile Panel 177 PN	Mobile Panel 277	Mobile Panel 277 IWLAN Mobile Panel 277F IWLAN
Date/time PLC	Yes	Yes	Yes	Yes	Yes
Coordination	Yes	Yes	Yes	Yes	Yes
Project ID	Yes	Yes	Yes	Yes	Yes
Job mailbox	Yes	Yes	Yes	Yes	Yes

Basic Panels

	KTP400 Basic PN	KTP600 Basic PN	KTP600 Basic DP	KTP1000 Basic PN	KTP1000 Basic DP	TP1500 Basic PN
Screen number	Yes	Yes	Yes	Yes	Yes	Yes
Data record	Yes	Yes	Yes	Yes	Yes	Yes
Date/time	Yes	Yes	Yes	Yes	Yes	Yes
Date/time PLC	Yes	Yes	Yes	Yes	Yes	Yes
Coordination	Yes	Yes	Yes	Yes	Yes	Yes
Project ID	Yes	Yes	Yes	Yes	Yes	Yes
Job mailbox	Yes	Yes	Yes	Yes	Yes	Yes

Panels

	OP 73	OP 77A	OP 77B	TP 170A	TP 170B OP 170B	TP 177A	TP 177B OP 177B	TP 270 OP 270	TP 277 OP 277
Screen number	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Data record	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Date/time	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Date/time PLC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Coordination	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Project ID	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Job mailbox	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes

Multi Panels

	MP 177	MP 270B	MP 277	MP 370	MP 377
Screen number	Yes	Yes	Yes	Yes	Yes
Data record	Yes	Yes	Yes	Yes	Yes
Date/time	Yes	Yes	Yes	Yes	Yes
Date/time PLC	Yes	Yes	Yes	Yes	Yes
Coordination	Yes	Yes	Yes	Yes	Yes
Project ID	Yes	Yes	Yes	Yes	Yes
Job mailbox	Yes	Yes	Yes	Yes	Yes

WinCC flexible Runtime

	WinCC flexible Runtime
Screen number	Yes
Data record	Yes
Date/time	Yes
Date/time PLC	Yes
Coordination	Yes
Project ID	Yes
Job mailbox	Yes

1) The devices OP 73 micro, TP 170micro and TP 177micro can only communicate with a S7-200 PLC.

1.5.4 Device-based dependency of alarms

Introduction

Alarms are issued to the HMI device. They give information regarding the operating states or operating faults on the PLC or the HMI device.

The alarm texts consist of configurable texts and/or tags with actual values.

We differentiate between the following alarms:

- Warning alarms

  A warning alarm shows a status.
- Error alarms

  An error alarm shows an operating fault.

The programmer defines what a warning alarm and what an error alarm is.

Device-based dependency of alarms and words

The following tables show the maximum number of alarms and words for different HMI devices.

Overview

Micro Panels

	OP 73micro	TP 170micro	TP 177micro
Words, in total	16	32	32
Alarms, in total	250	500	500

Mobile Panels

	Mobile Panel 170	Mobile Panel 177 DP	Mobile Panel 177 PN	Mobile Panel 277	Mobile Panel 277 IWLAN Mobile Panel 277F IWLAN
Words, in total	125	125	125	250	250
Alarms, in total	2000	2000	2000	4000	4000

Basic Panels

	KTP400 Basic PN	KTP600 Basic DP	KTP600 Basic PN	KTP1000 Basic DP	KTP1000 Basic PN	TP1500 Basic PN
Words, in total	13	13	13	13	13	13
Alarms, in total	200	200	200	200	200	200

Panels

	OP 73	OP 77A	OP 77B	TP 170A [1)]	TP 170B OP 170B	TP 177A	TP 177B OP 177B	TP 270 OP 270	TP 277 OP 277
Words, in total	32	63	63	63	125	63	125	250	250
Alarms, in total	500	1000	1000	1000	2000	1000	2000	4000	4000

Multi Panels

	MP 177	MP 270B	MP 277	MP 370	MP 377
Words, in total	125	250	250	250	250
Alarms, in total	2000	4000	4000	4000	4000

WinCC flexible Runtime

	WinCC flexible Runtime
Words, in total	250
Alarms, in total	4000

[1)] Only warning alarms possible

1.5.5 Device-based dependency of direct keys

Supported HMI devices

You can use the functionality of the direct keys with the following HMI devices:

Overview

Micro Panels

	OP 73micro	TP 170micro	TP 177micro
PROFIBUS DP direct keys	No	No	No
PROFINET°IO direct keys	No	No	No

Mobile Panels

	Mobile Panel 170	Mobile Panel 177 DP	Mobile Panel 177 PN	Mobile Panel 277	Mobile Panel 277 IWLAN Mobile Panel 277F IWLAN
PROFIBUS DP direct keys	No	Yes	No	Yes	Yes
PROFINET°IO direct keys	No	No	Yes	Yes	Yes

Basic Panels

	KTP400 Basic PN	KTP600 Basic DP	KTP600 Basic PN	KTP1000 Basic DP	KTP1000 Basic PN	TP1500 Basic PN
PROFIBUS DP direct keys	No	No	No	No	No	No
PROFINET IO direct keys	No	No	No	No	No	No

Panels

	OP 73	OP 77A	OP 77B	TP 170A	TP 170B OP 170B	TP 177A	TP 177B OP 177B	TP 270 OP 270	TP 277 OP 277
PROFIBUS DP direct keys	No	No	Yes	No	Yes	No	Yes	Yes	Yes
PROFINET°IO direct keys	No	No	No	No	No	No	Yes 1)	No	Yes

Multi Panels

	MP 177	MP 270B	MP 277	MP 370	MP 377
PROFIBUS DP direct keys	Yes	Yes	Yes	Yes	Yes
PROFINET°IO direct keys	No	No	Yes	No	Yes

WinCC flexible Runtime

	WinCC flexible Runtime
PROFIBUS DP direct keys	No
PROFINET°IO direct keys	No

1) Only available with TP 177B PN/DP and OP 177B PN/DP

1.5.6 Device-based dependency of interfaces for the project transfer

Supported HMI devices

Depending on the HMI device, the transfer of projects can take place via the following interfaces:

Overview

Micro Panels

	OP 73micro	TP 170micro	TP 177micro
Serial	Yes 1)	Yes 1)	Yes 1)
MPI/PROFIBUS DP	No	No	No
Ethernet	No	No	No
USB	Yes 2)	No	Yes 2)
S7Ethernet	No	No	No

Mobile Panels

	Mobile Panel 170	Mobile Panel 177 DP	Mobile Panel 177 PN	Mobile Panel 277	Mobile Panel 277 IWLAN Mobile Panel 277F IWLAN
Serial	Yes	Yes 1)	Yes 1)	Yes 1)	No
MPI/PROFIBUS DP	Yes	Yes	No	Yes 6)	No
Ethernet	No	No	Yes	Yes 6)	Yes
USB	No	No	No	Yes	Yes
S7Ethernet	No	No	No	Yes	Yes

Basic Panels

	KTP400 Basic PN	KTP600 Basic DP	KTP600 Basic PN	KTP1000 Basic DP	KTP1000 Basic PN	TP1500 Basic PN
Serial	No	Yes 1)	No	Yes 1)	No	No

	KTP400 Basic PN	KTP600 Basic DP	KTP600 Basic PN	KTP1000 Basic DP	KTP1000 Basic PN	TP1500 Basic PN
MPI/PROFIBUS DP	No	Yes	Yes	Yes	No	No
Ethernet	Yes	No	No	No	Yes	Yes
USB	Yes [2)]	Yes [2)]	Yes [2)]	Yes [2)]	No	Yes [2)]
S7Ethernet	No	No	No	No	No	No

Panels

	OP 73	OP 77A	OP 77B	TP 170A	TP 170B OP 170B	TP 177A	TP 177B OP 177B	TP 270 OP 270	TP 277 OP 277
Serial	Yes [1)]	Yes [1)]	Yes	Yes	Yes	Yes [1)]	Yes [1)]	Yes	Yes [1)]
MPI/PROFIBUS DP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ethernet	No	No	No	No	No	No	Yes [3)]	Yes [4)]	Yes
USB	Yes [2)]	Yes [2)]	Yes	No	No	Yes [2)]	Yes	Yes	Yes
S7Ethernet	No	No	No	No	No	No	no [7)]	No	No

Multi Panels

	MP 177	MP 270B	MP 277	MP 370	MP 377
Serial	Yes	Yes	Yes [1)]	Yes	Yes
MPI/PROFIBUS DP	Yes	Yes	Yes	Yes	Yes
Ethernet	Yes	Yes	Yes	Yes	Yes
USB	Yes	Yes	Yes	Yes	Yes
S7Ethernet	Yes	No	Yes	No	Yes

WinCC flexible Runtime

	WinCC flexible Runtime on Panel PC	WinCC flexible Runtime on PC
Serial	Yes (COM1 through COM4)	Yes (COM1 ... COM4, depending on configuration)
MPI/PROFIBUS DP	Yes	Yes [5)]
Ethernet	Yes	Yes
USB	Yes	Yes
S7Ethernet	No	No

1) Only when using a PC/PPI cable via the RS-485 interface
2) Only when using a USB/PPI cable (6ES7 901-3DB30-0XA0) via the RS-485 interface
3) Only available with TP 177B PN/DP and OP 177B PN/DP
4) Only when using an Ethernet CF card
5) Only when using a PROFIBUS DP card (e.g. CP5611)
6) Depends on which connection box is used
7) Exception: TP 177B 4" supports the S7Ethernet interface

1.6 Conversion when changing controllers

Changing the controller

With controllers and drivers for which it is pointless to attempt to adopt the addresses from other controllers, for example SIMOTION, SIMATIC HMI HTTP protocol or OPC, the address is deleted. With all other controllers, there is an attempt to adopt the data type. If this is successful, there is an attempt to adopt the address. If the adoption of the data type fails, a default data type and a default address are used. If the adoption of the address fails, a default address is used.

Changing within a device family or changing the CPU type

As described above, there is an attempt to adopt the address and data type. If an address or a data type needs to be adapted before it can be accepted (for example because the new CPU/controller does not support the previous address format),

- a message is displayed
- the field is displayed on an orange background.
  Change the relevant value to a valid value.

Communication with Allen-Bradley controllers 2

2.1 Communication with Allen-Bradley

2.1.1 Communication between the HMI device and the PLC (Allen-Bradley)

Communications principle

The HMI device and the PLC communicate using tags and the user data areas.

Tags

The PLC and the HMI device exchange data using process values. In your configuration, create tags that point to an address on the PLC. The HMI device reads and displays the value from the defined address. The operator can also make an entry on the HMI device that is then written to the address on the PLC.

User data areas

User data areas are intended for the exchange of special data and are set up only when such data is used.

Data for which user data areas are required, for example:

- Job mailboxes
- Transfer of data records
- Date/time synchronization
- Sign-of-life monitoring

The user data areas are created while configuring in WinCC flexible. You assign the corresponding addresses in the PLC.

2.1.2 Communication peers for the DF1 and DH485 Protocol (Allen-Bradley)

Introduction

This section describes communication between the HMI device and the Allen-Bradley PLC from the following series:

- SLC500
- SLC501
- SLC502
- SLC503
- SLC504
- SLC505 (hereafter referred to as SLC)
- PLC5
- MicroLogix

These PLCs communicate by means of their PLC-specific protocols.

- DF1 - point-to-point connection
- DH+ over KF2 module and DF1 multipoint connection
- DH485 - multipoint connection
- DH485 over KF3 module and DF1 multipoint connection

Connectable PLCs

The communication drivers listed below support Allen-Bradley PLCs: :

PLC	DF1 (point-to-point) RS-232	DF1 (point-to-point) RS-422	DF1 (multipoint) over KF2 module to DH+ LAN RS-232/RS-422	DF1 (multipoint) over KF3 module to DH485 LAN RS-232	DH485 (point-to-point) RS-232	DH485 (multipoint) RS-485
SLC500	–	–	–	X	X	X
SLC501	–	–	–	X	X	X
SLC502	–	–	–	X	X	X
SLC503	X	–	–	X	X	X
SLC504	X	–	X	X	X	X
SLC505	X	–	–	X	X	X
MicroLogix	X	–	–	X	X	X
PLC-5 [1)]	X	X	X	–	–	–

[1)] Processors released for PLC-5: PLC-5/11, PLC-5/20, PLC-5/30, PLC-5/40, PLC-5/60, and PLC-5/80.

2.1.3 Communication peer for the Allen-Bradley E/IP C.Logix protocol

Introduction

This section describes communication between the HMI device and the Allen-Bradley PLC.

These PLCs communicate by means of the following own protocols:

- Allen-Bradley E/IP C.Logix (Ethernet IP)

Connectable PLCs

Connections can be implemented for the following Allen-Bradley PLCs:

- Allen-Bradley ControlLogix 5500
- Allen-Bradley CompactLogix 5300

Types of communication released for Allen-Bradley E/IP C.Logix

Types of communication which have been tested and released:

- Point-to-point connection:
- Multipoint interconnection of an HMI device (Allen-Bradley Ethernet IP client) with up to 4 PLCs, each with different connections.

  Connections supported:

  – Connection to the Ethernet CPU interface of CompactLogix

  – Connection to ControlLogix via communication module for Ethernet 1756-ENBT

2.2 Configuring the Allen-Bradley communication driver

2.2.1 Communication via DF1 protocol

2.2.1.1 Requirements of communication

Connection

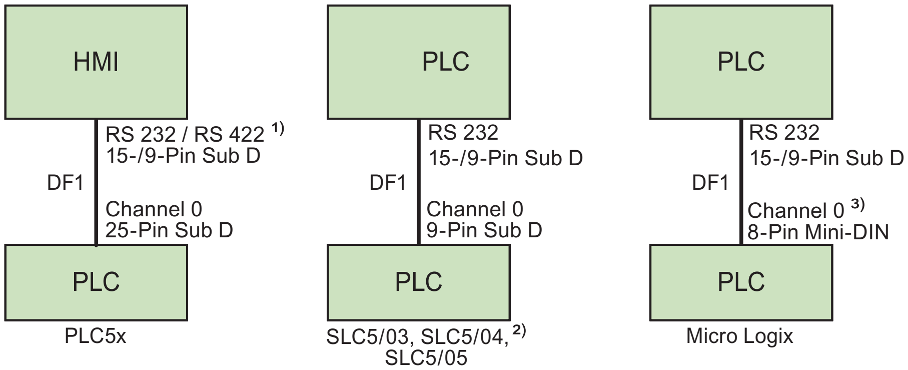
The connection between the HMI device and the Allen-Bradley PLC defines the interface parameters and the bus address. It is not necessary to install special communication blocks in the PLC.

Note

Allen-Bradley offers a wide range of communications adapters for DH485, DH, and DH+ networks for the integration of "DF1 nodes". Corresponding connections via KF2 and KF3 module have been released. Siemens AG has neither tested, nor released any other connections.

Point-to-point connection over DF1 protocol

The DF1 protocol only supports the implementation of point-to-point connections.



1) Panel PC and PC only support RS-232.

2) DF1 does not support point-to-point connection to the SLC500, SLC501, and SLC502 PLCs.

3) MicroLogix ML1500 LRP also supports channel 1 (9-pin sub D). Use the 6XV1440-2K _ _ _ cable to connect the 15-pin RS-232 port, and the 1747-CP3 cable to connect the 9-pin RS-232.

Connecting cables

HMI panel interface used	For connection to PLC5x	For connection to SLC5/03, SLC5/04, SLC5/05	For connection to Micro Logix
RS-232, 15-pin	6XV1440-2L _ _ _	6XV1440-2K _ _ _	PP1 (RS 232 - ML)
RS-232, 9-pin	Allen-Bradley cable 1784-CP10	Allen-Bradley cable 1747-CP3	Allen-Bradley cable 1761-CBL-PM02
RS-422, 9-pin	6XV1440-2V _ _ _	—	—

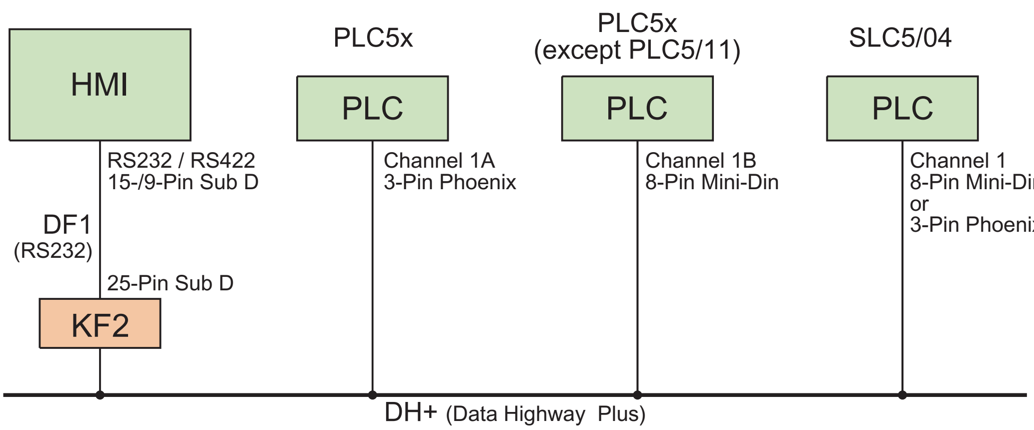
'_ _ _' Length key, see catalog ST 80

The HMI port to be used is defined in the corresponding Manual.

The pin assignment of the cables is described in the section "Connecting cables for Allen-Bradley".

DF1 protocol with multipoint connection over KF2 module on DH+ LAN

The KF2 protocol interface module supports the connection of PLCs to the DH+ LAN (data highway plus local area network).



Connecting cables

HMI panel interface used	For connection to Interface Module KF2
RS-232, 15-pin	6XV1440-2L _ _ _ and adapter 25-pin female/female
RS-232, 9-pin	Allen-Bradley cable 1784-CP10 and 25-pin female/female adapter
RS-422, 9-pin	6XV1440-2V _ _ _ and 25-pin female/female adapter

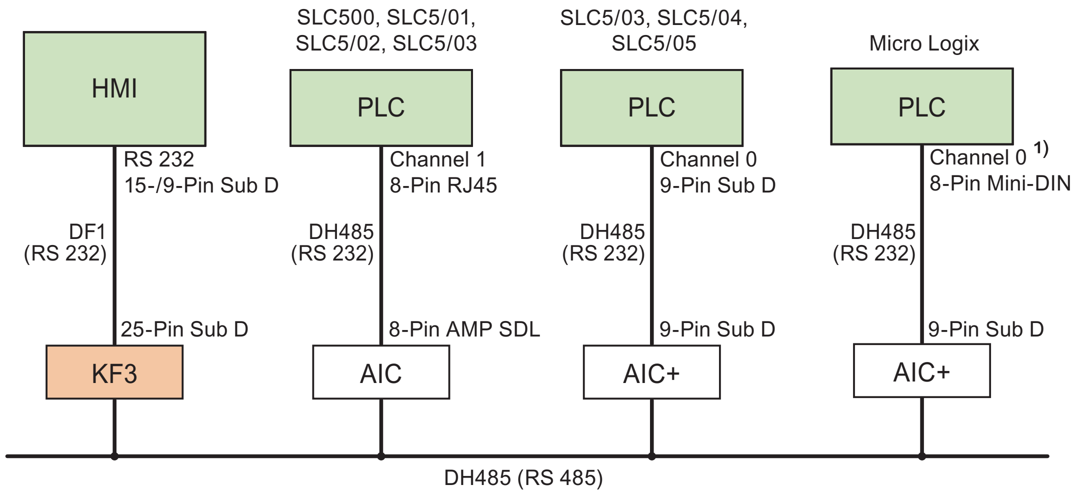
'_ _ _' Length key, see catalog ST 80

The cable connection of PLCs to the DH+ data bus is defined in the Allen-Bradley documentation.

The HMI port to be used is defined in the corresponding Manual.

The pin assignment of the cables is described in the section "Connecting cables for Allen-Bradley".

DF1 protocol with multipoint connection over KF3 module on DH485 LAN



1) MicroLogix ML1500 LRP also supports Channel 1 (9-pin sub D).

Connecting cables

HMI panel interface used	For connection to Interface Module KF3
RS-232, 15-pin	6XV1440-2L _ _ _ and adapter 25-pin female/female
RS-232, 9-pin	Allen-Bradley cable 1784-CP10 and 25-pin female/female adapter

'_ _ _' Length key, see catalog ST 80

The HMI port to be used is defined in the corresponding Manual.

The pin assignment of the cables is described in the section "Connecting cables for Allen-Bradley".

2.2.1.2 Installing the communication driver

Driver for the HMI device

The communication driver for Allen-Bradley PLCs for which WinCC flexible supports connections over DF1 protocol is supplied with WinCC flexible and installed automatically.

It is not necessary to install special communication blocks in the PLC.

2.2.1.3 Configuring the controller type and protocol

Selecting the PLC

Double-click "Communication > Connections" in the project window of the HMI device to configure a connection over DF1 protocol with an Allen-Bradley PLC. Select the Allen-Bradley DF1 protocol from the "Communication drivers" column in the working area.

The properties dialog box displays the parameters of the selected protocol.

You can edit the parameters at any time by double-clicking "Communication > Connections" in the project window of the HMI device. Select the connection and edit its parameters in the properties dialog box.

Note

The HMI device and PLC settings must match.

2.2.1.4 Configuring protocol parameters

Parameters to be set

Double-click "Communication > Connections" in the project window of the HMI device to configure the parameters. "Allen-Bradley DF1" is selected in the "Communication drivers" column in the working area. You can now enter or edit the protocol parameters in the Properties window.

Device-dependent parameters

- Interface

  Select the HMI port to which the Allen-Bradley PLC is connected at the "Interface" entry.

  For more detailed information, refer to the HMI device manual.
- Type

  Select RS-232, RS-422 or RS-485, depending on the HMI device and the selected port.
- Baud rate

  Define the transmission rate between the HMI device and the PLC under "Baud rate".

Note

The highest station address must be less than or equal to 63 if you set a transmission rate of 1.5 Mbaud at OP 73 or OP 77A.

If connecting a TP 170A to a SIMATIC S7 station at a transmision rate of 1.5 MBaud on PROFIBUS DP, set a value less than or equal to 63 for the highest station address (HSA).

- Data bits

  Select "7 bits" or "8 bits" under "Databits".
- Parity

  Select "None", "Even" or "Odd" under "Parity."
- Stop bits

  Select "1" or "2" "Stop bits".

Network parameters

- Checksum

  Define the procedure to be used to determine the error code at "Checksum": "BCC" or "CRC".

PLC-dependent parameters

- Destination address (dec.)

  Define the PLC address at "Destination address". Set Address 0 for point-to-point DF1 connections.
- CPU type

  Define the CPU type of your PLC at "CPU type".

Note

To parameterize the DF1 FULL-DUPLEX driver in the CPU: "NO HANDSHAKING" for "Control line" and "AUTO DETECT" for "Embedded responses".

2.2.1.5 Permitted data types (Allen-Bradley DF1)

Permitted data types

The table lists the user data types that can be used when configuring tags and area pointers.

Name	File type	Data type
ASCII [1)]	A	ASCII
Binary	B	BIT, UNSIGNED INT
Counter	C	BIT, SIGNED INT, UNSIGNED INT
BCD (only PLC5)	D	BIT, SIGNED INT, UNSIGNED INT, BCD4, BCD8
Float [1)]	F	REAL
Digital input	I	BIT, UNSIGNED INT
Data register (integer)	N	BIT, SIGNED INT, UNSIGNED INT, SIGNED LONG, UNSIGNED LONG, REAL
Digital output	O	BIT, UNSIGNED INT
Control	R	BIT, UNSIGNED INT
Status	S	BIT, UNSIGNED INT
Timer	T	BIT, SIGNED INT, UNSIGNED INT

[1)] Applies to PLCs of the SLC503, SLC504, SLC505, and PLC5 series.

Representation in WinCC flexible

Short names of data type formats in WinCC flexible:

- UNSIGNED INT = UInt
- UNSIGNED LONG = ULong
- SIGNED INT = Int
- SIGNED LONG = Long

Special features of connections with Allen-Bradley DF1

Area pointers can only be created in the "N", "O", "I", "S", and "B" file types.

Only the "N", "O", "I", "S", and "B" tags in "File Type" are allowed for use as "trigger tag" for discrete alarms. These tags are only valid for the data types "Int" and "UInt".

WinCC flexible only supports array tags for discrete alarms and trends. That is, you can only create array tags using tags of the "N", "O", "I", "S", and "B" file type and "Int" and "UInt" data type.

Note

I/O modules with 8 or 16 ports occupy one data word on the PLC. I/O modules with 24 or 32 ports occupy two data words. The HMI device does not output an error message if using non-existent bits.

You should always make sure that I/O modules with 8 or 24 ports only occupy the bits that are actually assigned to a port.

2.2.1.6 Optimizing the configuration

Acquisition cycle and update time

The acquisition cycles for the "Area pointers" and of the tags defined in the configuration software are decisive in terms of the update times which can actually be achieved.

The update time is equivalent to the acquisition cycle + transmission time + processing time.

Items to observe when optimizing the update times in configuration data:

- Optimize the maximum and minimum size of the data areas.
- Define data areas that belong together as belonging together. You can improve the update time by setting up one large data area instead of several small areas.
- Acquisition cycles which are too short lead to unnecessary load on overall performance. Set the acquisition cycle according to the rate of change of the process values. The rate of temperature changes at a furnace, for example, is significantly slower compared to the speed rate of an electrical drive. A time of approx. 1 second is a benchmark for the acquisition cycle.
- Avoid any gaps when entering the alarm or screen tags in a data area.
- Changes in the PLC can only be detected reliably if these are available at least within the actual acquisition cycle.
- Set a maximum possible transmission rate.

Discrete alarms

Use arrays to handle discrete alarms and assign each alarm to one bit of the array tag instead of assigning these to any subelements. You may only use tags of the "N", "O", "I", "S", and "B" file types and "Int" and "UInt" data types for discrete alarms and arrays.

Screens

The refresh rate of screens is determined by the type and volume of data to be visualized.

Only configure short acquisition cycles for objects which actually require shorter refresh cycles. This procedure reduces update times.

Trends

The HMI device always updates all bit-triggered trends whose group bit is set in the "Trend transfer area". It resets the bits in the next cycle.

The group bit in the PLC program can only be set again after the HMI device has reset all bits.

PLC jobs

A high rate and volume of PLC jobs transferred may lead to overload in communication between the HMI device and the PLC.

The HMI device confirms acceptance of the PLC job by entering the value zero in the first data word of the job mailbox. The HMI device now processes the job for which it requires a certain time slice. It may take the HMI device some time to process a new PLC job which is transferred in immediate succession to the job mailbox. The next PLC job is only accepted if sufficient computing resources are available.

2.2.1.7 Commissioning components (Allen-Bradley DF1)

Transferring the PLC program to the PLC

1. Interconnect the PC with the CPU using the appropriate cable.
2. Download the program files to the CPU.
3. Then set the CPU to RUN.

Transferring project data to the HMI device

1. The HMI device must be in transfer mode in order to accept the project transfer.

   Possible scenarios:

   – Initial startup

     The HMI device does not yet contain any configuration data in the initial startup phase. The project data and runtime software required for operation must be transferred from the configuration computer to the device: The HMI device automatically changes to transfer mode.
     The transfer dialog box opens with a connection message on the HMI device.

   – Recommissioning

     Recommissioning means that you overwrite existing project data on the HMI device.

   For corresponding detailed instructions, refer to the HMI device manual.

2. Check whether the alarm settings meet requirements of your WinCC flexible project.
3. Select "Project > Transfer > Transfer settings" to configure the transfer parameters before you transfer project data to the HMI device:
   – Select the used port.
   – Set the transfer parameters.
   – Select the target storage location.
4. Initiate the transfer of project data by clicking "Transfer".
   – The project is compiled automatically.
   – All compilation and transfer steps are logged to a message window.

   Message output on the configuration computer on successful completion of the transfer: "Transfer completed successfully".

   The start screen appears on the HMI device.

Interconnecting the PLC with the HMI device

1. Interconnect the PLC with the HMI device using a suitable cable.
2. The message "Connection to PLC .... is established" is output to the HMI device. Note that users can edit the system alarm texts in WinCC flexible.

NOTICE
Always observe the safety-related information in the HMI device Manual when commissioning the device. RF radiation emitted from devices such as mobile phones may cause unwanted operating states.

2.2.2 Communication via DH485 protocol

2.2.2.1 Requirements of communication

Connection

A connection between the HMI device and the Allen-Bradley PLC only requires basic configuration of the interface parameters and bus addresses. It is not necessary to install special communication blocks in the PLC.

Note

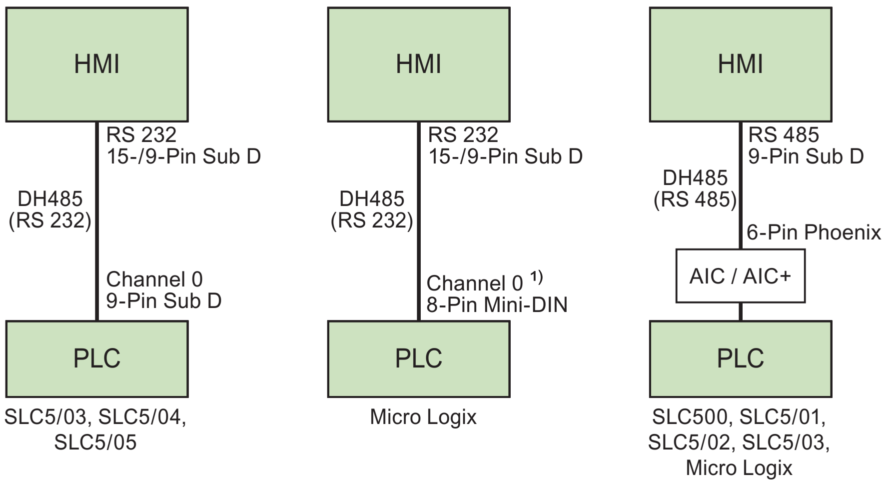
Allen-Bradley corporation offers a multitude of communication adapters for the integration of nodes in DH485, DH and DH+ networks. None of the Allen-Bradley communication adapters have not been subject to system tests and release in conjunction with the Siemens communication driver for DH485 protocol.

Point-to-point connection over DH485 protocol

The DH485 protocol supports point-to-point and multipoint connections.

An HMI device can be interconnected directly with the PLC by means of RS-232 port.

An Isolated Link Coupler (AIC) or an Advanced Interface Converter (AIC+) must be installed for the electrical isolation of the RS-485 port for connections over DH485. For more detailed information, refer to the Allen-Bradley documentation.



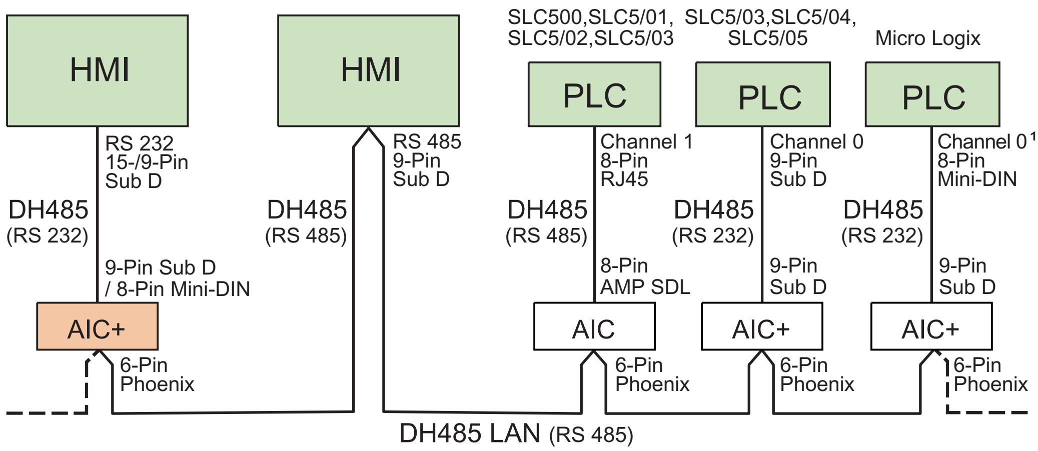
1) MicroLogix ML1500 LRP also supports Channel 1 (9-pin sub D).

Connecting cables

HMI panel interface used	Connection to SLC5/03, SLC5/04, SLC5/05	Micro Logix	SLC500, SLC5/01, SLC5/02, SLC5/03, Micro Logix
For RS-232 15-pin	6XV1440-2K _ _ _	PP1 (RS 232 – Micro Logix)	—
For RS-232 9-pin	Allen-Bradley cable 1747-CP3	Allen-Bradley cable 1761-CBL-PM02	—
For RS-485 9-pin	—	—	PP4 (RS 485 - AIC)

The pin assignment of the cables is described in the section "Connecting cables for Allen-Bradley".

Multipoint connection over DH485 protocol



1) MicroLogix ML1500 LRP also supports Channel 1 (9-pin sub D).

Connecting cables

HMI panel interface used	For connection to Interface Module AIC+	For connection to LAN (RS485)
For RS-232 15-pin	to 9-pin sub D: PP2 (RS 232 - AIC+) to 8-pin Mini DIN: PP3 (RS 232 - AIC+)	—
For RS-232 9-pin	to 9-pin sub D: 1761-CP3 to 8-pin mini DIN: 1761-CBL-PM02	—
For RS-485 9-pin	—	MP1 (RS 485 - DH485 LAN)

The HMI device port to be used is defined in the corresponding Manual.

Refer to the Allen-Bradley documentation for information on cabling.

The pin assignment of the cables is described in the section "Connecting cables for Allen-Bradley".

2.2.2.2 Installing the communication driver

Driver for the HMI device

The communication driver for Allen-Bradley PLCs for which WinCC flexible supports communication over DH485 protocol is supplied with WinCC flexible.

This driver is installed automatically for Panels and Multi Panels.

It must be installed manually for Panel PCs and standard PCs:

Installing the driver for Panel PCs and standard PCs running on Windows XP and Windows Vista

The Allen-Bradley DH485 protocol is released for the operating systems:

- Windows XP
- Windows Vista

The computer must meet the following requirements:

- Processor at least 450 MHz

Only communication with the RS-232 interface over the "AIC+" module has been released.

Note

When the driver is being installed, no other serial interface may be operating. This also applies to interfaces switched online by other programs, for example RSLogix 500 or RSLinx.

Using DH485 on a Windows XP computer

Connections over DH485 a Windows XP computer require installation of the DH485 protocol driver:

1. Select the "Device Manager" option from the "My Computer > Properties > Hardware" shortcut menu.
2. Under "Ports" select the required communications port, for example, COM1.
3. Click the "Properties" toolbar button.

   The "Communications Port (COM1) Properties" dialog box opens.
4. Select "Update driver" in the toolbar.

   The "Hardware Update Wizard" opens.
5. Select the "Install from a list or specific location [Advanced]" option and then click "Next".
6. Select the option "Don´t search, let me select the installable driver" and confirm with "Continue".
7. Click "Have Disk" button to open the "Install From Disk" dialog box.
8. Click the "Browse" button.
9. Select the "fwDH485.inf" file from the "\\Common Files\Siemens\FWDH485" directory and confirm with "OK".
10. Confirm the message "DH485 has not passed the Windows Logo test" with "Continue installation".
11. Complete the driver installation and restart your computer.

Control Panel "SIMATIC HMI DH485 - DH485 protocol driver configuration"

The control panel "SIMATIC HMI DH485 - DH485 protocol driver configuration" is automatically installed when you install WinCC flexible Runtime.

The Control Panel is used to configure the port for connections over DH485 in the PC operating system.

- Set automatic activation of the DH485 driver at the start of Windows XP.
- Open the "Status" tab to check the driver version and status.

The "SIMATIC HMI DH485" Control Panel is available in the Windows Control Panel.

Using DH485 on a Windows Vista computer

Install the DH485 protocol driver to enable DH485 coupling on a Windows Vista computer:

1. Open the "Explorer."
2. Select "Properties" in the shortcut menu of "Computer".

   Note

   You must be logged on with administrator privileges to carry out all further actions.

3. Click on "Device Manager."
4. Use "+" to expand the "Ports (COM & LPT)" category on the left pane.
5. Click on "Update driver software..." in the shortcut menu of "Communications Port (COM1)."

   A new dialog box opens.
6. Answer the question with "Search for driver software on the computer".
7. Select "Select from a list of device drivers on the computer".
8. Click on "Data volume", enter the path "C:\Program Files\Common Files\Siemens\FWDH485" and then confirm your entries.
9. Select the "DH485.inf" file.
10. Click "Next".
11. Confirm the next prompt to install the driver.

2.2.2.3 Configuring the controller type and protocol

Selecting the PLC

Double-click "Communication > Connections" in the project window of the HMI device to configure a connection over DH485 protocol with an Allen-Bradley PLC. Select the Allen-Bradley DH485 protocol from the "Communication drivers" column in the working area.

The properties dialog box displays the parameters of the selected protocol.

You can edit the parameters at any time by double-clicking "Communication > Connections" in the project window of the HMI device. Select the connection and edit its parameters in the properties dialog box.

Note

The HMI device and PLC settings must match.

2.2.2.4 Configuring protocol parameters

Parameters to be set

Double-click "Communication > Connections" in the project window of the HMI device to configure the parameters. "Allen-Bradley DH485" is selected in the "Communication drivers" column. You can now enter or modify the protocol parameters in the Properties window.

Device-dependent parameters

- Interface

  Select the HMI port to which the Allen-Bradley PLC is connected at the "Interface" entry.

  For more detailed information, refer to the HMI device manual.

- Type

  You can select the RS-232 or RS-485 port at this entry, depending on the HMI device and the selected interface.

Note

Adapt the RS-485 RxD and RTS signal settings using the four DIP switches on the rear of the Multi Panel when operating with IF1B interface.

- Baud rate

  Define the transmission rate between the HMI device and the PLC under "Baud rate".

Note

The highest station address must be less than or equal to 63 if you set a transmission rate of 1.5 Mbaud at OP 73 or OP 77A.

If connecting a TP 170A to a SIMATIC S7 station at a transmision rate of 1.5 MBaud on PROFIBUS DP, set a value less than or equal to 63 for the highest station address (HSA).

- Data bits

  Select "7 bits" or "8 bits" under "Databits".

- Parity

  Select "None", "Even" or "Odd" under "Parity."

- Stop bits

  Select "1" or "2" "Stop bits".

Network parameters

- HMI address

  Set the HMI address at "HMI Address". You can select any address from 1 to 31.

- Max. bus address

  Set the highest bus address used at the "Max. Bus Address" parameter. The bus address is evaluated for token passing.
  You can set addresses 2 through 31.

PLC-dependent parameters

- Destination address

  Define the PLC address at the "Destination address" parameter.

- CPU type

  Set the PLC type to which the HMI device is connected at the "CPU type" parameter.

  Select "SLC50x" for the SLC503, SLC504, or SLC505 PLCs.

2.2.2.5 Permitted data types (Allen-Bradley DH485)

Permitted data types

The table lists the user data types that can be used when configuring tags and area pointers.

Name	File type	Data type
ASCII [1)]	A	ASCII
Binary	B	BIT, UNSIGNED INT
Counter	C	BIT, SIGNED INT, UNSIGNED INT
Float [1)]	F	REAL
Digital input	I	BIT, UNSIGNED INT
Data register (integer)	N	BIT, SIGNED INT, UNSIGNED INT, SIGNED LONG, UNSIGNED LONG, REAL
Digital output	O	BIT, UNSIGNED INT
Control	R	BIT, UNSIGNED INT
Status	S	BIT, UNSIGNED INT
Timer	T	BIT, SIGNED INT, UNSIGNED INT

[1)] Valid for SLC 503, SLC 504, and SLC 505

Representation in WinCC flexible

Short names of data formats in WinCC flexible:

- UNSIGNED INT = UInt
- UNSIGNED LONG = ULong
- SIGNED INT = Int
- SIGNED LONG = Long

Special features of connections over Allen-Bradley DH485

Area pointers can only be created in the "N", "O", "I", "S", and "B" file types.

Only the "N", "O", "I", "S", and "B" tags in "File Type" are allowed for use as "trigger tag" for discrete alarms. These tags are only valid for the data types "Int" and "UInt".

Array tags may only be used for discrete alarms and trends. That is, you can only create array tags using tags of the "N", "O", "I", "S", and "B" file type and "Int" and "UInt" data type.

Note

I/O modules with 8 or 16 ports occupy one data word on the PLC. I/O modules with 24 or 32 ports occupy two data words. The HMI device does not output an error message if using non-existent bits.

You should always make sure that I/O modules with 8 or 24 ports only occupy the bits that are actually assigned to a port.

2.2.2.6 Optimizing the configuration

Acquisition cycle and update time

The acquisition cycles for the "Area pointers" and of the tags defined in the configuration software are decisive in terms of the update times which can actually be achieved.

The update time is equivalent to the acquisition cycle + transmission time + processing time.

Items to observe when optimizing the update times in configuration data:

- Optimize the maximum and minimum size of the data areas.
- Define data areas that belong together as belonging together. You can improve the update time by setting up one large data area instead of several small areas.
- Acquisition cycles which are too short lead to unnecessary load on overall performance. Set the acquisition cycle according to the rate of change of the process values. The rate of temperature changes at a furnace, for example, is significantly slower compared to the speed rate of an electrical drive. A time of approx. 1 second is a benchmark for the acquisition cycle.
- Avoid any gaps when entering the alarm or screen tags in a data area.
- Changes in the PLC can only be detected reliably if these are available at least within the actual acquisition cycle.
- Set a maximum possible transmission rate.

Discrete alarms

Use arrays to handle discrete alarms and assign each alarm to one bit of the array tag instead of assigning these to any subelements. You may only use tags of the "N", "O", "I", "S", and "B" file type and "Int" and "UInt" data type in discrete alarms and arrays.

Screens

The refresh rate of screens is determined by the type and volume of data to be visualized.

Only configure short acquisition cycles for objects which actually require shorter refresh cycles. This procedure reduces update times.

Trends

The HMI device always updates all bit-triggered trends whose group bit is set in the "Trend transfer area". It resets the bits in the next cycle.

The group bit in the PLC program can only be set again after the HMI device has reset all bits.

PLC jobs

A high rate and volume of PLC jobs transferred may lead to overload in communication between the HMI device and the PLC.

The HMI device confirms acceptance of the PLC job by entering the value zero in the first data word of the job mailbox. The HMI device now processes the job for which it requires a certain time slice. It may take the HMI device some time to process a new PLC job which is transferred in immediate succession to the job mailbox. The next PLC job is only accepted if sufficient computing resources are available.

Setting network parameters

The HMI device and PLC network nodes have the same priority in the DH485 protocol. The current "token" holder controls the bus until it has passed the token to the node with the next higher node number. Items to observe in order to optimize bus parameters:

- The bus nodes must be allocated consecutive addresses starting at 1 in order to avoid any interruption of token passing.
- The "Max. bus address" parameter setting must correspond with the highest bus node address used.

2.2.2.7 Commissioning components (Allen-Bradley DH485)

Transferring the PLC program to the PLC

1. Interconnect the PC with the CPU using the appropriate cable.
2. Download the program files to the CPU.
3. Then set the CPU to RUN.

Transferring project data to the HMI device

1. The HMI device must be in transfer mode in order to accept the project transfer.

   Possible scenarios:

   – Initial startup

     The HMI device does not yet contain any configuration data in the initial startup phase. The project data and runtime software required for operation must be transferred from the configuration computer to the device: The HMI device automatically changes to transfer mode.
     The transfer dialog box opens with a connection message on the HMI device.

   – Recommissioning

     Recommissioning means that you overwrite existing project data on the HMI device.

   For corresponding detailed instructions, refer to the HMI device manual.

2. Check whether the alarm settings meet requirements of your WinCC flexible project.
3. Select "Project > Transfer > Transfer settings" to configure the transfer parameters before you transfer project data to the HMI device:

   – Select the used port.

   – Set the transfer parameters.

   – Select the target storage location.

4. Initiate the transfer of project data by clicking "Transfer".

   – The project is compiled automatically.

   – All compilation and transfer steps are logged to a message window.

   Message output on the configuration computer on successful completion of the transfer: "Transfer completed successfully".

   The start screen appears on the HMI device.

Interconnecting the PLC with the HMI device

1. Interconnect the PLC with the HMI device using a suitable cable.
2. The message "Connection to PLC .... is established" is output to the HMI device. Note that users can edit the system alarm texts in WinCC flexible.

NOTICE
Always observe the safety-related information in the HMI device Manual when commissioning the device. RF radiation emitted from devices such as mobile phones may cause unwanted operating states.

2.2.3 Communication via Allen-Bradley Ethernet IP

2.2.3.1 Communication requirements (Allen-Bradley Ethernet IP)

Connection

Components for integrating the HMI device in the Allen-Bradley PLC:

- Existing Ethernet network in which the PLCs are located
- Cross-over Ethernet cable, directly connected to the Ethernet port of the CPU or communication module.

HMI device communication with an Allen-Bradley PLC basically requires only the cable connection. It is not necessary to install special communication blocks in the PLC.

2.2.3.2 Installing the communication driver (Allen-Bradley Ethernet IP)

Driver for the HMI device

The drivers for connections over Allen-Bradley Ethernet IP to an Allen-Bradley PLC are included in the WinCC flexible software and are installed automatically.

The communication driver is named Allen-Bradley E/IP C.Logix

It is not necessary to install special communication blocks in the PLC.

2.2.3.3 Configuring the PLC type and protocol (Allen-Bradley Ethernet IP)

Selecting the PLC

Double-click "Communication > Connections" in the project window of the HMI device to configure a connection with an Allen-Bradley PLC. Select the Allen-Bradley E/IP C.Logix protocol from the "Communication drivers" column in the working area.

The properties dialog box displays the protocol parameters.

You can edit the parameters at any time by double-clicking "Communication > Connections" in the project window of the HMI device. Select the connection and edit its parameters in the properties dialog box.

2.2.3.4 Configuring protocol parameters (Allen-Bradley Ethernet IP)

Parameters to be set

1. Double-click "Communication > Connections" in the project window.
2. Select the "Allen-Bradley E/IP C.Logix" protocol from the "Communication drivers" column in the working area.

   Protocol parameters you can enter or edit in the properties dialog box:

Device-specific parameters

- Interface

  Select the HMI port to be used for networking the device.

  The default is "Ethernet".

  For more detailed information, refer to the Manual of the HMI device.
- Type

  The "IP" protocol is set permanently.

Note

The "ISO" protocol is not released for the current version of WinCC flexible.

Note

Configure the IP address and the subnet mask manually on the HMI device.

PLC specific parameters

- Address

  Set the IP address (or host name) of the Ethernet/IP module of the PLC. Port 44818 is set by default for Ethernet/IP devices.
- Communication path

  Configure the CIP path from the Ethernet module to the PLC. This setting creates a logical interconnection of the Ethernet module with the PLC, irrespective of their location in different CIP networks.

2.2.3.5 Examples: Communication path

Example 1:

Connection with a PLC in the same Allen-Bradley rack.

1,0

Number	Meaning
1	Stands for a backplane connection.
0	Stands for a CPU slot number.

Example 2:

Connection with a PLC in remote Allen-Bradley racks. Two Allen-Bradley racks are networked on Ethernet.

1,2,2,190.130.3.101,1,5

Number	Meaning
1	Backplane connection
2	Stands for the CPU slot number of the second Ethernet module.
2	Stands for an Ethernet connection.
190.130.3.101	IP address of a remote AB rack on the network – in particular the third Ethernet module
1	Backplane connection
5	Slot number of the CPU

2.2.3.6 Valid data types and addressing

Valid data types for Allen-Bradley E/IP C.Logix

The selection of data types listed below can be used to configure tags.

Basic data types

Data type	Bit address space
Bool	-
SInt	0-7
USInt	0-7
Int	0 to 15
UInt	0-15
DInt	0-31
UDInt	0 to 31
Real	-
String	-

Valid data types

Address	Valid data types
Array	SInt, USInt, Int, UInt, DInt, UDInt, Real
Individual bits from the basic data types of the PLC SInt, USInt, Int, UInt, DInt, UDInt	Bool*

* Any changed value of certain defined bits is written back to the PLC. There is no check to determine whether any other bits have changed. The PLC (or other PLCs) may only read access the value.

Note

Strings in RSLogix 5000 have a default length of 82 characters. WinCC flexible can visualize up to 80 characters. Always use strings which do not exceed the maximum length of 80 characters.

Note

Only the data type Int and array of Int are allowed in the area pointer configuration.

Addressing

Addressing with Allen-Bradley E/IP C.Logix

Addressing

A tag is uniquely referenced in WinCC flexible by means of an address in the PLC. The address must correspond with the tag name in the PLC. The tag address is defined by a string with a length of up to 128 characters.

Using characters for addressing

Valid characters for tag addressing:

- Letters (a to z, A to Z)
- Numbers (0 to 9)
- Underscore (_)

The tag address consists of tag name and other character strings used to specify the tag in the PLC.

Tag name properties:

- The tag name may begin but not end with an underscore character.
- Strings with successive underscore and space characters are invalid.
- The address may not exceed a length of 128 characters.

Note

The characters reserved for tag addressing may not be used in program/tag names or at any other address instance.

The reserved characters are listed below:

Reserved character	Function
.	Element delimiter
:	Definition of a program tag
,	Delimiter for addressing multi-dimensional arrays
/	Reserved for bit addressing.
[ ]	Addressing of array elements or arrays

PLC and program tags

The Allen-Bradley E/IP C.Logix driver supports addressing of PLC tags (global project tags) and/or program tags (global program tags). A program tag is declared based on the program name in the PLC and actual tag name which are delimited by colon. PLC tags are simply addressed by their name.

NOTICE

Addressing errors

Addressing errors are generated when the tag name and data type are inconsistent.

The tag name defined in the address field in WinCC flexible must correspond with the tag name in the PLC. The data type of tags in WinCC flexible and in the PLC must correspond.

Note

Module-specific tags, e.g. for data on input and output modules, cannot be addressed directly. Instead, use an alias tag in the PLC.

Example: Local:3:O.data cannot be addressed in WinCC flexible

If, for Local:3:O in the PLC, the alias "MyOut" is defined, you can address with WinCC flexible via MyOut.Data.

Addressing syntax

Notation of addresses

The tables below define the notation of addressing options in E/IP C.Logix.

Access to arrays, basic data types and structure elements

Data types	Type	Address
Basic data types	PLC tag	Tag name
	Program tag	Programname:tagname
Arrays	PLC tag	Array tag
	Program tag	Program name: array tag
Bits	PLC tag	Tagname/bitnumber
	Program tag	Programname:tagname/bitnumber
Structure elements	PLC tag	Structure tag. Structure element
	Program tag	Program name: structure tag. structure element

Note

Bit addressing with the data types Bool, Real and String is not permitted and will cause an addressing fault.

Description of the syntax

Syntax description:

```
(Programname:)tagname([x(,y)(,z)]){.tagname([x(,y)(,z)])}(/bitnumber
)
```

- The "( )" defines an optional, single instance of an expression.
- The "{ }" defines an optional expression with multiple single instances.

The address string length may not exceed 128 characters.

Addressing types in Allen-Bradley E/IP C.Logix

Arrays

An array is a data structure that includes a number of data of the same type. WinCC flexible only supports one-dimensional arrays.

In the address column of the tag editor, enter the array name possibly by specifying a start element. The length is defined in the Array Elements input box of the tag editor. Any violation of array limits in the PLC leads to addressing errors. Example: faulty indexing.

These arrays must be declared in the PLC as controller or program tags.

Two- or three-dimensional arrays in the PLC can only be addressed in WinCC flexible if these can be formed in each area on one-dimensional arrays.

Note

Read and write operations always include all array tag elements. The contents of an array tag which is interconnected with a PLC are always transferred whenever there is a change. The HMI device and the PLC cannot concurrently write data to the same array tag for this reason. Instead of writing data only to a single element, the program writes the entire array to the PLC.

Array elements

Elements of one-dimensional, two-dimensional and three-dimensional arrays in the PLC are indexed by setting an index and the corresponding notation in the tag editor. Array addressing starts at element "0", with arrays of all basic types being valid for element addressing. Read/write operations are only carried out at the addressed element, and not for the entire array.

Bits and bit tags

Bit access is allowed to all basic data types with the exception of Bool, Real and String. Bit addressing is also allowed at array/structure elements. Data type Bool is set in WinCC flexible for the addressing of bits and bit tags in the basic data types.

One-place bit numbers will be address with "/x" or "/0x" (x = bit number). Bit numbers are defined by up to two digits.

Note

With the "Bool" data type in the data types SInt, Int and DInt, after changing the specified bit the complete tag is then written in the PLC again. In the meantime, no check is made as to whether other bits in the tag have since changed. Therefore, the PLC may have only read access to the specified tag.

Structures

User-defined data types are created by means of structures. These structures group tags of different data types. Structures may consist of basic types, arrays and of other structures. WinCC flexible only addresses structure elements instead of the entire structure.

Structure elements

Structure elements are addressed by means of the name of the structure and of the required structure element. This addressing is separated by point. In addition to basic data types, the structure elements may represent arrays or other structures. Only one-dimensional arrays may be used as a structure element.

Note

The nesting depth of structures is only limited by the maximum length of 128 characters for the address.

Address multiplexing in Allen-Bradley E/IP C.Logix

Address multiplexing

The Allen-Bradley E/IP C.Logix communication driver supports address multiplexing.

Address multiplexing requires two tags:

- "Tag_1" of data type "String"; contains a logical address such as "HMI:Robot5.Block5" as value.

  The value may change to a second valid address, for example, "HMI:Robot4.Block3".
- "Tag_2" contains a connection setup with the "Allen-Bradley E/IP C.Logix" communication driver.

  However, declare "[Tag_1]" as address instead of a constant. The square brackets indicate address multiplexing. The address is derived from the actual value in "Tag_1".

Note

You can only multiplex the entire Allen-Bradley E/IP C.Logix addresses. Multiplexing of address elements is not possible. "HMI:Robot[Tag_1].Block5" is an invalid address.

You can optionally click the arrow right icon in the "Address" column. Replace the "Constant" with the "Multiplex" entry by clicking the arrow on the left edge of the next address dialog box. Now the tag selection list only returns tags of data type "String".

You can also configure a function triggered by a "change of value" event for multiplexed tags.

Examples of addressing with Allen-Bradley E/IP C.Logix

Example of a table for addressing

The table below defines the basic variants for addressing PLC tags. Other addressing variants are possible by means of combination.

Type	Type	Address
General	PLC tag	Tag name
	Program tag	Program:tagname
Array	Access to an element of a 2-dimensional array	Arraytag[Dim1,Dim2]
	Element of structure array (1-dimensional)	Arraytag[Dim1].structureelement
	Bit in element basic type array (2-dimensional)	Arraytag[Dim1,Dim2]/Bit
Structure	Array in structure	Structuretag.arraytag
	Bit in the element of an array in the substructure	Structuretag.structure2.arraytag [element]/bit

Note

Program tags are addressed by leading the address with the program name derived from the PLC with colon delimiter.

Example: Programname:arraytag[Dim1,Dim2]

Access to array elements

Type	Address
PLC tag	Arraytag[Dim1]
	Arraytag[Dim1,Dim2]
	Arraytag[Dim1,Dim2,Dim3]
Program tag	Programname:arraytag[Dim1]
	Programname:arraytag[Dim1,Dim2]
	Programname:arraytag[Dim1,Dim2,Dim3]

Optimizing the configuration (Allen-Bradley Ethernet IP)

Acquisition cycle and update time

The acquisition cycles for the "Area pointers" and the acquisition cycles of the tags specified in the configuration software are decisive factors for the actual update times that can be achieved.

The update time is the sum of the acquisition cycle + transmission time + processing time.

To achieve optimum update times, note the following during configuration:

- Optimize the maximum and minimum size of the data areas.
- Acquisition cycles which are too short lead to unnecessary load on overall performance. Set the acquisition cycle according to the rate of change of the process values. The rate of temperature changes at a furnace, for example, is significantly slower compared to the speed rate of an electrical drive. A time of approx. 1 second is a benchmark for the acquisition cycle.
- Changes in the PLC can only be detected reliably if these are available at least within the actual acquisition cycle.

Discrete alarms

Use arrays to handle discrete alarms and assign each alarm to one bit of the array tag instead of assigning these to any subelements. Only tags of the data types "Int" and "+/- Int" are valid for discrete alarms and arrays.

Screens

The refresh rate of screens is determined by the type and volume of data to be visualized.

Configure short acquisition cycles only for objects which actually require shorter refresh cycles.

Trends

The HMI device always updates all bit-triggered trends whose group bit is set in the "Trend transfer area". It resets the bits in the next cycle.

The group bit in the PLC program can only be set again after the HMI device has reset all bits.

PLC jobs

A high rate and volume of PLC jobs transferred may lead to overload in communication between the HMI device and the PLC.

The HMI device confirms acceptance of the Job mailbox by entering the value zero in the first data word of the job mailbox. The HMI device now processes the job for which it requires a certain time slice. It may take the HMI device some time to process a new Job mailbox which is transferred in immediate succession to the job mailbox. The next Job mailbox is only accepted if sufficient computing resources are available.

Timeout response with TCP/IP (Ethernet)

The Ethernet IP protocol causes a minimum delay of approx. one minute in the detection of communication failure. Communication failure cannot be reliably detected if no tags are requested, for example, no output tags in the current screen.

Configure an area pointer coordination for each PLC. This setup delays the detection of communication failure only by approx. two minutes even in the aforementioned scenario.

Commissioning components (communications modules)

Transferring the PLC program to the PLC

1. Interconnect the PC with the CPU using the appropriate cable.
2. Download the program files to the CPU.
3. Then set the CPU to RUN.

Transferring project data to the HMI device

1. The HMI device must be in transfer mode in order to accept the project transfer.

   Possible scenarios:

   – Initial commissioning

     The HMI device does not yet contain any configuration data in the initial commissioning phase. The project data and runtime software required for operation must be transferred from the configuration computer to the device. The HMI device automatically changes to transfer mode.
     The transfer dialog box opens with a connection message on the HMI device.

   – Recommissioning

     Recommissioning means that you overwrite existing project data on the HMI device.

     For corresponding detailed instructions, refer to the Manual of your HMI device.
2. Check whether the alarm settings meet requirements of your WinCC flexible project.
3. Select "Project > Transfer > Transfer settings" to configure the transfer parameters before you transfer project data to the HMI device:
   – Select the used port.
   – Set the transfer parameters.
   – Select the target storage location.
4. Initiate the transfer of project data by clicking "Transfer".
   – The project is compiled automatically.
   – All compilation and transfer steps are logged to a message window.

   Message output on the configuration computer after successful completion of the transfer: "Transfer completed successfully".

   The start screen appears on the HMI device.

Interconnecting the PLC with the HMI device

1. Interconnect the PLC (CPU or communication module) with the HMI device using a suitable patch cable.
2. The message "Connection to PLC .... is established" is output to the HMI device. Note that users can edit the system alarm texts in WinCC flexible.

NOTICE
Always observe the safety-related information in the HMI device manual when commissioning the device. RF radiation emitted from devices such as mobile phones may cause unwanted operating states.

2.3 User data areas

2.3.1 Trend request and trend transfer

Function

A trend is a graphic representation of one or more values from the PLC. The value is read either time- or bit-triggered, depending on the configuration.

Time-triggered trends

The HMI device reads in the trend values cyclically at an interval specified in the configuration. Time-triggered trends are suitable for logging continuous processes such as the operating temperature of a motor.

Bit-triggered trends

By setting a trigger bit in the tag trend request, the HMI device either reads in a trend value or an entire trend buffer. This setting is defined in configuration data. Bit-triggered trends are normally used to represent fast changing values. One example might be the injection pressure in the production of plastic parts.

To trigger bit-triggered trends, create suitable external tags in the "Tags" editor of WinCC flexible and interconnect those to trend areas. The HMI device and PLC then communicate with each other over these trend areas.

The following areas are available for trends:

- Trend request area
- Trend transfer area 1
- Trend transfer area 2 (required only with switch buffers)

For communication drivers DF1 and DH485

Tags of the data type "N", "O", "I", "S" or "B" are valid. They must be of the data type "UInt" or an array tag of the data type "UInt." Assign a bit to the trend in configuration data. This sets a defined bit assignment for all trend areas.

For communication driver Ethernet IP

Valid are tags of data type "Int" or array tags of data type "Int". Assign a bit to the trend in configuration data. This sets a defined bit assignment for all trend areas.

Trend request area

The HMI device sets corresponding bits in the trend request area when you open a screen which contains one or several trends on the HMI device. After deselecting the screen, the HMI device resets the relevant bits in the trend request area.

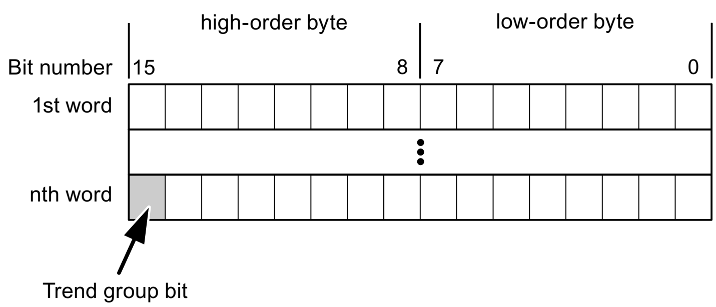
Using the trend request area, the PLC can recognize which trend is currently displayed on the HMI device. Trends can also be triggered without evaluation of the trend request area.

Trend transfer area 1

This area is used to trigger trends. In your control program, you set the bit assigned to the trend in the trend transfer area and set the trend group bit. The trend group bit is the last bit in the trend transfer area.

The HMI device detects the trigger. The HMI device reads either a value or the entire buffer from the PLC. It then resets the trend bit and the trend group bit.

The following picture shows the structure of a trend transfer area.



The trend transfer area must not be modified by the control program until the trend group bit has been reset.

Trend transfer area 2

Trend transfer area 2 is required for trends configured with a switch buffer. The trend transfer areas 1 and 2 have a similar structure.

Switch buffers

The switch buffer is a second buffer for the same trend that can be set up during configuration.

The PLC writes to Buffer 2 while the HMI device reads the values from Buffer 1, and writes to Buffer 1 when the HMI device is reading Buffer 2. This prevents the PLC from overwriting trend values while the trend is being read on the HMI device.

2.3.2 LED mapping

Function

The function keys of the keyboard units of the Operator Panel (OP), Multi Panel (MP) and Panel PC are equipped with LEDs. These LEDs can be controlled by the PLC. This functionality can be used to activate an LED in order to tell the operator which key to press in a specific situation, for example.

Requirements

In order to enable control of an LED, you must set up an LED tag or array tag in the PLC and declare this as the LED tag in the configuration data.

LED assignment

Assign the LEDs to the LED tag bits when you configure the function keys. Define the "LED tag" and the corresponding "bit" for each function key in the "General" group of the properties view.

The bit number "bit" identifies the first of two consecutive bits that control the following LED states:

		LED function	
Bit n+ 1	Bit n	all Mobile Panels, Operator Panels, and Multi Panels	Panel PCs
0	0	Off	Off
0	1	Rapid flashing	Flashing
1	0	Slow flashing	Flashing
1	1	Permanent signal	Permanent signal

2.3.3 Area pointer

2.3.3.1 General information on area pointers (Allen-Bradley)

Introduction

Area pointers are parameter fields. WinCC flexible Runtime reads these parameter fields in order to obtain information about the location and size of data areas in the PLC. The PLC and the HMI device interactively communicate read and write data for these data areas . The PLC and the HMI device trigger defined interactions based on the evaluation of stored data.

The area pointers reside in PLC memory. Their addresses are configured in the "Area pointers" dialog of the "Connections" editor.

Area pointers used in WinCC flexible:

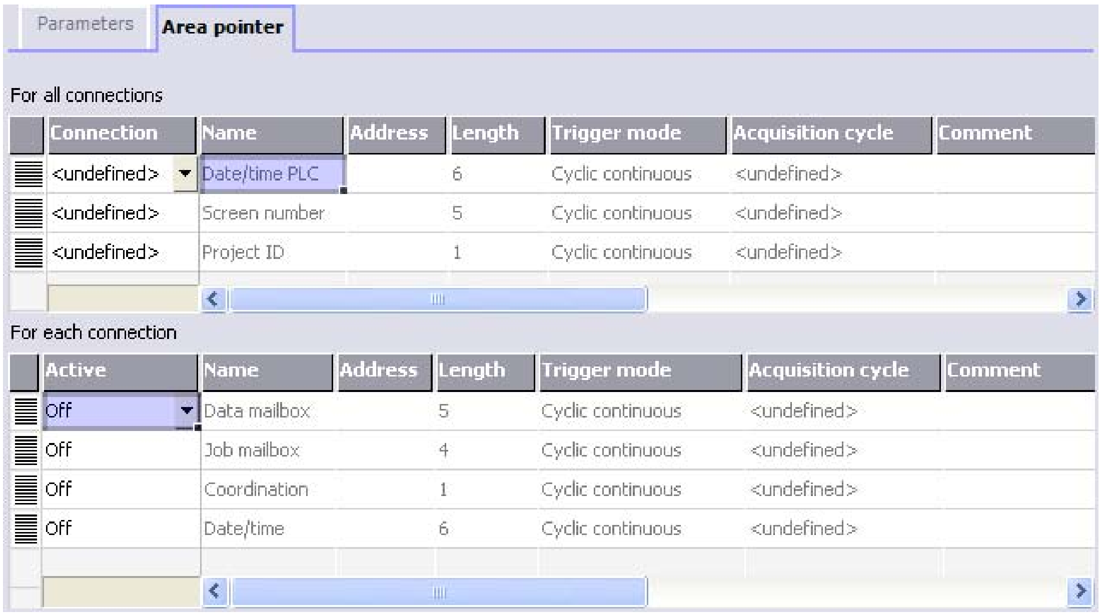
- PLC job
- Project ID
- Screen number
- Data record
- Date/time
- Date/time PLC
- Coordination

Device-dependency

Availability of the area pointer depends on the HMI device used.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use.



Enabling an area pointer based on the example of a SIMATIC S7 PLC

- Active

  Enables the area pointer.
- Name

  Name of the area pointer defined by WinCC flexible.
- Address

  Tag address of the area pointer in the PLC.
- Length

  WinCC flexible defines the default length of the area pointer.
- Acquisition cycle

  Define an acquisition cycle in this field to allow cyclic reading of the area pointer in Runtime. An extremely short acquisition time may have a negative impact on HMI device performance.
- Comment

  Save a comment, for example, to describe the purpose of the area pointer.

Accessing data areas

The table shows how the PLC and HMI device handle read (R) and write (W) access to the data areas.

Data area	Required for	HMI device	PLC
Screen number	Evaluation by the PLC in order to determine the active screen.	W	R
Data record	Transfer of data records with synchronization	R/W	R/W
Date/time	Transfer of the date and time from the HMI device to the PLC	W	R
Date/time PLC	Transfer of the date and time from the PLC to the HMI device	R	W
Coordination	Requesting the HMI device status in the control program	W	R
Project ID	Runtime checks consistency between the WinCC flexible project ID and the project in the PLC.	R	W
PLC job	Triggering of HMI device functions by the control program	R/W	R/W

The next sections describe the area pointers and their associated PLC jobs.

2.3.3.2 "Screen number" area pointer

Function

The HMI device saves information about the screen called on the HMI device to the "Screen number" area pointer.

This allows the transfer of the current screen contents from the HMI device to the PLC. The PLC can trigger specific reactions such as the call of a different screen.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use. You can create only **one** instance of the "Screen number" area pointer and only on **one** PLC.

The screen number is transferred spontaneously to the PLC. That is, it is always transferred when a new screen is activated on the HMI device. It is therefore unnecessary to configure an acquisition cycle.

Structure

The area pointer is a data area in the memory of the PLC with a fixed length of 5 words.

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1st word	Current screen type															
2nd word	Current screen number															
3rd word	Reserved															
4th word	Current field number															
5th word	Reserved															

- Current screen type

  "1" for the root screen or
  "4" for the permanent window
- Current screen number

  1 to 32767
- Current field number

  1 to 32767

2.3.3.3 "Date/time" area pointer

Function

This area pointer is used to transfer the date and time from the HMI device to the PLC.

The PLC writes control job "41" to the job mailbox.

