Introduction

Content

Introduction **1**

General 2
Documentation structure....3

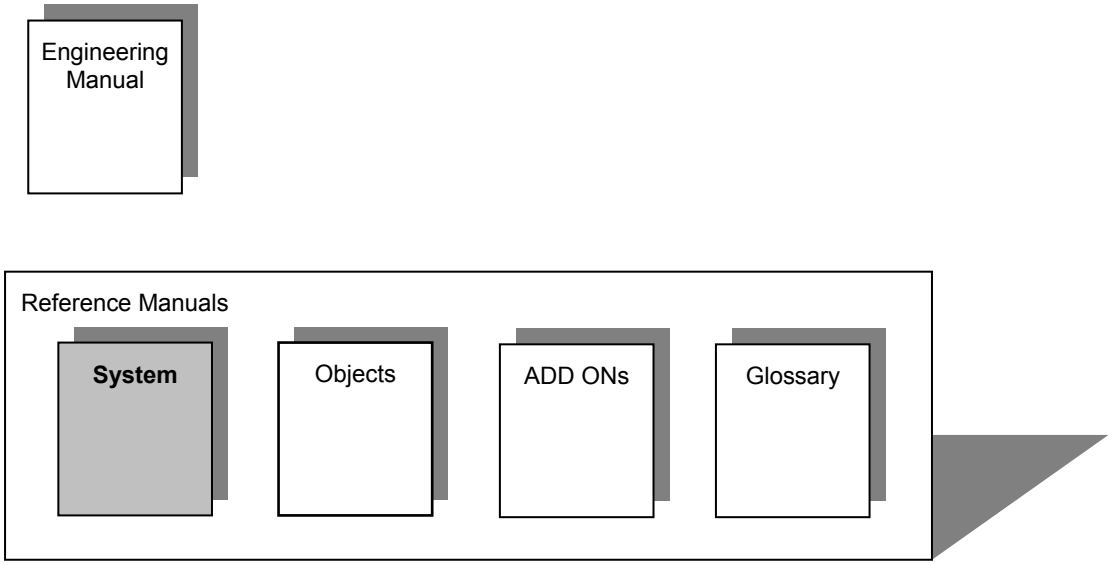
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General

You have here the *System Manual* for CEMAT V8.0. This manual is part of the *Reference Manual*. It should support you in performing the work required to configure your plant.

The *Reference Manual* is part of a comprehensive CEMAT V8.0 complete documentation. In the current version V8.0, this consists of the volumes listed below.



After the installation of CEMAT V8.0 the CEMAT documentation is available as PDL in directory D:\CEMAT_CS\Docu

On the following pages you will find the content of each manual.

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Documentation structure

The manuals contain the following chapters:

	Engineering Manual
1	Introduction
2	Preparations
3	Installation of a PCS 7 Project
4	Assignments
5	Engineering Examples
6	PLC Engineering
7	AS-AS Coupling
8	OS Engineering
9.	Engineering Tools
10	Engineering Check List
11	Project Administration
12	free
13	Graphic Templates
14	Tips&Tricks
15	Update Information

	Reference - System
1	Introduction
2	Cemat System Architecture
3	
4	
5	
6	

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	Reference - Objects
1	Introduction
2	General
3	Unidirectional Drive
4	Bi-Directional Drive
5	Damper
6	Valve
7	
8	Adapt to Simocode
9.	Adapt
10	Annunciation Module
11	Annunciation Module with 7 Alarms
12	Measuring Value
13	Process Feedback block
14	
15	Group Module
16	Route Module
17	Selection
18	Interlock
19	Interlock 5
20	Object Data Acquisition
21	
22	
23	
24	
25	
26	Related Objects
27	Analog Value Selection
28	Storage
29	Storage Multichamber
30	

	Reference – ADD ONs
1	Introduction
2	Robicon
3	Synamics
4	Parameter Management

	Reference - Glossary
1	Introduction
2	Definitions and Instructions

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CEMAT System description

Edition: 08/2012

Content

CEMAT System description 1

Preface ... 4
System Overview ... 5
System components ... 7
Typical Example Configuration with SIMATIC PCS 7-CEMAT ... 7
Central and distributed Process I/O Systems ... 8
SIMATIC ET 200M ... 10
SIMATIC ET 200iSP ... 11
SIMATIC ET 200S ... 13
Automation Systems (Controllers) ... 14
Bus Systems (Communication) ... 16
System Bus ... 16
Firewall and router ... 23
Time synchronization ... 24
Field Bus ... 26
Coupling to Third-Party Systems ... 31
Operator Station CEMAT Server ... 33
Operator Station CEMAT Client ... 34
Overview ... 34
Engineering Stations / Engineering Tools ... 37
Hardware Overview ... 37
ENG Software Overview ... 37
General Function ... 38
WEB Server ... 39
Maintenance Station ... 40
Process Historian ... 41
CEMAT Design and Engineering ... 43
Overview ... 43
Plant configuration with AS in CR ... 44
CEMAT Modules ... 45
General Function Description of CEMAT ... 46
Operating Modes ... 46
Operating Methodology ... 47
Fault diagnosis and Messages ... 48
Operator control permission ... 49

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Acknowledgement modes ... 57
CEMAT Operator Interface ... 60
Process pictures ... 60
General ... 60
Text and color layout ... 61
Block Icons and Bitmaps ... 61
Cemat Browsers ... 71
Object Browser ... 72
Faceplates ... 74
Faceplates - secondary dialog 'Diagnosis' ... 90
Faceplates - secondary dialog 'Extended Diagn. with Interlock' ... 92
Faceplates Details APL- Interlock' ... 93
Faceplates - secondary dialog 'Alarm' ... 94
Faceplates - secondary dialog 'Statistic and Maintenance' ... 95
Faceplates - secondary dialog 'Info' ... 98
Faceplates - secondary dialog 'Preset' ... 105
Faceplates - secondary dialog 'Status' ... 106
Faceplates - secondary dialog 'Object' ... 107
Faceplates - secondary dialog 'Help' ... 109
CEMAT- Trend Groups ... 110
CEMAT Message Functionality ... 118
Module Description (Function Overview) ... 128
General module structure ... 128
Operating modes for drive functions ... 131
Operating modes for Annunciations, Measures, Select, Storage ... 135
C_DRV_1D Unidirectional Drive ... 136
C_DRV_2D Bi-directional drive ... 144
C_DAMPER Damper ... 152
C_VALVE Valve ... 162
C_SIMOS Adapter for SIMOCODE ... 171
C_GROUP Group ... 174
C_ROUTE Route ... 184
C_SELECT Selection ... 191
C_ANNUNC Annunciation Module ... 195
C_ANNUN8 Annunciation8 module ... 202
C_PROFB Process Feedback block ... 209
C_MEASUR Maesuring value block ... 216
C_ANASEL Analog Value Selection ... 227
C_STORAG Storage ... 230
C_STO_MA Storage Master module ... 239
C_POLY3 POLYGON with 3 Output values ... 246
C_ADAPT Adapter block ... 256
C_ODA Operation Data Acquisition ... 258
CEMAT Engineering ... 261
Setup of the PCS7 Project ... 261
AS Engineering ... 261
OS Engineering ... 262
Project planning example ... 264
Project Execution ... 264
Project Management ... 265
Configuration Input ... 276
Training ... 288
Necessary Courses for PCS 7/ Cemat ... 288
Requirements for Cemat Training ... 289
Hardware and Software requirements ... 289
Simulation Software and Hardware ... 289
Required knowledge ... 290
Training Schedule and Documentation ... 290
Training duration and number of participants ... 290

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Training/Test/Simulation 291
Training/Test System 291
Simulation Software 291
System Performance 293
System Configuration Technical Data 293
Bus Systems Technical Data 293
Process Stations Technical Data 295
OS Hardware for ES, Server and Client 297
System Performance CEMAT V8 303
Support 304
General Information about the System 305

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Preface

Purpose of this Documentation

This document should explain what a CEMAT- PCS standard system is.
It should briefly define how the Siemens solution fulfils the Customer requirements.
This document can also help Siemens sales engineers in defining what system can be provided to the Customer.

The documentation contains recommendations and information for planning and building PCS 7 CEMAT automation solutions with a content of

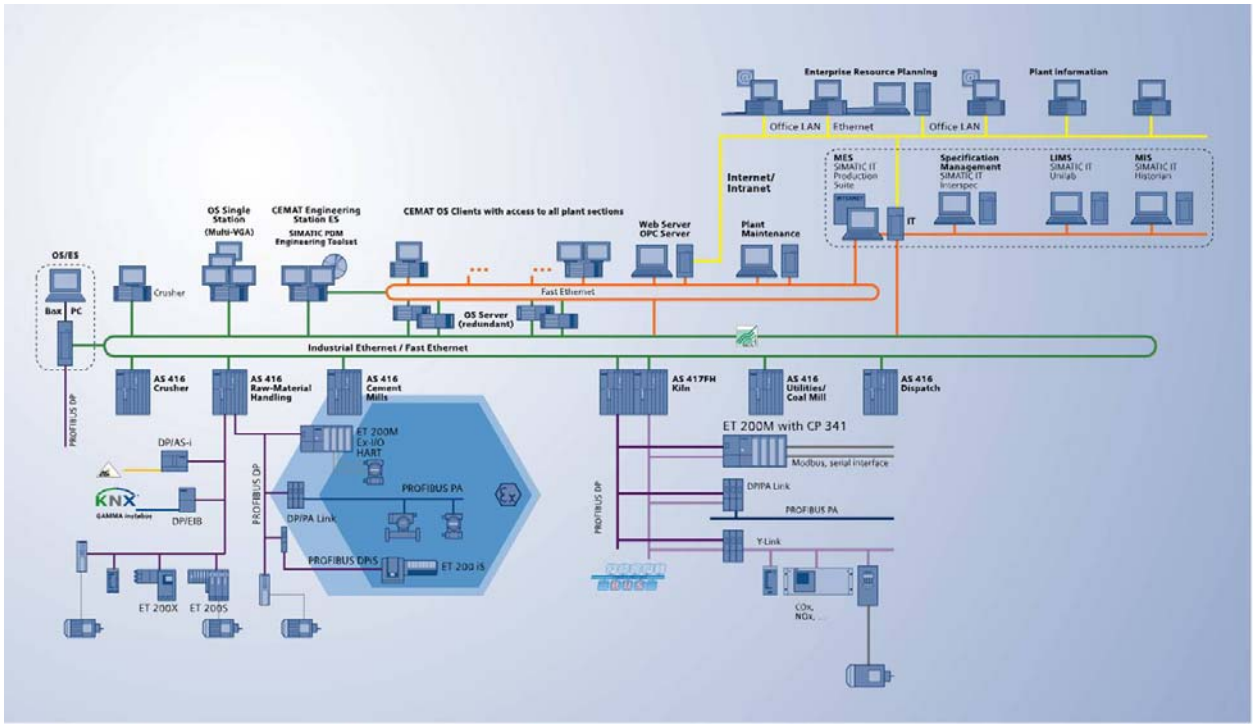
- Standard system architecture
- Brief description of the system components (building blocks)
- Design & Engineering considerations
- Project planning example (implementation reference)
- Training requirements
- Price reference/calculation
- System performance calculation
- Simulation and testing

Required Knowledge

This documentation is intended for persons involved in configuration, engineering and servicing of automation systems. (Automation experts, PCS project managers and project engineers.)

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System Overview



SIMATIC PCS 7 is a modern process control system that can be used alone and in combination with other systems, e.g. SIMATIC, SIMOTION or drive systems, as a consistent and homogenous overall system. Its popularity is increasing along with the demand for seamlessly integrated universal automation engineering solutions, which is determined by sustained competition and price pressure, the demand for increasingly flexible production plants and the need for increased productivity.

Against the background of ever-increasing complexity, in particular due to the merging of automation engineering with information technology, horizontal and vertical integrated system platforms are being increasingly accepted in comparison with automation solutions with so-called "best-in-class products".

Totally Integrated Automation with SIMATIC PCS 7 combines consistent data management, communication and configuration with outstanding system properties and high performance. This guarantees that the typical demands placed on a process control system are comprehensively satisfied, and that you are perfectly equipped for future requirements:

- Simple and reliable process control
- User-friendly operation and visualization, also using the Internet
- Powerful, fast and consistent system-wide engineering
- System-wide online modifications
- System openness at all levels
- Flexibility and scalability
- Redundancy at all levels
- Failsafe automation solutions
- Extensive fieldbus integration
- Flexible solutions for batch processes
- Incorporation of material transport
- Asset management for I&C equipment (diagnostics, preventive maintenance and repairs),
- Direct interface with the IT world.

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Flexibility and scalability

As a result of its modular and open architecture, which is based on selected hardware and software components from the standard SIMATIC range, SIMATIC PCS 7 can be applied effectively in small and large plants alike. It allows easy expansion or system modification to enable customers to meet the changing production requirements of their facility. SIMATIC PCS 7 is scalable from a small single system consisting of approx. 160 process tags (motors, valves, PID controllers), such as might be used for a laboratory system or a test center, up to a distributed multi-user system with client/server architecture and approx. 60,000 process tags, such as might be used for automation of a very large production plant or for groups of connected facilities.

Open for the future

SIMATIC PCS 7 is based on modular hardware and software components, which are perfectly matched to one another due to their conformance with TIA. These components can be expanded and innovated seamlessly and with little effort and are open for the future via long-term stable interfaces. This makes long-term protection of customer investments possible, despite the fast pace of innovation and short product cycles.

SIMATIC PCS 7 consistently applies new, powerful technologies together with internationally established industrial standards such as IEC, XML, PROFIBUS, Ethernet Gigabit technology, TCP/IP, OPC, ISA 88 and ISA 95, just to mention a few.

SIMATIC PCS 7's openness covers all levels and applies as much to automation systems and process peripherals as to operator and engineering systems, industrial communication networks or the SIMATIC IT framework as a link to information, coordination and planning tools for company management.

However, it is not just system architecture and communication that are characterized by openness. It is a feature that is also evident in the programming and data transfer interfaces for user programs as well as in the import and export functions for graphics, text and data, e.g., from the CAD/CAE world.

SIMATIC PCS 7 can therefore also be combined with components from other vendors, and integrated in existing infrastructures.

The SIMATIC PCS 7 process control system can be integrated through interfaces based on international industrial standards for data exchange within the corporate IT network. In this manner, process data can be made available at any time and any location within the company for the evaluation, planning, coordination and optimization of operational procedures, production processes and business processes, e.g. for:

- ERP (Enterprise Resource Planning)
- MIS (Management Information System)
- MES (Manufacturing Execution System)
- Advanced Process Control.

SIMATIC PCS 7 supports the system interfacing to SIMATIC IT, the Manufacturing Execution System from Siemens. SIMATIC IT can be used to record data in real-time from the ERP and control levels, to model the complete manufacturing know how, and to precisely define the operating processes.

The operator stations of SIMATIC PCS 7 provide further facilities for simple access to the IT environment. They can either be an OPC server data source for IT applications or, as an OPC client, access the data of OPC server applications.

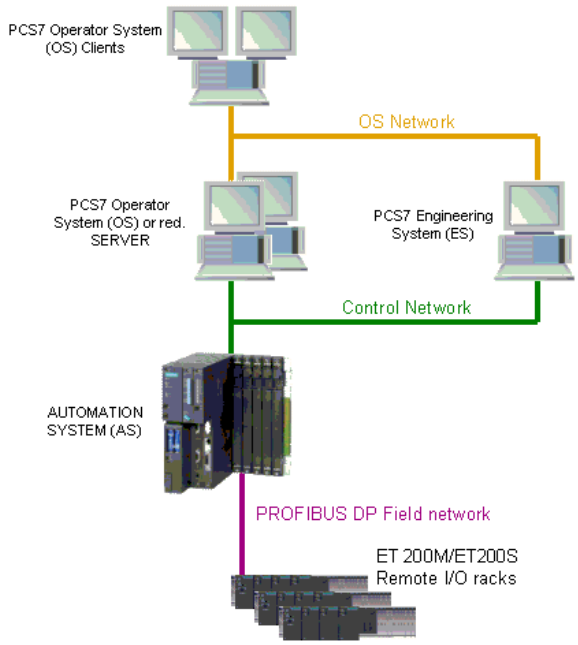
Using a PCS 7 Web server, the plant can be operated and monitored via Internet/intranet. The PCS 7 Web server connects the data of the subordinate OS servers, and makes them globally available for remote monitoring, operation, diagnostics and maintenance. The Web access is subject to the same access protection mechanisms as on the client in the control room.

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System components

Typical Example Configuration with SIMATIC PCS 7-CEMAT

The following configuration can be considered as an example configuration that covers the main components of SIMATIC PCS 7:



- OS single station/ Client
- Engineering station
- Red. Server / client structure
- Industrial Ethernet networks with switching technology
- Automation systems
- Central and distributed process I/O (PROFIBUS DP/ PROFINET)
- Fieldbus (PROFIBUS PA)
- Devices for hazardous and non hazardous areas

The example configuration doesn't cover properties like

- Coupling with Office LAN
- SIMATIC IT framework
- AS-Interface (AS-I)
- Distributed I/O: controller modules
- Operator panels
- Central Archive Server
- WEB Server

If you need information about these features, please contact one of your regional SIEMENS partners.

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Central and distributed Process I/O Systems

The PCS 7 process control system offers various possibilities for connecting I/O devices and for detecting and emitting process signals through sensors and actuators:

- Analog and digital I/O modules of the SIMATIC S7-400 operated centrally in the automation system
- Distributed ET 200M, ET 200S, ET 200iSP I/O systems with an extensive range of cost-effective signal and function modules, connected through PROFIBUS DP or PROFINET to the automation system (AS)
- Direct AS connection of intelligent, distributed field/process devices and operator terminals through PROFIBUS DP/PA (redundant or in hazardous zones 0, 1 or 2 also possible)

Signal groups of the SIMATIC S7-400 can be operated centrally in the automation system and are mainly used in small applications or systems of limited distributed expansion.

Characteristics such as

- modularity and consistency,
- flexible adaptability to the plant structure,
- minimum cabling and engineering requirements,
- low commissioning, servicing and lifecycle costs and a
- wide range of technical options

are the main reasons why distributed process peripherals are now predominant: ET 200 remote I/Os in conjunction with classical field/process devices and HART field devices or intelligent field/process devices directly on PROFIBUS or PROFINET.

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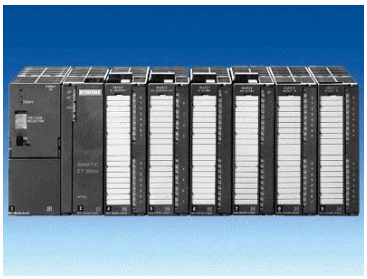
Recommended devices for field automation

Distributed I/O systems	DP	PDM	Safety		Description	Functions
	■		■	ET 200M	Modular remote I/Os for process control applications with SIMATIC PCS 7 in IP20 degree of protection ■ Transmission rates on the PROFIBUS up to 12 Mbit/s ■ Permits redundancy of the PROFIBUS interfaces ■ Can be installed in Ex zone 2, and the connected actuators and sensors also in Ex zone 1	Wide range of I/O modules of S7-300 design (up to 8 per station): ■ DI, DO, AI, AO signal modules (simple, with diagnostics capability, redundant and Ex version) ■ Function modules (controllers, counters) ■ HART modules ■ F-modules for fail-safe applications Supports online modifications: ■ Addition of station ■ Addition of I/O modules ■ Parameter assignment
	■			ET 200iSP	Intrinsically-safe, modular I/O system with independent wiring and IP30 degree of protection for up to 32 electronics modules ■ Transmission rates on the PROFIBUS up to 1.5 Mbit/s ■ Permits redundancy of the PROFIBUS interfaces ■ Can be installed directly in Ex zones 1, 2, 21 or 22, and the connected sensors/actuators also in Ex zone 0	Available electronics modules: ■ DI NAMUR ■ DO ■ AI for temperature measurements using resistance thermometer/thermocouple ■ AO ■ AI HART (for two-wire and four-wire transmitters) ■ AO HART Supports online modifications: ■ Addition of station ■ Expansion of station with modules ■ Modification of module parameters Replacement of individual modules during operation without fire certificate
	■		■	ET 200S	Bit-modular, extremely compact I/O system with independent wiring and IP20 degree of protection ■ Transmission rates on the PROFIBUS up to 12 Mbit/s ■ Can be installed in Ex zone 2	Range of I/Os comprises: ■ Power modules ■ DI, DO, AI and AO signal modules ■ Integral motor starters up to 7.5 kW Supports online modifications: ■ Addition of station
Drives						
Motor management						
	■	■		SIMOCODE pro motor management and control devices (can be integrated in SIMATIC PCS 7 using PCS 7 block library)	Flexible, modular motor management system for constant-speed motors in the low-voltage range ■ Power range 0.1 to 560 kW ■ Voltages up to 690 V AC ■ Rated motor currents up to 820 A Increased functionality possible using expansion modules.	Can be used wherever solid, liquid or gaseous materials have to be moved, conveyed, pumped or compressed, e.g. for operation of: ■ Pumps and fans ■ Compressors ■ Extruders and mixers ■ Mills
Frequency converter						
	■	■		MICROMASTER 4 (can be integrated in SIMATIC PCS 7 using PCS 7 block library)	Standard frequency converter with high dynamic performance for variable-speed drives ■ Power range 0.12 to 250 kW ■ Voltages from 200 to 600 V	For universal use, especially for: ■ Operation of pumps and fans ■ In conveyor systems

Columns 2-4: DP: can be connected to PROFIBUS DP, PDM: parameters can be assigned using SIMATIC PDM, Safety: with PROFIsafe profile

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SIMATIC ET 200M



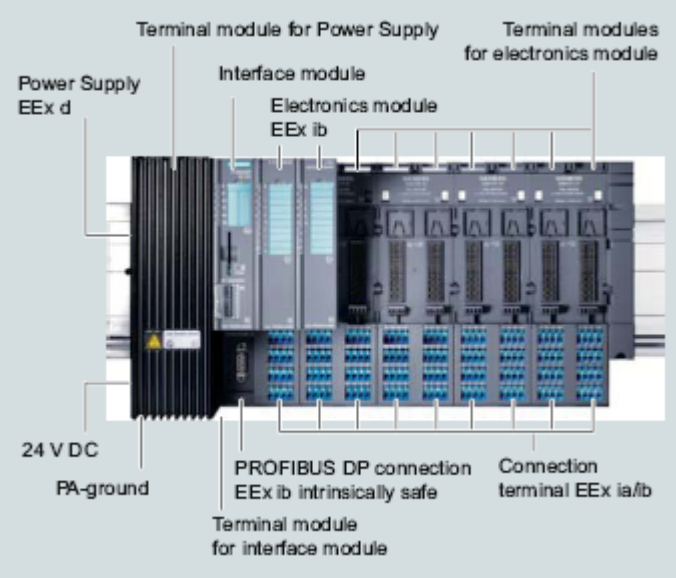
Features:

- Connection via PROFIBUS-DP, also redundant
- Transmission rate up to 12 Mbits/s
- Modules have redundancy-capability
- Max. 8 modules per station
- Electrical isolation from backplane bus
- Ex modules for connection of sensors/actuators to Zone 1
- Module replacement during operation
- Closed-loop control module (FM355)
- Counter modules (FM350)
- Hart modules
- Time-stamping of binary signals with resolution of 3 msec within one station and 10 msec across the process cell.
- Diagnostic alarm (channel and module diagnostics)
- F-modules for fail-safe applications to SIL3
- Addition of stations during operation
- Parameter assignment and addition of modules during operation
- IP20 degree of protection
- Temperature range (–20°C*) 0°C to +60°C *) for SIPLUS painted model

-

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SIMATIC ET 200iSP



The ET 200iSP is a modular, intrinsically-safe I/O system with IP30 degree of protection which can be operated in gas and dust atmospheres at ambient temperatures from -20 to +70 °C.

The ET 200iSP remote I/Os stations can be installed directly in the Ex zones 1, 2, 21 or 22 as well as in non-hazardous areas in accordance with ATEX directive 94/9/EC. The intrinsically-safe sensors, actuators and HART field devices can also be located in zone 0 or 20 if necessary.

The modular design of the ET 200iSP makes it possible to optimally adapt the remote I/O stations to the respective automation task through individual configuration and flexible expansion. To increase plant availability, the pressure-encapsulated power supply and the intrinsically-safe PROFIBUS DP connection (RS 485-iS) of the stations can also be of redundant design.

The modern architecture with independent wiring and automatic slot coding supports simple and reliable hot swapping of individual modules without a fire certificate.

In addition to analog and digital I/O modules for the automation of the technological functions of the process (Basic Process Control), the range of electronics modules also includes safetyrelated F-I/O modules for implementing safety applications. The various types of electronics module can be arranged mixed within a station.

Main components of the ET 200iSP distributed I/O system:

- Terminal modules for prewiring, and also for inserting power supply, interface and electronics modules, mounted on an S7-300 rail
- Power supply unit 1 or 2 (redundant) power supply modules PS with pressurized enclosure for feeding 24 V DC or 120/230 V AC
- Interface module 1 or 2 (redundant) IM 152 interface modules for connecting the station to the PROFIBUS DP
- Electronics modules (2/4/8 channels): Up to 32 in any combination
  - Digital electronics modules (DI, DO)
  - Analog electronics modules (AI, AO)
  - Safety-related electronics modules (F-DI, F-DO and F-AI)
  - Watchdog module
- Accessories
  - Reserve module for reserving a slot for any electronics module
  - Terminating module (included in scope of delivery of terminal modules for the PROFIBUS interface)
  - Labeling sheets with printable labeling strips
  - Inscription labels for slot numbering Assembly

Assembly is quick and easy:

- Latching of terminal modules onto the S7-300 rail
- Prewiring of process signal cables on the terminal modules using spring-loaded or screw-type connections
- Plugging-in of power supply, interface and electronics modules without the need for additional tools

The station width is 107 cm in the maximum configuration with 32 electronic modules.

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The maximum number of electronics modules which can be used per station may be limited depending on the current consumption of the modules required to solve the automation task. However, up to 16 electronics modules can be used without limitation.

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SIMATIC ET 200S

The ET 200S is a bit-modular distributed I/O system in IP 20 degree of protection and is approved for operation in Ex zone 2 (except for operation with motor starters). It is designed with independent wiring that supports the hot swapping of I/O modules (with fire certificate).

The range of I/Os that can be used with SIMATIC PCS 7 includes power modules for electronics modules and motor starters, analog and digital signal modules,.

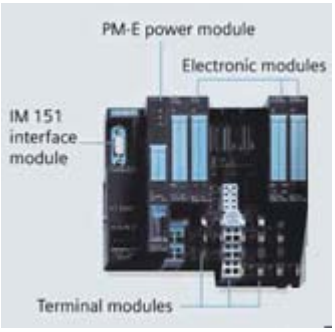
The implementation of safety engineering applications is supported by:

- Failsafe terminal, power and electronics modules
- SIGUARD safety engineering for motor starter applications in plants of safety categories 2 to 4 (EN 954-1).

Design

Main components of the ET 200S distributed I/O system:

- Terminal modules enable the electrical and mechanical connection of the I/O modules and carry the terminals for the process wiring:
  - TM-P terminal modules for power modules
  - TM-E terminal modules for electronics modules
  - TM-DS/TM-RS terminal modules for motor starters and TMxB expansion modules
- IM 151 interface module for connecting the PROFIBUS DP to the ET 200S station. The terminal module is included in the scope of delivery.
- Power modules for PM-E electronics modules and PM-D motor starters
  - For individual grouping of load and sensor supply voltages and their monitoring, as well as for the safe shutting down of digital output modules with PROFIsafe
  - For supplying and monitoring the auxiliary voltages for motor starters, as well as for the shutting down of a complete group of motor starters
- Electronics modules for process data exchange:
  - Digital electronics modules for connecting digital sensors and actuators
  - Analog electronics modules for connecting analog sensors and actuators
- Motor starter modules for switching and protecting any three-phase loads
- Accessories
  - Reserve module for reserving a slot for any electronics module
  - Label sheets for printing ID labels on a laser printer
  - Shield connection: shield connecting element, shield terminal, ground terminal, copper voltage bus 3 x 10 mm;
- Components for the low-impedance connection of cable shielding at low cost of installation



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Automation Systems (Controllers)

The SIMATIC PCS 7 process control system offers a wide range of automation systems whose performances are finely matched to one another within wide limits.
The automation systems offered can be differentiated according to various criteria. In accordance with the design, they are categorized as:
• Microbox automation system with software controller
• Modular automation systems of the S7-400 range with hardware controller

Microbox automation system
The SIMATIC PCS 7 AS RTX Microbox automation system represents the starter system for the low to mid-performance range of SIMATIC PCS 7. As a result of its exceptional physical properties and small dimensions, it is particularly suitable for use at plant level in industrial applications.

Modular automation systems of the S7-400 range
In these "Automation system bundles", selected components of the SIMATIC S7-400 are combined together.
The following characteristics make the SIMATIC S7-400 predestined for use as a SIMATIC PCS 7 automation system:

- Modular design without fans
- High expansion capability and ruggedness
- Single or redundant design
- Comprehensive communication facilities
- Integral system functions
- Integrable safety functions (Safety Integrated)
- Simple linking of central or distributed I/O
-

In accordance with their functionalities, the modular automation systems of the S7-400 range can be classified into:

- Standard automation systems
- Fault-tolerant automation systems
- Safety-related automation systems
-

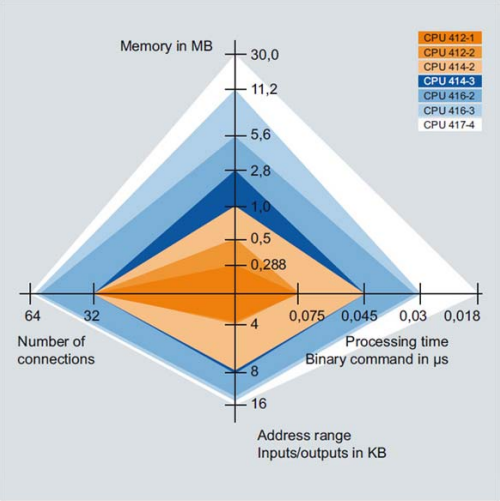
Various automation systems are available with a price/performance ratio which can be tailored to your system requirements.
The CPU of the automation systems is already equipped as standard with an onboard PROFIBUS DP fieldbus connection.
Depending on the type of CPU, 1 or 2 further PROFIBUS DP interfaces are possible using additional IF 964-DP interface modules. PROFIBUS communication modules can be additionally fitted if required.
In addition to the AS 414-3 and AS 416-3 systems with Industrial Ethernet connection via CP 443-1, two automation systems are offered where the Industrial Ethernet interface is integrated in the CPU. These AS 414-3IE and AS 416-3IE systems are a little cheaper than the comparable AS 414-3 and AS 416-3 systems with the same performance, but differ in their time synchronization (NTP instead of S7).

The automation systems are supplied as preassembled, tested complete systems consisting of:

- Rack with 9 or 18 slots
- Controllers 414, 416 and 417
- 24 VDC or 120/230 VAC power supply
- Internal RAM of 1.4 to 20 Mbytes
- Swappable memory card with 1 to 16 Mbytes of RAM



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Seven performance classes of the S7-400 standard CPUs

CPU Performance overview

Technical Data

CPU	CPU 416-2	CPU 416F-2	CPU 416-3 1)	CPU 416-3 PN/DP 1)	CPU 416F-3 PN/DP	CPU 417-4 1)
Dimensions (mm)	25 x 290 x 219		50 x 290 x 219			50 x 290 x 219
Slots	1		2			2
Order No. group: 6ES7	416-2XN.	416-2FN.	416-3XR.	416-3ES.	416-3FS.	417-4XT.
Firmware	V5	V5	V5	V6	V6	V5
Work memory						
Integrated	5.6 MB		11.2 MB	16 MB		30 MB
Instructions	920 K		1840 K	2 680 K		5 M
For program	2.8 MB		5.6 MB	8 MB		15 MB
For data	2.8 MB		5.6 MB	8 MB		15 MB
Processing times						
Bit operation	0.03 µs					0.018 µs
Word operation	0.03 µs					0.018 µs
Fixed-point operation	0.03 µs					0.018 µs
Floating-point operation	0.09 µs					0.054 µs
Bit memories, timers, counters						
Bit memory	16 KB					16 KB
S7 timers/counters	2 048 / 2 048					2 048 / 2 048
IEC timers/counters	● *)					● *)
Address ranges						
I/O	16 KB / 16 KB					16 KB / 16 KB
I/O process image	16 KB / 16 KB					16 KB / 16 KB
Digital channels	131 072 / 131 072					131 072 / 131 072
Analog channels	8 192 / 8 192					8 192 / 8 192
DP interfaces						
Number of DP interfaces	1		2	1		3
Number of DP slaves	125		125 each			125 each
plug-in interfaces			1 x DP			2 x DP
PN interfaces						
Number of PN interfaces				1 (2 ports)		
PROFINET IO				●		
PROFINET with IRT				●		
PROFINET CBA				●		
TCP/IP				●		
UDP				●		
ISO-on-TCP (RFC 1006)				●		
Web server				●		
Data set gateway	●					●

1) As SIPLUS extreme component also for corrosive atmosphere/condensation (for further details, see page 98 or **www.siemens.com/siplus-extreme**)

*) Via SFB, number unlimited or limited by main memory

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Bus Systems (Communication)

Communication within SIMATIC PCS 7 utilizes the SIMATIC NET networking components. The product range of SIMATIC NET is based on globally established standards and provides powerful and matched communications networks for reliable data transfer between all levels and components within a plant.
The SIMATIC NET products specially developed for industrial applications provide optimum suitability for plants in all sectors.
They are matched to one another, and satisfy maximum demands, especially in areas subject to extreme influences, such as:

- Electromagnetic interfering fields
- Corrosive liquids and atmospheres
- Danger of explosion
- High mechanical stress

The SIMATIC NET products guarantee expandability and the protection of investments as a result of compatible further developments, as well as uniformity from inbound logistics to outbound logistics and from field devices up to the management information system.

Industrial Ethernet is used as the plant bus as well as terminal bus for multi-user systems with client/server architecture. For small systems, the "Basic Communication Ethernet" (BCE) integrated in the SIMATIC PCS 7 Industrial Workstations permits operation of single stations and servers on the plant bus even without a CP 1613/CP 1623 communications processor.

In medium and large plants characterized by high requirements, SIMATIC PCS 7 applies modern Gigabit and FastEthernet technology which combines the high security provided by redundant optical rings with the scalable performance provided by switching technology and high transmission rates up to 1 Gbit/s.

With the introduction of SIMATIC PCS 7 V8.0, PROFINET has been integrated into the process control system. PROFINET is based on the international standards IEC 61158 and IEC 61784 and combines the advantages of the open network standard, Ethernet, and the PROFIBUS fieldbus system. It stands for maximum transparency, open IT communication, network security and real-time communication down to the field level.
This makes PROFINET the basis for uniform automation network in the plant, into which existing fieldbuses implemented with PROFIBUS can be easily integrated.
In the context of the SIMATIC PCS 7 process control system, the application of PROFINET mainly focuses on the communication between the automation systems (controllers) and the process I/O. The communication initially limited to the modular standard automation systems of the S7-400 series and the ET 200M remote I/O stations will be gradually expanded.

PROFIBUS in the DP or PA version is used as the communications medium for interfacing intelligent distributed I/O devices, transmitters and actuators to the controller level. The rugged and reliable PROFIBUS is a universal, open fieldbus complying with the IEC 61158 and IEC 61784 international standards. In the PA version (which permits digital data transmission and power supply for the field devices on a two-wire cable), or with a series connected isolating transformer (RS 485iS coupler), it can be routed intrinsically-safe into hazardous areas of Zone 1.

System Bus

The system bus of the SIMATIC PCS 7 process control system is based on Industrial Ethernet, a powerful area and cell network for industrial applications in line with the international IEEE 802.3 standard (Ethernet).

With Industrial Ethernet, SIMATIC NET expands the Ethernet technology by special components and capabilities for use in industrial environments:

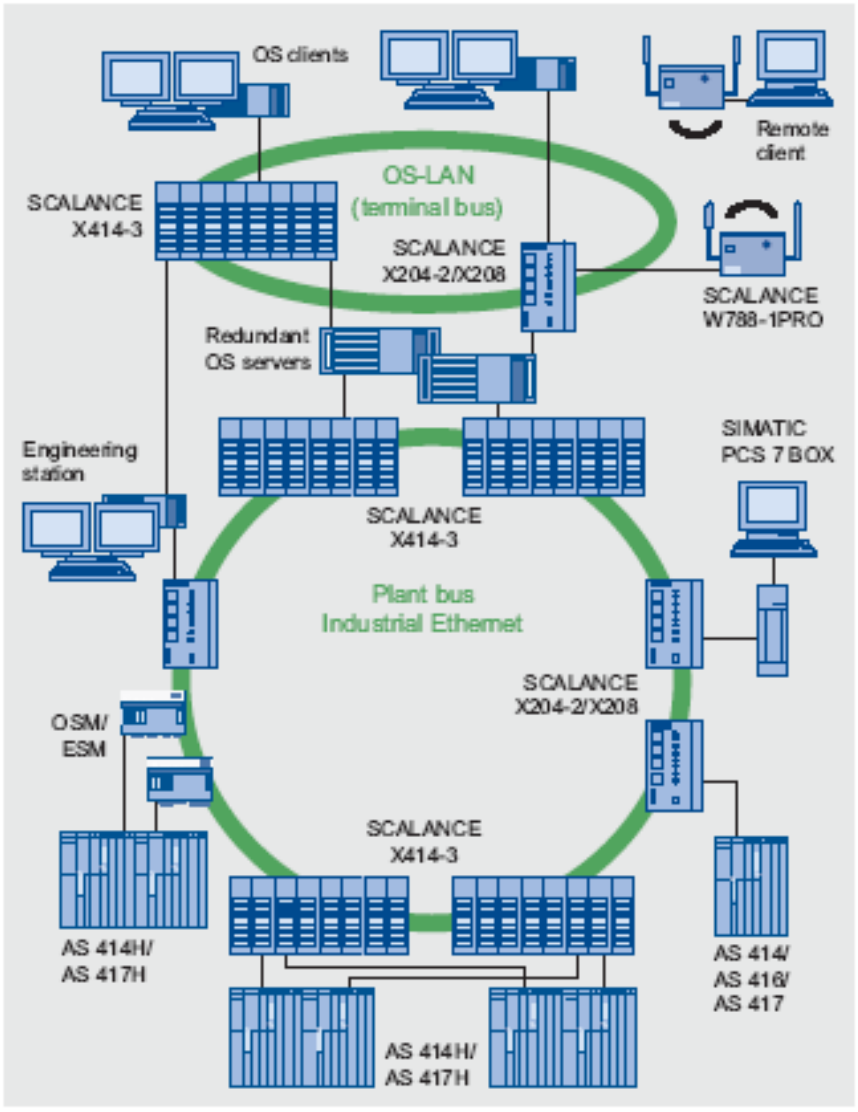
- Network components for tough industrial environments
- Fast local assembly using the FastConnect cabling system with RJ45 technology
- Failsafe networks through high-speed redundancy

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- Continuous monitoring of network components through a simple yet effective signaling concept
- Future-oriented network components with the new SCALANCE X Ethernet product family

	Industrial Fast Ethernet	
Data transmission	IEEE 802.3 (electric)	IEEE 802.2 (fiber optic)
Protocol	TCP/IP or ISO	TCP/IP or ISO
Transmission rate	10/100 Mbit/s	10/100 Mbit/s
Cable	Shielded 4-wire	Fiber optic
Topology	Line, ring, star	Line, ring, star
Stations	1023	1023
Cable length per segment	100 m	> 10 km
Cable length (Local Area Network - LAN)	Approx. 1.5 km	Approx. 150 km
Cable length (Wide Area Network)	Worldwide with TCP/IP	Worldwide with TCP/IP

Industrial Ethernet is used as the **"Plant Control bus**" (System bus) as well as "**Plant automation bus**" (terminal bus) for multi-user systems with client/server architecture.



Industrial Ethernet, connection examples

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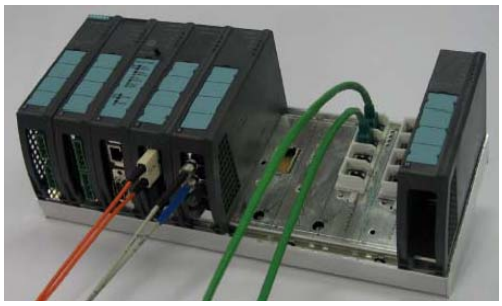
Decision aid for Industrial Ethernet switches

Different types of switches can be used for the Industrial Ethernet communication within the SIMATIC PCS 7 process control system.

SCALANCE X-400 managed (layer 3)

For use in high-performance plant networks (e.g. with high-speed redundancy). Thanks to the modular design, the switches can be adapted to the respective task . Due to the support of IT standards (e.g. VLAN, IGMP, RSTP), the seamless integration of automation networks into existing office networks is possible.

Routing functions on layer 3 permit communication between different IP subnetworks.



SCALANCE X-300 managed

Networking of subsystem/plant areas, as well as linking to the enterprise network. The SCALANCE X-300 managed product line combines the firmware functionality of the SCALANCE X-400 product line with the compact design of the SCALANCE X-200 product line. This means the SCALANCE X-300 switches have extended management functions and an extended firmware functionality compared to the SCALANCE X-200 switches.

Electrical and optical Gigabit Ethernet ports are available in addition.

SCALANCE XR-300 managed

The functions of the SCALANCE XR-300 Industrial Ethernet switches correspond to those of the SCALANCE X-300 switches. Designed as rack switches, they are particularly suitable for use in 19" control cabinets. They are also fully modular, and can be adapted to the respective task using 2-port media modules (electrical and optical).

EEC versions (Enhanced Environmental Conditions) in compact and rack design can be used in power engineering systems and under difficult environmental conditions.



SCALANCE X-200 managed

For universal use, from machine-level applications to networked subsystems. Configuration and remote diagnosis are integrated into the STEP 7 engineering tool. This increases the plant availability. Devices with a high degree of protection permit cabinetless installation.

Corresponding switches (SCALANCE X-200IRT) are also available for use in subsystem networks with hard real-time requirements and maximum availability.



SCALANCE X Overview

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		Hardware																
	Type of device	Connection to S7 backplane bus	Format module S7	PC module	Flat type of construction	Box type of construction	19" type of construction	Rugged, compact housing	Modular design	Gigabit Ethernet	PoE (Power over Ethernet)	LED diagnosis	SIMATIC environment	Redundant power supply (2 x 24 V DC)	External supply for integrated switch	Signal contact	Local display (SET pushbutton)	C-PLUG slot
SCALANCE X-400	X414-3E								•	•		•	•	•		•	•	•
	X408-2								•	•		•	•	•		•	•	•
SCALANCE X-300	X310							•		•		•	•	•		•	•	•
	X310FE							•				•	•	•		•	•	•
	X306-1LD FE							•				•	•	•		•	•	•
	X320-1FE							•				•	•	•		•	•	•
	X320-3LD FE							•				•	•	•		•	•	•
	X307-3							•		•		•	•	•		•	•	•
	X307-3LD							•		•		•	•	•		•	•	•
	X308-2							•		•		•	•	•		•	•	•
	X308-2LD							•		•		•	•	•		•	•	•
	X308-2LH							•		•		•	•	•		•	•	•
	X308-2LH+							•		•		•	•	•		•	•	•
	X308-2M							•	•	•		•	•	•		•	•	•
	X302-7EEC							•		•		•	•	•		•	•	•
	X307-2EEC							•		•		•	•	•		•	•	•
	XR324-12M						•		•	•		•	•	•		•	•	•
	XR324-4M EEC						•		•	•		•	•	•		•	•	•
SCALANCE X-200	X204IRT							•				•	•	•		•	•	•
	XF204IRT				•							•	•	•		•	•	•
	XF204				•							•	•	•		•	•	•
	XF208				•							•	•	•		•	•	•
	XF204-2				•							•	•	•		•	•	•
	XF206-1				•							•	•	•		•	•	•
	X202-2IRT							•				•	•	•		•	•	•
	X202-2P IRT							•				•	•	•		•	•	•
	X201-3P IRT							•				•	•	•		•	•	•
	X200-4P IRT							•				•	•	•		•	•	•
	X204IRT PRO							•				•	•	•		•	•	•
	X202-2P IRT PRO							•				•	•	•		•	•	•
	X224							•				•	•	•		•	•	•
	X216							•				•	•	•		•	•	•
	X212-2							•				•	•	•		•	•	•
	X212-2LD							•				•	•	•		•	•	•
	X208							•				•	•	•		•	•	•
	X208PRO							•				•	•	•		•	•	•
	X206-1							•				•	•	•		•	•	•
	X206-1LD							•				•	•	•		•	•	•
	X204-2							•				•	•	•		•	•	•
	X204-2LD							•				•	•	•		•	•	•

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Overview of the functions of the SCALANCE X Industrial Ethernet switches and components with switch functionality – Hardware

		Software																										
	Type of device	PROFINET diagnosis	Topology support (LLDP)	Command Line Interface / Telnet	Web based Management	Configuration with STEP 7	SNMP	Ring redundancy incl. RM-functionality	Standby redundancy	IRT capability	VLAN (Virtual Local Area Network)	GVRP (Generic VLAN Registaration Protocol)	STP/ RSTP (Spanning Tree Protocol/ Rapid Spanning Tree Protocol)	Passive Listening	IGMP Snooping/Querier (Internet Group Management Protocol)	GMRP (Generic Multicast Protocol)	Broadcast/ Multicast/ Unicast Limiter	Broadcast blocking	DHCP Option 82 (Dynamic Host Configuration Protocol)	IP Access List	Access Control List (MAC)	IEEE 802.1x (Radius)	Link Aggregation	Static Routing	RIPv2 (Dynamic Routing)	OSPFv2 (Dynamic Routing)	VRRP, Router Redundancy (Virtual Router Redundancy Protocol)
SCALANCE X-400	X414-3E	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•
	X408-2	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
SCALANCE X-300	X310	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X310FE	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X307-3	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X307-3LD	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X308-2	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X306-1LD FE	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X320-1FE	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X320-3LD FE	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X308-2LD	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X308-2LH	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X308-2LH+	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X308-2M	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X302-7EEC	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	X307-2EEC	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	XR324-12M	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
	XR324-4M EEC	•	•	•	•	•	•	•	•		•	•	•	•	•	•	•	•	•		•	•	•				
SCALANCE X-200	X204IRT	•	•		•	•	•	•	•	•				•													
	XF204IRT	•	•		•	•	•	•	•	•				•													
	XF204	•	•		•	•	•	•						•													
	XF208	•	•		•	•	•	•						•													
	XF204-2	•	•		•	•	•	•						•													
	XF206-1	•	•		•	•	•	•						•													
	X202-2IRT	•	•		•	•	•	•	•	•				•													
	X202-2P IRT	•	•		•	•	•	•	•	•				•													
	X201-3P IRT	•	•		•	•	•	•	•	•				•													
	X200-4P IRT	•	•		•	•	•	•	•	•				•													
	X204IRT PRO	•	•		•	•	•	•	•	•				•													
	X202-2P IRT PRO	•	•		•	•	•	•	•	•				•													
	X224	•	•		•	•	•	•						•													
	X216	•	•		•	•	•	•						•													
	X212-2	•	•		•	•	•	•						•													
	X212-2LD	•	•		•	•	•	•						•													
	X208	•	•		•	•	•	•						•													
	X208PRO				•	•	•																				
	X206-1	•	•		•	•	•	•						•													
	X206-1LD	•	•		•	•	•	•						•													
	X204-2	•	•		•	•	•	•						•													
	X204-2LD	•	•		•	•	•	•						•													

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	Type and quantity of ports					
	Gigabit Ethernet			Fast Ethernet		Max. distance
	10 / 100 / 1000 Mbit/s	1000 Mbit/s		100 Mbit/s		
	Electrical	Optical		Optical		
Type of module	Twisted Pair	Multimode	Singlemode	Multimode	Singlemode	
Media modules						
MM992-2CUC	2x RJ45[1)]					100 m
MM992-2CU	2x RJ45					100 m
MM991-2				2x BFOC		3 km
MM991-2LD					2x BFOC	26 km
MM991-2				2x SC		3 km
MM991-2LD					2x SC	26 km
MM991-2LH+					2x SC	70 km
MM992-2		2x SC				750 m
MM992-2LD			2x SC			10 km
MM992-2LH			2x SC			40 km
MM992-2LH+			2x SC			70 km
MM992-2ELH			2x SC			120 km
MM992-2SFP		2x LC[2)]	2x LC[2)]	2x LC[2)]	2x LC[2)]	
SFP modules[3)]						
SFP991-1				1x LC		3 km
SFP991-1LD					1x LC	26 km
SFP991-1LH+					1x LC	70 km
SFP992-1		1x LC				750 m
SFP992-1LD			1x LC			10 km
SFP992-1LH			1x LC			40 km
SFP992-1LH+			1x LC			70 km
SFP992-1ELH			1x LC			120 km

G_IK10_XX_10277

1) with retaining collars
2) The MM392-2SFP SFP slot module can accommodate up to two 1-port SFP modules
3) Can only be plugged into an MM392-2SFP slot module

Media modules for SCALANCE X-300

For further Information please have a look into the Internet.

http://www.automation.siemens.com/net/html_76/produkte/040_switches.htm

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Industrial Wireless LAN (IWLAN)

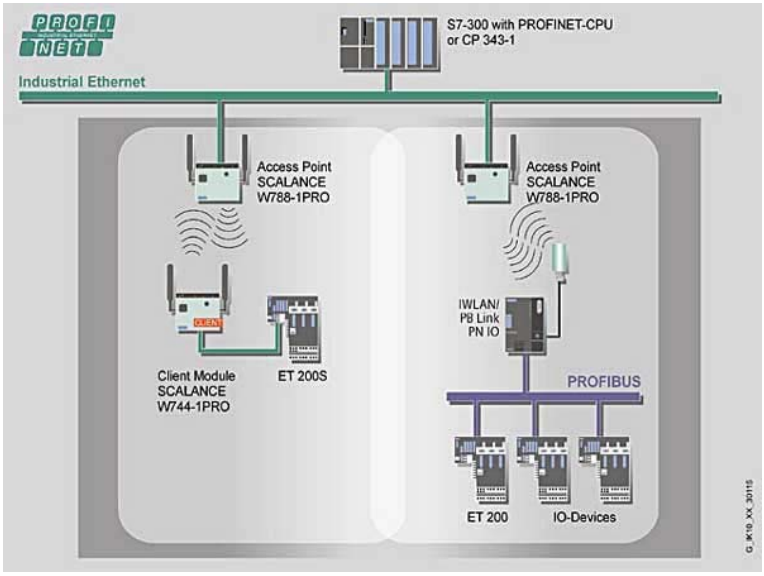
SIMATIC PCS 7 allows you to integrate mobile or stationary remote clients into the OS-LAN via a SCALANCE W788-1PRO access point.

Via IWLAN, mobile remote clients (e.g. notebooks) can communicate with the access point using a CP 7515 communications processor, stationary remote components in a desktop/ tower housing can communicate using a SCALANCE W746-1PRO Ethernet client module.

The following applications can then be implemented:

- Use of additional remote OS clients (up to 2 on IWLAN)
- Linking of Web clients to a PCS 7 Web server (up to 2 on IWLAN)
- Remote access to an engineering station with application of Remote Desktop or PC Anywhere, e.g. during commissioning.

All components used are very rugged, apply state-of-the-art authentication and encryption procedures, and guarantee high reliability of the radio channel.



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Firewall and router

With a combination of different security measures such as firewall and NAT/NAPT routers, the SCALANCE S602 protects individual devices or even entire automation cells from:

- Data espionage
- Unauthorized access

SCALANCE S602 allows this protection flexibly and without complicated handling.

SCALANCE S602 is configured with the Security Configuration Tool.

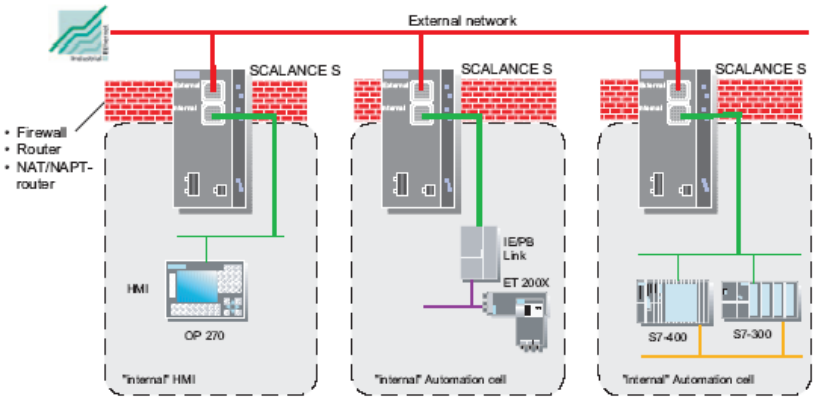




Figure 1-2 Network configuration with SCALANCE S602

Security functions

- Firewall
  – IP firewall with stateful packet inspection;
  – Firewall also for Ethernet "non-IP" frames according to IEEE 802.3 (layer 2 frames; does not apply to S602 if router mode is used);
  – Bandwidth limitation

  All network nodes located in the internal network segment of a SCALANCE S are protected by its firewall.
- Router mode:
  By operating the SCALANCE S as a router, you separate the internal network from the external network. The internal network connected over SCALANCE S therefore becomes a separate subnet; SCALANCE S must be addressed explicitly as a router using its IP address.
- Protection for devices and network segment:
  The firewall protective function can be applied to the operation of single devices, several devices, or entire network segments.
- No repercussions when included in flat networks:
  This means that when a SCALANCE S602 is installed in an existing network infrastructure, the settings of end devices do not need to be made again.

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Time synchronization

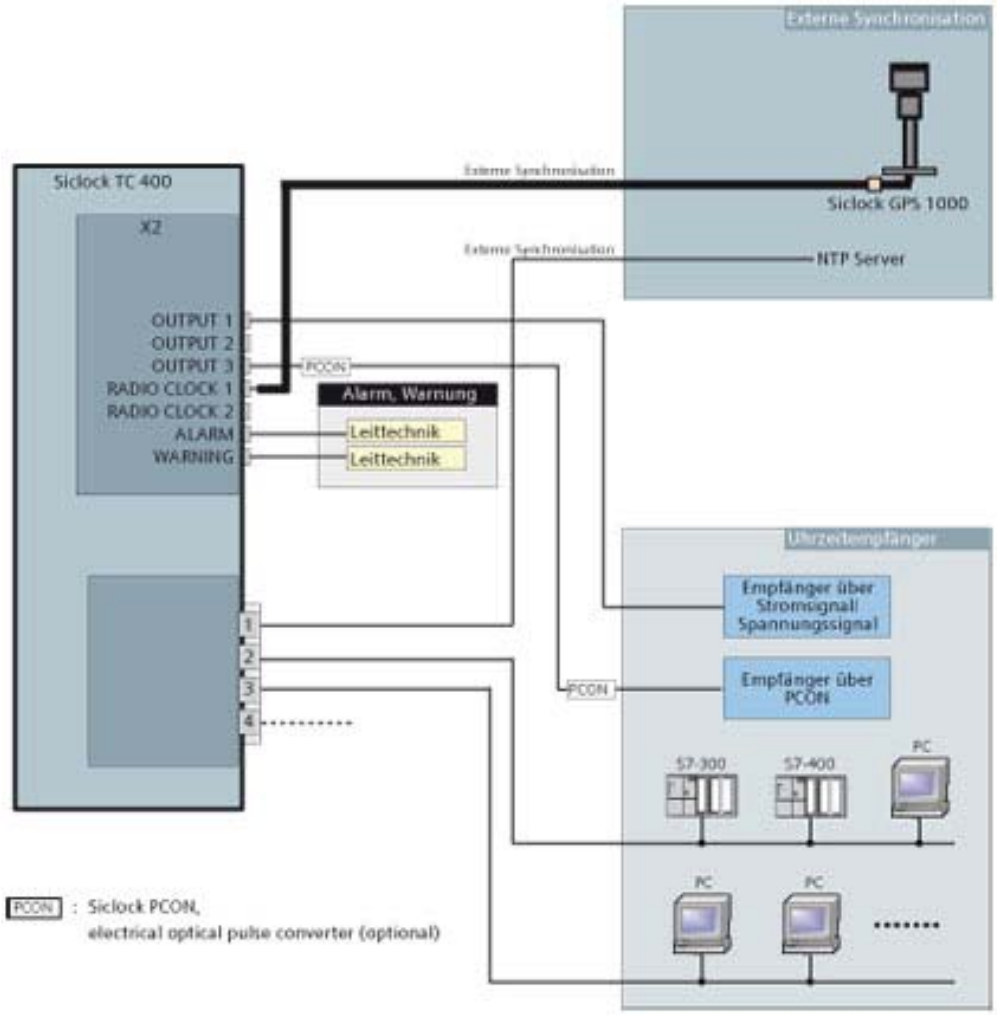
The central plant clock is the central component for the time synchronization of plants. It controls the time for the complete plant, and synchronizes all time-dependent plant components via its interfaces. The interfaces supported by SICLOCK central plant clocks offer a wide range of possible applications.

SICLOCK TC serves as a central plant clock for highly exact time control, and distributes the time to all systems to be synchronized via 4 Industrial Ethernet ports.



The plant central clock SICLOCK TM is connected to the plant control bus. The connection is usually to a Scalance X408 switch via twisted pair RJ45 interface.

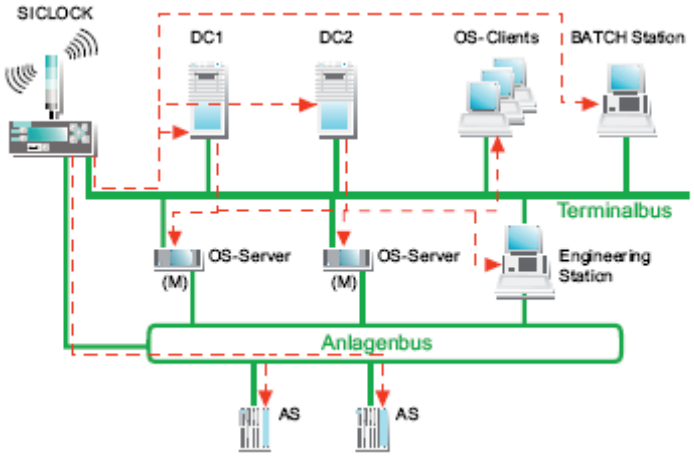
The figure shows the synchronization of the AS stations on the plant bus:



SICLOCK TC sends periodically synchronization telegrams as broadcast in Simatic method on the plant Control bus. The AS stations receive these and synchronize. The protocol used is „layer 2 – GMT“.

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The SICLOCK TC 400 central plant clock is used in a Windows domain for time synchronize of the OS.



- All operator stations must be installed in one domain.
- The SICLOCK TC 400 must be connected to the terminal bus and the plant bus.
- For the CP of the OS server the "Time tracking" option is selected in NetPro.
- The OS server must be equipped with a communication module:

– CP 1613 or CP 1623 (more than 8 AS or high-availability AS)

– BCE (up to 8 AS)

- All automation systems must be configured as time slaves (exceptions: CPU 416-3 PN/DP, CPU 414-3 PN/DP).

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Field Bus

PROFIBUS is predestined for these tasks because it enables high-speed communication with the intelligent distributed I/Os by means of a communications protocol (PROFIBUS DP) as well as communication and simultaneous power supply for transmitters and actuators (PROFIBUS PA).

PROFIBUS supports:

- HART communication for integration of previously installed HART devices
- Redundancy
- Fail-safety (PROFIsafe up to SIL 3 according to IEC 61508)
- Isochronous mode
- Time synchronization
- Time tagging

PROFIBUS is simple, rugged and reliable, can be expanded online by further distributed components, and can be used in both standard environments and hazardous areas. On account of these characteristics, PROFIBUS is now established in all sectors of the production, process and hybrid industries and has become the most successful open fieldbus in the world.

The PROFIBUS DP fieldbus enables the SIMATIC PCS 7 automation systems to communicate with distributed I/Os from the ET 200 range (remote I/Os) as well as with field/process devices, CPUs/CPs and operator terminals that have a PROFIBUS DP interface.

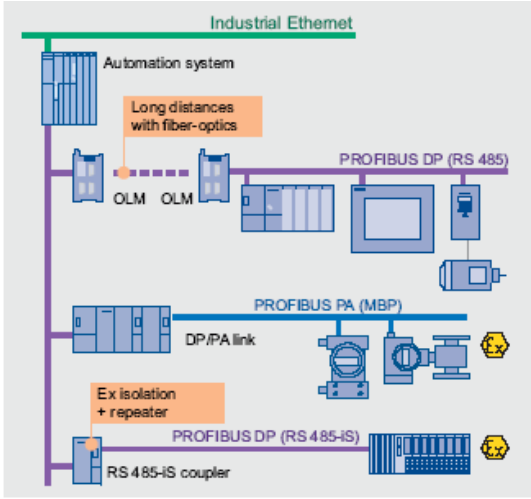
It is possible to route the PROFIBUS DP into Ex zone 1 by using a fieldbus isolating transformer (RS 485-iS coupler) and the RS 485-iS transmission technology. Connection of the intelligent, distributed field/process devices and operator terminals on PROFIBUS PA to the automation system takes place likewise through PROFIBUS DP.

Depending on the type of automation system and the number of available slots, up to 4 ROFIBUS DP lines can be connected to a SIMATIC PCS 7 automation system through internal interfaces in the CPU, and up to 10 PROFIBUS DP lines through additional CP 443-5 Extended communications processors.
On a PROFIBUS DP line it is possible to operate up to 125 devices, and on a bus segment up to 31 devices with PROFIBUS DP interface (32 stations).

Electrical and optical transmission technologies offer many different configuration options for PROFIBUS DP networks. Electrical networks can span up to approx. 10 km.
With optical transmission systems, the total size of the network is governed primarily by the cycle times as a result of the almost loss-free transmission.

With SIMATIC PCS 7, PROFIBUS DP topologies are always implemented through the standard electrical PROFIBUS DP connection on the automation system in the form of electrical or mixed (electrical/optical) networks. In the case of mixed networks, the transition between the two media is implemented by an optical link module (OLM). As regards communication between the stations, there is no difference between electrical two wire technology and fiber optic technology.

Electrical networks can be configured with a line or tree topology. Mixed electrical/optical networks with OLMs as routers can be configured with a line, ring or star topology.



PROFIBUS transmission systems

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PROFIBUS transmission systems

PROFIBUS DP

- RS 485:
  Simple and low-cost electrical transmission system based on shielded two-wire cable.
- RS 485-iS:
  Intrinsically-safe electrical transmission system for hazardous areas up to Ex zone 1, implemented using a shielded two-wire cable with a transmission rate of 1.5 Mbit/s.
- Fiber-optic:
  Optical transmission system with glass or plastic fiber-optic cables, for fast transmission of large quantities of data in environments with high interferences or for covering long distances.

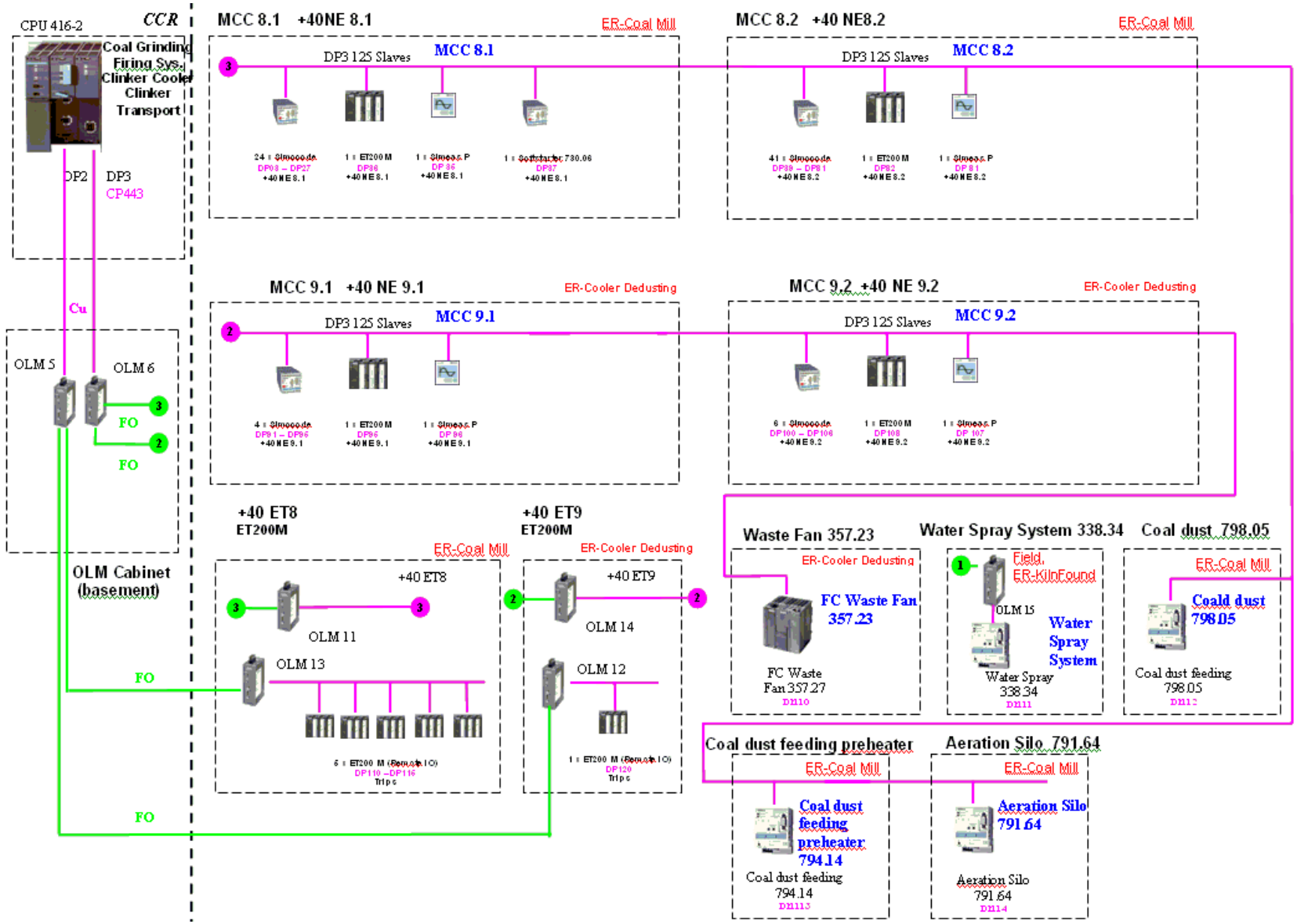
PROFIBUS PA

- MBP (Manchester coded; bus powered):
  Intrinsically-safe transmission system which permits simultaneous transmission of digital data and powering of the field devices by means of a two-wire cable. It is suitable for direct interfacing of devices in environments up to Ex zone 0 or 1.

	PROFIBUS DP			PROFIBUS PA
Data transmission	RS485	RS485-IS	Fiber optic	MBP
Transmission rate	9.6 kBit/s - 12 Mbit/s	9.6 kBit/s -1.5 Mbit/s	9.6 kBit/s - 12 Mbit/s	31,25 kBit/s
Cable	Shielded 2-wire	Shielded 2-wire	Plastic, glass	Shielded 2-wire
Type of protection		EEx(ib)		EEx(ia/ib)
Topology	Line	Line	Ring, star	Line, tree
Stations per segment	32	32	-	32
Stations per network	126	126	126	-
Cable length per segment	1.000m at 187.5 kbit/s 400m at 500 kbit/s 200m at 1.5 Mbit/s 100m at 12 Mbit/s	1.000m at 187.5 kbit/s 400m at 500 kbit/s 200m at 1.5 Mbit/s	Plastic:; max. 80 m multimode fiber: 2-3 km single mode fiber: >15km @ 12 Mbit/s	1,900m: Standard 1,900m: Eex(ib) 1,000m: Eex(ia)
Signal refresh repeaters	Max. 9	Max. 9	unlimited	

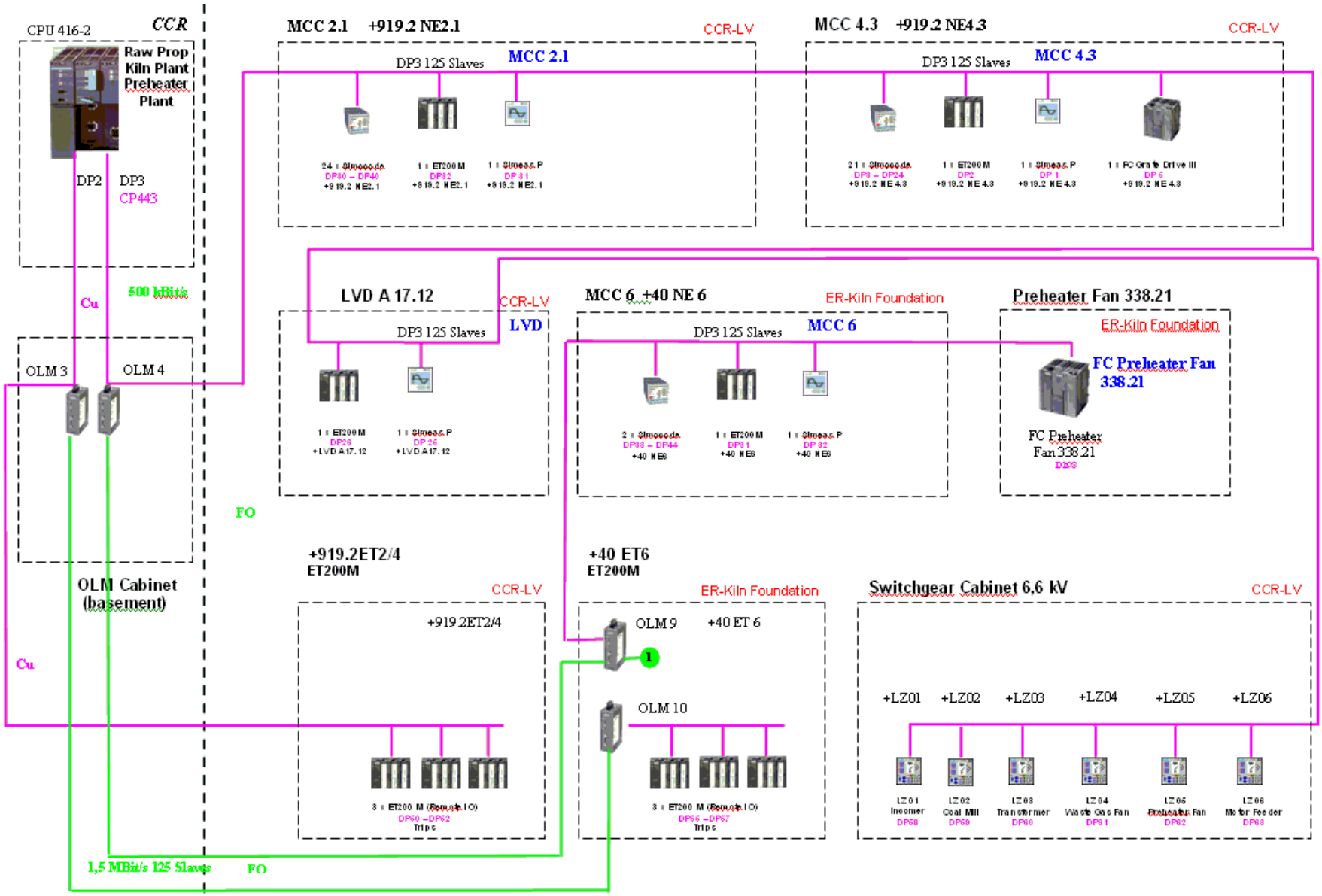
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Example 1 of Profibus DP and peripheral equipment



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Example 2 of Profibus DP and peripheral equipment



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Coupling to Third-Party Systems

- ASI interface (with CP 343-2)
- EIB instabus (with PROFIBUS DP – EIB link)
- Modbus (with CP 341)
- OPC

OpenPCS 7 for process data evaluation and management

The process data of SIMATIC PCS 7 V8.0 can be made available to a higher level system via an OpenPCS 7 server for the purpose of production planning and process data evaluation and management.

The OpenPCS 7 Interface is based on the OPC specifications (Openness, Productivity, Collaboration), which mainly use the DCOM technology (Distributed Component Object Model) from Microsoft for the communication between applications.

The Open PCS 7 Station provides the following data:

Access to Data	OLE/DB	OPC	Data Type	Type of Access
OS Server		DA	Variables of process operation	Read/Write
OS Server		A&E	Messages and alarms	Read/Write
OS Server	Yes	HDA	Historical measuring values	Read
OS Server	Yes	H A&E	Historical messages and alarms	Read
CAS	Yes	HDA	Historical measuring values	Read
CAS	Planed	H A&E	Historical messages and alarms	Read

Archive tags are read transparently across computer boundaries, i.e. a read job will automatically be continued on the CAS once the archive limit on the OS server is reached.

The OpenPCS 7 Server collects data distributed over various SIMATIC PCS 7 industrial workstations, e.g. OS servers or CAS, for the OPC clients:

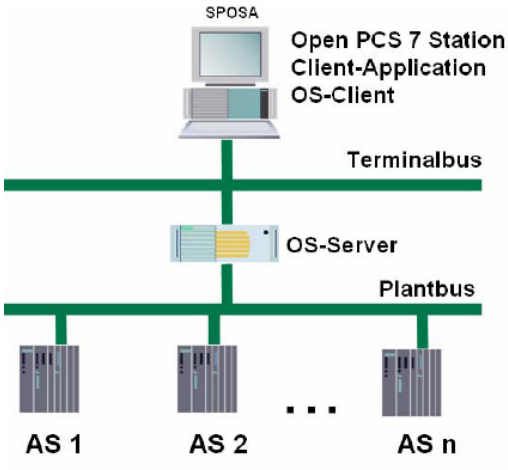
OPC HDA clients, e.g. reporting tools, can specifically request historical data by specifying the start and end of a time interval.

OPC A&E clients at production and management level receive messages from the OPC A&E server incl. all process auxiliary values, in line with their subscription.
Filter mechanisms limit data transmission to selected and changed data.

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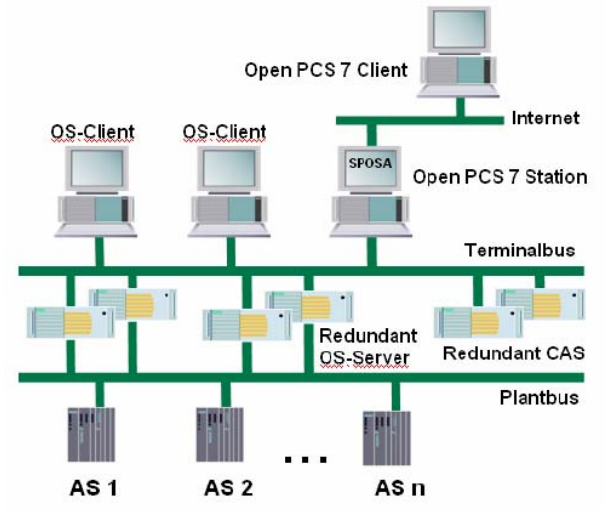
The OpenPCS 7 Server can be operated in two configurations:

- As multi-functional SIMATIC PCS 7 industrial workstation, type Client, with OpenPCS 7 Server and OS Client functionality (OpenPCS 7 Server/OS Client)



Open PCS 7 Station, OS client and client applications (OPC or OLE/DB) on one common PC.
This configuration is recommended for small-sized plants.
Generally, Open PCS 7 Station can perform data access to an OS server or CAS.

- As stand-alone OpenPCS 7 Server, based on a SIMATIC PCS 7 industrial workstation, type Client (recommended configuration)



Configuration of multiple station system with client/server architecture for medium and large sized plants.
The Open PCS 7 Station is equipped with two network cards. The OPC clients are connected via network (office network).
As additional protection it is possible to install a firewall.

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Operator Station CEMAT Server

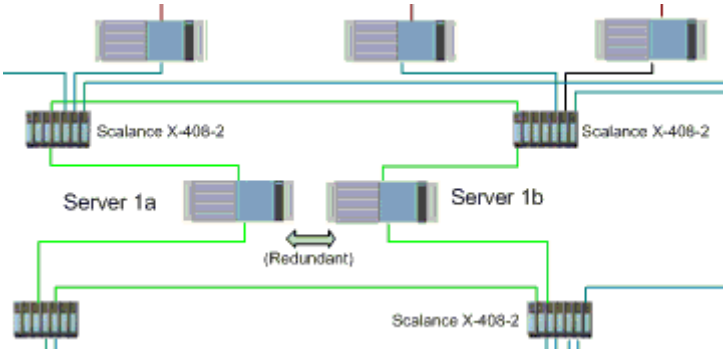
The OS Server are redundant designed. Synchronization of the redundant pairs of servers is carried out automatically and at high speed.

OS clients can access the data of not only one OS server/server pair, but from several OS servers/pairs of servers simultaneously. This makes it possible to divide a plant into technological units and to distribute the data accordingly to several OS servers pairs of servers. In addition to scalability, the advantage of distributed systems is the ability to decouple plant areas from each other, which results in higher availability

A second Server pair will be necessary if there are more then 8000 process objects in use or a second Product line has to build up.

SIMATIC PCS 7 supports multi-user systems with up to 12 redundant OS pairs of servers. In multiclient mode, OS clients can access data from one or more of the 12 OS servers/pairs of servers in parallel (up to 32 OS clients simultaneously on all).

The OS servers are designed in addition with client functions which permit them to access the data (archives, messages, tags, variables) from the other OS servers of in the multi-user system. This means that process graphics on one OS server can also be linked with variables on other OS servers (area-independent displays).



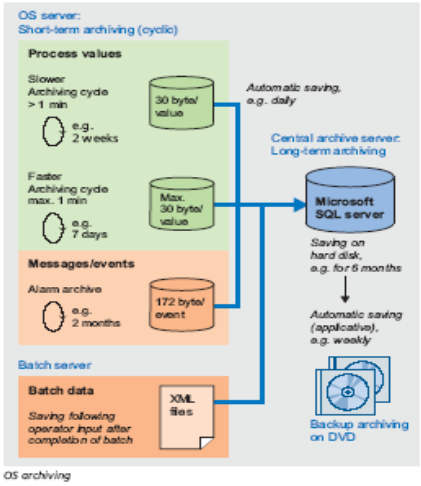
In case of a system architecture with redundant OS servers, the OS clients are switched over to the backup server in the event of a fault. Background processes permanently monitor important server applications for faults which may then result in a redundant switchover. Automatic synchronization of process data, message archives and user archive is carried out when the partner server starts up again.

The communication network identified as Plant-Automation-Bus is implemented with standard SIMATIC NET components such as switches(X408), network cards, communications processors (CP), cables etc.

OS archiving

The operator system already includes a high-performance archiving system based on Microsoft SQL Server with cyclic archives for short-term saving of process values and messages/ events (alarms). Increased requirements are satisfied by the powerful central archive server which can archive approx. 10,000 values/s from up to 11 servers/pairs of servers. The data managed in the central archive server can be saved on all storage media supported by the operating system. This may require additional hardware and software, e.g. a DVD writer with suitable burning software.

The central archive server is a station on the OS-LAN (terminal bus), and are not connected to the plant bus.