When it evaluating the control job, the HMI device saves its current date and time to the data area configured in the "Date/time" area pointer. All definitions are coded in BCD format.

The "Date/Time" area pointer when used in a project which contains multiple connections must be enabled for each configured connection.

The date/time data area has the following structure:

Data word	Left byte (15 … 8)	Right byte (7 … 0)	
n+0	Reserved	Hour (0 to 23)	Time
n+1	Minute (0 to 59)	Second (0 to 59)	
n+2	Reserved	Reserved	
n+3	Reserved	Weekday (1 to 7, 1 = Sunday)	Date
n+4	Day (1 to 31)	Month (1 to 12)	
n+5	Year (80 to 99/0 to 29)	Reserved	

Note

The entry of values from 80 to 99 in the "Year" data area returns the years 1980 through 1999; values from 0 to 29 return the years 2000 through 2029.

2.3.3.4 "Date/time controller" area pointer

Function

This area pointer is used to transfer the date and time from the PLC to the HMI device. Use this area pointer if the PLC is the time master.

The PLC loads the data area of the area pointer. All definitions are coded in BCD format.

The HMI device reads the data cyclically within the configured acquisition cycle and synchronizes itself.

Note

Set an acquisition cycle of sufficient length for the date/time area pointer in order to avoid any negative impact on HMI device performance.
Recommended: Acquisition cycle of 1 minute if your process can handle it.

The date/time data area has the following structure:

DATE_AND_TIME format (in BCD code)

<table>
<tr><th rowspan="2">Data word</th><th colspan="3">Left byte</th><th colspan="4">Right byte</th></tr>
<tr><th>15</th><th>......</th><th>8</th><th>7</th><th colspan="2">......</th><th>0</th></tr>
<tr><td>n+0</td><td colspan="3">Year (80 to 99/0 to 29)</td><td colspan="4">Month (1 to 12)</td></tr>
<tr><td>n+1</td><td colspan="3">Day (1 to 31)</td><td colspan="4">Hour (0 to 23)</td></tr>
<tr><td>n+2</td><td colspan="3">Minute (0 to 59)</td><td colspan="4">Second (0 to 59)</td></tr>
<tr><td>n+3</td><td colspan="3">Reserved</td><td colspan="3">Reserved</td><td>Weekday (1 to 7, 1 = Sunday)</td></tr>
<tr><td>n+4 1)</td><td colspan="3">Reserved</td><td colspan="4">Reserved</td></tr>
<tr><td>n+5 1)</td><td colspan="3">Reserved</td><td colspan="4">Reserved</td></tr>
</table>

1) The two data words must be available in the data area in order to ensure compliance of the data format with WinCC flexible and to avoid the reading of incorrect information.

Note

Note that when you enter the year, values 80-99 result in years 1980 through 1999 and the values 0-29 result in the years 2000 through 2029.

2.3.3.5 "Coordination" area pointer

Function

The "Coordination" area pointer is used to implement the following functionality:

- detection in the control program of HMI device startup
- detection in the control program of the current HMI device operating mode
- detection in the control program of the HMI devices ready to communicate state

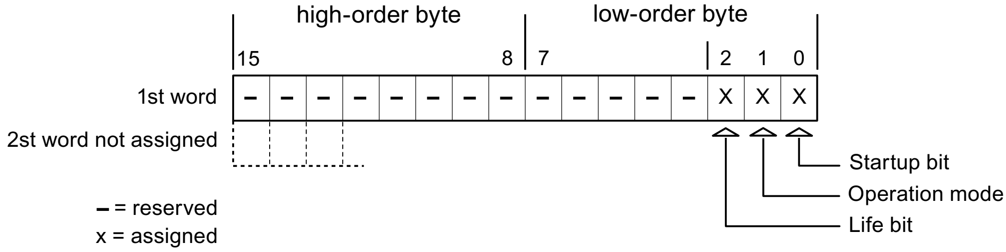
The "Coordination" area pointer has a length of two words.

Application

Note

The HMI device always writes the entire coordination area when updating the area pointer. The control program may not make changes to the coordination area for this reason.

Assignment of bits in the "Coordination" area pointer



Startup bit

The startup bit is set briefly to "0" by the HMI device during startup. It sets the bit permanently to "1" when startup is completed.

Operating mode

The operating mode bit is set to 1 as soon as the user switches the HMI device offline. The state of the operating mode bit is "0" during normal operation of the HMI device. You can determine the current operating mode of the HMI device by reading this bit.

Life bit

The HMI device inverts the life bit at intervals of approximately one second. You can check whether or not the connection to the HMI device is still up by querying this bit in the control program.

2.3.3.6 "Project ID" area pointer

Function

You can check whether the HMI device is connected to the correct PLC at the start of runtime. This check is important when operating with several HMI devices.

The HMI device compares a value stored on the PLC with the value specified in configuration data. This ensures compatibility of configuration data with the control program. If discrepancy is detected, a system alarm is displayed on the HMI device and runtime is stopped.

Application

Settings in configuration data required when using this area pointer:

- Define the version of configuration data. Possible values between 1 and 255.

  Enter the version in the "Device settings ▸ Device settings" editor in "Project ID."
- Data address of the value for the version that is stored in the PLC:

  Enter the data address in the "Communication ▸ Connections" editor in "Address."

Connection failure

A connection failure to a device on which the "project ID" area pointer is configured results in all the other connections in the project being switched to "offline".

This behavior has the following prerequisites:

- You have several configured connections in a project.
- You are using the "project ID" area pointer in at least one connection.

Causes which may set connections "offline":

- The PLC is not available.
- The connection has been switched offline in the engineering system.

2.3.3.7 "Job mailbox" area pointer

Function

The PLC can use the job mailbox to transfer jobs to the HMI device to trigger corresponding actions on the HMI device. These functions include, for example:

- Display screen
- Set date and time

Data structure

The first word of the job mailbox contains the job number. Depending on the job mailbox, up to three parameters can be transferred.

Word	Left byte	Right byte
n+0	0	Job number
n+1	Parameter 1	
n+2	Parameter 2	
n+3	Parameter 3	

The HMI device evaluates the job mailbox if the first word of this job is unequal to zero. This means that the parameters must be entered in the job mailbox first, followed by the job number.

When the HMI device accepts the job mailbox, the first word is set to 0 again. The execution of the job mailbox is generally not completed at this point in time.

Job mailboxes

All job mailboxes and their parameters are listed below. The "No." column contains the job number of the job mailbox. Job mailboxes can only be triggered by the PLC when the HMI device is online.

Note

Please note that not all HMI devices support job mailboxes. TP 170A and Micro Panel do not support PLC jobs, for example.

No.	Function	
14	**Setting the time (BCD coded)**	
	Parameter 1	Left byte: - Right byte: hours (0-23)
	Parameter 2	Left byte: minutes (0-59) Right byte: seconds (0-59)
	Parameter 3	-
15	**Setting the date (BCD coded)**	
	Parameter 1	Left byte: - Right byte: weekday (1-7: Sunday-Saturday)
	Parameter 2	Left byte: day (1-31) Right byte: month (1-12)
	Parameter 3	Left byte: year
23	**User logon**	
	Logs the user on with the name "PLC user" at the HMI device with the group number transferred in Parameter 1. The logon is possible only when the transferred group number exists in the project.	
	Parameter 1	Group number 1 to 255

No.	Function	
14	**Setting the time (BCD coded)**	
	Parameter 2, 3	-
24	**User logoff**	
	Logs off the current user. The function corresponds to the "logoff" system function)	
	Parameter 1, 2, 3	-
40	**Transfer date/time to PLC**	
	(in the S7 format DATE_AND_TIME) An interval of at least 5 seconds must be maintained between two successive jobs to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
41	**Transfer date/time to PLC**	
	(In OP/MP format) An interval of at least 5 seconds must be maintained between successive jobs in order to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
46	**Update tags**	
	Causes the HMI device to read the current value of the PLC tags whose update ID matches the value transferred in Parameter 1. (Function corresponds to the "UpdateTag" system function.)	
	Parameter 1	1 - 100
49	**Clear process alarm buffer**	
	Parameter 1, 2, 3	-
50	**Clear alarm buffer**	
	Parameter 1, 2, 3	-
51	**Screen selection** 1)	
	Parameter 1	Screen number
	Parameter 2	-
	Parameter 3	Field number
69	**Read data record from PLC**	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	0: Do not overwrite existing data record 1: Overwrite existing data record
70	**Write data record to PLC**	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	-

1) OP 73, OP 77A and TP 177A HMI devices also execute the "Screen selection" job mailbox if the on-screen keyboard is active.

2.3.3.8 "Data mailbox" area pointer

"Data mailbox" area pointer

Function

When data records are transferred between the HMI device and PLC, both partners access common communications areas on the PLC.

Data transfer types

There are two ways of transferring data records between the HMI device and PLC:

- Transfer without synchronization
- Transfer with synchronization over the data record

Data records are always transferred directly. That is, the tag values are read from an address or written to an address configured for this tag directly, without redirecting the values by means of interim memory.

Initiating the transfer of data records

There are three ways of triggering the transfer:

- Operator input in the recipe view
- PLC jobs

  The transfer of data records can also be triggered by the PLC.
- Triggering by configured functions

If the transfer of data records is triggered by a configured function or by a PLC job, the recipe display on the HMI device remains operable. The data records are transferred in the background.

Simultaneous processing of several transfer requests is, however, not possible. In this case, the HMI device rejects the other transfer requests with a system alarm.

Transfer without synchronization

If you select asynchronous transfer of data records between the HMI device and PLC, there is no coordination over the common data areas. It is therefore unnecessary to set up a data area during configuration.

Asynchronous data record transfer can be a useful alternative, for example, when:

- The system is capable of excluding the risk of uncontrolled overwriting of data by the communication peer.
- The PLC does not require information about the recipe number and data record number.
- The transfer of data records is triggered by the operator of the HMI device.

Reading values

When a read job is triggered, the values are read from the PLC addresses and transferred to the HMI device.

- Triggering by the operator in the recipe view:

  The values are downloaded to the HMI device. You can then process, edit, or save these values, for example.

- Triggering by a function or PLC job:

  The values are saved immediately to the data volume.

Writing values

When a write job is triggered, the values are written to the PLC addresses.

- Triggering by the operator in the recipe view:

  The current values are written to the PLC.

- Triggering by a function or PLC job:

  The current values are written to the PLC from the data medium.

Transfer with synchronization (Allen-Bradley)

If you select synchronous transfer, both communication partners set status bits in the common data area. You can use this mechanism to prevent uncontrolled overwriting of data in either direction in your control program.

Application

Synchronous data record transfer can be a useful solution, for example, when:

- The PLC is the "active partner" in the transfer of data records.
- The PLC evaluates the information about the recipe number and data record number.
- The transfer of data records is triggered by means of a Job mailbox.

Requirements

In order to synchronize transfer of data records between the HMI device and the PLC, the following requirements must be met during configuration:

- An area pointer has been set up: "Communication ▸ Connections" editor in "Area pointer"
- The PLC with which the HMI device synchronizes transfer of data records is specified in the recipe: "Recipes" editor, properties view of the recipe, "Properties" group in "Transfer".

Structure of the data area

The data area has a fixed length of 5 words. Structure of the data area:

	15		0
1. Word	Current recipe number (1 - 999)		
2. Word	Current data record number (0 - 65535)		
3. Word	Reserved		
4. Word	Status (0, 2, 4, 12)		
5. Word	Reserved		

- Status

  The status word (word 4) can adopt the following values:

Value		Meaning
Decimal	Binary	
0	0000 0000	Transfer permitted, data record free
2	0000 0010	Transfer is busy
4	0000 0100	Transfer completed without error
12	0000 1100	Transfer completed with error

Possible causes of error when transferring data records

Possible causes of error

The section below shows possible error causes which lead to the cancellation of data record transfer:

- Tag address not set up on the PLC
- Overwriting data records not possible
- Recipe number does not exist
- Data record number does not exist

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

Reaction to an aborted transfer due to errors

If the transfer of data records is aborted due to errors, the HMI device reacts as follows:

- Triggering by the operator in the recipe display

  Information in the status bar of the recipe view and output of system alarms
- Triggered by function

  Output of system alarms
- Triggering by PLC job

  No feedback message on the HMI device

You can nonetheless evaluate the status of the transfer by querying the status word in the data record.

Sequence of the transfer when triggered by a configured function

Reading from the PLC using a configured function

<table>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td rowspan="2">1</td><td colspan="2">Check: Status word = 0?</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>2</td><td>The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.</td><td>Abort with system alarm.</td></tr>
<tr><td>3</td><td>The HMI device reads the values from the PLC and stores them in the data record specified in the function.</td><td></td></tr>
<tr><td>4</td><td>• If "Yes" was selected for the "Overwrite" function, an existing data record is overwritten without any prompt for confirmation.
The HMI device sets the status "Transfer completed."
• If "No" was selected for the "Overwrite" function and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.</td><td></td></tr>
<tr><td>5</td><td>The control program must reset the status word to zero in order to enable further transfers.</td><td></td></tr>
</table>

Writing to the PLC by means of configured function

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.	Abort with system alarm.
3	The HMI device fetches the values of the data record specified in the function from the data medium and transfers the values to the PLC.	
4	The HMI device sets the status "Transfer completed."	
5	The control program can now evaluate the transferred data. The control program must reset the status word to zero in order to enable further transfers.	

Sequence of the transfer triggered by a job mailbox

The transfer of data records between the HMI device and the PLC can be initiated by either one of these stations.

The two PLC jobs No. 69 and No. 70 are available for this type of transfer.

No. 69: Read data record from PLC ("PLC → DAT")

PLC job no. 69 transfers data records from the PLC to the HMI device. The PLC job is structured as follows:

	Left byte (LB)	Right byte (RB)
Word 1	0	69
Word 2	Recipe number (1-999)	
Word 3	Data record number (1 to 65535)	
Word 4	Do not overwrite existing data record: 0 Overwrite existing data record: 1	

No. 70: Write data record to PLC ("DAT → PLC")

PLC job No. 70 transfers data records from the HMI device to the PLC. The PLC job is structured as follows:

	Left byte (LB)	Right byte (RB)
Word 1	0	70
Word 2	Recipe number (1-999)	
Word 3	Data record number (1 to 65535)	
Word 4	—	

Sequence when reading from the PLC with PLC job "PLC → DAT" (no. 69)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device reads the values from the PLC and saves these to the data record defined in the PLC job.	
4	• If "Overwrite" was selected in the job, an existing data record is overwritten without any prompt for confirmation. The HMI device sets the status "Transfer completed." • If "Do not overwrite" was selected in the job, and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Sequence of writing to the PLC using PLC job "DAT → PLC" (no. 70)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device fetches the values of the data record specified in the function from the data medium and writes the values to the PLC.	
4	The HMI device sets the status "Transfer completed."	
5	The control program can now evaluate the transferred data. The control program must reset the status word to zero in order to enable further transfers.	

Sequence of a transfer started by the operator in the recipe display

Reading from the PLC started by the operator in the recipe display

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe number to be read and the status "Transfer active" in the data record and sets the data record number to 0.	Abort with system alarm.
3	The HMI device reads the values from the PLC and displays them in the recipe display. If the recipes have synchronized tags, the values from the PLC are also written to the tags.	
4	The HMI device sets the status "Transfer completed."	
5	The control program must reset the status word to zero in order to enable further transfers.	

Writing to the PLC started by the operator in the recipe display

Step	Action	
	Check: Status word = 0?	
1	Yes	No
	The HMI device enters the recipe and data record number to be written and the status "Transfer active" in the data record.	Abort with system alarm.
2	The HMI device writes the current values to the PLC. If the recipes have synchronized tags, the changed values are synchronized between the recipe display and tags and then written to the PLC.	
3	The HMI device sets the status "Transfer completed."	
4	If required, the control program can now evaluate the transferred data.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

2.3.4 Events, alarms, and acknowledgments

2.3.4.1 General information on events, alarms, and acknowledgments

Function

Messages return information about the PLC or HMI device operating states or problems to the user on the HMI device. The message texts consist of configurable texts and/or tags with actual values.

Operational messages and events must be distinguished. The programmer defines what is an operational message and what is an error alarm.

Operational message

An operational message indicates a state. Example:

- Motor on
- PLC in manual mode

Alarm message

An error alarm indicates a malfunction. Example:

- Valve does not open.
- Excess motor temperature

Alarms indicate exceptional operational states, and must therefore be acknowledged.

Acknowledgment

To acknowledge error alarms:

- Operator input on the HMI device
- The PLC sets an acknowledgment bit.

Triggering alarms

Triggering of an alarm in the PLC:

- Setting a tag bit
- Measured value limits exceeded

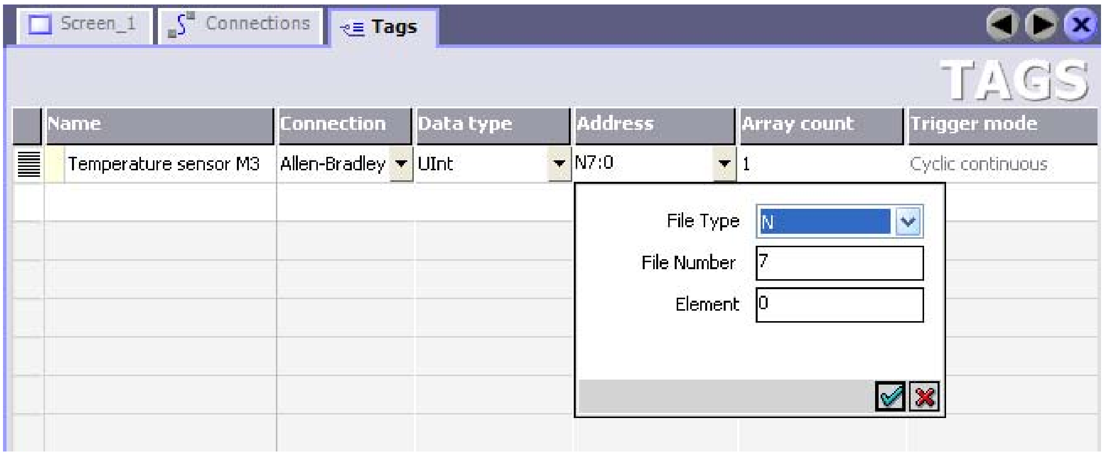
The location of tags, or of the tag array, is defined in WinCC flexible ES. The tag or array must be set up on the PLC.

2.3.4.2 Step 1: Creating tags or an array

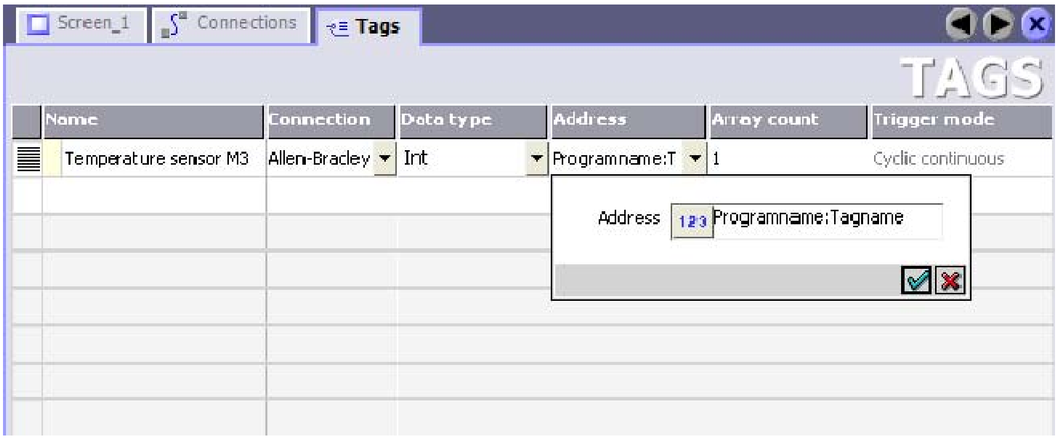
Procedure

Create the tags or arrays in the "Tags" editor. The dialog box is shown below.

DF1 protocol and DH 485



E/IP C.Logix



- Define the tag and array names.
- Select a PLC connection.

  The connection must already be configured in the "Connections" editor.
- Select a data type.

  The available data types depend on the PLC being used. If you select an illegal data type the tag will not be available in the "Discrete alarms" and "Analog alarms" editors.

The following data types are supported by Allen-Bradley PLCs:

Communication driver	PLC	Valid data types	
		Discrete alarms	Analog alarms
DF1 and DH485	SLC500, SLC501, SLC502, SLC503, SLC504, SLC505, PLC5, MicroLogix	Int, UInt	Int, UInt, Long, ULong, Bit, Real
E/IP C.Logix	ControlLogix, CompactLogix	Int, UInt	SInt, USInt, Int, UInt, DInt, UDInt, Bool, Real

- Enter an address.

  The addressed tag contains the alarm-triggering bit.

  As soon as the bit of the tag is set on the PLC and is transferred to the HMI device in the configured acquisition cycle, the HMI device recognizes the alarm as "incoming."

  After the same bit is reset on the PLC, the HMI device recognizes the alarm as "outgoing."
- Select the array elements.

  You can select more bit numbers in the "Discrete alarms" editor by increasing the number of array elements. An array with a length of three words provides 48 alarm bits, for example.

2.3.4.3 Step 2: Configuring an alarm

Procedure

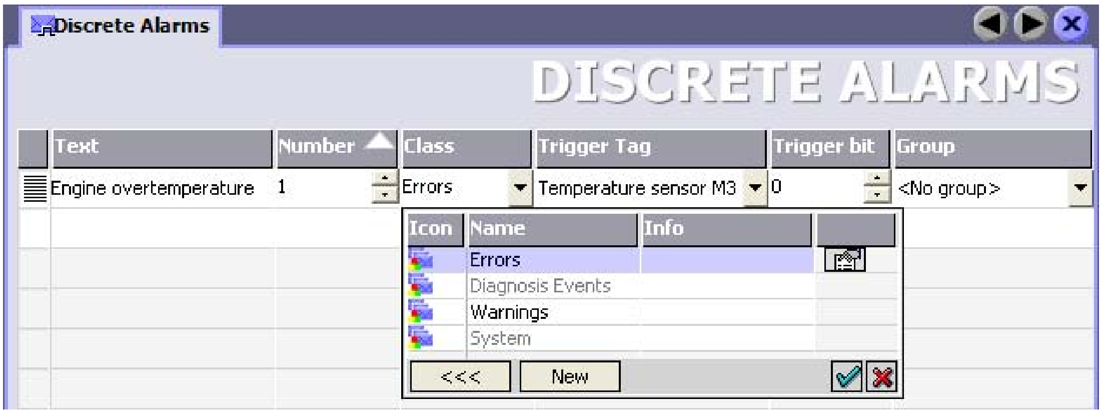
We distinguish between the following alarms:

- Discrete alarms
- Analog alarms

You create alarms in the "Discrete alarms" and "Analog alarms" editors.

Discrete alarms

The editor is shown below.



- Edit text

  Enter the text to display in runtime. You can format the text characters. The text may contain fields for the output of tags.

  The text is output to the alarm view if this view was configured in the "Screens" editor.

- Specify number

  Each alarm number must be unambiguous within the project. It is used to uniquely identify the alarm and is indicated with the alarm in runtime.

  The permitted range of values is 1 to 100.000.

  The numbers are assigned consecutively in the engineering system. You can change the alarm numbers when assigning these to groups, for example.

- Specify the alarm class

  Available alarm classes:

  – Error alarms

    This class must be acknowledged.

  – Operational message

    This class signals events with incoming and outgoing alarms.

- Assign trigger tag

  In the "Trigger tag" column, you link the configured alarm with the tag created in step 1. The selection list returns all tags with valid data type.

- Specify the bit number

  In the "bit number" column, specify the relevant bit position in the created tag.

  Remember that the way the bit positions are counted depends on the particular PLC. With Allen-Bradley PLCs, the bit positions are counted as follows:

How the bit positions are counted	left byte								right byte							
In Allen-Bradley PLCs	15							8	7							0
Configurations in WinCC flexible:	15							8	7							0

Analog alarms

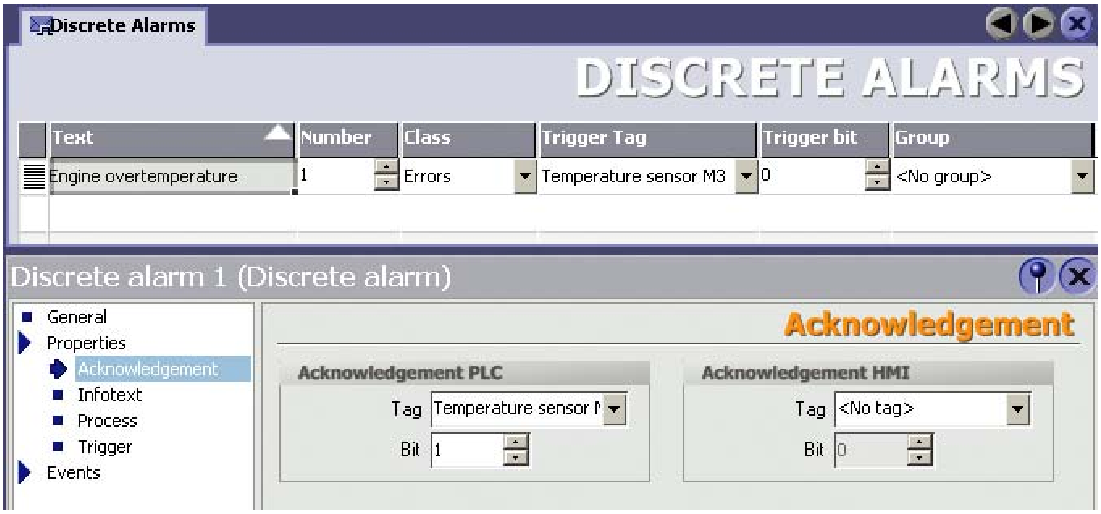
The only difference between analog messages and bit messages is that you configure a limit rather than a bit number. The alarm is triggered when this limit is exceeded. The outgoing alarm is triggered when the low limit is violated, making allowances for any configured hysteresis.

2.3.4.4 Step 3: Configure the acknowledgment

Procedure

Create suitable tags on the PLC to acknowledge an error alarm. You assign these tags to an alarm in the "Bit messages" editor. You make the assignment in "Properties ▸ Acknowledgment."

The following figure shows the dialog for configuring an acknowledgment.



Distinction in terms of acknowledgment:

- Acknowledgment on the HMI device
- Acknowledgment by the PLC

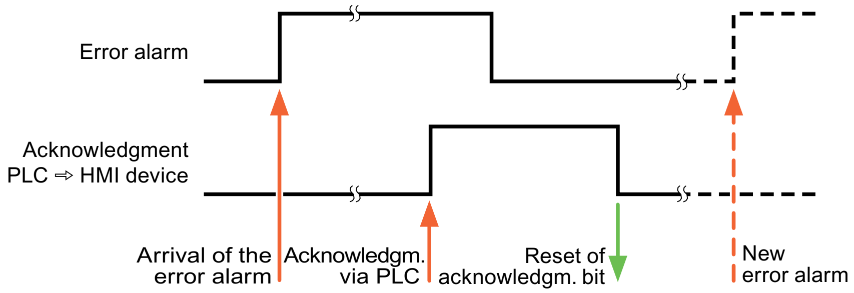
Acknowledgment by the PLC

In "Acknowledgment PLC tag", you configure the tag or the array tag and the bit number based on which the HMI device can recognize an acknowledgment by the PLC.

A bit set in the tag triggers acknowledgment of the assigned error alarm bit at the HMI device. This tag bit returns a function similar to acknowledgment on the HMI device which is triggered by pressing the "ACK" button, for example.

The acknowledgment bit must be located in the same tag as the bit for the error alarm.

Reset the acknowledgment bit before setting the bit in the alarm area again. The figure below shows the pulse diagram.



Acknowledgment on the HMI device

In "Ack read tag", you configure the tag or the array tag and the bit number that is written to the PLC after acknowledgment from the HMI device. Make sure when you use an array tag that it is not longer than 6 words.

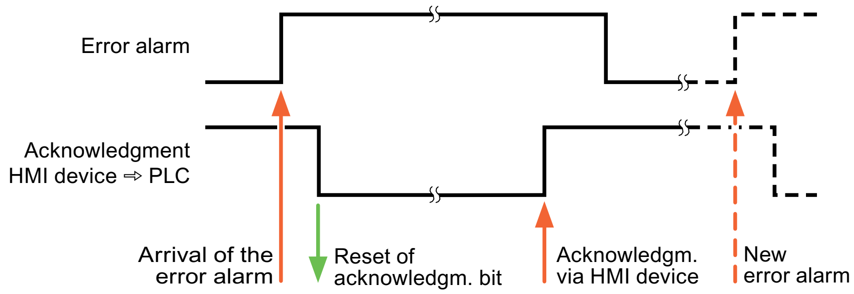
In order to ensure that a signal transition is generated as soon as the acknowledgment bit is set, the HMI device first resets the acknowledgment bit assigned to an error alarm. There is a certain time-based offset between these two operations, due to the processing time of the HMI device.

Note

The reset includes all alarm bits acknowledged since the last restart of Runtime. The PLC may only read this area once.

If the alarm is acknowledged on the HMI device, the bit is then set in the assigned acknowledgment tag on the PLC. This allows the PLC to recognize that the error alarm has been acknowledged.

The figure below shows the pulse diagram.



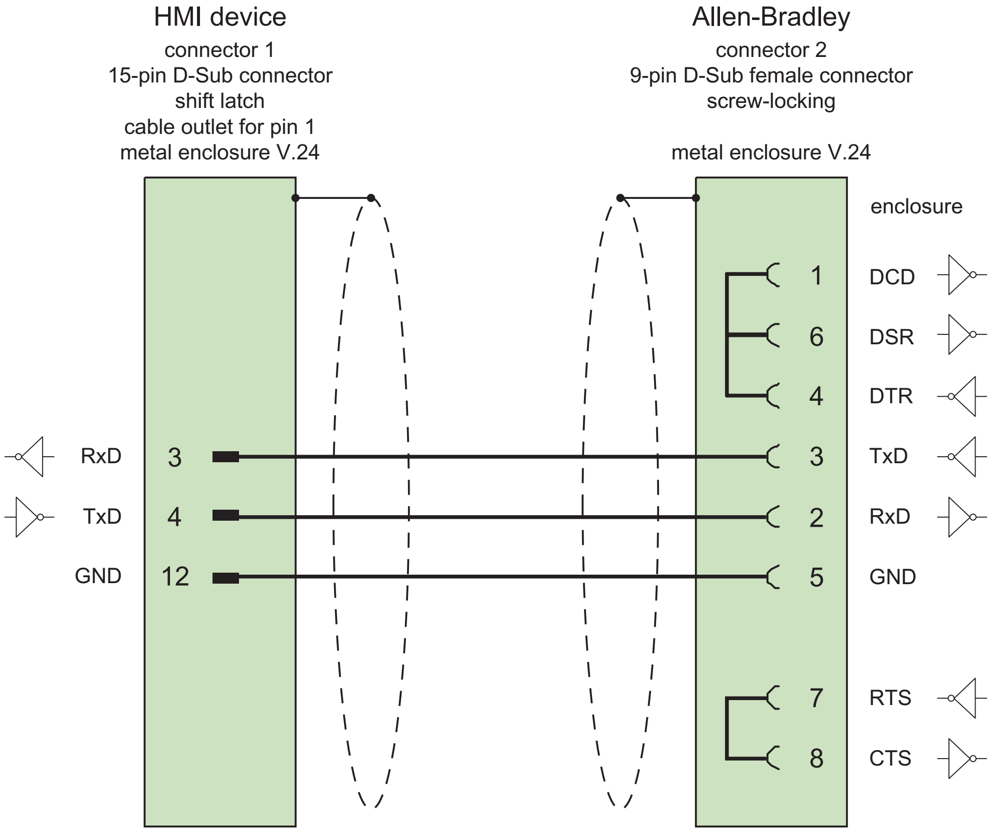
2.4 Connecting cables for Allen-Bradley

2.4.1 Connecting cable 6XV1440-2K, RS 232 for Allen-Bradley

6XV1440 - 2K _ _ _

Length key, see catalog ST 80

For interconnecting the HMI device (RS 232, 15-pin sub D) - SLC503, SLC504, SLC505, Micro Logix ML1500 LRP



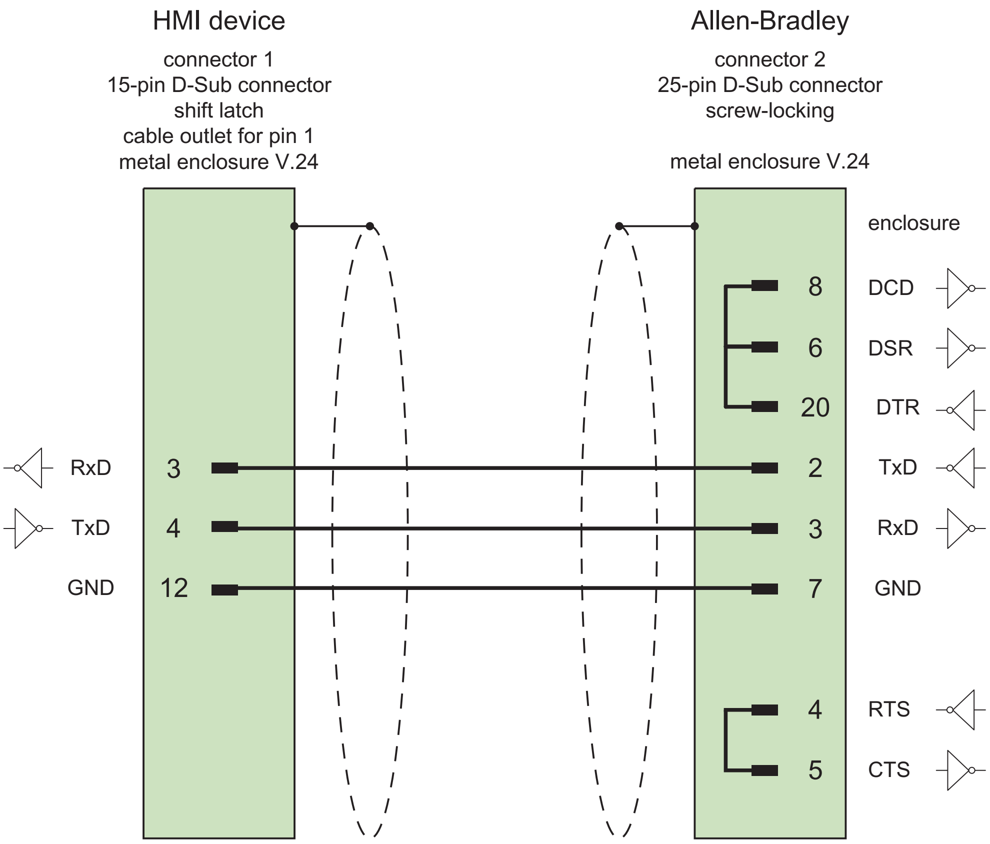
Shield with large-area contact to housing at both ends
Cable: 5 x 0.14 mm^2, shielded,
length: 15 m

2.4.2 Connecting cable 6XV1440-2L, RS 232, for Allen-Bradley

6XV1440-2L _ _ _

Length key, see catalog ST 80

For interconnecting the HMI device (15-pin sub D) - PLC5x, KF2, KF3



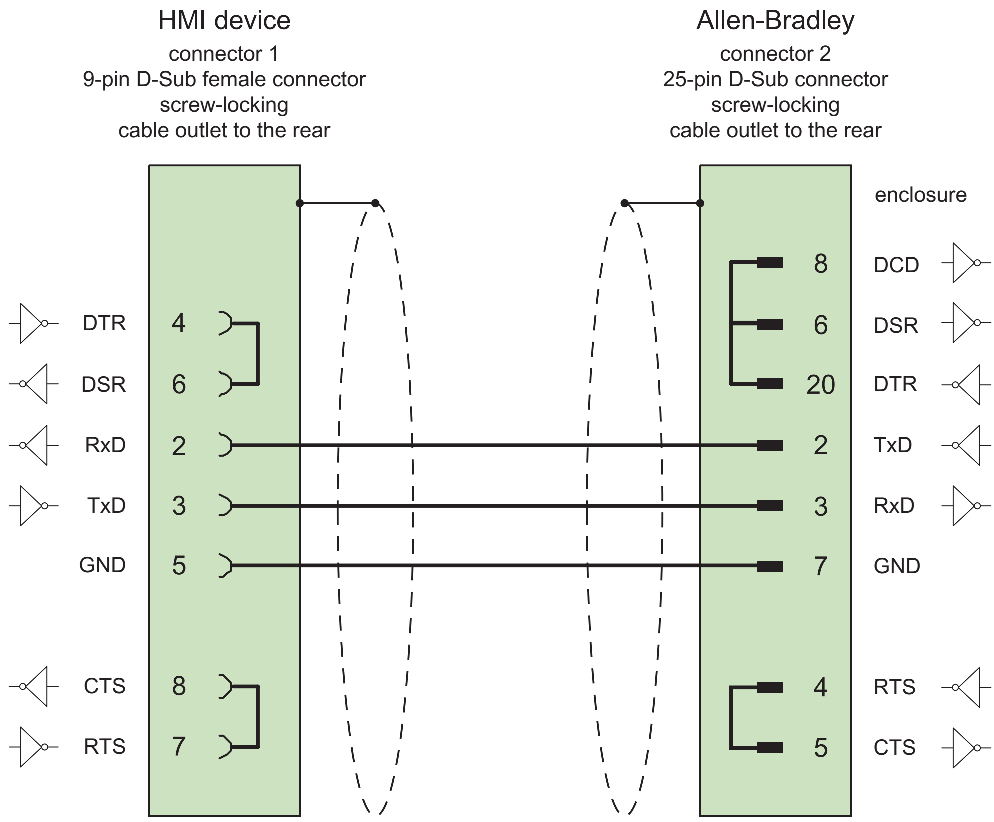
Shield with large-area contact to housing, however, without contact to the PE pins
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

2.4.3 Connecting cable 1784-CP10, RS 232, for Allen-Bradley

Allen-Bradley cable 1784-CP10

For interconnecting the HMI device (RS 232, 9-pin sub D) - PLC5x, KF2, KF3

You require an additional 25-pin, female / female adapter (gender changer) for interconnections with KF2 and KF3.



Shield with large-area contact to housing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

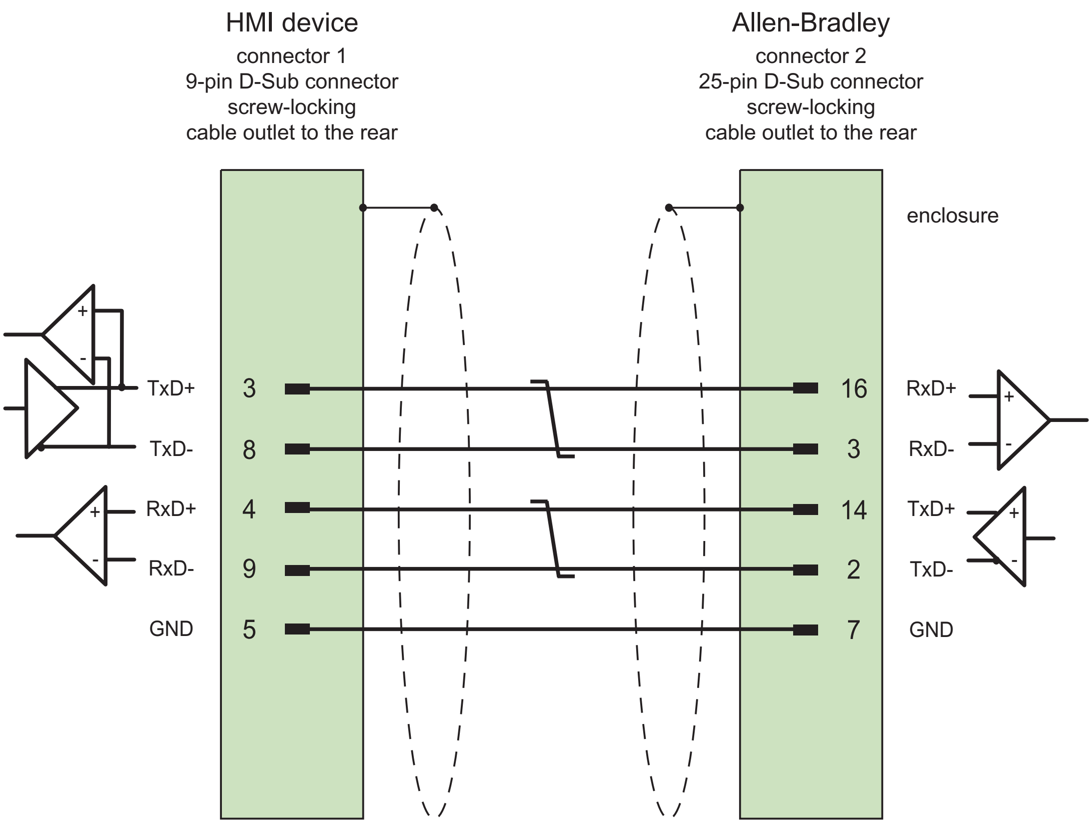
2.4.4 Connecting cable 6XV1440-2V, RS 422, for Allen-Bradley

6XV1440 -2V _ _ _

Length key, see catalog ST 80

For interconnecting the HMI device (RS 422, 9-pin sub D) - PLC5x, KF2, KF3

You require an additional 25-pin, female / female adapter (gender changer) for interconnections with KF2 and KF3.

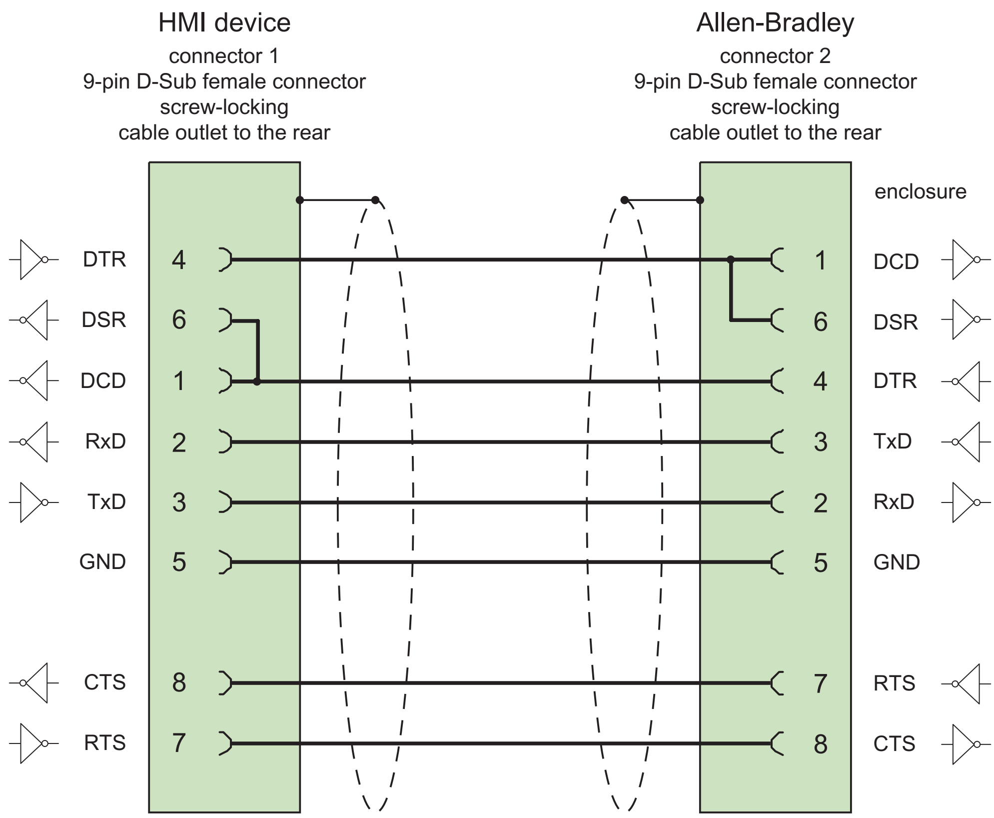


Shield with large-area contact to housing at both ends, interconnected shield contacts
Cable: 3 x 2 x 0.14 mm², shielded,
max. length 60 m

2.4.5 Connecting cable 1747-CP3, RS-232, for Allen-Bradley

Allen-Bradley cable 1747-CP3

For interconnecting the HMI device (RS 232, 9-pin sub D) - SLC503, SLC504, SLC505 (Channel 0), AIC+

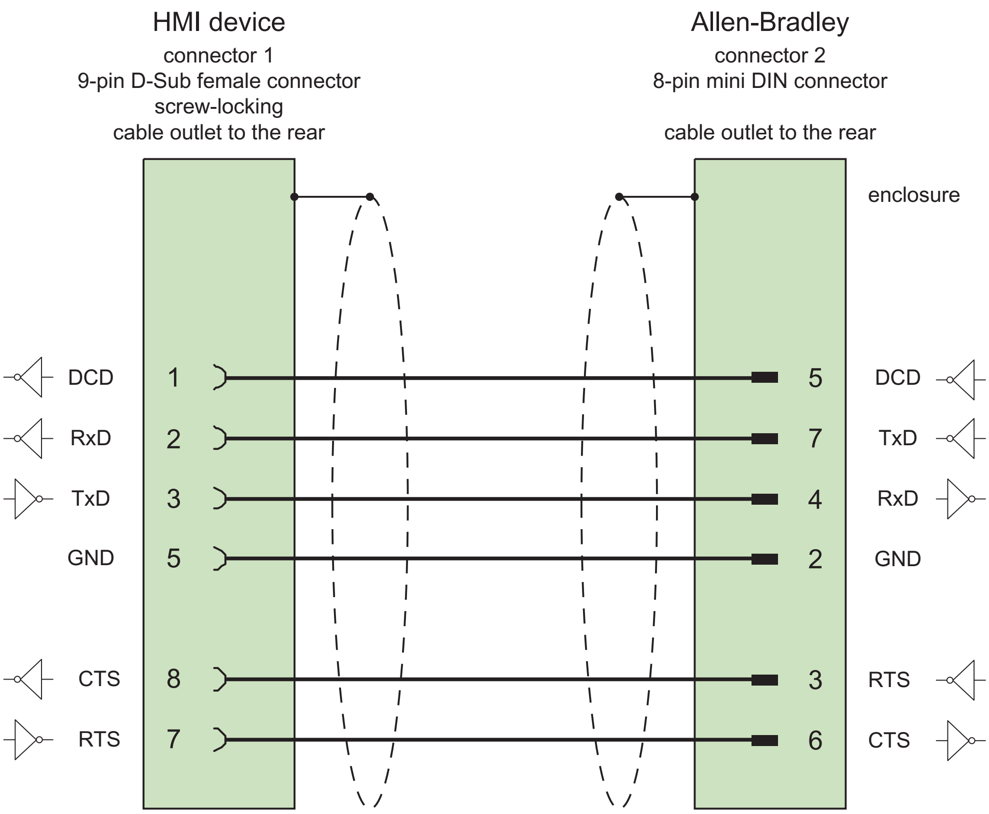


Shield with large-area contact to housing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 3 m

2.4.6 Connecting cable 1761-CBL-PM02, RS-232, for Allen-Bradley

Allen-Bradley cable 1761-CBL-PM02

For interconnecting the HMI device (RS 232, 9-pin sub D) - Micro Logix, AIC+

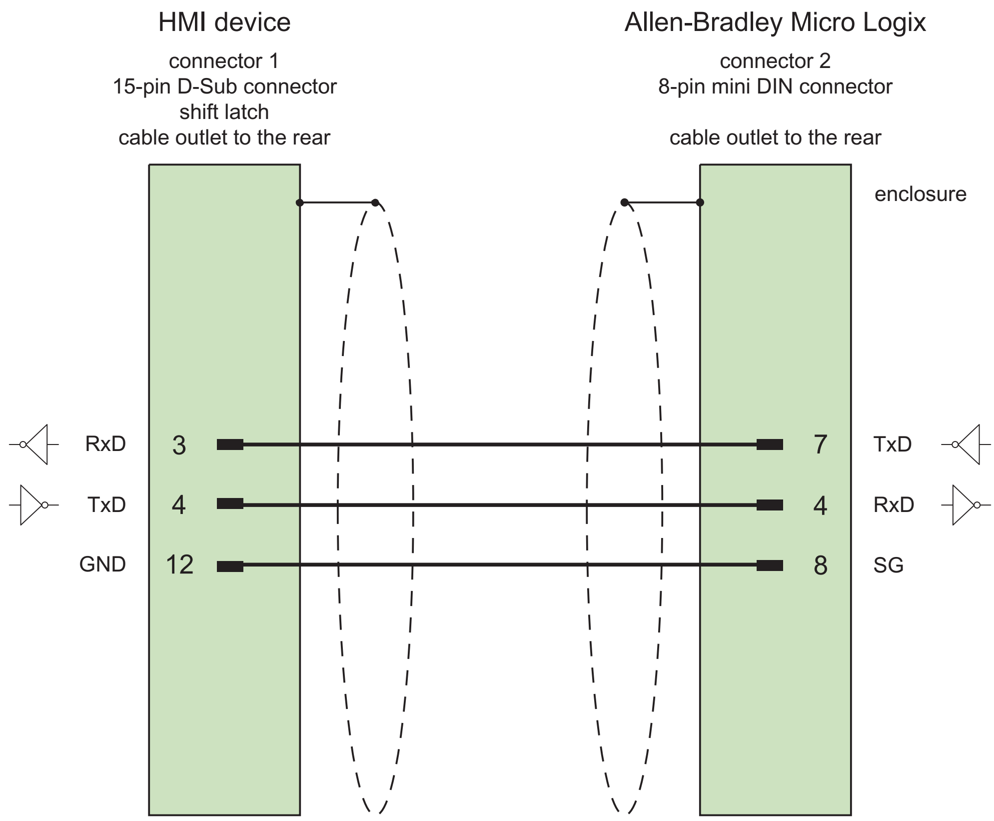


Shield with large-area contact to housing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

2.4.7 Connecting cable PP1, RS-232, for Allen-Bradley

PP1 connecting cable

For interconnecting the HMI device (RS 232, 15-pin sub D) - Micro Logix

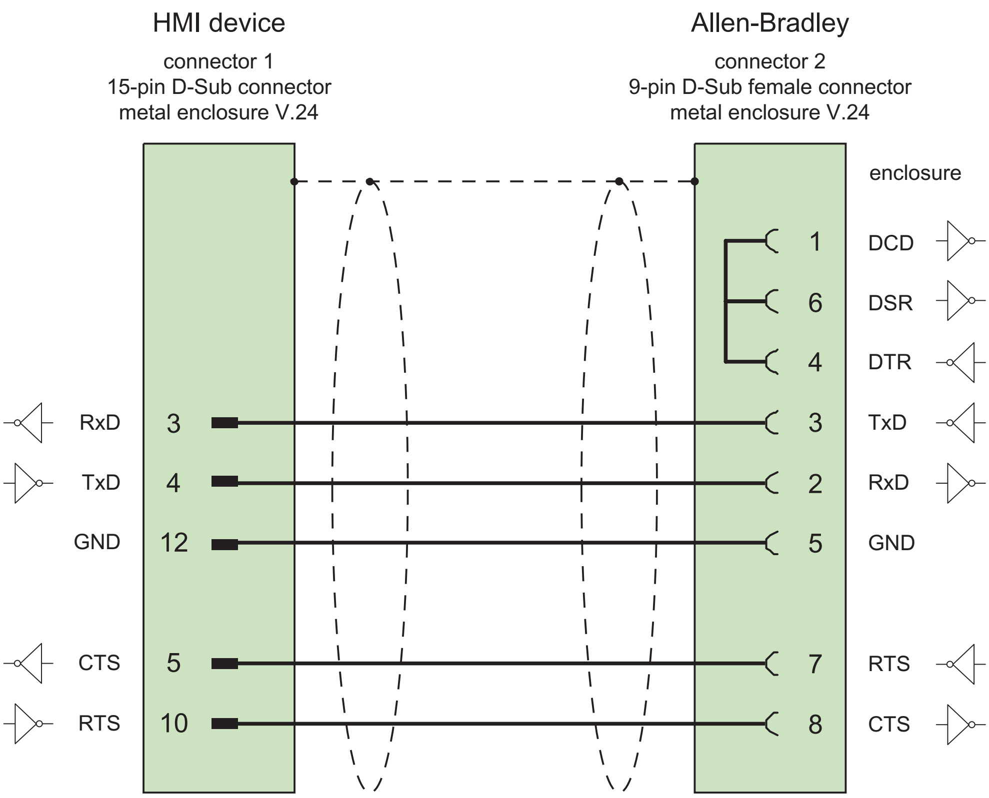


Shield with large-area contact to housing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

2.4.8 Connecting cable PP2, RS-232, for Allen-Bradley

PP2 connecting cable

For interconnecting the HMI device (RS 232, 15-pin sub D) - AIC+ (Advanced Interface Converter)

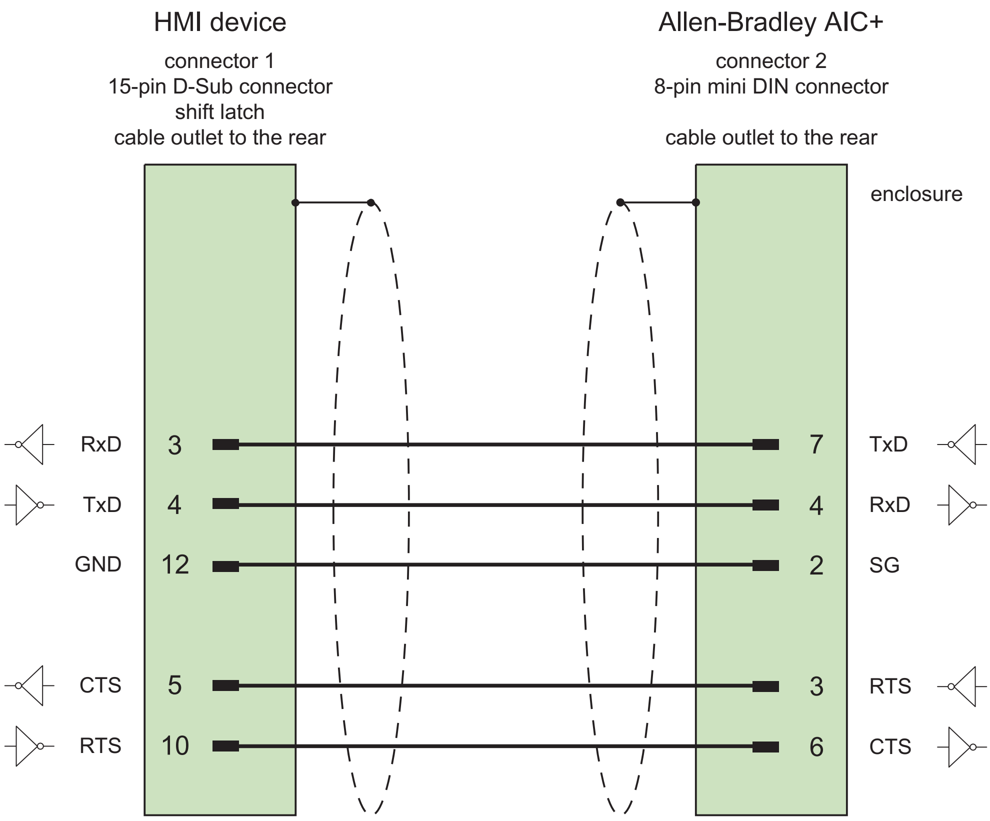


Shield with large-area contact to housing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

2.4.9 Connecting cable PP3, RS-232, for Allen-Bradley

PP3 connecting cable

For interconnecting the HMI device (RS 232, 15-pin sub D) - AIC+



Shield with large-area contact to housing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

2.4.10 Connecting cable PP4, RS-485, for Allen-Bradley

PP4 connecting cable

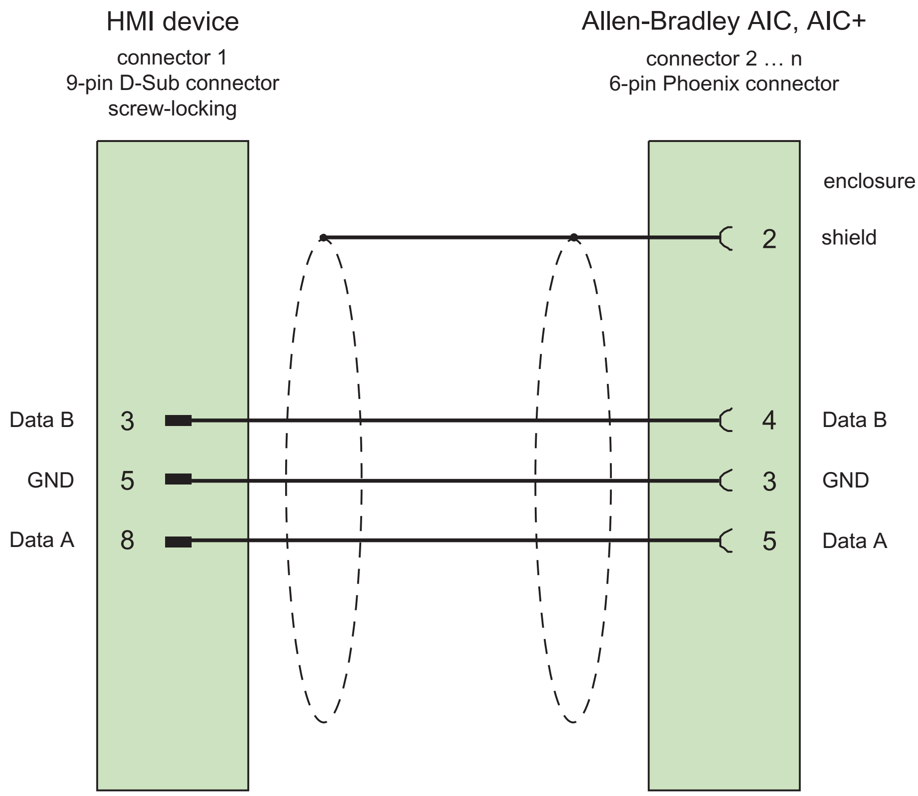
For interconnecting the HMI device (RS 485, 9-pin sub D) - AIC, AIC+

Items to observe when defining the connection concept:

- Minimum cable length = 1 m
- Maximum cable length = 1220 m
- Terminating resistance of 120 ohms between the data lines Data A and Data B only for longer cables.

Note

The shield of the cable may not be connected to the HMI device housing.



Cables: 5 x 0.14 mm², shielded,
min. length 1 m
max. bus length 1500 m

2.4.11 Connecting cable MP1, RS-485, for Allen-Bradley

MP1 connecting cable

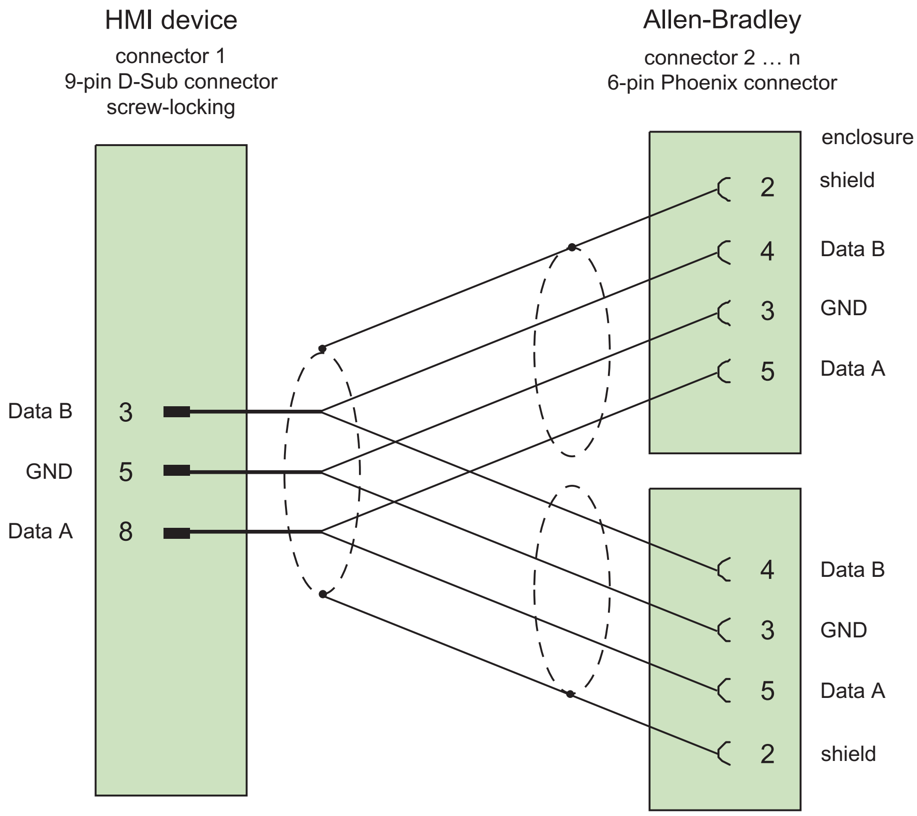
For connection HMI device (RS 485, 9-pin sub D) - DH485-LAN (AIC, AIC+)

When planning the network attachment, remember the following points:

- The HMI device must not be attached at the start or end of the LAN
- Both ends of the bus must be terminated. Refer to the Allen-Bradley documentation on installing the RS-485 network (for example, Allen-Bradley 1761-6.4).
- Cable length of the entire DH485 network: max. 1,220 m

Note

The shield of the cable must not be connected to the casing of the HMI device.



Cables: 5 x 0.14 mm², shielded,
max. length 1220 m

3 Communication with GE Fanuc controllers

3.1 Communication with GE Fanuc

3.1.1 Communication partner (GE Fanuc)

Introduction

This section describes the communication between the HMI device and the GE Fanuc automation PLC of the series 90-30, 90-70 and VersaMax Micro. These series are collectively called GE Fanuc PLC 90 in the remainder of this section.

With this PLC, the PLC's own protocol SNP multipoint connection is used for communication.

3.1.2 Communication between HMI device and controller (GE Fanuc)

Communications principle

The HMI device and the PLC communicate using tags and the user data areas.

Tags

The PLC and the HMI device exchange data using process values. In your configuration, create tags that point to an address on the PLC. The HMI device reads and displays the value from the defined address. The operator can also make an entry on the HMI device that is then written to the address on the PLC.

User data areas

User data areas are intended for the exchange of special data and are set up only when such data is used.

Data for which user data areas are required, for example:

- Job mailboxes
- Transfer of data records
- Date/time synchronization
- Sign-of-life monitoring

The user data areas are created while configuring in WinCC flexible. You assign the corresponding addresses in the PLC.

3.2 Configuring the communication driver for GE Fanuc

3.2.1 Requirements of communication

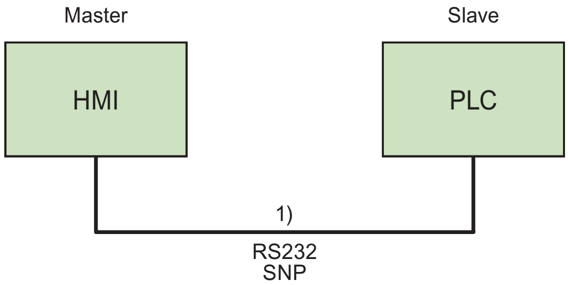
Connection

The communication between the HMI device and the GE Fanuc PLC 90 PLC sets the interface parameters and the bus address. No special blocks are required on the PLC for the connection.

The HMI device can be connected over two different interfaces:

RS-232 port

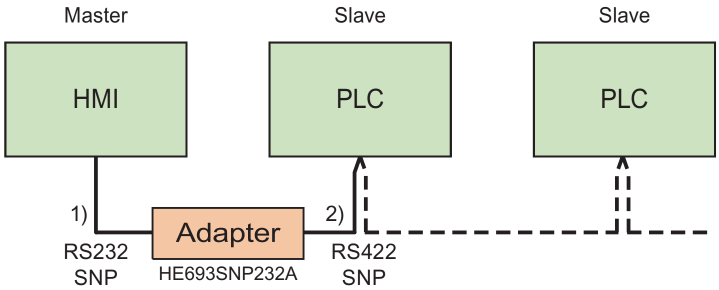
Point-to-point communication



1) Cable PP3 through PP6 depending on the HMI device and PLC

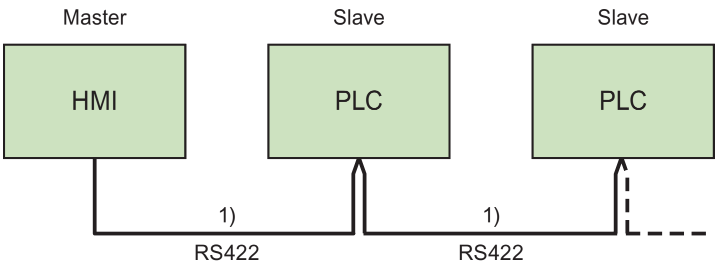
Multipoint communication

This principle can also be used for a point-to-point connection.



1) cable PP1 or cable PP2 for adapter HE693SNP232A
2) cable MP1 (multipoint cable)

RS-422 port



[1] cable MP2 (multipoint cable)

Refer to the documentation of the PLC and the HMI device manual to determine which ports you should use.

Note

Applies only to Mobile Panel 170:

For a trouble-free communication of the mobile panel 170 with GE Fanuc via RS422 the resistances contained in the multipoint cable MP2 are necessary.

As with mobile panel 170 the necessary signals +5V and GND are not available, it is recommended that you use an adapter in accordance with the multipoint cable MP1.

Cables

The following cables are available to connect the HMI device to the PLC:

Interface on the HMI device or adapter	GE Fanuc PLC			
	9-pin Sub D	6-pin western	8-pin RJ45	15-pin Sub D
RS 232, 9-pin	PP1	PP3	PP5	–
RS 232, 15-pin	PP2	PP4	PP6	–
RS-232, with cable to adapter	–	–	–	MP1
RS-422, 9-pin	–	–	–	MP2

The HMI device port to be used is defined in the corresponding Manual.

The pin assignment of the cables is described in the section "Connecting cables for GE Fanuc".

3.2.2 Installing the communication driver

Driver for the HMI device

The driver for connection to GE Fanuc controllers is supplied with WinCC flexible and is installed automatically.

No special blocks are required on the PLC for the connection.

3.2.3 Configuring the controller type and protocol

Select the PLC

For a connection to a GE Fanuc PLC over SNP, double-click on "Communication ▸ Connections" in the project view of the HMI device. Go to the "Communication drivers" column and select the protocol GE Fanuc SNP.

The property view displays the parameters of the selected protocol.

You can edit the parameters at any time by double-clicking "Communication ▸ Connections" in the project view of the HMI device. Select the connection and edit its parameters in the properties dialog box.

Note

The settings on the HMI device and on the PLC must match.

3.2.4 Configuring protocol parameters

Parameters to be set

To edit the parameters, double-click "Communication > Connections" in the project window of the HMI device. In the work area of the HMI device. "GE Fanuc SNP" is selected in the "Communication drivers" column. You can now enter or modify the protocol parameters in the Properties window:

Device-dependent parameters

- Interface

  Select the HMI port to which the GE Fanuc PLC is connected under "Interface".

  For more detailed information, refer to the Manual of the HMI device.
- Type

  Depending on the selected interface, here RS 232 or RS 422 are chosen.

  Note

  If you use the IF1B interface, you must also switch over the RS-422 received data and the RTS signal using 4 DIP switches on the back of the Multi Panel.

- Baud rate

  Define the transmission rate between the HMI device and the PLC under "Baud rate".

  Note

  The highest station address must be less than or equal to 63 if you set a transmission rate of 1.5 Mbaud at OP 73 or OP 77A.

  If connecting a TP 170A to a SIMATIC S7 station at a transmision rate of 1.5 MBaud on PROFIBUS DP, set a value less than or equal to 63 for the highest station address (HSA).

- Data bits

  Under "Data bits", "8 bits" is always selected.
- Parity

  Select "None", "Even" or "Odd" under "Parity."
- Stop bits

  Select "1" or "2" "Stop bits".

Network parameters

- Long break

  Under "Long Break", you set the time (in ms) for establishing connections to the individual controllers.

We recommend keeping the default setting of 50 ms. If connection problems occur despite identical interface parameters on the PLC and HMI device, increase this value step by step.