OS archiving

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Operator Station CEMAT Client

Overview

The operator system is the human-machine interface of the SIMATIC PCS 7 process control system, and thus represents the user's window into the process. It is extremely flexible, and can be easily adapted to different plant architectures and customer requirements.

It receives data (project data, process values, archives, alarms and messages) from one or more OS servers through an OS LAN (automation bus).

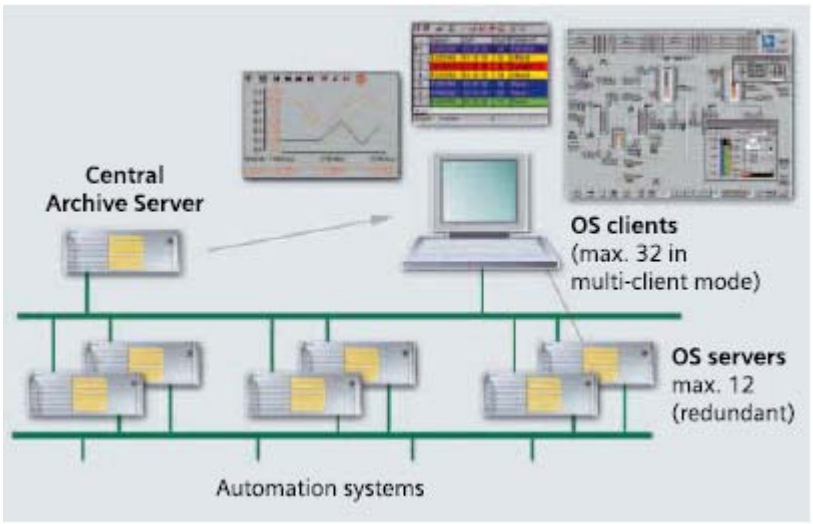
The predefined user interface of the operator system has all the features typical of a control system. It is multilingual, clearly structured, ergonomic and easy to understand. The operator can survey the process extremely easily, and rapidly navigate between different views of the plant. He is supported by a picture tree manager, which organizes the picture hierarchy according to user requirements and permits direct selection of subordinate areas.

Process displays and process tags can also be called up by name. An online language selector permits the user to change the display language during runtime.

The SIMATIC PCS 7 OS process control software/hardware provides the general functions:

- User-friendly process control and high operational reliability, also in conjunction with multi-screen technology
- Extended status displays through combination of status and analog values with alarm information
- Central user management, access control, electronic signature, Access verification via chip card reader
- Online language switchover
- System-wide time synchronization based on UTC (Universal Time Coordinated)
- Predefined layout with navigation buttons
- Hierarchical picture layout
- Tag logging with online curve summary
- Long-term data logging
- Report functions

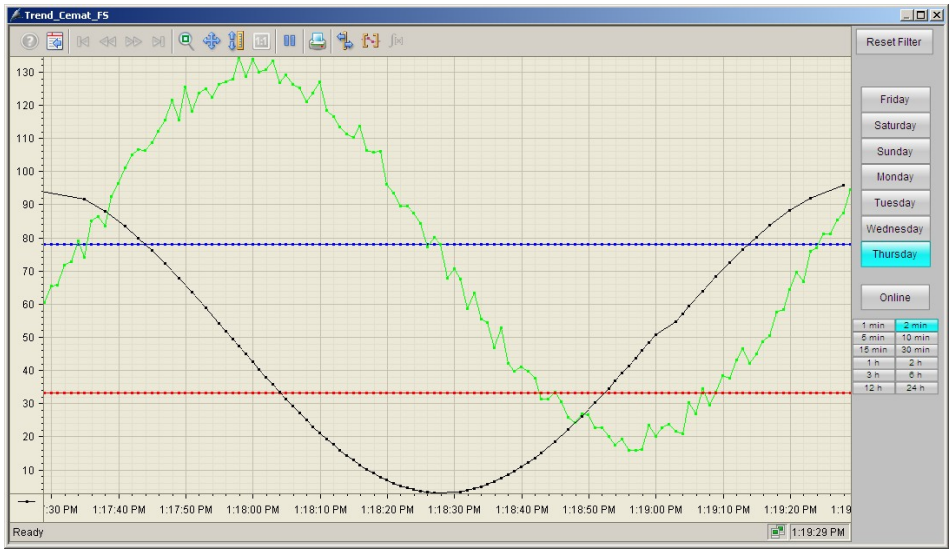




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User interface

Trends



Trend window on the operator station

Trends can be displayed as a full-size picture or as a window in the working area, and printed directly. Some trends/trend groups are predefined during plant configuration. Operators can also compile their own trends while online, to select them by process tag names, and to save them for reuse.

Messages and alarms

Message priorities are issued as an additional attribute to the known signal classes in order to make it easier to assess large quantities of signals and to be better able to distinguish important messages from the less important.

Operators can specifically disable messages (alarms) from individual process tags or from all process tags of a display/area in the event of faults in a sensor/actuator or during startup. Disabling and enabling are recorded in an input report.

Active messages are signaled by group displays representing preconfigured views based on signal groups. The group displays also indicate whether messages are disabled or not.

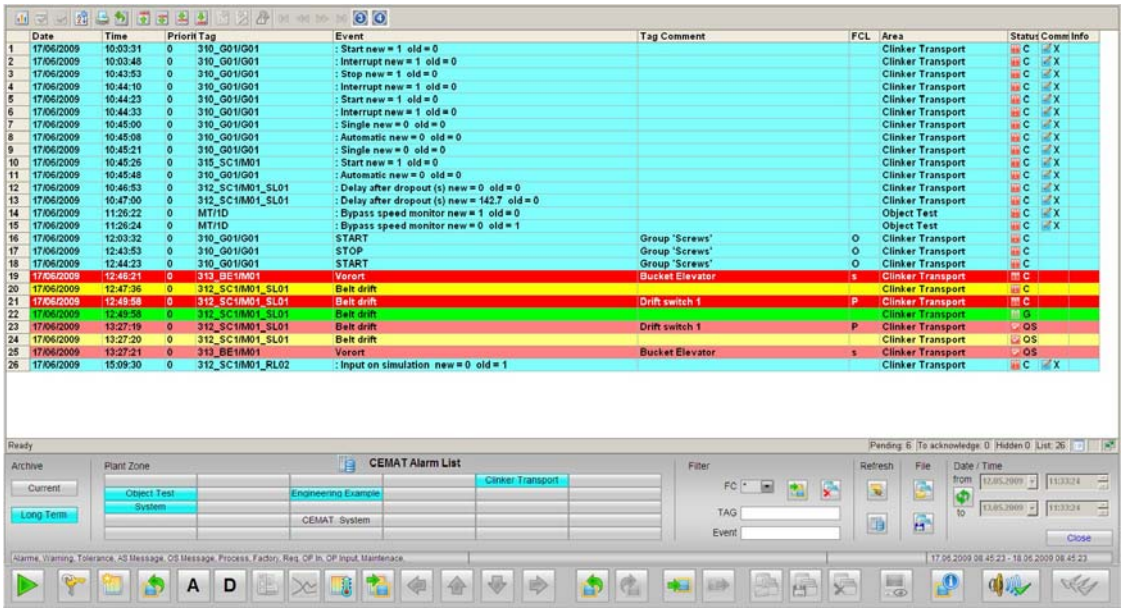
The last message to have arrived - or the message with the highest priority when alarm priorities are utilized - is displayed at the top edge of the standard view. A predefined window with further messages can be called up with the "Extended message line“

The "Loop-in-alarm" and "Select display using process tag" functions support the quick evaluation and resolution of faults. Using "Loop-in-alarm", the operator can jump directly to the process display in which the fault has occurred, and can then call up the associated faceplate (loop display) through the process tag whose block symbol is colored (cyan).

The faceplate window (loop display) can be anchored using a pin button so that it remains visible even when the display is changed.

Flexible sound setting options and priorities which can be defined using signal variables support the audible annunciation of messages/alarms through a soundcard or by controlling external horns via a signal module.

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Central user management, access control and electronic signature

SIMATIC Logon offers central user administration with security and access control based on Windows 2000 Professional or Windows XP Professional / Server 2003 for the SIMATIC PCS 7 system components as well as non-SIMATIC components connected through API. It can be used to fulfill the validation requirements of 21 CFR Part 11. An electronic signature function can also be used in conjunction with SIMATIC Logon.

A chipcard reader can be used to provide an additional level of security for controlling access to the operator stations by checking the operator privileges stored on a chipcard.

Sign-of-life monitoring

With the "Sign-of-life monitoring function", the operator system is able to monitor the correct operation of all subordinate systems connected to the plant bus. A graphical plant configuration display shows the status of each monitored component. The SIMATIC PCS 7 asset management offers enhanced functionality in this context (see Section "Asset Management").

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Engineering Stations / Engineering Tools

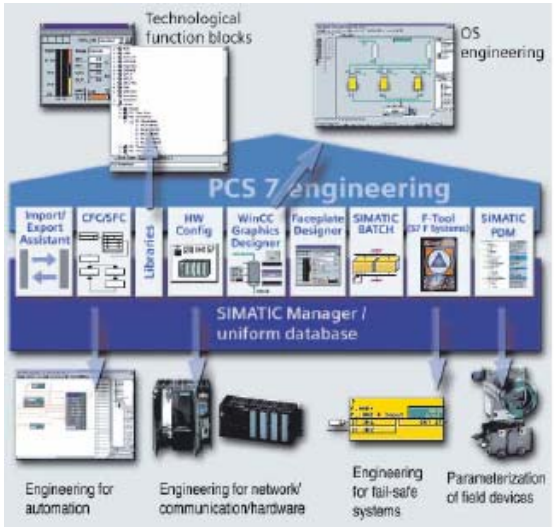
Hardware Overview



The central engineering system of the SIMATIC PCS 7 process control system is based on the SIMATIC Rack IPC 547 and is already prepared for installation in 19" rack systems . This is characterized by powerful PC technology that can be used together with Windows XP Professional operating system in the office as well as industrial environments and provides an optimum basis for engineering.

For more user-friendliness, the operating range can be extended by connecting up to 4 process monitors using a special multi- VGA graphics card.

ENG Software Overview



The SIMATIC PCS 7 engineering system contains tools which are optimally matched to one another for system-wide project-oriented engineering, and which simultaneously provide the basis for asset management of the I&C equipment. These permit you to carry out the engineering of standard automation functions as well as the configuration of consistent safety functions for safe, fault-tolerant and high-availability process applications. The engineering toolset comprises the following tools for engineering:

• of the hardware and field devices,

• of the communication networks,

• of continuous and sequential process operations,

• of the operation and monitoring strategies,

• of batch processes with SIMATIC BATCH and

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• of route controls with SIMATIC Route Control.

Technologists as well as process and production engineers can plan and configure in the environment they are familiar with by utilizing the engineering toolset designed for technological needs together with the predefined blocks and plans.

The Software is available in packages of various size to match the number of configurable process objects (250, 1,000, 2,000, 3,000, 5,000 or unlimited/8,500 POs). The number of configurable process objects can be subsequently increased at any time by means of engineering PowerPacks.

The engineering system supports the implementation of large projects and the related processing of bulk data by providing appropriate functions such as:

- Plant hierarchy (plant view)
- Project library for process tag types as well as the import and export of process tags (process object view)
- Multi-project engineering
- Branch & merge
- Extended rename

The following software options expand the basic system with special functions:

- Import/export assistant
- Version cross-checker
- Engineering Process Safety for engineering of fail-safe systems, including SIMATIC Safety Matrix engineering tool
- SIMATIC PCS 7 asset engineering
- SIMATIC route control engineering
- SIMATIC PDM Process Device Manager for SIMATIC PCS 7
- PCS 7 PID-Tuner for controller optimization
- S7-PLCSIM for the functional testing of CFC/SFC programs

General Function

Typical automation components such as motors, valves and PID controllers are already saved as standardized software objects (process tag types) in a control engineering library and need only be integrated in the process operations and graphically connected. This is easy and quick to accomplish even by technologists without any programming experience. When image objects are connected, the associated OS variables are saved (together with the associated blocks where applicable) in the block list.

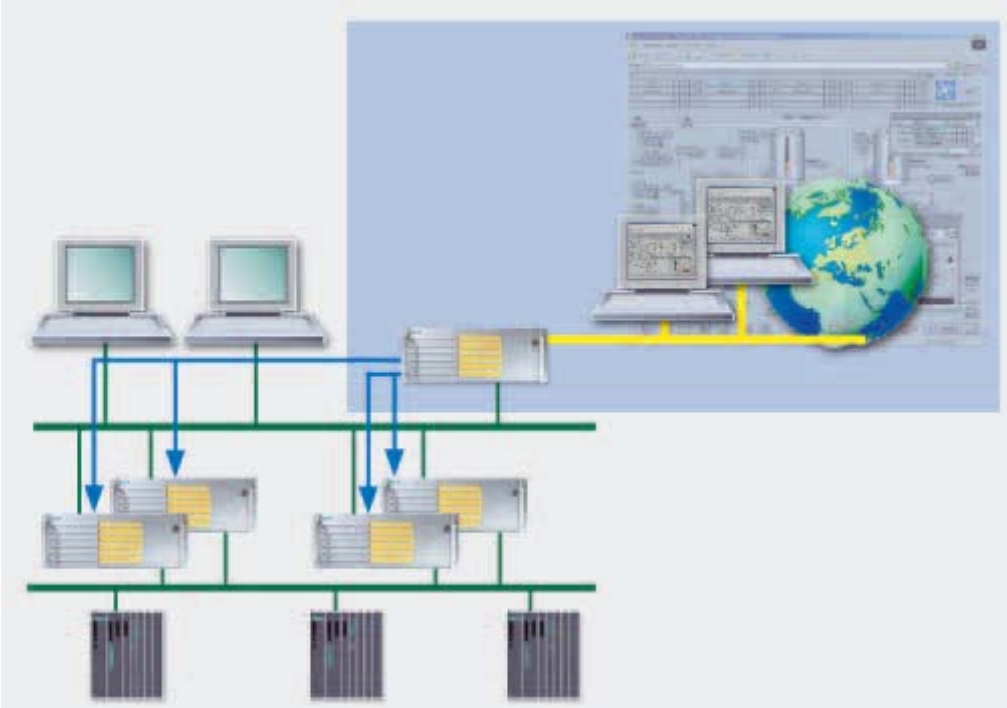
The uniform database for the engineering systems ensures that data which have been entered once are available system-wide.

All project modifications associated with the automation systems and the operator systems can be compiled and loaded in one step. The engineering system automatically ensures the correct sequence. A central dialog displays and controls the operation.

Selective changes to the configuration can be loaded online into the corresponding system components. Short turnaround times result in short waiting times for the commissioning engineer and have a positive impact on the commissioning costs. Changes to the configuration which are relevant to automation systems can be debugged in a test system before being downloaded into the target system of the running plant.

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WEB Server



The PCS 7 Web server makes available the project data of the OS servers for PCS 7 Web clients and thus enables worldwide operator control and monitoring of a plant via intranet/Internet.
It does this by accessing project-specific process data in the lower-level OS servers using the mechanisms of a multi-client.

Function

The Web clients equipped with Internet Explorer and with plug-in installable via the World Wide Web access the project data provided by the PCS 7 Web server via intranet/Internet. The process displays are converted by "publication" into a form suitable for presentation by the Internet Explorer.

You can operate and monitor your plant via the Web clients in the same manner as via the OS clients. You must log on with the Web client just as with an OS client, and the rules for assignment of privileges are also identical. The input operations made on the Web clients are recorded in the OS operating log.

The integral OS user management guarantees high security when accessing the OS servers from the PCS 7 Web server. In line with the security requirements of the respective system, access protection is possible using password, firewall technology and individual security strategies.
The SIMATIC PCS 7 OS server with Microsoft Windows Server 2008 R2 Standard 64-bit operating system offered in the section "Industrial Workstation/IPC" can be used as the basic hardware for the PCS 7 Web server. The OS software server of the SIMATIC PCS 7 V8.0 process control system is preinstalled on this basic device in addition to the operating system. For the configuration of the PCS 7 Web server, you additionally need the "OS Software Client" license for both the "Standard" application as well as for the "Diagnostics" application. Contrary to the information in the ordering data, the OS Software Client license in this special application is approved for the Windows Server 2003 R2 Standard 32-bit and Windows Server 2008 R2 Standard 64-bit operating systems

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Maintenance Station



The maintenance station for PCS 7 asset management uses hardware and software components of the engineering system and operator system.

The message system, user desktop, display hierarchy and operator prompting are oriented according to the HMI philosophy of the operator system. The diagnostics data of all assets are displayed on uniform faceplates whose contents depend on the intelligence of the respective component. This means that working with the maintenance station is simple and intuitive – complex familiarization is not required.

As a result of the close interlacing, ES, OS and asset management functions execute on common hardware. Such a multifunctional station cannot only be used for asset management, but also for system engineering or HMI.

The diagnostics displays structured according to the plant hierarchy with the operating states of all PCS 7 components can be displayed on the maintenance station and also on an OS client.

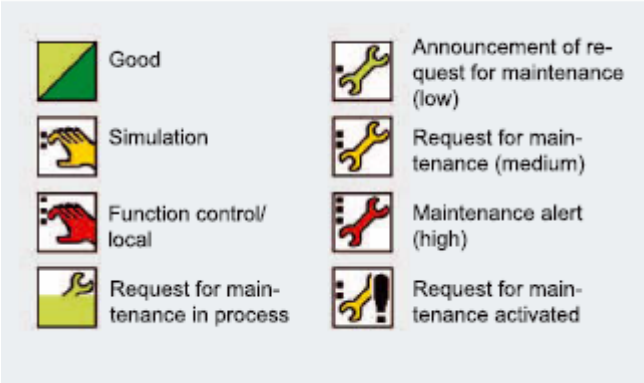
However, enhanced online diagnostics functions in conjunction with HW Config or SIMATIC PDM can only be called from the maintenance station.

The SIMATIC logon handles user management and access control for the maintenance station.

Design

Depending on the architecture of the SIMATIC PCS 7 plant, the maintenance station can be implemented based on a SIMATIC PCS 7 BOX, PCS 7 single station or client/server combination. The following table shows possible hardware/software configurations of the maintenance station

Uniform symbols

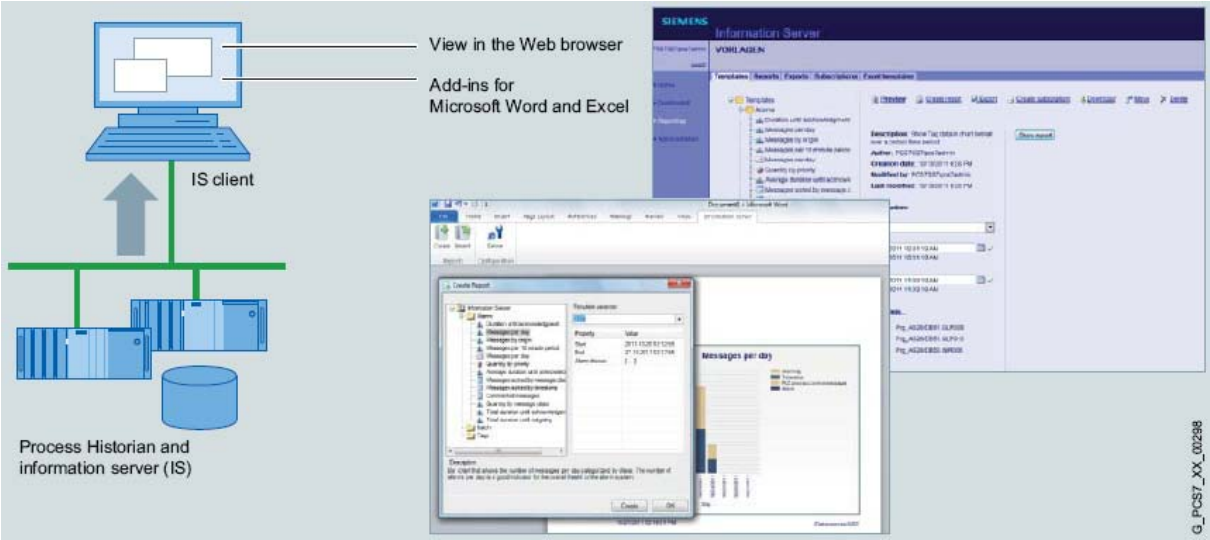


Uniform symbols for visualization of the maintenance status and for HMI on the maintenance station

A significant feature with visualization of the access management functionality is the uniform symbols and texts for displaying the statuses of all assets, i.e. for operator stations as well as for network components, controllers or field devices. The asset faceplates are also uniform. The amount of information displayed depends on the intelligence of the respective component.

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Process Historian



The Process Historian can archive process values, messages, and batch data from the SIMATIC PCS 7 V8.0 process control system. It is configured in a SIMATIC PCS 7 project similar to other stations of the SIMATIC PCS 7 process control system (e.g. OS Server, Batch Server, Route Control Server, OpenPCS 7 Server or all clients).

The process values and messages managed in the database of the Process Historian on the OS clients and OS single stations can be visualized in graphic and clear manner. Data selection is supported by integrated filter functions. Messages and process values can be shown in table form, and process values also in graphic form. Tables of process values can be exported in CSV format for processing in other Windows applications, e.g. Microsoft Excel.

The data managed by Process Historian can be transferred to commercially available storage media (backup/restore). This requires additional hardware and software which support the operating system of the Process Historian, e.g. a DVD burner with appropriate burner software. The export can be triggered by the operator.

Archiving and visualization functions:

- Real-time archiving of process values and messages from the SIMATIC PCS 7 V8.0 operator systems
- Support for the OS single stations of SIMATIC PCS 7 V8.0
- Archiving of batch data from SIMATIC BATCH V8.0
- Support of multiple SIMATIC PCS 7 projects
- Scaling relative to the basic hardware employed in respect to performance and quantity structure
- Swapping out of all data as well as cataloging onto external storage media
- Reading the swapped-out data and cataloging from external storage media
- Data visualization on the OS clients/OS single stations:
  - Configuration of views (picture windows and masks) including the selection criteria for displaying the data
  - Visualizing of messages in table form dependent on filter functions
  - Displaying of process values in table or graphic form dependent on filter functions
  - Visualizing a batch overview (selecting the detailed log of a batch from the batch overview is possible)

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Information Server

The Information Server is the reporting system of the Process Historian. Based on the Microsoft Reporting Services, it offers web-based thin-client access to the historical data. Add-ins for Microsoft Word and Excel provide additional access to the database of the Process Historian.

Reporting functions

- Frequently used report templates for process values, messages and batches
- Open reporting system for creating any number of new report templates
- Storage of configured (parameterized) report templates for faster access
- Report export in common document formats
- Support of subscriptions for cyclic report generation including e-mail service
- Creation and storage of role-based dashboards
- Role management for Windows users; supports workgroups and Active Directory; user rights can be assigned for specific projects
- Generation of reports and inserting as graphics in Microsoft Office Word documents
- Creation of Microsoft Excel reports for historical process values and messages as well as storage of the Excel report templates on the Information Server
- Support of subscriptions for Excel report templates

Design

The basis hardware for the Process Historian can be a SIMATIC PCS 7 Industrial Workstation of the type IPC847C, server version, with an additional hard disk for the operating system and SIMATIC PCS 7 software.

A RAID 5 hard disk configuration, which can be selected in the ordering data, can be used for the database.

The use of a Fujitsu Primergy server is recommended for larger quantity structures (more than 3 OS servers in the maximum archive configuration)

The Information Server can be installed and operated on the Process Historian hardware or on separate hardware. When the Information Server is operated separately, any server version or single station version of the SIMATIC PCS 7 Industrial Workstation is suitable.

The Process Historian and Information Server run under the Windows Server 2008 R2 Standard 64-bit operating system, the information server on separate hardware can also run under Windows 7 Ultimate 32/64-bit or Windows Server 2003 R2 Standard 32-bit.

The Process Historian and Information Server do not need a connection to the plant bus. They can be connected to the OS and batch servers of the SIMATIC PCS 7 system via terminal bus, e.g. via the integrated network connection (Ethernet RJ45 port onboard) of the server.

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CEMAT Design and Engineering

Overview

Cemat is a Control System based on SIMATIC PCS 7, the mainstream process control system of Siemens. It offers a unique, open architecture for modern, future-proof and economic solutions for the Minerals industry.

Cemat makes use of all features of SIMATIC PCS 7 and it further adds the philosophy of plant operation and fault diagnosis.

Special function blocks and faceplates are designed for all kind of operation, interlocking and supervision functions as typically required in Minerals Plants.

The functions are preconfigured and well proven over many years. This makes engineering easy, fast and reliable.

Diagnosis functions such as **diagnostic dialog**, **loop-in-alarm function and information dialog** lead to the information very fast and help to reduce down-time to a minimum.

Cemat contains a powerful **message system** with special filter functions and sophisticated plausibility logic:

- Alarms will only be given for plant sections which are "in operation".
- In case of general faults like power supply failure, the alarms from the modules can be blocked in order to give no misleading information to the operator.

A **status report** gives an overview of all unsolved problems within a plant section (group) and prevents unnecessary group starts. This saves time and energy.

An **object list** shows all objects of a plant section (group). This function can be used to see the status of the objects and to search for potential simulations or software jumpers.

The **information dialog** of each object provides additional information. It displays the hardware's installation location, I/O data, Additional I/O Information (including Signal Addresses), MCC data, AS data, notes and object related messages.
An open user interface in the information dialog offers access to sound files, videos, PDF descriptions and CAD drawings.

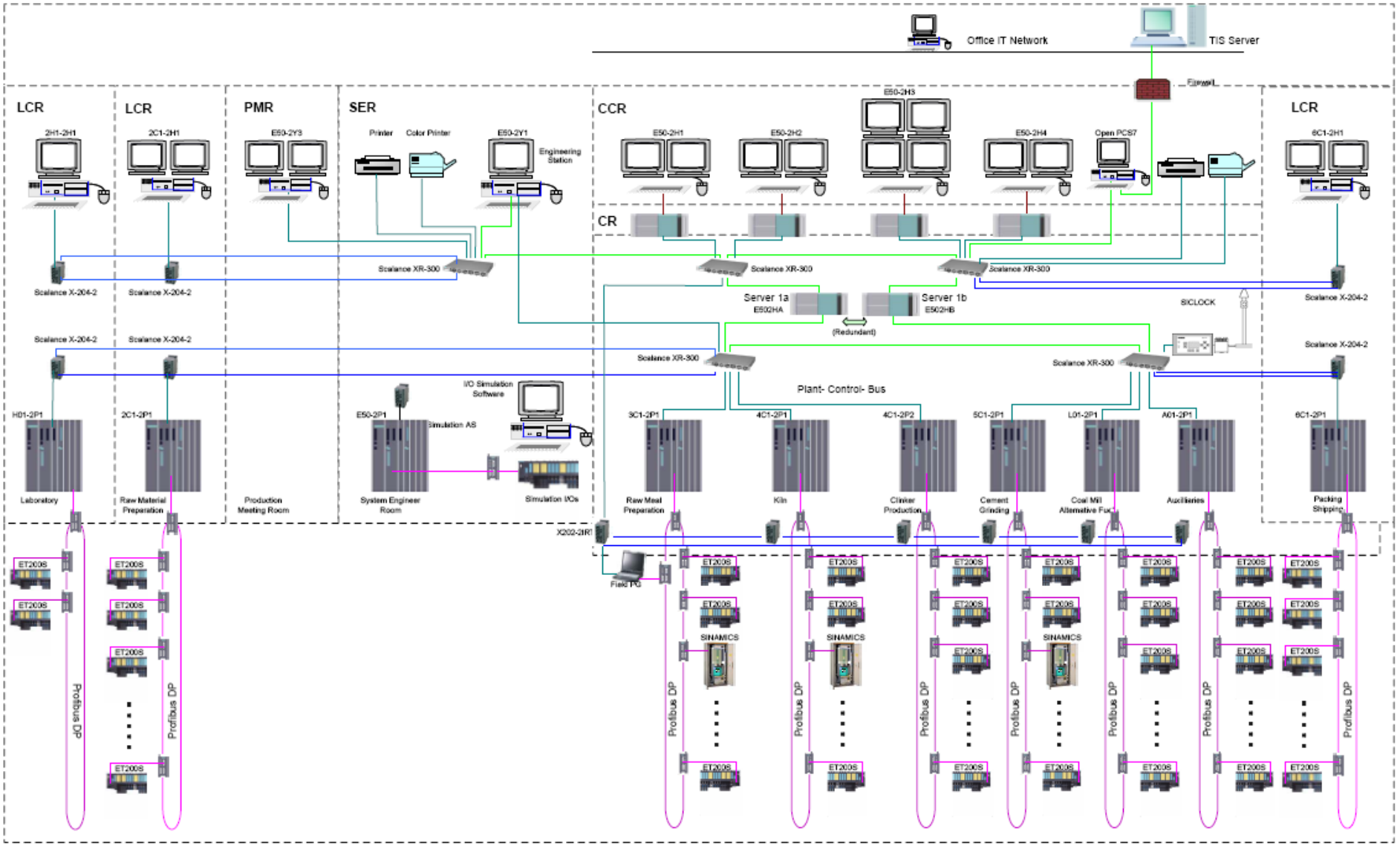
The **maintenance dialog** shows Statistic values like Operating hours and Maintenance data information.

Cemat provides assistance in all phases of the project:

- Project planning and ordering:
  - Cemat DEMO systems offline and online
  - Order information for the calculation of the automation components
- Engineering and Commissioning:
  - Training in the SIMATIC training center or, if desired, on site
  - Extensive documentation (Object description and Engineering Manuals)
  - Engineering tools
- Trouble shooting
  - FAQs and information to latest versions in the internet
  - Special contact partners in the PCS7 Hotline
- Migration
  - Migration tools for connecting old systems to newer versions
  - Upgrade procedures and engineering tools for the upgrade to the latest versions.

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Plant configuration with AS in CR



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CEMAT Modules



Note: The following list refers to Minerals Cemat Standard (Project code = 001).

A CEMAT Module is a combination of a control program in the automation system (function block) and the appropriate visualization in the operator station, the so-called faceplates.

The CEMAT Modules are designed for all kind of operation, interlocking and supervision functions as required in a Cement or Mining Plant:

Modules for drive functions

C_DRV_1D	Unidirectional drive
C_DRV_2D	Bi-directional drive
C_DAMPER	Damper
C_VALVE	Valve
C_SIMOS	Adapter for SIMOCODE cyclic
C_SIM_AD	Adapter for SIMOCODE acyclic
C_STORAG	Storage location
C_STO_MA	Storage Multi Chamber module

Modules for control and supervision functions

C_GROUP	Group module
C_MUX	Additional block for group/route
C_ROUTE	Route module
C_SELECT	Selection module

Modules for supervision of process signals

C_ANNUNC	Annunciation module
C_ANNUN8	Annunciation module for up to 7 Messages
C_MEASUR	Measuring value
C_ANASEL	Analog Value Selection

Special functions

C_ADAPT	Adapter block to include non-CEMAT modules into group supervision.
C_ODA	Object Data Acquisition
C_POLY3	Polygon module with 3 outputs (used for startup / shut down Kiln)
C_SIMU_L	Entry into Cemat list simulated Objects

The detailed description of the CEMAT Functions you find in the object description an in the only help.
All other blocks from the PCS7 standard library can be used as well.

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General Function Description of CEMAT

Operating Modes



Note: The following description refers to Normal Standard (Project code = 001). In some of the project versions of CEMAT it may differ. Please see the respective documentation files.

In CEMAT three main operating modes are possible

In normal operation all drives of a technological plant section is started and stopped in the so-called **Automatic Mode**. The start/stop commands are carried out by the operator in the control room via the faceplate of the group.
With a group start the group module generates a start-up warning. After the start-up warning time has elapsed, all affiliated drives are started sequentially according to the interlocking conditions.
With a group stop all affiliated drives are stopped according to the interlocking conditions.

Automatic start/stop can also be initiated via program (by a process condition).

In the **Manual-start mode** the drives can be started and stopped individually from the operator station. In the Manual-start mode the drive module itself generates a start-up-warning. After the start-up warning time has elapsed the start command is given.
In the Manual-start mode all interlocking conditions (start and operating interlocks as well as protection interlocks) are effective.
An already running drive can be switched back to automatic mode. If the interlocking conditions are fulfilled, the drive will keep running.
The Manual-start mode can be enabled per group (from the group faceplate). All affiliated drives will be switched to Manual-start mode and back.

A third mode allows starting and stopping of the drives from locally installed push buttons. The so-called **Local mode** is mainly used for maintenance and must be enabled by the operator in the control room.
The local mode is a non-interlocked mode, which means that start and operating conditions of the drive are not effective. Only the protection interlocks are effective. A special protection interlock can be used for signals which should not be effective in local mode as for example the belt drift switch.
The Local mode can be enabled per group (from the group faceplate). All affiliated drives will be switched to Manual-start mode and back.

Change of the operating mode

By default, all drives are in **Automatic mode**.

Changeover between automatic and local mode:
Open the faceplate of the group and press the button *Local*. Running drives continue to run.

Changeover between automatic and Manual-start mode:
Open the faceplate of the group and press the button *Manual*. Already running drives continue to run. All interlock conditions are active.

A changeover between local mode and Manual-start mode is not possible.

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Operating Methodology

Note: The following description refers to Normal Standard (Project code = 000). In some of the project versions of CEMAT it may differ.

Normal group start in automatic mode

The group start in automatic mode can be carried out via operator faceplate or (if enabled) via program. After a start-up warning is given the group gives a start command to the drives and the drives start according to the start sequence, considering the interlocking conditions and the time delays. After the startup is completed and the last drive in the sequence is running, the group receives a feedback ON signal and it indicates "completely running".

Group interlocking conditions or an unacknowledged fault for one of the group objects prevent the group start. After making sure that all faults are acknowledged, the operator can use the status call function in order to check for availability of the group.

Static faults in one of the group objects don't prevent the group start. (The fault may come from a measure which is at the moment not affecting the process.)
But any incoming (dynamic) fault during the start-up of the group leads to an interrupt of the start command. In order to avoid unnecessary group starts the operator should carry out a status call, which gives him (her) a list of all the faulty objects and he (she) can decide whether any action is required before group start.

Normal group stop in automatic mode

The group stop in automatic mode can be carried out via operator faceplate or via program. The group gives a stop signal to the drives which will be stopped in the stop sequence, considering the interlocking conditions and the time delays.

Immediate stop

The immediate stop can be carried out via operator faceplate of the group or via program. After pressing immediate stop, all drives are stopped instantaneously, without time delay.

Manual start/stop of a drive

Use the group Faceplate button in order to enable the Manual-start mode for all affiliated drives.

Once the Manual-start mode is enabled, the drives can be started/ stopped individually via drive faceplate. Pressing the start button a start-up warning is generated and after the start-up time elapsed the drive gets started. Pressing the stop button leads to an immediate stop.

To disable the Manual-start mode the group must be switched back into automatic mode. Running drives continue to run.

Local start/stop of a drive

Use the group Faceplate button in order to enable the Local mode for all affiliated drives. The drive remains in automatic mode unless the local switch **EVO** is switched into "Local" position.

Once the local mode is enabled, the drives can be started/ stopped via locally installed push buttons. This is a non-interlocked mode and should not be used for normal operation. In the local mode no start-up warning is generated.
Pressing the local start button **ESR** and presuming that there is no fault, the drive starts immediately. Pressing the local stop button **ESP** will stop the drive.

To disable the local mode the local switch **EVO** must be switched to "Remote" position and the group must be switched back into automatic mode.

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Fault diagnosis and Messages

A number of indications are used in CEMAT in order to show the operator the actual status of the plant and to allow fast and reliable trouble-shooting in case of a fault.

- The **group** block has **summarizing indications** for "Faults" or "Warnings" in any of its affiliated objects.
- The group **status call function** shows a list of all faults and interlocks.
- The group **instance list** shows a list of all objects, including an indication for software jumpers and simulations (override function).
- The block icons of the **plant objects** (drives, measures or process signals) show the operating mode and fault status.
- The **diagnosis picture** shows the detailed information of the fault type.
- The **information dialog** shows additional information about the object regarding location, I/O addresses, MCC etc.
- The **alarm dialog** shows all messages created by the specific object (events and operations).

If a plant fault needs the attention of the operator (e. g. something has been stopped by a wrong process condition) an alarm message will be generated. Each incoming alarm must be acknowledged individually by the operator.

One of the main features of CEMAT is that no unnecessary alarms are generated.

- Alarms are filtered per section (AREA): Only the operator who is authorized for a plant sections will see the alarms.
- A plausibility logic prevents fault messages caused by another fault
- In case of general faults like power supply failure, the alarms from the modules are blocked and only the alarm for power supply failure will be given.
- If the drives are enabled for local operation, no alarm message is created.
- Alarm messages are only created in Automatic mode and in Manual-start mode and only if the drive is started or already running. Drives which are not in operation do not create alarms.

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Operator control permission

The following conditions have an effect on operator control permissions:

1. Local operating permission using the “OpStations” block.
   That means block instances can be enabled or disabled for use on an operator station independently of one another.
2. User management in the PCS 7 OS and CEMAT
   Via WinCC User Administration Operation levels are defined. Each user gets the permission to operate certain levels in certain areas.
   The currently logged in user can carry out any operation belonging to this level.
3. Dependencies and parameter settings at the block itself:
   - Feature bit settings:
     Via feature bits the complete function can be enabled or disabled.

   - OS PermissionLog:
     Via OS Permission it can be decided to allow or not to allow operator action.
     (Some function may be enabled via feature bit setting, but can only be managed by program).
     At the end, certain operations also depend on the plant situation (e.g. for a group which is already running completely, the start command can not be given).

   - The Operation level for each type of operation is defined at the block parameters in the CFC and can be modified.
     This allows modular (instance specific) adjustments for individual operation types.
     If additional user rights are defined in WinCC, operation can be permitted to restricted personal only.

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Local operating permission with “OpStation” block

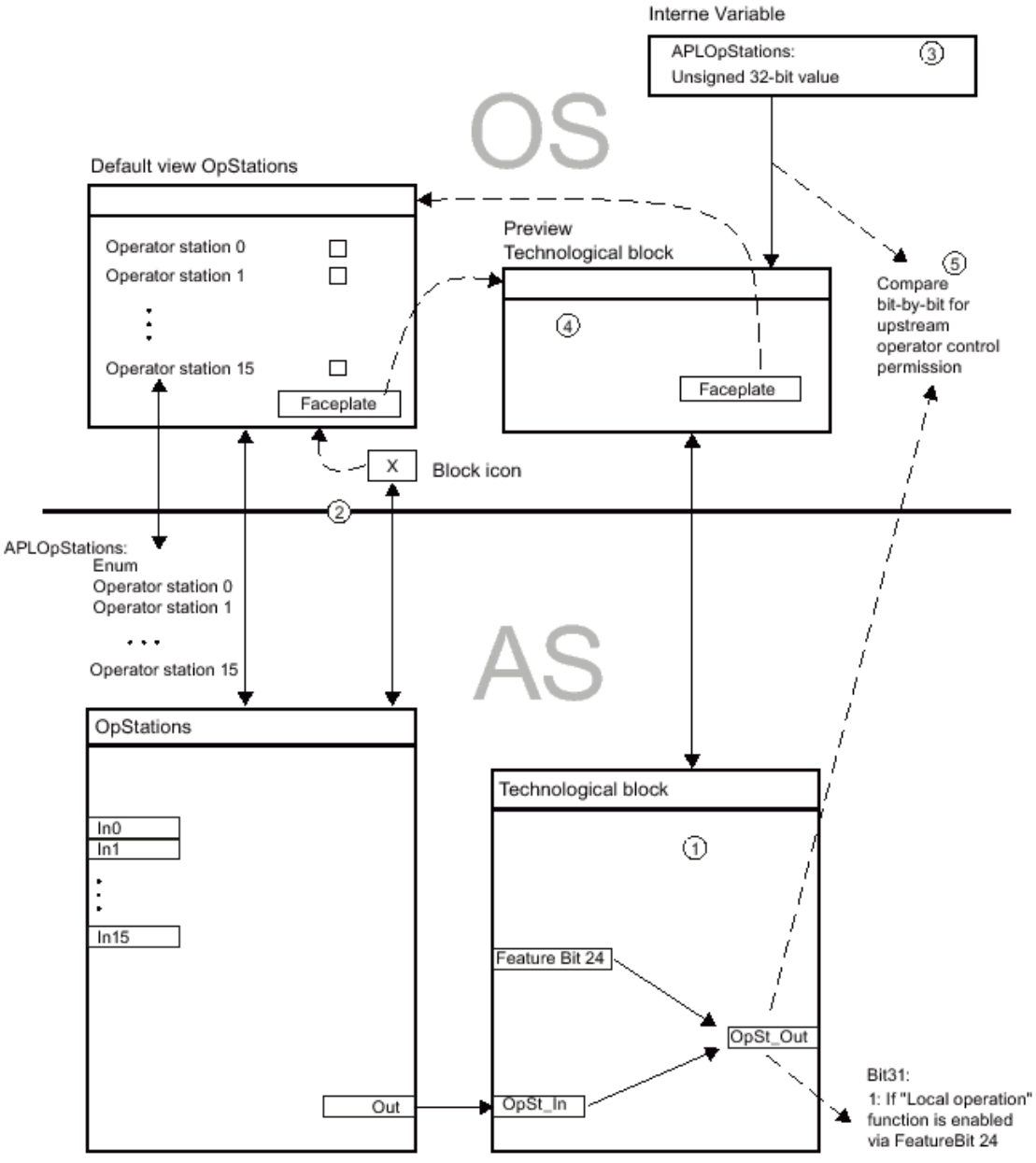
Local operating permission is an upstream operator control permission which is determined before the operator control permissions for user management and the release of the block, and is realized via the “OpStation” block.