Note

Increasing the long break, however, always increases the update times.

PLC-dependent parameters

- Bus address

  Under "Bus address" you set the bus address of the PLC.

  Seven ASCII characters are permitted: 0-9, _ (underscore) and A-Z (upper case).

3.2.5 Permitted data types (GE Fanuc)

Permitted data types

The table lists the user data types that can be used when configuring tags and area pointers.

Name	Operand	Data type
Analog IN	AI	Word, UInt, Int, DWord, DInt, Real, BCD–4, BCD–8
Analog OUT	AQ	Word, UInt, Int, DWord, DInt, Real, BCD–4, BCD–8
Binary	M	Bit, Byte, Word, UInt, Int, DWord, DInt, Real, BCD–4, BCD–8
Binary	T or G	Bit, Word, UInt, Int, DWord, DInt, Real, BCD–4, BCD–8
Digital input	I	Bit, word
Digital output	Q	Bit, word
Data register (integer)	R	Word, UInt, Int, DWord, DInt, Real, BCD–4, BCD–8
Status	S, SA, SB, SC	Bit, word
Program registers (90-70 CPU only)	P	Word, UInt, Int, DWord, DInt, Real, BCD–4, BCD–8

Note

Applies to the "program registers" data type.

The password for accessing "program registers" (operand "P") is "P_TASK". This password is specified in the driver and cannot be changed by the user.

The password is included in the protocol when accessing "program registers". As a result, the LM-90 project to be accessed must have the name P_TASK.

Representation in WinCC

The representation of the data types corresponds to the representation in WinCC.

Special features of connections with GE Fanuc SNP

Area pointers can only be created with the "R" and "M" operands.

The trigger tag for discrete alarms can only be tags of the "R" and "M" operands. These tags are only valid for the data types "Int" and "Word".

Array tags may only be used for discrete alarms and trends. Array tags only of the "R" and "M" operands and data types "Int" and "Word" are permitted.

3.2.6 Optimizing the configuration

Acquisition cycle and update time

The acquisition cycles for the "Area pointers" and the acquisition cycles of the tags specified in the configuration software are decisive factors for the update times that can actually be achieved.

The update time is the sum of the acquisition cycle + transmission time + processing time.

To achieve optimum update times, remember the following points during configuration:

- Keep the individual data areas as small as possible and as large as necessary.
- Define data areas that belong together as belonging together. You can improve the update time by setting up one large data area instead of several small areas.
- If the acquisition cycles you select are too short, this is detrimental to the overall performance. Set the acquisition cycle to suit the rate of change of the process values. The rate of temperature changes at a furnace, for example, is significantly slower compared to the speed rate of an electrical drive. As a general guideline, the acquisition cycle should be approx. 1 second.
- Put the tags of an alarm or a screen in one data area without gaps.
- To allow changes in the PLC to be recognized reliably, these must be available at least during the actual acquisition cycle.
- Set the transmission rate to the highest possible value.

Discrete alarms

For discrete alarms, use arrays and assign the individual alarms to one bit of the array tags themselves and not to the individual subelements. For discrete alarms and arrays, only tags of the "R" and "M" operands and data types "Int" and "WORD" are permitted.

Screens

With screens, the update rate that can actually be achieved depends on the type and amount of data to be displayed.

During configuration, make sure that you only configure short acquisition cycles for objects that actually need to be updated quickly. This reduces the update times.

Trends

When using bit-triggered trends, if the group bit is set in the "Trend transfer area", the HMI device always updates all the trends whose bit is set in this area. It then resets the bits.

The group bit in the PLC program can only be set again after all bits have been reset by the HMI device.

Job mailboxes

If large numbers of job mailboxes are sent in quick succession, this can lead to overload in the communication between the HMI device and PLC.

The HMI device confirms acceptance of the job mailbox by entering the value zero in the first data word of the job mailbox. The HMI device now processes the job for which it requires time. If a new job mailbox is entered again immediately in the job mailbox, it may take some time before the HMI device can process the next job mailbox. The next job mailbox will only be accepted when there is computing capacity available.

3.3 User data areas

3.3.1 Trend request and trend transfer

Function

A trend is the graphic visualization of one or more values from the PLC. The value is read either time- or bit-triggered, depending on the configuration.

Time-triggered trends

The HMI device reads in the trend values cyclically at an interval specified in the configuration. Time-triggered trends are suitable for continuous processes, for example, the operating temperature of a motor.

Bit-triggered trends

By setting a trigger bit in the trend request tag, the HMI device either reads in a trend value or an entire trend buffer. This setting is defined in configuration data. Bit-triggered trends are normally used to visualize rapidly changing values. One example might be the injection pressure in the production of plastic parts.

To trigger bit-triggered trends, create suitable external tags in the "Tags" editor of WinCC flexible. The tags must be linked with the trend areas. The HMI device and PLC then communicate with each other over these trend areas.

The following areas are available for trends:

- Trend request area
- Trend transfer area 1
- Trend transfer area 2 (required only with switch buffers)

Tags of the "R" or "M" operands are permitted. They must be of the data type "Word" or an array tag of the data type "Word". During configuration you assign a bit to a trend. This sets a unique bit assignment for all areas.

Trend request area

If a screen is opened on the HMI device with one or more trends, the HMI device sets the corresponding bits in the trend request area. After deselecting the screen, the HMI device resets the relevant bits in the trend request area.

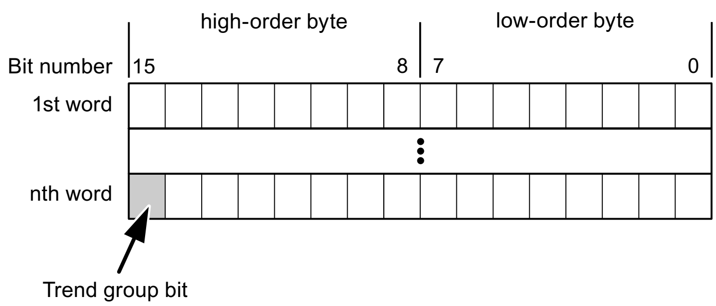
Using the trend request area, the PLC can recognize which trend is currently displayed on the HMI device. Trends can also be triggered without evaluation of the trend request area.

Trend transfer area 1

This area is used to trigger trends. In your PLC program, you set the bit assigned to the trend in the trend transfer area and set the trend group bit. The trend group bit is the last bit in the trend transfer area.

The HMI device detects the trigger. The HMI device reads either a value or the entire buffer from the PLC. It then resets the trend bit and the trend group bit.

The following picture shows the structure of a trend transfer area.



The trend transfer area must not be modified by the PLC program until the trend group bit has been reset.

Trend transfer area 2

Trend transfer area 2 is required for trends configured with a switch buffer. The trend transfer areas 1 and 2 have a similar structure.

Switch buffers

The switch buffer is a second buffer for the same trend that can be set up during configuration.

While the HMI device reads the values from buffer 1, the PLC writes to buffer 2. If the HMI device is reading buffer 2, the PLC writes to buffer 1. This prevents the trend values being overwritten by the PLC while the trend is being read out by the HMI device.

3.3.2 LED mapping

Function

The function keys of the keyboard units of the Operator Panel (OP), Multi Panel (MP) and Panel PC are equipped with LEDs. These LEDs can be controlled by the PLC. This functionality can be used to activate an LED in order to tell the operator which key to press in a specific situation, for example.

Requirements

In order to enable control of an LED, you must set up an LED tag or array tag in the PLC and declare this as the LED tag in the configuration data.

LED assignment

Assign the LEDs to the LED tag bits when you configure the function keys. Define the "LED tag" and the corresponding "bit" for each function key in the "General" group of the properties view.

The bit number "bit" identifies the first of two consecutive bits that control the following LED states:

Bit n+ 1	Bit n	LED function	
		all Mobile Panels, Operator Panels, and Multi Panels	Panel PCs
0	0	Off	Off
0	1	Rapid flashing	Flashing
1	0	Slow flashing	Flashing
1	1	Permanent signal	Permanent signal

3.3.3 Area pointer

3.3.3.1 General information on area pointers (GE FANUC)

Introduction

Area pointers are parameter fields. WinCC flexible Runtime reads these parameter fields in order to obtain information about the location and size of data areas in the PLC. The PLC and the HMI device interactively communicate read and write data for these data areas . The PLC and the HMI device trigger defined interactions based on the evaluation of stored data.

The area pointers reside in PLC memory. Their addresses are configured in the "Area pointers" dialog of the "Connections" editor.

Area pointers used in WinCC flexible:

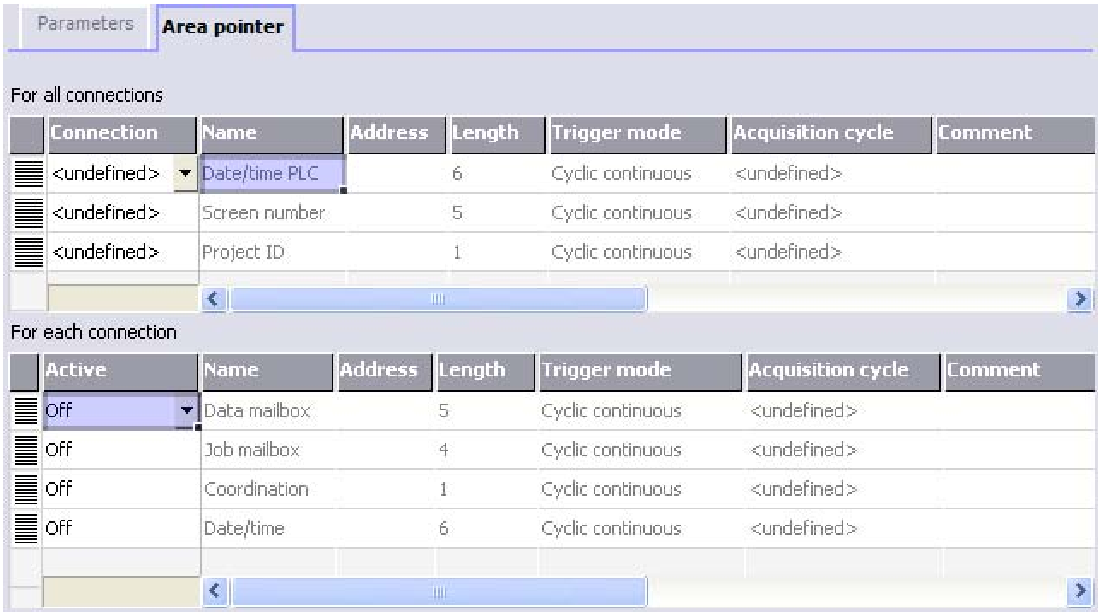
- PLC job
- Project ID
- Screen number
- Data record
- Date/time
- Date/time PLC
- Coordination

Device-dependency

Availability of the area pointer depends on the HMI device used.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use.



Enabling an area pointer based on the example of a SIMATIC S7 PLC

- Active

  Enables the area pointer.
- Name

  Name of the area pointer defined by WinCC flexible.
- Address

  Tag address of the area pointer in the PLC.
- Length

  WinCC flexible defines the default length of the area pointer.
- Acquisition cycle

  Define an acquisition cycle in this field to allow cyclic reading of the area pointer in Runtime. An extremely short acquisition time may have a negative impact on HMI device performance.
- Comment

  Save a comment, for example, to describe the purpose of the area pointer.

Accessing data areas

The table shows how the PLC and HMI device handle read (R) and write (W) access to the data areas.

Data area	Required for	HMI device	PLC
Screen number	Evaluation by the PLC in order to determine the active screen.	W	R
Data record	Transfer of data records with synchronization	R/W	R/W
Date/time	Transfer of the date and time from the HMI device to the PLC	W	R
Date/time PLC	Transfer of the date and time from the PLC to the HMI device	R	W
Coordination	Requesting the HMI device status in the control program	W	R
Project ID	Runtime checks consistency between the WinCC flexible project ID and the project in the PLC.	R	W
PLC job	Triggering of HMI device functions by the control program	R/W	R/W

The next sections describe the area pointers and their associated PLC jobs.

3.3.3.2 "Screen number" area pointer

Function

The HMI device saves information about the screen called on the HMI device to the "Screen number" area pointer.

This allows the transfer of the current screen contents from the HMI device to the PLC. The PLC can trigger specific reactions such as the call of a different screen.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use. You can create only **one** instance of the "Screen number" area pointer and only on **one** PLC.

The screen number is transferred spontaneously to the PLC. That is, it is always transferred when a new screen is activated on the HMI device. It is therefore unnecessary to configure an acquisition cycle.

Structure

The area pointer is a data area in the memory of the PLC with a fixed length of 5 words.

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1st word	Current screen type															
2nd word	Current screen number															
3rd word	Reserved															
4th word	Current field number															
5th word	Reserved															

- Current screen type

  "1" for the root screen or
  "4" for the permanent window
- Current screen number

  1 to 32767
- Current field number

  1 to 32767

3.3.3.3 "Date/time" area pointer

Function

This area pointer is used to transfer the date and time from the HMI device to the PLC.

The PLC writes control job "41" to the job mailbox.

When it evaluating the control job, the HMI device saves its current date and time to the data area configured in the "Date/time" area pointer. All definitions are coded in BCD format.

The "Date/Time" area pointer when used in a project which contains multiple connections must be enabled for each configured connection.

The date/time data area has the following structure:

Data word	Left byte								Right byte								
	15							8	7							0	
n+0	Reserved								Hour (0 to 23)								Time
n+1	Minute (0 to 59)								Second (0 to 59)								
n+2	Reserved								Reserved								
n+3	Reserved								Weekday (1 to 7, 1 = Sunday)								Date
n+4	Day (1 to 31)								Month (1 to 12)								
n+5	Year (80 to 99/0 to 29)								Reserved								

Note

The entry of values from 80 to 99 in the "Year" data area returns the years 1980 through 1999; values from 0 to 29 return the years 2000 through 2029.

3.3.3.4 "Date/time controller" area pointer

Function

This area pointer is used to transfer the date and time from the PLC to the HMI device. Use this area pointer if the PLC is the time master.

The PLC loads the data area of the area pointer. All definitions are coded in BCD format.

The HMI device reads the data cyclically within the configured acquisition cycle and synchronizes itself.

Note

Set an acquisition cycle of sufficient length for the date/time area pointer in order to avoid any negative impact on HMI device performance.
Recommended: Acquisition cycle of 1 minute if your process can handle it.

The date/time data area has the following structure:

DATE_AND_TIME format (in BCD code)

Data word	Left byte			Right byte		
	15	......	8	7	......	0
n+0	Year (80 to 99/0 to 29)			Month (1 to 12)		
n+1	Day (1 to 31)			Hour (0 to 23)		
n+2	Minute (0 to 59)			Second (0 to 59)		
n+3	Reserved			Reserved		Weekday (1 to 7, 1 = Sunday)
n+4 [1)]	Reserved			Reserved		
n+5 [1)]	Reserved			Reserved		

1) The two data words must be available in the data area in order to ensure compliance of the data format with WinCC flexible and to avoid the reading of incorrect information.

Note

Note that when you enter the year, values 80-99 result in years 1980 through 1999 and the values 0-29 result in the years 2000 through 2029.

3.3.3.5 "Coordination" area pointer

Function

The "Coordination" area pointer is used to implement the following functionality:

- detection in the control program of HMI device startup
- detection in the control program of the current HMI device operating mode
- detection in the control program of the HMI devices ready to communicate state

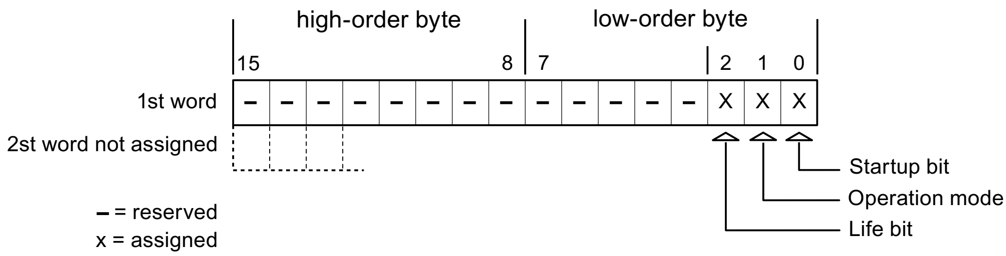
The "Coordination" area pointer has a length of two words.

Application

Note

The HMI device always writes the entire coordination area when updating the area pointer. The control program may not make changes to the coordination area for this reason.

Assignment of bits in the "Coordination" area pointer



Startup bit

The startup bit is set briefly to "0" by the HMI device during startup. It sets the bit permanently to "1" when startup is completed.

Operating mode

The operating mode bit is set to 1 as soon as the user switches the HMI device offline. The state of the operating mode bit is "0" during normal operation of the HMI device. You can determine the current operating mode of the HMI device by reading this bit.

Life bit

The HMI device inverts the life bit at intervals of approximately one second. You can check whether or not the connection to the HMI device is still up by querying this bit in the control program.

3.3.3.6 "Project ID" area pointer

Function

You can check whether the HMI device is connected to the correct PLC at the start of runtime. This check is important when operating with several HMI devices.

The HMI device compares a value stored on the PLC with the value specified in configuration data. This ensures compatibility of configuration data with the control program. If discrepancy is detected, a system alarm is displayed on the HMI device and runtime is stopped.

Application

Settings in configuration data required when using this area pointer:

- Define the version of configuration data. Possible values between 1 and 255.

  Enter the version in the "Device settings ▸ Device settings" editor in "Project ID."
- Data address of the value for the version that is stored in the PLC:

  Enter the data address in the "Communication ▸ Connections" editor in "Address."

Connection failure

A connection failure to a device on which the "project ID" area pointer is configured results in all the other connections in the project being switched to "offline".

This behavior has the following prerequisites:

- You have several configured connections in a project.
- You are using the "project ID" area pointer in at least one connection.

Causes which may set connections "offline":

- The PLC is not available.
- The connection has been switched offline in the engineering system.

3.3.3.7 "Job mailbox" area pointer

Function

The PLC can use the job mailbox to transfer jobs to the HMI device to trigger corresponding actions on the HMI device. These functions include, for example:

- Display screen
- Set date and time

Data structure

The first word of the job mailbox contains the job number. Depending on the job mailbox, up to three parameters can be transferred.

Word	Left byte	Right byte
n+0	0	Job number
n+1	Parameter 1	
n+2	Parameter 2	
n+3	Parameter 3	

The HMI device evaluates the job mailbox if the first word of this job is unequal to zero. This means that the parameters must be entered in the job mailbox first, followed by the job number.

When the HMI device accepts the job mailbox, the first word is set to 0 again. The execution of the job mailbox is generally not completed at this point in time.

Job mailboxes

All job mailboxes and their parameters are listed below. The "No." column contains the job number of the job mailbox. Job mailboxes can only be triggered by the PLC when the HMI device is online.

Note

Please note that not all HMI devices support job mailboxes. TP 170A and Micro Panel do not support PLC jobs, for example.

No.	Function	
14	**Setting the time (BCD coded)**	
	Parameter 1	Left byte: - Right byte: hours (0-23)
	Parameter 2	Left byte: minutes (0-59) Right byte: seconds (0-59)
	Parameter 3	-
15	**Setting the date (BCD coded)**	
	Parameter 1	Left byte: - Right byte: weekday (1-7: Sunday-Saturday)
	Parameter 2	Left byte: day (1-31) Right byte: month (1-12)
	Parameter 3	Left byte: year
23	**User logon**	
	Logs the user on with the name "PLC user" at the HMI device with the group number transferred in Parameter 1. The logon is possible only when the transferred group number exists in the project.	
	Parameter 1	Group number 1 to 255

No.	Function	
14	Setting the time (BCD coded)	
	Parameter 2, 3	-
24	User logoff	
	Logs off the current user. The function corresponds to the "logoff" system function)	
	Parameter 1, 2, 3	-
40	Transfer date/time to PLC	
	(in the S7 format DATE_AND_TIME) An interval of at least 5 seconds must be maintained between two successive jobs to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
41	Transfer date/time to PLC	
	(In OP/MP format) An interval of at least 5 seconds must be maintained between successive jobs in order to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
46	Update tags	
	Causes the HMI device to read the current value of the PLC tags whose update ID matches the value transferred in Parameter 1. (Function corresponds to the "UpdateTag" system function.)	
	Parameter 1	1 - 100
49	Clear process alarm buffer	
	Parameter 1, 2, 3	-
50	Clear alarm buffer	
	Parameter 1, 2, 3	-
51	Screen selection [1)]	
	Parameter 1	Screen number
	Parameter 2	-
	Parameter 3	Field number
69	Read data record from PLC	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	0: Do not overwrite existing data record 1: Overwrite existing data record
70	Write data record to PLC	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	-

[1)] OP 73, OP 77A and TP 177A HMI devices also execute the "Screen selection" job mailbox if the on-screen keyboard is active.

3.3.3.8 "Data mailbox" area pointer

"Data mailbox" area pointer

Function

When data records are transferred between the HMI device and PLC, both partners access common communications areas on the PLC.

Data transfer types

There are two ways of transferring data records between the HMI device and PLC:

- Transfer without synchronization
- Transfer with synchronization over the data record

Data records are always transferred directly. That is, the tag values are read from an address or written to an address configured for this tag directly, without redirecting the values by means of interim memory.

Initiating the transfer of data records

There are three ways of triggering the transfer:

- Operator input in the recipe view
- PLC jobs

  The transfer of data records can also be triggered by the PLC.
- Triggering by configured functions

If the transfer of data records is triggered by a configured function or by a PLC job, the recipe display on the HMI device remains operable. The data records are transferred in the background.

Simultaneous processing of several transfer requests is, however, not possible. In this case, the HMI device rejects the other transfer requests with a system alarm.

Transfer without synchronization

If you select asynchronous transfer of data records between the HMI device and PLC, there is no coordination over the common data areas. It is therefore unnecessary to set up a data area during configuration.

Asynchronous data record transfer can be a useful alternative, for example, when:

- The system is capable of excluding the risk of uncontrolled overwriting of data by the communication peer.
- The PLC does not require information about the recipe number and data record number.
- The transfer of data records is triggered by the operator of the HMI device.

Reading values

When a read job is triggered, the values are read from the PLC addresses and transferred to the HMI device.

- Triggering by the operator in the recipe view:

  The values are downloaded to the HMI device. You can then process, edit, or save these values, for example.
- Triggering by a function or PLC job:

  The values are saved immediately to the data volume.

Writing values

When a write job is triggered, the values are written to the PLC addresses.

- Triggering by the operator in the recipe view:

  The current values are written to the PLC.
- Triggering by a function or PLC job:

  The current values are written to the PLC from the data medium.

Transfer with synchronization (GE Fanuc)

If you select synchronous transfer, both communication partners set status bits in the common data area. You can use this mechanism to prevent uncontrolled overwriting of data in either direction in your control program.

Application

Synchronous data record transfer can be a useful solution, for example, when:

- The PLC is the "active partner" in the transfer of data records.
- The PLC evaluates the information about the recipe number and data record number.
- The transfer of data records is triggered by means of a Job mailbox.

Requirements

In order to synchronize transfer of data records between the HMI device and the PLC, the following requirements must be met during configuration:

- An area pointer has been set up: "Communication ▸ Connections" editor in "Area pointer"
- The PLC with which the HMI device synchronizes transfer of data records is specified in the recipe: "Recipes" editor, properties view of the recipe, "Properties" group in "Transfer".

Structure of the data area

The data area has a fixed length of 5 words. Structure of the data area:

	15		0
1. Word	Current recipe number (1 - 999)		
2. Word	Current data record number (0 - 65535)		
3. Word	Reserved		
4. Word	Status (0, 2, 4, 12)		
5. Word	Reserved		

- Status

  The status word (word 4) can adopt the following values:

Value		Meaning
Decimal	Binary	
0	0000 0000	Transfer permitted, data record free
2	0000 0010	Transfer is busy
4	0000 0100	Transfer completed without error
12	0000 1100	Transfer completed with error

Possible causes of error when transferring data records

Possible causes of error

The section below shows possible error causes which lead to the cancellation of data record transfer:

- Tag address not set up on the PLC
- Overwriting data records not possible
- Recipe number does not exist
- Data record number does not exist

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

Reaction to an aborted transfer due to errors

If the transfer of data records is aborted due to errors, the HMI device reacts as follows:

- Triggering by the operator in the recipe display

  Information in the status bar of the recipe view and output of system alarms
- Triggered by function

  Output of system alarms
- Triggering by PLC job

  No feedback message on the HMI device

You can nonetheless evaluate the status of the transfer by querying the status word in the data record.

Sequence of the transfer when triggered by a configured function

Reading from the PLC using a configured function

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.	Abort with system alarm.
3	The HMI device reads the values from the PLC and stores them in the data record specified in the function.	
4	• If "Yes" was selected for the "Overwrite" function, an existing data record is overwritten without any prompt for confirmation. The HMI device sets the status "Transfer completed." • If "No" was selected for the "Overwrite" function and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Writing to the PLC by means of configured function

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.	Abort with system alarm.
3	The HMI device fetches the values of the data record specified in the function from the data medium and transfers the values to the PLC.	
4	The HMI device sets the status "Transfer completed."	
5	The control program can now evaluate the transferred data. The control program must reset the status word to zero in order to enable further transfers.	

Sequence of the transfer triggered by a job mailbox

The transfer of data records between the HMI device and the PLC can be initiated by either one of these stations.

The two PLC jobs No. 69 and No. 70 are available for this type of transfer.

No. 69: Read data record from PLC ("PLC → DAT")

PLC job no. 69 transfers data records from the PLC to the HMI device. The PLC job is structured as follows:

	Left byte (LB)	Right byte (RB)
Word 1	0	69
Word 2	Recipe number (1-999)	
Word 3	Data record number (1 to 65535)	
Word 4	Do not overwrite existing data record: 0 Overwrite existing data record: 1	

No. 70: Write data record to PLC ("DAT → PLC")

PLC job No. 70 transfers data records from the HMI device to the PLC. The PLC job is structured as follows:

	Left byte (LB)	Right byte (RB)
Word 1	0	70
Word 2	Recipe number (1-999)	
Word 3	Data record number (1 to 65535)	
Word 4	—	

Sequence when reading from the PLC with PLC job "PLC → DAT" (no. 69)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device reads the values from the PLC and saves these to the data record defined in the PLC job.	
4	• If "Overwrite" was selected in the job, an existing data record is overwritten without any prompt for confirmation. The HMI device sets the status "Transfer completed." • If "Do not overwrite" was selected in the job, and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Sequence of writing to the PLC using PLC job "DAT → PLC" (no. 70)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device fetches the values of the data record specified in the function from the data medium and writes the values to the PLC.	
4	The HMI device sets the status "Transfer completed."	
5	The control program can now evaluate the transferred data. The control program must reset the status word to zero in order to enable further transfers.	

Sequence of a transfer started by the operator in the recipe display

Reading from the PLC started by the operator in the recipe display

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe number to be read and the status "Transfer active" in the data record and sets the data record number to 0.	Abort with system alarm.
3	The HMI device reads the values from the PLC and displays them in the recipe display. If the recipes have synchronized tags, the values from the PLC are also written to the tags.	
4	The HMI device sets the status "Transfer completed."	
5	The control program must reset the status word to zero in order to enable further transfers.	

Writing to the PLC started by the operator in the recipe display

Step	Action	
	Check: Status word = 0?	
1	Yes	No
	The HMI device enters the recipe and data record number to be written and the status "Transfer active" in the data record.	Abort with system alarm.
2	The HMI device writes the current values to the PLC. If the recipes have synchronized tags, the changed values are synchronized between the recipe display and tags and then written to the PLC.	
3	The HMI device sets the status "Transfer completed."	
4	If required, the control program can now evaluate the transferred data.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

3.3.4 Events, alarms, and acknowledgments

3.3.4.1 General information on events, alarms, and acknowledgments

Function

Messages return information about the PLC or HMI device operating states or problems to the user on the HMI device. The message texts consist of configurable texts and/or tags with actual values.

Operational messages and events must be distinguished. The programmer defines what is an operational message and what is an error alarm.

Operational message

An operational message indicates a state. Example:

- Motor on
- PLC in manual mode

Alarm message

An error alarm indicates a malfunction. Example:

- Valve does not open.
- Excess motor temperature

Alarms indicate exceptional operational states, and must therefore be acknowledged.

Acknowledgment

To acknowledge error alarms:

- Operator input on the HMI device
- The PLC sets an acknowledgment bit.

Triggering alarms

Triggering of an alarm in the PLC:

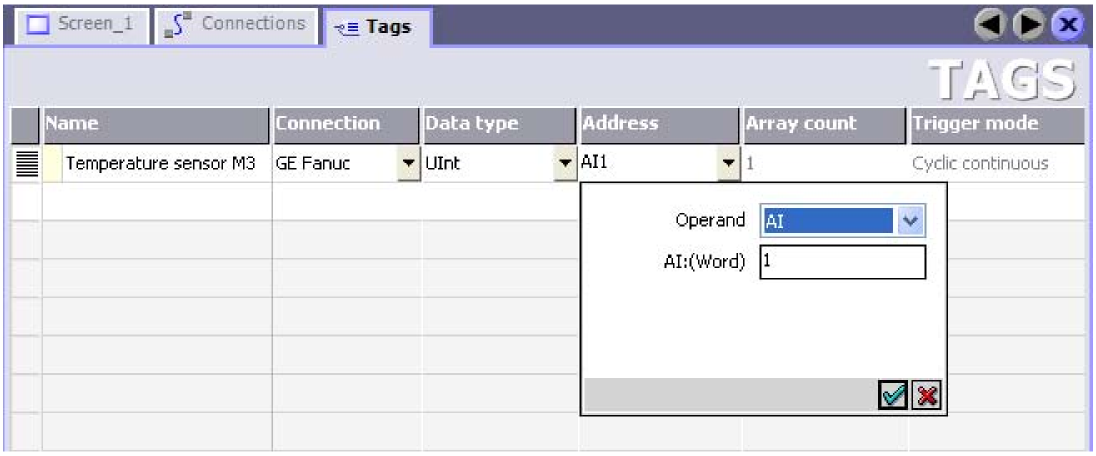
- Setting a tag bit
- Measured value limits exceeded

The location of tags, or of the tag array, is defined in WinCC flexible ES. The tag or array must be set up on the PLC.

3.3.4.2 Step 1: Creating tags or an array

Procedure

You create tags or arrays in the "Tags" editor. The dialog is shown in the following figure.



- Define the tag and array names.
- Select the connection to the PLC.

  The connection must already be configured in the "Connections" editor.
- Select the data type.

  The available data types depend on the PLC being used. If you select an illegal data type the tag will not be available in the "Discrete alarms" and "Analog alarms" editors.

  The following data types are supported for GE Fanuc controllers:

PLC	Permitted data types	
	Discrete alarms	Analog alarms
Series 90–30, 90–70 and VersaMax Micro	Int, Word	Byte, Int, UInt, Word, DInt, DWord, Bit, Real

- Enter an address.

  The tag addressed here contains the bit that triggers the alarm.

  As soon as the bit of the tag is set on the PLC and is transferred to the HMI device in the configured acquisition cycle, the HMI device recognizes the alarm as "incoming".

  After the same bit is reset on the PLC, the HMI device recognizes the alarm as "outgoing".
- Select the array elements.

  If the number of array elements is increased, you can select more bit numbers in the "Discrete alarms" editor. An array with a length of three words provides 48 alarm bits, for example.

3.3.4.3 Step 2: Configuring an alarm

Procedure

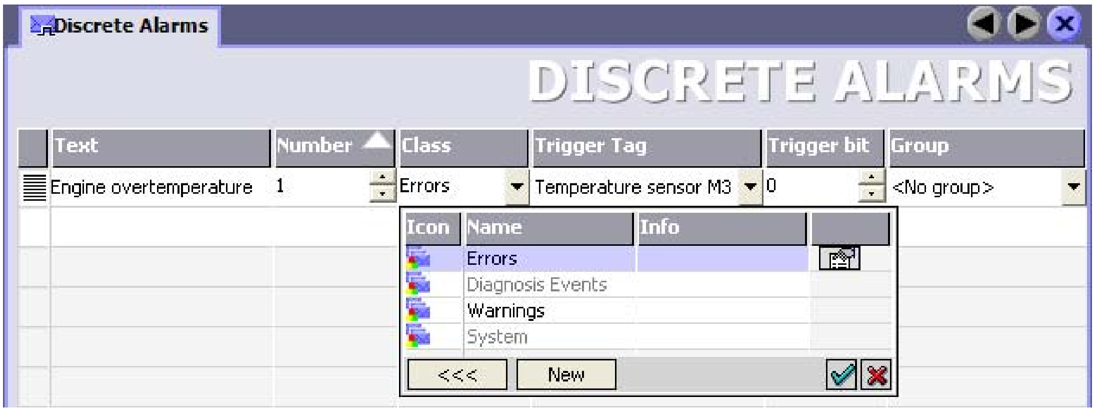
Alarms fall into the following categories:

- Discrete alarms
- Analog alarms

You create alarms in the "Discrete alarms" and "Analog alarms" editors.

Discrete alarms

The editor is shown in the following figure.



- Edit text

  Enter the text to display in runtime. You can format the text characters. The text may contain fields for the output of tags.

  The text is output to the alarm view if this view was configured in the "Screens" editor.
- Specify number

  Every alarm has a number that must be unique within the project. It is used to uniquely identify the alarm and is indicated with the alarm in runtime.

  The permitted values are between 1 and 100,000.

  The WinCC flexible engineering system assigns consecutive numbers. You can change the alarm numbers when assigning these to groups, for example.
- Specify the alarm class

  Possible alarm classes are:

  – Fault alarms

    This class must be acknowledged.

  – Operation alarms

    This class signals events with incoming and outgoing alarms.

- Assign trigger tag

  In the "Trigger tag" column, you link the configured alarm with the tag created in step 1. The selection list returns all tags with valid data type.
- Specify the bit number

  In the "bit number" column, you specify the relevant bit position in the created tag.

  Remember that the way the bit positions are counted depends on the particular PLC. With GE Fanuc controllers, the bit positions are counted as follows:

How the bit positions are counted	Left byte								Right byte							
in GE Fanuc controllers	16							9	8							1
In WinCC flexible configure:	15							8	7							0

Analog alarms

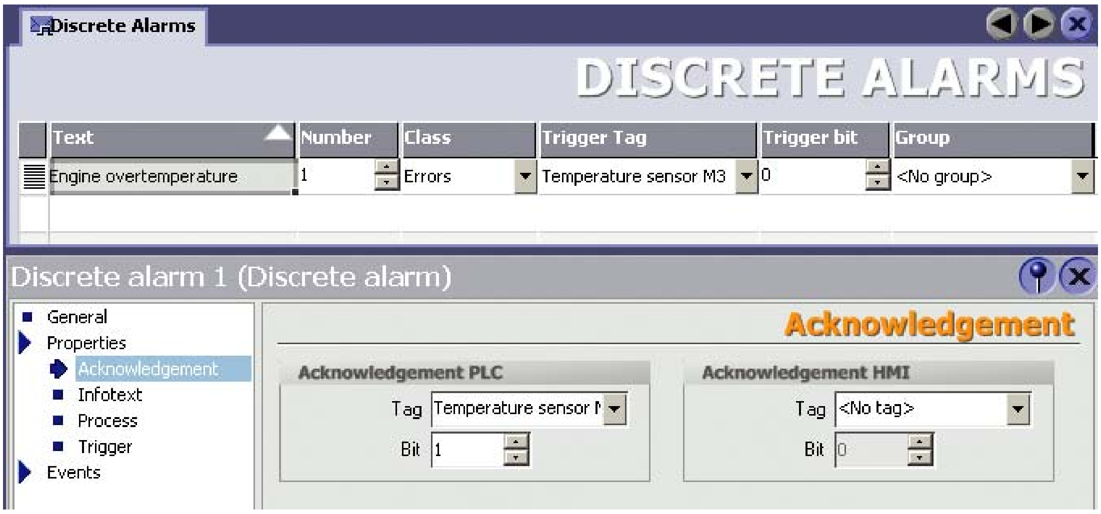
The only difference between discrete alarms and analog alarms is that instead of a bit number, you configure a limit value. The alarm is triggered when this limit is exceeded. The outgoing alarm is triggered when the low limit is violated, making allowances for any configured hysteresis.

3.3.4.4 Step 3: Configure the acknowledgment

Procedure

Create suitable tags on the PLC to acknowledge an error alarm. You assign these tags to an alarm in the "Bit messages" editor. You make the assignment in "Properties ▸ Acknowledgment."

The following figure shows the dialog for configuring an acknowledgment.



Distinction in terms of acknowledgment:

- Acknowledgment on the HMI device
- Acknowledgment by the PLC

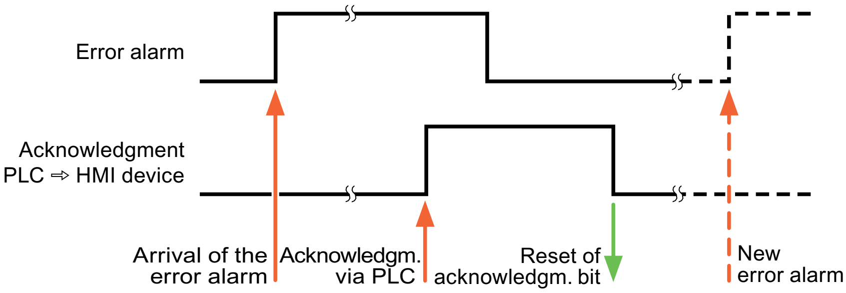
Acknowledgment by the PLC

In "Acknowledgment PLC tag", you configure the tag or the array tag and the bit number based on which the HMI device can recognize an acknowledgment by the PLC.

A bit set in the tag triggers acknowledgment of the assigned error alarm bit at the HMI device. This tag bit returns a function similar to acknowledgment on the HMI device which is triggered by pressing the "ACK" button, for example.

The acknowledgment bit must be located in the same tag as the bit for the error alarm.

Reset the acknowledgment bit before setting the bit in the alarm area again. The figure below shows the pulse diagram.



Acknowledgment on the HMI device

In "Ack read tag", you configure the tag or the array tag and the bit number that is written to the PLC after acknowledgment from the HMI device. Make sure when you use an array tag that it is not longer than 6 words.

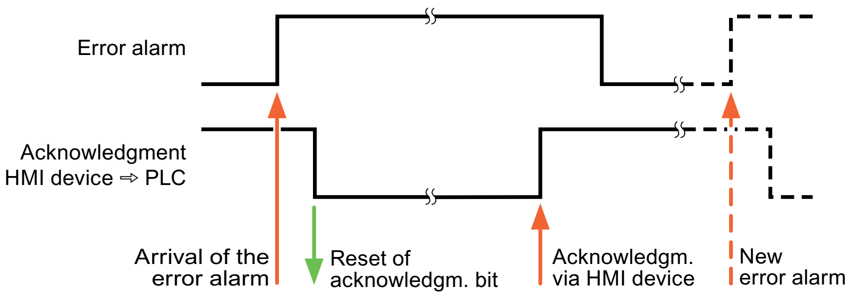
In order to ensure that a signal transition is generated as soon as the acknowledgment bit is set, the HMI device first resets the acknowledgment bit assigned to an error alarm. There is a certain time-based offset between these two operations, due to the processing time of the HMI device.

Note

The reset includes all alarm bits acknowledged since the last restart of Runtime. The PLC may only read this area once.

If the alarm is acknowledged on the HMI device, the bit is then set in the assigned acknowledgment tag on the PLC. This allows the PLC to recognize that the error alarm has been acknowledged.

The figure below shows the pulse diagram.



3.4 Commissioning components

3.4.1 Commissioning components

Transferring the PLC program to the PLC

1. Interconnect the PC with the CPU using the appropriate cable.
2. Download the program files to the CPU.
3. Then set the CPU to RUN.

Transferring project data to the HMI device

1. The HMI device must be in transfer mode in order to accept the project transfer.

   Possible scenarios:

   – Initial startup

     The HMI device does not yet contain any configuration data in the initial startup phase. The project data and runtime software required for operation must be transferred from the configuration computer to the device: The HMI device automatically changes to transfer mode.
     The transfer dialog box opens with a connection message on the HMI device.

   – Recommissioning

     Recommissioning means that you overwrite existing project data on the HMI device.

   For corresponding detailed instructions, refer to the HMI device manual.
2. Check whether the alarm settings meet requirements of your WinCC flexible project.
3. Select "Project > Transfer > Transfer settings" to configure the transfer parameters before you transfer project data to the HMI device:
   – Select the used port.
   – Set the transfer parameters.
   – Select the target storage location.
4. Initiate the transfer of project data by clicking "Transfer".
   – The project is compiled automatically.
   – All compilation and transfer steps are logged to a message window.

   Message output on the configuration computer on successful completion of the transfer: "Transfer completed successfully".

   The start screen appears on the HMI device.

Interconnecting the PLC with the HMI device

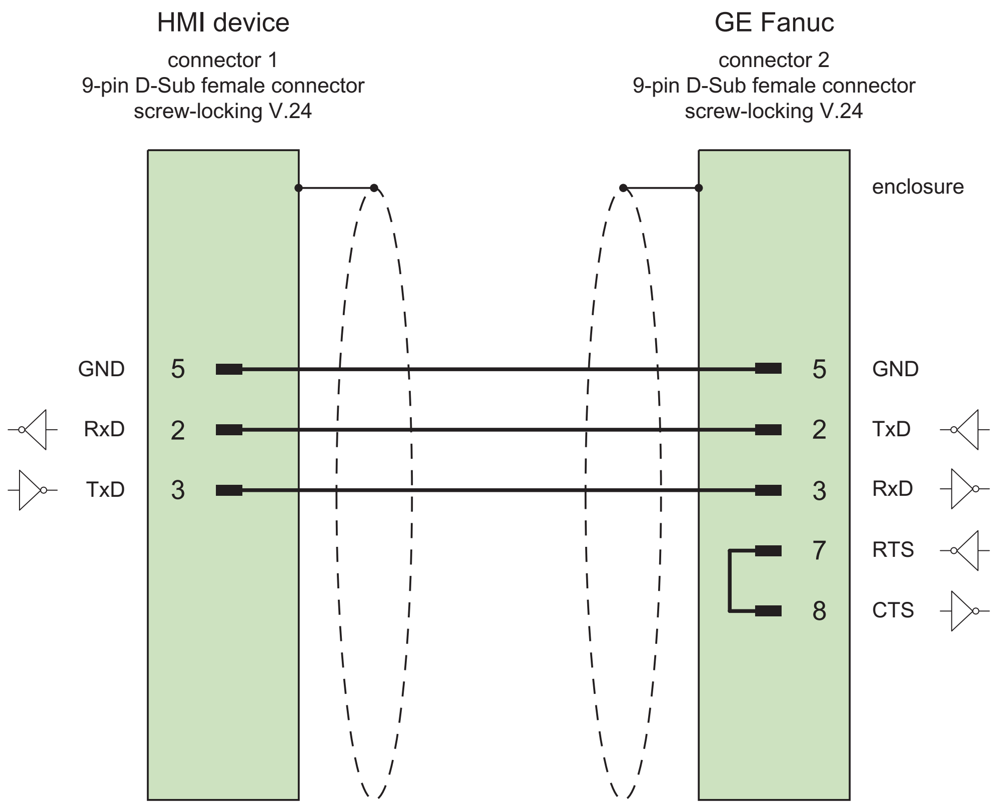
1. Interconnect the PLC with the HMI device using a suitable cable.
2. The message "Connection to PLC .... is established" is output to the HMI device. Note that users can edit the system alarm texts in WinCC flexible.

NOTICE
Always observe the safety-related information in the HMI device Manual when commissioning the device. RF radiation emitted from devices such as mobile phones may cause unwanted operating states.

3.5 Connecting cables for GE Fanuc

3.5.1 Connecting cable PP1, RS-232, for GE Fanuc

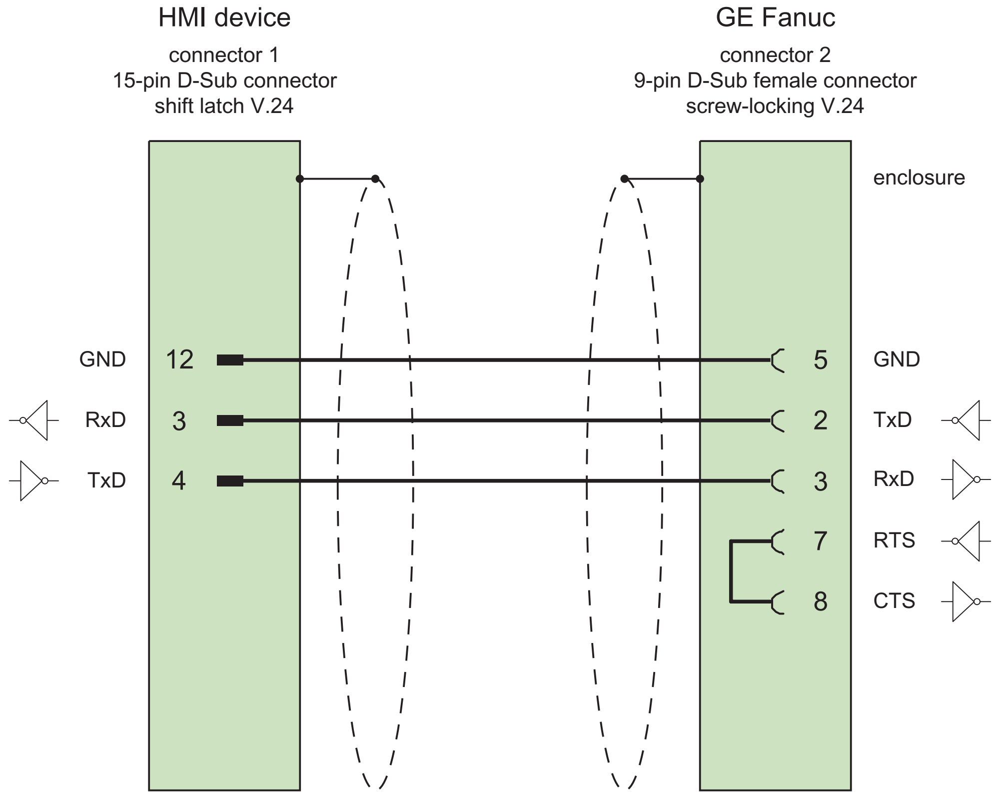
Connecting cable PP1 for adapter HE693SNP232A



Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

3.5.2 Connecting cable PP2, RS-232, for GE Fanuc

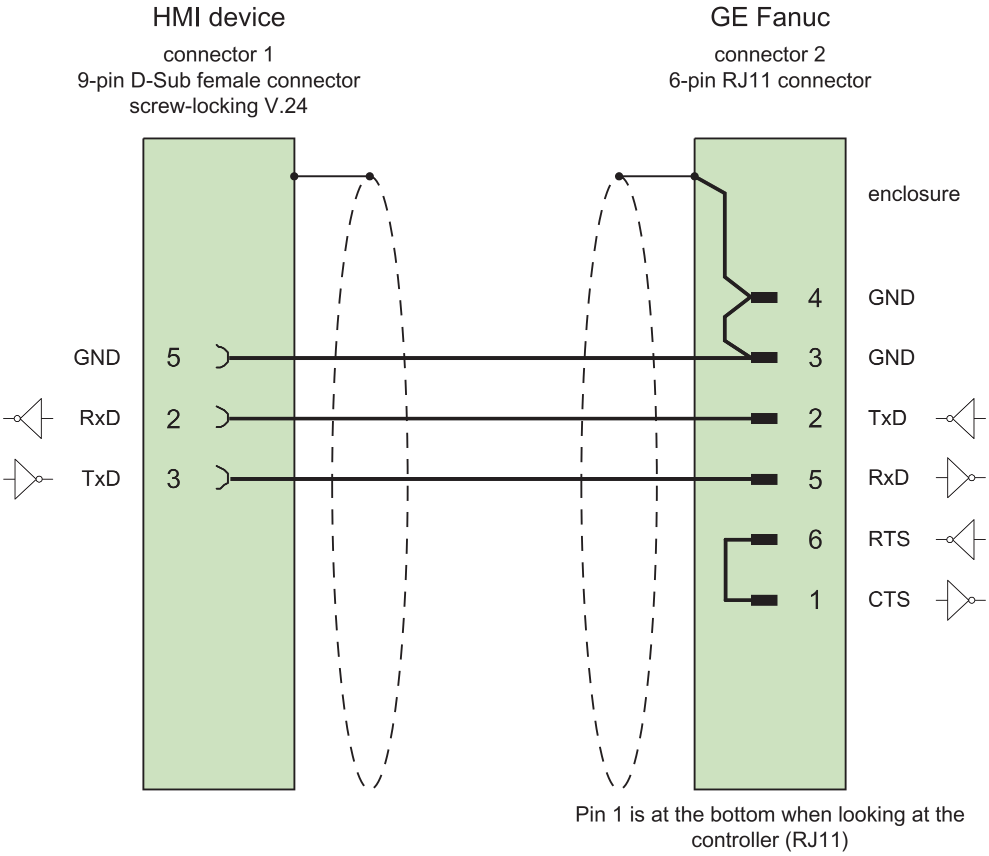
Connecting cable PP2 for adapter HE693SNP232A



Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm^2, shielded,
max. length 15 m

3.5.3 Connecting cable PP3, RS-232, for GE Fanuc

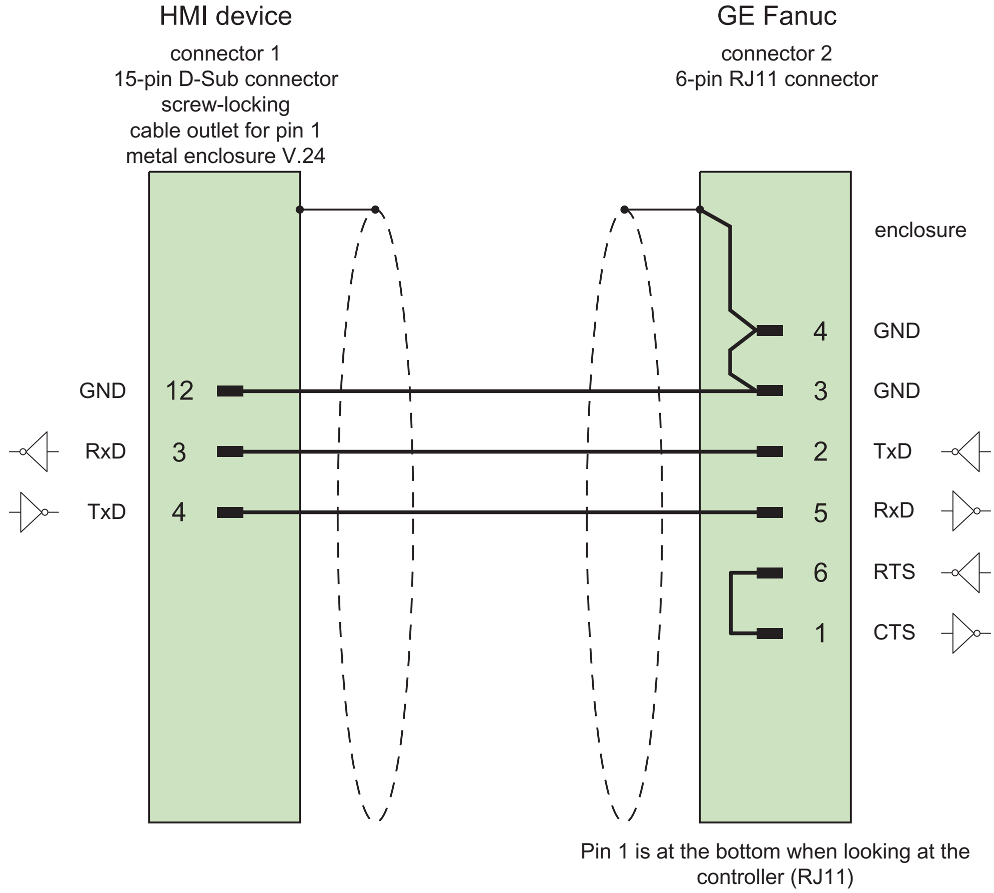
Connecting cable PP3 with Western connector



Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

3.5.4 Connecting cable PP4, RS-232, for GE Fanuc

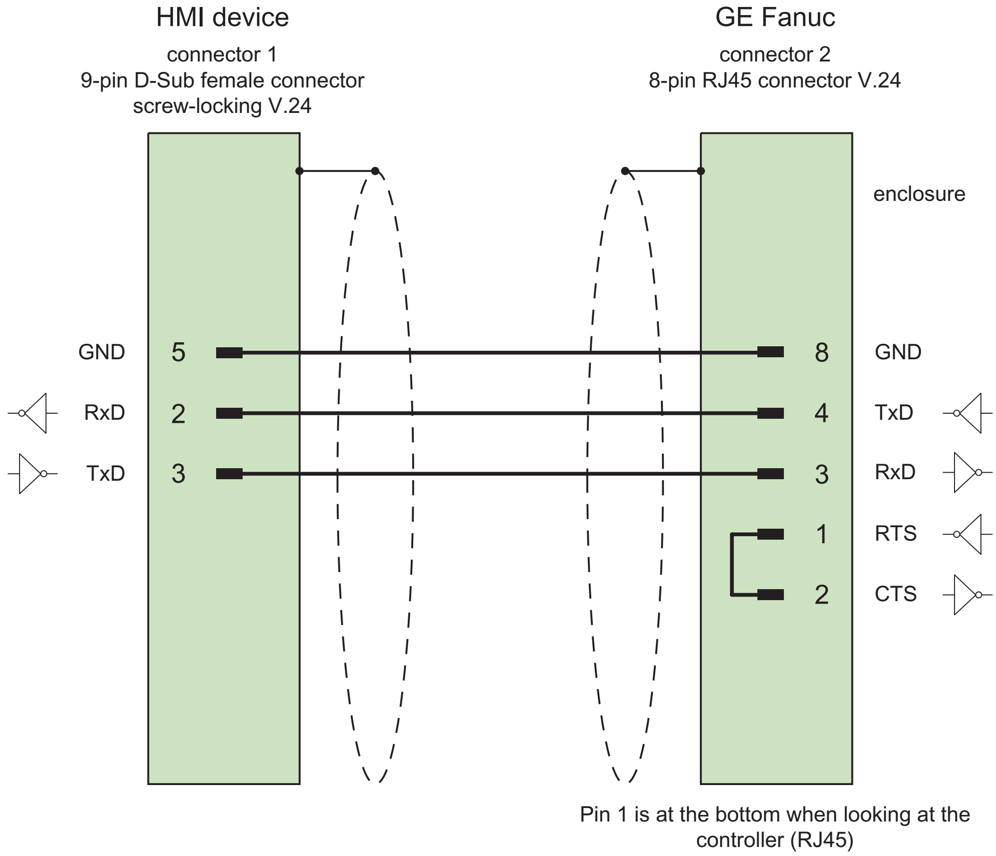
Connecting cable PP4 with Western connector



Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

3.5.5 Connecting cable PP5, RS-232, for GE Fanuc

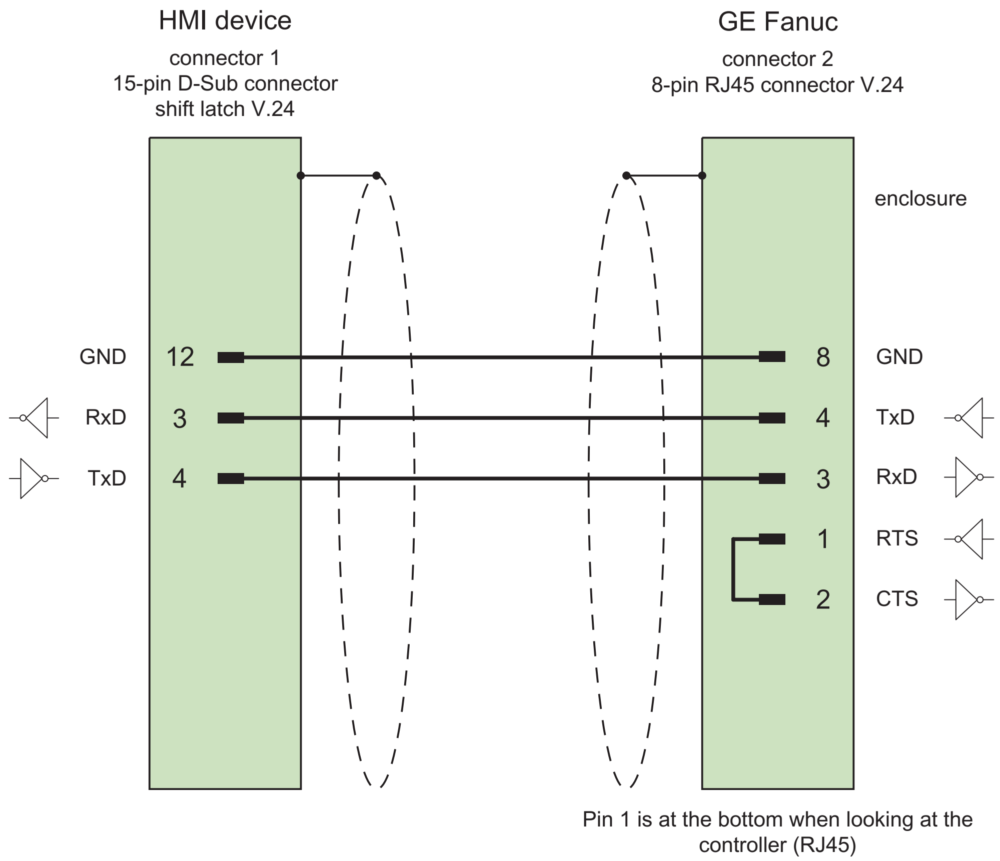
Connecting cable PP5 with RJ-45 connector



Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

3.5.6 Connecting cable PP6, RS-232, for GE Fanuc

Connecting cable PP6 with RJ-45 connector



Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

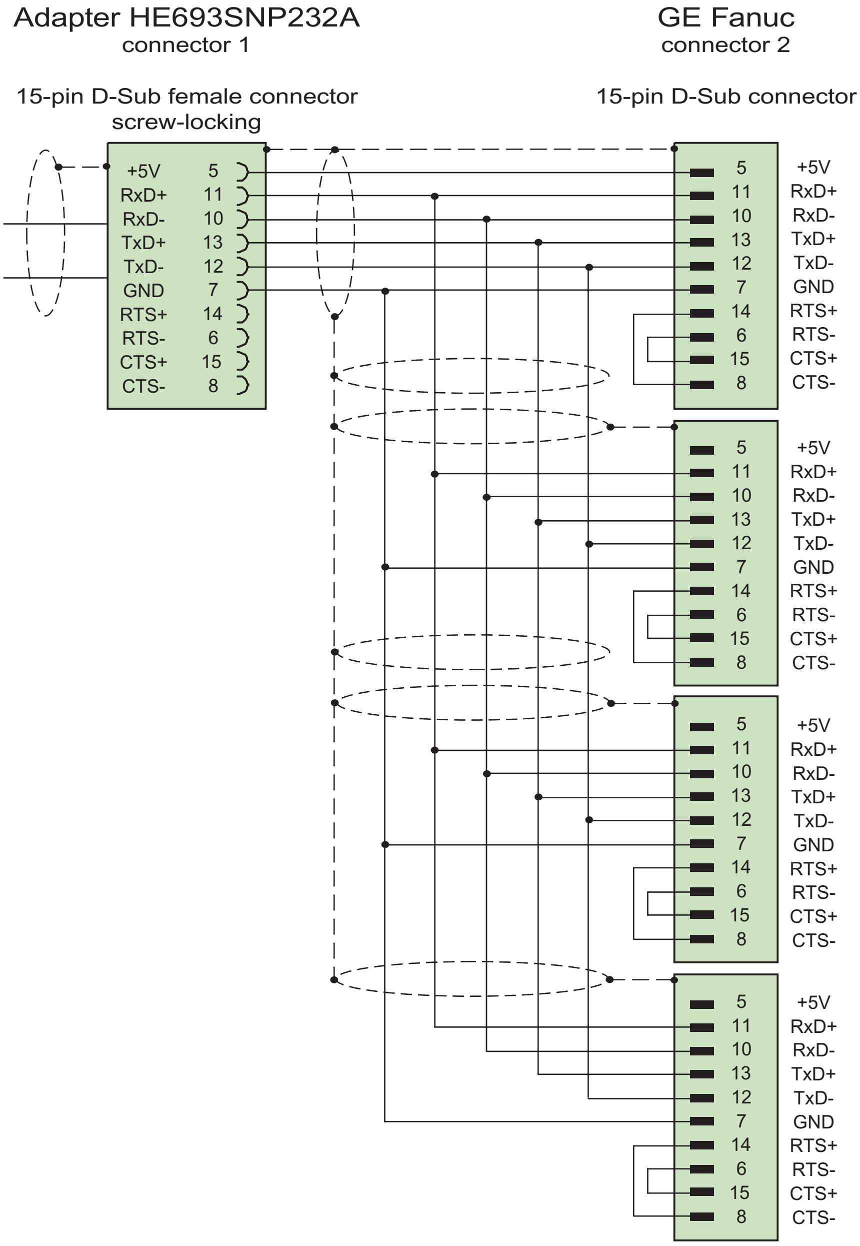
3.5.7 Connection cable MP1, RS 422, for GE Fanuc

Multipoint cable MP1

This cable connects the RS-422 output of the HE693SNP232A adapter with the Fanuc controllers.

The HMI device is connected to the adapter with the PP1 or PP2 cables.

> **CAUTION**
>
> The power supply for the adapter must only be connected in one PLC, otherwise the controllers will be damaged.

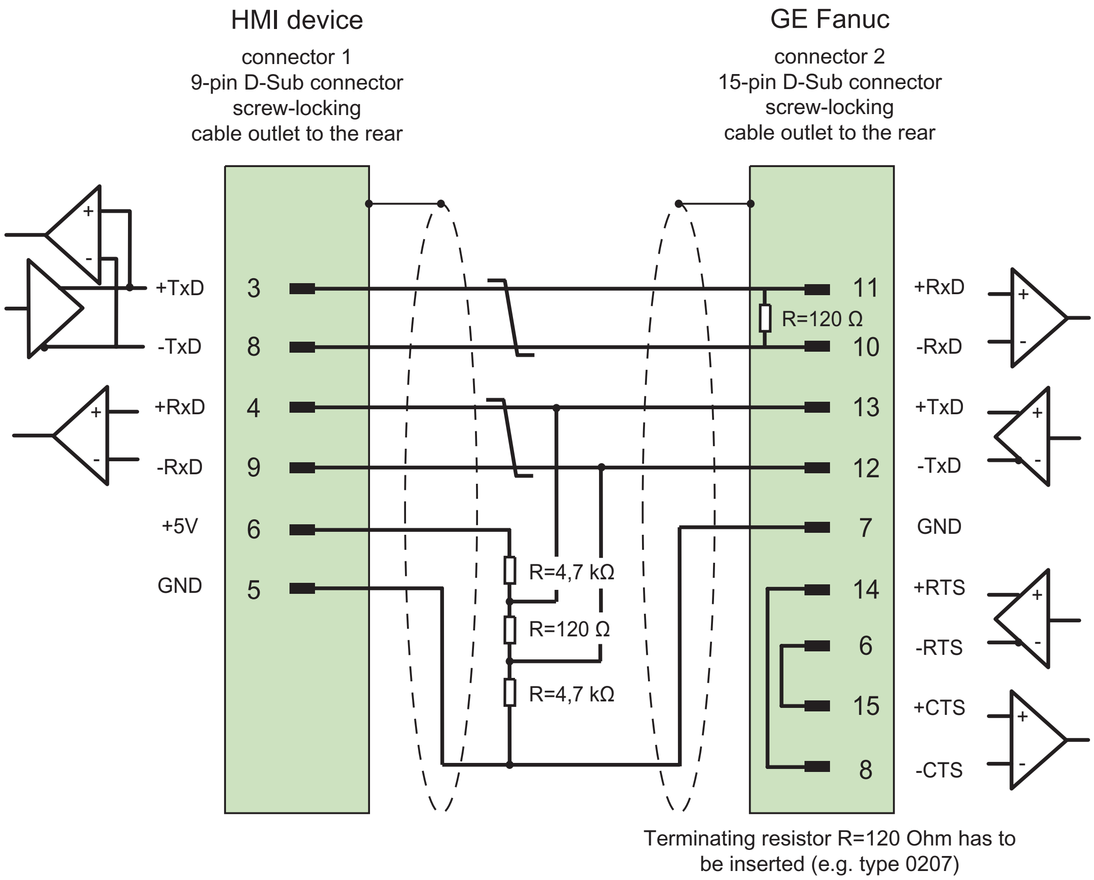


Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 300 m

3.5.8 Connection cable MP2, RS 422, for GE Fanuc

Multipoint cable MP8

Further controllers are attached as with the MP7 cable.



Shield with large-area contact to casing at both ends, shield contacts connected,
terminating resistor must be installed,
cable: 3 x 2 x 0.14 mm², shielded,
max. length 1200 m

4 Communication with LG controllers

4.1 Communication with LG GLOFA-GM

4.1.1 Communication partner (LG GLOFA)

Introduction

This section describes the communication between an HMI device and an LG Industrial Systems (Lucky Goldstar) PLC of the GLOFA-GM (GM4, GM6 and GM7) series resp. IMO PLC of the G4, G6 and G7 series (simply called LG controllers below).

Communication between one or more LG controllers and the HMI device is implemented over a Cnet communication module, for example G4L-CUEA or G6L–CUEC, with an RS-232/RS-485/RS-422 interface.

With this PLC, the PLC's own protocol is used for a dedicated connection.

Released communication types

The following types of physical connection have been released for LG controllers:

- RS-232
- RS-422

Note

The HMI device can only be operated as a master.

4.1.2 Communication between HMI device and controller (LG GLOFA)

Communications principle

The HMI device and the PLC communicate using tags and the user data areas.

Tags

The PLC and the HMI device exchange data using process values. In your configuration, create tags that point to an address on the PLC. The HMI device reads and displays the value from the defined address. The operator can also make an entry on the HMI device that is then written to the address on the PLC.

User data areas

User data areas are intended for the exchange of special data and are set up only when such data is used.

Data for which user data areas are required, for example:

- Job mailboxes
- Transfer of data records
- Date/time synchronization
- Sign-of-life monitoring

The user data areas are created while configuring in WinCC flexible. You assign the corresponding addresses in the PLC.

4.2 Configuring the LG GLOFA-GM communication driver

4.2.1 Requirements of communication

Connector

The HMI device must be connected to the Cnet module, for example G4L-CUEA or G6L-CUEC over RS-232, RS-422 or RS-485.

For the RS-232 interface, operation is supported only with a null modem cable.

With the implemented dedicated protocol, it is also possible to connect directly to the GM6 CPU-B without a computer link module (Cnet) G6L. This GM6 CPU communication however does not support symbolic tags "named2.

Cables

The following cables are available to connect the HMI device to the PLC:

Interface on the HMI device or adapter	LG GLOFA-GM PLC	
	Point-to-point cable	Multipoint cable
RS-232, 9-pin	PP1 connecting cable	–
RS-232, 15-pin	PP4 connecting cable	–
RS-422, 9-pin	PP2 connecting cable	MP2 connecting cable
RS-485, 9-pin	PP3 connecting cable	MP1 connecting cable

The HMI device port to be used is defined in the corresponding manual.

The pin assignments of the cables are described in the section "Connecting cables for LG".

Setting the operating mode switch on the Cnet module

The operating mode switch must be set to dedicated (e.g. on the G4L–CUEA to setting "3").

4.2.2 Installing the communication driver

Driver for the HMI device

The driver for connection to LG INDUSTRIAL SYSTEMS/IMO controllers is supplied with WinCC flexible and is installed automatically.

No special blocks are required in the PLC for the connection.

4.2.3 Configuring the controller type and protocol

Select the PLC

For a connection to an LG/IMO PLC using dedicated communication, double-click on "Communication ▸ Connections" in the project view of the HMI device. Go to the "Communication drivers" column and select the protocol LG GLOFA-GM.

The property view displays the parameters of the selected protocol.

Note

The settings on the HMI device and on the PLC must match.

You can check and set the PLC parameters for the Cnet module using the LG program Cnet Frame Editor (CnetEdit.exe). Settings on the Cnet module become effective only after the voltage returns. The parameters for GM6 CPU-B and GM7 are set with GMWIN.