If local operating permission is missing, operation of a block instance on an OS is usually blocked. Otherwise, when local operating permission is allowed, the operator control permission is normally determined through user management and the block.

Local operating permission can be set for each specific instance; in other words, block instances can be enabled or disabled for use on an operator station independently of one another.

You can find additional information for the use of local operating permission in the Helpfile of APL Modules.

OpStations block diagram



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User management in the PCS 7 OS and CEMAT

In PCS7 each operation is linked to a specific authorization. After definition of user groups and users the individual authorizations can be enabled, either in general or per plant section (AREA).

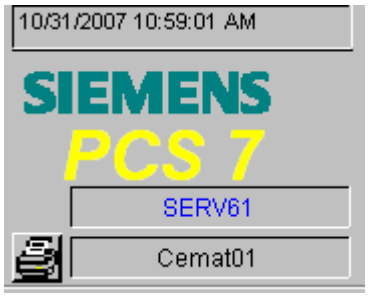
After Login, each user can operate the system according to his authorization level.

The following authorization levels are used in Cemat:

002	Authorization for the Area	
004	Monitoring	call-up of the faceplates
005	Process operator control	manual operation changing the operation mode changes of setpoints
018	Modify warning limits	Measuring value
019	Modify alarm limits	Measuring value
020	Modify switching limits	Measuring value
021	Controller parameters	Parameter change for controller blocks
022	Object parameters	Change of process values
023	System operations	Reset Functions
024	Interlocking signals	Override and Simulation functions
025	Enter recipe data	
026	Read recipe data	
027	Info dialog value input	General Settings in the Info Dialog
028	Info dialog Service parameterization	Service Tab in the Info Dialog
029	Maintenance parameters	Change of Device information in the Maintenance Dialog

The operator authorizations are specified for each Operator Station and can be shown online with the following mouse actions.

The overview area shows the actual server name and the actually logged in user.

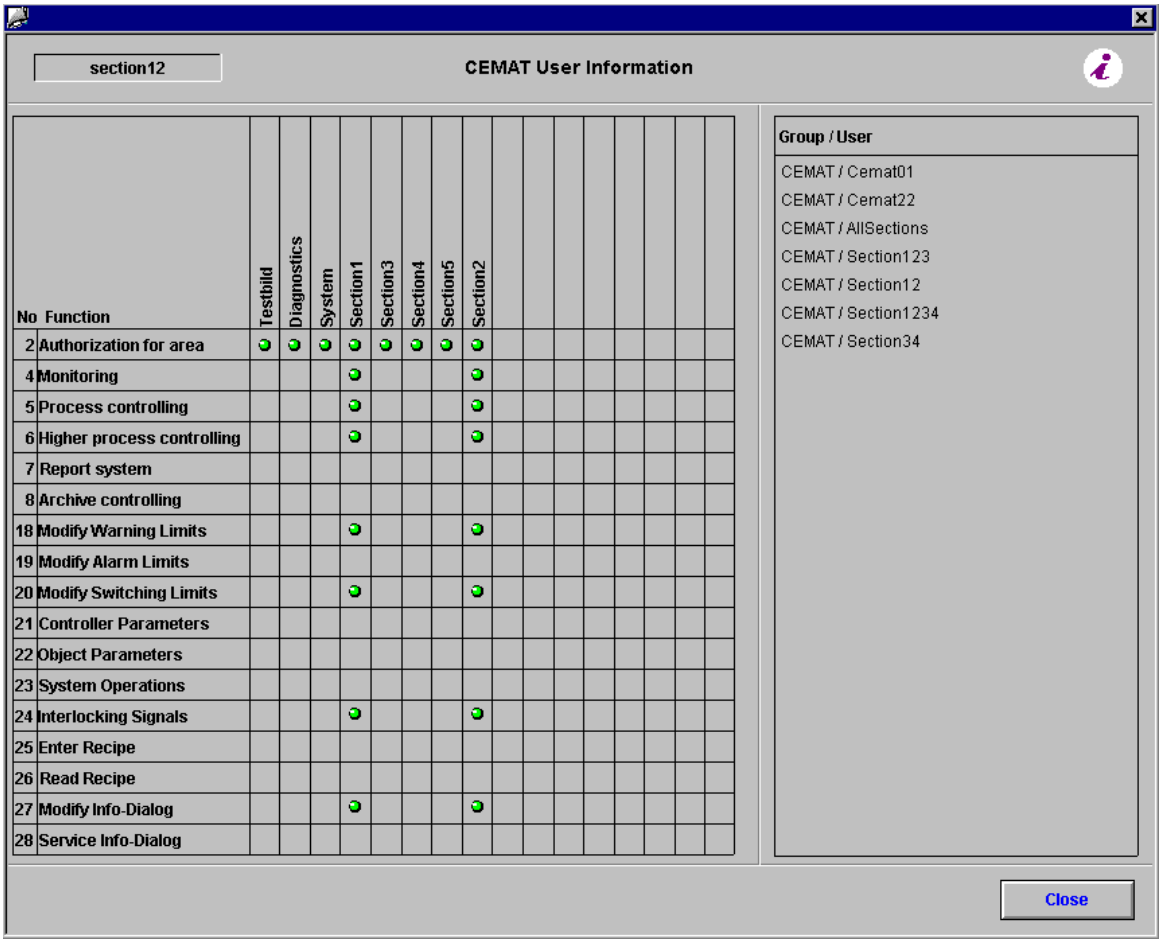


For MultiClients the Server name is displayed (the Server which is currently connected).
For the other station types (Manual Stations or Server) the own station name is displayed.

Left mouse click on the **user** field opens the System Login dialog.

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Right mouse click on the user field opens the CEMAT User Information dialog below:



In the CEMAT User Information dialog you can see which authorizations are enabled for the actual user.

The right hand side shows a list of all User Groups and Users.

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Dependencies and parameter settings at the block itself:

The following table shows the user rights for the particular the CEMAT Functions.

Operation levels and OS Permissions for **control functions**:

	OS Commands	C_GROUP	C_ROUTE	C_SELECT		Feature Bit	OS_PermissionLog	Op_Level	Block Parameter
Mode Change	Switch to automatic mode	x	x	x		21	2	5	AutModOn
	Switch to local mode	x	x			0	0	5	LocModOn
	Force to Out of Service mode			x		20	3	23	OsSModOn
	Switch to manual mode	x	x			13	1	5	ManModOn
	Bypass interlocks	x				14	14	24	COMMAND
Start/Stop/Select	Start	x					10	5	AutModOn
	Stop	x					11	5	AutModOn
	Interrupt	x					12	5	AutModOn
	Select		x				10	5	AutModOn
	Deselect		x				11	5	AutModOn
	Select			x			10	5	COMMAND
	Deselect			x			11	5	COMMAND
	Release Power Management	x					4	5	PMinvol
	Group not empty	x					15	5	AutModOn
	OsS	x					16	5	AutModOn
	Group / AS Acknowledge	x						5	AutModOn
Process Parameter	Time for startup warning	x					31	22	WarnTi
	Waiting time for manual start	x					31	22	WaitTi
	Start up command release time	x					31	22	CoURelTi
	Shut down release time	x					31	22	CoDRelTi

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Operation levels and OS Permissions for **drive functions**:

	OS Commands	**C_DRV_1D**	**C_DRV_2D**	**C_DAMPER**	**C_VALVE**	**Feature Bit**	**OS_PermissionLog**	**Op_Level**	**Block Parameter**
Mode Change	Switch to automatic mode	x	x	x	x	21	2	5	AutModOn
	Emergency stop	x	x	x	x	30	30	5	AutModOn
	Switch to local mode	x	x	x	x	0	0	5	LocModOn
	Force to Out of Service mode	x	x	x	x	20	3	23	OoSModOn
	Switch to manual mode	x	x	x	x	13	1	5	ManModOn
	Manual mode: non interlocked	x	x	x	x	16	5	23	COMMAND
	Manual mode: only protection	x	x	x		17	7	23	COMMAND
	Manual mode: reduced interlocks	x	x	x	x	18	6	23	COMMAND
	Simulation of active position				x	31	27	23	OoSModOn
	Simulation of idle position				x	31	28	23	OoSModOn
Start/Stop/Select	Start, Start D1	x	x	x	x		10	5	ManModOn
	Start D2		x	x			12	5	ManModOn
	Stop	x	x	x	x		11	5	ManModOn
	Inching more			x			10	5	AutModOn
	Inching less			x			10	5	AutModOn
	Release Power Management	x	x				4	5	PMinvol
	Start calibration			x			30	23	COMMAND
Setpoint	Setpoint	x		x		29	28	5	SP_Os
	Setpoint low limit	x		x			20	19	SP_LoLim
	Setpoint high limit	x		x			20	19	SP_HiLim
Process Parameter	Start delay time	x	x		x		31	22	StaDelTi
	Stop delay time	x	x		x		31	22	StpDelTi
	Direction change delay time		x				31	22	DirChaTi
	Time for feedback monitoring	x	x	x	x		31	22	FbkMonTi
	Time for startup warning	x	x	x	x		31	22	WarnTi
	Monitoring time from pos1 to pos2			x	x		31	22	MovMonTi
	Time Limit switch delay			x	x		31	22	LSDelTi
	Minimum pulse length			x			31	22	MinPulTi
	Actuator run time			x			31	22	MovActTi
	No. of wagging operations			x			31	22	WaggNo
	Hysteresis resp. threshold			x			31	22	DeadzoH
	Hysteresis drop. threshold			x			31	22	DeadzoL
Maintenance	Reset statistic values	x	x	x	x		29	23	RelTimOS
	Start Maintenance	x	x	x	x		16	29	MaiInt

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Operation levels and OS Permissions for **annunciations and measurements**:

	OS Commands	C_ANNUNC	C_PROFB	C_ANNUN8	C_MEASUR	Feature Bit	OS_PermissionLog	Op_Level	Block Parameter
Mode Change	Switch to automatic mode	x	x	x	x	21	2	5	AutModOn
	Force to Out of Service mode	x	x	x	x	20	3	23	OoSModOn
	Simulation	x	x	x		23	15	24	InSig
	Simulation				x	23	15	24	SimPV
	Bypass measuring channel				x	0	14	24	PV
Analog values	Value HH limit				x		20	19	HH_Lim
	Value H limit				x		21	18	H_Lim
	Value L limit				x		26	18	L_Lim
	Value LL limit				x		27	19	LL_Lim
	Value HH switching limit				x		22	20	SHH_Lim
	Value H switching limit				x		23	20	SH_Lim
	Value L switching limit				x		24	20	SL_Lim
	Value LL switching limit				x		25	20	SLL_Lim
	Startup OK limit		x				21	20	StUpLim
	Shut down OK limit		x				26	20	ShDoLim
Process Parameter	Substitute value				x		31	22	SubValOs
	Time smoothing				x		31	22	SmooTi
	Time spike suppression delay				x		31	22	SpSupTi
	Time delay live zero				x		31	22	LZDelTi
	Hysteresis				x		31	22	Hysteres
	Gradient negative				x		31	22	GradNeg
	Gradient positive				x		31	22	GradPos
	Gradient delay time				x		31	22	GradDTi
	Tolerance speed monitor		x				31	22	ProFbTol
	Out Signal on delay time [s]		x				31	22	PFOnDTi
	Out Signal off delay time [s]		x				31	22	PFOfDTi
	Out Signal on delay time [s]	x		x			31	22	OutOnDTi(1-7)
	Out Signal off delay time [s]	x					31	22	OutOfDTi
	Supervision delay time [s] for rising edges (0 – 1)	x		x	x		31	22	SupOnTi(1-7)
	Annunciation repeat time	x					31	22	RepTi
	Delay between warning and fault message	x					31	22	WaDelTi

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Operation levels and OS Permissions for **special functions**:

	OS Commands	**C_SIMOS**	**C_STORAG**			**Feature Bit**	**OS_PermissionLog**	**Op_Level**	**Block Parameter**
Mode Change	Switch to automatic mode	x	x			21	2	5	AutModOn
	Force to Out of Service mode	x	x			20	3	23	OoSModOn
	Simulation		x			23	15	24	SimPV
	Locked		x				0	24	StoLocked
Analog values	Value HH limit		x				20	19	HH_Lim
	Value H limit		x				21	18	H_Lim
	Value L limit		x				26	18	L_Lim
	Value LL limit		x				27	19	LL_Lim
	Startup OK limit		x				21	20	StUpLim
	Shut down OK limit		x				26	20	ShDoLim
Process Parameter	Time delay live zero		x				31	22	LZDelTi
	Delay for Dedusting		x				31	22	DedDelTi
	Material Quantity charge		x				31	22	MQ_IN
	Material Quantity discharge		x				31	22	MQ_Out
	Height		x				31	22	Height
	Width		x				31	22	StoWidth
	Length		x				31	22	Length
	StoDiam		x				31	22	StoDiam
	Capacity		x				31	22	Capacity
	Assigned Storage Material		x				31	22	Material
	Actual charge Material		x				31	22	ChargMat
	Material quality		x				31	22	MQ_Out
	Batch name		x				31	22	Batchname
	Batch ID		x				31	22	BatchID

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Acknowledgement modes

There are two independent acknowledgement modes in the System:

- OS Alarm line acknowledgement
- AS acknowledgement

Acknowledgement of the Alarm line

is only possible from the

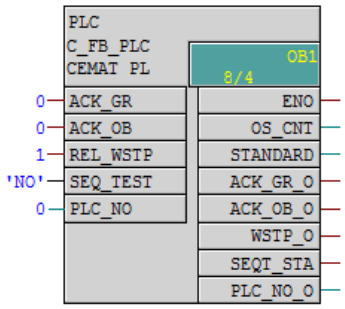
Alarm line itself, -if there is an Alarm shown-,  or from the Object Faceplate 

AS acknowledgement:

There are four possibilities to acknowledge a fault in the AS.

- AS-wide Acknowledgement (by default).
- Group-wise acknowledgement
- Acknowledgement will be done per object.
- Module internal acknowledgement with the module Interface “Ack”

The pre definition will be done in the System chart on module “C_FB_PLC”



AS-wide Acknowledgement (Default)

A Cemat Object generates an alarm and the *alarm message appears in the alarm line*.
- Pressing the Acknowledge button in the alarm line or in the faceplate of these module, the alarm disappears and at the same time an acknowledgment command is sent to the corresponding AS in order to acknowledge all faults.

A Cemat Object generates an alarm and the *alarm message did not appear in the alarm line*
- Open the Faceplate of this faulty module and press the Acknowledge button., an acknowledgment command is sent only to this module.
- Open the Faceplate of a Group module and press the Acknowledge button., an acknowledgment command is sent to the corresponding AS in order to acknowledge all faults.

Parameter on “C_FB_PLC”
- ACK_GR = “0”
- ACK_OB = “0”

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Group-wise Acknowledgement

A Cemat Object generates an alarm and the *alarm message appears in the alarm line*.
- Pressing the acknowledge button in the alarm line, only the OS alarm disappears.
- In order to acknowledge the fault in the AS you have to open the group faceplate and press the
  Acknowledge button . Only the modules belonging to this Group will be acknowledged.
- Open the Faceplate of this faulty module and press the Acknowledge button, an acknowledgment command is sent only to this module.

A Cemat Object generates an alarm and the *alarm message did not appear in the alarm line*
- In order to acknowledge the fault in the AS you have to open the group faceplate and press the
  Acknowledge button . Only the modules belonging to this group will be acknowledged.
- Open the Faceplate of this faulty module and press the Acknowledge button, an acknowledgment command is sent only to this module.

This requires a modification of the settings in the system chart and some additional programming for each object.

Parameter on “C_FB_PLC”
- ACK_GR = “1”
- ACK_OB = “0”

Object-wise Acknowledgement

A Cemat Object generates an alarm and the *alarm message appears in the alarm line*.
- The acknowledge button in the alarm line resets the alarm and the fault of the object which produced it.
- Open the Faceplate of this faulty module and press the Acknowledge button, an acknowledgment command is sent only to this module.

A Cemat Object generates an alarm and the *alarm message did not appear in the alarm line*.
- Open the Faceplate of this faulty module and press the Acknowledge button, an acknowledgment command is sent only to this module.



Caution: The group faceplate shows the Acknowledge button but he has not function.

Parameter on “C_FB_PLC”
- ACK_GR = “0”
- ACK_OB = “1”



Additional advice: In case of protection interlock of a drive, the message is created by an annunciation block or measure, not by the drive itself. In this case the Acknowledgement of the alarm line does not acknowledge the drive fault. The drive faceplate must be opened and Acknowledge Button must be pressed there.

Module internal acknowledgement with the module Interface “Ack”

If the acknowledgment of modules should be done by PLC Software the Interface Input “Ack” can be used.
If there is a requirement to acknowledge only from the “field”, it is possible to disable the OS ackn. with Feature Word Bit 19 (only Module C_ANNUNC, C_ANNUN8, C_MEASUR, C_PROFB) and connect the Interface Input “Ack” with that external Signal.

Parameter on “C_FB_PLC”

- irrelevant

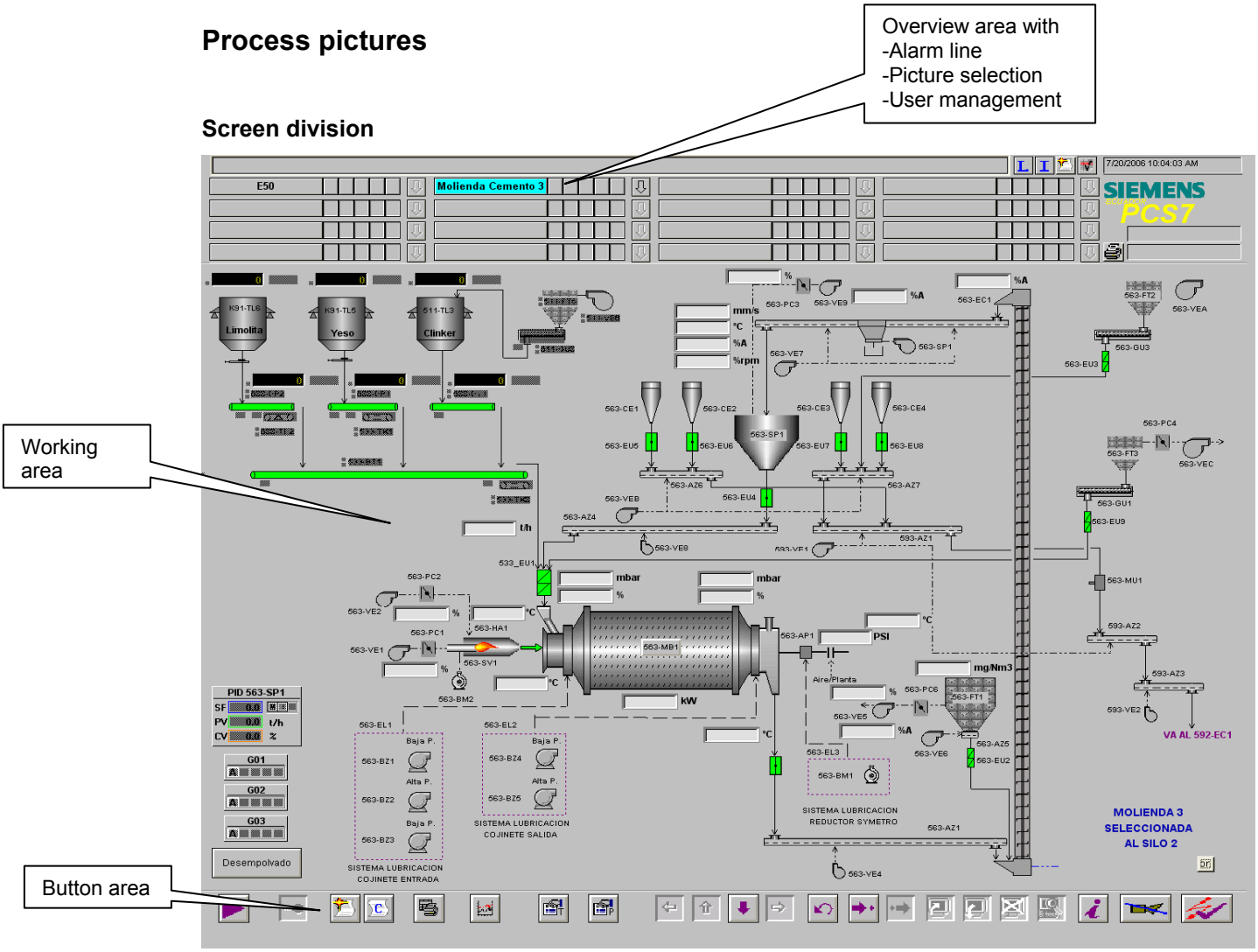
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CEMAT Operator Interface

Process pictures

Screen division



General

All displays and graphics that show real time data are automatically updated when the display or graphic is on a screen. Updates do not require operator initiation.

The system provides an overview of the alarm status of all areas which can be viewed by an operator, no matter which graphic is displayed.

Working area design

Schematic display of all components complete with their connection by flow line to reflect the relationship in process control system. We recommend distributing the following pictures:

- Overviews (normally shows the entire group)
- Groups (used for group controlling, selects and more info's than the overviews)
- Details (Shows special details of group, e.g. Hydraulic of a C-Mill)
- Trends (Shows Trend curves)
- Services (Handling of special process values, see appendix)
- Pop-up's (Additional information and handling of devices)

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Text and color layout

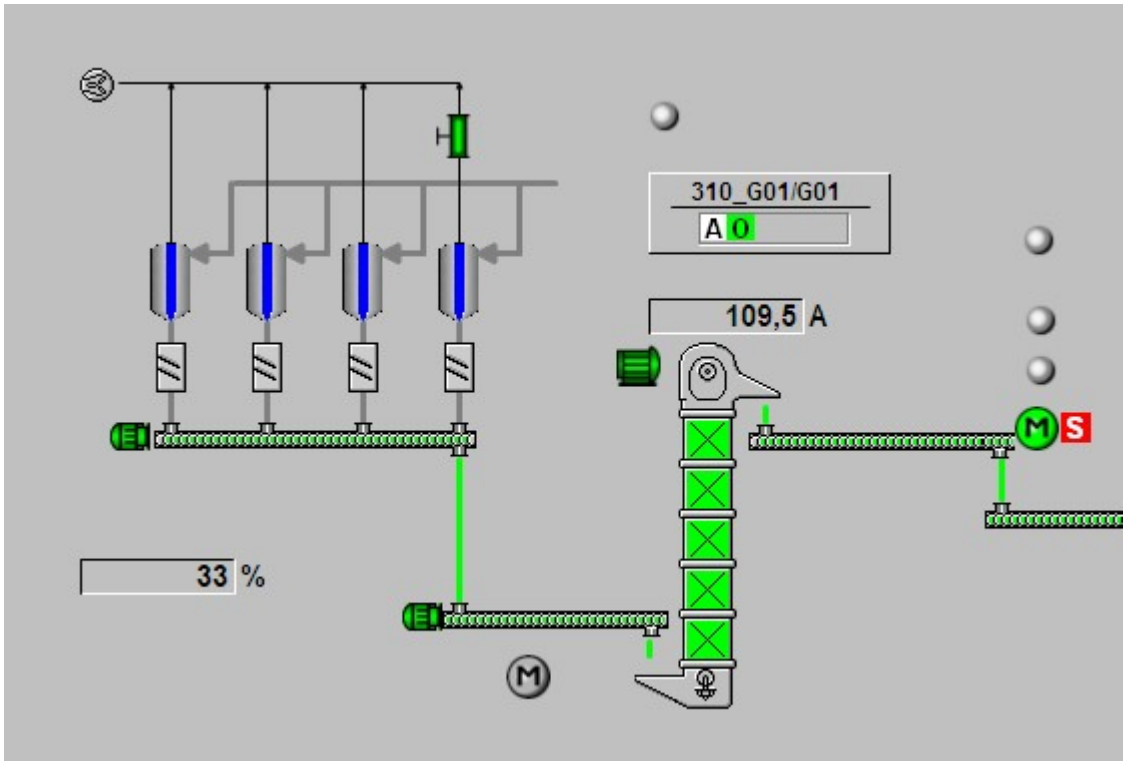
For the representation of the plant objects in the pictures and for the text and layout colors the CUSTOMER “Design Criteria” has to be followed. (See C_Styleguide_e.doc)

The symbols for process pictures must be as clear understandable as possible for the operators. Process mimics, in which the plant parts like belt conveyors, bucket elevators and so on, are presented by means of graphic symbols in a simplified manner.

Block Icons and Bitmaps

A block icon is the representation of the AS module in the process picture. The block icon is linked to the object. Via click on the block icon a faceplate will open, which shows detail information and allows additional actions for operator control

The block icons must follow the CUSTOMER Design criteria.



In accordance with the representation type the block icon can contain the following information:

- Status display of the AS module (Symbol)
- Plant identification (TagName)
- Setpoint, actual value
- Annunciation / operating status display

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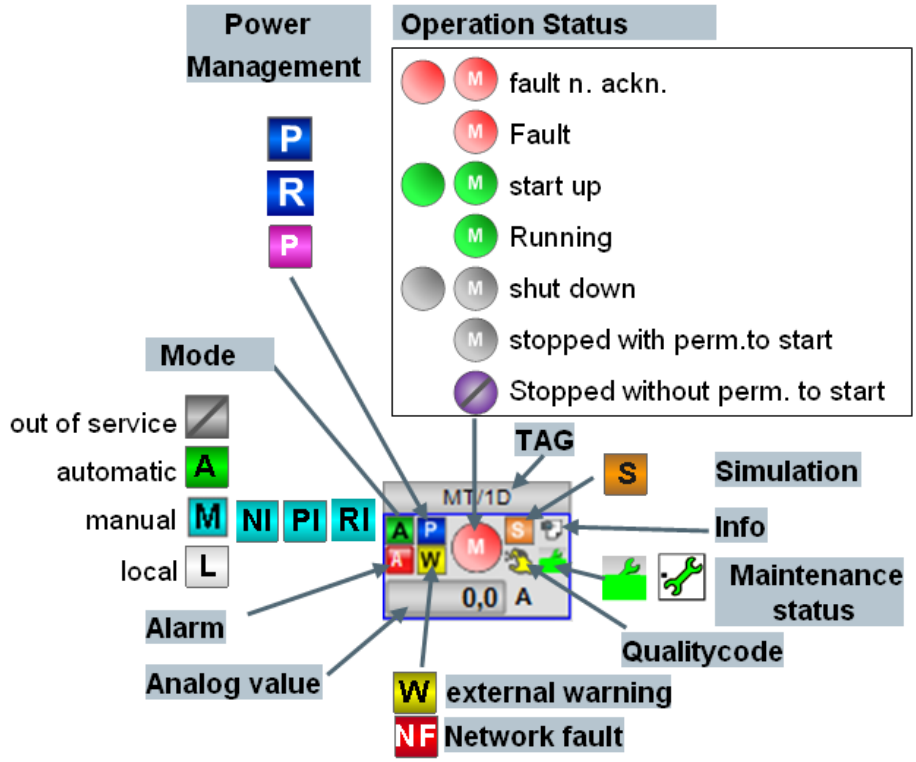
Design criteria for the CEMAT Block Icons

Block icons for drive functions

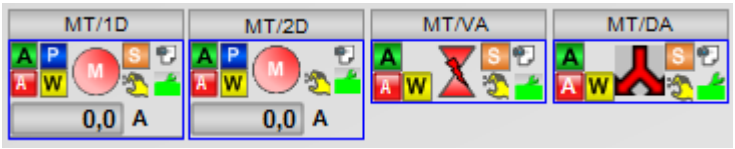
All drive functions (C_DRV_1D, C_DRV_2D, C_VALVE, C_DAMPER) are represented by a symbol. Via click on the Symbol the faceplate will open.



The Operation Status of the drives is indicated with different colors according to the definition below:
Additional information such as Tagname, Mode, Alarmsymbol, external Warning, Simulation, Maintenance status, Info and Analog value can be attached to the block icon. The Tagname will be displayed only on demand.



Blockicon Typ 23 of C_DRV_1D, C_DRV_2D, C_VALVE, C_DAMPER



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Block icons for control and supervision functions:

Control and Supervision functions such as C_GROUP, C_ROUTE and C_SELECT are represented by the following block icons:



In the status indications the following information is given:

- Operating mode (C_GROUP)
- Starting or stopping active (C_GROUP)
- Summarizing fault indication (C_GROUP and C_ROUTE)
- Summarizing warning indication (C_GROUP and C_ROUTE)
- Selections (C_ROUTE and C_SELECT)
- Interlocking condition (C_GROUP, C_ROUTE and C_SELECT)

Block icons for supervision of process signals:

Annunciation block and Annunciation_8 block:

The annunciations functions like C_ANNUNC and C_ANNUN8 are represented by a symbol. Via click on the Symbol the faceplate will open.



The status of the annunciations is indicated with different colors according to the following definition:

White	No fault
Yellow	Warning
Yellow flashing	Non-acknowledged warning
Red	Fault
Red flashing	Non-acknowledged fault
Green	Signal status "1" (only for C_ANNUNC)

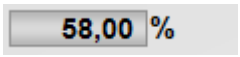
Additional information such as Tagname, Mode, Bad Quality (Driver) and Info can be attached to the block icon. The Tagname will be displayed only on demand.



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Measured value block:

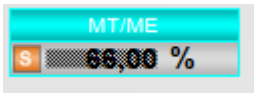
The measured value is shown together with the unit.



The following colors are used to indicate the status of the measure:

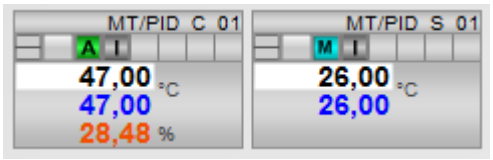
White/ gray	Measuring Value ok
Yellow	Warning
Red	Fault
Blue	Measuring Value bypassed

Additional information such as Tagname, Mode, Bad Quality (Driver) can be attached to the block icon. The Tagname will be displayed only on demand.



Block icons for controller functions:

For the block PIDConL and PIDStepL the symbol shows the following information:



Below the status information it shows the Setpoint, the process value and the Output (Manipulated Value). The Tagname will be displayed only on demand.

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Color change of Status information in Symbols or Faceplates Text fields

Color change of Symbols:

If the Color for the “run” or “fault” Symbols must be changed it is only necessary to rename the existing “*.emf” files.

Example: C_DRV_1D

Symbol Name	Description	Display	Symbol	Basic Picture / Flash Picture
SymbolFault	fault not acknowledged	red flashing		C_Drv_err_001.emf / C_Drv_off_blank_001.emf
	fault	red		C_Drv_err_001.emf
SymbolStartup	Start up	green flashing		C_Drv_off_blank_001.emf C_Drv_on_001.emf
	running	green		C_Drv_on_001.emf
SymbolOff	Shut down	grey flashing		C_Drv_off_001.emf / C_Drv_off_blank_001.emf
	Stopped with permission to start	grey		C_Drv_off_001.emf
	Stopped without permis. to start or not ready	magenta		C_Drv_notready_001.emf

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Standard Symbols for additional Object Information and Objects like C_GROUP, C_ROUTE, C_SELECT, C_DAMPER are shown in the table below.

In column “Org_CEM_EMF” are shown all Cemat Symbols
In column “Org_APL_EMF” the Symbols which used from the APL Faceplates
In column “G” the common Symbols are marked

That means, if after the Cemat Installation the “OS Project Editor” was running
it could be necessary to copy again all Symbols from “Org_CEM_EMF” in to the GraCS.

In case the Symbols for “Local” and “Manual” mode should shown in APL Style the two Symbols apl_bi_local.emf and apl_bi_manual.emf from “Org_APL_EMF” must be copied in to GraCS.

Org_CEM_EMF	Org_APL_EMF	G	Standard Symbol Name
		x	apl_bi_automatic.emf
			apl_bi_local.emf
			apl_bi_manual.emf
			c_bi_manual_non_interlock_Bl.emf
			c_bi_manual_non_removable_interlock_ Bl.emf
			c_bi_manual_only_prot_interlock_Bl.emf
		x	apl_bi_out_of_service.emf
			c_bi_simulation.emf
			C_bi_emergency.emf
			C_bi_up_green.emf
			C_bi_up_white.emf
		x	apl_bi_on.emf
			C_bi_down_green.emf
		x	apl_bi_alarm.emf
			c_bi_Warning.emf
			C_bi_interlocked.emf

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P			C_bi_PM_selected.emf
R			C_bi_PM_released.emf
P			C_bi_PM_blocked.emf
L			C_bi_locked_cyan.emf
D			C_bi_deselected_white.emf
P			C_bi_preselected_green.emf
S			C_bi_selected_white.emf
S			C_bi_selected_green.emf
	T		apl_bi_tracking.emf
T			C_bi_tracking.emf
C			C_bi_controlled.emf
I			C_bi_inching.emf
P			C_bi_posi.emf
	E		apl_bi_external.emf
	I		apl_bi_internal.emf
		x	apl_bi_ms_release_op.emf
		x	apl_fp_st_bad_device.emf
F			c_bi_forced.emf
L			C_bi_locked_violett.emf
NR			C_bi_notready.emf
NF			c_bi_Network_fault.emf

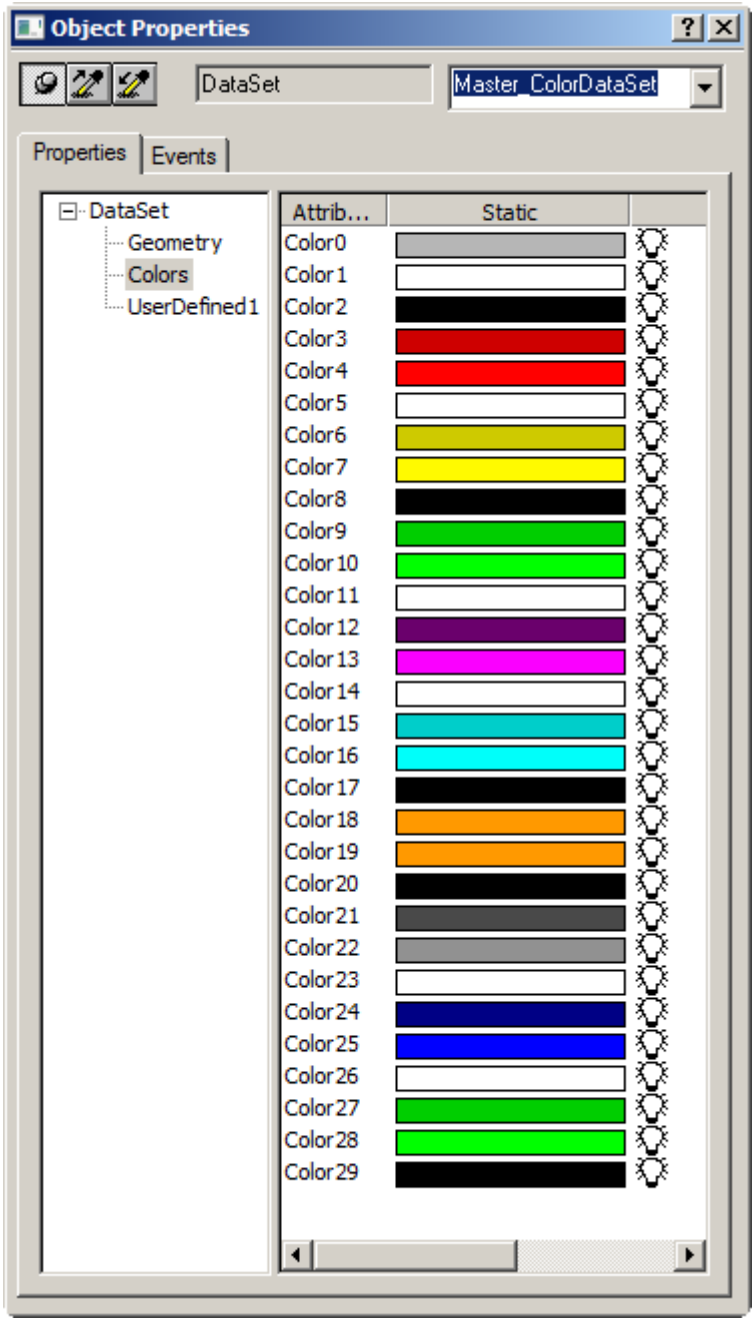
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Color change of Text information:

Inside of Overview1.pdl the general color definition is done with the “MasterColorData” Object.

This complete color definition for text will be loaded in every Cemat object Dialog and used then in the variable Text objects like “Mode” or “Status” indication.

The Picture below shows “MasterColorData” structure:



If a color should be changed, please do it in the Master_ColorDataSet.

Always three Color definitions are used for one Text.
for example:
Color0 = “BackColor”
Color1 = “FillColor”
Color2 = “FontColor”

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Where the color definition is used will be shown on the next pages.