You can edit the parameters at any time by double-clicking "Communication ▸ Connections" in the project view of the HMI device. Select the connection and edit its parameters in the properties dialog box.

4.2.4 Configuring protocol parameters

Parameters to be set

To edit the parameters, double-click "Communication > Connections" in the project window of the HMI device. In the project view of the HMI device. "LG GLOFA-GM" is selected in the "Communication drivers" column. You can now enter or modify the protocol parameters in the Properties window:

Device-dependent parameters

- Interface

  Select the HMI device port to which the LG/IMO PLC is connected under "Interface".

  For more detailed information, refer to the HMI device manual.
- Type

  Under "type" set RS-232, RS-422 or RS-485.

  Note

  If you use the IF1B interface, you must also switch over the RS-422 received data and the RTS signal using 4 DIP switches on the back of the Multi Panel.

- Baud rate

  Define the transmission rate between the HMI device and the PLC under "Baud rate".

  System defaults: 19200 bps

  Note

  The highest station address must be less than or equal to 63 if you set a transmission rate of 1.5 Mbaud at OP 73 or OP 77A.

  If connecting a TP 170A to a SIMATIC S7 station at a transmision rate of 1.5 MBaud on PROFIBUS DP, set a value less than or equal to 63 for the highest station address (HSA).

- Data bits

  Under "Data bit" you can select between 7 or 8 bits.
- Parity

  Select "None", "Even" or "Odd" under "Parity."
- Stop bits

  Select "1" or "2" "Stop bits".

PLC-dependent parameters

- Station address

  Under "Station address" you can specify the station number of the Cnet module of the LG GLOFA-GM PLC.

  Values from 0 through 31 are permitted.

4.2.5 Permitted data types (LG GLOFA)

Permitted data types

The table lists the user data types that can be used when configuring tags and area pointers.

Name	Area	Addressing	Data type
Internal memory	M	0 to max. 64 KB	BOOL, BYTE, WORD, DOUBLE WORD
Output	Q	Base (0-63) Slot (0-7) Card (0-63)	BOOL, BYTE, WORD, DOUBLE WORD
Input	I	Base (0-63) Slot (0-7) Card (0-63)	BOOL, BYTE, WORD, DOUBLE WORD
Symbolic tags	Named	max. 16 byte long string consisting of: A-Z, 0-9, "_", "."	BOOL, BYTE, WORD, DOUBLE WORD, SINT, INT, DINT, USINT, UINT, UDINT, TIME, STRING

Special features of connections to LG GLOFA-GM

Area pointers can only be created in the "M" area.

Trigger tags for discrete alarms can only be tags in the "M" area and only for the data type "Word".

Array tags may only be used for discrete alarms and trends. Array tags only of the "M" area and the data types "Word" are permitted.

Representation in WinCC flexible

It is essential that these data areas are also set up for the CPU with GMWIN.

For symbolic tags, the exact name used on the PLC must be entered. To be able to write to a symbolic tag in the "access tag area" of the PLC in GMWIN, it must be registered as "READ_WRITE". "READ_ONLY" is only adequate for output fields.

Note

Symbolic tags ("Named" area) can be used for communication with GM7 (over the Cnet module) and cannot be used directly on GM6 CPU-B.

You cannot use the data type "Bool" directly on GM6 CPU-B.

Note

Only the data type "Word" can be used for area pointers, arrays, and discrete alarms. For "internal memory" (M area), you have the following options for the data type "Bool" when entering the address:

- "MX" bit
- "MB" bits in byte
- "MW" bits in word
- "MD" bits in double word

You cannot use the data type "Bool" in the upper memory areas. Values are not read and written correctly for addresses greater than:

- %MX9999
- %MB1249.7
- %MW624.15
- %MD312.15

Only tags of the data type "string" up to 4 ASCII characters long can be read by the Lucky Goldstar communications software and they cannot be written.

4.2.6 Optimizing the configuration

Acquisition cycle and update time

The acquisition cycles for the "Area pointers" and the acquisition cycles of the tags specified in the configuration software are decisive factors for the update times that can actually be achieved.

The update time is the sum of the acquisition cycle + transmission time + processing time.

To achieve optimum update times, remember the following points during configuration:

- Keep the individual data areas as small as possible and as large as necessary.
- Define data areas that belong together as belonging together. You can improve the update time by setting up one large data area instead of several small areas.
- If the acquisition cycles you select are too short, this is detrimental to the overall performance. Set the acquisition cycle according to the rate of change of the process values. The rate of temperature changes at a furnace, for example, is significantly slower compared to the speed rate of an electrical drive. As a general guideline, the acquisition cycle should be approx. 1 second.
- Put the tags of an alarm or a screen in one data area without gaps.
- To allow changes in the PLC to be recognized reliably, these must be available at least during the actual acquisition cycle.
- Set the transmission rate to the highest possible value.

Discrete alarms

For discrete alarms, use arrays and assign the individual alarms to one bit of the array tags themselves and not to the individual subelements. For discrete alarms and arrays, only tags of the "M" area and data type "WORD" are permitted.

Screens

With screens, the update rate that can actually be achieved depends on the type and amount of data to be displayed.

Configure short acquisition cycles only for objects which actually require shorter refresh cycles.

Trends

When using bit-triggered trends, if the group bit is set in the "Trend transfer area", the HMI device always updates all the trends whose bit is set in this area. It then resets the bits.

The group bit in the PLC program can only be set again after all bits have been reset by the HMI device.

Job mailboxes

If large numbers of job mailboxes are sent in quick succession, this can lead to overload in the communication between the HMI device and PLC.

The HMI device confirms acceptance of the job mailbox by entering the value zero in the first data word of the job mailbox. The HMI device now processes the job for which it requires time. If a new job mailbox is entered again immediately in the job mailbox, it may take some time before the HMI device can process the next job mailbox. The next job mailbox will only be accepted when there is processing capacity available.

4.3 User data areas

4.3.1 Trend request and trend transfer

Function

A trend is the graphic visualization of one or more values from the PLC. The value is read either time- or bit-triggered, depending on the configuration.

Time-triggered trends

The HMI device reads in the trend values cyclically at an interval specified in the configuration. Time-triggered trends are suitable for continuous processes, for example, the operating temperature of a motor.

Bit-triggered trends

By setting a trigger bit in the trend request tag, the HMI device either reads in a trend value or an entire trend buffer. This setting is defined in configuration data. Bit-triggered trends are normally used to visualize rapidly changing values. One example might be the injection pressure in the production of plastic parts.

To trigger bit-triggered trends, create suitable external tags in the "Tags" editor of WinCC flexible. The tags must be linked with the trend areas. The HMI device and PLC then communicate with each other over these trend areas.

The following areas are available for trends:

- Trend request area
- Trend transfer area 1
- Trend transfer area 2 (required only with switch buffers)

Tags of the "M" "Area" are permitted. They must be of the data type "Word" or an array tag of the data type "Word". During configuration you assign a bit to a trend. This sets a unique bit assignment for all areas.

Trend request area

The HMI device sets corresponding bits in the trend request area when you open a screen which contains one or several trends on the HMI device. After deselecting the screen, the HMI device resets the relevant bits in the trend request area.

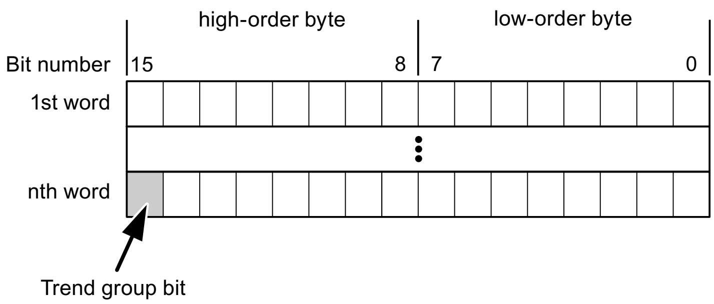
Using the trend request area, the PLC can recognize which trend is currently displayed on the HMI device. Trends can also be triggered without evaluation of the trend request area.

Trend transfer area 1

This area is used to trigger trends. In your PLC program, you set the bit assigned to the trend in the trend transfer area and set the trend group bit. The trend group bit is the last bit in the trend transfer area.

The HMI device detects the trigger. The HMI device reads either a value or the entire buffer from the PLC. It then resets the trend bit and the trend group bit.

The following picture shows the structure of a trend transfer area.



The trend transfer area must not be modified by the PLC program until the trend group bit has been reset.

Trend transfer area 2

Trend transfer area 2 is required for trends configured with a switch buffer. The trend transfer areas 1 and 2 have a similar structure.

Switch buffers

The switch buffer is a second buffer for the same trend that can be set up during configuration.

While the HMI device reads the values from buffer 1, the PLC writes to buffer 2. If the HMI device is reading buffer 2, the PLC writes to buffer 1. This prevents the trend values being overwritten by the PLC while the trend is being read out by the HMI device.

4.3.2 LED mapping

Function

The function keys of the keyboard units of the Operator Panel (OP), Multi Panel (MP) and Panel PC are equipped with LEDs. These LEDs can be controlled by the PLC. This functionality can be used to activate an LED in order to tell the operator which key to press in a specific situation, for example.

Requirements

In order to enable control of an LED, you must set up an LED tag or array tag in the PLC and declare this as the LED tag in the configuration data.

LED assignment

Assign the LEDs to the LED tag bits when you configure the function keys. Define the "LED tag" and the corresponding "bit" for each function key in the "General" group of the properties view.

The bit number "bit" identifies the first of two consecutive bits that control the following LED states:

Bit n+ 1	Bit n	LED function	
		all Mobile Panels, Operator Panels, and Multi Panels	Panel PCs
0	0	Off	Off
0	1	Rapid flashing	Flashing
1	0	Slow flashing	Flashing
1	1	Permanent signal	Permanent signal

4.3.3 Area pointer

4.3.3.1 General information on area pointers (LG GLOFA-GM)

Introduction

Area pointers are parameter fields. WinCC flexible Runtime reads these parameter fields in order to obtain information about the location and size of data areas in the PLC. The PLC and the HMI device interactively communicate read and write data for these data areas . The PLC and the HMI device trigger defined interactions based on the evaluation of stored data.

The area pointers reside in PLC memory. Their addresses are configured in the "Area pointers" dialog of the "Connections" editor.

Area pointers used in WinCC flexible:

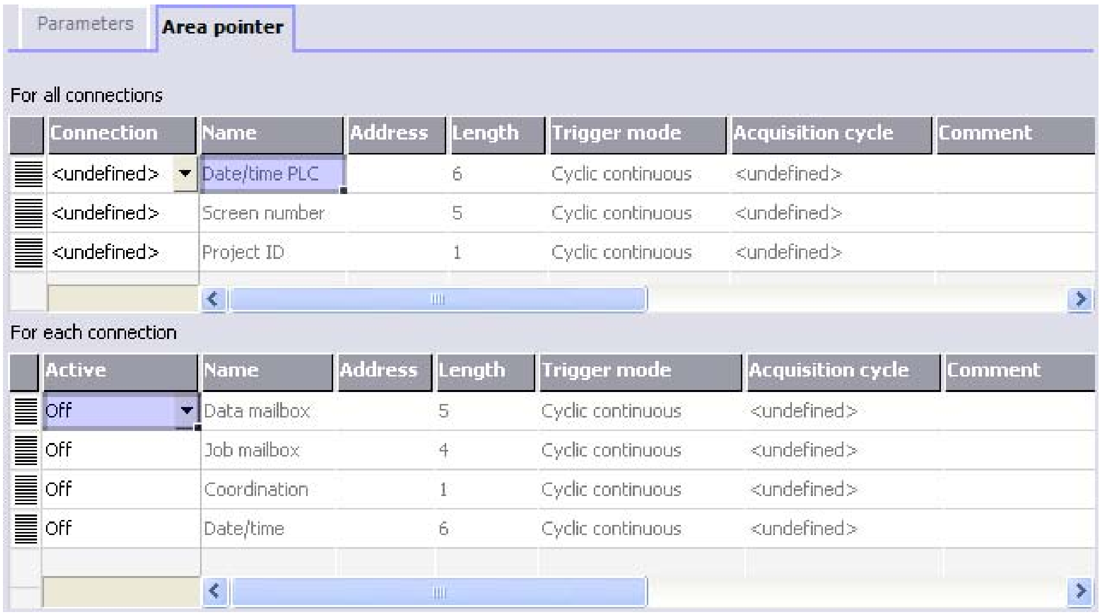
- PLC job
- Project ID
- Screen number
- Data record
- Date/time
- Date/time PLC
- Coordination

Device-dependency

Availability of the area pointer depends on the HMI device used.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use.



Enabling an area pointer based on the example of a SIMATIC S7 PLC

- Active

  Enables the area pointer.

- Name

  Name of the area pointer defined by WinCC flexible.

- Address

  Tag address of the area pointer in the PLC.

- Length

  WinCC flexible defines the default length of the area pointer.

- Acquisition cycle

  Define an acquisition cycle in this field to allow cyclic reading of the area pointer in Runtime. An extremely short acquisition time may have a negative impact on HMI device performance.

- Comment

  Save a comment, for example, to describe the purpose of the area pointer.

Accessing data areas

The table shows how the PLC and HMI device handle read (R) and write (W) access to the data areas.

Data area	Required for	HMI device	PLC
Screen number	Evaluation by the PLC in order to determine the active screen.	W	R
Data record	Transfer of data records with synchronization	R/W	R/W
Date/time	Transfer of the date and time from the HMI device to the PLC	W	R
Date/time PLC	Transfer of the date and time from the PLC to the HMI device	R	W
Coordination	Requesting the HMI device status in the control program	W	R
Project ID	Runtime checks consistency between the WinCC flexible project ID and the project in the PLC.	R	W
PLC job	Triggering of HMI device functions by the control program	R/W	R/W

The next sections describe the area pointers and their associated PLC jobs.

4.3.3.2 "Screen number" area pointer

Function

The HMI device saves information about the screen called on the HMI device to the "Screen number" area pointer.

This allows the transfer of the current screen contents from the HMI device to the PLC. The PLC can trigger specific reactions such as the call of a different screen.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use. You can create only **one** instance of the "Screen number" area pointer and only on **one** PLC.

The screen number is transferred spontaneously to the PLC. That is, it is always transferred when a new screen is activated on the HMI device. It is therefore unnecessary to configure an acquisition cycle.

Structure

The area pointer is a data area in the memory of the PLC with a fixed length of 5 words.

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1st word	Current screen type															
2nd word	Current screen number															
3rd word	Reserved															
4th word	Current field number															
5th word	Reserved															

- Current screen type

  "1" for the root screen or
  "4" for the permanent window
- Current screen number

  1 to 32767
- Current field number

  1 to 32767

4.3.3.3 "Date/time" area pointer

Function

This area pointer is used to transfer the date and time from the HMI device to the PLC.

The PLC writes control job "41" to the job mailbox.

When it evaluating the control job, the HMI device saves its current date and time to the data area configured in the "Date/time" area pointer. All definitions are coded in BCD format.

The "Date/Time" area pointer when used in a project which contains multiple connections must be enabled for each configured connection.

The date/time data area has the following structure:

Data word	Left byte								Right byte								
	15							8	7							0	
n+0	Reserved								Hour (0 to 23)								Time
n+1	Minute (0 to 59)								Second (0 to 59)								
n+2	Reserved								Reserved								
n+3	Reserved								Weekday (1 to 7, 1 = Sunday)								Date
n+4	Day (1 to 31)								Month (1 to 12)								
n+5	Year (80 to 99/0 to 29)								Reserved								

Note

The entry of values from 80 to 99 in the "Year" data area returns the years 1980 through 1999; values from 0 to 29 return the years 2000 through 2029.

4.3.3.4 "Date/time controller" area pointer

Function

This area pointer is used to transfer the date and time from the PLC to the HMI device. Use this area pointer if the PLC is the time master.

The PLC loads the data area of the area pointer. All definitions are coded in BCD format.

The HMI device reads the data cyclically within the configured acquisition cycle and synchronizes itself.

Note

Set an acquisition cycle of sufficient length for the date/time area pointer in order to avoid any negative impact on HMI device performance.
Recommended: Acquisition cycle of 1 minute if your process can handle it.

The date/time data area has the following structure:

DATE_AND_TIME format (in BCD code)

Data word	Left byte			Right byte			
	15	. . . . . .	8	7	. . . . . .	0	
n+0	Year (80 to 99/0 to 29)			Month (1 to 12)			
n+1	Day (1 to 31)			Hour (0 to 23)			
n+2	Minute (0 to 59)			Second (0 to 59)			
n+3	Reserved			Reserved		Weekday (1 to 7, 1 = Sunday)	
n+4 1)	Reserved			Reserved			
n+5 1)	Reserved			Reserved			

1) The two data words must be available in the data area in order to ensure compliance of the data format with WinCC flexible and to avoid the reading of incorrect information.

Note

Note that when you enter the year, values 80-99 result in years 1980 through 1999 and the values 0-29 result in the years 2000 through 2029.

4.3.3.5 "Coordination" area pointer

Function

The "Coordination" area pointer is used to implement the following functionality:

- detection in the control program of HMI device startup
- detection in the control program of the current HMI device operating mode
- detection in the control program of the HMI devices ready to communicate state

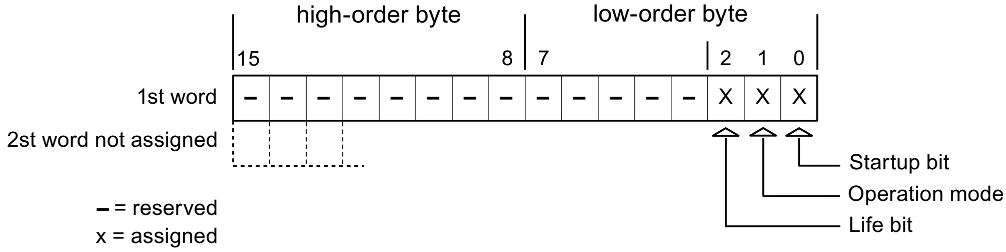
The "Coordination" area pointer has a length of two words.

Application

Note

The HMI device always writes the entire coordination area when updating the area pointer. The control program may not make changes to the coordination area for this reason.

Assignment of bits in the "Coordination" area pointer



Startup bit

The startup bit is set briefly to "0" by the HMI device during startup. It sets the bit permanently to "1" when startup is completed.

Operating mode

The operating mode bit is set to 1 as soon as the user switches the HMI device offline. The state of the operating mode bit is "0" during normal operation of the HMI device. You can determine the current operating mode of the HMI device by reading this bit.

Life bit

The HMI device inverts the life bit at intervals of approximately one second. You can check whether or not the connection to the HMI device is still up by querying this bit in the control program.

4.3.3.6 "Project ID" area pointer

Function

You can check whether the HMI device is connected to the correct PLC at the start of runtime. This check is important when operating with several HMI devices.

The HMI device compares a value stored on the PLC with the value specified in configuration data. This ensures compatibility of configuration data with the control program. If discrepancy is detected, a system alarm is displayed on the HMI device and runtime is stopped.

Application

Settings in configuration data required when using this area pointer:

- Define the version of configuration data. Possible values between 1 and 255.

  Enter the version in the "Device settings ▸ Device settings" editor in "Project ID."
- Data address of the value for the version that is stored in the PLC:

  Enter the data address in the "Communication ▸ Connections" editor in "Address."

Connection failure

A connection failure to a device on which the "project ID" area pointer is configured results in all the other connections in the project being switched to "offline".

This behavior has the following prerequisites:

- You have several configured connections in a project.
- You are using the "project ID" area pointer in at least one connection.

Causes which may set connections "offline":

- The PLC is not available.
- The connection has been switched offline in the engineering system.

4.3.3.7 "Job mailbox" area pointer

Function

The PLC can use the job mailbox to transfer jobs to the HMI device to trigger corresponding actions on the HMI device. These functions include, for example:

- Display screen
- Set date and time

Data structure

The first word of the job mailbox contains the job number. Depending on the job mailbox, up to three parameters can be transferred.

Word	Left byte	Right byte
n+0	0	Job number
n+1	Parameter 1	
n+2	Parameter 2	
n+3	Parameter 3	

The HMI device evaluates the job mailbox if the first word of this job is unequal to zero. This means that the parameters must be entered in the job mailbox first, followed by the job number.

When the HMI device accepts the job mailbox, the first word is set to 0 again. The execution of the job mailbox is generally not completed at this point in time.

Job mailboxes

All job mailboxes and their parameters are listed below. The "No." column contains the job number of the job mailbox. Job mailboxes can only be triggered by the PLC when the HMI device is online.

Note

Please note that not all HMI devices support job mailboxes. TP 170A and Micro Panel do not support PLC jobs, for example.

No.	Function	
14	**Setting the time (BCD coded)**	
	Parameter 1	Left byte: - Right byte: hours (0-23)
	Parameter 2	Left byte: minutes (0-59) Right byte: seconds (0-59)
	Parameter 3	-
15	**Setting the date (BCD coded)**	
	Parameter 1	Left byte: - Right byte: weekday (1-7: Sunday-Saturday)
	Parameter 2	Left byte: day (1-31) Right byte: month (1-12)
	Parameter 3	Left byte: year
23	**User logon**	
	Logs the user on with the name "PLC user" at the HMI device with the group number transferred in Parameter 1. The logon is possible only when the transferred group number exists in the project.	
	Parameter 1	Group number 1 to 255

No.	Function	
14	**Setting the time (BCD coded)**	
	Parameter 2, 3	-
24	**User logoff**	
	Logs off the current user. The function corresponds to the "logoff" system function)	
	Parameter 1, 2, 3	-
40	**Transfer date/time to PLC**	
	(in the S7 format DATE_AND_TIME) An interval of at least 5 seconds must be maintained between two successive jobs to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
41	**Transfer date/time to PLC**	
	(In OP/MP format) An interval of at least 5 seconds must be maintained between successive jobs in order to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
46	**Update tags**	
	Causes the HMI device to read the current value of the PLC tags whose update ID matches the value transferred in Parameter 1. (Function corresponds to the "UpdateTag" system function.)	
	Parameter 1	1 - 100
49	**Clear process alarm buffer**	
	Parameter 1, 2, 3	-
50	**Clear alarm buffer**	
	Parameter 1, 2, 3	-
51	**Screen selection** [1)]	
	Parameter 1	Screen number
	Parameter 2	-
	Parameter 3	Field number
69	**Read data record from PLC**	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	0: Do not overwrite existing data record 1: Overwrite existing data record
70	**Write data record to PLC**	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	-

1) OP 73, OP 77A and TP 177A HMI devices also execute the "Screen selection" job mailbox if the on-screen keyboard is active.

4.3.3.8 "Data mailbox" area pointer

"Data mailbox" area pointer

Function

When data records are transferred between the HMI device and PLC, both partners access common communications areas on the PLC.

Data transfer types

There are two ways of transferring data records between the HMI device and PLC:

- Transfer without synchronization
- Transfer with synchronization over the data record

Data records are always transferred directly. That is, the tag values are read from an address or written to an address configured for this tag directly, without redirecting the values by means of interim memory.

Initiating the transfer of data records

There are three ways of triggering the transfer:

- Operator input in the recipe view
- PLC jobs

  The transfer of data records can also be triggered by the PLC.
- Triggering by configured functions

If the transfer of data records is triggered by a configured function or by a PLC job, the recipe display on the HMI device remains operable. The data records are transferred in the background.

Simultaneous processing of several transfer requests is, however, not possible. In this case, the HMI device rejects the other transfer requests with a system alarm.

Transfer without synchronization

If you select asynchronous transfer of data records between the HMI device and PLC, there is no coordination over the common data areas. It is therefore unnecessary to set up a data area during configuration.

Asynchronous data record transfer can be a useful alternative, for example, when:

- The system is capable of excluding the risk of uncontrolled overwriting of data by the communication peer.
- The PLC does not require information about the recipe number and data record number.
- The transfer of data records is triggered by the operator of the HMI device.

Reading values

When a read job is triggered, the values are read from the PLC addresses and transferred to the HMI device.

- Triggering by the operator in the recipe view:

  The values are downloaded to the HMI device. You can then process, edit, or save these values, for example.
- Triggering by a function or PLC job:

  The values are saved immediately to the data volume.

Writing values

When a write job is triggered, the values are written to the PLC addresses.

- Triggering by the operator in the recipe view:

  The current values are written to the PLC.
- Triggering by a function or PLC job:

  The current values are written to the PLC from the data medium.

Transfer with synchronization (LG GLOFA)

If you select synchronous transfer, both communication partners set status bits in the common data area. You can use this mechanism to prevent uncontrolled overwriting of data in either direction in your control program.

Application

Synchronous data record transfer can be a useful solution, for example, when:

- The PLC is the "active partner" in the transfer of data records.
- The PLC evaluates the information about the recipe number and data record number.
- The transfer of data records is triggered by means of a Job mailbox.

Requirements

In order to synchronize transfer of data records between the HMI device and the PLC, the following requirements must be met during configuration:

- An area pointer has been set up: "Communication ▸ Connections" editor in "Area pointer"
- The PLC with which the HMI device synchronizes transfer of data records is specified in the recipe: "Recipes" editor, properties view of the recipe, "Properties" group in "Transfer".

Structure of the data area

The data area has a fixed length of 5 words. Structure of the data area:

	15		0
1. Word	Current recipe number (1 - 999)		
2. Word	Current data record number (0 - 65535)		
3. Word	Reserved		
4. Word	Status (0, 2, 4, 12)		
5. Word	Reserved		

- Status

  The status word (word 4) can adopt the following values:

Value		Meaning
Decimal	Binary	
0	0000 0000	Transfer permitted, data record free
2	0000 0010	Transfer is busy
4	0000 0100	Transfer completed without error
12	0000 1100	Transfer completed with error

Possible causes of error when transferring data records

Possible causes of error

The section below shows possible error causes which lead to the cancellation of data record transfer:

- Tag address not set up on the PLC
- Overwriting data records not possible
- Recipe number does not exist
- Data record number does not exist

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

Reaction to an aborted transfer due to errors

If the transfer of data records is aborted due to errors, the HMI device reacts as follows:

- Triggering by the operator in the recipe display

  Information in the status bar of the recipe view and output of system alarms
- Triggered by function

  Output of system alarms
- Triggering by PLC job

  No feedback message on the HMI device

You can nonetheless evaluate the status of the transfer by querying the status word in the data record.

Sequence of the transfer when triggered by a configured function

Reading from the PLC using a configured function

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.	Abort with system alarm.
3	The HMI device reads the values from the PLC and stores them in the data record specified in the function.	
4	• If "Yes" was selected for the "Overwrite" function, an existing data record is overwritten without any prompt for confirmation. The HMI device sets the status "Transfer completed." • If "No" was selected for the "Overwrite" function and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Writing to the PLC by means of configured function

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.	Abort with system alarm.
3	The HMI device fetches the values of the data record specified in the function from the data medium and transfers the values to the PLC.	
4	The HMI device sets the status "Transfer completed."	
5	The control program can now evaluate the transferred data. The control program must reset the status word to zero in order to enable further transfers.	

Sequence of the transfer triggered by a job mailbox

The transfer of data records between the HMI device and the PLC can be initiated by either one of these stations.

The two PLC jobs No. 69 and No. 70 are available for this type of transfer.

No. 69: Read data record from PLC ("PLC → DAT")

PLC job no. 69 transfers data records from the PLC to the HMI device. The PLC job is structured as follows:

	Left byte (LB)	Right byte (RB)
Word 1	0	69
Word 2	Recipe number (1-999)	
Word 3	Data record number (1 to 65535)	
Word 4	Do not overwrite existing data record: 0 Overwrite existing data record: 1	

No. 70: Write data record to PLC ("DAT → PLC")

PLC job No. 70 transfers data records from the HMI device to the PLC. The PLC job is structured as follows:

	Left byte (LB)	Right byte (RB)
Word 1	0	70
Word 2	Recipe number (1-999)	
Word 3	Data record number (1 to 65535)	
Word 4	—	

Sequence when reading from the PLC with PLC job "PLC → DAT" (no. 69)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device reads the values from the PLC and saves these to the data record defined in the PLC job.	
4	• If "Overwrite" was selected in the job, an existing data record is overwritten without any prompt for confirmation. The HMI device sets the status "Transfer completed." • If "Do not overwrite" was selected in the job, and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Sequence of writing to the PLC using PLC job "DAT → PLC" (no. 70)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device fetches the values of the data record specified in the function from the data medium and writes the values to the PLC.	
4	The HMI device sets the status "Transfer completed."	
5	The control program can now evaluate the transferred data. The control program must reset the status word to zero in order to enable further transfers.	

Sequence of a transfer started by the operator in the recipe display

Reading from the PLC started by the operator in the recipe display

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe number to be read and the status "Transfer active" in the data record and sets the data record number to 0.	Abort with system alarm.
3	The HMI device reads the values from the PLC and displays them in the recipe display. If the recipes have synchronized tags, the values from the PLC are also written to the tags.	
4	The HMI device sets the status "Transfer completed."	
5	The control program must reset the status word to zero in order to enable further transfers.	

Writing to the PLC started by the operator in the recipe display

Step	Action	
	Check: Status word = 0?	
1	Yes	No
	The HMI device enters the recipe and data record number to be written and the status "Transfer active" in the data record.	Abort with system alarm.
2	The HMI device writes the current values to the PLC. If the recipes have synchronized tags, the changed values are synchronized between the recipe display and tags and then written to the PLC.	
3	The HMI device sets the status "Transfer completed."	
4	If required, the control program can now evaluate the transferred data.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

4.3.4 Events, alarms, and acknowledgments

4.3.4.1 General information on events, alarms, and acknowledgments

Function

Messages return information about the PLC or HMI device operating states or problems to the user on the HMI device. The message texts consist of configurable texts and/or tags with actual values.

Operational messages and events must be distinguished. The programmer defines what is an operational message and what is an error alarm.

Operational message

An operational message indicates a state. Example:

- Motor on
- PLC in manual mode

Alarm message

An error alarm indicates a malfunction. Example:

- Valve does not open.
- Excess motor temperature

Alarms indicate exceptional operational states, and must therefore be acknowledged.

Acknowledgment

To acknowledge error alarms:

- Operator input on the HMI device
- The PLC sets an acknowledgment bit.

Triggering alarms

Triggering of an alarm in the PLC:

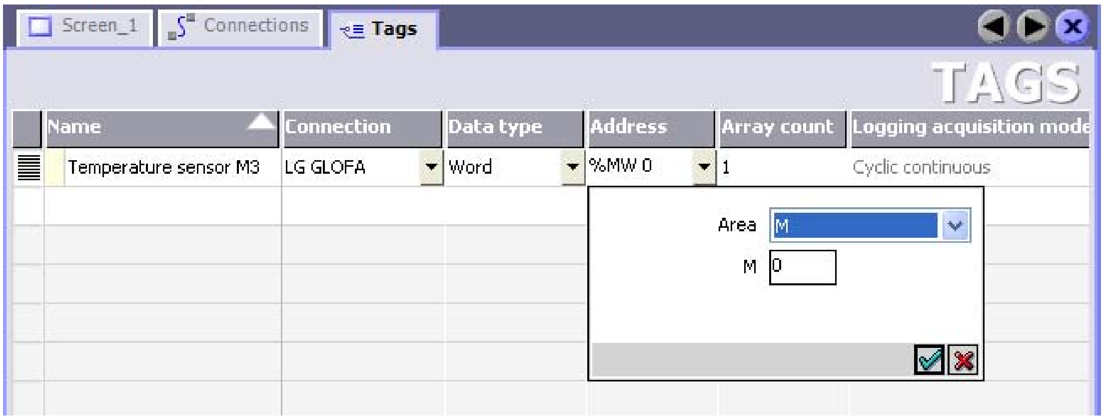
- Setting a tag bit
- Measured value limits exceeded

The location of tags, or of the tag array, is defined in WinCC flexible ES. The tag or array must be set up on the PLC.

4.3.4.2 Step 1: Creating tags or an array

Procedure

You create tags or arrays in the "Tags" editor. The dialog box is shown below.



- Define the tag and array names.
- Select the connection to the PLC.

  The connection must already be configured in the "Connections" editor.
- Select the data type.

  The available data types depend on the PLC being used. If you select an illegal data type, the tag will not be available in the "Discrete alarms" and "Analog alarms" editors.

  The following data types are supported for LG Industrial Systems controllers:

PLC	Permitted data types	
	Discrete alarms	Analog alarms
GLOFA-GM (GM4, GM6 and GM7)	WORD	WORD, DOUBLE WORD, SINT, INT, DINT, USINT, UINT, UDINT

- Enter an address.

  The tag addressed here contains the bit that triggers the alarm.

  As soon as the bit of the tag is set on the PLC and is transferred to the HMI device in the configured acquisition cycle, the HMI device recognizes the alarm as "incoming".

  After the same bit is reset on the PLC, the HMI device recognizes the alarm as "outgoing".
- Select the array elements.

  If the number of array elements is increased, you can select more bit numbers in the "Discrete alarms" editor. An array with a length of three words provides 48 alarm bits, for example.

4.3.4.3 Step 2: Configuring an alarm

Procedure

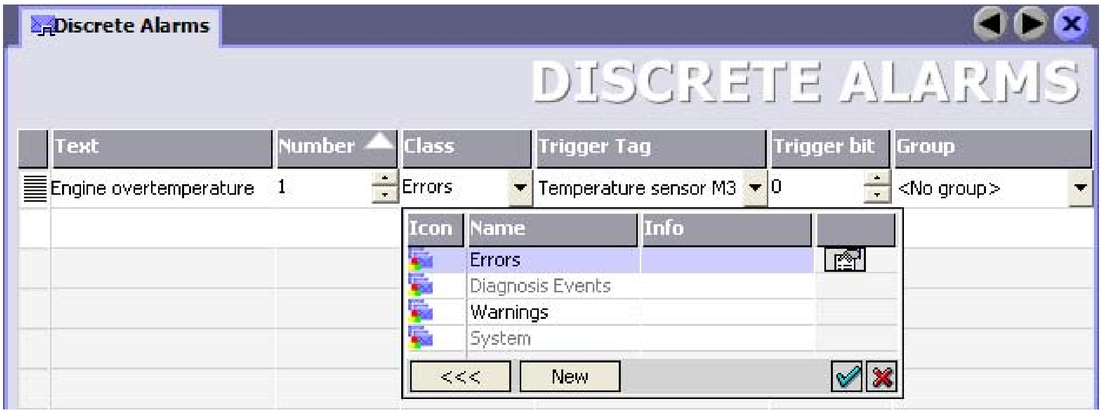
Alarms fall into the following categories:

- Discrete alarms
- Analog alarms

You create alarms in the "Discrete alarms" and "Analog alarms" editors.

Discrete alarms

The editor is shown in the figure below.



- Edit text

  Enter the text to display in runtime. You can format the text characters. The text may contain fields for the output of tags.

  The text is output to the alarm view if this view was configured in the "Screens" editor.

- Specify number

  Every alarm has a number that must only occur once within the project. It is used to uniquely identify the alarm and is displayed with the alarm in runtime.

  The permitted range of values is 1 to 100,000.

  The alarm numbers are assigned consecutively in the WinCC flexible engineering system. You can change the alarm numbers when assigning these to groups, for example.

- Specify the alarm class

  Available alarm classes:

  – Error alarms

    This class must be acknowledged.

  – Warning alarms

    This class signals events with incoming and outgoing alarms.

- Assign trigger tag

  In the "Trigger tag" column, you link the configured alarm with the tag created in step 1. The selection list returns all tags with valid data type.

- Specify the bit number

  In the "bit number" column, specify the relevant bit position in the created tag.

  Remember that the way the bit positions are counted depends on the particular PLC. With LG GLOFA controllers, the bit positions are counted as follows:

How the bit positions are counted	Left byte								Right byte							
in LG GLOFA controllers	15							8	7							0
In the WinCC flexible, you configure the following:	15							8	7							0

Analog alarms

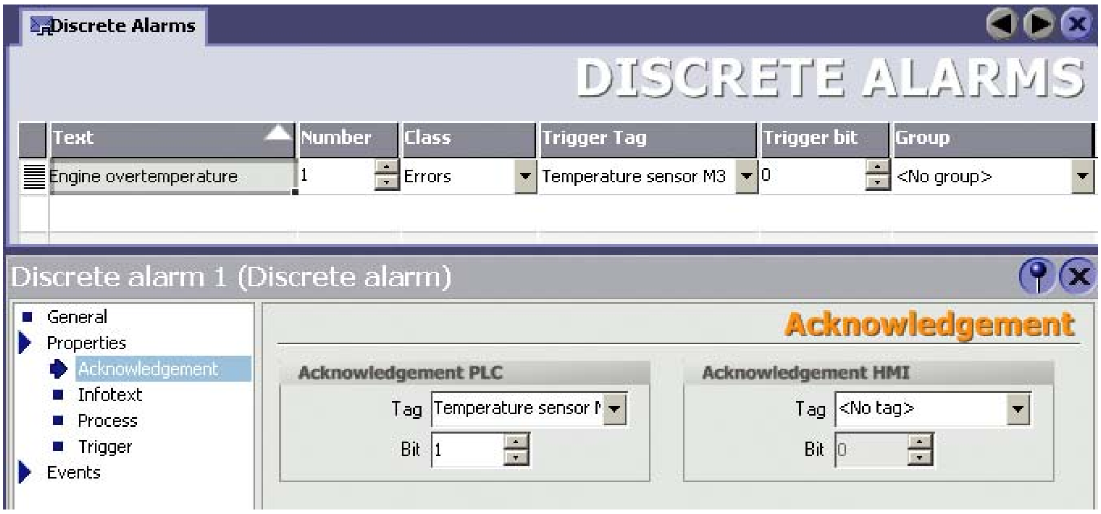
The only difference between discrete alarms and analog alarms is that you configure a limit value, rather than a bit number. The alarm is triggered when this limit is exceeded. The outgoing alarm is triggered when the low limit is violated, making allowances for any configured hysteresis.

4.3.4.4 Step 3: Configure the acknowledgment

Procedure

Create suitable tags on the PLC to acknowledge an error alarm. You assign these tags to an alarm in the "Bit messages" editor. You make the assignment in "Properties ▸ Acknowledgment."

The following figure shows the dialog for configuring an acknowledgment.



Distinction in terms of acknowledgment:

- Acknowledgment on the HMI device
- Acknowledgment by the PLC

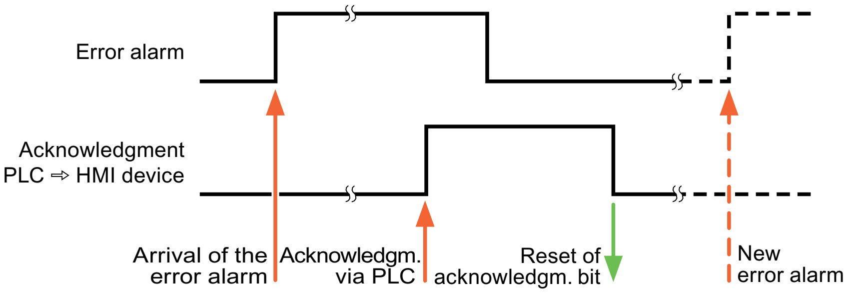
Acknowledgment by the PLC

In "Acknowledgment PLC tag", you configure the tag or the array tag and the bit number based on which the HMI device can recognize an acknowledgment by the PLC.

A bit set in the tag triggers acknowledgment of the assigned error alarm bit at the HMI device. This tag bit returns a function similar to acknowledgment on the HMI device which is triggered by pressing the "ACK" button, for example.

The acknowledgment bit must be located in the same tag as the bit for the error alarm.

Reset the acknowledgment bit before setting the bit in the alarm area again. The figure below shows the pulse diagram.



Acknowledgment on the HMI device

In "Ack read tag", you configure the tag or the array tag and the bit number that is written to the PLC after acknowledgment from the HMI device. Make sure when you use an array tag that it is not longer than 6 words.

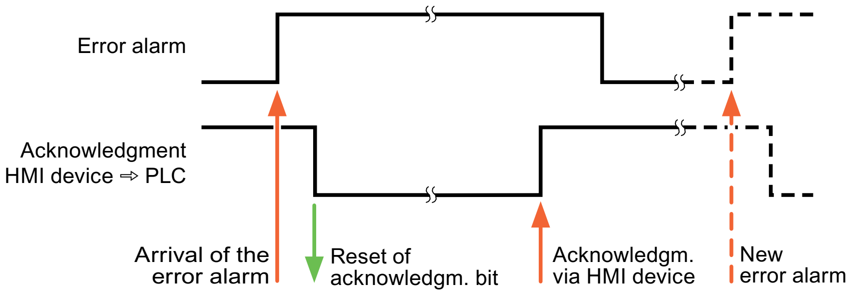
In order to ensure that a signal transition is generated as soon as the acknowledgment bit is set, the HMI device first resets the acknowledgment bit assigned to an error alarm. There is a certain time-based offset between these two operations, due to the processing time of the HMI device.

Note

The reset includes all alarm bits acknowledged since the last restart of Runtime. The PLC may only read this area once.

If the alarm is acknowledged on the HMI device, the bit is then set in the assigned acknowledgment tag on the PLC. This allows the PLC to recognize that the error alarm has been acknowledged.

The figure below shows the pulse diagram.



4.4 Commissioning components

4.4.1 Commissioning components (communications modules)

Transferring the PLC program to the PLC

1. Interconnect the PC with the CPU using the appropriate cable.
2. Download the program files to the CPU.
3. Then set the CPU to RUN.

Transferring project data to the HMI device

1. The HMI device must be in transfer mode in order to accept the project transfer.

   Possible scenarios:

   – Initial commissioning

     The HMI device does not yet contain any configuration data in the initial commissioning phase. The project data and runtime software required for operation must be transferred from the configuration computer to the device. The HMI device automatically changes to transfer mode.
     The transfer dialog box opens with a connection message on the HMI device.

   – Recommissioning

     Recommissioning means that you overwrite existing project data on the HMI device.

     For corresponding detailed instructions, refer to the Manual of your HMI device.

2. Check whether the alarm settings meet requirements of your WinCC flexible project.
3. Select "Project > Transfer > Transfer settings" to configure the transfer parameters before you transfer project data to the HMI device:

   – Select the used port.

   – Set the transfer parameters.

   – Select the target storage location.

4. Initiate the transfer of project data by clicking "Transfer".

   – The project is compiled automatically.

   – All compilation and transfer steps are logged to a message window.

   Message output on the configuration computer after successful completion of the transfer: "Transfer completed successfully".

   The start screen appears on the HMI device.

Interconnecting the PLC with the HMI device

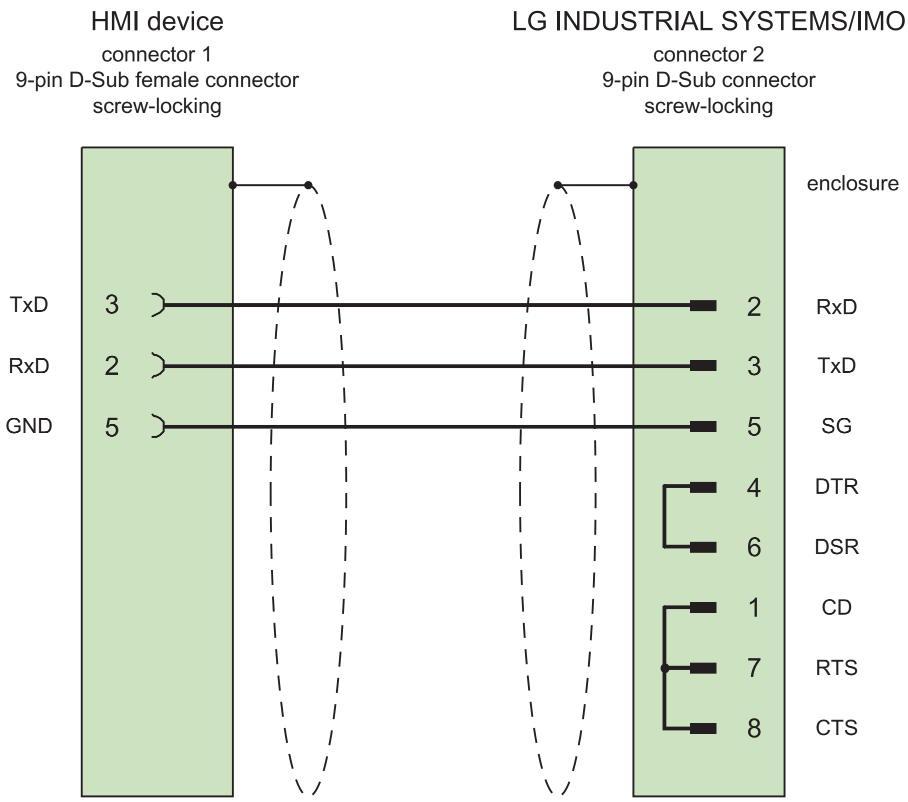
1. Interconnect the PLC (CPU or communication module) with the HMI device using a suitable patch cable.
2. The message "Connection to PLC .... is established" is output to the HMI device. Note that users can edit the system alarm texts in WinCC flexible.

NOTICE
Always observe the safety-related information in the HMI device manual when commissioning the device. RF radiation emitted from devices such as mobile phones may cause unwanted operating states.

4.5 Connecting cables for LG GLOFA-GM

4.5.1 Connecting cable PP1, RS-232, for LG/IMO

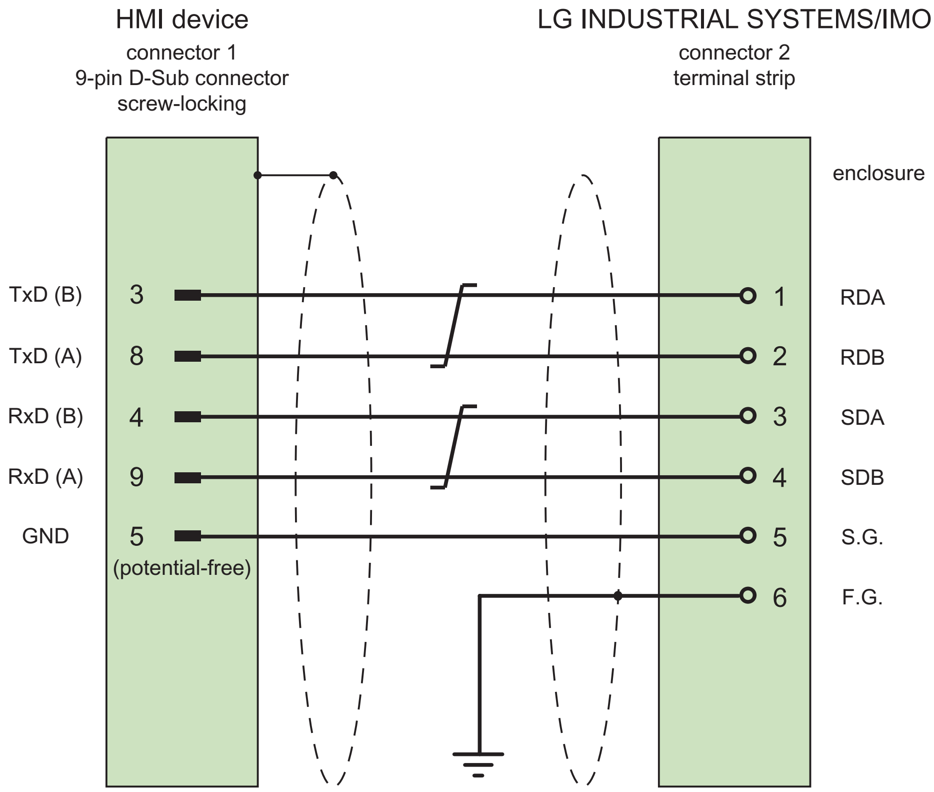
Point-to-point cable 1



Shield with large-area contact to casing at both ends
Cable: 3 x 0.14 mm², shielded,
max. length 15 m

4.5.2 Connecting cable PP2, RS-422, for LG/IMO

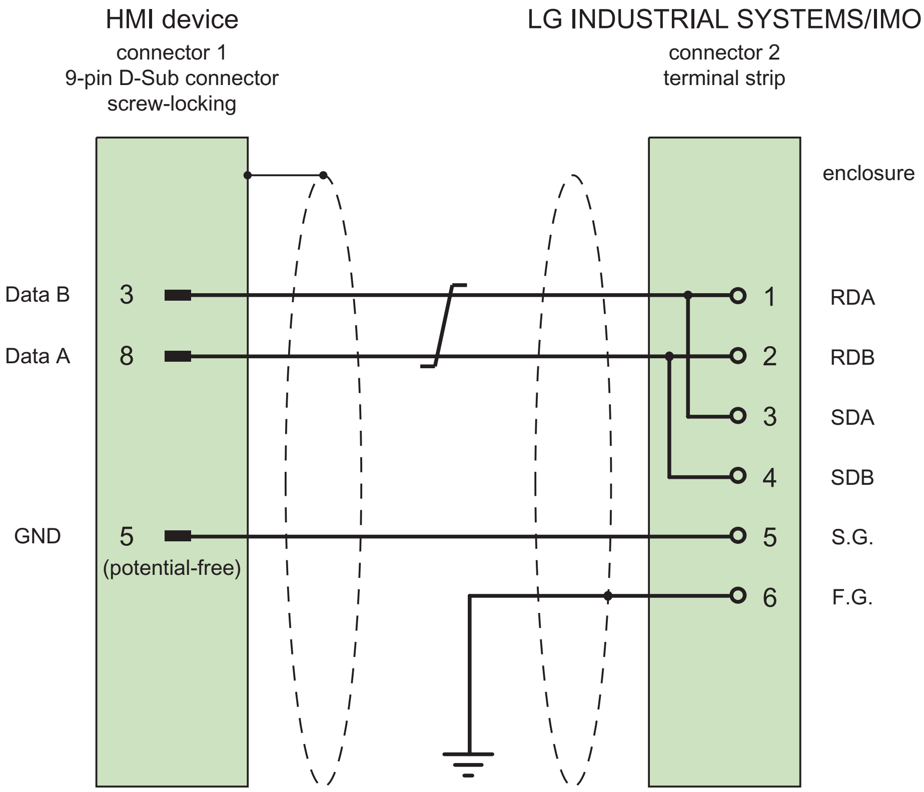
Point-to-point cable 2



Shield with large-area contact to casing at both ends
Cable: 3 x 2 x 0.14 mm², shielded,
max. length 500 m

4.5.3 Connecting cable PP3, RS-485, for LG/IMO

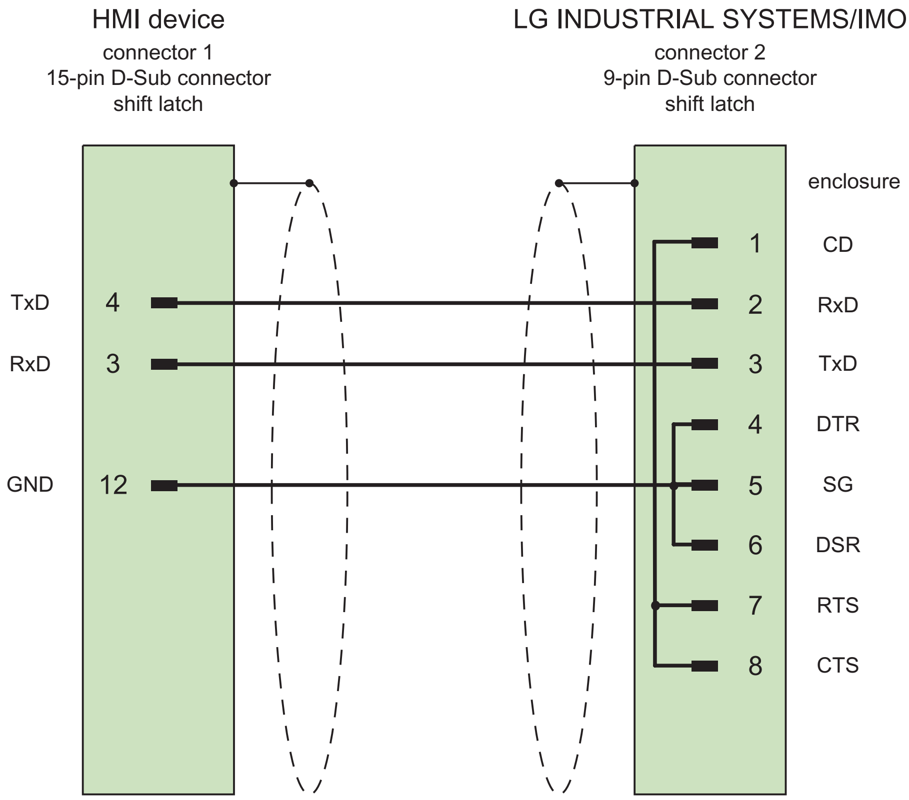
Point-to-point cable 3



Shield with large-area contact to casing at both ends
Cable: 2 x 2 x 0.14 mm², shielded,
max. length 500 m

4.5.4 Connecting cable PP4, RS-232, for LG/IMO

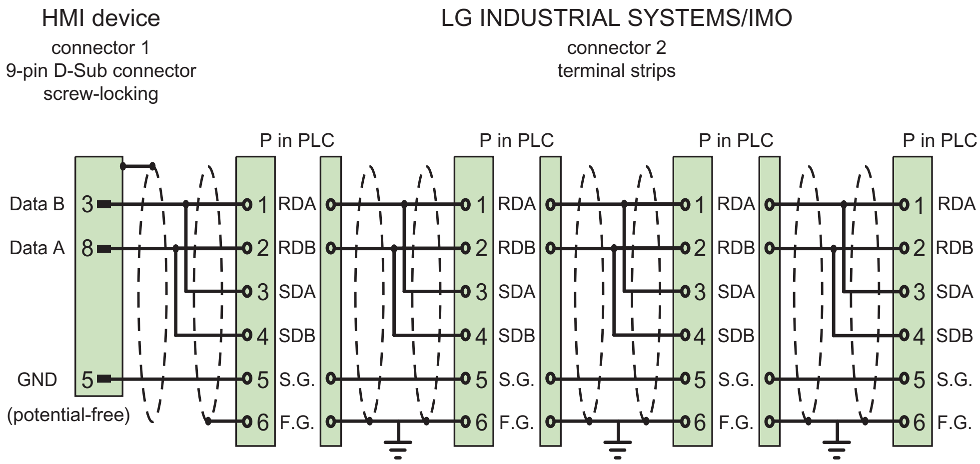
Point-to-point cable 4



Shield with large-area contact to casing at both ends
Cable: 3 x 0.14 mm², shielded,
max. length 15 m

4.5.5 Connecting cable MP1, RS-485, for LG/IMO

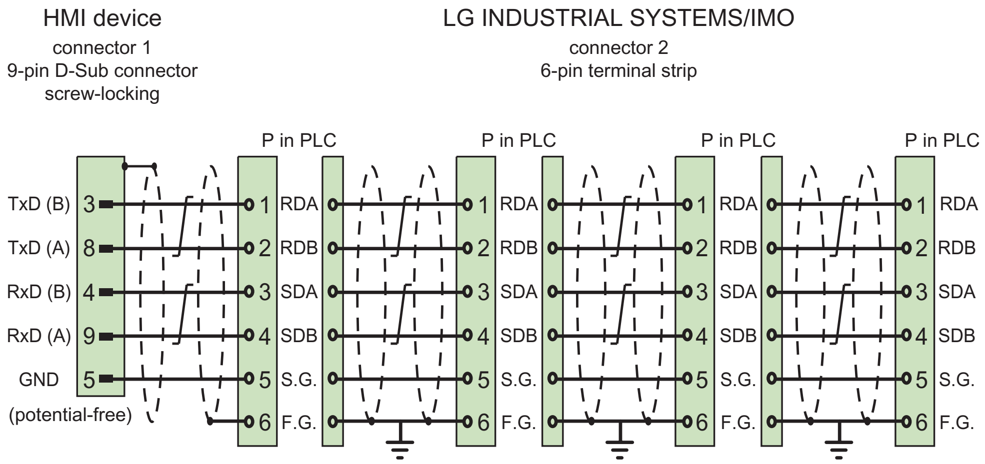
Multipoint cable 1



Shield with large-area contact to casing at both ends
Cable: 2 x 2 x 0.14 mm², shielded,
max. length 500 m

4.5.6 Connecting cable MP2, RS-422, for LG/IMO

Multipoint cable 2



Shield with large-area contact to casing at both ends
Cable: 3 x 2 x 0.14 mm^2, shielded,
max. length 500 m

Communication with Mitsubishi controllers 5

5.1 Communication with Mitsubishi MELSEC

5.1.1 Communication partner (Mitsubishi MELSEC)

Introduction

This section describes communication between an HMI device and Mitsubishi Electric controllers.

These controllers communicate by means of the following own protocols:

- Programming device protocol (PG protocol)

  For this point-to-point connection, the HMI device is connected to the programming interface of the CPU (RS-422).

- Protocol 4

  With this protocol, point-to-point or multipoint connections can be established over Mitsubishi communications modules with RS-232 or RS-422 interfaces.

Connectable controllers

Connections can be implemented for the following Mitsubishi controllers:

PLC	PG protocol	Protocol 4
MELSEC FX, FX0	X	
MELSEC FX0n, FX1n,FX2n	X	X
MELSEC A 1)		X
MELSEC Q 2)		X
1) A series is the generic term for AnA, AnN, AnS, AnU 2) Q series is the generic term for QnA and QnAS		

Released communication types

Applies only to the PG protocol:

The point-to-point connection from an HMI device to a Mitsubishi FX–CPU using the PG protocol (protocol for access to the program and memory elements of the FX series PC CPU version V1.21 and higher) has been subjected to a system test by Siemens AG and released.

Applies only to Protocol 4:

On the HMI devices only the physical connections that are available as standard on the HMI devices are enabled. Particularly on a standard PC only the RS 232 port is enabled. A multipoint connection with up to 4 PLCs is possible over the RS-232 interface (Panel PCs and Multi Panels) or RS-232/RS-422 converter.

Note

The HMI device can only be operated as a master.

5.1.2 Communication between the HMI device and controller (Mitsubishi)

Communications principle

The HMI device and the PLC communicate using tags and the user data areas.

Tags

The PLC and the HMI device exchange data using process values. In your configuration, create tags that point to an address on the PLC. The HMI device reads and displays the value from the defined address. The operator can also make an input on the HMI device that is then written to the address on the PLC.

User data areas

User data areas are intended for the exchange of special data and are set up only when such data is used.

Data for which user data areas are required, for example:

- Job mailboxes
- Transferring data records
- Date/time synchronization
- Sign-of-life monitoring

You set up the user data areas when you create the project in the project window of the HMI device by selecting "Communication ▸ Connections" in the "Range pointers" work area. At the same time, you also set up the user data areas with the corresponding address area on the PLC.

Special features of connections with protocol 4

Note

The CPUs of the various series have different limits for the address areas and these can be found in the Mitsubishi **Computerlink** manuals. In the Q series, it is only possible to address up to 8191 in the M and D area.

5.2 Communication via PG protocol

5.2.1 Requirements of communication

Connector

The HMI device must be connected to the programming interface of the CPU (RS-422 - refer to the PLC documentation).

The connection between the HMI device and the Mitsubishi Electric PLC essentially involves setting the interface parameters and the bus address. No special blocks are required on the PLC for the connection.

Cable

The following cables are available to connect the HMI device to the PLC:

Interface on the HMI device or adapter	Mitsubishi Electric PLC using the PG protocol	
	FX series, D-sub, 25-pin	FX0, mini DIN, 8-pin
RS-232, 9-pin	Mitsubishi SC–08 1)	Mitsubishi SC–07 1)
RS-232, 15-pin	Adapter 6XV1440–2UE32 and Mitsubishi cable SC–08 1)	Adapter 6XV1440–2UE32 and Mitsubishi cable SC–07 1)
RS-422, 9-pin	6XV1440–2R_ _ _	6XV1440–2P_ _ _

'_' Length key (see catalog ST 80)
1) Since the Mitsubishi controllers generally communicate via RS 422, the Mitsubishi programming cable SC-07 or SC-08 with integrated adjustment RS 422/RS 232 is required for the connection of an HMI device via RS 232.

Note

Applies only to RS-232:

Restricted cable length of 0.32 m.

The HMI device port to be used is defined in the corresponding Manual.

The pin assignment of the cables is described in the section "Connecting cables for Mitsubishi".

5.2.2 Installing the communication driver

Driver for the HMI device

The driver for connection to Mitsubishi controllers with the PG protocol is supplied with WinCC flexible and is installed automatically.

No special blocks are required in the PLC for the connection.

5.2.3 Configuring the controller type and protocol

Select the PLC

For a connection to a Mitsubishi PLC over PG Protocol, double-click on "Communication ▸ Connections" in the project view of the HMI device. Go to the "Communication drivers" column and select the protocol Mitsubishi FX.

The property view displays the parameters of the selected protocol.

You can edit the parameters at any time by double-clicking "Communication ▸ Connections" in the project window of the HMI device. Select the connection and edit its parameters in the properties dialog box.

Note

The settings on the HMI device and on the PLC must match.

5.2.4 Configuring protocol parameters

Parameters to be set

To edit the parameters, double-click "Communication > Connections" in the project window of the HMI device. In the project window of the HMI device. "Mitsubishi FX " is selected in the "Communication drivers" column. You can now enter or modify the protocol parameters in the Properties window.

Device-dependent parameters

- Interface

  Select the HMI port to which the Mitsubishi PLC is connected under "Interface".

  For more detailed information, refer to the Manual of the HMI device.

- Type

  Depending on the selected interface, RS-232, RS-422 or RS-485 is selected here.

  Note

  If you use the IF1B interface, you must also switch over the RS-422 received data and the RTS signal using 4 DIP switches on the back of the Multi Panel.

- Baud rate

  Define the transmission rate between the HMI device and the PLC under "Baud rate".

  Note

  The highest station address must be less than or equal to 63 if you set a transmission rate of 1.5 Mbaud at OP 73 or OP 77A.

  If connecting a TP 170A to a SIMATIC S7 station at a transmision rate of 1.5 MBaud on PROFIBUS DP, set a value less than or equal to 63 for the highest station address (HSA).

- Data bits

  Select "7 bits" or "8 bits" under "Databits".

- Parity

  Select "None", "Even" or "Odd" under "Parity."

- Stop bits

  Select "1" or "2" "Stop bits".

5.2.5 Permitted data types (Mitsubishi PG)

Permitted data types

The table lists the "User data types" that can be used when configuring tags and area pointers.

Name	Operand	Data type
Input	X	Bit, 4-Bit-Block, 8-Bit-Block, 12-Bit-Block, 16-Bit-Block, 20-Bit-Block, 24-Bit-Block, 28-Bit-Block, 32-Bit-Block
Output	Y	Bit, 4-Bit-Block, 8-Bit-Block, 12-Bit-Block, 16-Bit-Block, 20-Bit-Block, 24-Bit-Block, 28-Bit-Block, 32 Bit-Block
Flag	M	Bit, 4-Bit-Block, 8-Bit-Block, 12-Bit-Block, 16-Bit-Block, 20-Bit-Block, 24-Bit-Block, 28-Bit-Block, 32-Bit-Block
Timer actual value	T	Word
16-bit counter actual value	C - 16-bit	Word
32-bit counter actual value	C -32-bit	Double
Data register	D	Bit 1), Word, Double, String, IEEE-Float

1) In the case of write accesses note:
With the "bit" data type in the "D" operand, after changing the specified bit the entire word is written back to the PLC. There is no check to determine whether any other bits in the word have changed. As a result, the PLC only has read access to the specified word.

Special features of a connection with the Mitsubishi Electric PG protocol

Area pointers can only be created with the "D" operand.

The trigger tag for discrete alarms can only be tags of the "D" operand and the data type "Word".

Array tags may only be used for discrete alarms and trends. Array tags only of the "D" operand and the data types "Word" are permitted.

5.2.6 Optimizing the configuration

Acquisition cycle and update time

The acquisition cycles for the "Area pointers" and of the tags defined in the configuration software are decisive in terms of the update times which can actually be achieved.

The update time is the sum of the acquisition cycle + transmission time + processing time.

To achieve optimum update times, remember the following points during configuration:

- Keep the individual data areas as small as possible and as large as necessary.
- Define data areas that belong together as belonging together. You can improve the update time by setting up one large data area instead of several small areas.
- If the acquisition cycles you select are too short, this is detrimental to the overall performance. Set the acquisition cycle according to the rate of change of the process values. The rate of temperature changes at a furnace, for example, is significantly slower compared to the speed rate of an electrical drive. As a general guideline, the acquisition cycle should be approx. 1 second.
- Put the tags of an alarm or a screen in one data area without gaps.
- To allow changes in the PLC to be recognized reliably, these must be available at least during the actual acquisition cycle.
- Set the transmission rate to the highest possible value.

Discrete alarms

For discrete alarms, use arrays and assign the individual alarms to one bit of the array tags themselves and not to the individual subelements. For discrete alarms and arrays, only tags of the "D" operand and data type "Word" are permitted.

Screens

With screens, the update rate that can actually be achieved depends on the type and amount of data to be displayed.

Configure short acquisition cycles only for objects which actually require shorter refresh cycles.

Trends

When using bit-triggered trends, if the group bit is set in the "Trend transfer area", the HMI device always updates all the trends whose bit is set in this area. It then resets the bits.

The group bit in the PLC program can only be set again after all bits have been reset by the HMI device.

Job mailboxes

If large numbers of job mailboxes are sent in quick succession, this can lead to overload in the communication between the HMI device and PLC.

The HMI device confirms acceptance of the job mailbox by entering the value zero in the first data word of the job mailbox. The HMI device now processes the job for which it requires time. If a new job mailbox is entered again immediately in the job mailbox, it may take some time before the HMI device can process the next job mailbox. The next job mailbox will only be accepted when there is computing capacity available.

5.2.7 Commissioning components

Transferring the PLC program to the PLC

1. Interconnect the PC with the CPU using the appropriate cable.
2. Download the program files to the CPU.
3. Then set the CPU to RUN.

Transferring project data to the HMI device

1. The HMI device must be in transfer mode in order to accept the project transfer.

   Possible scenarios:

   – Initial startup

     The HMI device does not yet contain any configuration data in the initial startup phase. The project data and runtime software required for operation must be transferred from the configuration computer to the device: The HMI device automatically changes to transfer mode.
     The transfer dialog box opens with a connection message on the HMI device.

   – Recommissioning

     Recommissioning means that you overwrite existing project data on the HMI device.

   For corresponding detailed instructions, refer to the HMI device manual.

2. Check whether the alarm settings meet requirements of your WinCC flexible project.
3. Select "Project > Transfer > Transfer settings" to configure the transfer parameters before you transfer project data to the HMI device:

   – Select the used port.

   – Set the transfer parameters.

   – Select the target storage location.

4. Initiate the transfer of project data by clicking "Transfer".

   – The project is compiled automatically.

   – All compilation and transfer steps are logged to a message window.

   Message output on the configuration computer on successful completion of the transfer: "Transfer completed successfully".

   The start screen appears on the HMI device.

Interconnecting the PLC with the HMI device

1. Interconnect the PLC with the HMI device using a suitable cable.
2. The message "Connection to PLC .... is established" is output to the HMI device. Note that users can edit the system alarm texts in WinCC flexible.

NOTICE
Always observe the safety-related information in the HMI device Manual when commissioning the device. RF radiation emitted from devices such as mobile phones may cause unwanted operating states.

5.3 Communication via protocol 4

5.3.1 Requirements of communication

Connector

The HMI device must be connected to one or more PLCs of the FX series over the multifunction serial interface with a RS-232 or RS-422 communications module (for example, FX2N–232–BD) or to PLCs of the series A (AnN, AnA, AnU, AnS) Q and QnA (QnAS) over interface modules, for example A1SJ71UC24–R2/R4 (AnS(H)), A1SJ71QC24 (QnAS), AJ71UC24 (A/AnU) or AJ71QC24N (Q/QnA) over RS-232 or RS-422.

Cable

The following cables are available to connect the HMI device to the PLC:

Interface	Point-to-point cable	Multipoint cable
RS-232, 9/9-pin	PP1 connecting cable	Connecting cable MP1 over converter
RS-232, 9/25-pin	PP2 connecting cable	—
RS-232, 9/15-pin	PP3 connecting cable	—
RS-232, 15/25-pin	PP4 connecting cable	—
RS-422, 9-pin	Connecting cable PP5	MP2 connecting cable

The HMI device port to be used is defined in the corresponding Manual.

The pin assignment of the cables is described in the section "Connecting cables for Mitsubishi".

5.3.2 Installing the communication driver

Driver for the HMI device

The driver for connection to Mitsubishi controllers with protocol 4 is supplied with WinCC flexible and is installed automatically.

No special blocks are required in the PLC for the connection.

5.3.3 Configuring the controller type and protocol

Select the PLC

For a connection to a Mitsubishi PLC via protocol 4, double-click on "Communication ▸ Connections" in the project view of the HMI device. Go to the "Communication drivers" column and select the Mitsubishi protocol 4.

The property view displays the parameters of the selected protocol.

You can edit the parameters at any time by double-clicking "Communication ▸ Connections" in the project view of the HMI device. Select the connection and edit its parameters in the properties dialog box.

Note

The settings on the HMI device and on the PLC must match.

5.3.4 Configuring protocol parameters

Parameters to be set

To edit the parameters, double-click "Communication > Connections" in the project window of the HMI device. In the project window of the HMI device. "Mitsubishi Protocol 4" is selected in the "Communication drivers" column. You can now enter or modify the protocol parameters in the Properties window:

Device-dependent parameters

- Interface

  Select the HMI port to which the Mitsubishi PLC is connected under "Interface".

  For more detailed information, refer to the HMI device manual.

- Type

  Here, you select the interface of the HMI device you want to use. You can choose between RS-232 or RS-422. If the HMI device is a PC, you can only use RS-232.

  Note

  If you use the IF1B interface, you must also switch over the RS-422 received data and the RTS signal using 4 DIP switches on the back of the Multi Panel.

- Baud rate

  Define the transmission rate between the HMI device and the PLC under "Baud rate".

  Note

  The highest station address must be less than or equal to 63 if you set a transmission rate of 1.5 Mbaud at OP 73 or OP 77A.

  If connecting a TP 170A to a SIMATIC S7 station at a transmision rate of 1.5 MBaud on PROFIBUS DP, set a value less than or equal to 63 for the highest station address (HSA).

- Data bits

  Select "7 bits" or "8 bits" under "Databits".

- Parity

  Select "None", "Even" or "Odd" under "Parity".

- Stop bits

  Select "1" or "2" "Stop bits".

Network parameters

- Checksum

  Under "Checksum" you can choose between "Yes" and "No."

PLC-dependent parameters

- Station address

  Under "Station address" set the station number of the PLC.

  The following are permitted: 0 - 15
- CPU type

  Set the PLC type to which the HMI device is connected at the "CPU type" parameter. The following entries are possible:

  – FX0N, FX1S

  – FX2C, FX1N, FX2N, FX2NC

  – A, AnS, AnN

  – AnA, AnU, Q, QnA, QnAS

  The PLC type must be selected for the following reasons:

  – The maximum frame length of the PLC is not exceeded at runtime.

  – Protocol differences between CPUs of the PLC types FX, A, AnS and AnN (5-character addressing) and the larger CPUs (7-character addressing) can be implemented.

  – Addressing for X and Y (hexadecimal or octal) is adapted.

  Instead of checking the address ranges of the operands depending on the PLC, they are selected as large as permitted by the protocol. The user is thus not restricted when addressing the memory areas of the supported controllers.

Setting parameters for the MITSUBISHI communications module

The settings on the HMI device and the communications modules must match.

In the controllers of the FX series, the communication parameters are set using the special registers D8120 and D8121.

On the interface modules of the A and Q series, the communication parameters are set using switches. On the A1SJ71UC24-R2 module, the station number is always 0.

The settings "Computer link", "Dedicated protocol", and "Protocol format 4" must be selected.

5.3.5 Permitted data types (Mitsubishi Protocol 4)

Permitted data types

The table lists the user data types that can be used when configuring tags and area pointers.

Name	Operand	Data type
Output	Y	Bit, 4–bit block, 8–bit block, 12–bit block, 16–bit block, 20–bit block, 24–bit block, 28–bit block, 32–bit block
Input	X	Bit, 4–bit block, 8–bit block, 12–bit block, 16–bit block, 20–bit block, 24–bit block, 28–bit block, 32–bit block
Bit memory	M	Bit, 4–bit block, 8–bit block, 12–bit block, 16–bit block, 20–bit block, 24–bit block, 28–bit block, 32–bit block
Link bit memory	B	Bit, 4–bit block, 8–bit block, 12–bit block, 16–bit block, 20–bit block, 24–bit block, 28–bit block, 32–bit block
Timer	T	Word
Counter	C	Word, DWord
Data register	D	Bit [1)], Word, DWord, Int, DInt, Real, String
Link register	W	Word, DWord, Int, DInt, Real
Error bit memory	F	Bit, 4–bit block, 8–bit block, 12–bit block, 16–bit block, 20–bit block, 24–bit block, 28–bit block, 32–bit block

1) In the case of write accesses note:
With the "bit" data type in the "D" operand, after changing the specified bit the entire word is written back to the PLC. There is no check to determine whether any other bits in the word have changed. As a result, the PLC only has read access to the specified word.

Special features of connections with protocol 4

NOTICE
If the CPU type is changed for a configured connection, tags with the following characteristics must be revised: • Operands that do not exist for the new CPU type such as "W", "B", "F". • Inputs and outputs with different addressing (hexadecimal/octal) • Addresses higher than the permitted address range of the new CPU type.

Protected areas ("Write disable during RUN") can only be read and not written depending on the CPU type. "Special relays/registers" can be write-protected or for system use only. Writing data to these special address areas (> 8191) can lead to malfunctions on the CPU.

The data types "String" and "Real" are not available on all CPUs.

Area pointers can only be created with the "D" operand.

The trigger tag for discrete alarms can only be tags of the "D" operand and the data types "Word" and "Int".

Array tags may only be used for discrete alarms and trends. Array tags only of the "D" operand and the data types "Int" and "Word" are permitted.

The CPUs of the various series have different limits for the address areas and these can be found in the MITSUBISHI Compterlink manuals.

Examples of the CPU-dependent and communications format-dependent limits of the address ranges:

Name	Operand	Max. address FX2N	Max. address AnU over AJ71UC24	Max. address Q series over AJ71QC24N or A1SJ71QC24
Output/input	Y/X	Octal X/Y 0 - 267	HEX X/Y 0 - 7FF	HEX X/Y 0 - 7FF
Bit memory	M	M0 - M3071 and M8000 - M8255	M/L/S 0 - 8191 M9000 - M9255	M/L/S 0 - 8191
Data register	D	D0 - 7999 D8000 - D8255	D0 - 8191 D9000 - D9255	D0 - 8191 D9000 - D9255 becomes SD1000 - SD1255
Counter	C	C0 - 255	C0 - 1023	C0 - 1023
Timer	T	T0 - 255	T0 - 2047	T0 - 2047
Link register	W	--	Hex: W0 - FFF	Hex: W0 - FFF
Link bit memory	B	--	Hex: B0 - FFF	Hex: B0 - FFF
Error bit memory	F	--	F0 -2047	F0 -2047

5.3.6 Optimizing the configuration

Acquisition cycle and update time

The acquisition cycles for the "Area pointers" and the acquisition cycles of the tags specified in the configuration software are decisive factors for the actual update times that can be achieved.

The update time is the sum of the acquisition cycle + transmission time + processing time.

To achieve optimum update times, remember the following points during configuration:

- Keep the individual data areas as small as possible and as large as necessary.
- Define data areas that belong together as belonging together. You can improve the update time by setting up one large data area instead of several small areas.
- If the acquisition cycles you select are too short, this is detrimental to the overall performance. Set the acquisition cycle to suit the rate of change of the process values. The rate of temperature changes at a furnace, for example, is significantly slower compared to the speed rate of an electrical drive. As a general guideline, the acquisition cycle should be approx. 1 second.
- Put the tags of an alarm or a screen in one data area without gaps.
- To allow changes in the PLC to be recognized reliably, these must be available at least during the actual acquisition cycle.
- Set the transmission rate to the highest possible value.

Discrete alarms

For discrete alarms, use arrays and assign the individual alarms to one bit of the array tags themselves and not to the individual subelements. For discrete alarms and arrays, only tags of the "D" operand and data types "Word" and "Int" are permitted.

Screens

With screens, the update rate that can actually be achieved depends on the type and amount of data to be displayed.

Configure short acquisition cycles only for objects which actually require shorter refresh cycles.

Trends

When using bit-triggered trends, if the group bit is set in the "Trend transfer area", the HMI device always updates all the trends whose bit is set in this area. It then resets the bits.

The group bit in the PLC program can only be set again after all bits have been reset by the HMI device.

Job mailboxes

If large numbers of PLC jobs are sent in quick succession, this can lead to overload in the communication between the HMI device and PLC.

The HMI device confirms acceptance of the job mailbox by entering the value zero in the first data word of the job mailbox. The HMI device now processes the job for which it requires time. If a new PLC job is entered again immediately in the job mailbox, it may take some time before the HMI device can process the next PLC job. The next job mailbox will only be accepted when there is computing capacity available.

5.3.7 Commissioning components

Transferring the PLC program to the PLC

1. Interconnect the PC with the CPU using the appropriate cable.
2. Download the program files to the CPU.
3. Then set the CPU to RUN.

Transferring project data to the HMI device

1. The HMI device must be in transfer mode in order to accept the project transfer.

   Possible scenarios:

   – Initial commissioning

     The HMI device does not yet contain any configuration data in the initial commissioning phase. The project data and runtime software required for operation must be transferred from the configuration computer to the device. The HMI device automatically changes to transfer mode.
     The transfer dialog box opens with a connection message on the HMI device.

   – Recommissioning

     Recommissioning means that you overwrite existing project data on the HMI device.

     For corresponding detailed instructions, refer to the Manual of your HMI device.

2. Check whether the alarm settings meet requirements of your WinCC flexible project.
3. Select "Project > Transfer > Transfer settings" to configure the transfer parameters before you transfer project data to the HMI device:

   – Select the used port.

   – Set the transfer parameters.

   – Select the target storage location.

4. Initiate the transfer of project data by clicking "Transfer".

   – The project is compiled automatically.

   – All compilation and transfer steps are logged to a message window.

   Message output on the configuration computer after successful completion of the transfer: "Transfer completed successfully".

   The start screen appears on the HMI device.

Interconnecting the PLC with the HMI device

1. Interconnect the PLC (CPU or communication module) with the HMI device using a suitable patch cable.
2. The message "Connection to PLC .... is established" is output to the HMI device. Note that users can edit the system alarm texts in WinCC flexible.

NOTICE
Always observe the safety-related information in the HMI device manual when commissioning the device. RF radiation emitted from devices such as mobile phones may cause unwanted operating states.

5.4 User data areas

5.4.1 Trend request and trend transfer

Function

A trend is a graphic representation of one or more values from the PLC. The value is read either time- or bit-triggered, depending on the configuration.

Time-triggered trends

The HMI device reads in the trend values cyclically at an interval specified in the configuration. Time-triggered trends are suitable for continuous processes, for example, the operating temperature of a motor.

Bit-triggered trends

By setting a trigger bit in the trend request tag, the HMI device either reads in a trend value or an entire trend buffer. This setting is defined in configuration data. Bit-triggered trends are normally used to represent fast changing values. One example might be the injection pressure in the production of plastic parts.

To trigger bit-triggered trends, create suitable external tags in the "Tags" editor of WinCC flexible. The tags must be linked with the trend areas. The HMI device and PLC then communicate with each other over these trend areas.

The following areas are available for trends:

- Trend request area
- Trend transfer area 1
- Trend transfer area 2 (required only with switch buffers)

Tags of the "D" "Operand" are permitted. They must be of the data type "Word", "Int", or an array tag of the data type "Word", "Int". During configuration you assign a bit to a trend. This sets a unique bit assignment for all areas.

Note

In conjunction with the Mitsubishi PG protocol, tags of the "Operand" "D" only of data type "Word" or an array tag of the data type "Word" are permitted.

Trend request area

The HMI device sets corresponding bits in the trend request area when you open a screen which contains one or several trends on the HMI device. After deselecting the screen, the HMI device resets the relevant bits in the trend request area.

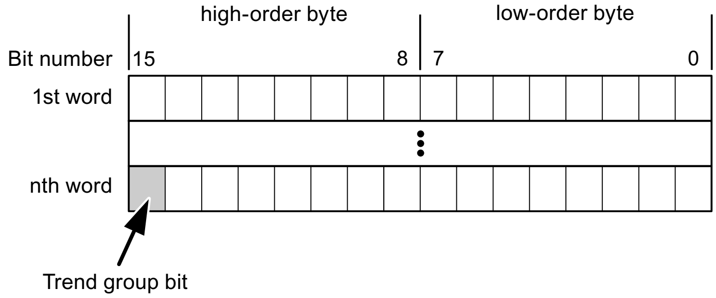
Using the trend request area, the PLC can recognize which trend is currently displayed on the HMI device. Trends can also be triggered without evaluation of the trend request area.

Trend transfer area 1

This area is used to trigger trends. In your PLC program, you set the bit assigned to the trend in the trend transfer area and set the trend group bit. The trend group bit is the last bit in the trend transfer area.

The HMI device detects the trigger. The HMI device reads either a value or the entire buffer from the PLC. It then resets the trend bit and the trend group bit.

The following picture shows the structure of a trend transfer area.



The trend transfer area must not be modified by the PLC program until the trend group bit has been reset.

Trend transfer area 2

Trend transfer area 2 is required for trends configured with a switch buffer. The trend transfer areas 1 and 2 have a similar structure.

Switch buffers

The switch buffer is a second buffer for the same trend that can be set up during configuration.

While the HMI device reads the values from buffer 1, the PLC writes to buffer 2. If the HMI device is reading buffer 2, the PLC writes to buffer 1. This prevents the trend values being overwritten by the PLC while the trend is being read out by the HMI device.

5.4.2 LED mapping

Function

The function keys of the keyboard units of the Operator Panel (OP), Multi Panel (MP) and Panel PC are equipped with LEDs. These LEDs can be controlled by the PLC. This functionality can be used to activate an LED in order to tell the operator which key to press in a specific situation, for example.

Requirements

In order to enable control of an LED, you must set up an LED tag or array tag in the PLC and declare this as the LED tag in the configuration data.

LED assignment

Assign the LEDs to the LED tag bits when you configure the function keys. Define the "LED tag" and the corresponding "bit" for each function key in the "General" group of the properties view.

The bit number "bit" identifies the first of two consecutive bits that control the following LED states:

Bit n+ 1	Bit n	LED function	
		all Mobile Panels, Operator Panels, and Multi Panels	Panel PCs
0	0	Off	Off
0	1	Rapid flashing	Flashing
1	0	Slow flashing	Flashing
1	1	Permanent signal	Permanent signal

5.4.3 Area pointer

5.4.3.1 General information on area pointers (Mitsubishi MELSEC)

Introduction

Area pointers are parameter fields. WinCC flexible Runtime reads these parameter fields in order to obtain information about the location and size of data areas in the PLC. The PLC and the HMI device interactively communicate read and write data for these data areas . The PLC and the HMI device trigger defined interactions based on the evaluation of stored data.

The area pointers reside in PLC memory. Their addresses are configured in the "Area pointers" dialog of the "Connections" editor.

Area pointers used in WinCC flexible:

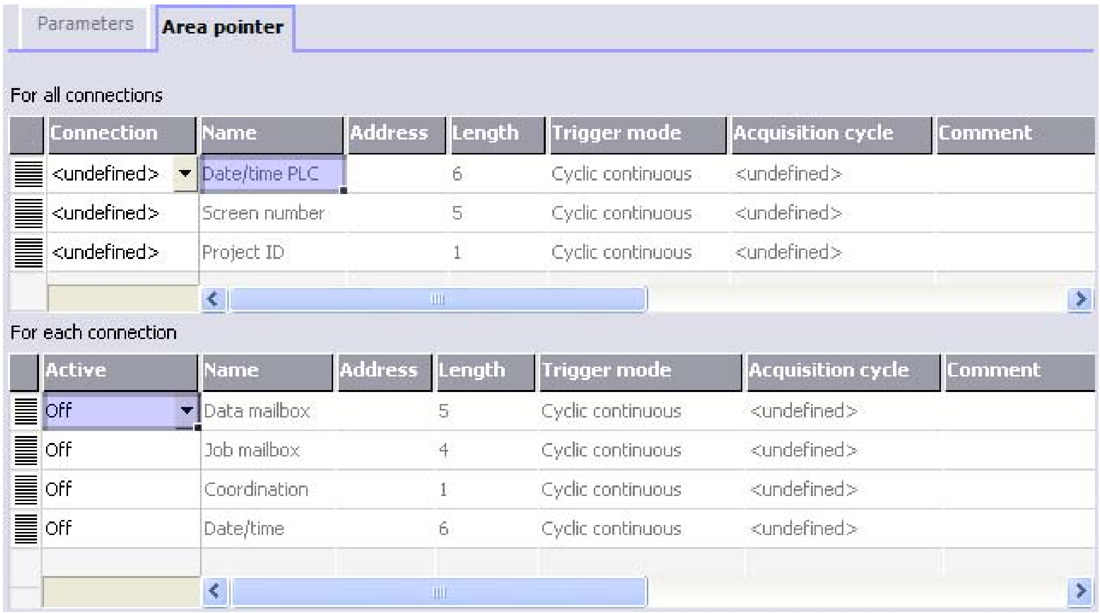
- PLC job
- Project ID
- Screen number
- Data record
- Date/time
- Date/time PLC
- Coordination

Device-dependency

Availability of the area pointer depends on the HMI device used.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use.



Enabling an area pointer based on the example of a SIMATIC S7 PLC

- Active

  Enables the area pointer.
- Name

  Name of the area pointer defined by WinCC flexible.
- Address

  Tag address of the area pointer in the PLC.
- Length

  WinCC flexible defines the default length of the area pointer.
- Acquisition cycle

  Define an acquisition cycle in this field to allow cyclic reading of the area pointer in Runtime. An extremely short acquisition time may have a negative impact on HMI device performance.
- Comment

  Save a comment, for example, to describe the purpose of the area pointer.

Accessing data areas

The table shows how the PLC and HMI device handle read (R) and write (W) access to the data areas.

Data area	Required for	HMI device	PLC
Screen number	Evaluation by the PLC in order to determine the active screen.	W	R
Data record	Transfer of data records with synchronization	R/W	R/W
Date/time	Transfer of the date and time from the HMI device to the PLC	W	R
Date/time PLC	Transfer of the date and time from the PLC to the HMI device	R	W
Coordination	Requesting the HMI device status in the control program	W	R
Project ID	Runtime checks consistency between the WinCC flexible project ID and the project in the PLC.	R	W
PLC job	Triggering of HMI device functions by the control program	R/W	R/W

The next sections describe the area pointers and their associated PLC jobs.

5.4.3.2 "Screen number" area pointer

Function

The HMI device saves information about the screen called on the HMI device to the "Screen number" area pointer.

This allows the transfer of the current screen contents from the HMI device to the PLC. The PLC can trigger specific reactions such as the call of a different screen.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use. You can create only **one** instance of the "Screen number" area pointer and only on **one** PLC.

The screen number is transferred spontaneously to the PLC. That is, it is always transferred when a new screen is activated on the HMI device. It is therefore unnecessary to configure an acquisition cycle.

Structure

The area pointer is a data area in the memory of the PLC with a fixed length of 5 words.

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1st word	Current screen type															
2nd word	Current screen number															
3rd word	Reserved															
4th word	Current field number															
5th word	Reserved															

- Current screen type

  "1" for the root screen or
  "4" for the permanent window
- Current screen number

  1 to 32767
- Current field number

  1 to 32767

5.4.3.3 "Date/time" area pointer

Function

This area pointer is used to transfer the date and time from the HMI device to the PLC.

The PLC writes control job "41" to the job mailbox.

When it evaluating the control job, the HMI device saves its current date and time to the data area configured in the "Date/time" area pointer. All definitions are coded in BCD format.

The "Date/Time" area pointer when used in a project which contains multiple connections must be enabled for each configured connection.

The date/time data area has the following structure:

Data word	Left byte								Right byte								
	15							8	7							0	
n+0	Reserved								Hour (0 to 23)								Time
n+1	Minute (0 to 59)								Second (0 to 59)								
n+2	Reserved								Reserved								
n+3	Reserved								Weekday (1 to 7, 1 = Sunday)								Date
n+4	Day (1 to 31)								Month (1 to 12)								
n+5	Year (80 to 99/0 to 29)								Reserved								

Note

The entry of values from 80 to 99 in the "Year" data area returns the years 1980 through 1999; values from 0 to 29 return the years 2000 through 2029.

5.4.3.4 "Date/time controller" area pointer

Function

This area pointer is used to transfer the date and time from the PLC to the HMI device. Use this area pointer if the PLC is the time master.

The PLC loads the data area of the area pointer. All definitions are coded in BCD format.

The HMI device reads the data cyclically within the configured acquisition cycle and synchronizes itself.

Note

Set an acquisition cycle of sufficient length for the date/time area pointer in order to avoid any negative impact on HMI device performance.
Recommended: Acquisition cycle of 1 minute if your process can handle it.

The date/time data area has the following structure:

DATE_AND_TIME format (in BCD code)

Data word	Left byte			Right byte		
	15	. . . . . .	8	7	. . . . . .	0
n+0	Year (80 to 99/0 to 29)			Month (1 to 12)		
n+1	Day (1 to 31)			Hour (0 to 23)		
n+2	Minute (0 to 59)			Second (0 to 59)		
n+3	Reserved			Reserved		Weekday (1 to 7, 1 = Sunday)
n+4 [1)]	Reserved			Reserved		
n+5 [1)]	Reserved			Reserved		

1) The two data words must be available in the data area in order to ensure compliance of the data format with WinCC flexible and to avoid the reading of incorrect information.

Note

Note that when you enter the year, values 80-99 result in years 1980 through 1999 and the values 0-29 result in the years 2000 through 2029.

5.4.3.5 "Coordination" area pointer

Function

The "Coordination" area pointer is used to implement the following functionality:

- detection in the control program of HMI device startup
- detection in the control program of the current HMI device operating mode
- detection in the control program of the HMI devices ready to communicate state

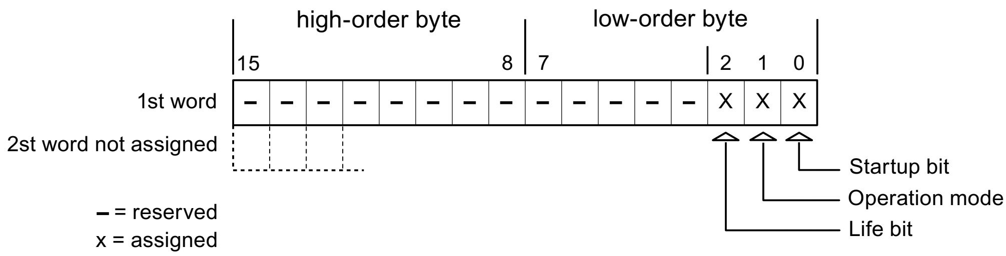
The "Coordination" area pointer has a length of two words.

Application

Note

The HMI device always writes the entire coordination area when updating the area pointer. The control program may not make changes to the coordination area for this reason.

Assignment of bits in the "Coordination" area pointer



Startup bit

The startup bit is set briefly to "0" by the HMI device during startup. It sets the bit permanently to "1" when startup is completed.

Operating mode

The operating mode bit is set to 1 as soon as the user switches the HMI device offline. The state of the operating mode bit is "0" during normal operation of the HMI device. You can determine the current operating mode of the HMI device by reading this bit.

Life bit

The HMI device inverts the life bit at intervals of approximately one second. You can check whether or not the connection to the HMI device is still up by querying this bit in the control program.

5.4.3.6 "User version" area pointer

Function

You can check whether the HMI device is connected to the correct PLC at the start of runtime. This check is important when operating with several HMI devices.

The HMI device compares a value stored on the PLC with the value specified in configuration data. This ensures compatibility of configuration data with the control program. If discrepancy is detected, a system alarm is displayed on the HMI device and runtime is stopped.

Application

Settings in configuration data required when using this area pointer:

- Define the version of configuration data. Possible values between 1 and 255.

  Enter the version in the "Device settings ▸ Device settings" editor in "Project ID."
- Data address of the value for the version that is stored in the PLC:

  Enter the data address in the "Communication ▸ Connections" editor in "Address."

Connection failure

A connection failure to a device on which the "project ID" area pointer is configured results in all the other connections in the project being switched to "offline".

This behavior has the following prerequisites:

- You have several configured connections in a project.
- You are using the "project ID" area pointer in at least one connection.

Causes which may set connections "offline":

- The PLC is not available.
- The connection has been switched offline in the engineering system.

5.4.3.7 "Job mailbox" area pointer

Function

The PLC can use the job mailbox to transfer jobs to the HMI device to trigger corresponding actions on the HMI device. These functions include, for example:

- Display screen
- Set date and time

Data structure

The first word of the job mailbox contains the job number. Depending on the job mailbox, up to three parameters can be transferred.

Word	Left byte	Right byte
n+0	0	Job number
n+1	Parameter 1	
n+2	Parameter 2	
n+3	Parameter 3	

The HMI device evaluates the job mailbox if the first word of this job is unequal to zero. This means that the parameters must be entered in the job mailbox first, followed by the job number.

When the HMI device accepts the job mailbox, the first word is set to 0 again. The execution of the job mailbox is generally not completed at this point in time.

Job mailboxes

All job mailboxes and their parameters are listed below. The "No." column contains the job number of the job mailbox. Job mailboxes can only be triggered by the PLC when the HMI device is online.

Note

Please note that not all HMI devices support job mailboxes. TP 170A and Micro Panel do not support PLC jobs, for example.

No.	Function	
14	Setting the time (BCD coded)	
	Parameter 1	Left byte: - Right byte: hours (0-23)
	Parameter 2	Left byte: minutes (0-59) Right byte: seconds (0-59)
	Parameter 3	-
15	Setting the date (BCD coded)	
	Parameter 1	Left byte: - Right byte: weekday (1-7: Sunday-Saturday)
	Parameter 2	Left byte: day (1-31) Right byte: month (1-12)
	Parameter 3	Left byte: year
23	User logon	
	Logs the user on with the name "PLC user" at the HMI device with the group number transferred in Parameter 1. The logon is possible only when the transferred group number exists in the project.	
	Parameter 1	Group number 1 to 255

No.	Function	
14	Setting the time (BCD coded)	
	Parameter 2, 3	-
24	User logoff	
	Logs off the current user. The function corresponds to the "logoff" system function)	
	Parameter 1, 2, 3	-
40	Transfer date/time to PLC	
	(in the S7 format DATE_AND_TIME) An interval of at least 5 seconds must be maintained between two successive jobs to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
41	Transfer date/time to PLC	
	(In OP/MP format) An interval of at least 5 seconds must be maintained between successive jobs in order to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
46	Update tags	
	Causes the HMI device to read the current value of the PLC tags whose update ID matches the value transferred in Parameter 1. (Function corresponds to the "UpdateTag" system function.)	
	Parameter 1	1 - 100
49	Clear process alarm buffer	
	Parameter 1, 2, 3	-
50	Clear alarm buffer	
	Parameter 1, 2, 3	-
51	Screen selection [1)]	
	Parameter 1	Screen number
	Parameter 2	-
	Parameter 3	Field number
69	Read data record from PLC	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	0: Do not overwrite existing data record 1: Overwrite existing data record
70	Write data record to PLC	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	-

1) OP 73, OP 77A and TP 177A HMI devices also execute the "Screen selection" job mailbox if the on-screen keyboard is active.

5.4.3.8 "Data mailbox" area pointer

"Data mailbox" area pointer

Function

When data records are transferred between the HMI device and PLC, both partners access common communications areas on the PLC.

Data transfer types

There are two ways of transferring data records between the HMI device and PLC:

- Transfer without synchronization
- Transfer with synchronization over the data record

Data records are always transferred directly. That is, the tag values are read from an address or written to an address configured for this tag directly, without redirecting the values by means of interim memory.

Initiating the transfer of data records

There are three ways of triggering the transfer:

- Operator input in the recipe view
- PLC jobs

  The transfer of data records can also be triggered by the PLC.
- Triggering by configured functions

If the transfer of data records is triggered by a configured function or by a PLC job, the recipe display on the HMI device remains operable. The data records are transferred in the background.

Simultaneous processing of several transfer requests is, however, not possible. In this case, the HMI device rejects the other transfer requests with a system alarm.

Transfer without synchronization

If you select asynchronous transfer of data records between the HMI device and PLC, there is no coordination over the common data areas. It is therefore unnecessary to set up a data area during configuration.

Asynchronous data record transfer can be a useful alternative, for example, when:

- The system is capable of excluding the risk of uncontrolled overwriting of data by the communication peer.
- The PLC does not require information about the recipe number and data record number.
- The transfer of data records is triggered by the operator of the HMI device.

Reading values

When a read job is triggered, the values are read from the PLC addresses and transferred to the HMI device.

- Triggering by the operator in the recipe view:

  The values are downloaded to the HMI device. You can then process, edit, or save these values, for example.

- Triggering by a function or PLC job:

  The values are saved immediately to the data volume.

Writing values

When a write job is triggered, the values are written to the PLC addresses.

- Triggering by the operator in the recipe view:

  The current values are written to the PLC.

- Triggering by a function or PLC job:

  The current values are written to the PLC from the data medium.

Transfer with synchronization (Mitsubishi)

If you select synchronous transfer, both communication partners set status bits in the common data area. You can use this mechanism to prevent uncontrolled overwriting of data in either direction in your control program.

Application

Synchronous data record transfer can be a useful solution, for example, when:

- The PLC is the "active partner" in the transfer of data records.
- The PLC evaluates the information about the recipe number and data record number.
- The transfer of data records is triggered by means of a Job mailbox.

Requirements

In order to synchronize transfer of data records between the HMI device and the PLC, the following requirements must be met during configuration:

- An area pointer has been set up: "Communication ▸ Connections" editor in "Area pointer"
- The PLC with which the HMI device synchronizes transfer of data records is specified in the recipe: "Recipes" editor, properties view of the recipe, "Properties" group in "Transfer".

Structure of the data area

The data area has a fixed length of 5 words. Structure of the data area:

	15		0
1. Word	Current recipe number (1 - 999)		
2. Word	Current data record number (0 - 65535)		
3. Word	Reserved		
4. Word	Status (0, 2, 4, 12)		
5. Word	Reserved		

- Status

  The status word (word 4) can adopt the following values:

Value		Meaning
Decimal	Binary	
0	0000 0000	Transfer permitted, data record free
2	0000 0010	Transfer is busy
4	0000 0100	Transfer completed without error
12	0000 1100	Transfer completed with error

Possible causes of error when transferring data records

Possible causes of error

The section below shows possible error causes which lead to the cancellation of data record transfer:

- Tag address not set up on the PLC
- Overwriting data records not possible
- Recipe number does not exist
- Data record number does not exist

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

Reaction to an aborted transfer due to errors

If the transfer of data records is aborted due to errors, the HMI device reacts as follows:

- Triggering by the operator in the recipe display

  Information in the status bar of the recipe view and output of system alarms
- Triggered by function

  Output of system alarms
- Triggering by PLC job

  No feedback message on the HMI device

You can nonetheless evaluate the status of the transfer by querying the status word in the data record.

Sequence of the transfer when triggered by a configured function

Reading from the PLC using a configured function

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.	Abort with system alarm.
3	The HMI device reads the values from the PLC and stores them in the data record specified in the function.	
4	• If "Yes" was selected for the "Overwrite" function, an existing data record is overwritten without any prompt for confirmation. The HMI device sets the status "Transfer completed." • If "No" was selected for the "Overwrite" function and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Writing to the PLC by means of configured function

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.	Abort with system alarm.
3	The HMI device fetches the values of the data record specified in the function from the data medium and transfers the values to the PLC.	
4	The HMI device sets the status "Transfer completed."	
5	The control program can now evaluate the transferred data. The control program must reset the status word to zero in order to enable further transfers.	

Sequence of the transfer triggered by a job mailbox

The transfer of data records between the HMI device and the PLC can be initiated by either one of these stations.

The two PLC jobs No. 69 and No. 70 are available for this type of transfer.

No. 69: Read data record from PLC ("PLC → DAT")

PLC job no. 69 transfers data records from the PLC to the HMI device. The PLC job is structured as follows:

	Left byte (LB)	Right byte (RB)
Word 1	0	69
Word 2	Recipe number (1-999)	
Word 3	Data record number (1 to 65535)	
Word 4	Do not overwrite existing data record: 0 Overwrite existing data record: 1	

No. 70: Write data record to PLC ("DAT → PLC")

PLC job No. 70 transfers data records from the HMI device to the PLC. The PLC job is structured as follows:

	Left byte (LB)	Right byte (RB)
Word 1	0	70
Word 2	Recipe number (1-999)	
Word 3	Data record number (1 to 65535)	
Word 4	—	

Sequence when reading from the PLC with PLC job "PLC → DAT" (no. 69)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device reads the values from the PLC and saves these to the data record defined in the PLC job.	
4	• If "Overwrite" was selected in the job, an existing data record is overwritten without any prompt for confirmation. The HMI device sets the status "Transfer completed." • If "Do not overwrite" was selected in the job, and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Sequence of writing to the PLC using PLC job "DAT → PLC" (no. 70)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device fetches the values of the data record specified in the function from the data medium and writes the values to the PLC.	
4	The HMI device sets the status "Transfer completed."	
5	The control program can now evaluate the transferred data. The control program must reset the status word to zero in order to enable further transfers.	

Sequence of a transfer started by the operator in the recipe display

Reading from the PLC started by the operator in the recipe display

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe number to be read and the status "Transfer active" in the data record and sets the data record number to 0.	Abort with system alarm.
3	The HMI device reads the values from the PLC and displays them in the recipe display. If the recipes have synchronized tags, the values from the PLC are also written to the tags.	
4	The HMI device sets the status "Transfer completed."	
5	The control program must reset the status word to zero in order to enable further transfers.	

Writing to the PLC started by the operator in the recipe display

Step	Action	
	Check: Status word = 0?	
1	Yes	No
	The HMI device enters the recipe and data record number to be written and the status "Transfer active" in the data record.	Abort with system alarm.
2	The HMI device writes the current values to the PLC. If the recipes have synchronized tags, the changed values are synchronized between the recipe display and tags and then written to the PLC.	
3	The HMI device sets the status "Transfer completed."	
4	If required, the control program can now evaluate the transferred data.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

5.4.4 Events, alarms, and acknowledgments

5.4.4.1 General information on events, alarms, and acknowledgments

Function

Messages return information about the PLC or HMI device operating states or problems to the user on the HMI device. The message texts consist of configurable texts and/or tags with actual values.

Operational messages and events must be distinguished. The programmer defines what is an operational message and what is an error alarm.

Operational message

An operational message indicates a state. Example:

- Motor on
- PLC in manual mode

Alarm message

An error alarm indicates a malfunction. Example:

- Valve does not open.
- Excess motor temperature

Alarms indicate exceptional operational states, and must therefore be acknowledged.

Acknowledgment

To acknowledge error alarms:

- Operator input on the HMI device
- The PLC sets an acknowledgment bit.

Triggering alarms

Triggering of an alarm in the PLC:

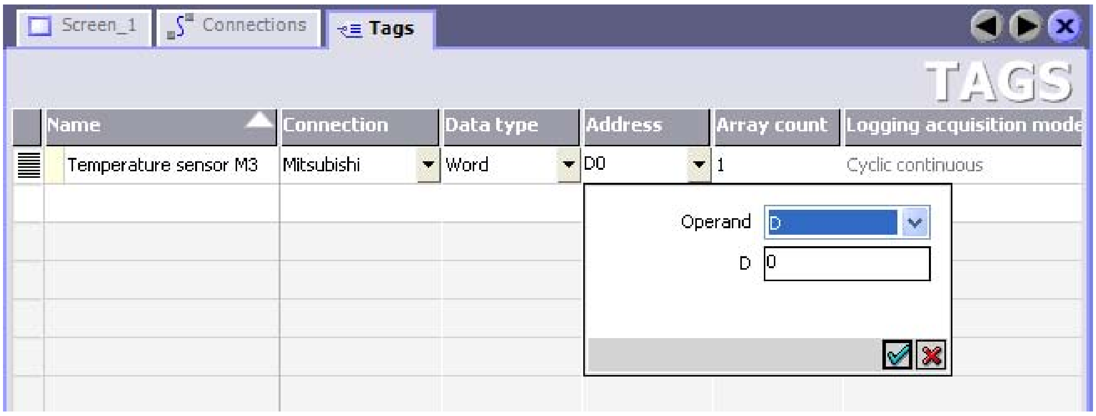
- Setting a tag bit
- Measured value limits exceeded

The location of tags, or of the tag array, is defined in WinCC flexible ES. The tag or array must be set up on the PLC.

5.4.4.2 Step 1: Creating tags or an array

Procedure

You create tags or arrays in the "Tags" editor. The dialog is shown in the following figure.



- Define the tag and array names.
- Select the connection to the PLC.

  The connection must already be configured in the "Connections" editor.
- Select the data type.

  The available data types depend on the PLC being used. If you select an illegal data type the tag will not be available in the "Discrete alarms" and "Analog alarms" editors.

  The following data types are supported for Mitsubishi Electric controllers:

PLC	Permitted data types	
	Discrete alarms	Analog alarms
MELSEC FX, FX0, FX0n, FX1n,FX2n, AnA, AnN, AnS, AnU, QnA, QnAS	Word, Int [1]	Bit, 4-Bit-Block, 8-Bit-Block, 12-Bit-Block, 16-Bit-Block, 20-Bit-Block, 24-Bit-Block, 28-Bit-Block, 32-Bit-Block, Word, DWord [1], Double [2], Int [1], DInt [1], Real [1]

[1] Not with Mitsubishi PG protocol
[2] Not with Mitsubishi protocol 4

- Enter an address.

  The tag addressed here contains the bit that triggers the alarm.

  As soon as the bit of the tag is set on the PLC and is transferred to the HMI device in the configured acquisition cycle, the HMI device recognizes the alarm as "incoming".

  After the same bit is reset on the PLC, the HMI device recognizes the alarm as "outgoing".
- Select the array elements.

  If the number of array elements is increased, you can select more bit numbers in the "Discrete alarms" editor. An array with a length of three words provides 48 alarm bits, for example.

5.4.4.3 Step 2: Configuring an alarm

Procedure

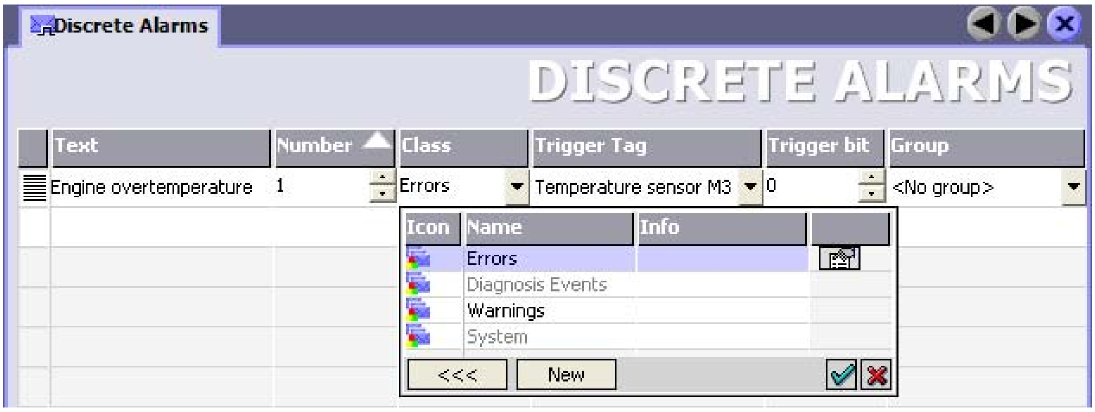
We differentiate between the following alarms:

- Discrete alarms
- Analog alarms

You create alarms in the "Discrete alarms" and "Analog alarms" editors.

Discrete alarms

The editor is shown in the figure below.



- Edit text

  Enter the text to display in runtime. You can format the text characters. The text may contain fields for the output of tags.

  The text is output to the alarm view if this view was configured in the "Screens" editor.

- Specify number

  Every alarm has a number that must be unique within the project. It is used to uniquely identify the alarm and is indicated with the alarm in runtime.

  The permitted range of values is 1 to 100,000.

  The WinCC flexible engineering system assigns consecutive numbers. You can change the alarm number when assigning it to groups, for example.

- Specify the alarm class

  Available alarm classes:

  – Error alarms

    This class must be acknowledged.

  – Warning alarms

    This class signals events with incoming and outgoing alarms.

- Assign trigger tag

  In the "Trigger tag" column, you link the configured alarm with the tag created in step 1. The selection list returns all tags with valid data type.

- Specify the bit number

  In the "bit number" column, specify the relevant bit position in the created tag.

  Remember that the way the bit positions are counted depends on the particular PLC. With Mitsubishi controllers, the bit positions are counted as follows:

How the bit positions are counted	Left byte								Right byte							
In Mitsubishi controllers	15							8	7							0
In the WinCC flexible, you configure the following:	15							8	7							0

Analog alarms

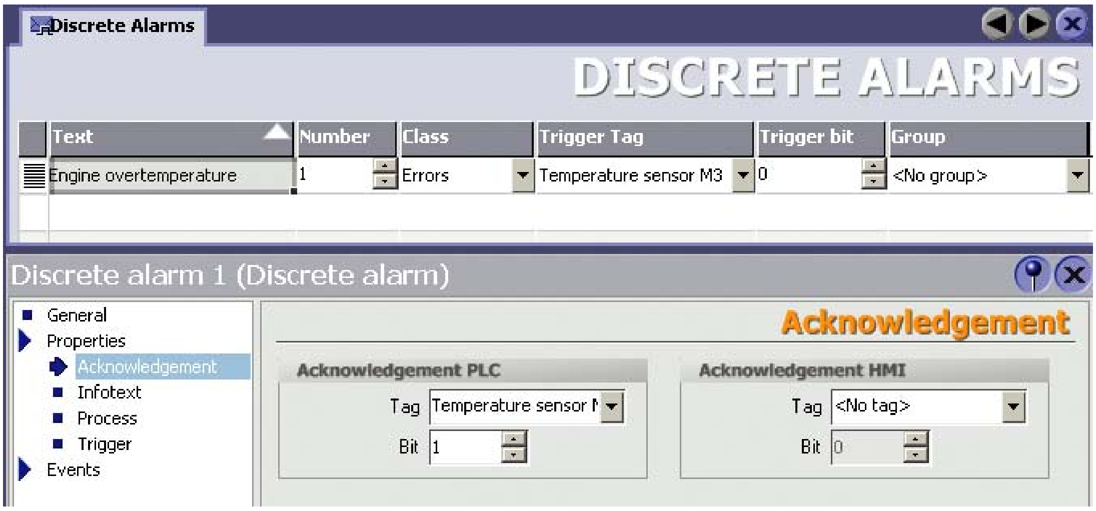
The only difference between discrete alarms and analog alarms is that you configure a limit value, rather than a bit number. The alarm is triggered when this limit is exceeded. The outgoing alarm is triggered when the low limit is violated, making allowances for any configured hysteresis.

5.4.4.4 Step 3: Configure the acknowledgment

Procedure

Create suitable tags on the PLC to acknowledge an error alarm. You assign these tags to an alarm in the "Bit messages" editor. You make the assignment in "Properties ▸ Acknowledgment."

The following figure shows the dialog for configuring an acknowledgment.



Distinction in terms of acknowledgment:

- Acknowledgment on the HMI device
- Acknowledgment by the PLC

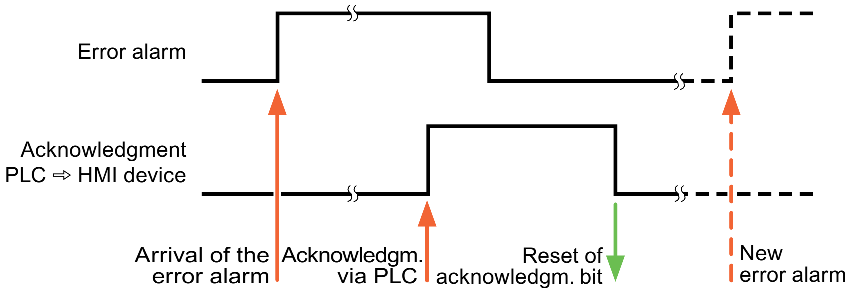
Acknowledgment by the PLC

In "Acknowledgment PLC tag", you configure the tag or the array tag and the bit number based on which the HMI device can recognize an acknowledgment by the PLC.

A bit set in the tag triggers acknowledgment of the assigned error alarm bit at the HMI device. This tag bit returns a function similar to acknowledgment on the HMI device which is triggered by pressing the "ACK" button, for example.

The acknowledgment bit must be located in the same tag as the bit for the error alarm.

Reset the acknowledgment bit before setting the bit in the alarm area again. The figure below shows the pulse diagram.



Acknowledgment on the HMI device

In "Ack read tag", you configure the tag or the array tag and the bit number that is written to the PLC after acknowledgment from the HMI device. Make sure when you use an array tag that it is not longer than 6 words.

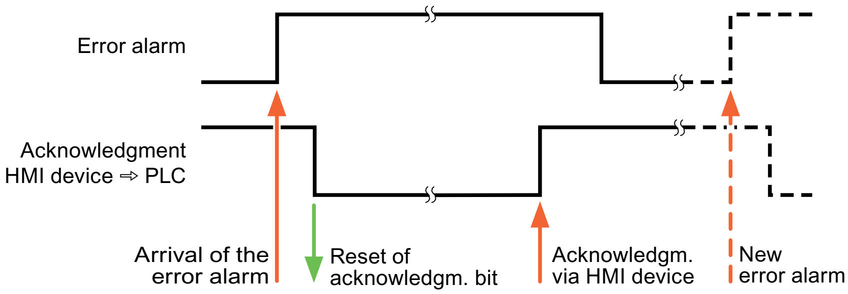
In order to ensure that a signal transition is generated as soon as the acknowledgment bit is set, the HMI device first resets the acknowledgment bit assigned to an error alarm. There is a certain time-based offset between these two operations, due to the processing time of the HMI device.

Note

The reset includes all alarm bits acknowledged since the last restart of Runtime. The PLC may only read this area once.

If the alarm is acknowledged on the HMI device, the bit is then set in the assigned acknowledgment tag on the PLC. This allows the PLC to recognize that the error alarm has been acknowledged.

The figure below shows the pulse diagram.



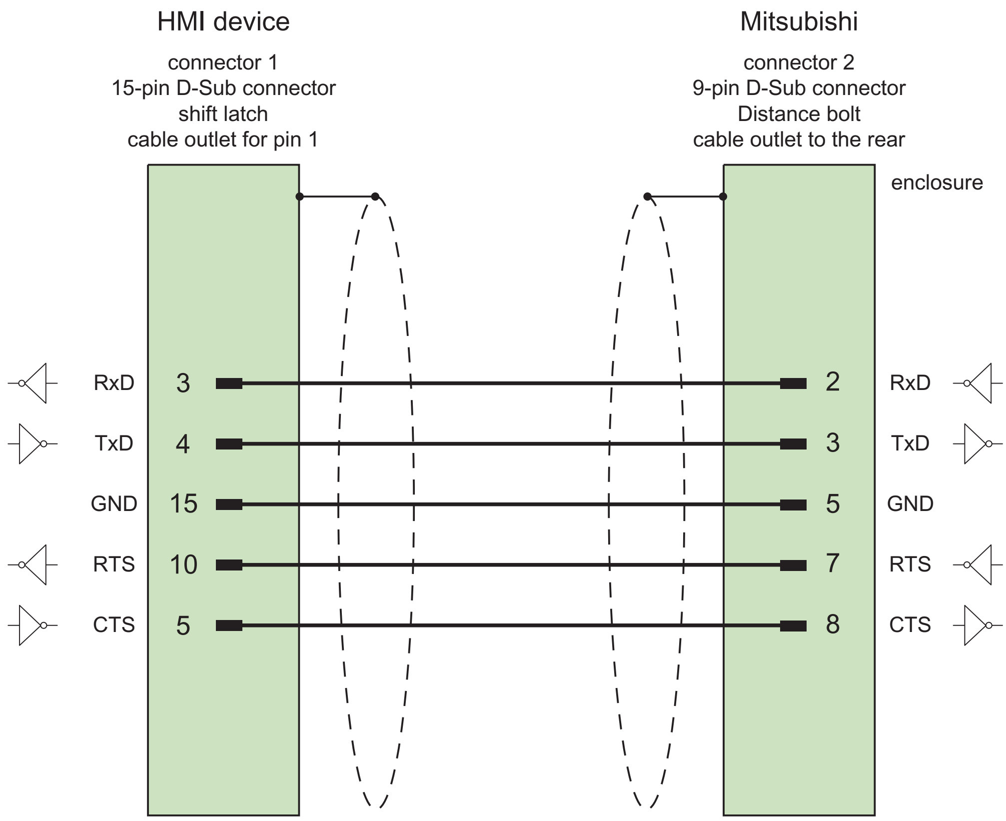
5.5 Connecting cables for Mitsubishi

5.5.1 Connecting cables for Mitsubishi PG protocol

5.5.1.1 Adapter 6XV1440-2UE32, RS-232, for Mitsubishi

6XV1440 - 2UE32

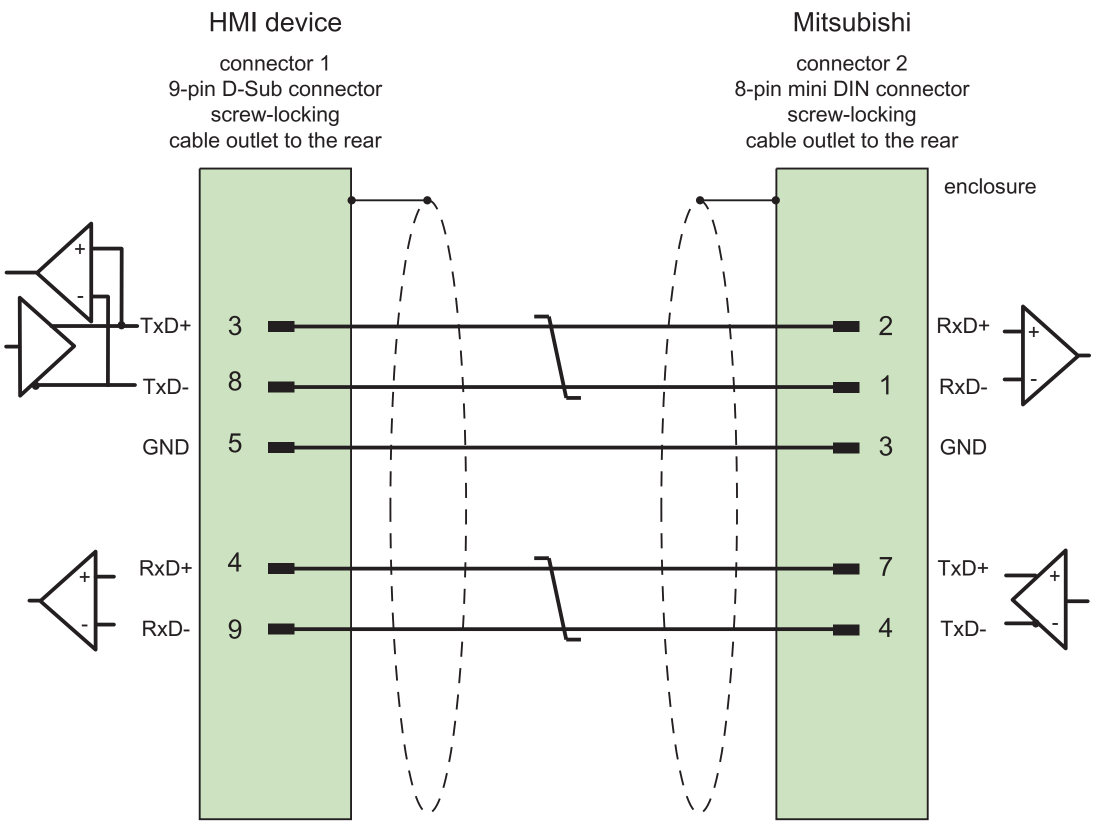
This adapter is inserted in the HMI device and enables the Mitsubishi cable SC-07 (FX0) or SC-08 (FX) to be connected.



Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
length: 32 cm

5.5.1.2 Connecting cable 6XV1440-2P, RS-422, for Mitsubishi

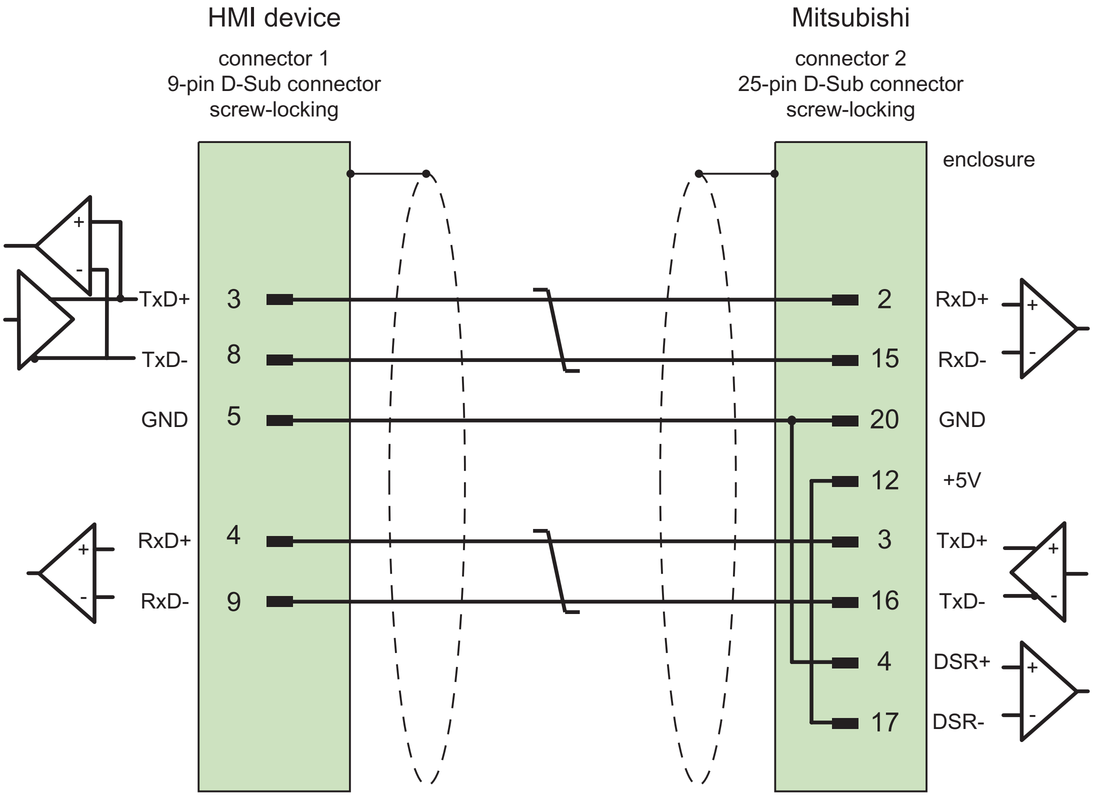
6XV1440 - 2P...



Shield with large-area contact to casing at both ends
Cable: 3 x 2 x 0.14 mm², shielded,
max. length 500 m

5.5.1.3 Connecting cable 6XV1440-2R, RS-422, for Mitsubishi

6XV1440 –2R...

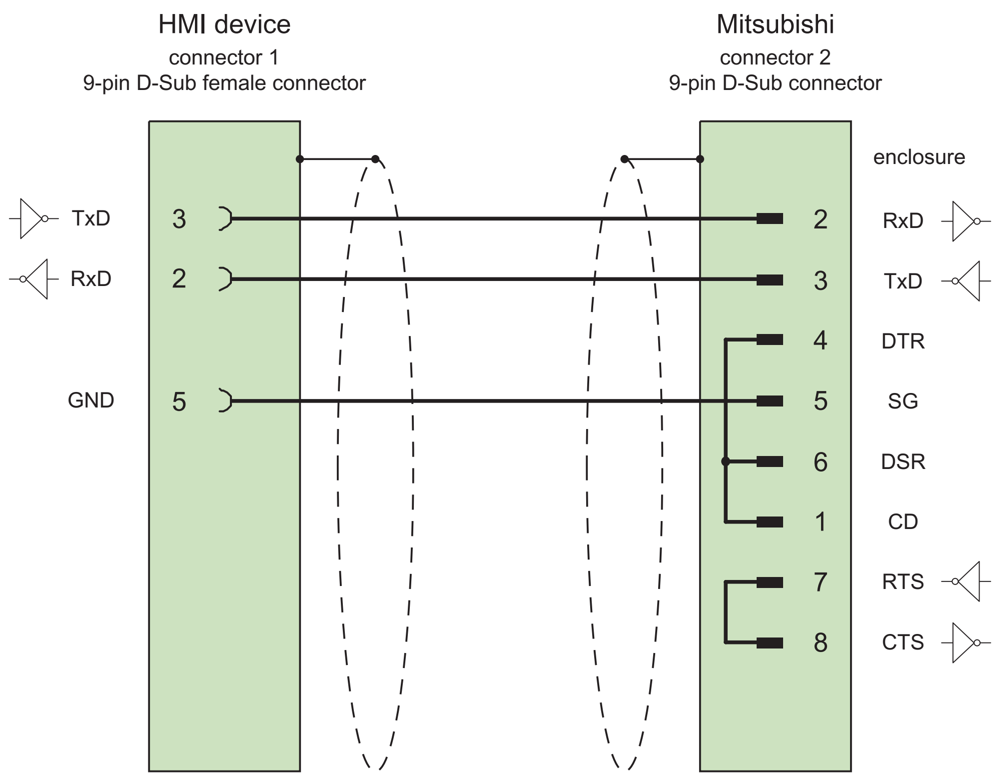


Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

5.5.2 Connecting cable for Mitsubishi protocol 4

5.5.2.1 Connecting cable PP1, RS-232, for Mitsubishi

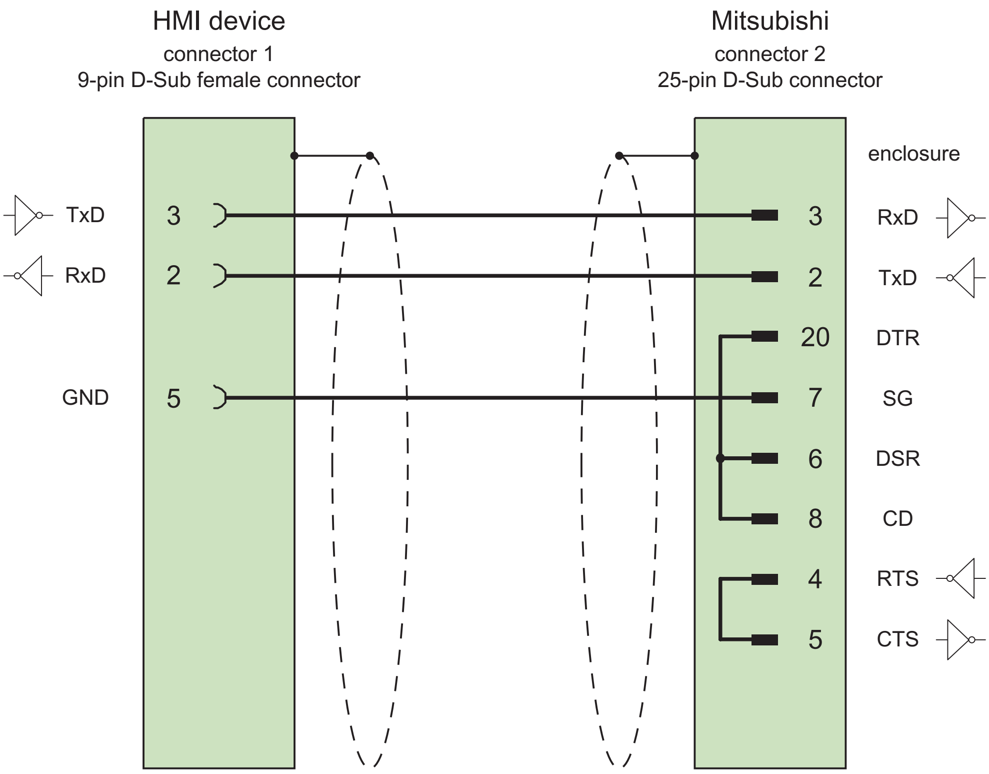
PP1 connecting cable



Shield with large-area contact to casing at both ends
Cable: 3 x 2 x 0.14 mm², shielded,
max. length 1200 m

5.5.2.2 Connecting cable PP2, RS-232, for Mitsubishi

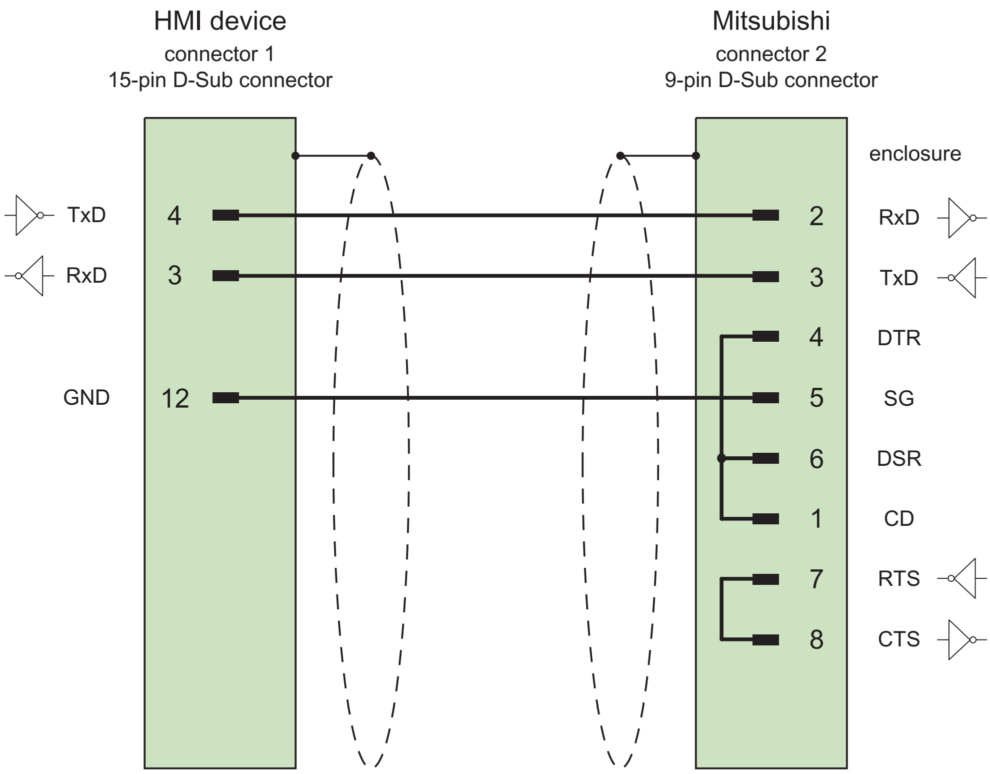
PP2 connecting cable



Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

5.5.2.3 Connecting cable PP3, RS-232, for Mitsubishi

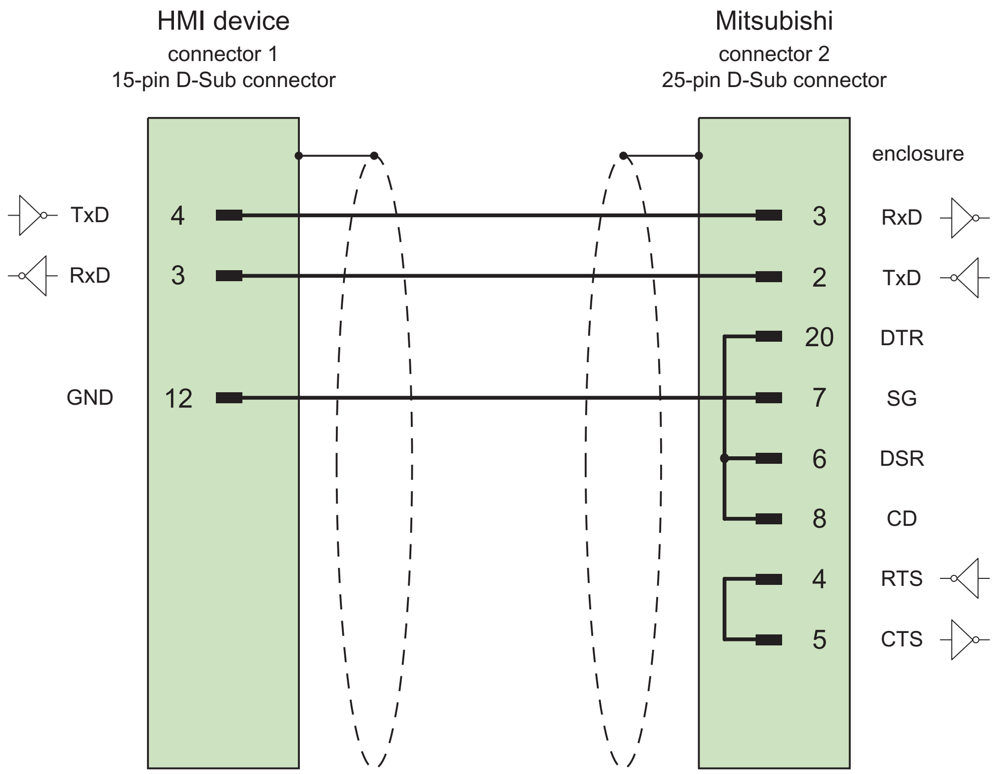
PP3 connecting cable



Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

5.5.2.4 Connecting cable PP4, RS-232, for Mitsubishi

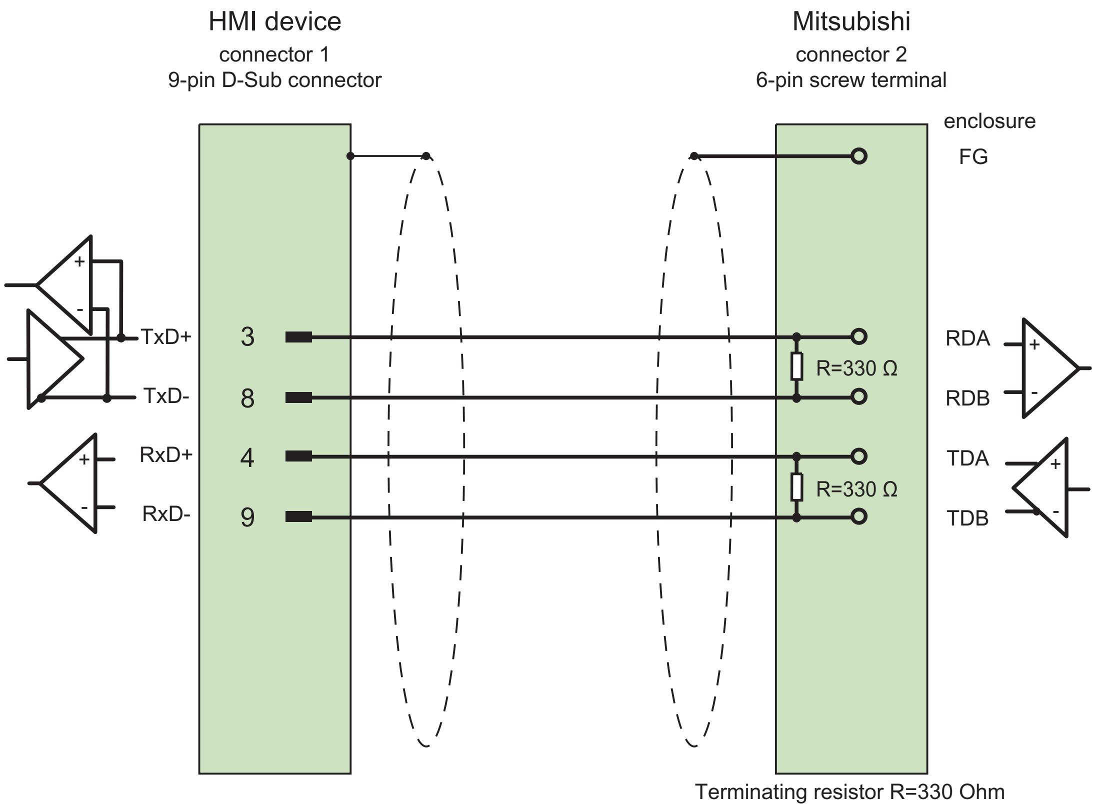
PP4 connecting cable



Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 300 m

5.5.2.5 Connecting cable PP5, RS-232, for Mitsubishi

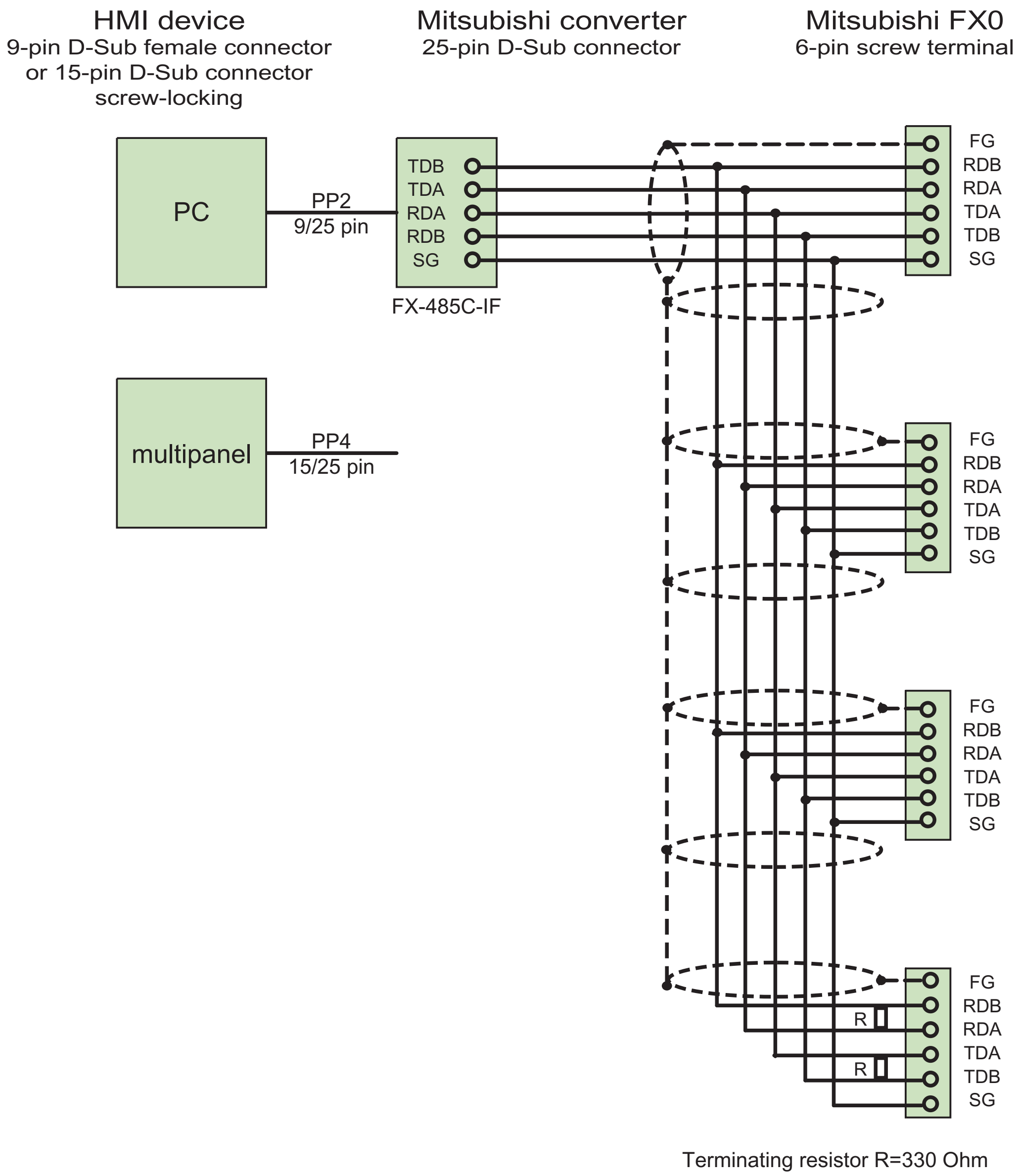
Connecting cable PP5



Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 500 m

5.5.2.6 Connecting cable MP3, RS-232, over converter, for Mitsubishi

Connecting cable MP1 (over converter)



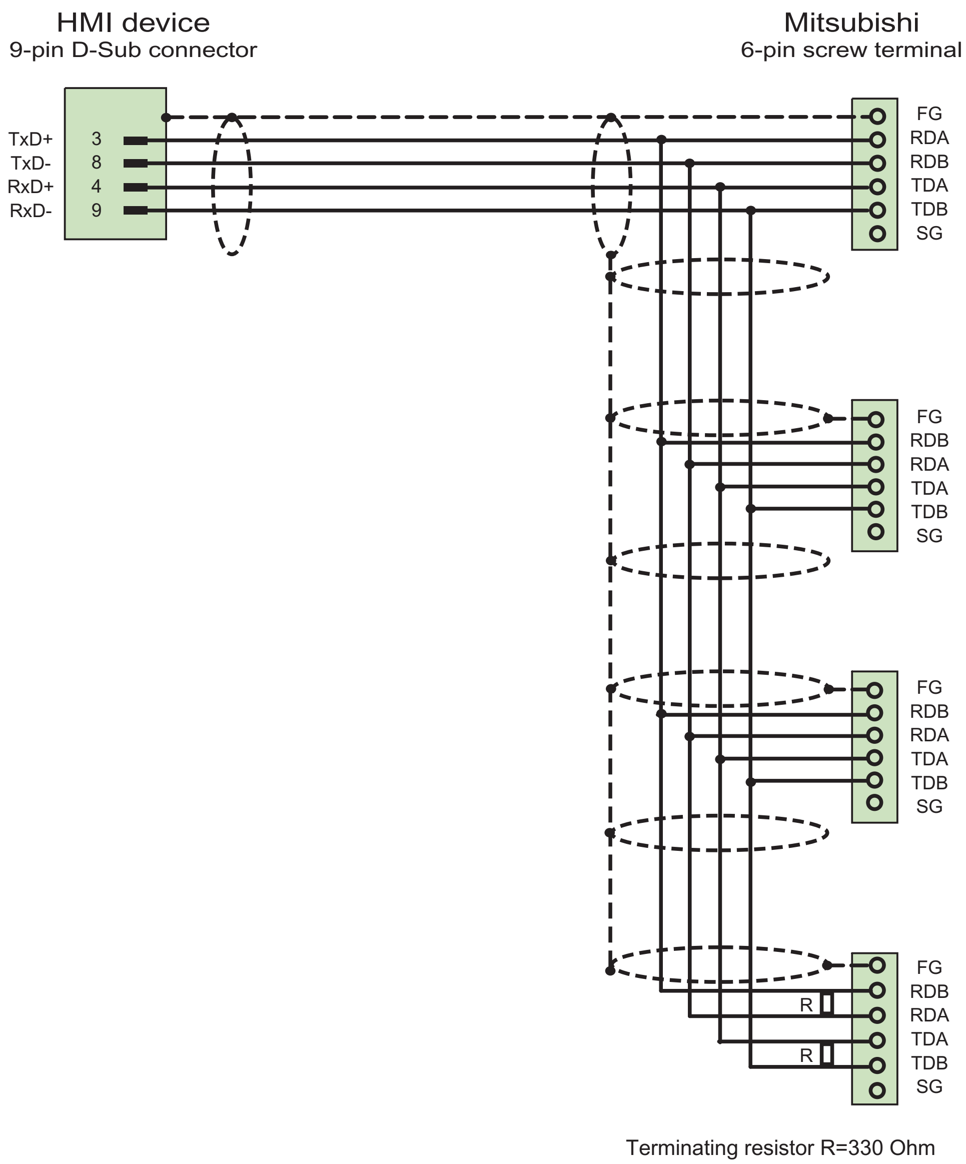
Shield with large-area contact to casing at both ends
Cable: 5 x 0.14 mm², shielded,
max. length 500 m

Use the connection cable PP2 to connect the PC converter.