Color Status line for:

C_DRV_1D, C_DRV_2D
C_MEASUR, C_PROFB

(csoVisu)

off	0-1-2
fault not acknow.	3-4-5
fault	3-4-5
startup	27-28-29
running	27-28-29
shut down/1	0-1-2
startup D2	27-28-29
running D2	27-28-29
shut down D2	0-1-2
stopped with permission to start	0-1-2
stopped without perm. to start	12-13-14
Network fault	3-4-5
limit pos.2 with permission to start	27-28-29
limit pos.1 with permission to start	27-28-29
moving to limit position 2	27-28-29
moving to limit position 1	0-1-2
moving to limit position 1	27-28-29
no limit position	0-1-2
fault limit position 1	3-4-5
fault limit position 2	3-4-5
limit pos.2 without perm. to start	12-13-14
limit pos.1 without perm. to start	12-13-14
D1 act, position 1	27-28-29
D1 act, moving to limit position 1	27-28-29
D1 act, limit pos.2 with perm. to start	27-28-29
D1 act, moving to limit position 2	0-1-2
D1 act, limit pos.2 without perm. to start	12-13-14

Color Status line for:

C_ANNUNC, C_ANNUN8,
C_DAMPER, C_VALVE

off	0-1-2
fault not acknow.	3-4-5
fault	3-4-5
warning not acknow.	6-7-8
warning	6-7-8
no fault	0-1-2
no warning	0-1-2
live Zero / Bad Quality	3-4-5
gradient negativ exceeded	0-1-2
gradient positive exceeded	0-1-2
Last valid value Substitude Value	18-19-20
Network fault	3-4-5

Group status (csoVisu)

Group not in operation	0-1-2
Start up in automatic mode	27-28-29
Start command on	27-28-29
Completely running	27-28-29
not completely started	0-1-2
does not run completely anmore	0-1-2
shut down in automatic mode	27-28-29
stopped without permission to start	12-13-14

C_SIMOS Status

General fault	3-4-5
General warning	6-7-8
Simocode running	0-1-2

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Mode Text line for C_DRV_1D, C_DRV_2D, C_DAMPER, C_VALVE, C_MEASUR
C_STORAGE, C_SIMOS

(csoMode)

Automatic	9-10-11
Manual	15-16-17
M: non interlocked	15-16-17
M: redused interl.	15-16-17
M:only prot. Interl.	15-16-17
Local	0-1-2
Out of Service	21-22-23
Simulation	18-19-20
Measure channel bypassed	24-25-26
Locked	12-13-14
Emerg. Start enabled	24-25-26

Mode Text for extern Objects:

Group/Route Obj.	Automatic	27-28-29	
Group/Route Obj.	Manual	15-16-17	
Group/Route Obj.	Local	0-1-2	
Group/Route Obj.	Out of Service	21-22-23	1D,2D,DA,V
Group/Route Obj.	Simulation	18-19-20	1D,2D,DA,V
Group/Route Obj.	Emergency Stop	3-4-5	
Group FP.	Interl. Bypassed	18-19-20	
Group FP.	Group not empty	0-1-2	
Route	Completly running	27-28-29	

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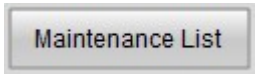
Cemat Browsers

The template picture C_Symbols.pdl contains buttons for general Cemat Functions. The buttons can be inserted in any process picture (e. g. in the system overview) in order to call superordinated functions.

The examples must be adapted and labeled accordingly.

Call of the Maintenance Overview

Via button "C_BtMaintenanceList" the Maintenance Overview will open:



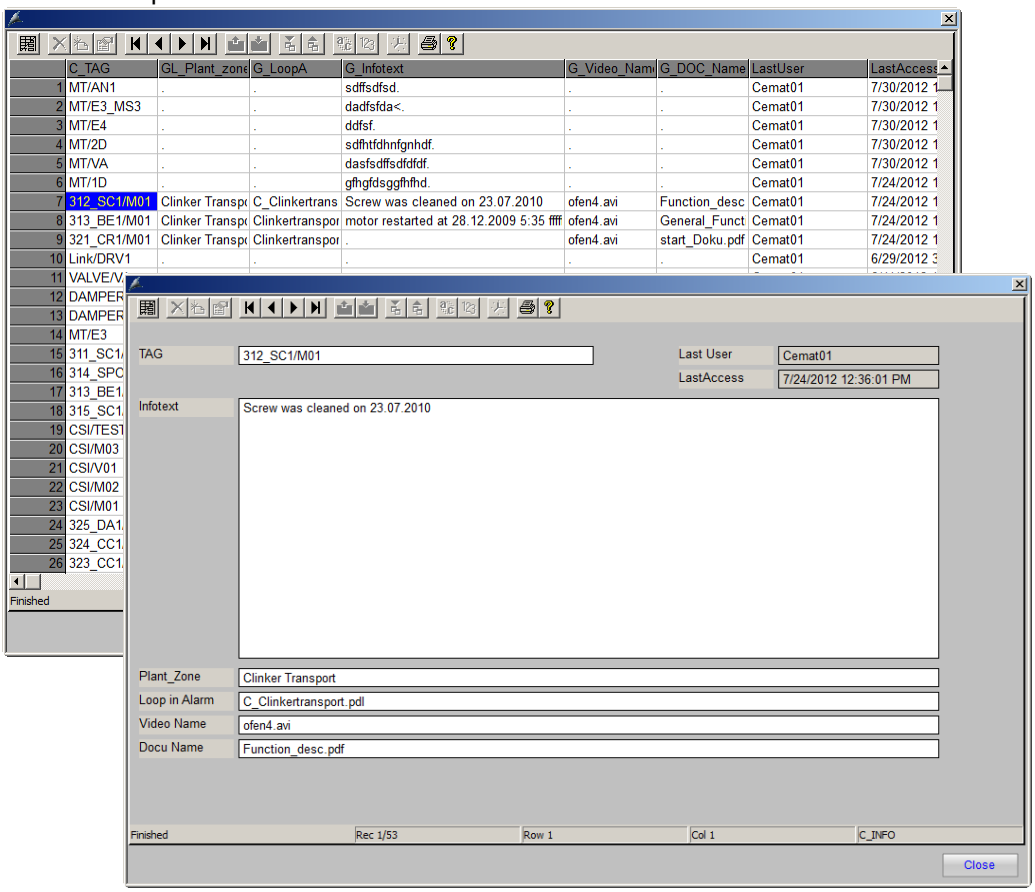
Please find more Information's under "Faceplates- secondary dialog Maintenance"

Call of the Info Overview

Via button "C_BtInfo" a window will open which shows the last entry into the user archive. From there you can browse back or change to a spreadsheet format.



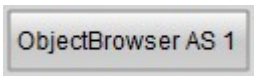
Adaptations are not required.



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Object Browser

For each AS a button " ObjectBrowser" can be created. With click on the button the operator will open the CEMAT Object Browser.



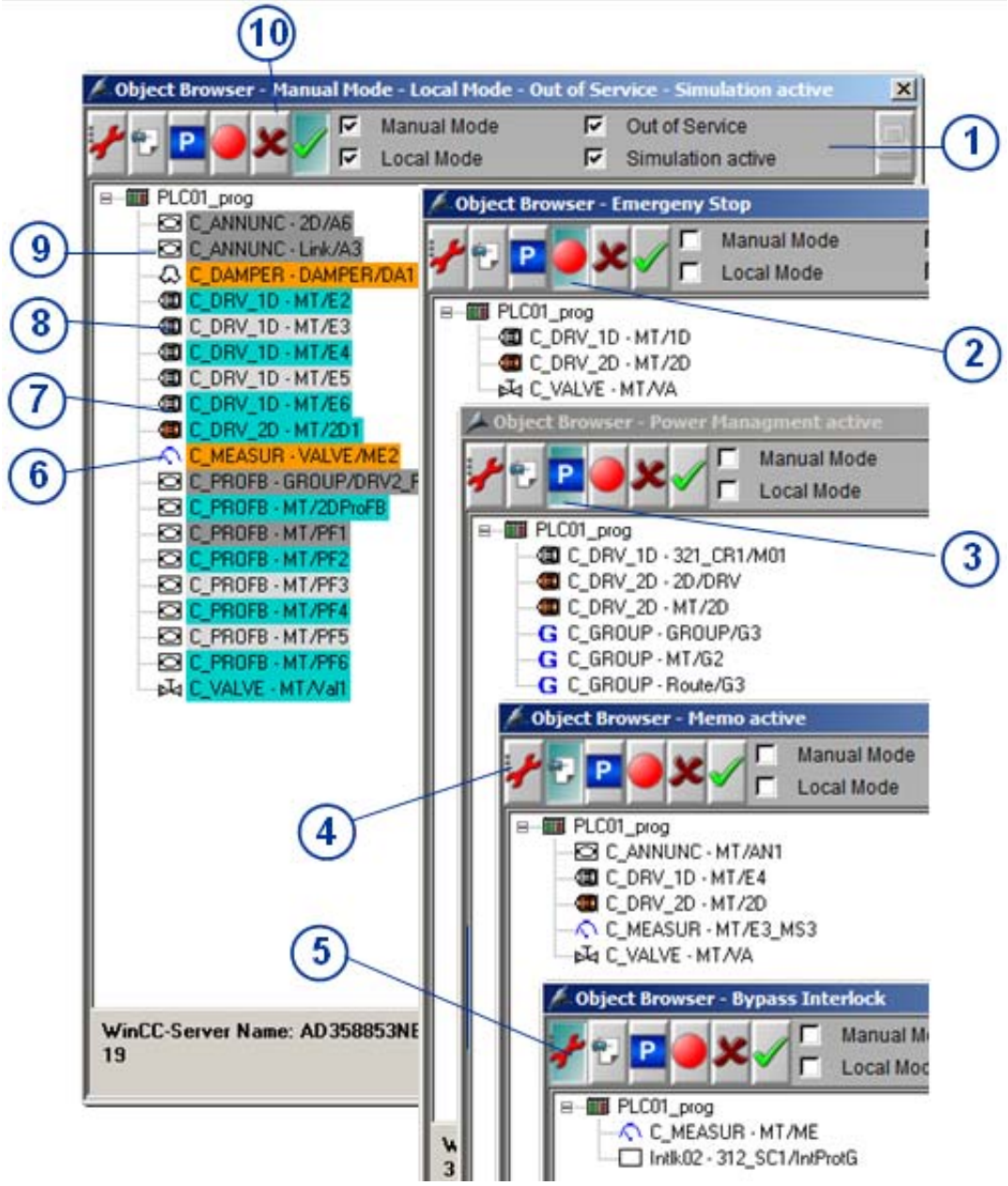
On Top is the selection bar, where it is possible to set a query or select direct with a button a search function. The query **(1)** can be done with the selection of “Manual mode” and/or “OutofService” and/or “Local mode” and/or “Simulation active” following with click on the green accept button. As result a list with colored Tags will be shown. **(6-9).** Click on one of these TAG’s will open the releated Faceplate.

(2) a click on the “Emergency Stop” button shows only the Objects with active “emergency stop”.

(3) a click on the “Power management” button shows only the Objects with a connection at the “PM involved” Input .

(4) a click on the “Memo active” button shows only the Objects with an stored text in the Information Dialog.

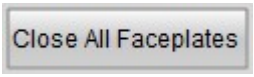
(5) a click on the “Bypass active” button shows only the Objects with an activated Bypass (Interlock or Measure modules).



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Close all open windows

Button "C_BtCloseAllFaceplates" closes all the open faceplates at a time.



Bitmaps

A wide range of bitmaps for Minerals Applications are available in the Standard Directory D:\CEMAT_CS\Bitmpas\ and can be used for the design of the Process pictures.
The bitmaps must be copied into the <WinCC-Project directory>\GraCS of the Server Project.
The distribution to other OS Projects can be done with a batch file.

The bitmaps for the Symbols (Drives, Valves) from Version 4.12 of CEMAT can also be used.
You find further models on the CD under CD:\Additional_Information\CEM_DRAFTS.

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Faceplates

A single mouse-click on the block icon opens the faceplate of the object. The faceplate provides detailed information and allows control and monitoring of the associated AS module.

The Faceplate is divided in general sections:

(1) *Displays and operator controls*
with Tag/ Comment/ Alarm symbols/ Status and Toolbar

(2) *Status information and Links to related Objects*
Link function to Group and other connected modules
Status and Link of Interlocks and Object Symbol status itself

(3) *direct Object operation in manual Mode*
Manual mode direct commands

(4) Emergency stop indication or "Sequence test"
The "Software Emergency stop" button or "Sequence test" is shown if they are on.

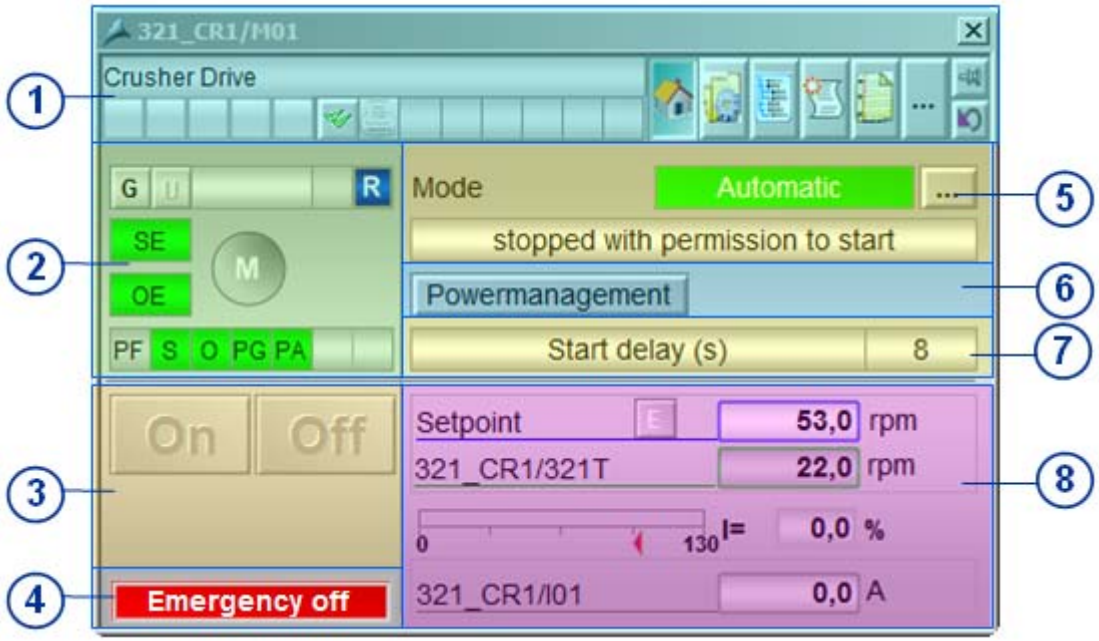
(5) Mode selection and status text
Operating mode selection and display of Status text

(6) Three Step *operator commands*
Button for Power management and operation in Manual mode with 3-Step dialog

(7) *actual timer name and value*
active timer name and reverse counted value

(8) *Analog values*
if released or connected
- the setpoint-, and feedback -value
- current or power bar with value
- additional Analogvalue

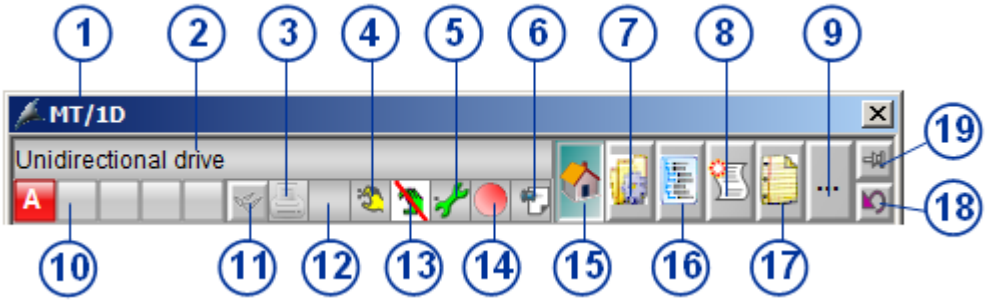
is shown.



For detail Information please follow the next pages.

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ad 1) Detail Information of Displays and operator controls:



(1) Tag of the object.

(2) Comment of the object.

(3) Print Dialog

(4) Worst signal status

Hex	Sym.	comment/ kommentar	Prio
80H		good or unknown / Gut oder unbekannt	8
60H		simulated / Simulation	0
00H		bad or not usable / Schlecht, ungültiger Wert	1
44H		Last valid value/ letzter gültiger Wert	3
48H		Substitute value/ Ersatzwert	4
28H		bad process related / Schlecht, prozessbedingt	2
68H		uncertain / Unsicher, gerätebedingt	5
78H		uncertain process related / Unsicher, prozessbedingt	6
A4H		maintenance request / Wartungsanforderung	7

(5) Maintenance activated 

Alarm 

(6) Information text available for this Object

(7) Open Diagnosis Dialog (RMK with separate Dialog)

(8) Open Message Dialog (RMK with separate Dialog)

(9) change Toolbar Level (see next page)

(10) the 

message status (Group display):

Alarm, Warning, Tolerances, Faults, Operator prompts

(11) If there is an alarm in the module, it can be acknowledged using this button.

(12) Empty

(13) user right “5” missing

(14) Process Feedback Signal in simulation mode

(15) Open Standard Dialog (RMK with separate Dialog)

(16) Open Objectlist Dialog (RMK with separate Dialog)

(17) Open Information Dialog (RMK with separate Dialog)

(18) back to the Flow mimic (block icon)

(19) Fix the Dialog on top

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Overview of CEMAT Object related Toolbars

Open “Faceplate” Dialog

Open Diagnosis Dialog

Open Object browser Dialog

Open Status or Message Dialog

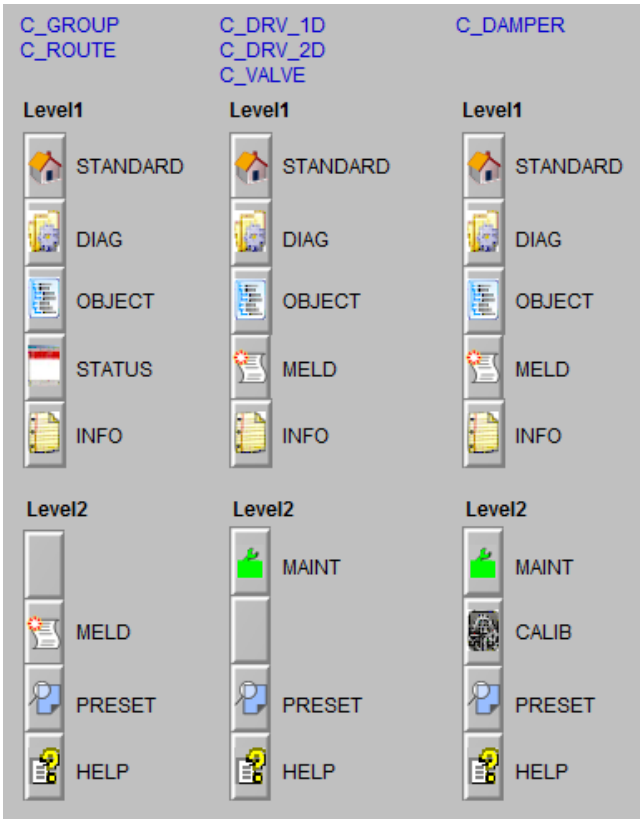
Open Information Dialog

Open Maintenance Dialog.

Open Message Dialog/ Calibration

Open Preset Dialog

Open Object Help file



Open “Faceplate” Dialog

Open Diagnosis Dialog

Open Curve Dialog

Open Message Dialog

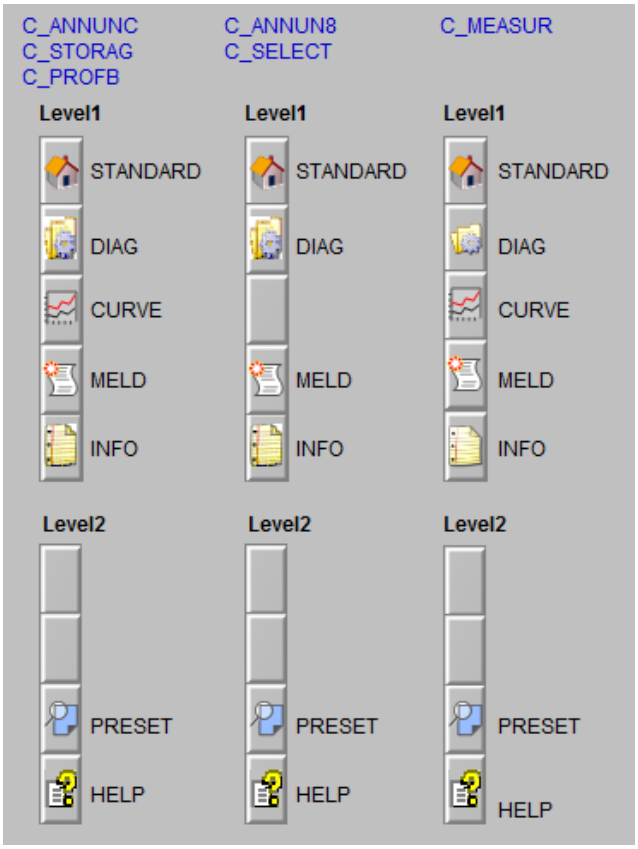
Open Information Dialog

Empty.

Empty

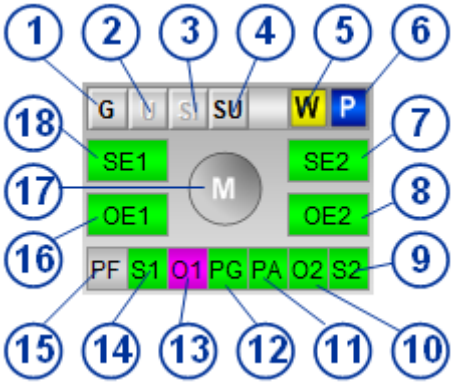
Open Preset Dialog

Open Object Help file



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ad 2) Detail Information "Status information and Link to related Objects ":



(1) open the Group faceplate of the first group
(2) open the Faceplate of connected "user defined Object"
(3) open the Faceplate of connected SIMOCODE
(4) open the Faceplate of connected Subcontrol

(5) show from the related Objects
or.



the warning Status

his own Network fault

(6) Indication of **P**ower **M**anagement Status



PM connected and involved

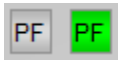
PM for this object is released

PM blocked or has switched of the object

(7,18) Essential Start up interlock(D1,D2) status indication and link to the connected Object
(8,16) Essential operating interlock(D1,D2) status indication and link to the connected Object
(9,14) Start up interlock(D1,D2) status indication and link to the connected Object
(10,13) Operating interlock(D1,D2) status indication and link to the connected Object
(11,12) Protection interlocks Auto/Manual status indication
(15) Process Feedback Signal status indication and link to the connected Object
(17) Object Symbol indication (status color definition see "Block Icon")

Presentation of Interlock Interfaces:
- If the Interface is not connected the Symbol will not be shown.
- If it is connected to another Object (Interlock/ Drive…), a Jump to this Object is possible with "mouse click" onto the Symbol.
- Status color definition:
  green = Signal ok
  violet = not ready
  gray = Signal = "0" or not used
  red = faulty

Process Feedback shows only the status "off" = grey or "on" = green

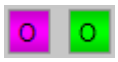


"Startup-" or "essential startup Interlock"
- is the Symbol is "green" the Signal has "1" status
- is the Symbol is "violet" the drive is stopped and the Signal has "0" status
- is the Symbol is "gray" the drive is running and the Signal has "0" status



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“Operation-” or “essential Operation Interlock”
- is the Symbol is “green” the Signal has “1” status, object is not interlocked
- is the Symbol is “violet” the Signal has “0” status, the drive is stopped and interlocked



“Protection Interlock general”
- is the Symbol is “green” the Signal has “1” status, all ok
- is the Symbol is “red” the Signal has “0” status, object is stopped and faulty



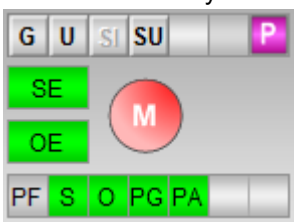
“Protection Interlock automatic and manual”
- is the Symbol is “green” the Signal has “1” status
- is the Symbol is “red” the Signal has “0” status



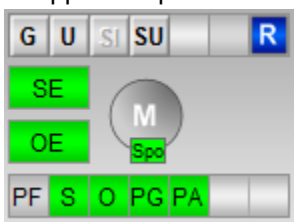
Example for Object Status Symbol:

Depending of Object Status the corresponding colored Symbol is shown.
The status color definition you will find on chapter “Block Icon”.

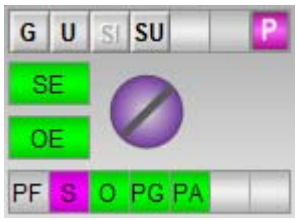
Drive faulty



Drive stopped in sporadic mode



Drive in Out of Service



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ad 3) direct Object operation in manual Mode

If in the OS Permission Word the Bit “one operation button” is released the direct Command Buttons are shown.
With one of the selected “Manual” modes and depending “OS Permission Log Bit’s” the direct Command Buttons are ready to be operated. (black colored Text)

For example:

Drive “On” is released



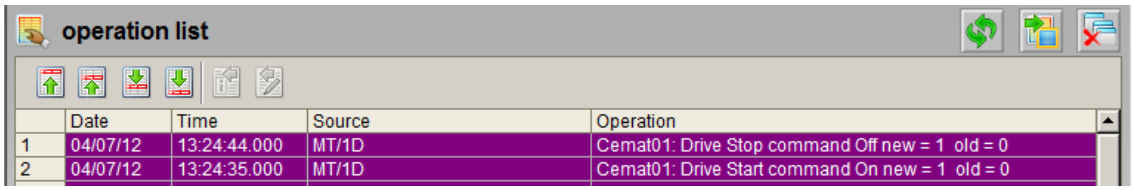
Drive “Off” is locked

Drive start to Direction 1 or Direction 2 is released



“Off” is locked

With “Mouse click” on the Button, a Command is send to the Object.
At the same time a “Operator Message” with combined Text from the ToolTippText and variable text of PLC Module Interface is generated in the message System.



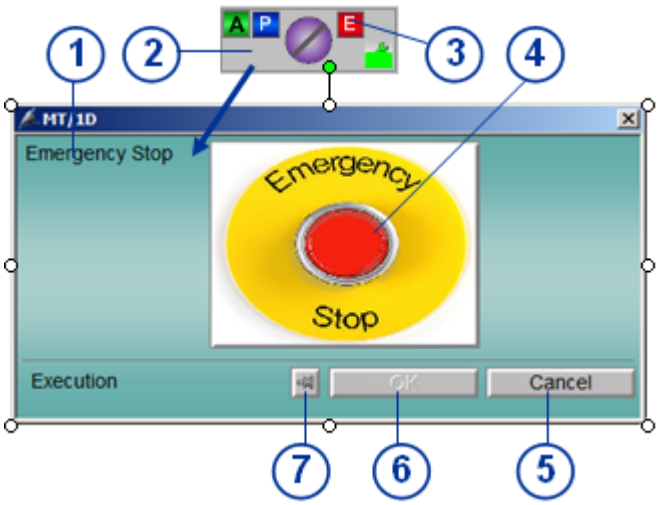
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ad 4) Emergency stop indication or "Sequence test"

With "right mouse click" **(2)** on the Drive Symbol the 3 step operation dialog **(1)** is shown.
A mouse click on the "Emergency button" **(4)** will release the "OK" button **(6)** and with click on them the "Emergency Stop" will be active.
A running object will be stopped and interlocked to start again. The symbol changed to "stopped without permission to start" and shows the red "E" **(3)**

If the "fix it" button **(7)** was pressed, the dialog will be still open after pressing the "ok" button.**(6)**

With the "Cancel" button **(5)** the dialog will be closed.



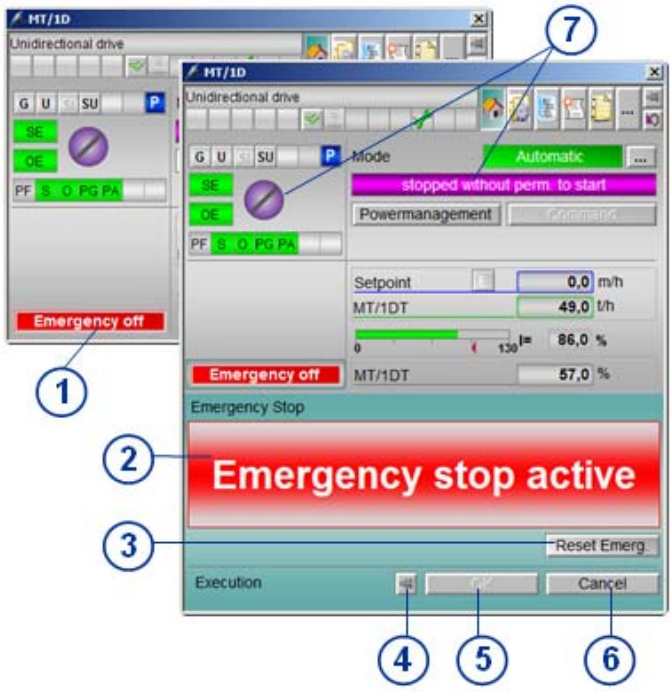
Inside the Faceplate an additional button "Emergency off" **(1)** is shown together with the Text "stopped without permission to start" **(7)**.

An Click on the "Emergency off" button will open the 3 step operation dialog with indication of "Emergency stop active" **(2)**

With pressing the "reset Emerg." Button **(3)** following by the click on the "Ok" button the Emergency stop will be reseted.

If the "fix it" button **(4)** was pressed, the dialog will be still open after pressing the "ok" button.**(5)**

With the "Cancel" button **(6)** the dialog will be closed.

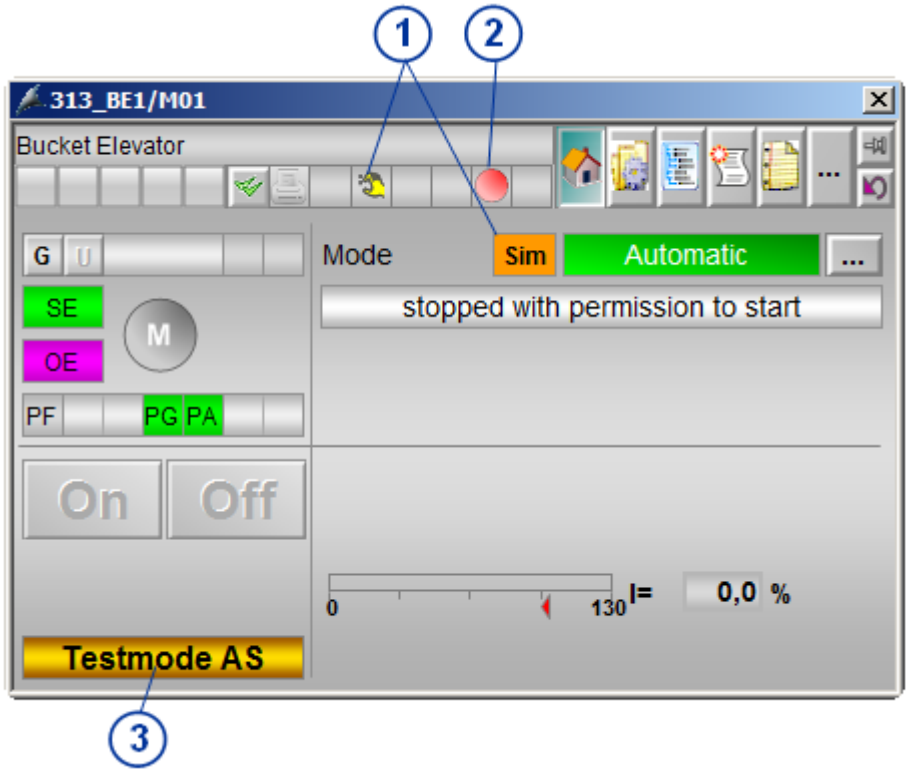


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PLC Sequence test

If the PLC “Sequence test” is switched on in “SysPLC01”, the Faceplate shows these states with different indication symbols.

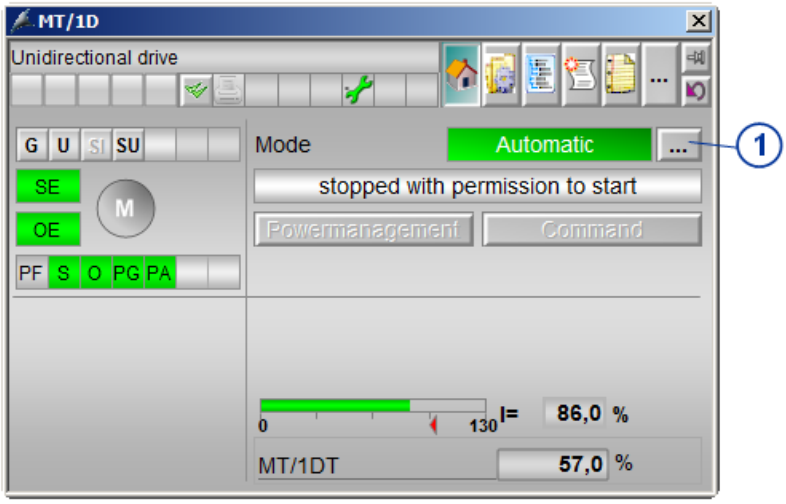
(1) Analog values or “Object linked” Modules are in “Simulation mode”.
(2) Process Feedback Signal is in Simulation
(3) The Object itself is in Test mode. (feedback signal is generated inside the module and Contactor Output’s are blocked)



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ad 5) Mode selection and Object status

You can change the operating mode and other parameters if needed in faceplates if you have the corresponding operator control permission (OS_Perm). This operator control permission can be configured in the engineering system.(see chapter “Operator authorization”)



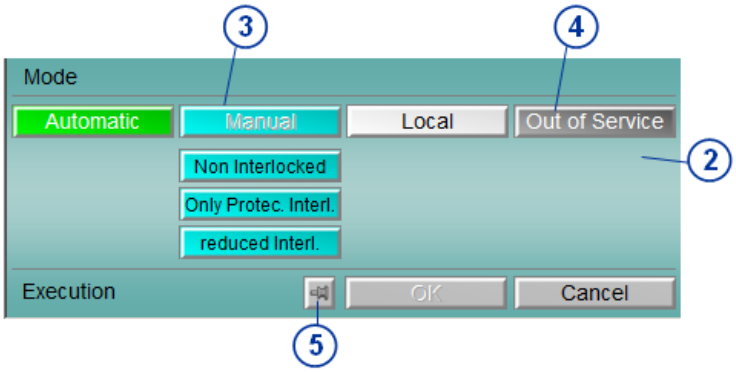
(1) The mouse cursor changes when you place it over the following button:



The mouse pointer now looks as follows:



When you click on the button with the mouse pointer, the bottom of the faceplate expands. You now see the field for changing the operating mode, for example.



(2) Field for changing the operating mode, operating state etc. This example describes changing the operating mode.

If the indicators for the operating state is currently located in this field and you have configured text for specific instances, this text is also shown.

(3) The text on this button is gray. You cannot select this operating mode due to the following reasons:

This operator control permission for this operating mode cannot be configured in the engineering system (ES).

or

The operating mode is already selected at this time.

or

Due to the technology, you cannot switch from the operating mode currently set and the desired operating mode.

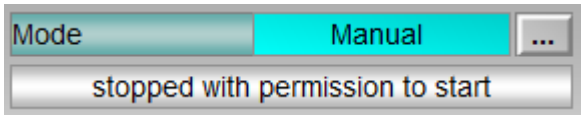
(4) The text on this button is black or white. You can switch to this operating mode.

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How to change the operating mode:

Click one of the selectable buttons in the operating mode field.

Confirm your selection by clicking "OK".
The mode change becomes activated and the new mode is shown in the top line.



If you do not want to apply your selection, click "Cancel".

After clicking the "OK" or "Cancel" button, the faceplate is reduced again to its original form.

(5) Multiple operations

If the operating window is not to close after the confirmation of a command, it can be "attached". The following button is located below the operating window for this purpose:

 Operating window is closed after the value is applied

 Operating window remains open after the value is applied

Setting the multiple step operation

You can use the internal @APLCommandExecutionSteps tag in the Tag Management of the WinCC Explorer to specify if command, mode change or values are to be changed in **two** or **three** steps.

Follow the steps outlined below:

Double-click on the internal @APLCommandExecutionSteps tag

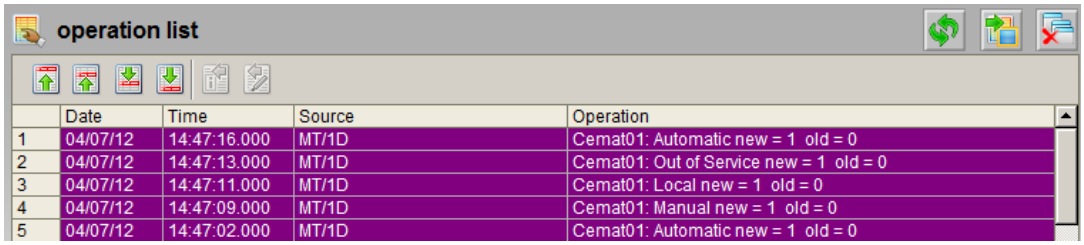
Change the start value to 2 or 3 in the Limits/Reporting tab.

Start value = 2: It is no longer necessary to confirm the selected button or value in the faceplate by clicking "OK"; commands or values are applied immediately.

Start value = 3: Each Command or value change in the faceplate (with the exception of those for direct control) needs to be confirmed with "OK".

Operation Messages

At the same time an “Operator Message” with the button Text is generated in the message System.

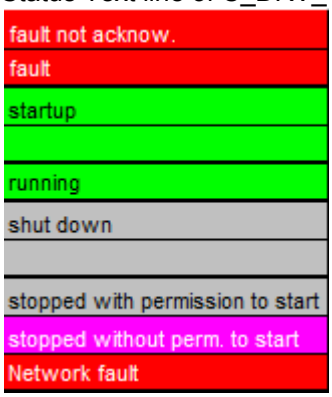


	Date	Time	Source	Operation
1	04/07/12	14:47:16.000	MT/1D	Cemat01: Automatic new = 1 old = 0
2	04/07/12	14:47:13.000	MT/1D	Cemat01: Out of Service new = 1 old = 0
3	04/07/12	14:47:11.000	MT/1D	Cemat01: Local new = 1 old = 0
4	04/07/12	14:47:09.000	MT/1D	Cemat01: Manual new = 1 old = 0
5	04/07/12	14:47:02.000	MT/1D	Cemat01: Automatic new = 1 old = 0

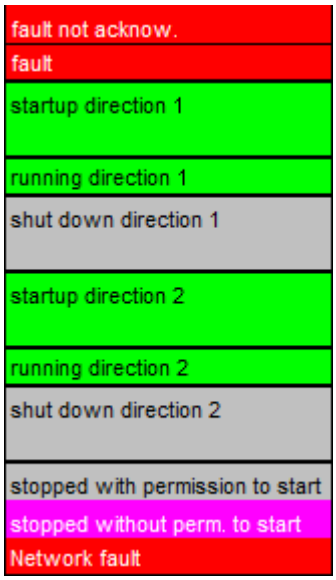
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Status Text displays:
Below the mode line a short status text is displayed. These texts vary and different for the different object types:

Status Text line of C_DRV_1D



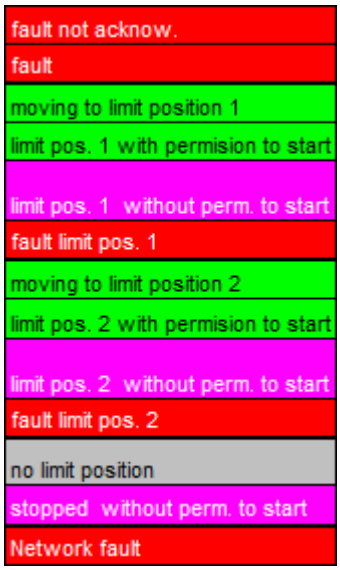
Status Text line of C_DRV_2D



Status Text line of C_VALVE

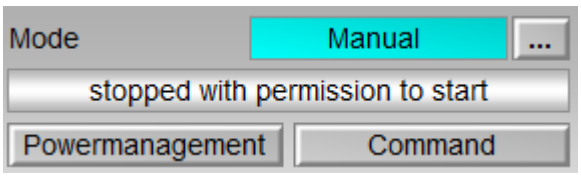


Status Text line of C_DAMPER



ad 6) Three Step *operator commands*

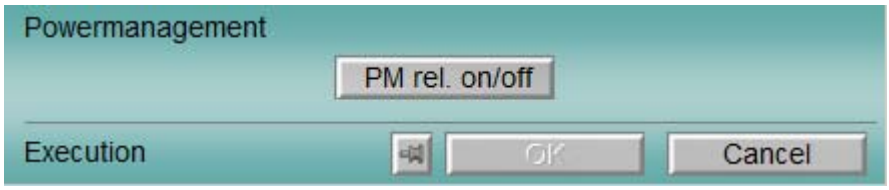
If in the OS Permission Word the bits “Power management” and “3 Step operation possible” are released the additional buttons “Power management” and “Command” are shown.