Use the connection cable PP4 to connect the Multi Panel converter.

5.5.2.7 Connecting cable MP2, RS-422, for Mitsubishi

MP2 connecting cable



Cables: 5 x 0.14 mm², shielded,
max. length 500 m

6 Communication with Modicon controllers

6.1 Communication with Modicon Modbus

6.1.1 Communication partner (Modicon Modbus)

Introduction

This section describes the communication between HMI devices and Schneider automation (Modicon) controllers.

These PLCs communicate by means of the following PLC-specific protocols:

- Modbus RTU
- Modbus TCP/IP

Connectable controllers

Connections can be realized for the following Modicon controllers:

Modicon PLC	Supported protocol	
	Modbus RTU	Modbus TCP/IP
Modicon 984	✓	✓ [1)]
TSX Compact	✓	✓ [1)]
TSX Quantum	✓	✓
Momentum	–	✓
Premium	–	✓
Micro	–	✓

[1)] Only via Ethernet TCP/IP Modbus Plus Bridge

Cleared methods of communication with Modbus RTU

The following types of communication have been system-tested and approved:

- Point-to-point connection only via the RS-232 port.
- Multipoint connection from an HMI device (Modbus master) with up to 4 controllers: The HMI device must be connected with a Modbus Plus Bridge or a Modicon 984 CPU or TSX Quantum CPU that is configured as a Modbus Plus Bridge.
- Connect the other PLCs via the Modbus plus connection to the first PLC. The PLCs can be reached under their address via the bridge functionality of the first PLC.

Note

It is not possible to integrate the HMI device in a Modbus network as the HMI device is a Modbus master.

- The integration of the HMI device in a Modbus Plus network via Modbus Plus Bridge type BM85-000 (logical point-to-point communication of the HMI device with a Modbus 984 or TSX Quantum).
- The integration of the HMI device in a Modbus Plus network via the Bridge function of the Modicon 984 or TSX Quantum, logical point-to-point communication of the HMI device with a PLC.

Restrictions

Connecting the HMI device to PLCs of other manufacturers who offer a Modbus interface has not been tested and is not approved.

If you nevertheless use a different PLC, you will find several useful tips here:

- This driver works only with tags with the standard (for Modicon PLCs) bit counting method from left (bit1 = highest value bit) to right (bit 16 = lowest bit with data type INT).
- The address offset displayed during configuration is subtracted at the protocol level in the frame. For example, the offset of the Holding register 4x is "40001". As a result, the configured address "40006" becomes address "5" in the frame. The conversion of the address transferred in the frame (for example "5") to the PLC-specific address area is achieved differently in the various non-Modicon controllers.
- A response frame without "ExceptionCode" is expected within 500 ms.
- The following function codes are used for the respective data areas:

Reading function codes		Address area	
01	ReadCoilStatus	0x	DIGITAL_OUT
02	ReadInputStatus	1x	DIGITAL_IN
03	ReadHoldingRegisters	4x	USERDATA
04	ReadInputRegisters	3x	ANALOG_IN
20 (14Hex)	ReadGeneralReference	6x	EXTENDEDMEMORY (not on all CPUs)

Writing function codes		Address area	
06	PresetSingleRegister	4x	USERDATA Single
16 (10Hex)	PresetMultipleRegisters	4x	USERDATA Multiple
05	ForceSingleCoil	0x	DIGITAL_OUT with BIT
15 (0FHex)	ForceMultipleCoils	0x	DIGITAL_OUT with 16 BIT GROUP
21 (15Hex)	WriteGeneralReference	6x	EXTENDEDMEMORY (not on all CPUs)

Cleared methods of communication with Modbus TCP/IP

The following types of communication have been system-tested and approved:

- Point-to-point connection:
- Multipoint connection from an HMI device (Modbus TCP/IP client) with up to 4 controllers, with differing connections in each case.

  The following types of connection are possible:

  – Connection to the Ethernet CPU interface of the TSX Unity Quantum

  – Connection via the communication module for Ethernet 140 NOE 771 01 for the series TSX Quantum and TSX Unity Quantum

  – Connection via the Ethernet interface of the CPU adapter 171 CCC 980 30 of the Momentum series

  – Connection to the Ethernet CPU interface of the TSX Unity Quantum

  – Connection via the Ethernet TCP/IP switch-on module TSX ETY 110 for the series TSX Premium and TSX Unity Premium

  – Connection via the Ethernet TCP/IP switch-on module TSX ETY 410 for the Micro series

  – Connection via the Ethernet TCP/IP Modbus Plus Bridge 174 CEV 200 40 to the Modbus Plus interface of the Compact, the TSX Quantum, the TSX Unity Quantum and the 984 series (apart from 984A, 984B and 984X)

  Via bridge the controllers can be reached via their remote slave address via the Ethernet interface of the bridge.

Note

It is not possible to integrate the HMI device in a Modbus network via a bridge, as the HMI device is a Modbus master.

Restrictions

The connection of the HMI device to PLCs of other manufacturers that offer a Modbus TCP/IP interface has not be system-tested and therefore is not approved.

If you nevertheless use a different PLC, you will find several useful tips here:

- Use the CPU type "Premium/Micro" as this works without an address offset and with the standard bit method of counting.
- The following function codes are used for the respective data areas:

Reading function codes		Address area	
01	ReadCoilStatus	0x / %M	DIGITAL_OUT
02	ReadInputStatus	1x / %I	DIGITAL_IN
03	ReadHoldingRegisters	4x / %MW	USERDATA
04	ReadInputRegisters	3x / %IW	ANALOG_IN
20 (14Hex)	ReadGeneralReference	6x / –	EXTENDEDMEMORY (not on all CPUs)

Writing function codes		Address area	
06	PresetSingleRegister	4x / %MW	USERDATA Single
16 (10Hex)	PresetMultipleRegisters	4x / %MW	USERDATA Multiple
05	ForceSingleCoil	0x / %M	DIGITAL_OUT with BIT
15 (0FHex)	ForceMultipleCoils	0x / %M	DIGITAL_OUT with 16 BIT GROUP
21 (15Hex)	WriteGeneralReference	6x / –	EXTENDEDMEMORY (not on all CPUs)

6.1.2 Communication between HMI device and controller (Modicon)

Communications principle

The HMI device and the PLC communicate using tags and the user data areas.

Tags

The PLC and the HMI device exchange data using process values. In your configuration, create tags that point to an address on the PLC. The HMI device reads and displays the value from the defined address. The operator can also make an entry on the HMI device that is then written to the address on the PLC.

User data areas

User data areas are intended for the exchange of special data and are set up only when such data is used.

Data for which user data areas are required, for example:

- Job mailboxes
- Transfer of data records
- Date/time synchronization
- Sign-of-life monitoring

The user data areas are created while configuring in WinCC flexible. You assign the corresponding addresses in the PLC.

6.2 Communication via Modbus RTU protocol

6.2.1 Requirements of communication

Connection

The HMI device must be connected to the programming interface of the CPU (RS 232).

Connecting the HMI device to Modicon is essentially restricted to the physical connection of the HMI device. No special blocks are required on the PLC for the connection.

Cables

The following connection cables are available to connect the HMI device to the Modicon Modbus:

Interface on the HMI device	Modicon PLC		
	directly via Modbus SS (RS 232)	over MB bridge (RS 232)	TSX Compact point-to-point connection
RS-232, 9-pin	PP1	PP1	PP2
RS-232, 15-pin	6XV1 440-1K...	6XV1 440-1K...	PP3

... = length key (see catalog)

The pin assignment of the cables is described in the section "Connecting cables for Modicon Modbus".

6.2.2 Installing the communication driver

Driver for the HMI device

The driver for connection to Modicon Modbus is supplied with WinCC flexible and is installed automatically.

No special blocks are required in the PLC for the connection.

6.2.3 Configuring the PLC type and protocol

Select the PLC

For a connection to a Modicon PLC, double-click on "Communication ▸ Connections" in the project view of the HMI device. Go to the "Communication drivers" column and select the protocol Modicon Modbus RTU.

The property view displays the protocol parameters.

You can edit the parameters at any time by double-clicking "Communication ▸ Connections" in the project view of the HMI device. Select the connection and edit its parameters in the properties dialog box.

Note

The settings on the HMI device and on the PLC must match.

6.2.4 Configuring protocol parameters

Parameters to be set

To edit the parameters, double-click "Communication > Connections" in the project window of the HMI device. Select "Modicon Modbus RTU" from the "Communications driver" column in the work area. You can now enter or modify the protocol parameters in the Properties window:

Device-dependent parameters

- Interface

  Select the HMI interface to which the Modicon PLC is connected under "Interface".

  For more detailed information, refer to the Manual of the HMI device.

- Type

  Only RS 232 has been system tested, there are no guarantees for RS 485 and RS 422.

- Baud rate

  Under "Baud rate" define the transmission rate between the HMI device and the Modicon PLC. Communication is possible at a baud rate of 19200, 9600 baud.

  Note

  The highest station address must be less than or equal to 63 if you set a transmission rate of 1.5 Mbaud at OP 73 or OP 77A.

  If connecting a TP 170A to a SIMATIC S7 station at a transmision rate of 1.5 MBaud on PROFIBUS DP, set a value less than or equal to 63 for the highest station address (HSA).

- Data bits

  Under "Data bits" you can only select "8".

- Parity

  Select "None", "Even" or "Odd" under "Parity."

- Stop bits

  Under "Stop bits" you can select 1 or 2.

Network parameters

- Framing

  Under "Framing" you can set that RTU (standard) is used as framing.

PLC-dependent parameters

- Slave address

  Under "Slave address" you set the slave address of the PLC.
- CPU type

  Select "CPU type" to specify the Modicon PLC which is connected to the HMI device.

  You can choose between the following CPUs:
  - CPU 984 (except CPU 984A, 984B and 984X)
  - CPU 984-785
  - CPU TSX Quantum

6.2.5 Permitted data types (Modbus RTU)

Permitted data types

The table lists the user data types that can be used when configuring tags and area pointers.

Name	Area	Data type
Coil (discrete output)	0x	Bit, 16 bit group
Discrete input	1x	Bit, 16 bit group
Input register	3x	Bit, +/- Int, Int
Holding register (output)	4x	Bit [1], +/- Int, Int, +/- Double, Double, Float, ASCII
Extended memory (Only available with the "TSX Quantum" CPU)	6x	Bit [1], +/- Int, Int, +/- Double, Double, Float, ASCII

[1] In the case of write accesses note:
With the "bit" data type in the "4x" and "6x" areas, after changing the specified bit the entire word is written back to the PLC. There is no check to determine whether any other bits in the word have changed. As a result, the PLC only has read access to the specified word.

The standard bit counting method (16 LSB - 1 MSB) used with controllers of the 984, Compact and Quantum series will only be used in the "Tags" editor with selected data type "bit". The following bit location assignment applies:

	Left byte								Right byte							
Counting with tags	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

When you enter bit numbers elsewhere in WinCC flexible, for example discrete alarms, LED mapping, "SetBitInTag" system function, graphics lists, the bit assignment of WinCC flexible (0 LSB - 15 MSB) applies:

How the bit positions are counted	Left byte								Right byte							
In the WinCC flexible engineering system, you configure the following:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Format for "Signed"

The placeholder "+/-" stands for the data types "Signed Int" and "Signed Double."

Special features of a connection with Modicon Modbus

Area pointers can only be used in the areas "4x" and "6x".

Only tags in the areas "4x" and "6x" and only the data types "Int" and "+/-Int" are permitted as trigger tags for discrete alarms.

Array tags may only be used for discrete alarms and trends. Array tags only of the "4x" and "6x" areas and data types "Int" and "+/-Int" are permitted.

6.2.6 Optimizing the configuration

Acquisition cycle and update time

The acquisition cycles for the "Area pointers" and the acquisition cycles of the tags specified in the configuration software are decisive factors for the actual update times that can be achieved.

The update time is the sum of the acquisition cycle + transmission time + processing time.

To achieve optimum update times, remember the following points during configuration:

- Keep the individual data areas as small as possible and as large as necessary.
- Define data areas that belong together as belonging together. You can improve the update time by setting up one large data area instead of several small areas.
- If the acquisition cycles you select are too short, this is detrimental to the overall performance. Set the acquisition cycle to suit the rate of change of the process values. The rate of temperature changes at a furnace, for example, is significantly slower compared to the speed rate of an electrical drive. As a general guideline, the acquisition cycle should be approx. 1 second.
- Put the tags of an alarm or a screen in one data area without gaps.
- To allow changes in the PLC to be recognized reliably, they must be available at least during the actual acquisition cycle.
- Set the transmission rate to the highest possible value.

Discrete alarms

For discrete alarms, use arrays and assign the individual alarms to one bit of the array tags themselves and not to the individual subelements. For discrete alarms and arrays, only tags of Reference "4x" and "6x" and data types "Int" and "+/-Int" are permitted.

Screens

With screens, the update rate that can actually be achieved depends on the type and amount of data to be displayed.

Configure short acquisition cycles only for objects which actually require shorter refresh cycles.

Trends

When using bit-triggered trends, if the group bit is set in the "Trend transfer area", the HMI device always updates all the trends whose bit is set in this area. It then resets the bits.

The group bit in the PLC program can only be set again after all bits have been reset by the HMI device.

Job mailboxes

If large numbers of job mailboxes are sent in quick succession, this can lead to overload in the communication between the HMI device and PLC.

The HMI device confirms acceptance of the job mailbox by entering the value zero in the first data word of the job mailbox. The HMI device now processes the job for which it requires time. If a new job mailbox is entered again immediately in the job mailbox, it may take some time before the HMI device can process the next job mailbox. The next job mailbox will only be accepted when there is computing capacity available.

6.2.7 Commissioning components

Transferring the PLC program to the PLC

1. Interconnect the PC with the CPU using the appropriate cable.
2. Download the program files to the CPU.
3. Then set the CPU to RUN.

Transferring project data to the HMI device

1. The HMI device must be in transfer mode in order to accept the project transfer.

   Possible scenarios:

   – Initial startup

     The HMI device does not yet contain any configuration data in the initial startup phase. The project data and runtime software required for operation must be transferred from the configuration computer to the device: The HMI device automatically changes to transfer mode.
     The transfer dialog box opens with a connection message on the HMI device.

   – Recommissioning

     Recommissioning means that you overwrite existing project data on the HMI device.

   For corresponding detailed instructions, refer to the HMI device manual.
2. Check whether the alarm settings meet requirements of your WinCC flexible project.
3. Select "Project > Transfer > Transfer settings" to configure the transfer parameters before you transfer project data to the HMI device:
   – Select the used port.
   – Set the transfer parameters.
   – Select the target storage location.
4. Initiate the transfer of project data by clicking "Transfer".
   – The project is compiled automatically.
   – All compilation and transfer steps are logged to a message window.

   Message output on the configuration computer on successful completion of the transfer: "Transfer completed successfully".

   The start screen appears on the HMI device.

Interconnecting the PLC with the HMI device

1. Interconnect the PLC with the HMI device using a suitable cable.
2. The message "Connection to PLC .... is established" is output to the HMI device. Note that users can edit the system alarm texts in WinCC flexible.

NOTICE
Always observe the safety-related information in the HMI device Manual when commissioning the device. RF radiation emitted from devices such as mobile phones may cause unwanted operating states.

6.3 Communication via Modbus TCP/IP protocol

6.3.1 Requirements of communication

Connector

The HMI device can be connected to the Modicon PLC via the following components:

- Existing Ethernet network in which the PLCs are located
- Cross-over Ethernet cable, directly connected to the Ethernet port of the CPU or communication module

The connection of the HMI device to a Modicon PLC is essentially restricted to the physical connection of the HMI device. No special blocks are required in the PLC for the connection.

6.3.2 Installing the communication driver

Driver for the HMI device

The drivers for the connection to a Modicon PLC via Modbus TCP/IP are provided and automatically installed with WinCC flexible.

No special blocks are required in the PLC for the connection.

6.3.3 Configuring the PLC type and protocol

Select the PLC

For a connection to a Modicon PLC, double-click on "Communication ▸ Connections" in the project view of the HMI device. Go to the "Communication drivers" column and select the protocol Modicon Modbus TCP/IP.

The property view displays the protocol parameters.

You can edit the parameters at any time by double-clicking "Communication ▸ Connections" in the project view of the HMI device. Select the connection and edit its parameters in the properties dialog box.

6.3.4 Configuring protocol parameters

Parameters to be set

To edit the parameters, double-click "Communication > Connections" in the project window of the HMI device. Select "Modicon MODBUS TCP/IP" from the "Communications driver" column in the work area. You can now enter or modify the protocol parameters in the properties view:

Device-specific parameters

- Interface

  Under "Interface", select the HMI interface with which the HMI device is connected to the network. In this case, set "Ethernet".

  For more detailed information, refer to the Manual of the HMI device.
- Type

  The protocol type "IP" is set as default.

  Note

  The "ISO" protocol is not cleared with the current WinCC flexible version.

  Note

  You hence need to configure the IP address and the subnet mask manually on the HMI device.

PLC-specific parameters

- CPU type

  Set to which Modicon PLC the HMI device is connected under "CPU type".

  You can choose between the following CPUs:
  - 984

    Use this CPU type for the CPU 984 (except for CPU 984A, 984B and 984X).
  - Compact, Quantum, Momentum
  - Premium, Micro
- Server

  Under "Server" you set the IP address (or host name) for the PLC.
- Port

  Under "Port" set the port that is to be used for the TCP/IP connection. The port used by the Modicon controllers is 502.
- Remote slave address

  Under "Remote slave address", only when using a bridge, set the slave address for the removed PLC.
  If no bridge is being used, the default value 255 (or 0) must remain.

6.3.5 Permitted data types (Modbus TCP/IP)

Permitted data types

The table lists the user data types that can be used when configuring tags and area pointers.

Name	Area with CPU Premium / Micro	Area with CPU 984, Compact, Quantum, Momentum	data type
Coil (discrete output)	%M [1)]	0x	Bit, 16 bit group
Discrete input	(%I) – not realized by Premium/Micro	1x	Bit, 16 bit group
Input register	(%IW) – not realized by Premium/Micro	3x	Bit, +/- Int, Int
Holding register (output)	%MW	4x	Bit [2)], +/- Int, Int, +/- Double, Double, Float, ASCII
Extended memory (Only available with the "Quantum/Momentum" CPU)	--	6x	Bit [2)], +/- Int, Int, +/- Double, Double, Float, ASCII

1) Due to a system characteristics of the external PLC the last x bits on the end of the address area cannot be accessed.

2) In the case of write accesses note:
With the "bit" data type in the "4x", "6x" and "%MW" areas, after changing the specified bit the entire word is written back to the PLC. There is no check to determine whether any other bits in the word have changed. As a result, the PLC only has read access to the specified word.

The standard bit counting method (16 LSB - 1 MSB) used with controllers of the 984, Compact, Quantum and Momentum series will only be used for these CPUs in the "Tags" editor with selected data type "bit". The following bit location assignment applies:

	Left byte								Right byte							
Counting with tags	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

When you enter bit numbers elsewhere in WinCC flexible, for example discrete alarms, LED mapping, "SetBitInTag" system function, graphics lists, the bit assignment of WinCC flexible (0 LSB - 15 MSB) applies:

How the bit positions are counted	Left byte								Right byte							
In the WinCC flexible engineering system, you configure the following:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

This bit counting method also applies to Premium and Micro controllers

Format for "Signed"

The placeholder "+/-" stands for the data types "Signed Int" and "Signed Double."

Points to note when connecting via Modbus TCP/IP protocol

Area pointers can only be used in the areas "4x", "6x" and "%MW".

Only tags in the areas "4x", "6x" and "%MW" and only the data types "Int" and "+/-Int" are permitted as trigger tags for discrete alarms.

Array tags may only be used for discrete alarms and trends. Array tags only of the "4x" or "%MW" and "6x" areas and data types "Int" and "+/-Int" are permitted.

If an existing Modbus RTU project is switched over to Modbus TCP/IP protocol, the character sequence in the string may differ.

6.3.6 Optimizing the configuration

Acquisition cycle and update time

The acquisition cycles for the "Area pointers" and the acquisition cycles of the tags specified in the configuration software are decisive factors for the actual update times that can be achieved.

The update time is the sum of the acquisition cycle + transmission time + processing time.

To achieve optimum update times, remember the following points during configuration:

- Keep the individual data areas as small as possible and as large as necessary.
- Define data areas that belong together as belonging together. You can improve the update time by setting up one large data area instead of several small areas.
- If the acquisition cycles you select are too short, this is detrimental to the overall performance. Set the acquisition cycle to suit the rate of change of the process values. The rate of temperature changes at a furnace, for example, is significantly slower compared to the speed rate of an electrical drive. As a general guideline, the acquisition cycle should be approx. 1 second.
- Put the tags of an alarm or a screen in one data area without gaps.
- To allow changes in the PLC to be recognized reliably, they must be available at least during the actual acquisition cycle.
- Set the transmission rate to the highest possible value.

Discrete alarms

For discrete alarms, use arrays and assign the individual alarms to one bit of the array tags themselves and not to the individual subelements. Only tags in the areas "4x", "6x" and "%MW" and only the data types "Int" and "+/-Int" are permitted as discrete alarms and arrays.

Screens

With screens, the update rate that can actually be achieved depends on the type and amount of data to be displayed.

Configure short acquisition cycles only for objects which actually require shorter refresh cycles.

Trends

When using bit-triggered trends, if the group bit is set in the "Trend transfer area", the HMI device always updates all the trends whose bit is set in this area. It then resets the bits.

The group bit in the PLC program can only be set again after all bits have been reset by the HMI device.

Job mailboxes

If large numbers of job mailboxes are sent in quick succession, this can lead to overload in the communication between the HMI device and PLC.

The HMI device confirms acceptance of the job mailbox by entering the value zero in the first data word of the job mailbox. The HMI device now processes the job for which it requires time. If a new job mailbox is entered again immediately in the job mailbox, it may take some time before the HMI device can process the next job mailbox. The next job mailbox will only be accepted when there is computing capacity available.

Timeout response with TCP/IP (Ethernet)

Due to the use of the TCP/IP protocol, the breakdown of a connection is detected at the earliest after approximately one minute. Communication failure cannot be reliably detected if no tags are requested, for example, no output tags in the current screen.

Configure an area pointer coordination for each PLC. This setting ensures that even in the situation described above, the breakdown of the connection will be detected after approximately two minutes.

6.3.7 Commissioning components

Transferring the PLC program to the PLC

1. Interconnect the PC with the CPU using the appropriate cable.
2. Download the program files to the CPU.
3. Then set the CPU to RUN.

Transferring project data to the HMI device

1. The HMI device must be in transfer mode in order to accept the project transfer.

   Possible scenarios:

   – Initial commissioning

     The HMI device does not yet contain any configuration data in the initial commissioning phase. The project data and runtime software required for operation must be transferred from the configuration computer to the device. The HMI device automatically changes to transfer mode.
     The transfer dialog box opens with a connection message on the HMI device.

   – Recommissioning

     Recommissioning means that you overwrite existing project data on the HMI device.

     For corresponding detailed instructions, refer to the Manual of your HMI device.

2. Check whether the alarm settings meet requirements of your WinCC flexible project.
3. Select "Project > Transfer > Transfer settings" to configure the transfer parameters before you transfer project data to the HMI device:

   – Select the used port.

   – Set the transfer parameters.

   – Select the target storage location.

4. Initiate the transfer of project data by clicking "Transfer".

   – The project is compiled automatically.

   – All compilation and transfer steps are logged to a message window.

   Message output on the configuration computer after successful completion of the transfer: "Transfer completed successfully".

   The start screen appears on the HMI device.

Interconnecting the PLC with the HMI device

1. Interconnect the PLC (CPU or communication module) with the HMI device using a suitable patch cable.
2. The message "Connection to PLC .... is established" is output to the HMI device. Note that users can edit the system alarm texts in WinCC flexible.

NOTICE
Always observe the safety-related information in the HMI device manual when commissioning the device. RF radiation emitted from devices such as mobile phones may cause unwanted operating states.

6.4 User data areas

6.4.1 Trend request and trend transfer

Function

A trend is the graphic visualization of one or more values from the PLC. The value is read either time- or bit-triggered, depending on the configuration.

Time-triggered trends

The HMI device reads in the trend values cyclically at an interval specified in the configuration. Time-triggered trends are suitable for continuous processes, for example, the operating temperature of a motor.

Bit-triggered trends

By setting a trigger bit in the trend request tag, the HMI device either reads in a trend value or an entire trend buffer. This setting is defined in configuration data. Bit-triggered trends are normally used to visualize rapidly changing values. One example might be the injection pressure in the production of plastic parts.

To trigger bit-triggered trends, create suitable external tags in the "Tags" editor of WinCC flexible. The tags must be linked with the trend areas. The HMI device and PLC then communicate with each other over these trend areas.

The following areas are available for trends:

- Trend request area
- Trend transfer area 1
- Trend transfer area 2 (required only with switch buffers)

Tags from "Reference" "4x", or "6x" are permitted. They must be of the data type "Int", "+/-Int", or an array tag of the data type "Int", "+/-Int". During configuration you assign a bit to a trend. This sets a unique bit assignment for all areas.

Trend request area

The HMI device sets corresponding bits in the trend request area when you open a screen which contains one or several trends on the HMI device. After deselecting the screen, the HMI device resets the relevant bits in the trend request area.

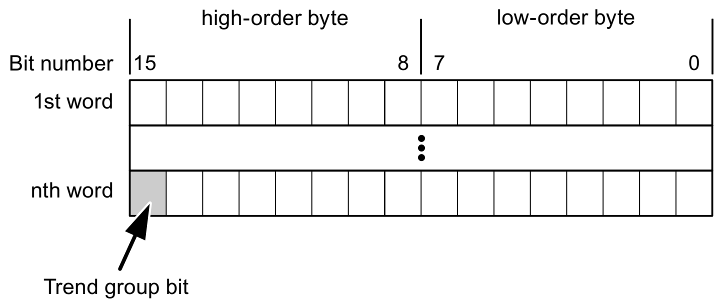
Using the trend request area, the PLC can recognize which trend is currently displayed on the HMI device. Trends can also be triggered without evaluation of the trend request area.

Trend transfer area 1

This area is used to trigger trends. In your PLC program, you set the bit assigned to the trend in the trend transfer area and set the trend group bit. The trend group bit is the last bit in the trend transfer area.

The HMI device detects the trigger. The HMI device reads either a value or the entire buffer from the PLC. It then resets the trend bit and the trend group bit.

The following picture shows the structure of a trend transfer area.



The trend transfer area must not be modified by the PLC program until the trend group bit has been reset.

Trend transfer area 2

Trend transfer area 2 is required for trends configured with a switch buffer. The trend transfer areas 1 and 2 have a similar structure.

Switch buffers

The switch buffer is a second buffer for the same trend that can be set up during configuration.

While the HMI device reads the values from buffer 1, the PLC writes to buffer 2. If the HMI device is reading buffer 2, the PLC writes to buffer 1. This prevents the trend values being overwritten by the PLC while the trend is being read out by the HMI device.

6.4.2 LED mapping

Function

The function keys of the keyboard units of the Operator Panel (OP), Multi Panel (MP) and Panel PC are equipped with LEDs. These LEDs can be controlled by the PLC. This functionality can be used to activate an LED in order to tell the operator which key to press in a specific situation, for example.

Requirements

In order to enable control of an LED, you must set up an LED tag or array tag in the PLC and declare this as the LED tag in the configuration data.

LED assignment

Assign the LEDs to the LED tag bits when you configure the function keys. Define the "LED tag" and the corresponding "bit" for each function key in the "General" group of the properties view.

The bit number "bit" identifies the first of two consecutive bits that control the following LED states:

Bit n+ 1	Bit n	LED function	
		all Mobile Panels, Operator Panels, and Multi Panels	Panel PCs
0	0	Off	Off
0	1	Rapid flashing	Flashing
1	0	Slow flashing	Flashing
1	1	Permanent signal	Permanent signal

6.4.3 Area pointer

6.4.3.1 General information on area pointers (Modicon Modbus)

Introduction

Area pointers are parameter fields. WinCC flexible Runtime reads these parameter fields in order to obtain information about the location and size of data areas in the PLC. The PLC and the HMI device interactively communicate read and write data for these data areas . The PLC and the HMI device trigger defined interactions based on the evaluation of stored data.

The area pointers reside in PLC memory. Their addresses are configured in the "Area pointers" dialog of the "Connections" editor.

Area pointers used in WinCC flexible:

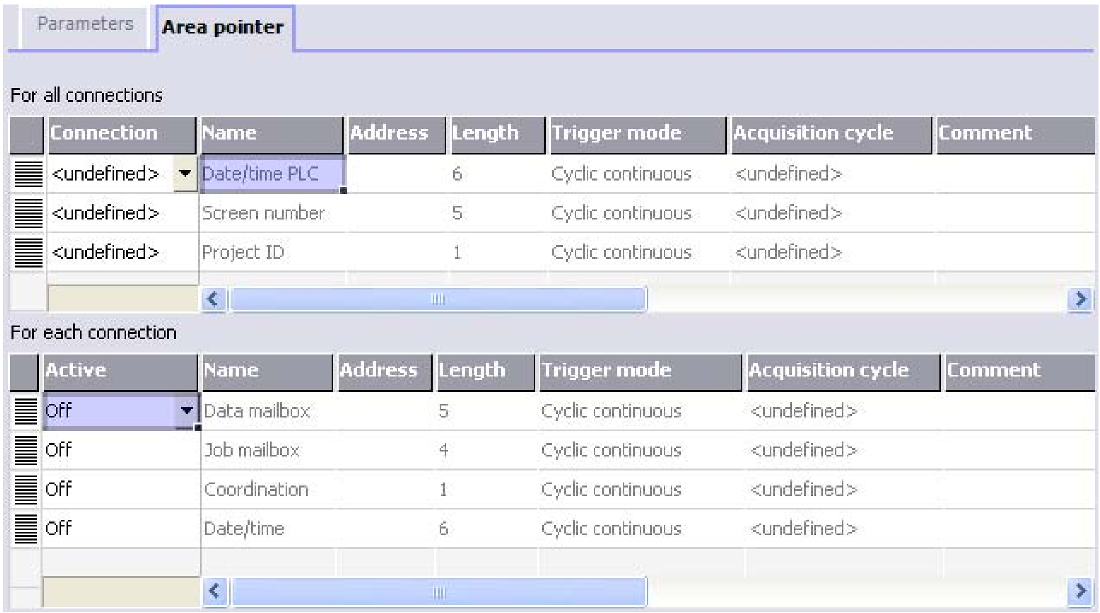
- PLC job
- Project ID
- Screen number
- Data record
- Date/time
- Date/time PLC
- Coordination

Device-dependency

Availability of the area pointer depends on the HMI device used.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use.



Enabling an area pointer based on the example of a SIMATIC S7 PLC

- Active

  Enables the area pointer.
- Name

  Name of the area pointer defined by WinCC flexible.
- Address

  Tag address of the area pointer in the PLC.
- Length

  WinCC flexible defines the default length of the area pointer.
- Acquisition cycle

  Define an acquisition cycle in this field to allow cyclic reading of the area pointer in Runtime. An extremely short acquisition time may have a negative impact on HMI device performance.
- Comment

  Save a comment, for example, to describe the purpose of the area pointer.

Accessing data areas

The table shows how the PLC and HMI device handle read (R) and write (W) access to the data areas.

Data area	Required for	HMI device	PLC
Screen number	Evaluation by the PLC in order to determine the active screen.	W	R
Data record	Transfer of data records with synchronization	R/W	R/W
Date/time	Transfer of the date and time from the HMI device to the PLC	W	R
Date/time PLC	Transfer of the date and time from the PLC to the HMI device	R	W
Coordination	Requesting the HMI device status in the control program	W	R
Project ID	Runtime checks consistency between the WinCC flexible project ID and the project in the PLC.	R	W
PLC job	Triggering of HMI device functions by the control program	R/W	R/W

The next sections describe the area pointers and their associated PLC jobs.

6.4.3.2 "Screen number" area pointer

Function

The HMI device saves information about the screen called on the HMI device to the "Screen number" area pointer.

This allows the transfer of the current screen contents from the HMI device to the PLC. The PLC can trigger specific reactions such as the call of a different screen.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use. You can create only **one** instance of the "Screen number" area pointer and only on **one** PLC.

The screen number is transferred spontaneously to the PLC. That is, it is always transferred when a new screen is activated on the HMI device. It is therefore unnecessary to configure an acquisition cycle.

Structure

The area pointer is a data area in the memory of the PLC with a fixed length of 5 words.

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1st word	Current screen type															
2nd word	Current screen number															
3rd word	Reserved															
4th word	Current field number															
5th word	Reserved															

- Current screen type

  "1" for the root screen or
  "4" for the permanent window
- Current screen number

  1 to 32767
- Current field number

  1 to 32767

6.4.3.3 "Date/time" area pointer

Function

This area pointer is used to transfer the date and time from the HMI device to the PLC.

The PLC writes control job "41" to the job mailbox.

When it evaluating the control job, the HMI device saves its current date and time to the data area configured in the "Date/time" area pointer. All definitions are coded in BCD format.

The "Date/Time" area pointer when used in a project which contains multiple connections must be enabled for each configured connection.

The date/time data area has the following structure:

Data word	Left byte 15 … 8	Right byte 7 … 0	
n+0	Reserved	Hour (0 to 23)	Time
n+1	Minute (0 to 59)	Second (0 to 59)	
n+2	Reserved	Reserved	
n+3	Reserved	Weekday (1 to 7, 1 = Sunday)	Date
n+4	Day (1 to 31)	Month (1 to 12)	
n+5	Year (80 to 99/0 to 29)	Reserved	

Note

The entry of values from 80 to 99 in the "Year" data area returns the years 1980 through 1999; values from 0 to 29 return the years 2000 through 2029.

6.4.3.4 "Date/time controller" area pointer

Function

This area pointer is used to transfer the date and time from the PLC to the HMI device. Use this area pointer if the PLC is the time master.

The PLC loads the data area of the area pointer. All definitions are coded in BCD format.

The HMI device reads the data cyclically within the configured acquisition cycle and synchronizes itself.

Note

Set an acquisition cycle of sufficient length for the date/time area pointer in order to avoid any negative impact on HMI device performance.
Recommended: Acquisition cycle of 1 minute if your process can handle it.

The date/time data area has the following structure:

DATE_AND_TIME format (in BCD code)

<table>
<tr><th rowspan="2">Data word</th><th colspan="3">Left byte</th><th colspan="3">Right byte</th></tr>
<tr><th>15</th><th>. . . . . .</th><th>8</th><th>7</th><th>. . . . . .</th><th>0</th></tr>
<tr><td>n+0</td><td colspan="3">Year (80 to 99/0 to 29)</td><td colspan="3">Month (1 to 12)</td></tr>
<tr><td>n+1</td><td colspan="3">Day (1 to 31)</td><td colspan="3">Hour (0 to 23)</td></tr>
<tr><td>n+2</td><td colspan="3">Minute (0 to 59)</td><td colspan="3">Second (0 to 59)</td></tr>
<tr><td>n+3</td><td colspan="3">Reserved</td><td colspan="2">Reserved</td><td>Weekday (1 to 7, 1 = Sunday)</td></tr>
<tr><td>n+4 1)</td><td colspan="3">Reserved</td><td colspan="3">Reserved</td></tr>
<tr><td>n+5 1)</td><td colspan="3">Reserved</td><td colspan="3">Reserved</td></tr>
</table>

1) The two data words must be available in the data area in order to ensure compliance of the data format with WinCC flexible and to avoid the reading of incorrect information.

Note

Note that when you enter the year, values 80-99 result in years 1980 through 1999 and the values 0-29 result in the years 2000 through 2029.

6.4.3.5 "Coordination" area pointer

Function

The "Coordination" area pointer is used to implement the following functionality:

- detection in the control program of HMI device startup
- detection in the control program of the current HMI device operating mode
- detection in the control program of the HMI devices ready to communicate state

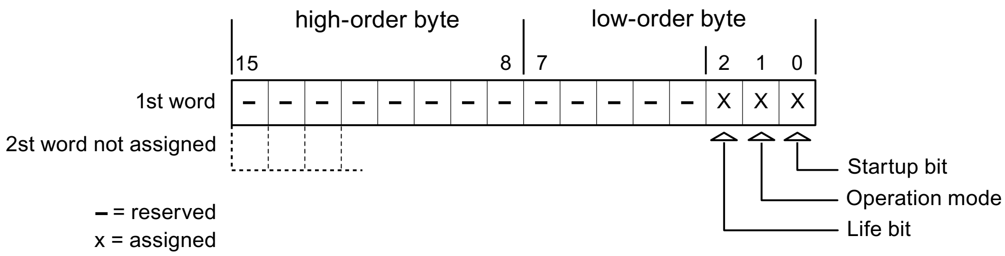
The "Coordination" area pointer has a length of two words.

Application

Note

The HMI device always writes the entire coordination area when updating the area pointer. The control program may not make changes to the coordination area for this reason.

Assignment of bits in the "Coordination" area pointer



Startup bit

The startup bit is set briefly to "0" by the HMI device during startup. It sets the bit permanently to "1" when startup is completed.

Operating mode

The operating mode bit is set to 1 as soon as the user switches the HMI device offline. The state of the operating mode bit is "0" during normal operation of the HMI device. You can determine the current operating mode of the HMI device by reading this bit.

Life bit

The HMI device inverts the life bit at intervals of approximately one second. You can check whether or not the connection to the HMI device is still up by querying this bit in the control program.

6.4.3.6 "Project ID" area pointer

Function

You can check whether the HMI device is connected to the correct PLC at the start of runtime. This check is important when operating with several HMI devices.

The HMI device compares a value stored on the PLC with the value specified in configuration data. This ensures compatibility of configuration data with the control program. If discrepancy is detected, a system alarm is displayed on the HMI device and runtime is stopped.

Application

Settings in configuration data required when using this area pointer:

- Define the version of configuration data. Possible values between 1 and 255.

  Enter the version in the "Device settings ▸ Device settings" editor in "Project ID."
- Data address of the value for the version that is stored in the PLC:

  Enter the data address in the "Communication ▸ Connections" editor in "Address."

Connection failure

A connection failure to a device on which the "project ID" area pointer is configured results in all the other connections in the project being switched to "offline".

This behavior has the following prerequisites:

- You have several configured connections in a project.
- You are using the "project ID" area pointer in at least one connection.

Causes which may set connections "offline":

- The PLC is not available.
- The connection has been switched offline in the engineering system.

6.4.3.7 "PLC job" area pointer

Function

The PLC can use the job mailbox to transfer jobs to the HMI device to trigger corresponding actions on the HMI device. These functions include, for example:

- Display screen
- Set date and time

Data structure

The first word of the job mailbox contains the job number. Depending on the job mailbox, up to three parameters can be transferred.

Word	Left byte	Right byte
n+0	0	Job number
n+1	Parameter 1	
n+2	Parameter 2	
n+3	Parameter 3	

The HMI device evaluates the job mailbox if the first word of this job is unequal to zero. This means that the parameters must be entered in the job mailbox first, followed by the job number.

When the HMI device accepts the job mailbox, the first word is set to 0 again. The execution of the job mailbox is generally not completed at this point in time.

Job mailboxes

All job mailboxes and their parameters are listed below. The "No." column contains the job number of the job mailbox. Job mailboxes can only be triggered by the PLC when the HMI device is online.

Note

Please note that not all HMI devices support job mailboxes. TP 170A and Micro Panel do not support PLC jobs, for example.

No.	Function	
14	**Setting the time (BCD coded)**	
	Parameter 1	Left byte: - Right byte: hours (0-23)
	Parameter 2	Left byte: minutes (0-59) Right byte: seconds (0-59)
	Parameter 3	-
15	**Setting the date (BCD coded)**	
	Parameter 1	Left byte: - Right byte: weekday (1-7: Sunday-Saturday)
	Parameter 2	Left byte: day (1-31) Right byte: month (1-12)
	Parameter 3	Left byte: year
23	**User logon**	
	Logs the user on with the name "PLC user" at the HMI device with the group number transferred in Parameter 1. The logon is possible only when the transferred group number exists in the project.	
	Parameter 1	Group number 1 to 255

No.	Function	
14	**Setting the time (BCD coded)**	
	Parameter 2, 3	-
24	**User logoff**	
	Logs off the current user. The function corresponds to the "logoff" system function)	
	Parameter 1, 2, 3	-
40	**Transfer date/time to PLC**	
	(in the S7 format DATE_AND_TIME) An interval of at least 5 seconds must be maintained between two successive jobs to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
41	**Transfer date/time to PLC**	
	(In OP/MP format) An interval of at least 5 seconds must be maintained between successive jobs in order to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
46	**Update tags**	
	Causes the HMI device to read the current value of the PLC tags whose update ID matches the value transferred in Parameter 1. (Function corresponds to the "UpdateTag" system function.)	
	Parameter 1	1 - 100
49	**Clear process alarm buffer**	
	Parameter 1, 2, 3	-
50	**Clear alarm buffer**	
	Parameter 1, 2, 3	-
51	**Screen selection** [1)]	
	Parameter 1	Screen number
	Parameter 2	-
	Parameter 3	Field number
69	**Read data record from PLC**	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	0: Do not overwrite existing data record 1: Overwrite existing data record
70	**Write data record to PLC**	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	-

1) OP 73, OP 77A and TP 177A HMI devices also execute the "Screen selection" job mailbox if the on-screen keyboard is active.

6.4.3.8 "Data mailbox" area pointer

"Data mailbox" area pointer

Function

When data records are transferred between the HMI device and PLC, both partners access common communications areas on the PLC.

Data transfer types

There are two ways of transferring data records between the HMI device and PLC:

- Transfer without synchronization
- Transfer with synchronization over the data record

Data records are always transferred directly. That is, the tag values are read from an address or written to an address configured for this tag directly, without redirecting the values by means of interim memory.

Initiating the transfer of data records

There are three ways of triggering the transfer:

- Operator input in the recipe view
- PLC jobs

  The transfer of data records can also be triggered by the PLC.
- Triggering by configured functions

If the transfer of data records is triggered by a configured function or by a PLC job, the recipe display on the HMI device remains operable. The data records are transferred in the background.

Simultaneous processing of several transfer requests is, however, not possible. In this case, the HMI device rejects the other transfer requests with a system alarm.

Transfer without synchronization

If you select asynchronous transfer of data records between the HMI device and PLC, there is no coordination over the common data areas. It is therefore unnecessary to set up a data area during configuration.

Asynchronous data record transfer can be a useful alternative, for example, when:

- The system is capable of excluding the risk of uncontrolled overwriting of data by the communication peer.
- The PLC does not require information about the recipe number and data record number.
- The transfer of data records is triggered by the operator of the HMI device.

Reading values

When a read job is triggered, the values are read from the PLC addresses and transferred to the HMI device.

- Triggering by the operator in the recipe view:

  The values are downloaded to the HMI device. You can then process, edit, or save these values, for example.
- Triggering by a function or PLC job:

  The values are saved immediately to the data volume.

Writing values

When a write job is triggered, the values are written to the PLC addresses.

- Triggering by the operator in the recipe view:

  The current values are written to the PLC.
- Triggering by a function or PLC job:

  The current values are written to the PLC from the data medium.

Transfer with synchronization (Modicon)

If you select synchronous transfer, both communication partners set status bits in the common data area. You can use this mechanism to prevent uncontrolled overwriting of data in either direction in your control program.

Application

Synchronous data record transfer can be a useful solution, for example, when:

- The PLC is the "active partner" in the transfer of data records.
- The PLC evaluates the information about the recipe number and data record number.
- The transfer of data records is triggered by means of a Job mailbox.

Requirements

In order to synchronize transfer of data records between the HMI device and the PLC, the following requirements must be met during configuration:

- An area pointer has been set up: "Communication ▸ Connections" editor in "Area pointer"
- The PLC with which the HMI device synchronizes transfer of data records is specified in the recipe: "Recipes" editor, properties view of the recipe, "Properties" group in "Transfer".

Structure of the data area

The data area has a fixed length of 5 words. Structure of the data area:

	15		0
1. Word	Current recipe number (1 - 999)		
2. Word	Current data record number (0 - 65535)		
3. Word	Reserved		
4. Word	Status (0, 2, 4, 12)		
5. Word	Reserved		

- Status

  The status word (word 4) can adopt the following values:

Value		Meaning
Decimal	Binary	
0	0000 0000	Transfer permitted, data record free
2	0000 0010	Transfer is busy
4	0000 0100	Transfer completed without error
12	0000 1100	Transfer completed with error

Possible causes of error when transferring data records

Possible causes of error

The section below shows possible error causes which lead to the cancellation of data record transfer:

- Tag address not set up on the PLC
- Overwriting data records not possible
- Recipe number does not exist
- Data record number does not exist

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

Reaction to an aborted transfer due to errors

If the transfer of data records is aborted due to errors, the HMI device reacts as follows:

- Triggering by the operator in the recipe display

  Information in the status bar of the recipe view and output of system alarms
- Triggered by function

  Output of system alarms
- Triggering by PLC job

  No feedback message on the HMI device

You can nonetheless evaluate the status of the transfer by querying the status word in the data record.

Sequence of the transfer when triggered by a configured function

Reading from the PLC using a configured function

<table>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td rowspan="2">1</td><td colspan="2">Check: Status word = 0?</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>2</td><td>The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.</td><td>Abort with system alarm.</td></tr>
<tr><td>3</td><td>The HMI device reads the values from the PLC and stores them in the data record specified in the function.</td><td></td></tr>
<tr><td>4</td><td>• If "Yes" was selected for the "Overwrite" function, an existing data record is overwritten without any prompt for confirmation.
The HMI device sets the status "Transfer completed."
• If "No" was selected for the "Overwrite" function and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.</td><td></td></tr>
<tr><td>5</td><td>The control program must reset the status word to zero in order to enable further transfers.</td><td></td></tr>
</table>

Writing to the PLC by means of configured function

<table>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td rowspan="2">1</td><td colspan="2">Check: Status word = 0?</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>2</td><td>The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.</td><td>Abort with system alarm.</td></tr>
<tr><td>3</td><td>The HMI device fetches the values of the data record specified in the function from the data medium and transfers the values to the PLC.</td><td></td></tr>
<tr><td>4</td><td>The HMI device sets the status "Transfer completed."</td><td></td></tr>
<tr><td>5</td><td>The control program can now evaluate the transferred data.
The control program must reset the status word to zero in order to enable further transfers.</td><td></td></tr>
</table>

Sequence of the transfer triggered by a PLC job

The transfer of data records between the HMI device and the PLC can be initiated by either one of these stations.

The two PLC jobs No. 69 and No. 70 are available for this type of transfer.

No. 69: Read data record from PLC ("PLC → DAT")

PLC job no. 69 transfers data records from the PLC to the HMI device. The PLC job is structured as follows:

<table>
<tr><th></th><th>Left byte (LB)</th><th>Right byte (RB)</th></tr>
<tr><td>Word 1</td><td>0</td><td>69</td></tr>
<tr><td>Word 2</td><td colspan="2">Recipe number (1-999)</td></tr>
<tr><td>Word 3</td><td colspan="2">Data record number (1 to 65535)</td></tr>
<tr><td>Word 4</td><td colspan="2">Do not overwrite existing data record: 0
Overwrite existing data record: 1</td></tr>
</table>

No. 70: Write data record to PLC ("DAT → PLC")

PLC job No. 70 transfers data records from the HMI device to the PLC. The PLC job is structured as follows:

	Left byte (LB)	Right byte (RB)
Word 1	0	70
Word 2	Recipe number (1-999)	
Word 3	Data record number (1 to 65535)	
Word 4	—	

Sequence when reading from the PLC with PLC job "PLC → DAT" (no. 69)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device reads the values from the PLC and saves these to the data record defined in the PLC job.	
4	• If "Overwrite" was selected in the job, an existing data record is overwritten without any prompt for confirmation. The HMI device sets the status "Transfer completed." • If "Do not overwrite" was selected in the job, and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Sequence of writing to the PLC using PLC job "DAT → PLC" (no. 70)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device fetches the values of the data record specified in the function from the data medium and writes the values to the PLC.	
4	The HMI device sets the status "Transfer completed."	
5	The control program can now evaluate the transferred data. The control program must reset the status word to zero in order to enable further transfers.	

Sequence of a transfer started by the operator in the recipe display

Reading from the PLC started by the operator in the recipe display

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe number to be read and the status "Transfer active" in the data record and sets the data record number to 0.	Abort with system alarm.
3	The HMI device reads the values from the PLC and displays them in the recipe display. If the recipes have synchronized tags, the values from the PLC are also written to the tags.	
4	The HMI device sets the status "Transfer completed."	
5	The control program must reset the status word to zero in order to enable further transfers.	

Writing to the PLC started by the operator in the recipe display

Step	Action	
	Check: Status word = 0?	
1	Yes	No
	The HMI device enters the recipe and data record number to be written and the status "Transfer active" in the data record.	Abort with system alarm.
2	The HMI device writes the current values to the PLC. If the recipes have synchronized tags, the changed values are synchronized between the recipe display and tags and then written to the PLC.	
3	The HMI device sets the status "Transfer completed."	
4	If required, the control program can now evaluate the transferred data.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

6.4.4 Events, alarms, and acknowledgments

6.4.4.1 General information on operational messages, alarm messages and acknowledgments

Function

Messages return information about the PLC or HMI device operating states or problems to the user on the HMI device. The message texts consist of configurable texts and/or tags with actual values.

Operational messages and events must be distinguished. The programmer defines what is an operational message and what is an error alarm.

Operational message

An operational message indicates a state. Example:

- Motor on
- PLC in manual mode

Alarm message

An error alarm indicates a malfunction. Example:

- Valve does not open.
- Excess motor temperature

Alarms indicate exceptional operational states, and must therefore be acknowledged.

Acknowledgment

To acknowledge error alarms:

- Operator input on the HMI device
- The PLC sets an acknowledgment bit.

Triggering alarms

Triggering of an alarm in the PLC:

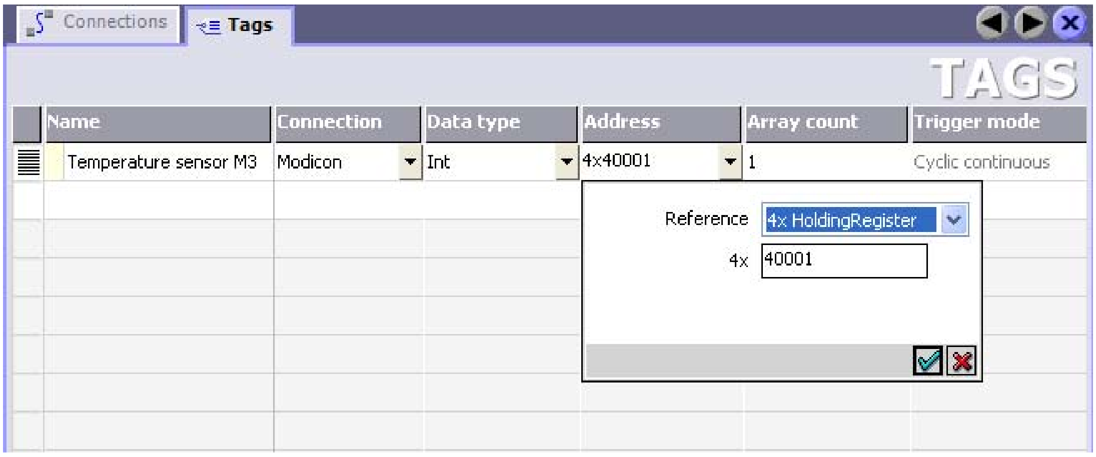
- Setting a tag bit
- Measured value limits exceeded

The location of tags, or of the tag array, is defined in WinCC flexible ES. The tag or array must be set up on the PLC.

6.4.4.2 Step 1: Creating tags or an array

Procedure

You create tags or arrays in the "Tags" editor. The dialog box is shown below.



- Define the tag and array names.
- Select the connection to the PLC.

  The connection must already be configured in the "Connections" editor.
- Select the data type.

  The available data types depend on the PLC being used. If you select an illegal data type the tag will not be available in the "Discrete alarms" and "Analog alarms" editors.

  The following data types are supported by Modicon controllers:

PLC	Permitted data types	
	Discrete alarms	Analog alarms
All Modicon series	Int, +/-Int	Bit, 16 Bit Group, Int, +/-Int, Double, +/-Double, Float

- Enter an address.

  The tag addressed here contains the bit that triggers the alarm.

  As soon as the bit of the tag is set on the PLC and is transferred to the HMI device in the configured acquisition cycle, the HMI device recognizes the alarm as "incoming".

  After the same bit is reset on the PLC, the HMI device recognizes the alarm as "outgoing".
- Select the array elements.

  If the number of array elements is increased, you can select more bit numbers in the "Discrete alarms" editor. An array with a length of three words provides 48 alarm bits, for example.

6.4.4.3 Step 2: Configuring an alarm

Procedure

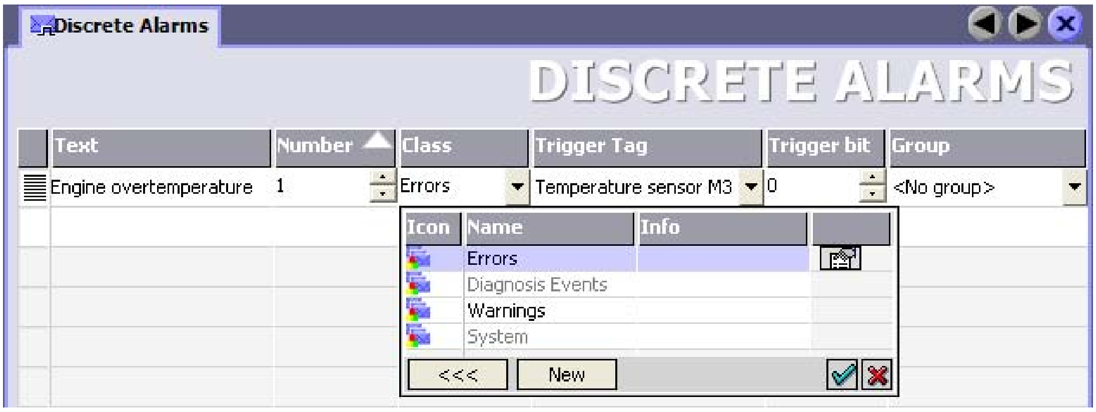
We differentiate between the following alarms:

- Discrete alarms
- Analog alarms

You create alarms in the "Discrete alarms" and "Analog alarms" editors.

Discrete alarms

The editor is shown in the figure below.



- Edit text

  Enter the text to display in runtime. You can format the text characters. The text may contain fields for the output of tags.

  The text is output to the alarm view if this view was configured in the "Screens" editor.

- Specify number

  Every alarm has a number that must only occur once within the project. It is used to uniquely identify the alarm and is indicated with the alarm in runtime.

  The permitted range of values is 1 to 100,000.

  Consecutive alarm numbers are assigned by WinCC flexible. You can change the alarm numbers when assigning these to groups, for example.

- Specify the alarm class

  Available alarm classes:

  – Error alarms

    This class must be acknowledged.

  – Warning alarms

    This class signals events with incoming and outgoing alarms.

- Assign trigger tag

  In the "Trigger tag" column, you link the configured alarm with the tag created in step 1. All tags with permitted data types are shown in the selection list.
- Specify the bit number

  In the "bit number" column, specify the relevant bit position in the created tag.

  Remember that the way the bit positions are counted does **not**depend on the particular PLC. With Modicon controllers, the bit positions are counted as follows:

How the bit positions are counted	Left byte								Right byte							
In the PLCs of the 984 series, Compact, Quantum und Momentum	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
in WinCC flexible and for CPUs of the series Premium und Micro you configure:	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Analog alarms

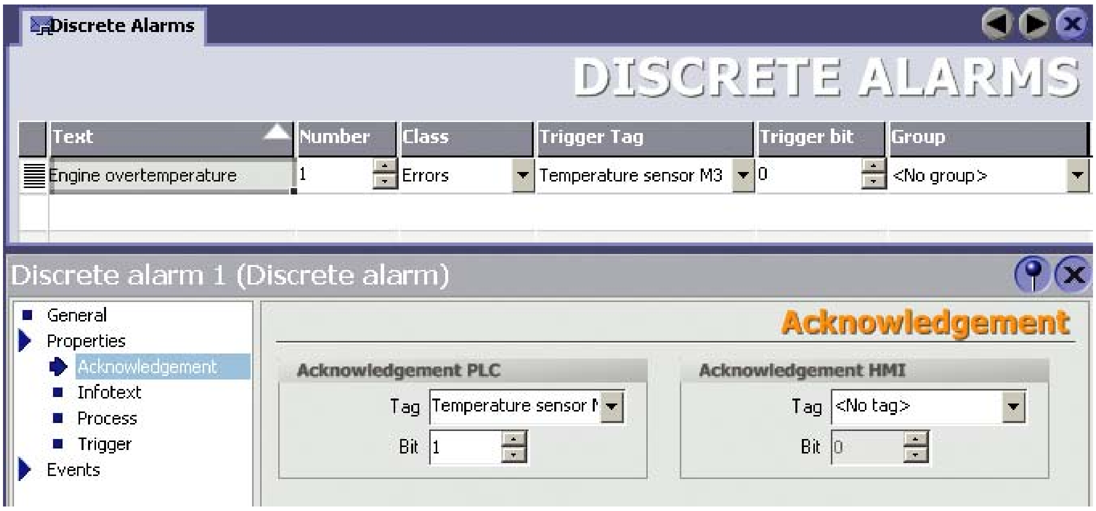
The only difference between discrete alarms and analog alarms is that you configure a limit value, rather than a bit number. The alarm is triggered when this limit is exceeded. The outgoing alarm is triggered when the low limit is violated, making allowances for any configured hysteresis.

6.4.4.4 Step 3: Configuring the acknowledgment

Procedure

Create suitable tags on the PLC to acknowledge an error alarm. You assign these tags to an alarm in the "Bit messages" editor. You make the assignment in "Properties ▸ Acknowledgment."

The following figure shows the dialog for configuring an acknowledgment.



Distinction in terms of acknowledgment:

- Acknowledgment on the HMI device
- Acknowledgment by the PLC

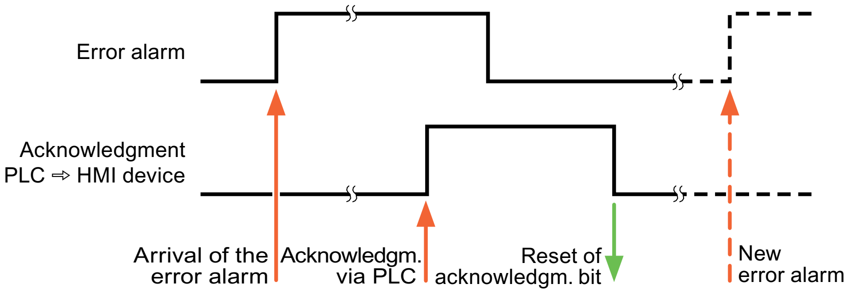
Acknowledgment by the PLC

In "Acknowledgment PLC tag", you configure the tag or the array tag and the bit number based on which the HMI device can recognize an acknowledgment by the PLC.

A bit set in the tag triggers acknowledgment of the assigned error alarm bit at the HMI device. This tag bit returns a function similar to acknowledgment on the HMI device which is triggered by pressing the "ACK" button, for example.

The acknowledgment bit must be located in the same tag as the bit for the error alarm.

Reset the acknowledgment bit before setting the bit in the alarm area again. The figure below shows the pulse diagram.



Acknowledgment on the HMI device

In "Ack read tag", you configure the tag or the array tag and the bit number that is written to the PLC after acknowledgment from the HMI device. Make sure when you use an array tag that it is not longer than 6 words.

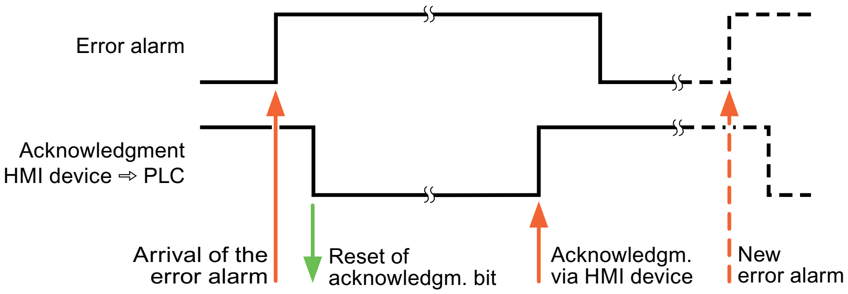
In order to ensure that a signal transition is generated as soon as the acknowledgment bit is set, the HMI device first resets the acknowledgment bit assigned to an error alarm. There is a certain time-based offset between these two operations, due to the processing time of the HMI device.

Note

The reset includes all alarm bits acknowledged since the last restart of Runtime. The PLC may only read this area once.

If the alarm is acknowledged on the HMI device, the bit is then set in the assigned acknowledgment tag on the PLC. This allows the PLC to recognize that the error alarm has been acknowledged.

The figure below shows the pulse diagram.

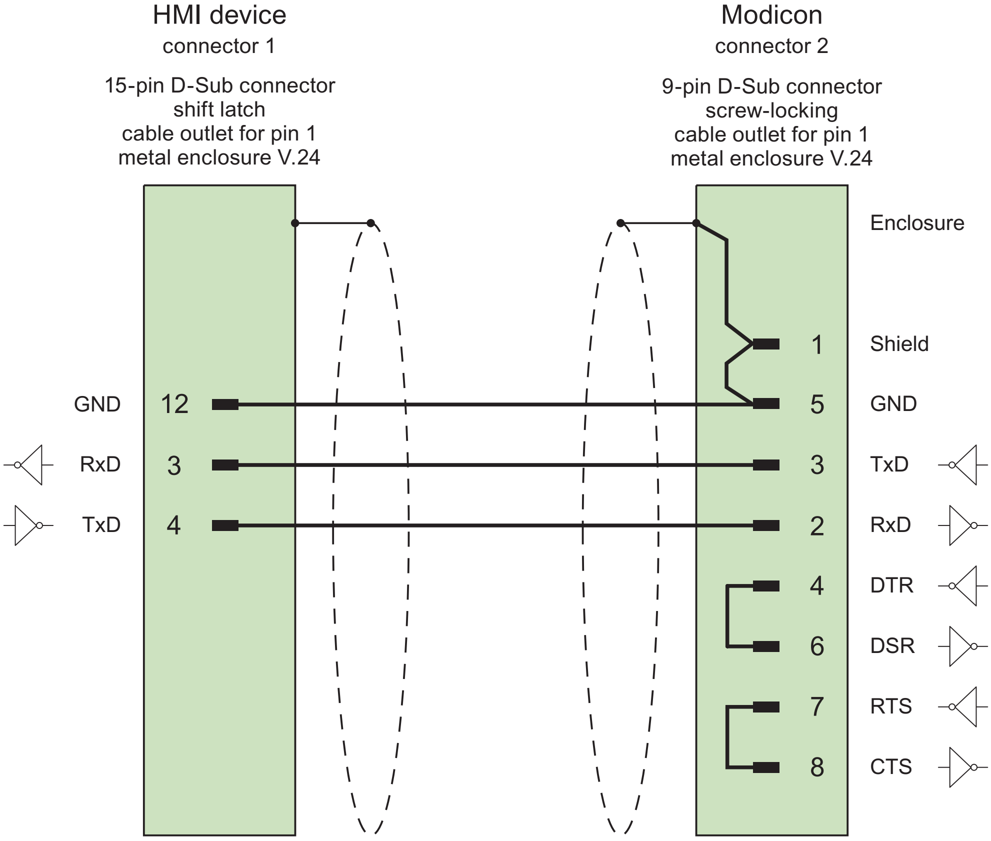


6.5 Connecting cables for Modicon Modbus

6.5.1 Communication cables for Modbus RTU protocol

6.5.1.1 Connecting cable 6XV1440-1K, RS-232, for Modicon

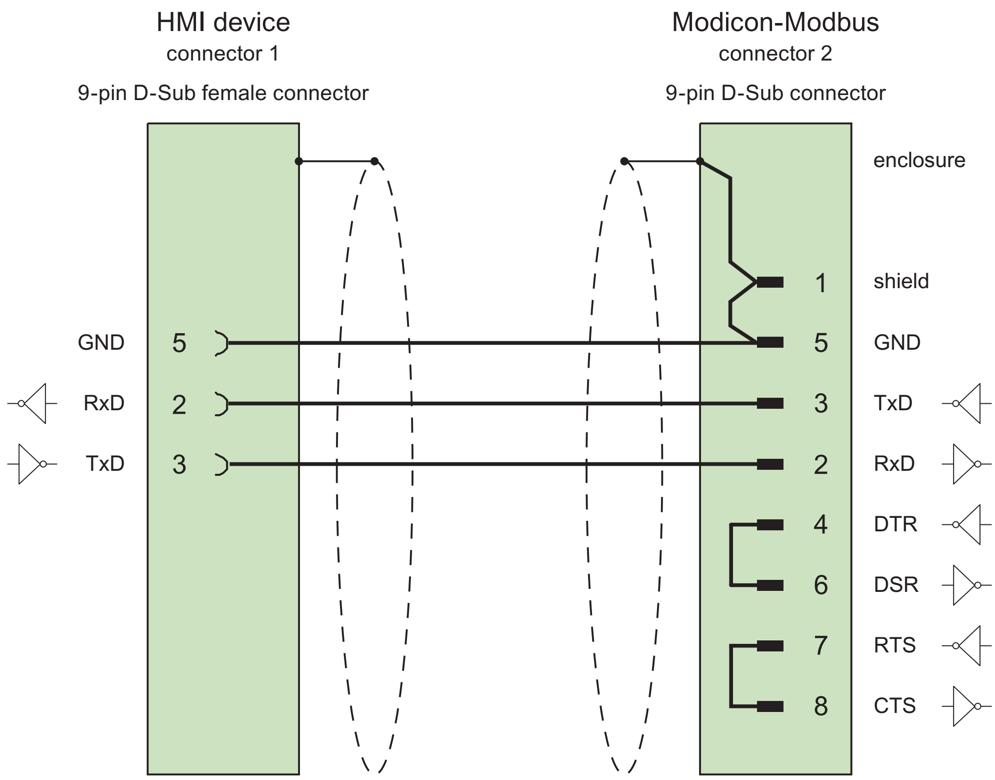
Order number: 6XV1440 -1K...



Shield with large-area contact to casing
Cable: 2 x 0.14 mm², shielded,
max. length 3.7 m

6.5.1.2 Connecting cable PP1, RS-232, for Modicon

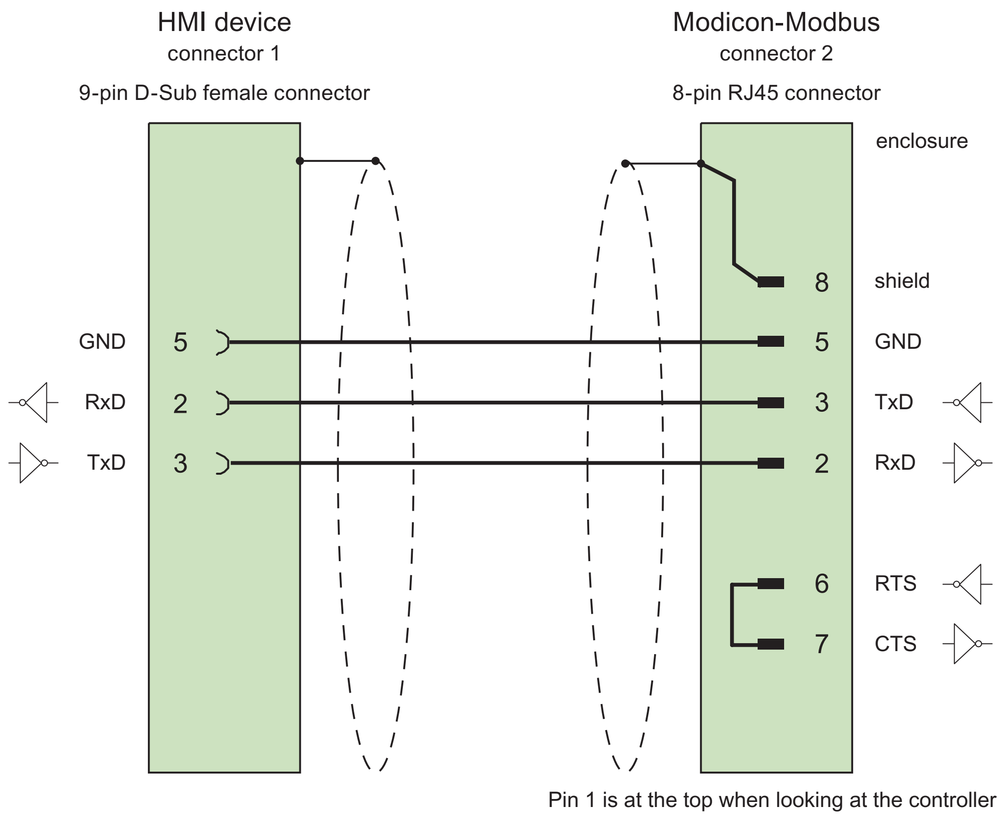
Point-to-point cable 1: PLC > PC ...



Cables: 3 x 0.14 mm², shielded,
max. length 15 m

6.5.1.3 Connecting cable PP2, RS-232, for Modicon

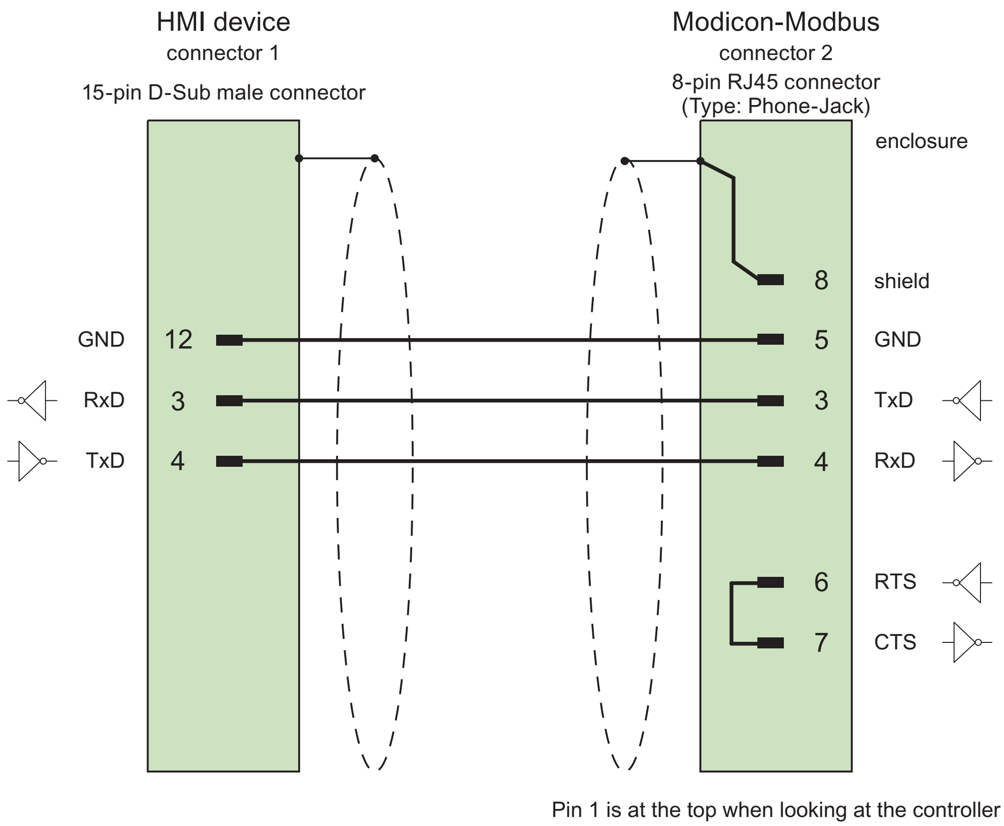
Point-to-point cable 2: PLC (TSX Compact) > PC...



Cables: 3 x 0.14 mm², shielded,
max. length 15 m

6.5.1.4 Connecting cable PP3, RS-232, for Modicon

Point-to-point cable 3: PLC (TSX Compact) > Multi Panel...



Cables: 3 x 0.14 mm², shielded,
max. length 15 m

7 Communication with Omron controllers

7.1 Communication with Omron Hostlink/Multilink

7.1.1 Communication partner (Omron)

Introduction

This section describes communication between an HMI device and OMRON controllers of the SYSMAC C, SYSMAC CV, SYSMAC CS1, SYSMAC alpha, and CP series.

With these PLCs, the PLC's own protocol SYSMAC Way (Hostlink/Multilink protocol) is used for the connection.

Released communication types

The connection of an HMI device to an OMRON CPU of the OMRON SYSMAC C (not CQM-CPU11/21), SYSMAC CV, SYSMAC CS1, and SYSMAC alpha series using the Hostlink/Multilink protocol over RS232 has been system tested and released by Siemens AG.

A multipoint connection to up to 4 OMRON controllers in an RS422 four-wire multidrop configuration can be implemented with communications adapters.

Note

The HMI device can only be operated as a master.

7.1.2 Communication between HMI device and controller (Omron)

Communications principle

The HMI device and the PLC communicate using tags and the user data areas.

Tags

The PLC and the HMI device exchange data using process values. In your configuration, create tags that point to an address on the PLC. The HMI device reads and displays the value from the defined address. The operator can also make an entry on the HMI device that is then written to the address on the PLC.

User data areas

User data areas are intended for the exchange of special data and are set up only when such data is used.

Data for which user data areas are required, for example:

- Job mailboxes
- Transfer of data records
- Date/time synchronization
- Sign-of-life monitoring

The user data areas are created while configuring in WinCC flexible. You assign the corresponding addresses in the PLC.

7.2 Configuring the communication driver Omron Hostlink/Multilink

7.2.1 Requirements for communication (Omron)

Connector

The connection of the HMI device to an OMRON PLC is essentially restricted to the physical connection of the HMI device. No special blocks are required in the PLC for the connection.

Connect the HMI device to the Hostlink / Multilink port of the CPU (RS-232).

Cable

The following cables are available to connect the HMI device to an Omron PLC:

Port on the HMI device	Omron PLC			
	RS232, 9-pin	**RS232 I/O periphery port**	**RS422, 9-pin**	**RS422, terminals/connector**
RS232, 9-pin	PP1	Programming cable (standard Omron cable)	—	—
RS232, 15-pin	6XC1440-2X ...	—	—	—
RS232 over converter	—	—	—	Multipoint cable 1
RS422, 9-pin	—	—	PP2	Multipoint cable 2

... = length key (see catalog)

The HMI device port to be used is defined in the corresponding Manual.

7.2.2 Installing the communication driver

Driver for the HMI device

The driver for connection to OMRON controllers is supplied with WinCC flexible and is installed automatically.

No special blocks are required in the PLC for the connection.

7.2.3 Configuring the controller type and protocol (Omron)

Select the PLC

For a connection to an Omron PLC, double-click on "Communication ▸ Connections" in the project view of the HMI device. Go to the "Communication drivers" column and select the protocol Omron Hostlink / Multilink.

The property view displays the protocol parameters.

You can edit the parameters at any time by double-clicking "Communication ▸ Connections" in the project view of the HMI device. Select the connection and edit its parameters in the properties dialog box.

Note

The settings on the HMI device and on the PLC must match.

7.2.4 Configuring protocol parameters (Omron)

Parameters to be set

To edit the parameters, double-click "Communication > Connections" in the project window of the HMI device. In the project window of the HMI device. "Omron Hostlink / Multilink" is selected in the "Communication drivers" column. You can now enter or modify the protocol parameters in the Properties window:

Device-dependent parameters

- Interface

  Select the HMI interface to which the OMRON PLC is connected under "Interface".

  For more detailed information, refer to the Manual of the HMI device.
- Type

  Here, you can only select "RS-232".
- Baud rate

  Under "Baud rate" set the transmission rate between the HMI device and OMRON. Communication is possible at a baud rate of 19200, 9600, 4800, 2400 or 1200 baud.

  Note

  In multipoint projects, use baud rates of 9600 bauds and 19200 bauds. At lower baud rates, you may encounter breaks in communication.

  Note

  The highest station address must be less than or equal to 63 if you set a transmission rate of 1.5 Mbaud at OP 73 or OP 77A.

  If connecting a TP 170A to a SIMATIC S7 station at a transmision rate of 1.5 MBaud on PROFIBUS DP, set a value less than or equal to 63 for the highest station address (HSA).
- Data bits

  Select "7 bits" or "8 bits" under "Databits".
- Parity

  Select "None", "Even" or "Odd" under "Parity".
- Stop bits

  Select "1" or "2" "Stop bits".

PLC-dependent parameters

- Station address

  Under "Station address" set the station number of the PLC.

7.2.5 Permitted data types (Omron)

Permitted data types

The table lists the user data types that can be used when configuring tags and area pointers.

Name	Range	Data type
Status	CPU status	BIN
Input/output words	I/O	BIN [1], DEC, +/-DEC
Memory words	HR	BIN [1], DEC, +/-DEC, LDC, +/-LDC, IEEE, ASCII
Auxiliary memory words	AR	BIN [1], DEC, +/-DEC, LDC, +/-LDC, ASCII
Link memory words	LR	BIN [1], DEC, +/-DEC, LDC, +/-LDC, ASCII
Data memory words	DM	BIN [1], DEC, +/-DEC, LDC, +/-LDC, IEEE, ASCII
Timer/counter status	T/C BIN	BIN
Timer/counter actual values	T/C VAL	DEC, +/-DEC
PLC type	CPU type	BYTE

[1] In the case of write accesses note:
With the "BIN" data type in the "I/O", "HR", "AR", "LR" and "DM" areas, after changing the specified bit the entire word is written back to the PLC. There is no check to determine whether any other bits in the word have changed. As a result, the PLC only has read access to the specified word.

Note

All data areas on the OMRON PLC can only be read or written reliably in the "STOP" or "MONITOR" modes.

"I/O" indicates either the IR/SR or the CIO area depending on the PLC series. The "LR", "HR", and "AR" areas are not available in all the PLC series.

Areas for newer PLCs

Areas for old PLCs	Areas CS and CJ PLCs
CPU status	CPU status
I/O	CIO
HR	H Range WinCC flex 0-511
AR	A
LR	n/a
DM	D
T/C	T/C
CPU type	CPU type

Special features of connections with Omron Hostlink/Multilink

Area pointers can only be created in "DM", "I/O", "HR", "AR" and "LR" areas.

As the Trigger tag for discrete alarms, only tags in the "DM", "I/O", "HR", "AR" and "LR" areas are permitted. These tags are only valid for the data types "DEC" and "+/-DEC".

Array tags may only be used for discrete alarms and trends. Only tags in the "DM", "I/O", "HR", "AR" and "LR" areas and only of the "DEC" and "+/-DEC" data types are permitted for array tags.

Addressing PLCs of the CV, CS and CJ series

With PLCs of the CV, CS and CJ series, timers 0-2047 are addressed with T/C 0-2047. Counters 0-2047 must be addressed in ProTool with an offset of 2048 (T/C 2048-4095 correspond to counters 0-2047).

Counters and timers with addresses higher than 2047 cannot be addressed over Hostlink.

Example:

If you want to address counter C20, the address in ProTool must be T/C 20+2048 = T/C 2068.

7.2.6 Optimizing the configuration

Acquisition cycle and update time

The acquisition cycles for the "Area pointers" and the those of the tags specified in the configuration software are decisive factors for the actual update times that can be achieved.

The update time is the sum of the acquisition cycle + transmission time + processing time.

To achieve optimum update times, remember the following points during configuration:

- Keep the individual data areas as small as possible and as large as necessary.
- Define data areas that belong together as belonging together. You can improve the update time by setting up one large data area instead of several small areas.
- If the acquisition cycles you select are too short, this is detrimental to the overall performance. Set the acquisition cycle to suit the rate of change of the process values. The rate of temperature changes at a furnace, for example, is significantly slower compared to the speed rate of an electrical drive. As a general guideline, the acquisition cycle should be approx. 1 second.
- Put the tags of an alarm or a screen in one data area without gaps.
- To allow changes in the PLC to be recognized reliably, they must be available at least during the actual acquisition cycle.
- Set the transmission rate to the highest possible value.

Discrete alarms

For discrete alarms, use arrays and assign the individual alarms to one bit of the array tags themselves and not to the individual subelements. For discrete alarms and arrays, only tags in the "DM", "I/O", "HR", "AR" and "LR" areas are permitted and only of the "DEC" and "+/-DEC" data types.

Screens

With screens, the update rate that can actually be achieved depends on the type and amount of data to be displayed.

During configuration, make sure that you only configure short acquisition cycles for objects that actually need to be updated quickly. This reduces the update times.

Trends

When using bit-triggered trends, if the group bit is set in the "Trend transfer area", the HMI device always updates all the trends whose bit is set in this area. It then resets the bits.

The group bit in the PLC program can only be set again after all bits have been reset by the HMI device.

Job mailboxes

The HMI device confirms acceptance of the job mailbox by entering the value zero in the first data word of the job mailbox. The HMI device now processes the job for which it requires time. If a new job mailbox is entered again immediately in the job mailbox, it may take some time before the HMI device can process the next job mailbox. The next job mailbox will only be accepted when there is computing capacity available.

7.3 User data areas

7.3.1 Trend request and trend transfer

Function

A trend is a graphic representation of one or more values from the PLC. The value is read out time- or bit-triggered depending on the configuration.

Time-triggered trends

The HMI device reads in the trend values cyclically at an interval specified in the configuration. Time-triggered trends are suitable for continuous processes, for example, the operating temperature of a motor.

Bit-triggered trends

By setting a trigger bit in the tag trend request, the HMI device either reads in a trend value or an entire trend buffer. Bit-triggered trends are used to represent fast changing values. One example might be the injection pressure in the production of plastic parts.

To trigger bit-triggered trends, create suitable external tags in the "Tags" editor of WinCC flexible. The tags must be linked with the trend areas. The HMI device and PLC then communicate with each other via these trend areas.

The following areas are available for trends:

- Trend request area
- Trend transfer area 1
- Trend transfer area 2 (only required with switch buffers)

Variables of the area "DM", "I/O", "HR", "AR" or "LR" are permitted. They must be of the data type "DEC", +/-DEC or an array tag of the data type "DEC", +/-DEC. During configuration you assign a bit to a trend. This sets a unique bit assignment for all areas.

Trend request area

The HMI device sets corresponding bits in the trend request area when you open a screen which contains one or several trends on the HMI device. When the screen is deselected, the HMI device resets the relevant bits in the trend request area.

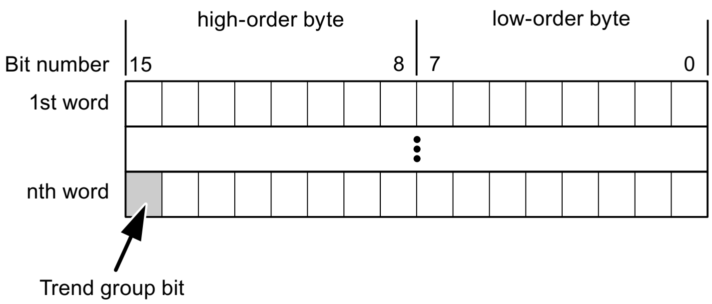
Using the trend request area, the PLC can recognize which trend is currently displayed on the HMI device. Trends can also be triggered without evaluation of the trend request area.

Trend transfer area 1

This area is used to trigger trends. In your PLC program, set the bit assigned to the trend in the trend transfer area and set the trend group bit. The trend group bit is the last bit in the trend transfer area.

The HMI device detects the trigger. The HMI device reads either a value or the entire buffer from the PLC. It then resets the trend bit and the trend group bit.

The following picture shows the structure of a trend transfer area.



The trend transfer area must not be changed by the PLC program until the trend group bit has been reset.

Trend transfer area 2

Trend transfer area 2 is required for trends configured with a switch buffer. The trend transfer areas 1 and 2 have a similar structure.

Switch buffers

The switch buffer is a second buffer for the same trend that can be set up during configuration.

While the HMI device reads the values from buffer 1, the PLC writes to buffer 2. If the HMI device is reading buffer 2, the PLC writes to buffer 1. This prevents the trend values being overwritten by the PLC while the trend is being read out by the HMI device.

7.3.2 LED mapping

Function

The function keys of the keyboard units of the Operator Panel (OP), Multi Panel (MP) and Panel PC are equipped with LEDs. These LEDs can be controlled by the PLC. This functionality can be used to activate an LED in order to tell the operator which key to press in a specific situation, for example.

Requirements

In order to enable control of an LED, you must set up an LED tag or array tag in the PLC and declare this as the LED tag in the configuration data.

LED assignment

Assign the LEDs to the LED tag bits when you configure the function keys. Define the "LED tag" and the corresponding "bit" for each function key in the "General" group of the properties view.

The bit number "bit" identifies the first of two consecutive bits that control the following LED states:

Bit n+ 1	Bit n	LED function	
		all Mobile Panels, Operator Panels, and Multi Panels	Panel PCs
0	0	Off	Off
0	1	Rapid flashing	Flashing
1	0	Slow flashing	Flashing
1	1	Permanent signal	Permanent signal

7.3.3 Area pointer

7.3.3.1 General information on area pointers (Omron Hostlink/Multilink)

Introduction

Area pointers are parameter fields. WinCC flexible Runtime reads these parameter fields in order to obtain information about the location and size of data areas in the PLC. The PLC and the HMI device interactively communicate read and write data for these data areas . The PLC and the HMI device trigger defined interactions based on the evaluation of stored data.

The area pointers reside in PLC memory. Their addresses are configured in the "Area pointers" dialog of the "Connections" editor.

Area pointers used in WinCC flexible:

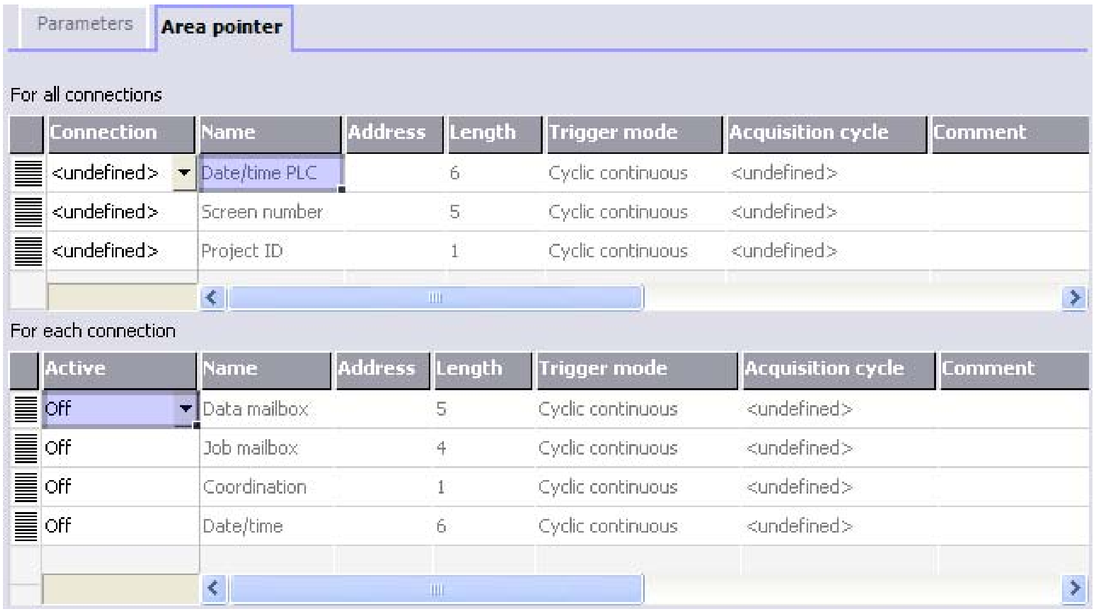
- PLC job
- Project ID
- Screen number
- Data record
- Date/time
- Date/time PLC
- Coordination

Device-dependency

Availability of the area pointer depends on the HMI device used.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use.



Enabling an area pointer based on the example of a SIMATIC S7 PLC

- Active

  Enables the area pointer.

- Name

  Name of the area pointer defined by WinCC flexible.

- Address

  Tag address of the area pointer in the PLC.

- Length

  WinCC flexible defines the default length of the area pointer.

- Acquisition cycle

  Define an acquisition cycle in this field to allow cyclic reading of the area pointer in Runtime. An extremely short acquisition time may have a negative impact on HMI device performance.

- Comment

  Save a comment, for example, to describe the purpose of the area pointer.

Accessing data areas

The table shows how the PLC and HMI device handle read (R) and write (W) access to the data areas.

Data area	Required for	HMI device	PLC
Screen number	Evaluation by the PLC in order to determine the active screen.	W	R
Data record	Transfer of data records with synchronization	R/W	R/W
Date/time	Transfer of the date and time from the HMI device to the PLC	W	R
Date/time PLC	Transfer of the date and time from the PLC to the HMI device	R	W
Coordination	Requesting the HMI device status in the control program	W	R
Project ID	Runtime checks consistency between the WinCC flexible project ID and the project in the PLC.	R	W
PLC job	Triggering of HMI device functions by the control program	R/W	R/W

The next sections describe the area pointers and their associated PLC jobs.

7.3.3.2 "Screen number" area pointer

Function

The HMI device saves information about the screen called on the HMI device to the "Screen number" area pointer.

This allows the transfer of the current screen contents from the HMI device to the PLC. The PLC can trigger specific reactions such as the call of a different screen.

Application

Configure and enable the area pointer in "Communication ▸ Connections" before you put it into use. You can create only **one** instance of the "Screen number" area pointer and only on **one** PLC.

The screen number is transferred spontaneously to the PLC. That is, it is always transferred when a new screen is activated on the HMI device. It is therefore unnecessary to configure an acquisition cycle.

Structure

The area pointer is a data area in the memory of the PLC with a fixed length of 5 words.

	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1st word	Current screen type															
2nd word	Current screen number															
3rd word	Reserved															
4th word	Current field number															
5th word	Reserved															

- Current screen type

  "1" for the root screen or
  "4" for the permanent window
- Current screen number

  1 to 32767
- Current field number

  1 to 32767

7.3.3.3 "Date/time" area pointer

Function

This area pointer is used to transfer the date and time from the HMI device to the PLC.

The PLC writes control job "41" to the job mailbox.

When it evaluating the control job, the HMI device saves its current date and time to the data area configured in the "Date/time" area pointer. All definitions are coded in BCD format.

The "Date/Time" area pointer when used in a project which contains multiple connections must be enabled for each configured connection.

The date/time data area has the following structure:

Data word	Left byte								Right byte								
	15							8	7							0	
n+0	Reserved								Hour (0 to 23)								Time
n+1	Minute (0 to 59)								Second (0 to 59)								
n+2	Reserved								Reserved								
n+3	Reserved								Weekday (1 to 7, 1 = Sunday)								Date
n+4	Day (1 to 31)								Month (1 to 12)								
n+5	Year (80 to 99/0 to 29)								Reserved								

Note

The entry of values from 80 to 99 in the "Year" data area returns the years 1980 through 1999; values from 0 to 29 return the years 2000 through 2029.

7.3.3.4 "Date/time controller" area pointer

Function

This area pointer is used to transfer the date and time from the PLC to the HMI device. Use this area pointer if the PLC is the time master.

The PLC loads the data area of the area pointer. All definitions are coded in BCD format.

The HMI device reads the data cyclically within the configured acquisition cycle and synchronizes itself.

Note

Set an acquisition cycle of sufficient length for the date/time area pointer in order to avoid any negative impact on HMI device performance.
Recommended: Acquisition cycle of 1 minute if your process can handle it.

The date/time data area has the following structure:

DATE_AND_TIME format (in BCD code)

Data word	Left byte			Right byte		
	15	. . . . . .	8	7	. . . . . .	0
n+0	Year (80 to 99/0 to 29)			Month (1 to 12)		
n+1	Day (1 to 31)			Hour (0 to 23)		
n+2	Minute (0 to 59)			Second (0 to 59)		
n+3	Reserved			Reserved		Weekday (1 to 7, 1 = Sunday)
n+4 [1)]	Reserved			Reserved		
n+5 [1)]	Reserved			Reserved		

1) The two data words must be available in the data area in order to ensure compliance of the data format with WinCC flexible and to avoid the reading of incorrect information.

Note

Note that when you enter the year, values 80-99 result in years 1980 through 1999 and the values 0-29 result in the years 2000 through 2029.

7.3.3.5 "Coordination" area pointer

Function

The "Coordination" area pointer is used to implement the following functionality:

- detection in the control program of HMI device startup
- detection in the control program of the current HMI device operating mode
- detection in the control program of the HMI devices ready to communicate state

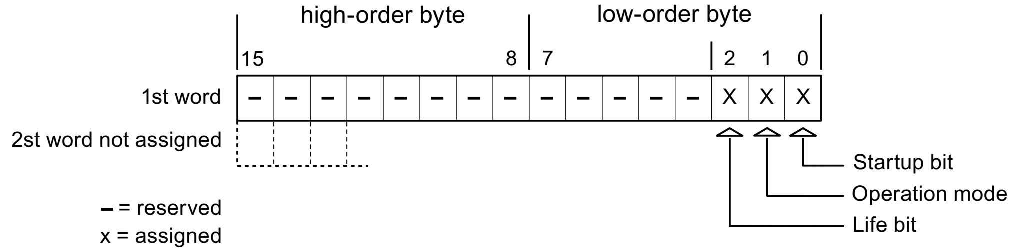
The "Coordination" area pointer has a length of two words.

Application

Note

The HMI device always writes the entire coordination area when updating the area pointer. The control program may not make changes to the coordination area for this reason.

Assignment of bits in the "Coordination" area pointer



Startup bit

The startup bit is set briefly to "0" by the HMI device during startup. It sets the bit permanently to "1" when startup is completed.

Operating mode

The operating mode bit is set to 1 as soon as the user switches the HMI device offline. The state of the operating mode bit is "0" during normal operation of the HMI device. You can determine the current operating mode of the HMI device by reading this bit.

Life bit

The HMI device inverts the life bit at intervals of approximately one second. You can check whether or not the connection to the HMI device is still up by querying this bit in the control program.

7.3.3.6 "Project ID" area pointer (Omron)

Function

You can check whether the HMI device is connected to the correct PLC at the start of runtime. This check is important when operating with several HMI devices.

The HMI device compares a value stored on the PLC with the value specified in configuration data. This ensures compatibility of configuration data with the control program. If discrepancy is detected, a system alarm is displayed on the HMI device and runtime is stopped.

Application

Settings in configuration data required when using this area pointer:

- Define the version of configuration data. Possible values between 1 and 255.

  Enter the version in the "Device settings ▸ Device settings" editor in "Project ID."
- Data address of the value for the version that is stored in the PLC:

  Enter the data address in the "Communication ▸ Connections" editor in "Address."

Connection failure

A connection failure to a device on which the "project ID" area pointer is configured results in all the other connections in the project being switched to "offline".

This behavior has the following prerequisites:

- You have several configured connections in a project.
- You are using the "project ID" area pointer in at least one connection.

Causes which may set connections "offline":

- The PLC is not available.
- The connection has been switched offline in the engineering system.

7.3.3.7 "Job mailbox" area pointer

Function

The PLC can use the job mailbox to transfer jobs to the HMI device to trigger corresponding actions on the HMI device. These functions include, for example:

- Display screen
- Set date and time

Data structure

The first word of the job mailbox contains the job number. Depending on the job mailbox, up to three parameters can be transferred.

Word	Left byte	Right byte
n+0	0	Job number
n+1	Parameter 1	
n+2	Parameter 2	
n+3	Parameter 3	

The HMI device evaluates the job mailbox if the first word of this job is unequal to zero. This means that the parameters must be entered in the job mailbox first, followed by the job number.

When the HMI device accepts the job mailbox, the first word is set to 0 again. The execution of the job mailbox is generally not completed at this point in time.

Job mailboxes

All job mailboxes and their parameters are listed below. The "No." column contains the job number of the job mailbox. Job mailboxes can only be triggered by the PLC when the HMI device is online.

Note

Please note that not all HMI devices support job mailboxes. TP 170A and Micro Panel do not support PLC jobs, for example.

No.	Function	
14	**Setting the time (BCD coded)**	
	Parameter 1	Left byte: - Right byte: hours (0-23)
	Parameter 2	Left byte: minutes (0-59) Right byte: seconds (0-59)
	Parameter 3	-
15	**Setting the date (BCD coded)**	
	Parameter 1	Left byte: - Right byte: weekday (1-7: Sunday-Saturday)
	Parameter 2	Left byte: day (1-31) Right byte: month (1-12)
	Parameter 3	Left byte: year
23	**User logon**	
	Logs the user on with the name "PLC user" at the HMI device with the group number transferred in Parameter 1. The logon is possible only when the transferred group number exists in the project.	
	Parameter 1	Group number 1 to 255

No.	Function	
14	Setting the time (BCD coded)	
	Parameter 2, 3	-
24	User logoff	
	Logs off the current user. The function corresponds to the "logoff" system function)	
	Parameter 1, 2, 3	-
40	Transfer date/time to PLC	
	(in the S7 format DATE_AND_TIME) An interval of at least 5 seconds must be maintained between two successive jobs to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
41	Transfer date/time to PLC	
	(In OP/MP format) An interval of at least 5 seconds must be maintained between successive jobs in order to prevent overload of the HMI device.	
	Parameter 1, 2, 3	-
46	Update tags	
	Causes the HMI device to read the current value of the PLC tags whose update ID matches the value transferred in Parameter 1. (Function corresponds to the "UpdateTag" system function.)	
	Parameter 1	1 - 100
49	Clear process alarm buffer	
	Parameter 1, 2, 3	-
50	Clear alarm buffer	
	Parameter 1, 2, 3	-
51	Screen selection 1)	
	Parameter 1	Screen number
	Parameter 2	-
	Parameter 3	Field number
69	Read data record from PLC	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	0: Do not overwrite existing data record 1: Overwrite existing data record
70	Write data record to PLC	
	Parameter 1	Recipe number (1-999)
	Parameter 2	Data record number (1-65535)
	Parameter 3	-

1) OP 73, OP 77A and TP 177A HMI devices also execute the "Screen selection" job mailbox if the on-screen keyboard is active.

7.3.3.8 "Data mailbox" area pointer

"Data mailbox" area pointer

Function

When data records are transferred between the HMI device and PLC, both partners access common communications areas on the PLC.

Data transfer types

There are two ways of transferring data records between the HMI device and PLC:

- Transfer without synchronization
- Transfer with synchronization over the data record

Data records are always transferred directly. That is, the tag values are read from an address or written to an address configured for this tag directly, without redirecting the values by means of interim memory.

Initiating the transfer of data records

There are three ways of triggering the transfer:

- Operator input in the recipe view
- PLC jobs

  The transfer of data records can also be triggered by the PLC.
- Triggering by configured functions

If the transfer of data records is triggered by a configured function or by a PLC job, the recipe display on the HMI device remains operable. The data records are transferred in the background.

Simultaneous processing of several transfer requests is, however, not possible. In this case, the HMI device rejects the other transfer requests with a system alarm.

Transfer without synchronization

If you select asynchronous transfer of data records between the HMI device and PLC, there is no coordination over the common data areas. It is therefore unnecessary to set up a data area during configuration.

Asynchronous data record transfer can be a useful alternative, for example, when:

- The system is capable of excluding the risk of uncontrolled overwriting of data by the communication peer.
- The PLC does not require information about the recipe number and data record number.
- The transfer of data records is triggered by the operator of the HMI device.

Reading values

When a read job is triggered, the values are read from the PLC addresses and transferred to the HMI device.

- Triggering by the operator in the recipe view:

  The values are downloaded to the HMI device. You can then process, edit, or save these values, for example.
- Triggering by a function or PLC job:

  The values are saved immediately to the data volume.

Writing values

When a write job is triggered, the values are written to the PLC addresses.

- Triggering by the operator in the recipe view:

  The current values are written to the PLC.
- Triggering by a function or PLC job:

  The current values are written to the PLC from the data medium.

Transfer with synchronization (Omron)

If you select synchronous transfer, both communication partners set status bits in the common data area. You can use this mechanism to prevent uncontrolled overwriting of data in either direction in your control program.

Application

Synchronous data record transfer can be a useful solution, for example, when:

- The PLC is the "active partner" in the transfer of data records.
- The PLC evaluates the information about the recipe number and data record number.
- The transfer of data records is triggered by means of a Job mailbox.

Requirements

In order to synchronize transfer of data records between the HMI device and the PLC, the following requirements must be met during configuration:

- An area pointer has been set up: "Communication ▸ Connections" editor in "Area pointer"
- The PLC with which the HMI device synchronizes transfer of data records is specified in the recipe: "Recipes" editor, properties view of the recipe, "Properties" group in "Transfer".

Structure of the data area

The data area has a fixed length of 5 words. Structure of the data area:

	15		0
1. Word	Current recipe number (1 - 999)		
2. Word	Current data record number (0 - 65535)		
3. Word	Reserved		
4. Word	Status (0, 2, 4, 12)		
5. Word	Reserved		

- Status

  The status word (word 4) can adopt the following values:

Value		Meaning
Decimal	Binary	
0	0000 0000	Transfer permitted, data record free
2	0000 0010	Transfer is busy
4	0000 0100	Transfer completed without error
12	0000 1100	Transfer completed with error

Possible causes of error when transferring data records

Possible causes of error

The section below shows possible error causes which lead to the cancellation of data record transfer:

- Tag address not set up on the PLC
- Overwriting data records not possible
- Recipe number does not exist
- Data record number does not exist

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

Reaction to an aborted transfer due to errors

If the transfer of data records is aborted due to errors, the HMI device reacts as follows:

- Triggering by the operator in the recipe display

  Information in the status bar of the recipe view and output of system alarms
- Triggered by function

  Output of system alarms
- Triggering by PLC job

  No feedback message on the HMI device

You can nonetheless evaluate the status of the transfer by querying the status word in the data record.

Sequence of the transfer when triggered by a configured function

Reading from the PLC using a configured function

<table>
<tr><th>Step</th><th colspan="2">Action</th></tr>
<tr><td rowspan="2">1</td><td colspan="2">Check: Status word = 0?</td></tr>
<tr><td>Yes</td><td>No</td></tr>
<tr><td>2</td><td>The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.</td><td>Abort with system alarm.</td></tr>
<tr><td>3</td><td>The HMI device reads the values from the PLC and stores them in the data record specified in the function.</td><td></td></tr>
<tr><td>4</td><td>• If "Yes" was selected for the "Overwrite" function, an existing data record is overwritten without any prompt for confirmation.
The HMI device sets the status "Transfer completed."
• If "No" was selected for the "Overwrite" function and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.</td><td></td></tr>
<tr><td>5</td><td>The control program must reset the status word to zero in order to enable further transfers.</td><td></td></tr>
</table>

Writing to the PLC by means of configured function

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the function and the status "Transfer active" in the data record.	Abort with system alarm.
3	The HMI device fetches the values of the data record specified in the function from the data medium and transfers the values to the PLC.	
4	The HMI device sets the status "Transfer completed."	
5	The control program can now evaluate the transferred data. The control program must reset the status word to zero in order to enable further transfers.	

Sequence of the transfer triggered by a job mailbox

The transfer of data records between the HMI device and the PLC can be initiated by either one of these stations.

The two PLC jobs No. 69 and No. 70 are available for this type of transfer.

No. 69: Read data record from PLC ("PLC → DAT")

PLC job no. 69 transfers data records from the PLC to the HMI device. The PLC job is structured as follows:

	Left byte (LB)	Right byte (RB)
Word 1	0	69
Word 2	Recipe number (1-999)	
Word 3	Data record number (1 to 65535)	
Word 4	Do not overwrite existing data record: 0 Overwrite existing data record: 1	

No. 70: Write data record to PLC ("DAT → PLC")

PLC job No. 70 transfers data records from the HMI device to the PLC. The PLC job is structured as follows:

	Left byte (LB)	Right byte (RB)
Word 1	0	70
Word 2	Recipe number (1-999)	
Word 3	Data record number (1 to 65535)	
Word 4	—	

Sequence when reading from the PLC with PLC job "PLC → DAT" (no. 69)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device reads the values from the PLC and saves these to the data record defined in the PLC job.	
4	• If "Overwrite" was selected in the job, an existing data record is overwritten without any prompt for confirmation. The HMI device sets the status "Transfer completed." • If "Do not overwrite" was selected in the job, and the data record already exists, the HMI device aborts the job and enters 0000 1100 in the status word of the data record.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Sequence of writing to the PLC using PLC job "DAT → PLC" (no. 70)

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe and data record number specified in the job and the status "Transfer active" in the data record.	Abort without return message.
3	The HMI device fetches the values of the data record specified in the function from the data medium and writes the values to the PLC.	
4	The HMI device sets the status "Transfer completed."	
5	The control program can now evaluate the transferred data. The control program must reset the status word to zero in order to enable further transfers.	

Sequence of a transfer started by the operator in the recipe display

Reading from the PLC started by the operator in the recipe display

Step	Action	
1	Check: Status word = 0?	
	Yes	No
2	The HMI device enters the recipe number to be read and the status "Transfer active" in the data record and sets the data record number to 0.	Abort with system alarm.
3	The HMI device reads the values from the PLC and displays them in the recipe display. If the recipes have synchronized tags, the values from the PLC are also written to the tags.	
4	The HMI device sets the status "Transfer completed."	
5	The control program must reset the status word to zero in order to enable further transfers.	

Writing to the PLC started by the operator in the recipe display

Step	Action	
	Check: Status word = 0?	
1	Yes	No
	The HMI device enters the recipe and data record number to be written and the status "Transfer active" in the data record.	Abort with system alarm.
2	The HMI device writes the current values to the PLC. If the recipes have synchronized tags, the changed values are synchronized between the recipe display and tags and then written to the PLC.	
3	The HMI device sets the status "Transfer completed."	
4	If required, the control program can now evaluate the transferred data.	
5	The control program must reset the status word to zero in order to enable further transfers.	

Note

The status word may only be set by the HMI device. The PLC may only reset the status word to zero.

Note

The PLC may only evaluate the recipe and data record numbers when data inconsistency is detected if one of the conditions outlined below has been met:

- The data mailbox status is set to "Transfer completed".
- The data mailbox status is set to "Transfer completed with error".

7.3.4 Events, alarms, and acknowledgments

7.3.4.1 General information on events, alarms, and acknowledgments

Function

Messages return information about the PLC or HMI device operating states or problems to the user on the HMI device. The message texts consist of configurable texts and/or tags with actual values.

Operational messages and events must be distinguished. The programmer defines what is an operational message and what is an error alarm.

Operational message

An operational message indicates a state. Example:

- Motor on
- PLC in manual mode

Alarm message

An error alarm indicates a malfunction. Example:

- Valve does not open.
- Excess motor temperature

Alarms indicate exceptional operational states, and must therefore be acknowledged.

Acknowledgment

To acknowledge error alarms:

- Operator input on the HMI device
- The PLC sets an acknowledgment bit.

Triggering alarms

Triggering of an alarm in the PLC:

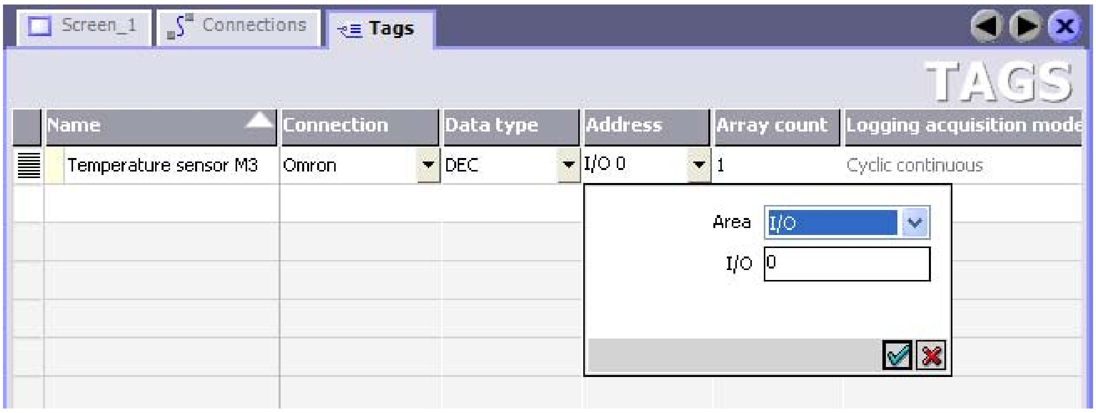
- Setting a tag bit
- Measured value limits exceeded

The location of tags, or of the tag array, is defined in WinCC flexible ES. The tag or array must be set up on the PLC.

7.3.4.2 Step 1: Creating tags or an array

Procedure

You create tags or arrays in the "Tags" editor. The dialog box is shown below.



- Define the tag and array names.
- Select the connection to the PLC.

  The connection must already be configured in the "Connections" editor.
- Select the data type.

  The available data types depend on the PLC being used. If you select an illegal data type the tag will not be available in the "Discrete alarms" and "Analog alarms" editors.

  The following data types are supported for Omron controllers:

PLC	Permitted data types	
	Discrete alarms	Analog alarms
Series SYSMAC C, CV, CS1, alpha and CP	DEC, +/-DEC	BIN, DEC, +/-DEC, LDC, +/-LDC

- Enter an address.

  The tag addressed here contains the bit that triggers the alarm.

  As soon as the bit of the tag is set on the PLC and is transferred to the HMI device in the configured acquisition cycle, the HMI device recognizes the alarm as "incoming".

  After the same bit is reset on the PLC, the HMI device recognizes the alarm as "outgoing".
- Select the array elements.

  If the number of array elements is increased, you can select more bit numbers in the "Discrete alarms" editor. An array with a length of three words provides 48 alarm bits, for example.

7.3.4.3 Step 2: Configuring an alarm

Procedure

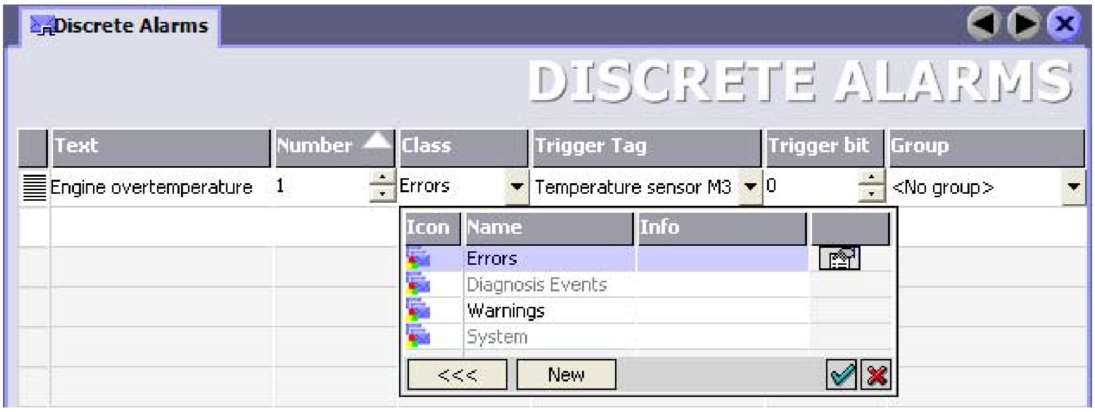
We differentiate between the following alarms:

- Discrete alarms
- Analog alarms

You create alarms in the "Discrete alarms" and "Analog alarms" editors.

Discrete alarms

The editor is shown in the figure below.



- Edit text

  Enter the text to display in runtime. You can format the text characters. The text may contain fields for the output of tags.

  The text is output to the alarm view if this view was configured in the "Screens" editor.
- Specify number

  Every alarm has a number that must only occur once within the project. It is used to uniquely identify the alarm and is indicated with the alarm in runtime.

  The permitted range of values is 1 to 100,000.

  The WinCC flexible engineering system assigns consecutive numbers. You can change these when assigning alarm numbers to groups, for example.
- Specify the alarm class

  Available alarm classes:

  – Error alarms

    This class must be acknowledged.

  – Process events

    This class signals events with incoming and outgoing alarms.

- Assign trigger tag

  In the "Trigger tag" column, you link the configured alarm with the tag created in step 1. All tags with the permitted data type are shown in the selection list.

- Specify the bit number

  In the "bit number" column, specify the relevant bit position in the created tag.

  Remember that the way the bit positions are counted depends on the particular PLC. With Omron controllers, the bit positions are counted as follows:

How the bit positions are counted	Left byte								Right byte							
In Omron controllers	15							8	7							0
In the WinCC flexible, you configure the following:	15							8	7							0

Analog alarms

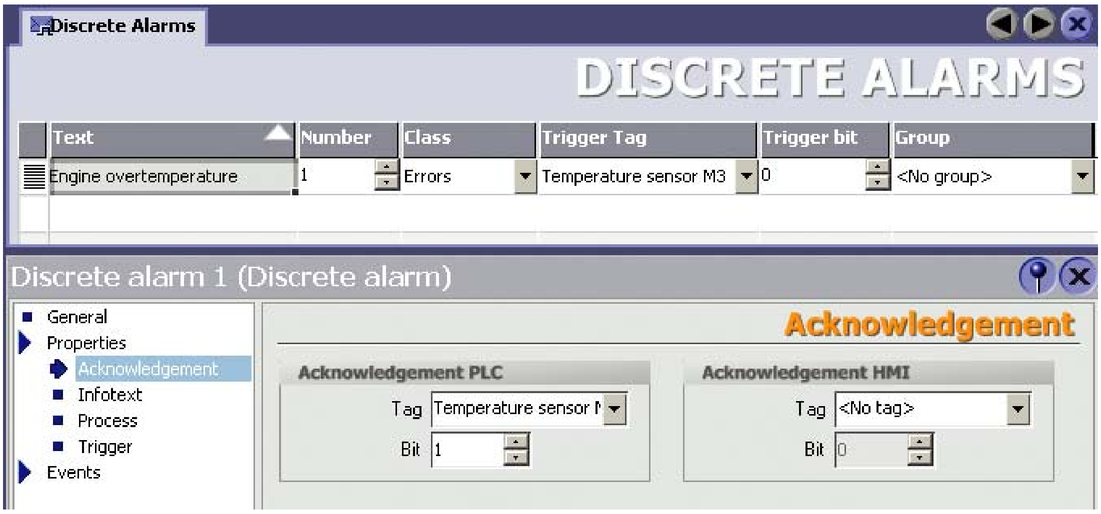
The only difference between discrete alarms and analog alarms is that you configure a limit value, rather than a bit number. The alarm is triggered when this limit is exceeded. The outgoing alarm is triggered when the low limit is violated, making allowances for any configured hysteresis.

7.3.4.4 Step 3: Configure the acknowledgment

Procedure

Create suitable tags on the PLC to acknowledge an error alarm. You assign these tags to an alarm in the "Bit messages" editor. You make the assignment in "Properties ▸ Acknowledgment."

The following figure shows the dialog for configuring an acknowledgment.



Distinction in terms of acknowledgment:

- Acknowledgment on the HMI device
- Acknowledgment by the PLC

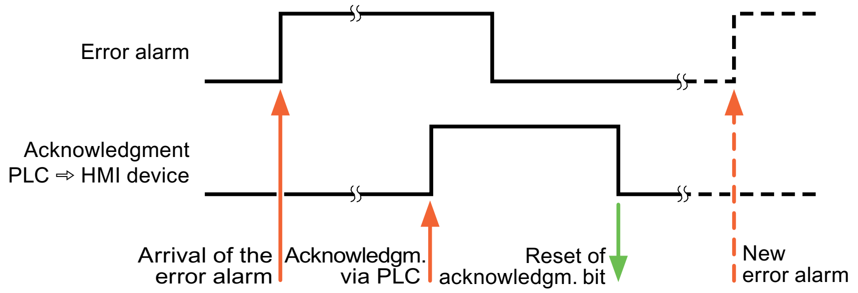
Acknowledgment by the PLC

In "Acknowledgment PLC tag", you configure the tag or the array tag and the bit number based on which the HMI device can recognize an acknowledgment by the PLC.

A bit set in the tag triggers acknowledgment of the assigned error alarm bit at the HMI device. This tag bit returns a function similar to acknowledgment on the HMI device which is triggered by pressing the "ACK" button, for example.

The acknowledgment bit must be located in the same tag as the bit for the error alarm.

Reset the acknowledgment bit before setting the bit in the alarm area again. The figure below shows the pulse diagram.



Acknowledgment on the HMI device

In "Ack read tag", you configure the tag or the array tag and the bit number that is written to the PLC after acknowledgment from the HMI device. Make sure when you use an array tag that it is not longer than 6 words.

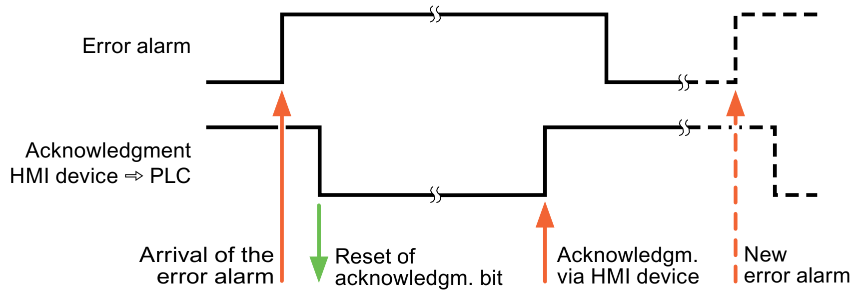
In order to ensure that a signal transition is generated as soon as the acknowledgment bit is set, the HMI device first resets the acknowledgment bit assigned to an error alarm. There is a certain time-based offset between these two operations, due to the processing time of the HMI device.

Note

The reset includes all alarm bits acknowledged since the last restart of Runtime. The PLC may only read this area once.

If the alarm is acknowledged on the HMI device, the bit is then set in the assigned acknowledgment tag on the PLC. This allows the PLC to recognize that the error alarm has been acknowledged.

The figure below shows the pulse diagram.



7.4 Commissioning components

7.4.1 Commissioning components

Transferring the PLC program to the PLC

1. Interconnect the PC with the CPU using the appropriate cable.
2. Download the program files to the CPU.
3. Then set the CPU to RUN.

Transferring project data to the HMI device

1. The HMI device must be in transfer mode in order to accept the project transfer.

   Possible scenarios:

   – Initial startup

     The HMI device does not yet contain any configuration data in the initial startup phase. The project data and runtime software required for operation must be transferred from the configuration computer to the device: The HMI device automatically changes to transfer mode.
     The transfer dialog box opens with a connection message on the HMI device.

   – Recommissioning

     Recommissioning means that you overwrite existing project data on the HMI device.

   For corresponding detailed instructions, refer to the HMI device manual.
2. Check whether the alarm settings meet requirements of your WinCC flexible project.
3. Select "Project > Transfer > Transfer settings" to configure the transfer parameters before you transfer project data to the HMI device:

   – Select the used port.

   – Set the transfer parameters.

   – Select the target storage location.
4. Initiate the transfer of project data by clicking "Transfer".

   – The project is compiled automatically.

   – All compilation and transfer steps are logged to a message window.

   Message output on the configuration computer on successful completion of the transfer: "Transfer completed successfully".

   The start screen appears on the HMI device.

Interconnecting the PLC with the HMI device

1. Interconnect the PLC with the HMI device using a suitable cable.
2. The message "Connection to PLC .... is established" is output to the HMI device. Note that users can edit the system alarm texts in WinCC flexible.

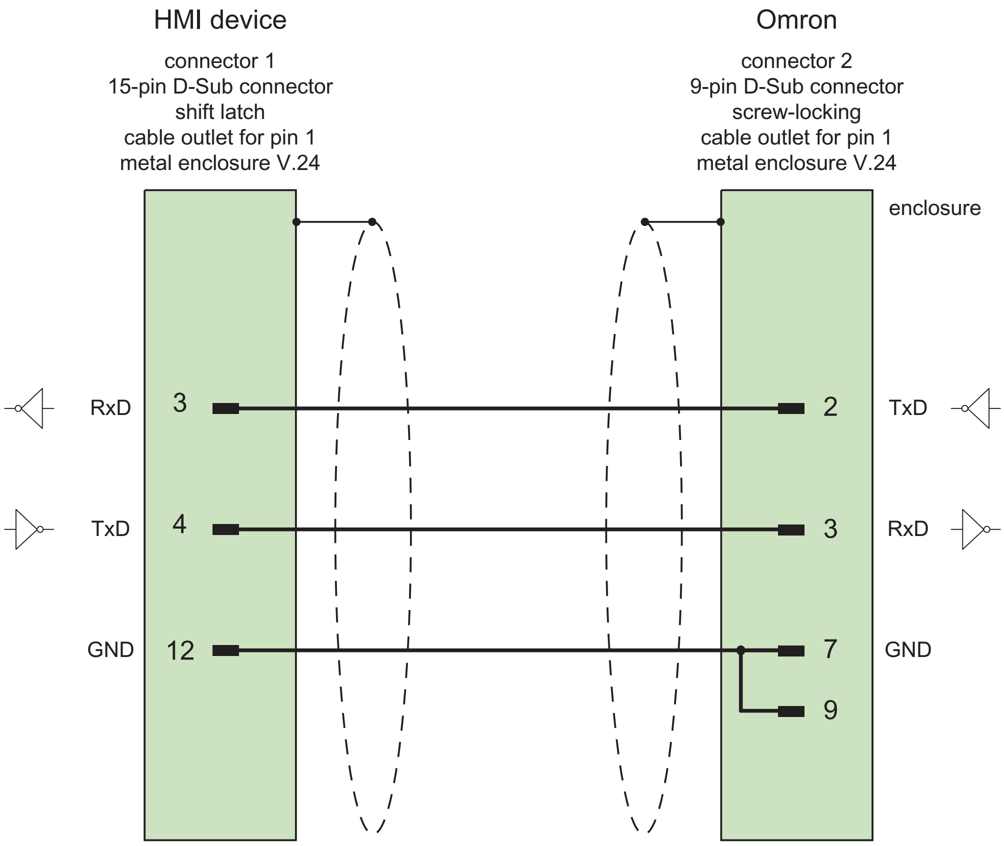
NOTICE
Always observe the safety-related information in the HMI device Manual when commissioning the device. RF radiation emitted from devices such as mobile phones may cause unwanted operating states.