If the Permission is granted, the “Command execution Dialogs” can be opened:

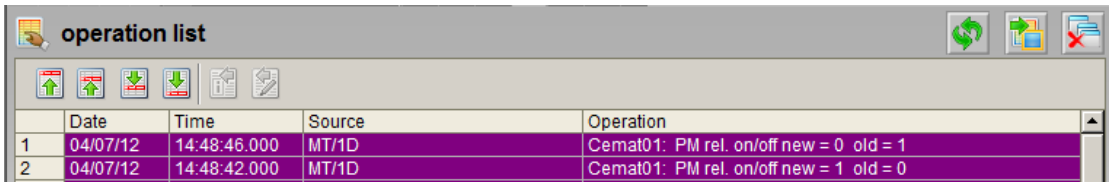
First Click on button “Power management”:

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With a second click on the button “PM rel.on/off” and
third click on “Ok” it is possible to set or reset the release of “Power management Control” via Module Interface. (PMblock)

At the same time an “Operator Message” with the button Text is generated in the message System.



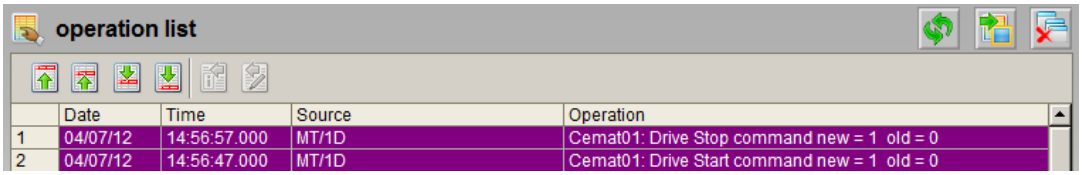
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First Click on button Commands



With a second click on the button “On” and a third click on “Ok” it is possible to start the Drive in “Manual mode”.
Or, if it is possible, with a second click on the button “Off” and a third click on “Ok” it is possible to stop the Drive in “Manual mode”.

At the same time an “Operator Message” with the button Text is generated in the message System.



ad 7) *actual timer name and value*
If the Object is “started up” or “moving” several timers (depending on the time settings and Operation Mode) are started.



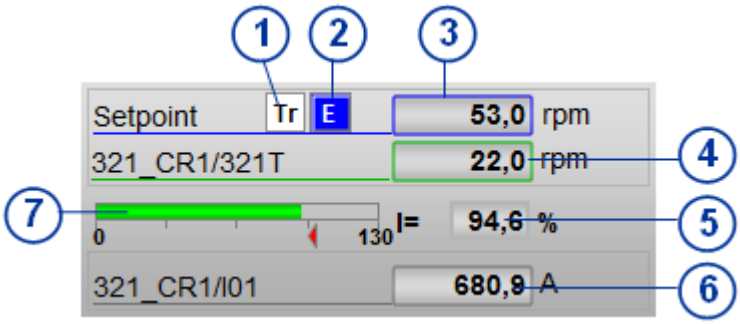
For example: available timer for:

Drive	Damper
Start delay (s)	Run time supervision (s)
Stop delay (s)	Time for start up warning (s)
Feedback time (s)	Limit switch delay time (s)
Start Up Warning (s)	Contactor Feedback time (s)

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ad 8) *Analog value handling*

Example: C_DRV_1D



Setpoint functions: (1-4)
With the enable Interface signal on the AS module the Setpoint input function is activated(visible).The button for (2)external Setpoint, the display of the (3)actual Setpoint (input field) , and the (4) Process value is shown with the associated units.
The Setpoint can either be entered via Input field ore as an external Setpoint. If the external Setpoint is connected and enabled the button “E” is blue and with click on it, the Faceplate of the external Object will be shown. If also the Setpoint tracking is on, the external Setpoint value is shown in the „actual Setpoint“ field. Without Setpoint tracking the OS Setpoint will be shown and the external Setpoint is only in the Diagnosis Dialog visible. Without external Setpoint the Setpoint Input is checked for Low limit “SP_LoLim” and High limit “SP_HiLim”.(see diagnosis dialog). There is no further evaluation in the drive block, the Setpoint is directly written to the output SP_Out . With click on the “Process value” field the Faceplate of the connected Analog value will be open.

Current or Power functions: (7+5)
If a measure block for the motor current exists or a SIMOCODE is used and the function is enabled, the (5) percentage value of the motor current (or power) can be displayed as value and (7)bar. In case of a measuring value the upper limit 1 of the measure corresponds to 100% value of motor current. In the bar of the drive faceplate 0-130% are displayed.

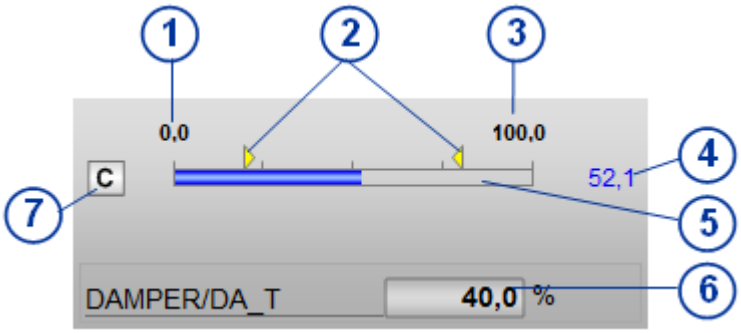
Analog Process Value: (6)
If one ore more measuring values are used as additional process signals of the drive (e. g. winding temperatures, bearing temperatures, power, current, etc.), these measures can be linked to the drive and will be shown as follows:
TAG and Value, Comment as Tooltip, Unit, upper and lower Limits .
With click on the Value the Faceplate of C_MEASUR or C_ANA_SEL can directly be opened.

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Example: C_DAMPER

Analog view with C_DAMPER in "control" mode **(7)**

The Damper Faceplate shows always the scale begin **(1)**, scale end **(3)** and set point limit **(2)** values. The "Set point Output value" is shown with a bar **(5)** and value **(4)**



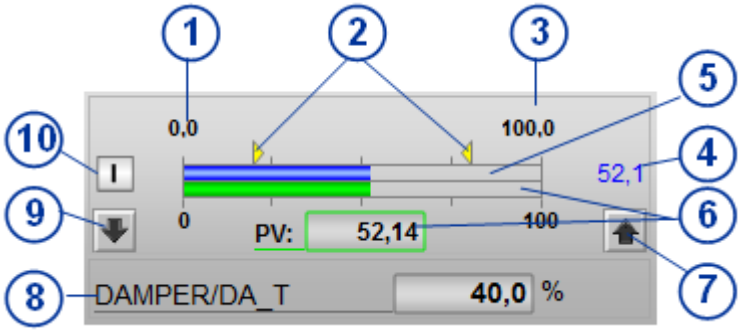
Analog Process Value: (6/8)
If one ore more measuring values are used as additional process signals of the damper (e. g. power, current, etc.), these measures can be linked to the drive and will be shown as follows:
TAG and Value, Comment as Tooltip, Unit, upper and lower Limits .
With click on the Value the Faceplate of C_MEASUR or C_ANA_SEL can directly be opened.

Analog view with C_DAMPER in "inching" mode

If the C_Damper operates in "inching mode" **(10)** then additional information's are shown.

(6) Process value with bar and value in %.
(7) Inching "up" button
(9) Inching "down" button

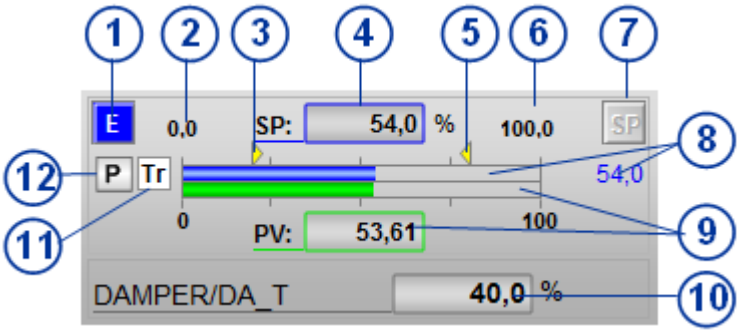
Left mouse click on the button will modify the Set point in short steps.
Right mouse click on the button will modify the Set point in 10 times short steps.



The step value is depending from "Actuator run time", "minimum pulse length" and cycle time.

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Analog view with C_DAMPER in "Positioner" mode



Positioning Setpoint functions: (1-9+11+12)
With the enable Interface signals on the AS module the "Positioner mode" (12) indication is shown and the Setpoint input function is activated(visible)(InchEn+PosMoEn).The button for (1)external Setpoint, the display of the Setpoint Operational Scale for low (2) and high (6) together with the (4)actual Setpoint (input field) and the (9) Process value is shown with the associated units.
The Setpoint can either be entered via Input field or as an external Setpoint. As internal Setpoint the Setpoint Input is checked for (3) Low limit "SP_LoLim" and (5) High limit "SP_HiLim".(see diagnosis dialog).
If the external Setpoint is connected and enabled the button "E" is blue and with click on it, the Faceplate of the external Object will be shown. If also the Setpoint tracking (11) is on, the external Setpoint value is shown in the „actual Setpoint" field and the field is blocked. Without Setpoint tracking the OS Setpoint will be shown and the external Setpoint is only in the Diagnosis Dialog visible. The Setpoint is directly written to the (8) output SP_Out and with an Object connection on that Output it is possible to follow the Value with the button "SP" (7). With click on the "Process value" field (9) the Faceplate of the connected Analog value will be open.

Analog Process Value: (10)
If one ore more measuring values are used as additional process signals of the damper (e. g. power, current, etc.), these measures can be linked to the drive and will be shown as follows: TAG and Value, Comment as Tooltip, Unit, upper and lower Limits .
With click on the Value the Faceplate of C_MEASUR or C_ANA_SEL can directly be opened.

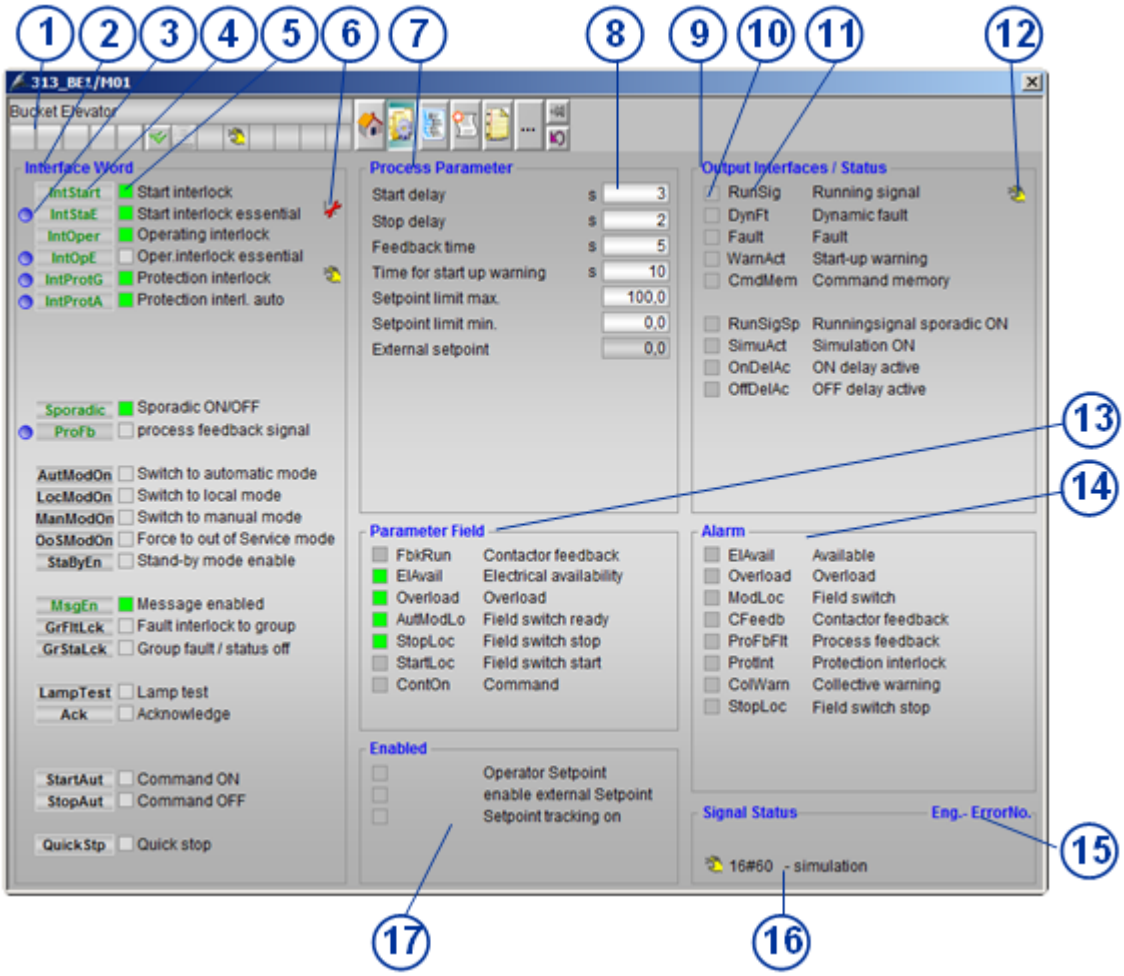
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Faceplates - secondary dialog 'Diagnosis'

The diagnostic dialog is available for all object types.

The diagnostic dialog shows status and parameter values in the automation system for the current module. If the user has the permission for this action, the diagnostic dialog also allows the modification of the process parameters.

Example for a C_DRV_1D diagnosis display



The diagnostic dialog has the following structure:

(1) *Displays and operator controls*
with Tag/ Comment/ Alarm symbols/ Status and Toolbar

(2) *Interface word display*

This displays the interface status of the AS module assigned to the picture module.
(5) The Input signal states are indicated using colored boxes.

Signal state: "0" = gray
"1" = green

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(4) To indicate the default signal states, these interfaces are listed in "green" with a "dark gray background".
(**3**) If a blue dot is visible before the input signal, an Interlock-Faceplate can be called for this signal. → Refer to 'Extended Diagnosis with Interlock Module'

(6) *Signal Status of interlock Signals*

(7) *Process parameter operator control*

(8) Display of the actual process values. If the respective authorization is available the process values can be modified by click on the value itself.

(9) *Module outputs*

The (**11**) output signals, important for diagnostic evaluation, are displayed together with their **(10)** status. The running Signal output shows the worst Signal Status **(12)** of all inputs.

(13) *Parameter field*

This displays the hardware signal states of the object.

(14) *Alarm*

Colored squares indicate Alarm or Warning.

Signal status "0" = gray (no Alarm)
"1" = red (Alarm)/ yellow (Warning)

(15) *Eng.- ErrorNo.*

If there is something wrong with the presetting of feature word or the connection to the Group module is missing, then a “Engineering Error Number” will be shown and the Object is forced to “Out of Service” mode.

(16) *Signal Status*

Under “Signal Status” is shown:

- status of Interface Input “ driver signal(s) bad quality
- status of Interface Input “ driver signal(s) simulation
- worst signal status of interlock structure inputs

(17) *Enabled*

Under 'Enabled' it can be seen which functions are enabled. Some functions can be enabled/ disabled only by the program; other functions can be enabled/ disabled via Operator System.

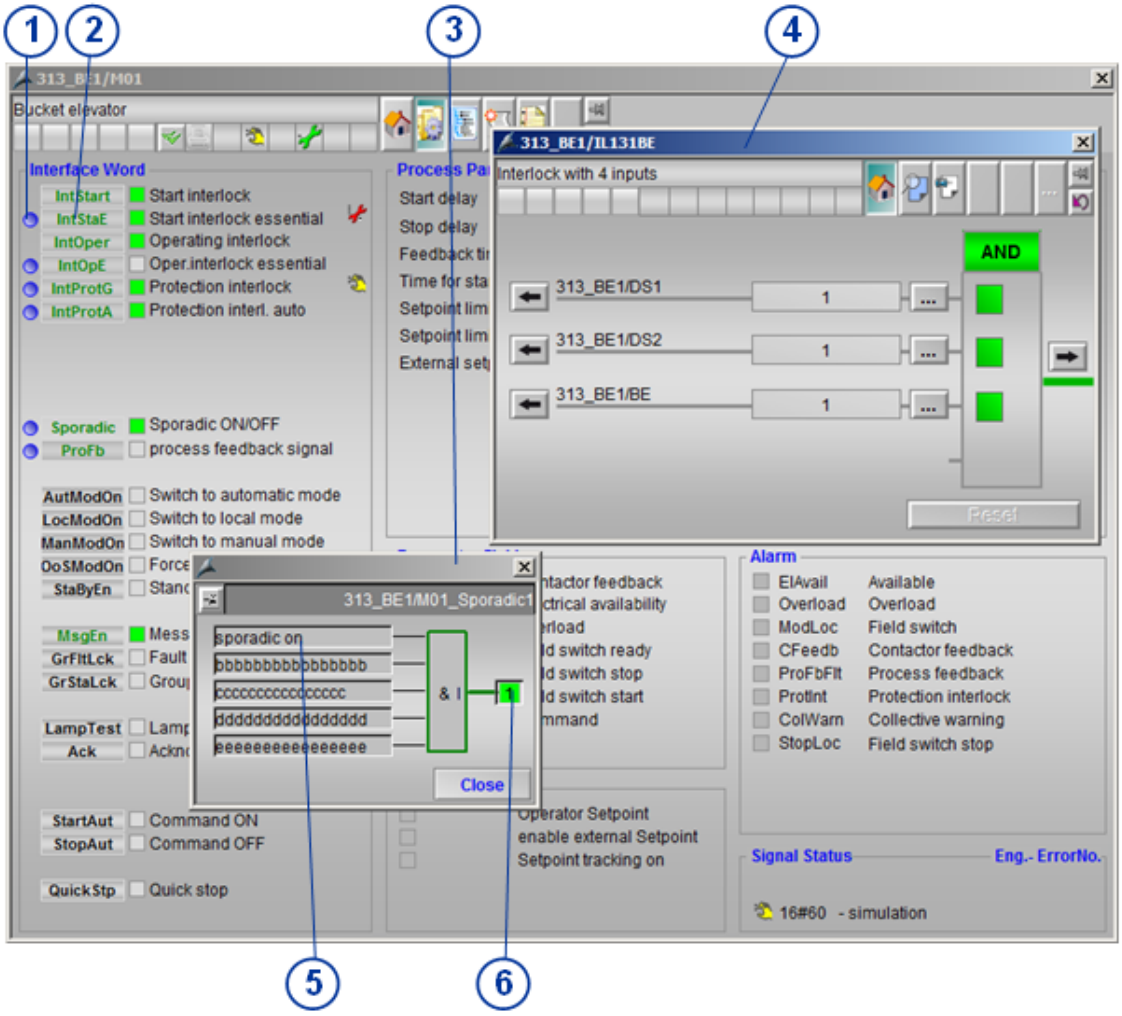
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Faceplates - secondary dialog 'Extended Diagn. with Interlock'

Interlock modules can be linked to the (2) interface flags, such as process interlocks or protection interlocks in order to give more detailed information about the signal status.

If an interlock module is present, the corresponding interface is marked with a (1) blue dot in the diagnostic dialog.

A click on the interface name opens the (3) CEMAT-Interlock dialog (Up to three interlock blocks can be linked to the same interface flag.) and one (4) APL Interlock if it is connected.

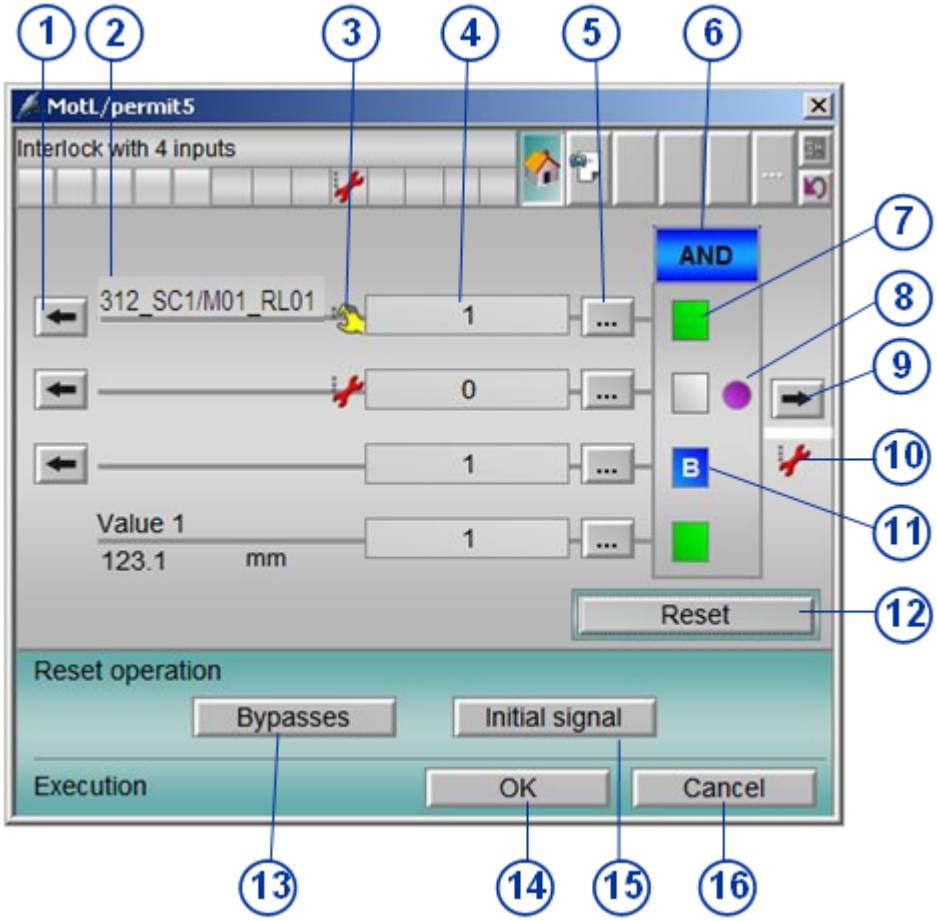


The CEMAT Interlock dialog displays only a (5) textual description of the inputs, its logical state and the (6) subsequent interconnection.

- The input text describes the error (max. 16 characters).
- In an error situation, the input text is displayed with a red background.

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Faceplates Details APL- Interlock'



(1) Call of the upstream block and Signal-Comment as Tooltip

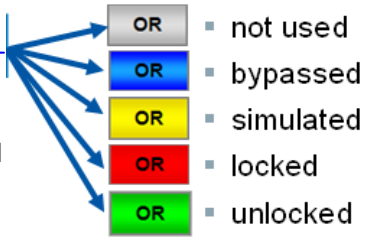
(2) Signal TAG

(3) input Signal Status

(4) additional Signal text or Value state

(5) Operation for bypass setting

(6) Interlock Status



(7) effective Input Value

(8) First Signal with influence to the Output signal

(9) Call up the previous Object

(10) worst Signal Status

(11) Effective Input value = bypassed

(12) open “Reset” Operation area

(13) Reset of all bypass settings

(14) execution of “Reset” Operation

(15) Reset First Signal with influence

(16) Cancel and Close “Reset operation”

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Faceplates - secondary dialog 'Alarm'

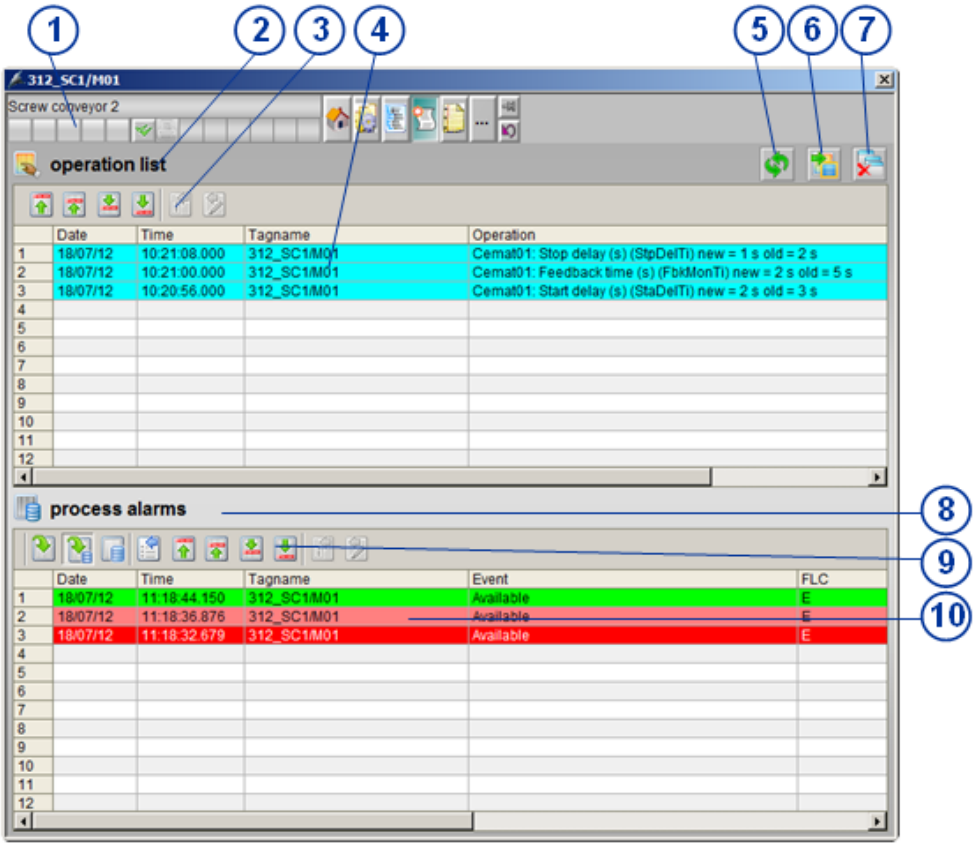
The alarm dialog is available for all objects which create messages and it shows all messages for the specific object.

(1) *Displays and operator controls*
with Tag/ Comment/ Alarm symbols/ Status and Toolbar

The Message list will be open by click on the button “Message”

(2) *Operation list*
The upper list shows all operator input messages with
Date, Time, Tagname and Operation information.
The “Operation” includes :

“User name”, who has done the modification
“Modification”, value or operation description
“new value” new value or new Status “0” or “1”
“old value” old value or old Status “0” or “1”



Inside the (3) operation- and (8) process list it is possible to scroll up and down or change the archives.

Depending on (6) selection button it is also possible to show additional Signal faults as RL2 or SL01

With button (7) reset the standard selection will be shown and with button (5) the two lists will be updated.

(8) *Process alarm list*
The list shows all process alarms (errors and warnings)
Date, Time, Tagname, Event and Fault Class.

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Faceplates - secondary dialog 'Statistic and Maintenance'

The Maintenance dialog is available for all drives, dampers and valves. It shows the **Statistic Values** and the **Maintenance Information** (Maintenance settings, Status and Device Information and can be opened from the “Displays and operator controls” area with click on button “Maint” **(4)**.

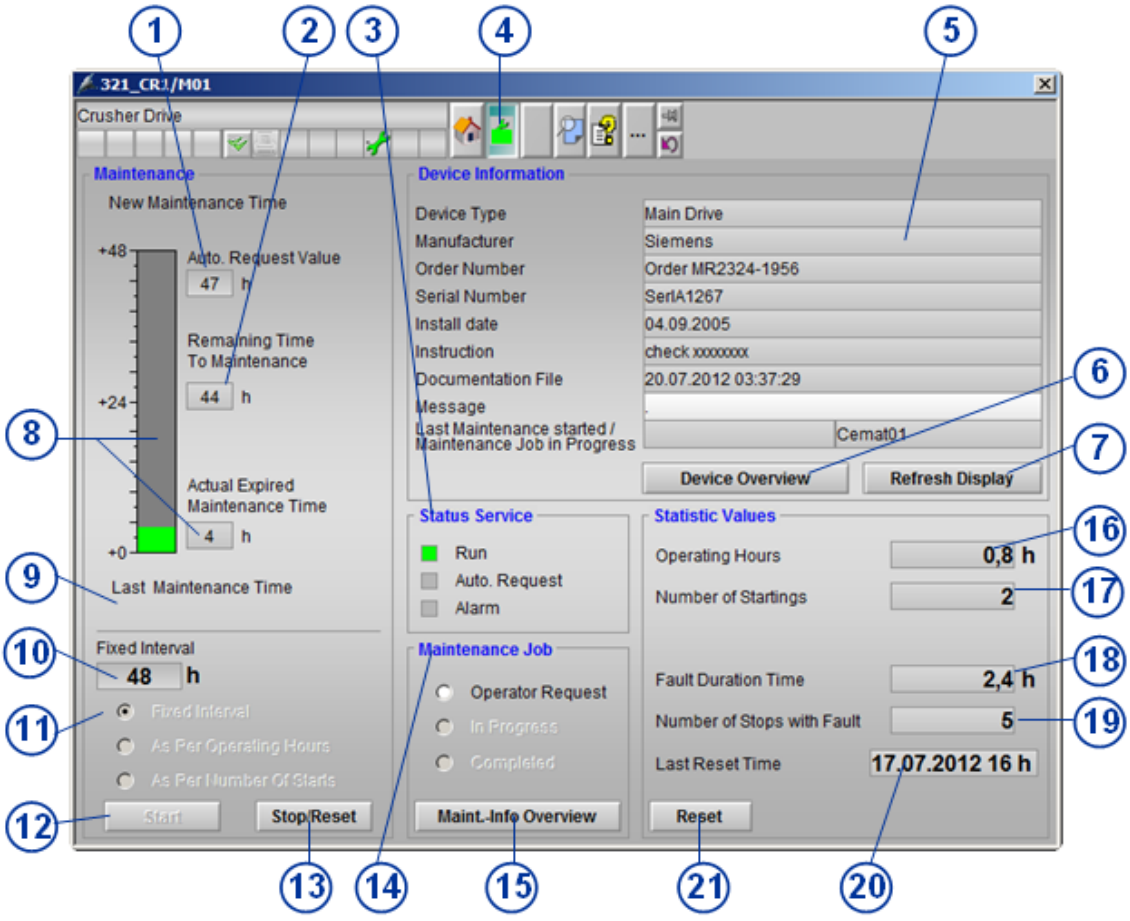
In Section **Statistic Values** the following information is displayed:

- Operating Hours **(16)**
- Number of Starting Dir. 1 and 2 **(17)**
- Fault duration time **(18)**
- Number of Stops with faults **(19)**

The following **Maintenance Information** can be displayed:

- Maintenance interval (fixed, operation hour, no. of Starts) **(10+11)**
- Actual Maintenance values (expired time, remaining time, auto request time) **(8,2,1)**
- Status (Run, Alarm, Auto Request) **(3)**
- Maintenance Job (Operator Request, In Progress, Completed) **(14)**
- The Device Information (Type of equipment and last Maintenance starting time) **(5)**

Example for a C_DRV_1D maintenance display



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Function description Statistic Values:

For C_DRV_1D, C_DRV_2D and C_VALVE the operating hours and the number of starts (in each direction) are displayed.

For C_DAMPER the number of starts in each direction is displayed.

For all drive functions the fault duration time and the number of stops with fault is displayed.

With "Reset" button **(21)** all counters under Statistic values are reset and the date and time of this action will be shown under **(20)** "Last Reset Time".

Function description Maintenance:

1. Under "Maintenance Interval" the maintenance cycle **(10)** has to be entered and one of the following options **(11)** has to be selected:

   - Fixed Interval: Maintenance request after a number of hours
   - As Per Operating Hours: Maintenance request after the drive was running a number of hours (default setting)
   - As Per No. Of Starts: Maintenance request after the drive has been started a number of times.
   - An Auto Request Value must be entered in order to indicate that the maintenance cycle is nearly complete.

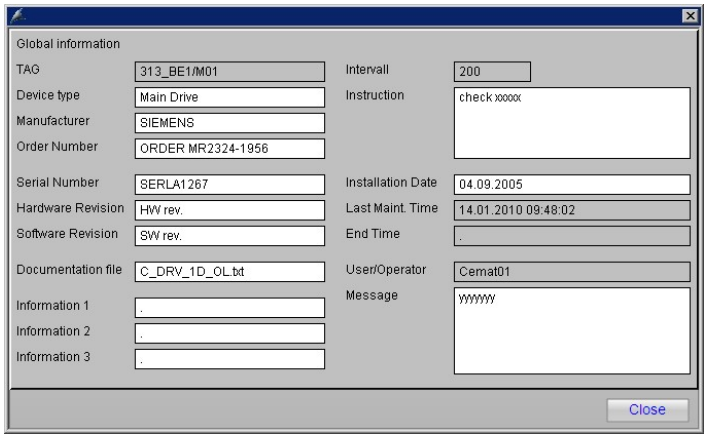
2. The "Start" button **(12)** enables the Maintenance function. The **(3)** status shows "Run". After this, the Maintenance interval can not be modified any more.
3. The "Stop/Reset" button **(13)** disables the Maintenance function and all timers and counters for Maintenance are reset. The Maintenance interval can now be modified.
4. After the Maintenance function is enabled the actual expired maintenance time **(8)** and the remaining time **(2)** to maintenance are displayed.
5. If the Auto Request Value is exceeded the bar shows yellow color and status bit "Auto Request" is set.**(3)**
   The information is also available as module output and can be connected to an annunciation block in order to create a warning message.
6. If the Interval Value is exceeded the bar shows red color and status bit "Alarm" is set.
   The information is also available as a module output and can be connected to an annunciation block in order to create a fault message.
7. With "Auto Request" the Operator Actions are enabled.**(14)**
   The Maintenance person has to select "in Progress" and to enter his comments into the Device Information Dialog (This Information will be saved in the user Archive with a time stamp).
8. After the Maintenance work is done the Maintenance person has to select "completed" in order to start the new maintenance cycle. (The time of completion is saved in the user archive).

The Dialog “Maintenance Info Overview” **(15)** shows all active Objects with the status.(see next page)

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The "Device Overview" button **(6)** opens the following Dialog where the **Device Information** can be entered. Closing the window the information is stored in the User Archive C_Info.

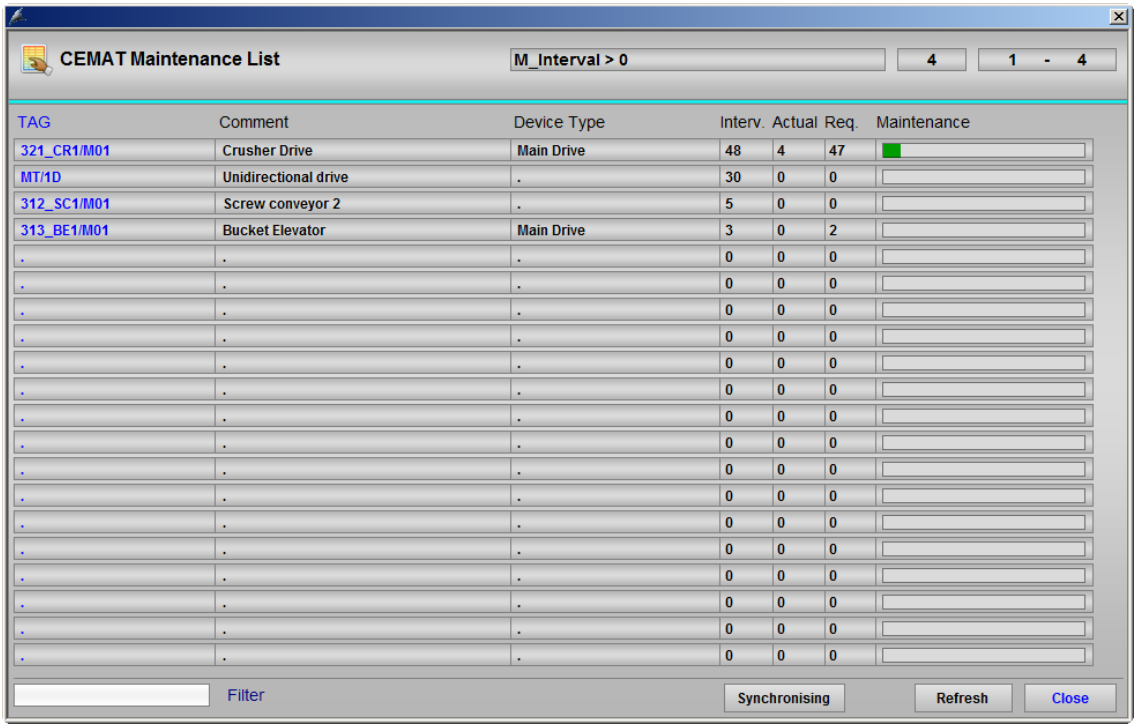
Caution: In the Maintenance Dialog the Device information is not automatically refreshed. You have to press "Refresh Display" in order to display the actualized data.



The Device Information is part of the user Archive C_Info and can also be imported via CSV file.

The **CEMAT Maintenance List** shows all drives which are enabled for Maintenance (each object with Interval value > 0) and its Maintenance status.

The list can be opened using the button "Maintenance Info Overview" in the Maintenance faceplate or via a separate button from any process picture.



The filter function can be used to search for specific objects. Use "Refresh" button on order to update the list.

Scroll bar can be used to scroll fore and back. You will always see the 20 objects before ore behind.

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Faceplates - secondary dialog 'Info'

The information dialog is available for all object types and it is organized as follows:

Header lines: **(1)** The header lines display the general location designations and the installation location of the object within the plant structure.

Registers: They contain standard information about
- Input/output descriptions **(2)**
- MCC descriptions **(3)**
- AS hardware and software modules **(4)**
- Service inputs for Loop in Alarm, etc.**(5)**

User notes: **(8)** The user is also given the capability to store his own information text.

Message output: **(7)** The object-related messages are output in a message window.

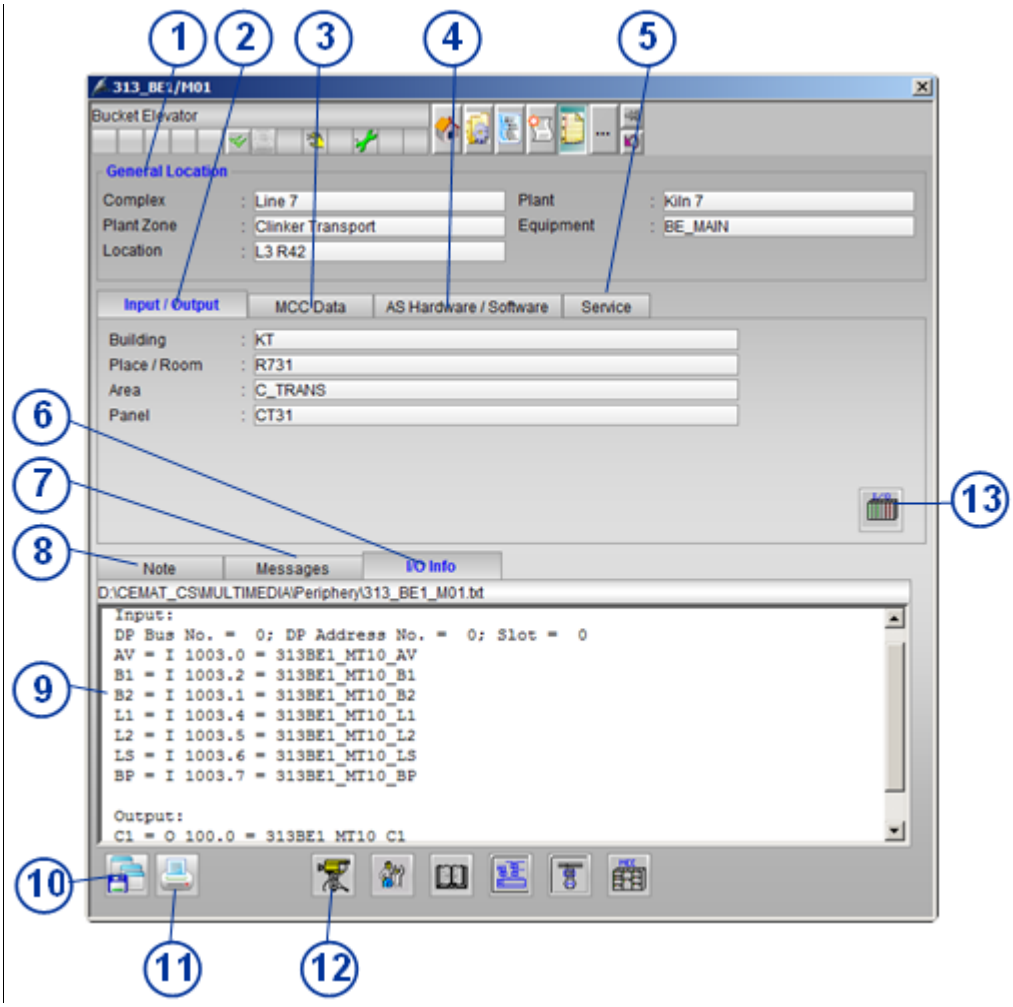
I/O Info **(6+9)** Input and Output information with absolute and symbolic address, DP Bus/ Address and Slot.
(13) Call the drawing from I/O Panel

Save **(10)** save the changes

Print **(11)** a preview dialog with all Information's of this Object will be shown.