7.5 Connecting cables for Omron Hostlink/Multilink

7.5.1 Connecting cable 6XV1440-2X, RS-232, for Omron

6XV1440 - 2X _ _ _

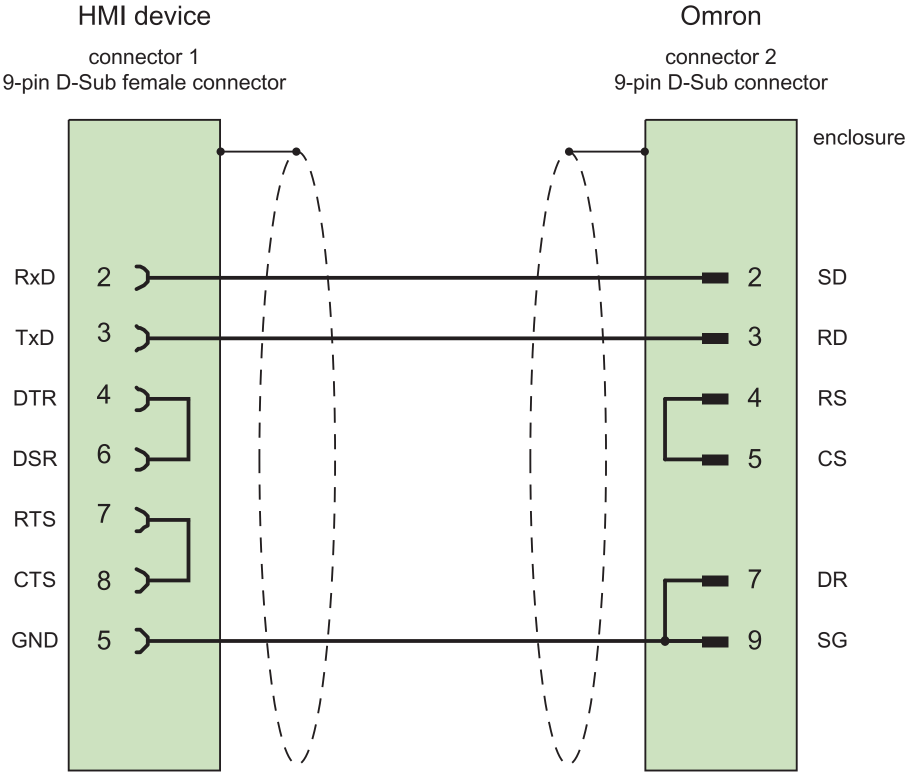
Length key, see catalog ST 80



Shield with large-area contact to casing
Cable: 5 x 0.14 mm², shielded,
max. length 15 m

7.5.2 Connecting cable PP1, RS-232, for Omron

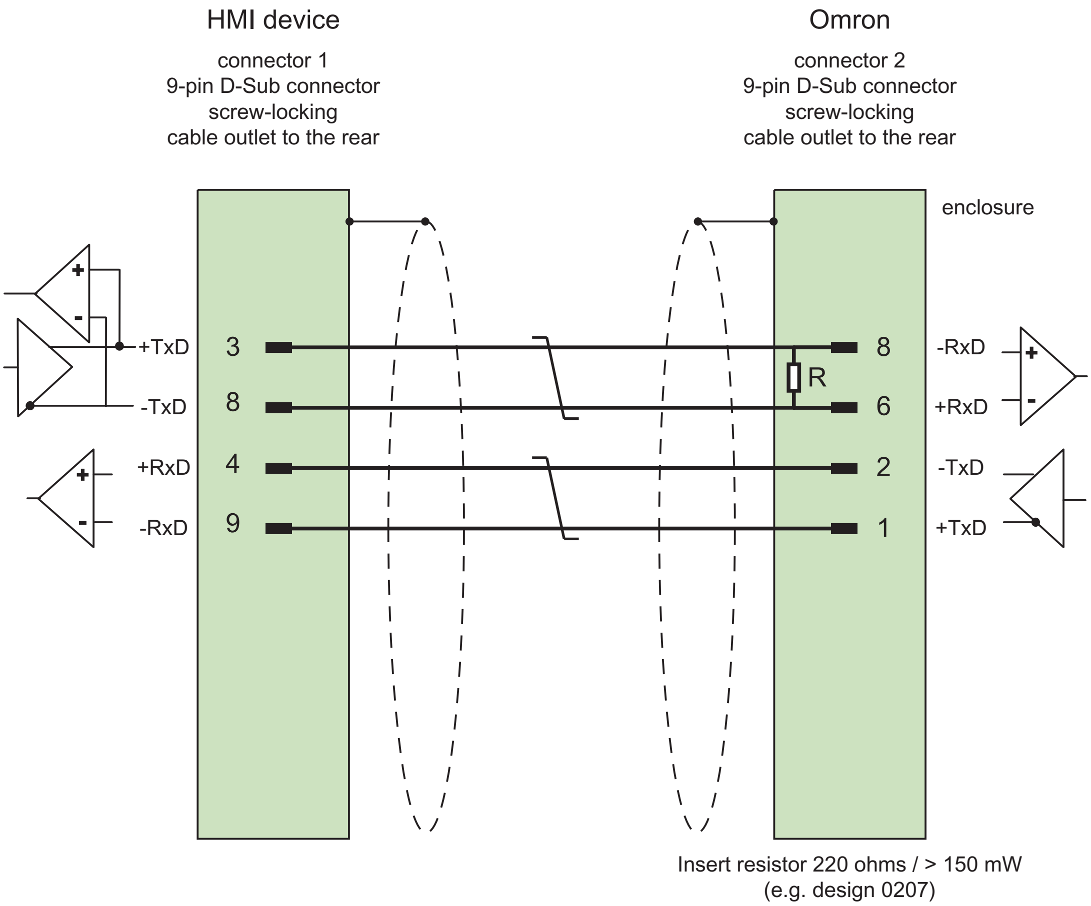
Point-to-point cable PP1, PC/TP/OP - PLC



Cables: 3 x 0.14 mm^2, shielded,
max. length 15 m

7.5.3 Connecting cable PP2, RS-422, for Omron

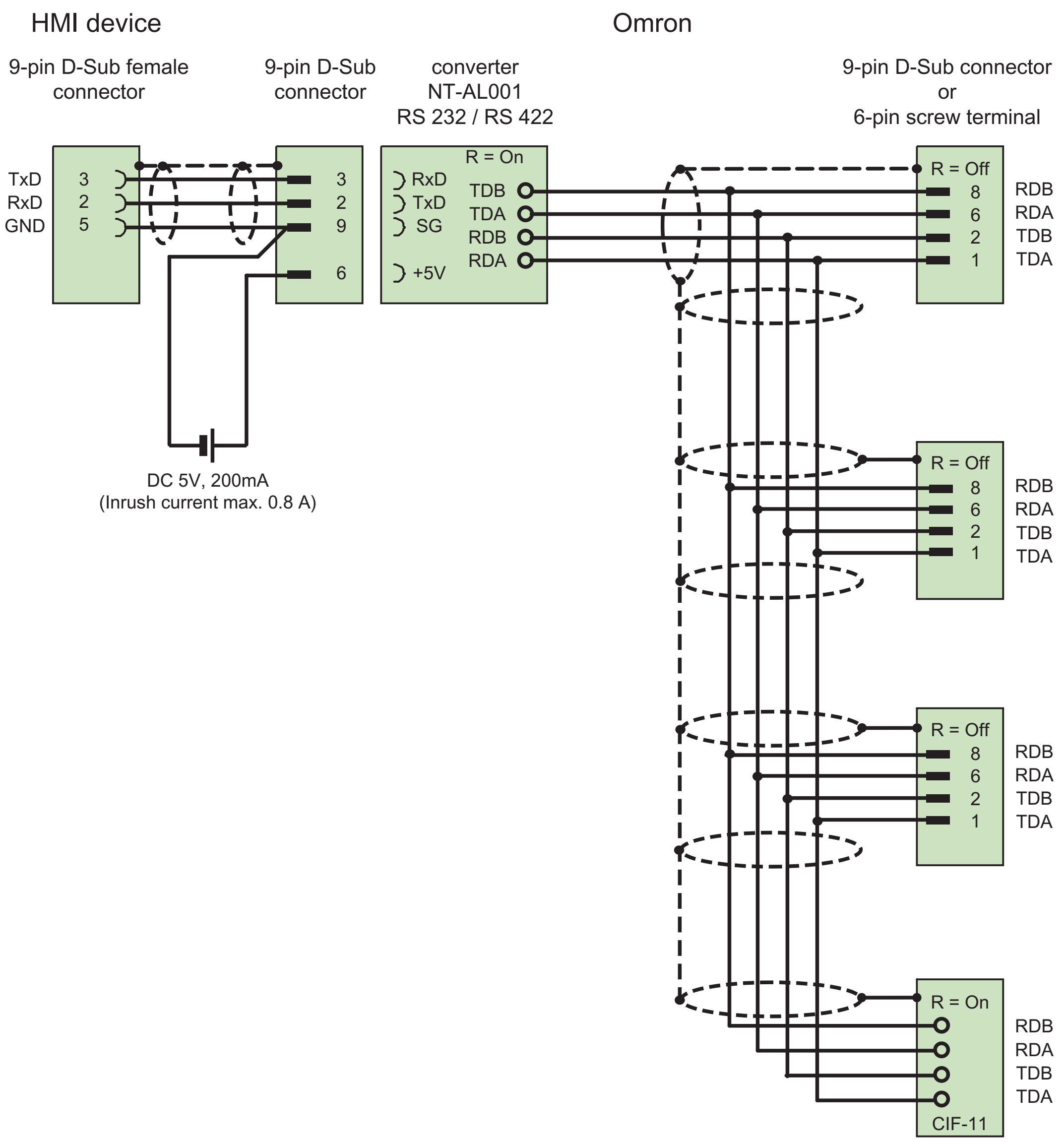
Point-to-point cable PP2, RS-422



Cables: 3 x 0.14 mm^2, shield contacts connected,
max. length 500 m

7.5.4 Connecting cable MP1, RS-232, over converter, for Omron

Multipoint cable 1: MP/TP/PC > PLC

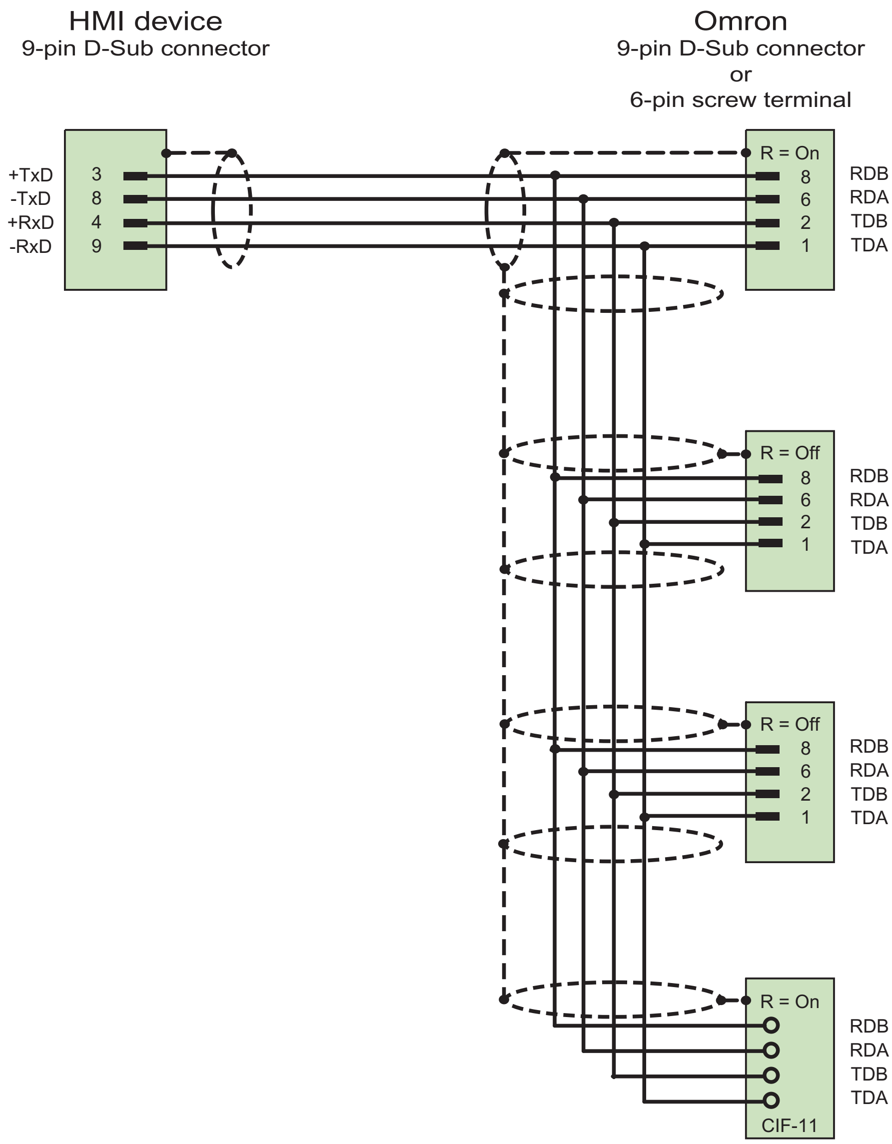


1) Inrush current max. 0.8 A

Cables: 5 x 0.14 mm², shielded, max. length 500 m

7.5.5 Connecting cable MP2, RS-422, for Omron

Multipoint cable 2: RS422, MP/TP/PC > SPS_



Cables: 5 x 0.14 mm², shielded,
max. length 500 m

Appendix 8

8.1 System alarms

Introduction

System alarms on the HMI device provide information about internal states of the HMI device and PLC.

The following overview shows the causes of system alarms and how to eliminate the cause of error.

Some of the system alarms described in this section are relevant to individual HMI devices based on their range of features.

Note

System alarms are only indicated if an alarm window was configured. System alarms are output in the language currently set on your HMI device.

System alarm parameters

System alarms may contain encrypted parameters which are relevant to troubleshooting because they provide a reference to the source code of the runtime software. These parameters are output after the text "Error code:"

Meaning of the system alarms

All the system alarms that can be displayed are listed below. The system alarms are divided into different ranges:

10000 - Printer alarms

Number	Effect/cause	Remedy
10000	The print job could not be started or was canceled due to an unknown error. Faulty printer setup. Or: No authorization is available for accessing the network printer. Power supply failure during data transfer.	Check the printer settings, cable connections and the power supply. Set up the printer once again. Obtain a network printer authorization. If the error persists, contact the Hotline!
10001	No printer is installed or a default printer has not been set up.	Install a printer and/or select it as the default printer.
10002	Overflow of the graphics buffer for printing. Up to two images are buffered.	Allow sufficient intervals between successive print jobs.

Number	Effect/cause	Remedy
10003	Images can now be buffered again.	--
10004	Overflow of the buffer for printing lines in text mode (e.g. alarms). Up to 1000 lines are buffered.	Allow sufficient intervals between successive print jobs.
10005	Text lines can now be buffered again.	--
10006	The Windows printing system reports an error. Refer to the output text and the error ID to determine the possible causes. Nothing is printed or the print is faulty.	Repeat the action if necessary.

20000 - Global script alarms

Number	Effect/causes	Remedy
20010	An error has occurred in the specified script line. Execution of the script was therefore aborted. Note the system alarm that may have occurred prior to this.	Select the specified script line in the configuration. Ensure that the tags used are of the allowed types. Check system functions for the correct number and types of parameters.
20011	An error has occurred in a script that was called by the specified script. Execution of the script was therefore aborted in the called script. Note the system alarm that may have occurred prior to this.	In the configuration, select the script that has been called directly or indirectly by the specified script. Ensure that the tags used are of the allowed types. Check system functions for the correct number and types of parameters.
20012	The configuration data is inconsistent. The script could therefore not be generated.	Recompile the configuration.
20013	The scripting component of WinCC flexible Runtime is not correctly installed. Therefore, no scripts can be executed.	Reinstall WinCC flexible Runtime on your PC. Rebuild your project with "Project > Generator > Generate" and transfer the project to the HMI device.
20014	The system function returns a value that is not written in any return tag.	Select the specified script in the configuration. Check whether the script name has been assigned a value.
20015	Too many successive scripts have been triggered in short intervals. When more than 20 scripts are queued for processing, any subsequent scripts are rejected. In this case, the script indicated in the alarm is not executed.	Find what is triggering the scripts. Extend the times, e.g. the polling time of the tags which trigger the scripts.

30000 - Alarms for IFwSetValue: SetValue()

Number	Effect/causes	Remedy
30010	The tag could not accept the function result, e.g. when it has exceeded the value range.	Check the tag type of the system function parameter.
30011	A system function could not be executed because the function was assigned an invalid value or type in the parameter.	Check the parameter value and tag type of the invalid parameter. If a tag is used as a parameter, check its value.
30012	A system function could not be executed because the function was assigned an invalid value or type in the parameter.	Check the parameter value and tag type of the invalid parameter. If a tag is used as a parameter, check its value.

40000 - Linear scaling alarms

Number	Effect/causes	Remedy
40010	The system function could not be executed since the parameters could not be converted to a common tag type.	Check the parameter types in the configuration.
40011	The system function could not be executed since the parameters could not be converted to a common tag type.	Check the parameter types in the configuration.

50000 - Data server alarms

Number	Effect/causes	Remedy
50000	The HMI device is receiving data faster than it is capable of processing. Therefore, no further data is accepted until all current data have been processed. Data exchange then resumes.	--
50001	Data exchange has been resumed.	--

60000 - Win32 function alarms

Number	Effect/causes	Remedy
60000	This alarm is generated by the “DisplaySystemAlarms” function. The text to be displayed is transferred to the function as a parameter.	--
60010	The file could not be copied in the direction defined because one of the two files is currently open or the source/target path is not available. It is possible that the Windows user has no access rights to one of the two files.	Restart the system function or check the paths of the source/target files. Using Windows NT/XP: The user executing WinCC flexible Runtime must be granted access rights for the files.
60011	An attempt was made to copy a file to itself. It is possible that the Windows user has no access rights to one of the two files.	Check the path of the source/target file. Using Windows NT/XP with NTFS: The user executing WinCC flexible Runtime must be granted access rights for the files.

70000 - Win32 function alarms

Number	Effect/causes	Remedy
70010	The application could not be started because it could not be found in the path specified or there is insufficient memory space.	Check whether the application exists in the specified path or close other applications.

Number	Effect/causes	Remedy
70011	The system time could not be modified. The error alarm only appears in connection with area pointer "Date/time PLC". Possible causes: • An invalid time was transferred in the job mailbox. • The Windows user has no right to modify the system time. If the first parameter in the system alarm is displayed with the value 13, the second parameter indicates the byte containing the incorrect value.	Check the time which is to be set. Using Windows NT/XP: The user executing WinCC flexible Runtime must be granted the right to change the system time of the operating system.
70012	An error occurred when executing the function "StopRuntime" with the option "Runtime and operating system". Windows and WinCC flexible Runtime are not closed. One possible cause is that other programs cannot be closed.	Close all programs currently running. Then close Windows.
70013	The system time could not be modified because an invalid value was entered. Incorrect separators may have been used.	Check the time which is to be set.
70014	The system time could not be modified. Possible causes: • An invalid time was transferred. • The Windows user has no right to modify the system time. Windows rejects the setting request.	Check the time which is to be set. Using Windows NT/XP: The user executing WinCC flexible Runtime must be granted the right to change the system time of the operating system.
70015	The system time could not be read because Windows rejects the reading function.	--
70016	An attempt was made to select a screen by means of a system function or job. This is not possible because the screen number specified does not exist. Or: A screen could not be generated due to insufficient system memory. Or: The screen is blocked. Or: Screen call has not been executed correctly.	Check the screen number in the function or job with the screen numbers configured. Assign the number to a screen if necessary. Check the details for the screen call and whether the screen is blocked for specific users.
70017	Date/time is not read from the area pointer because the address set in the PLC is either not available or has not been set up.	Change the address or set up the address in the PLC.
70018	Acknowledgment that the password list has been successfully imported.	--
70019	Acknowledgment that the password list has been successfully exported.	--
70020	Acknowledgment for activation of alarm reporting.	--
70021	Acknowledgment for deactivation of alarm reporting.	--
70022	Acknowledgment to starting the Import Password List action.	--
70023	Acknowledgment to starting the Export Password List action.	--

Number	Effect/causes	Remedy
70024	The value range of the tag has been exceeded in the system function. The calculation of the system function is not performed.	Check the desired calculation and correct it if necessary.
70025	The value range of the tag has been exceeded in the system function. The calculation of the system function is not performed.	Check the desired calculation and correct it if necessary.
70026	No other screens are stored in the internal screen memory. No other screens can be selected.	--
70027	The backup of the RAM file system has been started.	--
70028	The files from the RAM have been copied in the Flash memory. The files from the RAM have been copied in the Flash memory. Following a restart, these saved files are copied back to the RAM file system.	--
70029	Backup of the RAM file system has failed. No backup copy of the RAM file system has been made.	Check the settings in the "Control Panel > OP" dialog and save the RAM file system using the "Save Files" button in the "Persistent Storage" tab.
70030	The parameters configured for the system function are faulty. The connection to the new PLC was not established.	Compare the parameters configured for the system function with the parameters configured for the PLCs and correct them as necessary.
70031	The PLC configured in the system function is not an S7 PLC. The connection to the new PLC was not established.	Compare the S7 PLC name parameter configured for the system function with the parameters configured for the PLC and correct them as necessary.
70032	The object configured with this number in the tab order is not available in the selected screen. The screen changes but the focus is set to the first object.	Check the number of the tab order and correct it if necessary.
70033	An e-mail cannot be sent because a TCP/IP connection to the SMTP server no longer exists. This system alarm is generated only at the first attempt. All subsequent unsuccessful attempts to send an e-mail will no longer generate a system alarm. The event is regenerated when an e-mail has been successfully sent in the meantime. The central e-mail component in WinCC flexible Runtime attempts, in regular intervals (1 minute), to establish the connection to the SMTP server and to send the remaining e-mails.	Check the network connection to the SMTP server and re-establish it if necessary.
70034	Following a disruption, the TCP/IP connection to the SMTP server could be re-established. The queued e-mails are then sent.	--

Number	Effect/causes	Remedy
70036	No SMTP server for sending e-mails is configured. An attempt to connect to an SMTP server has failed and it is not possible to send e-mails. WinCC flexible Runtime generates the system alarm after the first attempt to send an e-mail.	Configure an SMTP server: In WinCC flexible Engineering System using "Device settings > Device settings" In the Windows CE operating system using "Control Panel > Internet Settings > E-mail > SMTP Server"
70037	An e-mail cannot be sent for unknown reasons. The contents of the e-mail are lost.	Check the e-mail parameters (recipient etc.).
70038	The SMTP server has rejected sending or forwarding an e-mail because the domain of the recipient is unknown to the server or because the SMTP server requires authentication. The contents of the e-mail are lost.	Check the domain of the recipient address or disable the authentication on the SMTP server if possible. SMTP authentication is currently not used in WinCC flexible Runtime.
70039	The syntax of the e-mail address is incorrect or contains illegal characters. The contents of the e-mail are discarded.	Check the e-mail address of the recipient.
70040	The syntax of the e-mail address is incorrect or contains illegal characters.	--
70041	The import of the user management was aborted due to an error. Nothing was imported.	Check your user management or transfer it again to the panel.
70042	The value range for the tags has been exceeded while executing the system function. The system function calculation has not been carried out.	Check the desired calculation and correct it if necessary.
70043	The value range for the tags has been exceeded while executing the system function. The system function calculation has not been carried out.	Check the desired calculation and correct it if necessary.

80000 - Archive alarms

Number	Effect/causes	Remedy
80001	The log specified is filled to the size defined (in percent) and must be stored elsewhere.	Store the file or table by executing a ‘move’ or ‘copy’ function.
80002	A line is missing in the specified log.	--
80003	The copying process for logging was not successful. In this case, it is advisable to check any subsequent system alarms, too.	--
80006	Since logging is not possible, this causes a permanent loss of the functionality.	In the case of databases, check whether the corresponding data source exists and start up the system again.
80009	A copying action has been completed successfully.	--
80010	Since the storage location was incorrectly entered in WinCC flexible, this causes a permanent loss of the functionality.	Configure the storage location for the respective log again and restart the system when the full functionality is required.

Number	Effect/causes	Remedy
80012	Log entries are stored in a buffer. If the values are read to the buffer faster than they can be physically written (using a hard disk, for example), overloading may occur and recording is then stopped.	Archive fewer values. Or: Increase the logging cycle.
80013	The overload status no longer applies. Archiving resumes the recording of all values.	--
80014	The same action was triggered twice in quick succession. Since the process is already in operation, the action is only carried out once.	--
80015	This system alarm is used to report DOS or database errors to the user.	--
80016	The logs are separated by the system function "CloseAllLogs" and the incoming entries exceed the defined buffer size. All entries in the buffer are deleted.	Reconnect the logs.
80017	The number of incoming events cause a buffer overflow. This can be caused, for example, by several copying actions being activated at the same time. All copy jobs are deleted.	Stop the copy action.
80019	The connection between WinCC flexible and all logs were closed, for example, after executing the system function "CloseAllLogs". Entries are written to the buffer and are then written to the logs when a connection is re-established. There is no connection to the storage location and the storage medium may be replaced, for example.	--
80020	The maximum number of simultaneously copy operations has been exceeded. Copying is not executed.	Wait until the current copying actions have been completed, then restart the last copy action.
80021	An attempt was made to delete a log which is still busy with a copy action. Deletion has not been executed.	Wait until the current copying actions have been completed, then restart the last action.
80022	An attempt was made to use the system function "StartSequenceLog" to start a sequence log for a log which is not configured as a sequence log. No sequence log file is created.	In the project, check • if the "StartSequenceLog" system function was properly configured. • if the tag parameters are properly provided with data on the HMI device.
80023	An attempt was made to copy a log to itself. The log is not copied.	In the project, check • if the "CopyLog" system function was properly configured. • if the tag parameters are properly provided with data on the HMI device.
80024	The "CopyLog" system function does not allow copying when the target log already contains data ("Mode" parameter). The log is not copied.	Edit the "CopyLog" system function in the project if necessary. Before you initiate the system function, delete the destination log file.
80025	You have canceled the copy operation. Data written up to this point are retained. The destination log file (if configured) is not deleted. The cancellation is reported by an error entry RT_ERR at the end of the destination log.	--

Number	Effect/causes	Remedy
80026	This alarm is output after all logs are initialized. Values are written to the logs from then on. Prior to this, no entries are written to the logs, irrespective whether WinCC flexible Runtime is active or not.	--
80027	The internal Flash memory has been specified as the storage location for a log. This is not permissible. No values are written to this log and the log file is not created.	Configure "Storage Card" or a network path as the storage location.
80028	The alarm returns a status report indicating that the logs are currently being initialized. No values are logged until the alarm 80026 is output.	--
80029	The number of logs specified in the alarm could not be initialized. The logs are initialized. The faulty log files are not available for logging jobs.	Evaluate the additional system alarms related to this alarm. Check the configuration, the ODBC (Open Database Connectivity) and the specified drive.
80030	The structure of the existing log file does not match the expected structure. Logging is stopped for this log.	Delete the existing log data manually, in advance.
80031	The log in CSV format is corrupted. The log cannot be used.	Delete the faulty file.
80032	Logs can be assigned events. These are triggered as soon as the log is full. If WinCC flexible Runtime is started and the log is already full, the event is not triggered. The log specified no longer logs data because it is full.	Close WinCC flexible Runtime, delete the log, then restart WinCC flexible Runtime. Or: Configure a button which contains the same actions as the event and press it.
80033	"System Defined" is set in the data log file as the data source name. This causes an error. No data is written to the database logs, whereas the logging to the CSV logs works.	Reinstall SQL Sever 2005 Express.
80034	An error has occurred in the initialization of the logs. An attempt has been made to create the tables as a backup. This action was successful. A backup has been made of the tables of the corrupted log file and the cleared log was restarted.	No action is necessary. However, it is recommended to save the backup files or delete them in order to make the space available again.
80035	An error has occurred in the initialization of the logs. An attempt has been made to create backups of the tables and this has failed. No logging or backup has been performed.	It is recommended to save the backups or to delete them in order to release memory.
80044	The export of a log was interrupted because Runtime was closed or due to a power failure. It was detected that the export needed to be resume when Runtime restarted.	The export resumes automatically.
80045	The export of a log was interrupted due to an error in the connection to the server or at the server itself.	The export is repeated automatically. Check: • The connection to the server. • If the server is running. • If there is enough free space on the server.
80046	The destination file could not be written while exporting the log.	Check whether there is enough space on the server and it you have permission to create the log file.

Number	Effect/causes	Remedy
80047	The log could not be read while exporting it.	Check whether the storage medium is correctly inserted.
80049	The log could not be renamed while preparing to export it. The job can not be completed."	Check whether the storage medium is correctly inserted and if there is sufficient space on the medium.
80050	The log which shall be exported is not closed. The job can not be completed.	Make sure the "CloseAll Logs" system function is called before using the "ExportLog" system function. Change the configuration as required.

90000 - FDA alarms

Number	Effect/causes	Remedy
90024	No operator actions can be logged due to lack of space on the storage medium for log. The operator action will therefore not be executed.	Make more space available by inserting an empty storage medium or swapping out the log files on the server using "ExportLog".
90025	No user actions can be logged because of error state of the archive. Therefore the user action will not be executed.	Check whether the storage medium is correctly inserted.
90026	No operator actions can be logged because the log is closed. The operator action will therefore not be executed.	Before further operator actions are carried out, the log must be opened again using the system function "OpenAllLogs". Change the configuration as required.
90028	The password you entered is incorrect.	Enter the correct password.
90029	Runtime was closed during ongoing operation (perhaps due to a power failure) or a storage medium in use is incompatible with Audit Trail. An Audit Trail is not suitable if it belongs to another project or has already be archived.	Ensure that you are using the correct storage medium.
90030	Runtime was closed during ongoing operation (perhaps due to a power failure).	--
90031	Runtime was closed during ongoing operation (perhaps due to a power failure).	--
90032	Running out of space on the storage medium for log.	Make more space available by inserting an empty storage medium or swapping out the log files on the server using "ExportLog".
90033	No more space on the storage medium for log. As of now, no more operator actions requiring logging will be executed.	Make more space available by inserting an empty storage medium or swapping out the log files on the server using "ExportLog".
90039	You do not have the necessary authorization to perform this action.	Adapt or upgrade your authorizations.
90040	Audit Trail is switched off because of a forced user action.	Activate the "Audit Trail" again using the system function "StartLog".
90041	A user action which has to be logged has been executed without a logged on user.	A user action requiring logging should only be possible with permission. Change the configuration by setting a required permission for the input object.
90044	A user action which has to be confirmed was blocked, because there is another user action pending.	Repeat the user action if necessary.

110000 - Offline function alarms

Number	Effect/causes	Remedy
110000	The operating mode was changed. "Offline" mode is now set.	--
110001	The operating mode was changed. "Online" mode is now set.	--
110002	The operating mode was not changed.	Check the connection to the PLCs. Check whether the address area for the area pointer 88 “Coordination" in the PLC is available.
110003	The operating mode of the specified PLC was changed by the system function "SetConnectionMode". The operating mode is now "offline".	--
110004	The operating mode of the specified PLC has been changed by the system function "SetConnectionMode". The operating mode is now "online".	--
110005	An attempt was made to use the system function SetConnectionMode to switch the specified PLC to "online" mode, although the entire system is in "offline" mode. This changeover is not allowed. The PLC remains in "offline" mode.	Switch the complete system to "online" mode, then execute the system function again.
110006	The content of the "project version" area pointer does not match the user version configured in WinCC flexible. WinCC flexible Runtime is therefore closed.	Check: • The project ID entered on the PLC. • The project ID entered in WinCC flexible.

120000 - Trend alarms

Number	Effect/causes	Remedy
120000	The trend is not displayed because you configured an incorrect axis to the trend or an incorrect trend.	Change the configuration.
120001	The trend is not displayed because you configured an incorrect axis to the trend or an incorrect trend.	Change the configuration.
120002	The trend is not displayed because the tag assigned attempts to access an invalid PLC address.	Check whether the data area for the tag exists in the PLC, the configured address is correct and the value range for the tag is correct.

130000 - System information alarms

Number	Effect/causes	Remedy
130000	The action was not executed.	Close all other programs. Delete files no longer required from the hard disk.
130001	The action was not executed.	Delete files no longer required from the hard disk.
130002	The action was not executed.	Close all other programs. Delete files no longer required from the hard disk.

Number	Effect/causes	Remedy
130003	No data medium found. The operation is canceled.	Check, for example, if • The correct data medium is being accessed • The data medium is inserted
130004	The data medium is write-protected. The operation is canceled.	Check whether access has been made to the correct data carrier. Remove the write protection.
130005	The file is read only. The operation is canceled.	Check whether access has been made to the correct file. Edit the file attributes if necessary.
130006	Access to file failed. The operation is canceled.	Check, for example, if • The correct file is being accessed • The file exists • Another action is preventing simultaneous access to the file.
130007	The network connection is interrupted. Records cannot be saved or read over the network connection.	Check the network connection and eliminate the cause of error.
130008	The storage card is not available. Records cannot be saved to / read from the storage card.	Insert the storage card.
130009	The specified folder does not exist on the storage card. Any files saved to this directory are not backed up when you switch off the HMI device.	Insert the storage card.
130010	The maximum nesting depth can be exhausted when, for example, a value change in a script results in the call of another script and the second script in turn has a value change that results in the call of yet a further script etc. The configured functionality is not supported.	Check the configuration.

140000 - Connection alarms chns7: Connection + device

Number	Effect/causes	Remedy
140000	An online connection to the PLC is established.	--
140001	The online connection to the PLC was shut down.	--
140003	No tag updating or writing is executed.	Check the connection and if the PLC is switched on. Check the parameter definitions in the Control Panel using "Set PG/PC interface". Restart the system.
140004	No tag update or write operations are executed because the access point or the module configuration is faulty.	Verify the connection and check whether the PLC is switched on. Check the access point or the module configuration (MPI, PPI, PROFIBUS) in the Control Panel with "Set PG/PC interface". Restart the system.

Number	Effect/causes	Remedy
140005	No tag updating or writing is executed because the HMI device address is incorrect (possibly too high).	Use a different HMI device address. Verify the connection and check whether the PLC is switched on. Check the parameter definitions in the Control Panel using "Set PG/PC interface". Restart the system.
140006	No tag updating or writing is executed because the baud rate is incorrect.	Select a different baud rate in WinCC flexible (according to module, profile, communication peer, etc.).
140007	Tags are not updated or written because the bus profile is incorrect (see %1). The following parameters could not be written to the registry: 1: Tslot 2: Tqui 3: Tset 4: MinTsdr 5: MaxTsdr 6: Trdy 7: Tid1 8: Tid2 9: Gap Factor 10: Retry Limit	Check the user-defined bus profile. Check the connection and if the PLC is switched on. Check the parameter definitions in the Control Panel using "Set PG/PC interface". Restart the system.
140008	No tag updating or writing is executed because baud rate is incorrect. The following parameters could not be written to the registry: 0: General error 1: Wrong version 2: Profile cannot be written to the registry. 3: The subnet type cannot be written to the registry. 4: The Target Rotation Time cannot be written to the registry. 5: Faulty Highest Address (HSA).	Check the connection and if the PLC is switched on. Check the parameter definitions in the Control Panel using "Set PG/PC interface". Restart the system.
140009	Tags are not updated or written because the module for S7 communication was not found.	Reinstall the module in the Control Panel using "Set PG/PC interface".
140010	No S7 communication partner found because the PLC is shut down. DP/T: The option “PG/PC is the only master” is not set in the Control Panel under “Set PG/PC interface.”	Switch the PLC on. DP/T: If only one master is connected to the network, disable "PG/PC is the only master" in "Set PG/PC interface". If several masters are connected to the network, enable these. Do not change any settings, for this will cause bus errors.
140011	No tag updating or writing is executed because communication is down.	Check the connection and that the communication partner is switched on.
140012	There is an initialization problem (e.g. when WinCC flexible Runtime was closed in Task Manager). Or: Another application (e.g.STEP7) with different bus parameters is active and the driver cannot be started with the new bus parameters (transmission rate, for example).	Restart the HMI device. Or: Run WinCC flexible Runtime, then start your other applications.

Number	Effect/causes	Remedy
140013	The MPI cable is disconnected and, thus, there is no power supply.	Check the connections.
140014	The configured bus address is in already in use by another application.	Edit the HMI device address in the PLC configuration.
140015	Wrong transmission rate Or: Faulty bus parameters (e.g. HSA) Or: OP address > HSA or: Wrong interrupt vector (interrupt does not arrive at the driver)	Correct the relevant parameters.
140016	The hardware does not support the configured interrupt.	Change the interrupt number.
140017	The set interrupt is in use by another driver.	Change the interrupt number.
140018	The consistency check was disabled by SIMOTION Scout. Only a corresponding note appears.	Enable the consistency check with SIMOTION Scout and once again download the project to the PLC.
140019	SIMOTION Scout is downloading a new project to the PLC. Connection to the PLC is canceled.	Wait until the end of the reconfiguration.
140020	The version in the PLC and that of the project (FWX file) do not match. Connection to the PLC is canceled.	The following remedies are available: Download the current version to the PLC using SIMOTION Scout. Regenerate the project using WinCC flexible ES, close WinCC flexible Runtime and restart with a new configuration.

150000 - Connection alarms chnAS511: Connection

Number	Effect/causes	Remedy
150000	No more data is read or written. Possible causes: • The cable is defective. • The PLC does not respond, is defective, etc. • The wrong port is used for the connection. • System overload	Ensure that the cable is plugged in, the PLC is operational, the correct port is being used. Restart the system if the system alarm persists.
150001	Connection is up because the cause of the interruption has been eliminated.	--

160000 - Connection alarms IVar (WinLC) / OPC: Connection

Number	Effect/causes	Remedy
160000	No more data is read or written. Possible causes: • The cable is defective. • The PLC does not respond, is defective, etc. • The wrong port is used for the connection. • System overload	Ensure that the cable is plugged in, the PLC is operational, the correct port is being used. Restart the system if the system alarm persists.
160001	Connection is up because the cause of the interruption has been eliminated.	--

Number	Effect/causes	Remedy
160010	No connection to the server because the server identification (CLS-ID) cannot be determined. Values cannot be read or written.	Check access rights.
160011	No connection to the server because the server identification (CLS-ID) cannot be determined. Values cannot be read or written.	Check, for example, if • The server name is correct. • The computer name is correct. • The server is registered.
160012	No connection to the server because the server identification (CLS-ID) cannot be determined. Values cannot be read or written.	Check, for example, if • The server name is correct. • The computer name is correct. • The server is registered. Note for advanced users: Interpret the value from HRESULT.
160013	The specified server was started as InProc server. This has not been released and may possibly lead to incorrect behavior because the server is running in the same process area as the WinCC flexible Runtime software.	Configure the server as OutProc Server or Local Server.
160014	Only one OPC server project can be started on a PC/MP. An alarm is output when an attempt is made to start a second project. The second project has no OPC server functionality and cannot be located as an OPC server by external sources.	Do not start a second project with OPC server functionality on the computer.

170000 - S7 dialog alarms

Number	Effect/causes	Remedy
170000	S7 diagnostics events are not indicated because it is not possible to log on to the S7 diagnostics functions at this device. The service is not supported.	--
170001	The S7 diagnostics buffer cannot be viewed because communication with the PLC is shut down.	Set the PLC to online mode.
170002	The S7 diagnostics buffer cannot be viewed because reading of the diagnostics buffer (SSL) was canceled with error.	--
170003	An S7 diagnostics event cannot be visualized. The system returns internal error %2.	--
170004	An S7 diagnostics event cannot be visualized. The system returns an internal error of error class %2, error number %3.	--
170007	It is not possible to read the S7 diagnostics buffer (SSL) because this operation was canceled with an internal error of class %2 and error code %3.	--

180000 - Misc/common alarms

Number	Effect/causes	Remedy
180000	A component/OCX received configuration data with a version ID which is not supported.	Install a newer component.
180001	System overload because too many actions running in parallel. Not all the actions can be executed, some are rejected.	Several remedies are available: • Generate the alarms at a slower rate (polling). • Initiate scripts and functions at greater intervals. If the alarm appears more frequently: Restart the HMI device.
180002	The screen keyboard could not be activated. Possible causes: "TouchInputPC.exe" was not registered due to a faulty Setup.	Reinstall WinCC flexible Runtime.

190000 - Tag alarms

Number	Effect/causes	Remedy
190000	It is possible that the tag is not updated.	--
190001	The tag is updated after the cause of the last error state has been eliminated (return to normal operation).	--
190002	The tag is not updated because communication with the PLC is down.	Select the system function "SetOnline" to go online.
190004	The tag is not updated because the configured tag address does not exist.	Check the configuration.
190005	The tag is not updated because the configured PLC type does not exist for this tag.	Check the configuration.
190006	The tag is not updated because it is not possible to map the PLC type in the data type of the tag.	Check the configuration.
190007	The tag value is not modified because the connection to the PLC is interrupted or the tag is offline.	Set online mode or reconnect to the PLC.
190008	The threshold values configured for the tag have been violated, for example, by • A value entered • A system function • A script	Observe the configured or current threshold values of the tag.
190009	An attempt has been made to assign the tag a value which is outside the permitted range of values for this data type. For example, a value of 260 was entered for a byte tag or a value of -3 for an unsigned word tag.	Observe the range of values for the data type of the tags.
190010	Too many values are written to the tag (for example, in a loop triggered by a script). Values are lost because only up to 100 actions are saved to the buffer.	The following remedies are available: • Increase the time interval between multiple write actions. • Do not use an array tag longer than 6 words when you configure an acknowledgment on the HMI device using "Acknowledgment HMI".

Number	Effect/causes	Remedy
190011	Possible cause 1: The value entered could not be written to the configured PLC tag because the high or low limit was exceeded. The system discards the entry and restores the original value. Possible cause 2: The connection to the PLC was interrupted.	Make sure that the value entered lies within the range of values of the control tags. Check the connection to the PLC.
190012	It is not possible to convert a value from a source format to a target format, for example: An attempt is being made to assign a value to a counter that is outside the valid, PLC-specific value range. A tag of the type Integer should be assigned a value of the type String.	Check the range of values or the data type of the tags.
190013	The user has entered a string that is longer than the tag. The string is automatically shortened to the permitted length.	Only enter strings that do not exceed the permitted tag length.

190100 - Area pointer alarms

Number	Effect/causes	Remedy
190100	The area pointer is not updated because the address configured for this pointer does not exist. Type 1 Warnings 2 Errors 3 PLC acknowledgment 4 HMI device acknowledgment 5 LED mapping 6 Trend request 7 Trend transfer 1 8 Trend transfer 2 No.: Consecutive number displayed in WinCC flexible ES.	Check the configuration.
190101	The area pointer is not updated because it is not possible to map the PLC type to the area pointer type. Parameter type and no.: see alarm 190100	--
190102	The area pointer is updated after the cause of the last error state has been eliminated (return to normal operation). Parameter type and no.: See alarm 190100.	--

200000 - PLC coordination alarms

Number	Effect/causes	Remedy
200000	Coordination is not executed because the address configured in the PLC does not exist/is not set.	Change the address or set up the address in the PLC.
200001	Coordination is canceled because the write access to the address configured in the PLC is not possible.	Change the address or set the address in the PLC at an area which allows write access.
200002	Coordination is not carried out at the moment because the address format of the area pointer does not match the internal storage format.	Internal error
200003	Coordination can be executed again because the last error state is eliminated (return to normal operation).	--
200004	The coordination may not be executed.	--
200005	No more data is read or written. Possible causes: • The cable is defective. • The PLC does not respond, is defective, etc. • System overload	Ensure that the cable is plugged in and the PLC is operational. Restart the system if the system alarm persists.

200100 - PLC user version alarms

Number	Effect/causes	Remedy
200100	Coordination is not executed because the address configured in the PLC does not exist/is not set.	Change the address or set up the address in the PLC.
200101	Coordination is canceled because the write access to the address configured in the PLC is not possible.	Change the address or set the address in the PLC at an area which allows write access.
200102	Coordination is not carried out at the moment because the address format of the area pointer does not match the internal storage format.	Internal error
200103	Coordination can be executed again because the last error state is eliminated (return to normal operation).	--
200104	The coordination may not be executed.	--
200105	No more data is read or written. Possible causes: • The cable is defective. • The PLC does not respond, is defective, etc. • System overload	Ensure that the cable is plugged in and the PLC is operational. Restart the system if the system alarm persists.

210000 - PLC job alarms

Number	Effect/causes	Remedy
210000	Jobs are not processed because the address configured in the PLC does not exist/has not been set up.	Change the address or set up the address in the PLC.
210001	Jobs are not processed because read/write access to the address configured in the PLC is not possible.	Change the address or set up the address in the PLC in an area which allows read/write access.
210002	Jobs are not executed because the address format of the area pointer does not match the internal storage format.	Internal error
210003	The job buffer is processed again because the last error status has been eliminated (return to normal operation).	--
210004	It is possible that the job buffer will not be processed.	--
210005	A control request with an illegal number was initiated.	Check the PLC program.
210006	An error occurred while attempting to execute the control request. As a result, the control request is not executed. Observe the next/previous system alarms.	Check the parameters of the control request. Recompile the configuration.

220000 - WinCC channel adapter alarms

Number	Effect/causes	Remedy
220001	The tag is not downloaded because the associated communication driver / HMI device does not support the download of Boolean/discrete data types.	Change the configuration.
220002	The tag is not downloaded because the associated communication driver / HMI device does not support write access to the data type BYTE.	Change the configuration.
220003	The communication driver cannot be loaded. The driver may not be installed.	Install the driver by reinstalling WinCC flexible Runtime.
220004	Communication is down and no update data is transferred because the cable is not connected or defective etc.	Check the connection.
220005	Communication is up.	--
220006	The connection between the specified PLC and the specified port is active.	--
220007	The connection to the specified PLC is interrupted at the specified port.	Check whether • The cable is plugged in • The PLC is OK • The correct port is used • Your configuration is OK (port parameters, protocol settings, PLC address). Restart the system if the system alarm persists.

Number	Effect/causes	Remedy
220008	The communication driver cannot access or open the specified port. The port may be in use by another application or the port used is not available on the destination device. There is no communication with the PLC.	Close all the applications which access this port and restart the computer. Use another port of the system.

230000 - View alarms

Number	Effect/causes	Remedy
230000	The value entered could not be accepted. The system discards the entry and restores the previous value. Either • The value range has been exceeded • Illegal characters have been entered • The maximum permitted number of users has been exceeded.	Enter a practical value or delete any unneeded users.
230002	The currently logged in user has not the required authorization. The system therefore discards the input and restored the previous value.	Log on as a user with appropriate authorization.
230003	Changeover to the specified screen failed because the screen is not available/configured. The current screen remains selected.	Configure the screen and check the screen selection function.
230005	The value range of the tag has been exceeded in the I/O field. The original value of the tag is retained.	Observe the range of values for the tag when entering a value.
230100	During navigation in the web browser, the system returned a message which may be of interest to the user. The web browser continues to run but may not (fully) show the new page.	Navigate to another page.
230200	The connection to the HTTP channel was interrupted due to an error. This error is explained in detail by another system alarm. Data is no longer exchanged.	Check the network connection. Check the server configuration.
230201	The connection to HTTP channel was established. Data is exchanged.	--

Number	Effect/causes	Remedy
230202	WININET.DLL has detected an error. This error is usually generated if it is not possible to connect to the server or if the server denies access because the client could not authenticate itself. A rejected server certificate could also cause a communication error in secure SSL connections. For details, refer to the error text in the alarm. This text is always output in the language of your Windows installation, as it is returned by the Windows operating system. Process values are not exchanged. The part of the alarm which is returned by the Windows operating system may not be displayed, for example "An error has occurred." WININET.DLL returns the following error: Number: 12055 Text:HTTP: <no error text available>."	Depending on the cause: When an attempt to connect fails or a timeout error occurs: • Check the network connection and the network. • Check the server address. • Check whether the WebServer is actually running on the destination station. Faulty authorization: • The configured user name and/or password do not match those on the server. Establish consistency When the server certificate is rejected: Certificate signed by an unknown CA ( ): • Either ignore this item in your project, or • Install a certificate that has been signed with a root certificate known to the client computer. The date of the certificate is invalid: • Either ignore this item in your project, or • Install a certificate with a valid date on the server. Invalid CN (Common Name or Computer Name): • Either ignore this item in your project, or • Install a certificate with a name that corresponds to that of the server address.
230203	Although a connection can be made to the server, the HTTP server refuses to connect because • WinCC flexible Runtime is not running on the server, or • The HTTP channel is not supported (503 Service unavailable). Other errors can only occur if the Webserver does not support the HTTP channel. The language of the alarm text depends on the Webserver. Data is not exchanged.	Error 503 Service unavailable: Check that WinCC flexible Runtime is running on the server and the HTTP channel is supported.
230301	An internal error has occurred. An English text explains the error in more detail. This may be caused by insufficient memory. OCX does not work.	--
230302	The name of the remote server cannot be resolved. The attempt to connect failed.	Check the configured server address. Check whether the DNS service is available on the network.
230303	The remote server is not running on the addressed computer. Wrong server address. The attempt to connect failed.	Check the configured server address. Check whether the remote server is running on the target computer.
230304	The remote server on the addressed computer is incompatible with VNCOCX. The attempt to connect failed.	Use a compatible remote server.

Number	Effect/causes	Remedy
230305	The authentication has failed because the password is incorrect. The attempt to connect failed.	Configure the correct password.
230306	Error in the connection to the remote server. This may occur as a result of network problems. The attempt to connect failed.	Check whether • The bus cable is plugged in • There are network problems.
230307	The connection to the remote server was shut down because • The remote server was shut down, or • The user instructed the server to close all connections. The connection is closed.	--
230308	This alarm provides information on the connection status. An attempt is made to connect.	--

240000 - Authorization alarms

Number	Effect/causes	Remedy
240000	WinCC flexible Runtime is operating in demo mode. You have no authorization or your authorization is corrupted.	Install the authorization.
240001	WinCC flexible Runtime is operating in demo mode. Too many tags are configured for the installed version.	Load an adequate authorization / powerpack.
240002	WinCC flexible Runtime is operating with a time-limited emergency authorization.	Restore the full authorization.
240004	Error while reading the emergency authorization. WinCC flexible Runtime is operating in demo mode.	Restart WinCC flexible Runtime, install the authorization or repair the authorization (see Commissioning Instructions Software Protection).
240005	The Automation License Manager has detected an internal system fault. Possible causes: • A corrupt file • A defective installation • No free space for the Automation License Manager etc.	Reboot the HMI device or PC. If this does not solve the problem, remove the Automation License Manager and install it again.

250000 - S7 Force alarms

Number	Effect/causes	Remedy
250000	The tag in the specified line in "Status Force" is not updated because the address configured for this tag is not available.	Check the set address and then verify that the address is set up in the PLC.

Number	Effect/causes	Remedy
250001	The tag in the specified line in "Status Force" is not updated because the PLC type configured for this tag does not exist.	Check the set address.
250002	The tag in the specified line in "Status Force" is not updated because it is not possible to map the PLC type in the tag type.	Check the set address.
250003	An attempt to connect to the PLC failed. The tags are not updated.	Check the connection to the PLC. Check that the PLC is switched on and is online.

260000 - Password system alarms

Number	Effect/causes	Remedy
260000	An unknown user or an unknown password has been entered in the system. The current user is logged off from the system.	Log on to the system as a user with a valid password.
260001	The logged in user does not have sufficient authorization to execute the protected functions on the system.	Log on to the system as a user with sufficient authorization.
260002	This alarm is triggered by the system function "TrackUserChange".	--
260003	The user has logged off from the system.	--
260004	The user name entered into the user view already exists in the user management.	Select another user name because user names have to be unique in the user management.
260005	The entry is discarded.	Enter a shorter user name.
260006	The entry is discarded.	Use a shorter or longer password.
260007	The logon timeout value entered is outside the valid range of 0 to 60 minutes. The new value is discarded and the original value is retained.	Enter a logon timeout value between 0 and 60 minutes.
260008	An attempt was made to read a PTProRun.pwl file created with ProTool V 6.0 in WinCC flexible. Reading the file was canceled due to incompatibility of the format.	--
260009	You have attempted to delete the user "Admin" or "PLC User". These users are fixed components of the user management and cannot be deleted.	If you need to delete a user, because perhaps you have exceeded the maximum number permitted, delete another user.
260012	The passwords entered in the "Change Password" dialog and the confirmation field are not identical. The password has not been changed. User will be logged off.	You have to log on to the system again. Then enter the identical password twice to be able to change the password.
260013	The password entered in the "Change Password" dialog is invalid because it is already in use. The password has not been changed. User will be logged off.	You have to log on to the system again. Then enter a new password that has not been used before.

Number	Effect/causes	Remedy
260014	You have tried unsuccessfully to log on three times in succession. You will be locked out and assigned to group no. 0.	You can log on to the system with your correct password. Only an administrator can change the assignment to a group.
260023	The password you entered does not meet the necessary security guidelines.	Enter a password that contains at least one number.
260024	The password you entered does not meet the necessary security guidelines.	Enter a password that contains at least one character.
260025	The password you entered does not meet the necessary security guidelines.	Enter a password that contains at least one special character.
260028	Upon system start-up, an attempt to log on, or when trying to change the password of a SIMATIC log-on user, the system attempts to access the SIMATIC Logon Server. If attempting to log on, the new user is not logged in. If a different user was logged on before, then this user is logged off.	Check the connection to the SIMATIC Logon Server and its configuration; for example: 1. Port number 2. IP address 3. Server name 4. Functional transfer cable Or use a local user.
260029	The SIMATIC Logon user is not associated to any or several groups. The new user is not logged in. If a different user was logged on before, then this user is logged off.	Check the user data on the SIMATIC Logon Server and the configuration in your WinCC flexible project. A user may only be assigned to one group.
260030	The SIMATIC Logon user could not change his password on the SIMATIC Logon Server. The new password may not comply with the password regulations on the server or the user does not have the right to change his password. The old password remains and the user is logged off.	Log in again and choose a different password. Check the password rules on the SIMATIC Logon Server.
260031	It was not possible to log the user on to the SIMATIC Logon Server. The user name or the password could be incorrect or the user does not have sufficient rights to log on. The new user is not logged in. If a different user was logged on before, then this user is logged off.	Try again. If necessary, check the password data on the SIMATIC Logon Server.
260032	It was not possible to log the user on to the SIMATIC Logon Server as his account is blocked. The new user is not logged in. If a different user was logged on before, then this user is logged off.	Check the user data on the SIMATIC Logon Server.
260033	The action change password or log on user could not be carried out.	Check the connection to the SIMATIC Logon Server and its configuration; for example: 1. Port number 2. IP address 3. Server name 4. Functional transfer cable Or use a local user.

Number	Effect/causes	Remedy
260034	The last logon operation has not yet ended. A user action or a logon dialog can therefore not be called. The logon dialog is not opened. The user action is not executed.	Wait until the logon operation is complete.
260035	The last attempt to change the password was not completed. A user action or a logon dialog can therefore not be called. The logon dialog is not opened. The user action is not executed.	Wait until the procedure is complete.
260036	There are insufficient licenses on the SIMATIC Logon Sever. The logon is not authorized.	Check the licensing on the SIMATIC Logon Server.
260037	There is no license on the SIMATIC Logon Sever. A logon is not possible. It is not possible to log on via the SIMATIC Logon Server, only via a local user.	Check the licensing on the SIMATIC Logon Server.
260040	The system attempts to access the SIMATIC Logon Server upon system start-up or when trying to change the password. If attempting to log on, the new user is not logged in. If a different user was logged on before, then this user is logged off.	Check connection to the domain and its configuration in the Runtime security settings editor. Or use a local user.

270000 - System alarms

Number	Effect/causes	Remedy
270000	A tag is not indicated in the alarm because it attempts to access an invalid address in the PLC.	Check whether the data area for the tag exists in the PLC, the configured address is correct and the value range for the tag is correct.
270001	There is a device-specific limit as to how many alarms may be queued for output (see the operating instructions). This limit has been exceeded. The view no longer contains all the alarms. However, all alarms are written to the alarm buffer.	--
270002	The view shows alarms of a log for which there is no data in the current project. Wildcards are output for the alarms.	Delete older log data if necessary.
270003	The service cannot be set up because too many devices want to use this service. A maximum of four devices may execute this action.	Reduce the number of HMI devices which want to use the service.
270004	Access to persistent buffer is not possible. Alarms cannot be restored or saved.	If the problems persist at the next startup, contact Customer Support (delete Flash).
270005	Persistent buffer damaged: Alarms cannot be restored.	If the problems persist at the next startup, contact Customer Support (delete Flash).

Number	Effect/causes	Remedy
270006	Project modified: Alarms cannot be restored from the persistent buffer.	The project was generated and transferred new to the HMI device; The error should no longer occur when the device starts again.
270007	A configuration problem is preventing the restore (a DLL is missing, a directory is unknown, etc.).	Update the operating system and then transfer your project again to the HMI device.

280000 - DPHMI alarms Connection

Number	Effect/causes	Remedy
280000	Connection is up because the cause of the interruption has been eliminated.	--
280001	No more data is read or written. Possible causes: • The cable is defective • The PLC does not respond, is defective, etc. • The wrong port is used for the connection • System overload	Check whether • The cable is plugged in • The PLC is OK • The correct port is used. Restart the system if the system alarm persists.
280002	The connection used requires a function block in the PLC. The function block has responded. Communication is now enabled.	--
280003	The connection used requires a function block in the PLC. The function block has not responded.	Check whether • The cable is plugged in • The PLC is OK • The correct port is used. Restart the system if the system alarm persists. Remedy depends on the error code: 1: The function block must set the COM bit in the response container. 2: The function block must not set the ERROR bit in the response container. 3: The function block must respond within the specified time (timeout). 4: Go online to the PLC.
280004	The connection to the PLC is interrupted. There is no data exchange at present.	Check the connection parameters in WinCC flexible. Ensure that the cable is plugged in, the PLC is operational, the correct port is being used. Restart the system if the system alarm persists.

290000 - Recipe system alarms

Number	Effect/causes	Remedy
290000	The recipe tag could not be read or written. It is assigned the start value. The alarm can be entered in the alarm buffer for up to four more failed tags if necessary. After that, alarm 290003 is output.	Check in the configuration that the address has been set up in the PLC.
290001	An attempt has been made to assign a value to a recipe tag which is outside the value range permitted for this type. The alarm can be entered in the alarm buffer for up to four more failed tags if necessary. After that, alarm 290004 is output.	Observe the value range for the tag type.
290002	It is not possible to convert a value from a source format to a target format. The alarm can be entered in the alarm buffer for up to four more failed recipe tags if necessary. After that, alarm 290005 is output.	Check the value range or type of the tag.
290003	This alarm is output when alarm number 290000 is triggered more than five times. In this case, no further separate alarms are generated.	Check in the configuration that the tag addresses have been set up in the PLC.
290004	This alarm is output when alarm number 290001 is triggered more than five times. In this case, no further separate alarms are generated.	Observe the value range for the tag type.
290005	This alarm is output when alarm number 290002 is triggered more than five times. In this case, no further separate alarms are generated.	Check the value range or type of the tag.
290006	The threshold values configured for the tag have been violated by values entered.	Observe the configured or current threshold values of the tag.
290007	There is a difference between the source and target structure of the recipe currently being processed. The target structure contains an additional data recipe tag which is not available in the source structure. The data recipe tag specified is assigned its start value.	Insert the specified data recipe tag in the source structure.
290008	There is a difference between the source and target structure of the recipe currently being processed. The source structure contains an additional data recipe tag which is not available in the target structure and therefore cannot be assigned. The value is rejected.	Remove the specified data recipe tag in the specified recipe from the project.
290010	The storage location configured for the recipe is not permitted. Possible causes: Illegal characters, write protection, data carrier out of space or does not exist.	Check the configured storage location.
290011	The record with the specified number does not exist.	Check the source for the number (constant or tag value).

Number	Effect/causes	Remedy
290012	The recipe with the specified number does not exist.	Check the source for the number (constant or tag value).
290013	An attempt was made to save a record under a record number which already exists. The action is not executed.	The following remedies are available: • Check the source for the number (constant or tag value). • First, delete the record. • Change the "Overwrite" function parameter.
290014	The file specified to be imported could not be found.	Check: • The file name • Ensure that the file is in the specified directory.
290020	Alarm reporting that the download of records from the HMI device to the PLC has started.	--
290021	Alarm reporting that the download of records from the HMI device to the PLC was completed.	--
290022	Alarm reporting that the download of records from the HMI device to the PLC was canceled due to an error.	Check in the configuration whether: • The tag addresses are configured in the PLC • The recipe number exists • The record number exist • The "Overwrite" function parameter is set
290023	Alarm reporting that the download of records from the PLC to the HMI device has started.	--
290024	Alarm reporting that the download of records from the PLC to the HMI device was completed.	---
290025	Alarm reporting that the download of records from the PLC to the HMI device was canceled due to an error.	Check in the configuration whether: • The tag addresses are configured in the PLC • The recipe number exists • The record number exist • The "Overwrite" function parameter is set
290026	An attempt has been made to read/write a record although the record is not free at present. This error may occur in the case of recipes for which downloading with synchronization has been configured.	Set the record status to zero.
290027	Unable to connect to the PLC at present. As a result, the record can neither be read nor written. Possible causes: No physical connection to the PLC (no cable plugged in, cable is defect) or the PLC is switched off.	Check the connection to the PLC.
290030	This alarm is output after you selected screen which contains a recipe view in which a record is already selected.	Reload the record from the storage location or retain the current values.
290031	While saving, it was detected that a record with the specified number already exists.	Overwrite the record or cancel the action.
290032	While exporting records it was detected that a file with the specified name already exists.	Overwrite the file or cancel the process.
290033	Confirmation request before deleting records.	--

Number	Effect/causes	Remedy
290040	A record error with error code %1 that cannot be described in more detail occurred. The action is canceled. It is possible that the record was not installed correctly on the PLC.	Check the storage location, the record, the "Data record" area pointer and if necessary, the connection to the PLC. Restart the action after a short time. If the error persists, contact Customer Support. Forward the relevant error code to Customer Support.
290041	A record or file cannot be saved because the storage location is full.	Delete files no longer required.
290042	An attempt was made to execute several recipe actions simultaneously. The last action was not executed.	Trigger the action again after waiting a short period.
290043	Confirmation request before storing records.	--
290044	The data store for the recipe has been destroyed and is deleted.	--
290050	Alarm reporting that the export of records has started.	--
290051	Alarm reporting that the export of records was completed.	--
290052	Alarm reporting that the export of records was canceled due to an error.	Ensure that the structure of the records at the storage location and the current recipe structure on the HMI device are identical.
290053	Alarm reporting that the import of records has started.	--
290054	Alarm reporting that the import of records was completed.	--
290055	Alarm reporting that the import of records was canceled due to an error.	Ensure that the structure of the records at the storage location and the current recipe structure on the HMI device are identical.
290056	Error when reading/writing the value in the specified line/column. The action was canceled.	Check the specified line/column.
290057	The tags of the recipe specified were toggled from "offline" to "online" mode. Each change of a tag in this recipe is now immediately downloaded to the PLC.	--
290058	The tags of the specified recipe were toggled from "offline" to "online" mode. Modifications to tags in this recipe are no longer immediately transferred to the PLC but must be transferred there explicitly by downloading a record.	--
290059	Alarm reporting that the specified record was saved.	--
290060	Alarm reporting that the specified record memory was cleared.	--
290061	Alarm reporting that clearing of record memory was canceled due to an error.	--
290062	The record number is above the maximum of 65536. This record cannot be created.	Select another number.

Number	Effect/causes	Remedy
290063	This occurs with the system function "ExportDataRecords" when the parameter "Overwrite" is set to No. An attempt has been made to save a recipe under a file name which already exists. The export is canceled.	Check the "ExportDataRecords" system function.
290064	Alarm reporting that the deletion of records has started.	--
290065	Alarm reporting that the deletion of records has successfully completed.	--
290066	Confirmation request before deleting records.	--
290068	Security request to confirm if all records in the recipe should be deleted.	--
290069	Security request to confirm if all records in the recipe should be deleted.	--
290070	The record specified is not in the import file.	Check the source of the record number or record name (constant or tag value).
290071	During the editing of record values, a value was entered which exceeded the low limit of the recipe tag. The entry is discarded.	Enter a value within the limits of the recipe tag.
290072	When editing record values, a value was entered which exceeds the high limit of the recipe tag. The entry is discarded.	Enter a value within the limits of the recipe tag.
290073	An action (e.g. saving a record) failed due to an unknown error. The error corresponds to the status alarm IDS_OUT_CMD_EXE_ERR in the large recipe view.	--
290074	While saving, it was detected that a record with the specified number already exists but under another name.	Overwrite the record, change the record number or cancel the action.
290075	A record with this name already exists. The record is not saved.	Please select a different record name.
290110	The default values could not be set due to an error.	--
290111	The Recipes subsystem cannot be used. Recipe views have no content and recipe-specific functions will not be performed. Possible causes: • An error occurred while transferring the recipes. • The recipe structure was changed in ES. When the project was downloaded again, the recipes were not transferred with it. This means that the new configuration data is not being transferred to the old recipes on the device.	Transfer the project to the device again, together with the recipes (the corresponding check box in the Transfer dialog must be checked).

300000 - Alarm_S alarms

Number	Effect/causes	Remedy
300000	Faulty configuration of process monitoring (e.g. using PDiag or S7-Graph): More alarms are queued than specified in the specifications of the CPU. No further ALARM_S alarms can be managed by the PLC and reported to the HMI devices.	Change the PLC configuration.
300001	ALARM_S is not registered on this PLC.	Select a controller that supports the ALARM_S service.

310000 - Report system alarms

Number	Effect/causes	Remedy
310000	An attempt is being made to print too many reports in parallel. Only one log file can be output to the printer at a given time; the print job is therefore rejected.	Wait until the previous active log was printed. Repeat the print job if necessary.
310001	An error occurred on triggering the printer. The report is either not printed or printed with errors.	Evaluate the additional system alarms related to this alarm. Repeat the print job if necessary.

320000 - Alarms

Number	Effect/causes	Remedy
320000	The movements have already been indicated by another device. The movements can no longer be controlled.	Deselect the movements on the other display units and select the motion control screen on the required display unit.
320001	The network is too complex. The faulty addresses cannot be indicated.	View the network in STL.
320002	No diagnosable alarm message (error) selected. The unit associated with the alarm message could not be selected.	Select a diagnostics alarm from the ZP_ALARM alarm screen.
320003	No alarm message (error) exists for the selected unit. The detail view cannot visualize any networks.	Select the defective unit from the overview screen.
320004	The required signal states could not be read by the PLC. The faulty addresses cannot be found.	Check the consistency between the configuration on the display unit and the PLC program.
320005	The project contains ProAgent elements which are not installed. ProAgent diagnostic functions cannot be performed	In order to run the project, install the optional ProAgent package.
320006	You have attempted to execute a function which is not supported in the current constellation.	Check the type of the selected unit.
320007	No error-triggering addresses were found on the networks. ProAgent cannot indicate any faulty addresses.	Switch the detail screen to STL layout mode and check the status of the addresses and exclusion addresses.

Number	Effect/causes	Remedy
320008	The diagnostic data stored in the configuration are not synchronized with those in the PLC. ProAgent can only indicate the diagnostic units.	Transfer the project to the HMI device again.
320009	The diagnostic data stored in the configuration are not synchronized with those in the PLC. The diagnostic screens can be operated as usual. ProAgent may be unable to show all diagnostic texts.	Transfer the project to the HMI device again.
320010	The diagnostic data stored in the configuration are not synchronized with those in STEP7. The ProAgent diagnostics data is not up-to-date.	Transfer the project to the HMI device again.
320011	A unit with the corresponding DB number and FB number does not exist. The function cannot be executed.	Check the parameters of the "SelectUnit" function and the units selected in the project.
320012	The "Step sequence mode" dialog is no longer supported.	Use the ZP_STEP step sequence screen from the corresponding standard project for your project. Instead of calling the Overview_Step_Sequence_Mode function, call the "FixedScreenSelection" function using ZP_STEP as the screen name.
320014	The selected PLC cannot be evaluated for ProAgent. The Alarm view assigned to the "EvaluateAlarmDisplayFault" system function could not be found.	Check the parameters of the "EvaluateAlarmDisplayFault" system function.

330000 - GUI alarms

Number	Effect/causes	Remedy
330022	Too many dialogs are open on the HMI device.	Close all dialogs you do not require on the HMI device.
330026	The password will expire after the number of days shown.	Enter a new password.

350000 - GUI alarms

Number	Effect/causes	Remedy
350000	PROFIsafe packages have not arrived within the necessary period. There is a communication problem with the F-CPU. RT is terminated.	Check the WLAN connection.

Number	Effect/causes	Remedy
350001	PROFIsafe packages have not arrived within the necessary period. There is a communication problem with the F-CPU. The PROFIsafe connection is re-established.	Check the WLAN connection.
350002	An internal error has occurred. Runtime is terminated.	Internal error
350003	Feedback concerning the connection established with the F-CPU. The Emergency-Off buttons are active immediately.	--
350004	PROFIsafe communication was set and the connection was cleared. The Runtime can be terminated. The Emergency-Off buttons are deactivated immediately.	--
350005	Incorrect address configured for the F-slave. No PROFIsafe connection.	Check and modify the address of the F slave in WinCC flexible ES.
350006	The project has started. At the start of the project, the enabling buttons must be checked for functionality.	Press the two enabling buttons one after another in the "Enable" and "Panic" positions.
350008	The wrong number of fail-safe buttons was configured. No PROFIsafe connection.	Change the number of fail-safe buttons in the project.
350009	The device is in Override mode. It may no longer be possible to detect the location because transponder detection fails.	Exit Override mode.
350010	Internal error: The device has no fail-safe buttons.	Send the device back. Worldwide contact person

8.2 Abbreviations

Abbreviations

The abbreviations and acronyms used in the manual have the following meaning:

PLC	Programmable Logic Controller
ANSI	American National Standards Institute
AS 511	Protocol of the PG interface to SIMATIC S5
ASCII	American Standard Code for Information Interchange
SM	Events
CCFL	Cold Cathode Fluorescence Lamp
CF	Compact Flash
CPU	Central Processing Unit
CS	Configuration System
CSA	Customer Specified Articles
CSV	Comma Separated Values
CTS	Clear To Send
DC	Direct Current
DCD	Data Carrier Detect
DI	Digital Input
DIP	Dual In–Line Package
DP	Distributed (Peripheral) I/O
DRAM	Dynamic Random Access Memory
DSN	Data Source Name
DSR	Data Set Ready
DTR	Data Terminal Ready
ESD	Electrostatic Discharge (and components/modules that can be damaged by it)
EMC	Electromagnetic Compatibility
EN	European standard
ESD	Electrostatic Discharge
HF	High Frequency
HMI	Human Machine Interface
GND	Ground
IEC	International Electrotechnical Commission
IF	Interface
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MOS	Metal Oxide Semiconductor
MP	Multi Panel
MPI	Multipoint Interface (SIMATIC S7)
MTBF	Mean Time Between Failures
OP	Operator Panel
PC	Personal Computer

PCL	Printer Control Language
PG	Programming device
PPI	Point to Point Interface (SIMATIC S7)
RAM	Random Access Memory
RTS	Request To Send
RxD	Receive Data
SELV	Safety Extra Low Voltage
AL	Alarm
SP	Service Pack
PLC	Programmable Logic Controller
SRAM	Static Random Access Memory
STN	Super Twisted Nematic
D-sub	Subminiature D (plug)
TCP/IP	Transmission Control Protocol/Internet Protocol
TFT	Thin Film Transistor
TP	Touch Panel
TTL	Transistor–Transistor Logic
TxD	Transmit Data
UL	Underwriter’s Laboratory
UPS	Uninterruptible Power Supply
UPS	Uninterruptible Power Supply
VGA	Video Graphic Array
AT	Accept button

8.3 Glossary

Alarm

Indicates particularly serious operating states that must be acknowledged.

Alarm cleared (also known as outgoing)

Time at which an alarm is cleared by the controller.

Alarm generated (also known as incoming)

Time at which an alarm is triggered by the controller or the HMI device.

Alarm level

Operational level of the HMI device in which the alarms are displayed.

Area pointer

Required for data exchange between HMI device and controller. It contains information on the location of data areas on the controller.

Alarm reporting

Printout of alarms and system messages at the same time as the screen display.

Alarm time

Time between generation and clearance of an alarm.

Combo box

Box for setting a parameter (one value can be selected from those displayed).

Configuration

Specifying basic settings, alarms, and screens for a specific plant using the ProTool configuration software.

Configuration computer

Generic term for programming devices and PCs on which configurations are created.

Display duration

Time between an alarm being generated and being cleared.

Display function

Function that causes a change in the displayed information, for example alarm level display, alarm buffer display, screen display

Events

Indicates certain statuses of the machine or plant connected to the controller.

Field

Reserved area in configured or fixed texts for output and/or input of values.

Flash memory

Programmable memory that can be erased quickly and then written to again.

Forced printout

Automatic printout of the alarms and system messages deleted when there is a buffer overflow.

Hard copy

Printout of the content of the display on a printer.

Job mailbox

Triggering of a function by the controller.

Loop through mode

Mode on the HMI device Includes normal operation and also allows communication between the configuration computer and controller over the second interface of the HMI device. This mode is possible only when the connection to the controller uses the AS511 protocol.

Normal mode

Mode on the HMI device in which alarms are displayed and input can made in screens.

Operator note

Configurable additional information on alarms, screens, screen entries and boxes.

Output box

Box for displaying a process value.

Screen

Display of logically related process data that can be displayed together on the HMI device and that can be individually changed.

Screen entry

Element of a screen - consists of the entry number, texts, and tags.

Screen level

Processing level on the HMI device at which pictures can be viewed and manipulated.

Self test

Test of the status of the CPU and the memory each time the power is turned on.

Softkey

Key with a variable assignment (dependent on the displayed screen entry)

System event

Indicates an internal state on the HMI device and on the controller.

System to be monitored

Related to operator control and monitoring using an HMI device, this includes machines, processing centers, systems, plants, and processes.

Transfer mode

Mode on the HMI device in which data is transferred from the configuration computer to the HMI device.

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