Multimedia **(12)** call up of external documents, video, drawings

Sample display (including I/O Info):

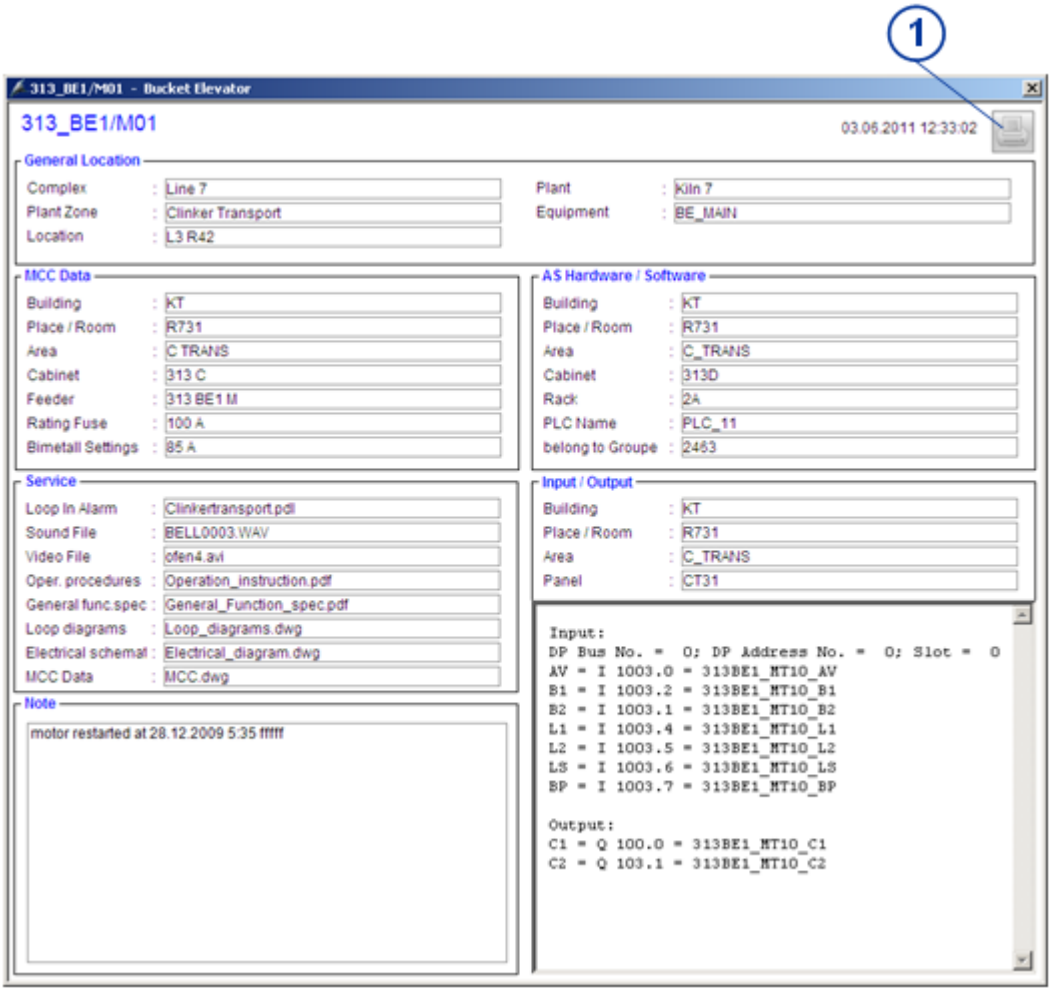


The Text files for I/O Info can be created with an Excel Macro based on the data from the HW-Configuration and the Process object view. Refer to chapter 09_Engineering_Tools.

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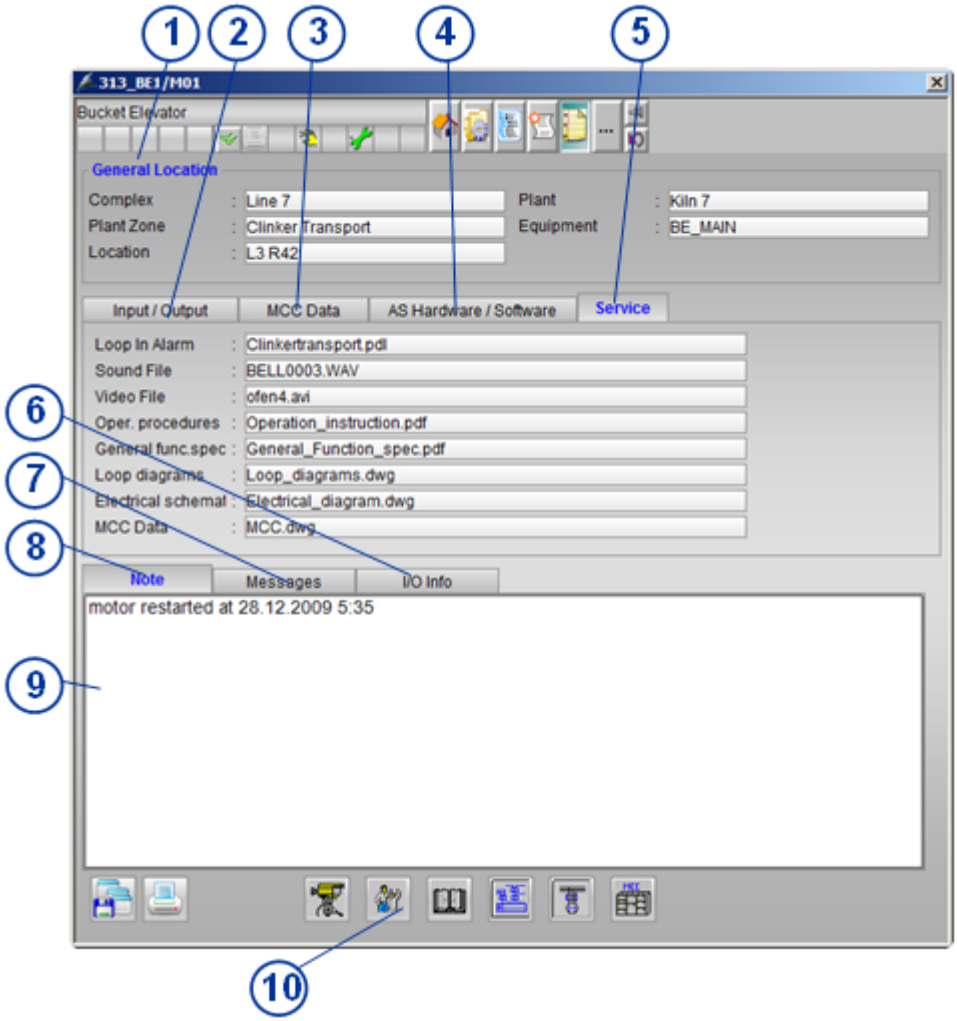
Sample display (Print preview)

From there the print out (1) to the standard printer is possible.



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Sample display (with operator notes):



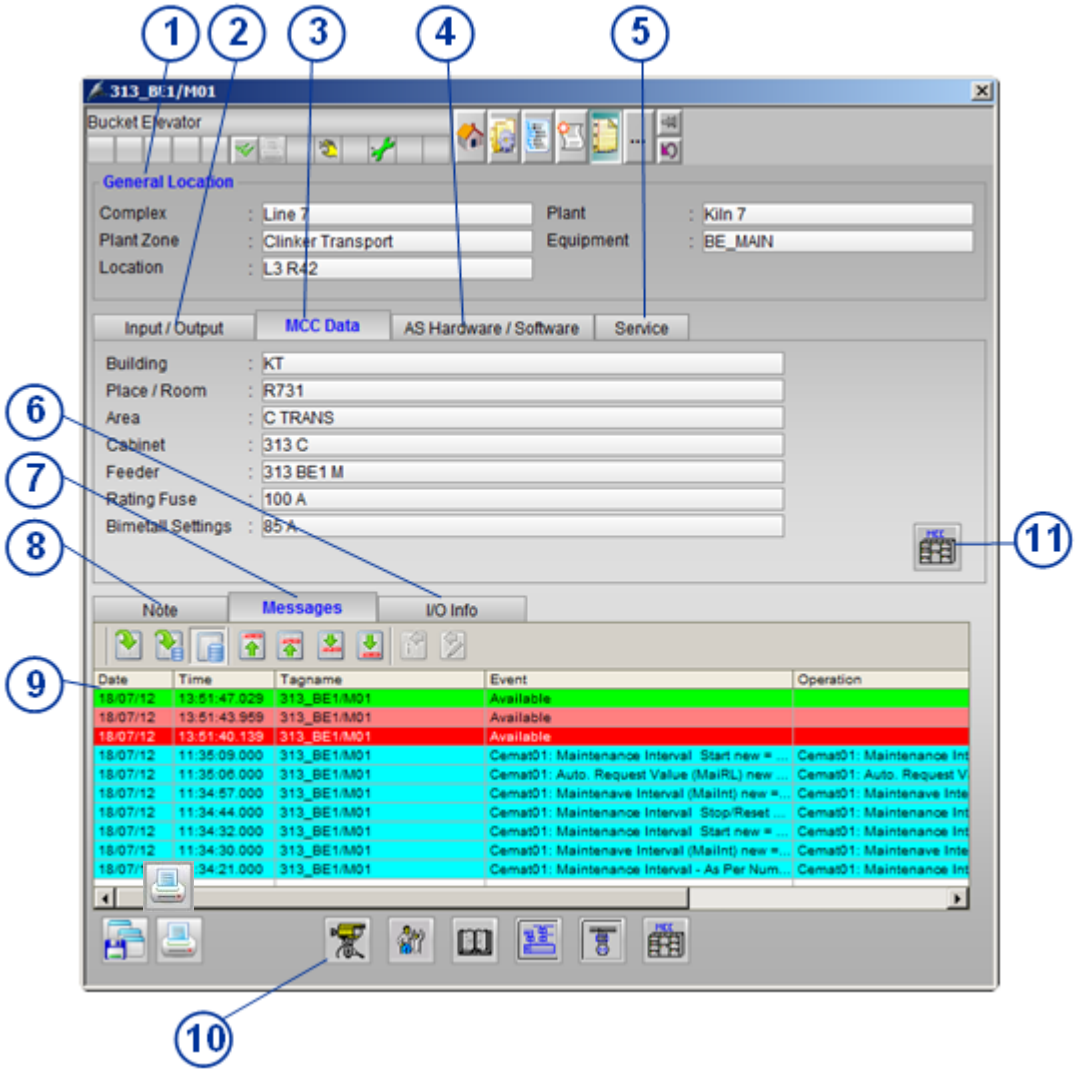
(9) Input field for Object information from Operator

An overview of Object- Notes can be called as separate list.

(5) Service information with settings for the multimedia buttons.
The multimedia files can be stored on a local station or on the Server

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Sample display (with messages):



(3) MCC Data with information about the location and Fuse and Bimetal setting

(9) The chronological messages of the Object will be shown together. (alarm and operation)

(11) Open file with MCC information (only .jpg)

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Additional User Documents can be linked to each Object via Information Dialog.
(The function is optional and must be configured accordingly):

In the Folders Input/Output, MCC Data and AS Hardware and Software a button will open respective drawings:

Folder 'Input/output' 

Assignment of the input/output cards (cabinet assignment)

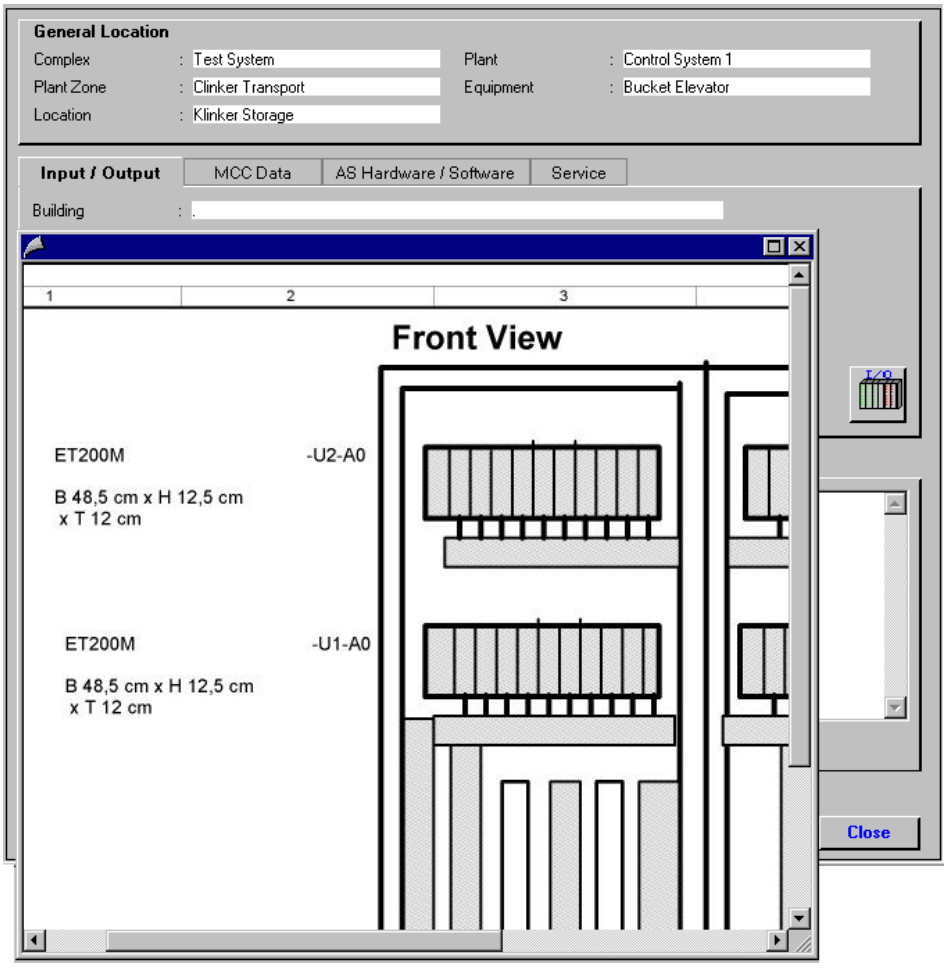
Folder 'MCC data' 

Assignment of the MCC cabinet (cabinet assignment)

Folder 'AS hardware' 

Construction of the cabinet in which the AS is installed which this object belongs to (cabinet assignment).

For this function, the File names of the documents must coincide with the object name.



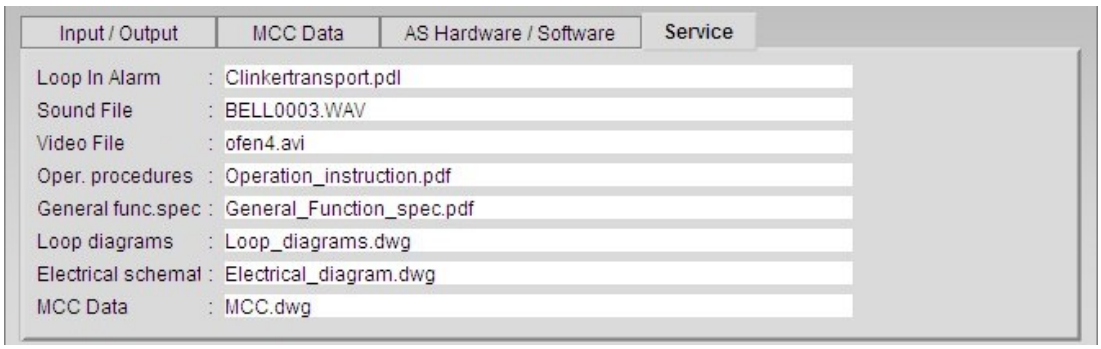
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The additional Buttons at the bottom of the information dialog can be used to open a Sound file, a Video, a Operating procedure, a Function description, a Loop diagram, an Electrical schematic or a MCC Data.



Sound 	Sound replay (USER)
Video guide 	Video description for trouble-shooting (USER)
Operation procedures 	Descriptions how to operate (USER) as doc, pdf, xls
General function desc. 	Descriptions of general functions for this object (USER) as doc, pdf, xls
Loop diagrams 	Process engineering- and Software interlock as CAD drawing
Electrical schematic 	Electrical schematic Drawings as CAD drawing
MCC data 	MCC cabinet drawings, settings as CAD drawing

For this function, the file names must be entered under 'Service'.



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Example for a Video:



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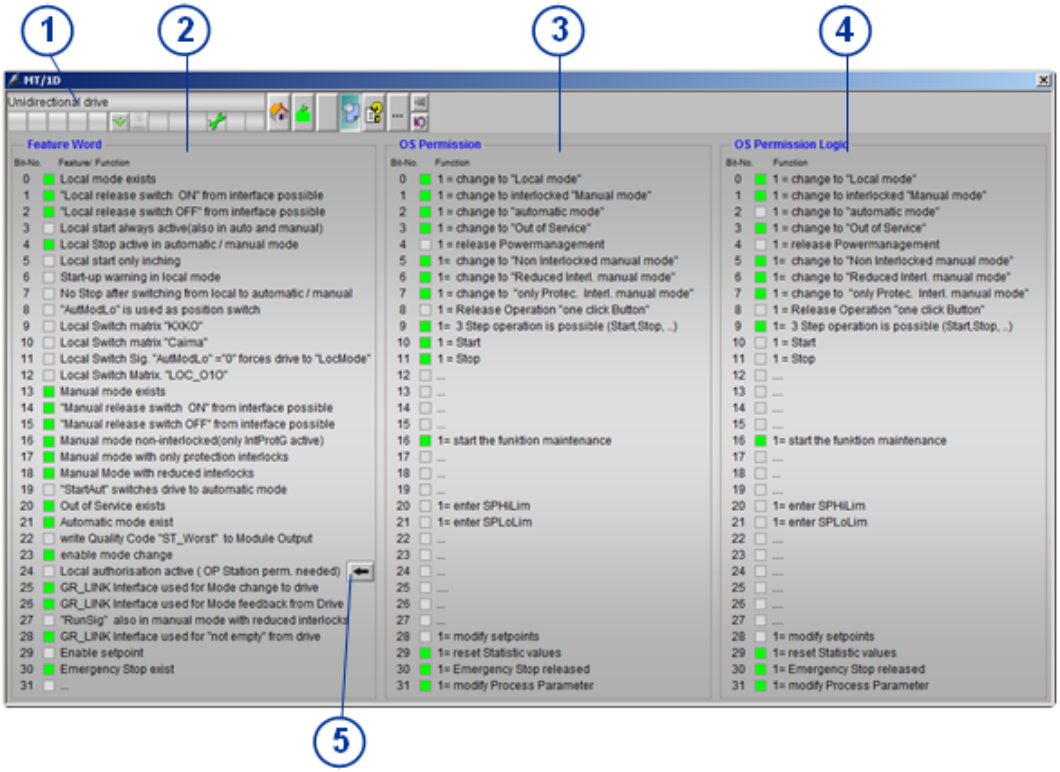
Faceplates - secondary dialog 'Preset'

The preset dialog is available for all object types.

It shows the settings of the startup characteristics for “Feature word”(2) and “OS Permission Word” (3).

In the last column the result status of OS Permission and PLC Logic is shown. That OS Permission Logic Bit’s(4) are used for operation release of all dialog objects.

Example for a C_DRV_1D Preset display



The preset dialog has the following structure:

(1) *Displays and operator controls*
with Tag/ Comment/ Alarm symbols/ Status and Toolbar

Feature Word (2), OS Permission Word (3) and OS Permission Logic Word (4)

This displays the startup characteristics of the AS module and the 32 Bit’s are related on the Object Typ.

Signal state: "0" = gray
"1" = green

With the button “OpStations” (5) the APL Standard view can be opened. It is only shown if the Feature Word Bit 24 has “1” signal and the Module is connected.

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Faceplates - secondary dialog 'Status'

The status call function is available for groups and routes:

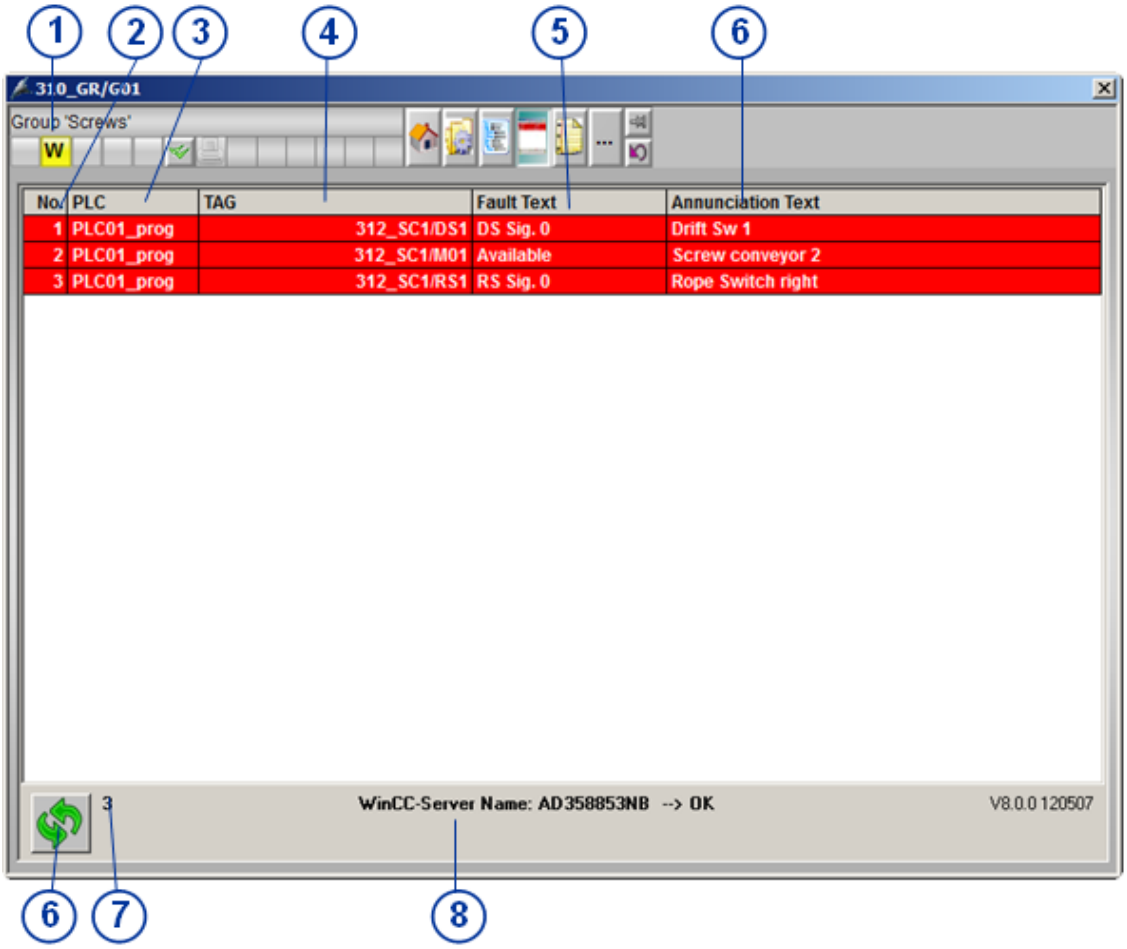
The status call of the group can be used in order to list all existing faults, warnings or interlocking conditions of the drives, measuring values and process signals assigned to this group.

The status call of the or route can be used in order to list all existing faults, warnings or interlocking conditions of the drives, measuring values and process signals assigned to this or route.

If the group has routes, the status call of the group is related to the selected routes of that group. The elements of the not selected route will not be displayed.

The information will not be taken from the message system, but directly requested from the AS.

The Dialog can be opened from the “Displays and operator controls” (1) area with click on button “Status”.



The following will be indicated in the table (from the left to the right):

(2) Index, (3) Tag of PLC, (4) Tag of the faulty object, (5) fault text, (6) comment from the module.

The actualization button,(6) number of messages (7)and the WinCC server name (8) are indicated at the bottom side.

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Faceplates - secondary dialog 'Object'

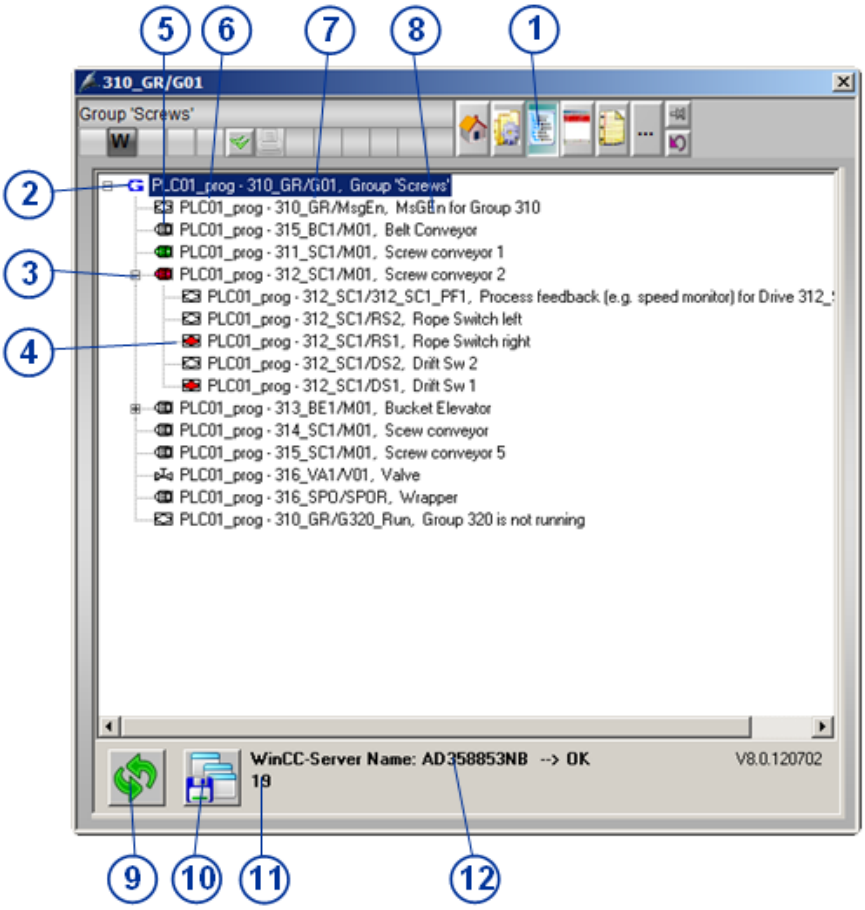
The Object or Instance list function is available for groups and routes:

The group instance list or Object list shows all drives, measuring values and process signals which are assigned to the group.

The route instance list or Object list shows all drives, measuring values and process signals which are assigned to the route.

The first time you open the group instance list the information will be read from the AS and with the save button it is stored into the user archive. If you open the list again the information is read from the user archive.

The Dialog can be opened from the “Displays and operator controls” (1) area with click on button “Object”.



The tree structure shows (from left to right):

Group information (2), Node symbol if an route or drive object is included (3)
Objects belong to a Drive, Damper, Valve (4)
the symbol of the object type with the status 'off', 'on', 'fault' (5)
the PLC Tag (6), the Object Tag (7), the comment to the object (8)

Selecting an object with the left mouse key it can be shifted to any position. Thus, the real start-up sequence as per the interlocking can be indicated.

A click on the soft key „save“(10) stores the new tree structure to the user archive.

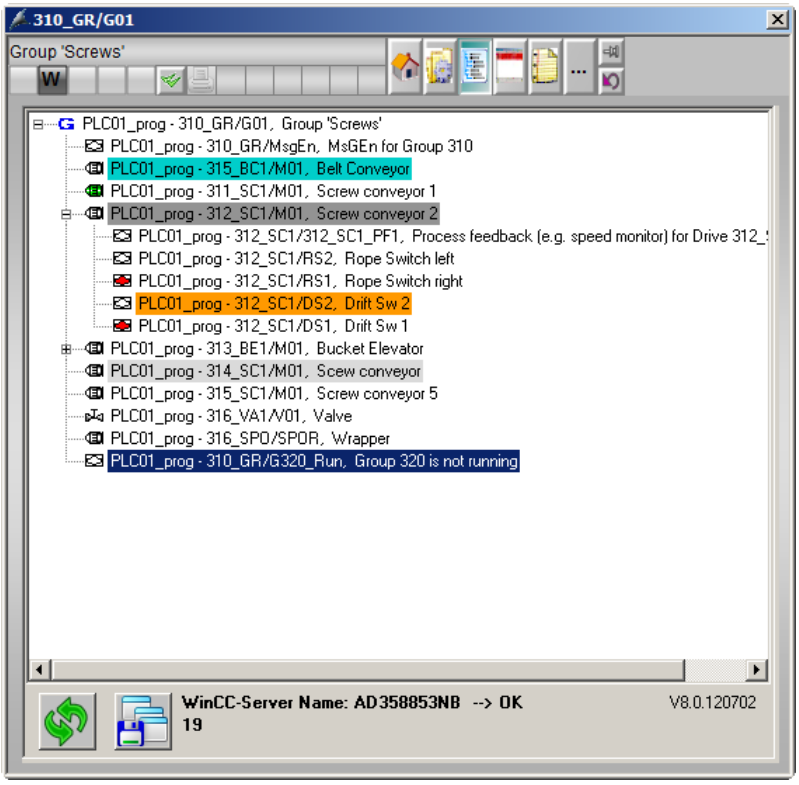
Single click on the soft key (9), reads the objects again from the AS and shows them unsorted in the tree structure.

A double-click on the line opens the faceplate of the corresponding object.

Amount of lines (11), WinCC server name (12) are indicated if the connection is ok

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If the mode of an object is not “Automatic” it will be shown with a colored line:
- bypass/ simulation -> brown
- local mode -> light gray
- manual mode -> cyan
- Out of Service -> dark gray

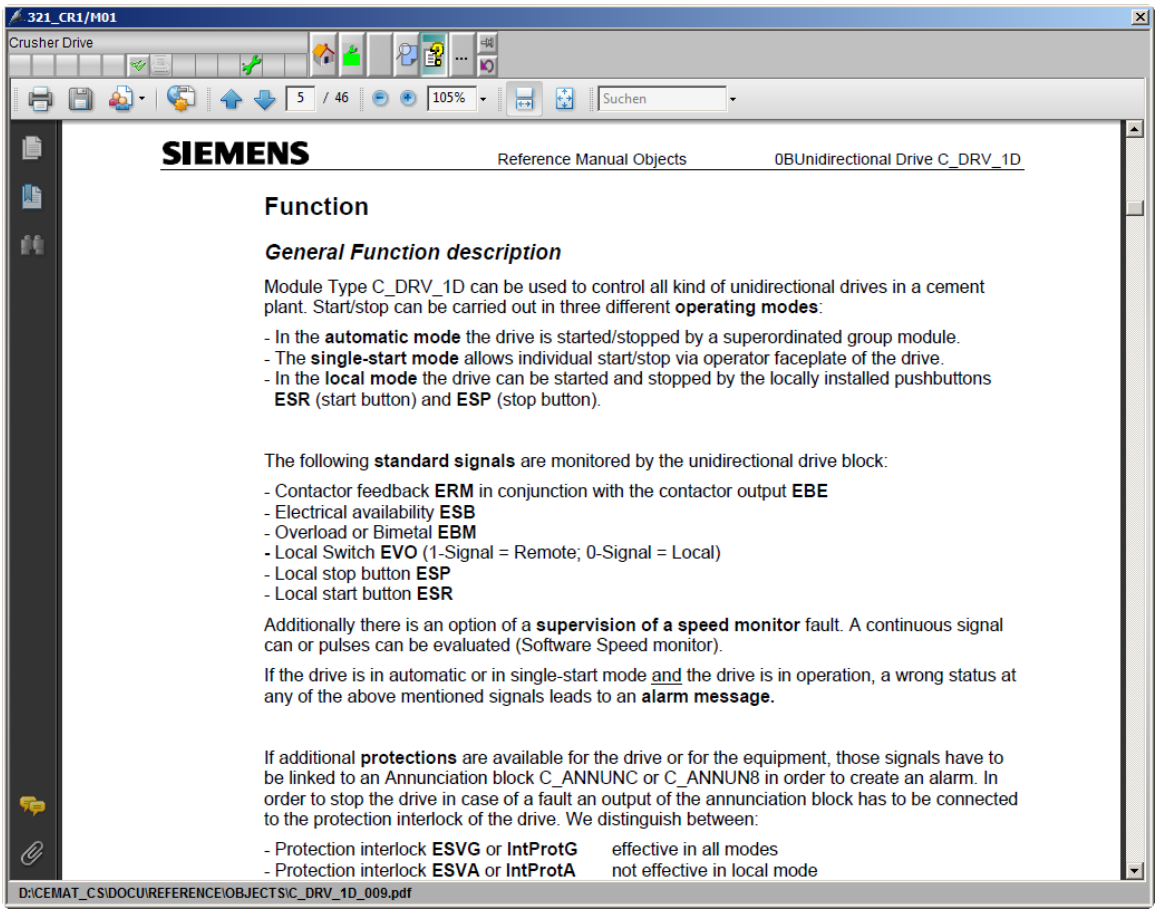


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Faceplates - secondary dialog 'Help'

The online help function is available for all object types

Example for C_DRV_1D help dialog:



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CEMAT- Trend Groups

CEMAT offers 3 representations of **online Trend curves**:

@TRG_Cemat_FS.pdl	Default trend control with additional CEMAT functions
@TRG_Cemat08.pdl	up to 8 curves with additional functions
@TRG_Cemat08_FS.pdl	up to 8 curves with additional CEMAT functions

Display

@TRG_Cemat08.pdll – up to 8 curves with additional functions.



To call Trend Groups:

Use the key  trend system.

Function description

On top of the Dialog the 8 curves with information of TAG **(2)**, actual value (3), unit **(4)**, comment **(5)**.
With the colored Button **(1)** at the beginning of each line the curve display can be switched off/on (with left mouse button click).
With right mouse button click, each Value axis **(11)** can be switched off/on

If the ruler is switched on**(6)** the ruler -value**(8)**, -Time**(9)** and –archive name**(7)** will be shown.

With the reset button **(10)** the “top area” will be initialized

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Toolbar Curve window operation

Icon/function	Description/functionality
" Help"	Opens the help for WinCC OnlineTrendControl.
"Configuration dialog"	Opens the configuration dialog, in which you can change the properties of the OnlineTrendControl.
"First data record"	Use this button to display in the trend window the trend of a tag over a specified period of time beginning with the first archived value. The button is enabled only if the update has been cancelled by pressing the "Stop" icon.
"Previous data record"	Use this button to display in the trend window the trend of a tag from a period previous to the currently shown time interval. The button is enabled only if the update has been cancelled by pressing the "Stop" icon.
"Next data record"	Use this button to display in the trend window the trend of a tag for the period of time to follow the currently shown time interval. The button is enabled only if the update has been cancelled by pressing the "Stop" icon.
"Last data record"	Use this button to display in the trend window the trend of a tag over a specified period of time ending with the last archived value. The button is enabled only if the update has been cancelled by pressing the "Stop" icon.
"Zoom section"	You can select an area by dragging the mouse in the trend window. This section of the trend window is enlarged. You can return to the original view using the "Normal view" button.
Zoom in/out	Zooms the visualized range of values without zooming the time coordinate. The trend is compressed for display purposes. The 50 % mark is located in the center of the value axis. You can use this function if a fixed value range, a linear scale, and no user-defined scale have been set for all the trends in WinCC OnlineTrendControl.
"Move trend selection"	Use the button to move the trends in the trend window along the time coordinate and the value axis.
"Move axis selection"	Use the button to move the trends in the trend window along the value axis.
"Original view"	Use the button to return to the original view from the enlarged display of a trend.
"Start/Stop"	The display update is cancelled or continued. The data is temporarily buffered and entered again in the trend window the next time the button is pressed.
"Print"	Starts printing the trend which is visualized in the trend view. You can specify the print request to be used for printing in the "General" tab of the configuration dialog.
"Ruler"	You can use the button to show the coordinates of a trend. The trend data is shown in the ruler window. The ruler window is an independent control as of PCS 7 V8.0 and will not be shown when the OnlineTrendControl is opened via "Load/configure trend groups". The ruler window control can be configured in a process picture during the configuration of an OnlineTrendControl.
"Specify statistical range"	Use the button to specify the period of time for calculating the statistics in the trend window.
"Calculate statistics"	Use the button to display the statistical values in the statistics window. The displayed values are based on a selected trend with the configured calculation period. The button can only be pressed when a statistics window is linked to the OnlineTrendControl.

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Icon/function	Description/functionality
Relative scale	The range of values of all trends of a group is visualized within a low limit of 0 % and a high limit of 100 %. You can use this function: • If a fixed value range, a linear scale, but no user-defined scale have been set for all the trends in WinCC OnlineTrendControl. If you want to compare several values for the purpose of detecting process relationships, e.g., pressure increase as a result of a rise in temperature.

Additional fast selection Buttons

The trend controls @TRG_CEMAT08_FS.pdl and @TRG_ CEMAT_FS.pdl has additional fast selection buttons:



Function description

Day of the week **(9)**:Opening the trend display, the actual day of the week is shown on the right side, the last days of a week on the left side.
With click on a “Day button“ the display switches over to offline and to this day. The previously adjusted time range remains.

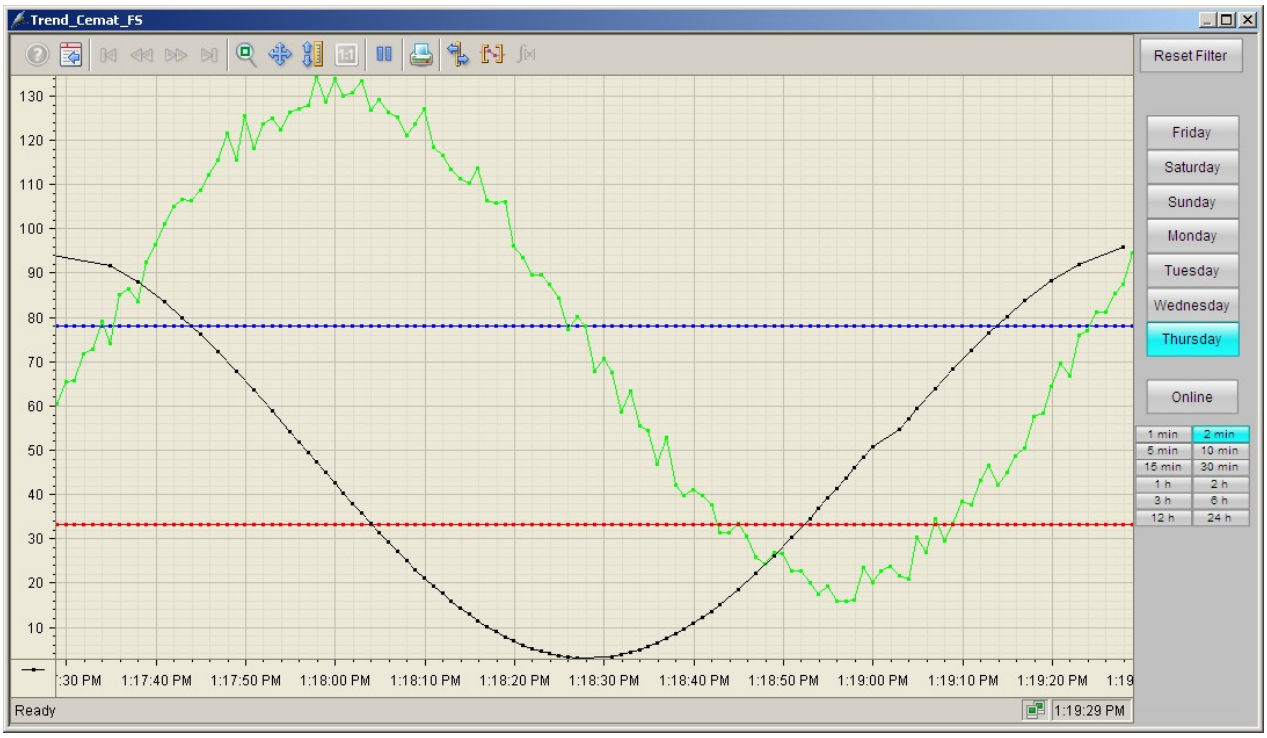
Time Range **(11**) The default value of time range is 30 min. selectable are 1min. up to 24h. The Time Range can be adjusted only in offline mode.

Online **(10)** Online mode is predefined.
Switches back to online mode. The previously selected Time Range gets dark gray and in order to show that no Time Range is considered.

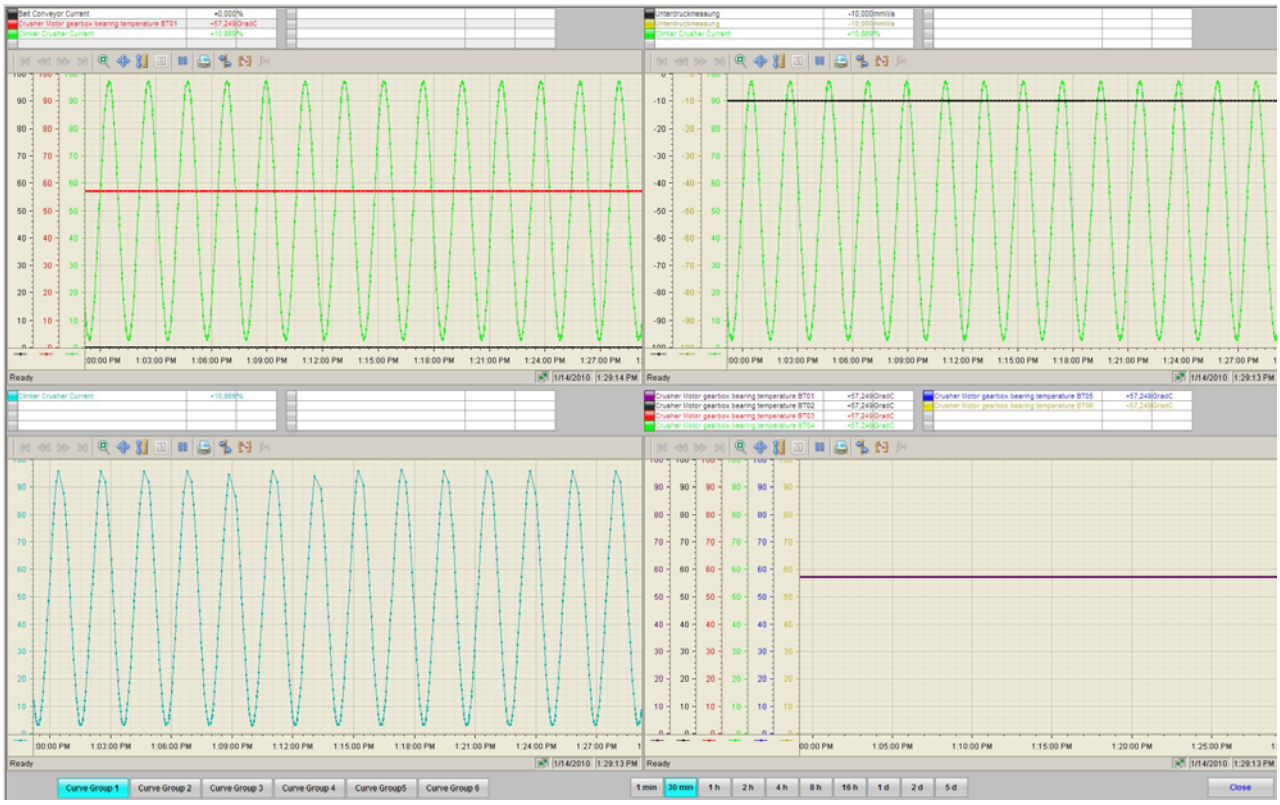
Print With click on the printer symbol the offline view is printed. CEMAT can use the print job C_TrendReport.rpl.

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@TRG_ CEMAT_FS.pdl without Tag and online value informations, but fast select buttons.



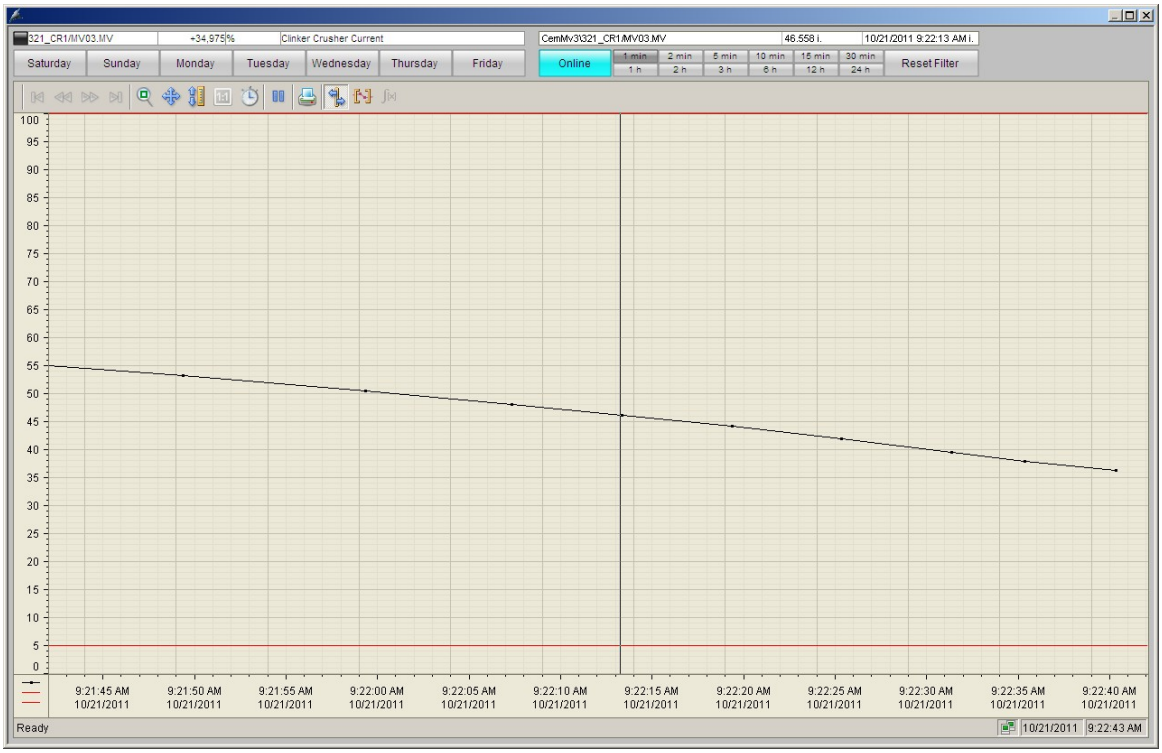
C_Curve_Group1.pdl as full screen Curve.



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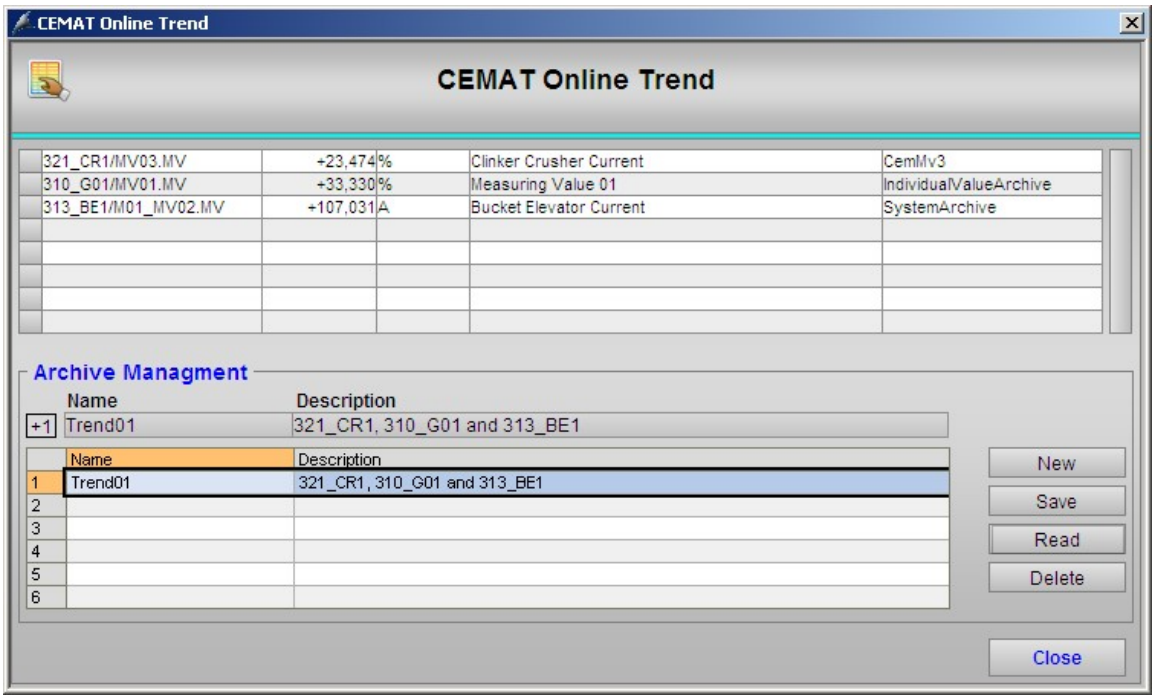
Quick View

Right mouse click on the value of block icon opens the quick view of the archive value



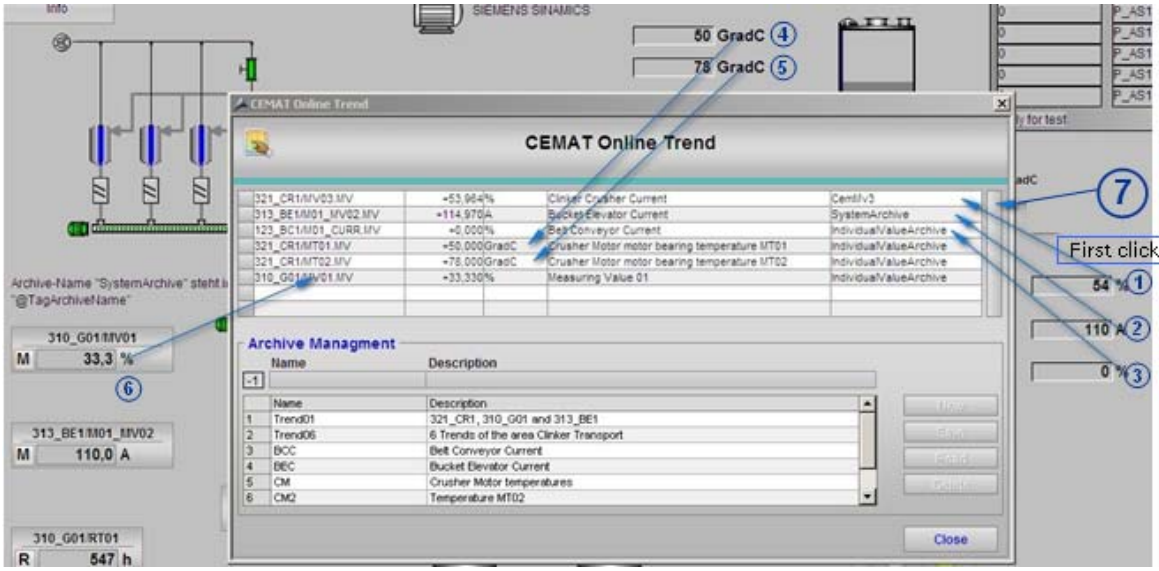
Quick Trend

Right mouse click on the unit of the block icon opens the quick trend management dialog. (in case it was not open) and writes the Object TAG , actual value, unit, comment and the archive name into the first line of the list.

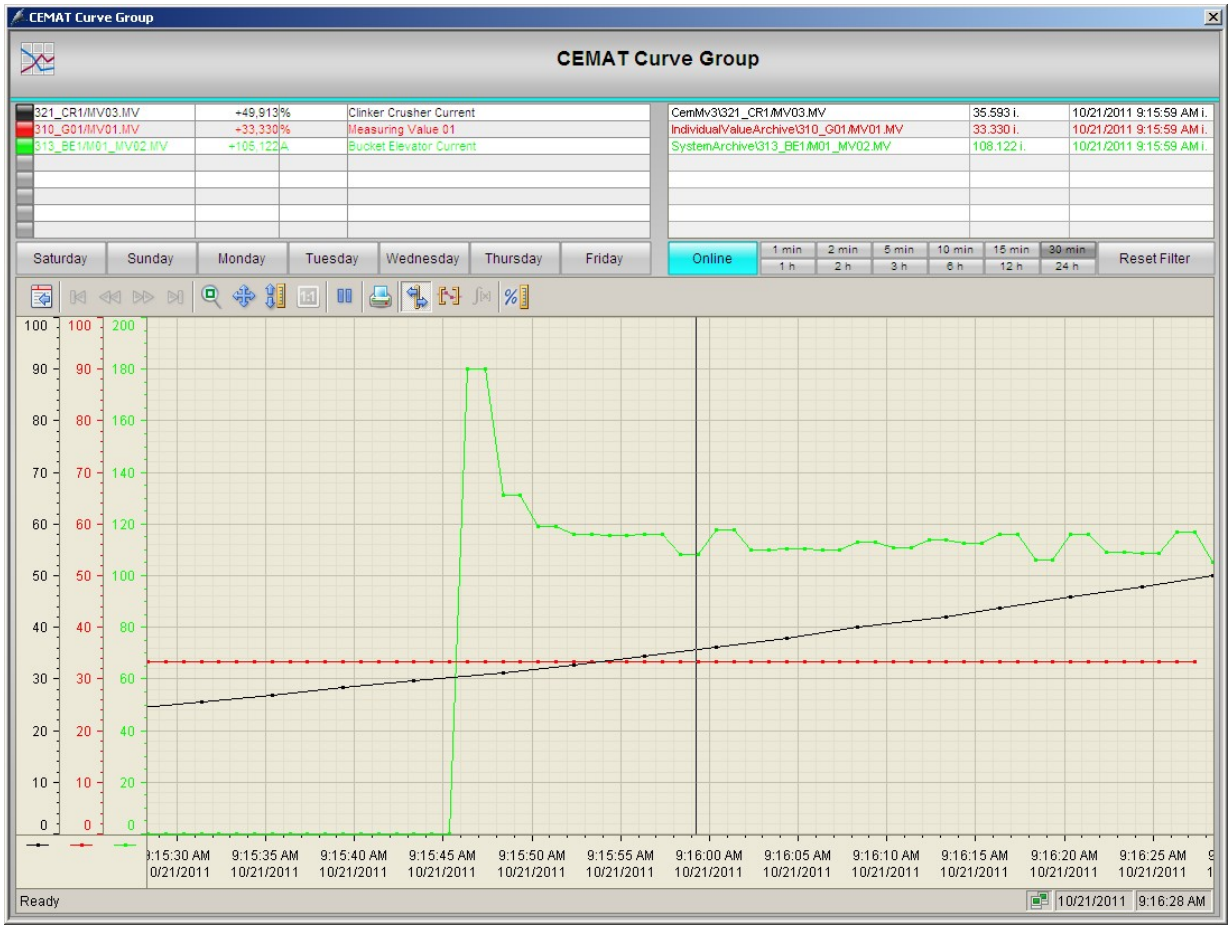


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Every new click on the unit of the block icon will add the new TAG to the list.**(1-6)** (up to 8).



With an click on the button right (7) a new Trend Dialog with all curves from the archive will be shown. (see below).

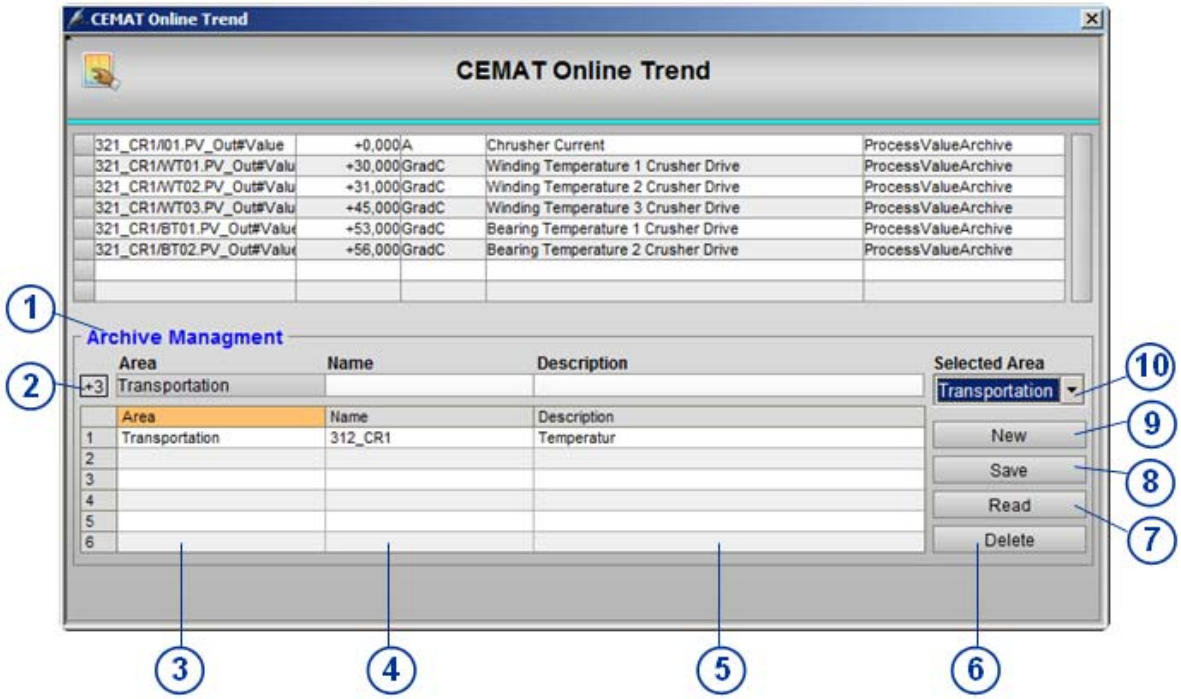


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In area "*Archive Management"* **(1)** it is possible to create a new Dataset **(2,9**) with Name **(4)** and Description **(5)**, sorted by "selected Area" **(3, 10)**. With the save **(8)** button the new Dataset will be stored.

With button "Read" **(7**) an before selected Dataset will be loaded an can shown in the Trenddialog.

With button "Delete" **(6)** an before selected Dataset will be erased from the archive.



All Information is stored in the UserArchive and available on each Client.

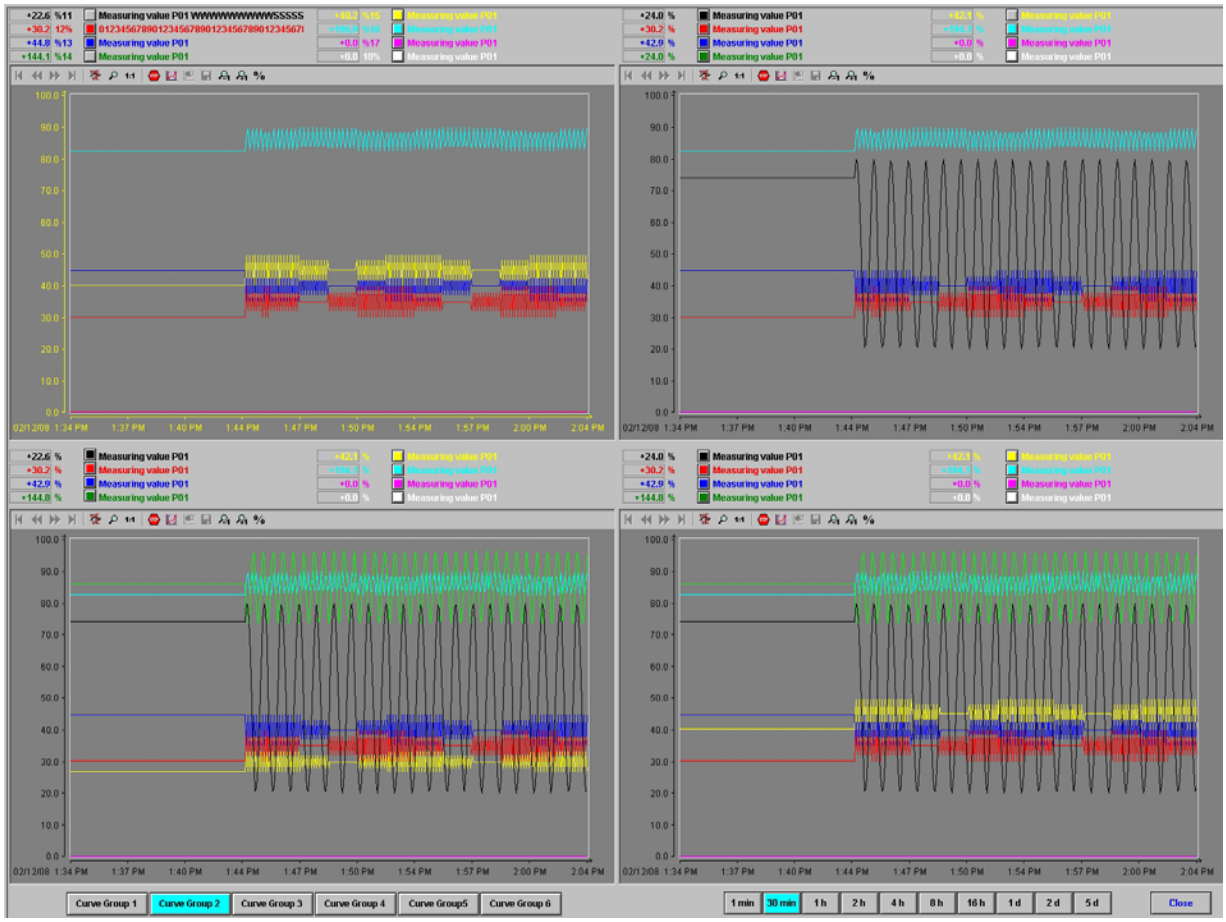
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Open Curve Group on Full Screen

The button “C_BtOpenCurveGroup” opens the curve group on full screen (optional).



This option allows the display of pre-configured curve groups in full screen mode, which means, when opening the curve group the complete screen is used as working area. There is no alarm line, no overview range (picture tree) and no button line.



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CEMAT Message Functionality

Two types of messages are stored in the message system of Cemat:

- Messages that are initiated by malfunction in the process (process specific values are reached or violated).
  These messages need the attention of the operator. They appear in the message line on top of the screen and need must be acknowledged. Parallel the messages are entered into the message archive.
- Messages originated by an operator action (starting, stopping, modification of a process parameter).
  These messages don't appear in the message line, but they are entered into the message archive.

Message line



The message line displays the **non-acknowledged** messages from the selected plant sections.

A newly arrived message

- always appears immediately in the message line (even when operations are being performed on the previously displayed message).
- produces an acoustical signal that continues until it is reset by clicking an acknowledge key.

A message line can contain the following information (from left to right):

- Incoming date/time of the message
- Plant identifier
- Fault type
- Message text
- Fault class. (P = process, E = electrical, M = mechanical, S = safety (emergency off))

In case of an alarm flooding Cemat analyses and prioritizes all alarms. As a result only **one** alarm will be recorded and reported in detail, while all other alarms are suppressed.

Each alarm must be acknowledged individually in the Alarm line

Only activated objects can generate alarms

Each fault is classified. Cemat distinguishes between electrical, mechanical or process faults or local emergency shutdowns.

The following events are displayed:

- potentially dangerous process conditions
- setpoint deviations beyond pre-selected values
- blocking of a start, stop or changeover operation
- operating interruptions

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Color attributes

The messages are displayed in the following colors depending on the message class and message state:

	Error messages	Warning messages	Process messages
Message arrived	white / red	black / yellow	white / red
Message gone	black / light green	black / light green	black / light green

Operator Control

The three additional keys placed at the right of the message line initiate the following functions:

	- *left mouse button* (SC) - *right mouse button (SC)*	Invoke alarm picture (Loop in Alarm). This is the process picture in which the faulty object is displayed. open “selection of Plant Zones” dialog
	- *left mouse button (SC)* - *right mouse button (SC)*	Invoke faceplate dialog for the object. From the faceplate you have the possibility to call the subsequent dialogs **Diagnosis** and **Info** Show the CEMAT Version dialog
	- *left mouse button* (SC)	Open the Alarm dialog (list of all non-acknowledged alarms)
	- *left mouse button* (SC)	Acknowledge pending messages until the message line is empty. When a message is acknowledged, the next non-acknowledged messages move up and an acknowledge telegram is sent to the automation unit from which the message came.

Area selections for the alarm line

The messages are filtered dependent on the operating authorization **"process controlling"** of the actually logged in user.

Loop in alarm Call

The loop in alarm function opens a predefined process picture in order to display the object which created the alarm.

The name of the Alarm Picture can be defined for each object in the Info Dialog in Register "Service". For explanation see Engineering Manual, chapter OS Engineering).
If no picture name is entered, the system looks into the 'Component list Editor' of WinCC and opens the 'Entry point picture'.

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CEMAT Message list

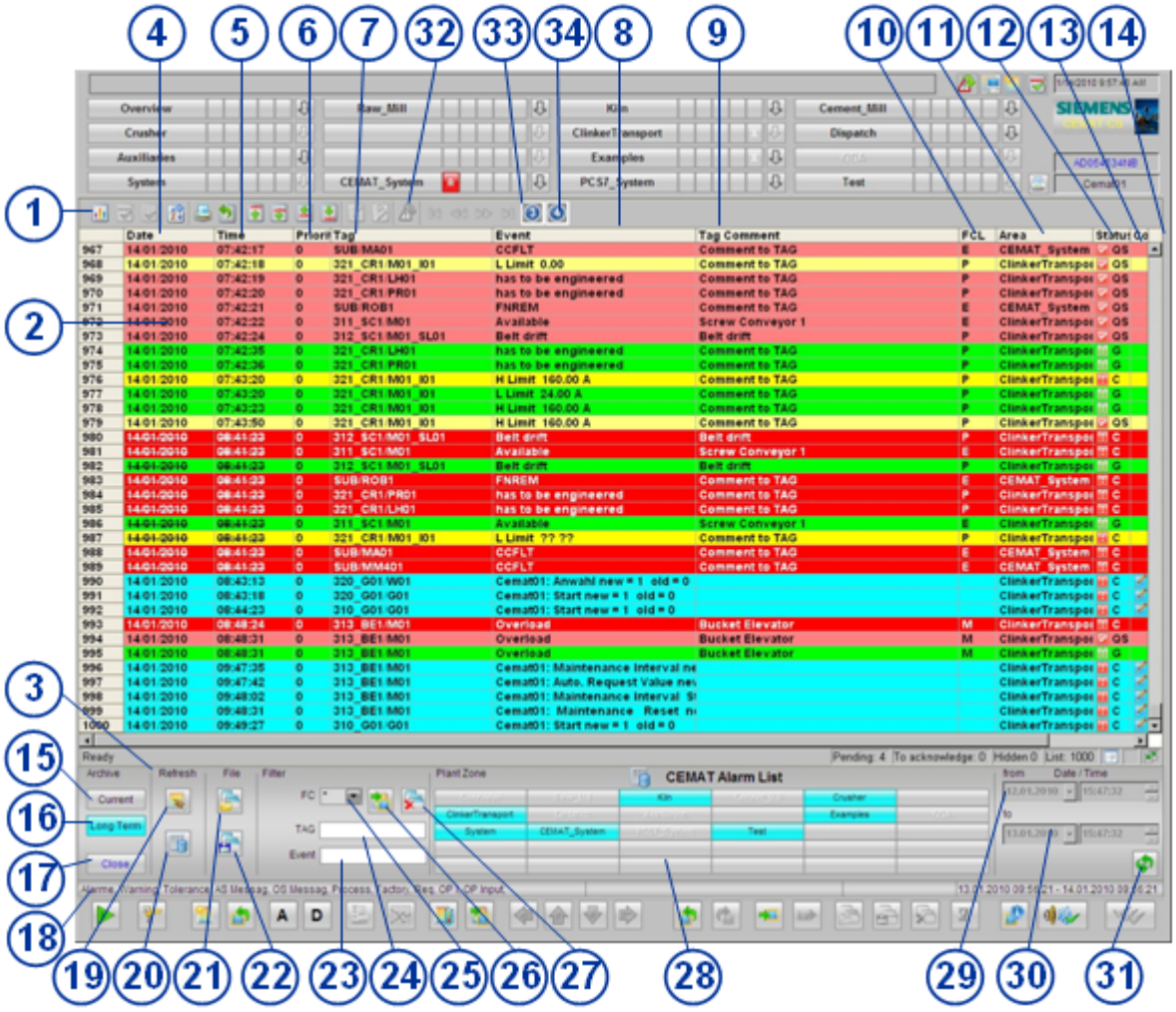
The key with the "C“ in the general toolbar opens the CEMAT Message list.



If you open the CEMAT message list, the previously defined settings are recovered.

If you close the CEMAT message list with the ‘Close’ Button, the actual settings are saved and the previous process picture is displayed again.

Display of the CEMAT Message List



The CEMAT message list dialog consists of three areas:

1. Toolbar message window (1)
2. Message list (2)
3. Selection input dialog. (3)

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Toolbar message operation (1)

Grouping	Individual points	Description
Hit List		Open the Hitlist dialog
Acknowledge individual message		Acknowledges the message with the selection triangle in front of it.
Acknowledge all visible messages		Acknowledges all queued, visible messages requiring acknowledgment in the message window.
Open sorting dialog box		Opens the "Sort" dialog box in the work area. In this dialog box, you select the message blocks/column headings according to which you want to sort the messages alphabetically.
Print		Sends a printout to a connected printer. The messages shown in the message window are printed immediately without a print dialog box appearing.
Export data		Export the selected Data to Excel
Display first message		The selection triangle jumps to the first/oldest message in the message window. You can only use this function after deactivating the "autoscroll" function.
Display previous message		The selection triangle jumps up to the previous message.
Display next message		The selection triangle jumps down to the next message..
Display last message		The selection triangle jumps to the last/most recent message in the message window.
Open info text dialog		Opens the "Info text for a message" dialog box in the work area. If an informational text was entered during the message configuration in PCS 7, this text is displayed in the dialog box. You can recognize whether or not informational text was stored in a message by the cross in the "Info" column.
Comments dialog		Opens the "Comment text for a message" dialog box in the work area. If an free user text is recorded in the input field You can recognize whether or not by the cross in the "Comment" column.
Loop in Alarm (32)		Displays the process picture containing the cause of the selected message in the work area. Depending on the source of the message, a faceplate or an SFC chart can also be displayed in the work area. This function cannot be used with system messages.
Page Mode on/off (33)		Shows a list with 50 messages and release the scroll buttons
Info (34)		After being clicked, the standard dialog of the object is opened.
Close (17)		The CEMAT message system will be closed and the actual selections are saved automatically. Returns to the previous process picture.

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Message list structure

Two types of message lists are available:

The **CEMAT Alarm list** shows all alarms, warnings, system messages and operations. The structure is as follows:

Column text	Description
Date (4)	Incoming date
Time (5)	Incoming time
Prio (6)	Priority of message (16 is always on top)
Tag (7)	Plant identifier as defined for the Object
Event (8)	Depending on the object fault types (e.g. operational)
Tag Comment (9)	Message text as defined for the Object
FCL (10)	Fault class E: electrical, M: mechanical, P: process, S: safety (emergency off)
Area (11)	AREA Code (Plant Section)
Status (12)	C=incoming; QS=acknowledged; G=went out
Comments (13)	Message note: Identification that a note exists for this message
Info Text (14)	Info Text Identification that an info text exists for this message

The **CEMAT Operation list** shows only the operator messages and has the following structure:

Column text	Description
Date	Date of the operation
Time	Time of the operation
Tag	Plant identifier as defined for Object
Operation	Operation
Tag Comment	Message text as defined for Object

Sort with column selection

DC on one of the column the whole working area will be sorted upward.  DC again sorted downward 
Double click on a second column the working area will be sorted again. (Col. marked with 2).

Color attributes

Depending on the message class and message state, the messages are displayed in the following colors:

	Alarm	Warning	Process	Operator Input
Message arrived	white / red	black / yellow	white / red	black / cyan
Message acknowledged	black / pink	black / light yellow	white / pink	-
Message gone	black / light	black / light	black / light	-

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	green	green	green	

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CEMAT Operation area functions

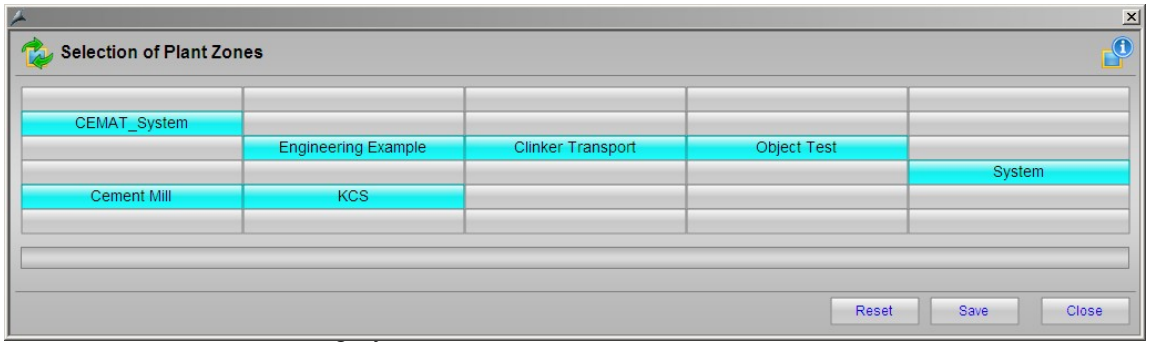
Grouping	Individual points	Description
Archives	Current (15)	Displays the currently pending messages.
	Long Term (16)	Displays all unacknowledged and acknowledged messages, operational messages and change messages of the last 24 hours.
Refresh	 Actualize message list (19)	Can only be operated if long term is selected: After any change of selection in the long term archive, this button must be pressed. The display of the current archive is updated automatically. The display of the right status line is updated. The Filter buttons are enabled again.
	 Actualize Operation list (20)	Can only be operated if long term is selected: Actualizes the display of the operation messages. The display of the right status line is updated. The operation of the filter buttons is disabled.
File	 Open user file (21)	Name under which the User selection (filter) is stored. Can only be operated if long term is selected: With click on the name field the file open dialog appears
	 Name under which the selection (filter) is stored.(22)	Can only be operated if long term is selected: With click on the name field the file open dialog appears (see below).
Filter		
	TAG Direct input (24)	Can only be operated if long term is selected: partial string possible
	Event Direct input (23)	Can only be operated if long term is selected: partial string possible
	FC Fault class (25)	Can only be operated if long term is selected: Select using drop-down menu.
	 Filter – Button Message classes (26) Alarm Warning Tolerance AS control system alarm OS control system alarm Process messages Operational message Operator requests Operator messages	The filter button opens the filter dialog (see below): The display in the left status line will be actualized. Selection using the accompanying criteria. Combinations of the message classes can be selected. If no message class is selected, messages for all message classes are output. The filter button can not be operated if the operation list is selected.
	 Filter standard setting (27)	Deletes all filter settings, restores the standard filter settings and updates the display.
Plant Zone	List of Areas (28)	Selection/ deselection by pressing the Area Button.
Date / Time	Date input fields from – to (29) Time input fields from – to (30)	Can only be operated if long term is selected: Input fields for date/time.
	 Refresh (31)	Refreshes the display according to the settings for date/time. The display of the right status line is deleted.

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Listing of the fault classes (25)

E	Electrical
M	Mechanical
S	Safety (emergency off switch)
P	Process-conditional

Selection of the Areas (28)



If a area selection is stored it will be shown on the right hand site.



Status line

The status line **(18)** can be seen at the bottom of the CEMAT message system.

At the left side the selected message classes are displayed and at the right side you will find the time frame. If the date/time filter is activated the right side is empty.

Additional functions when a message line is selected:

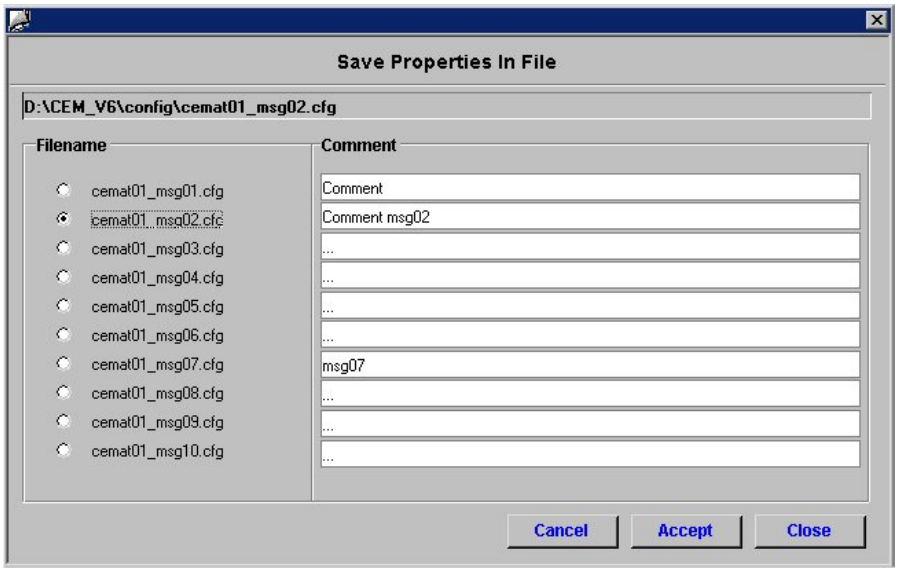
- An alarm picture can be opened using button "Loop in Alarm"
- The faceplate of the object can be opened using button "Info"
- The Comments Dialog can be opened and a comment can be entered.
- The Info-Text Dialog can be opened
- This message is acknowledged (only in the current alarm list, multi-line acknowledgements possible).

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Saving filter options (26)

In order to recall specific filter functions at a later time, it is possible to save these filters in a file. This is only possible in the long term list.

Click on the icon  opens the save as dialog:

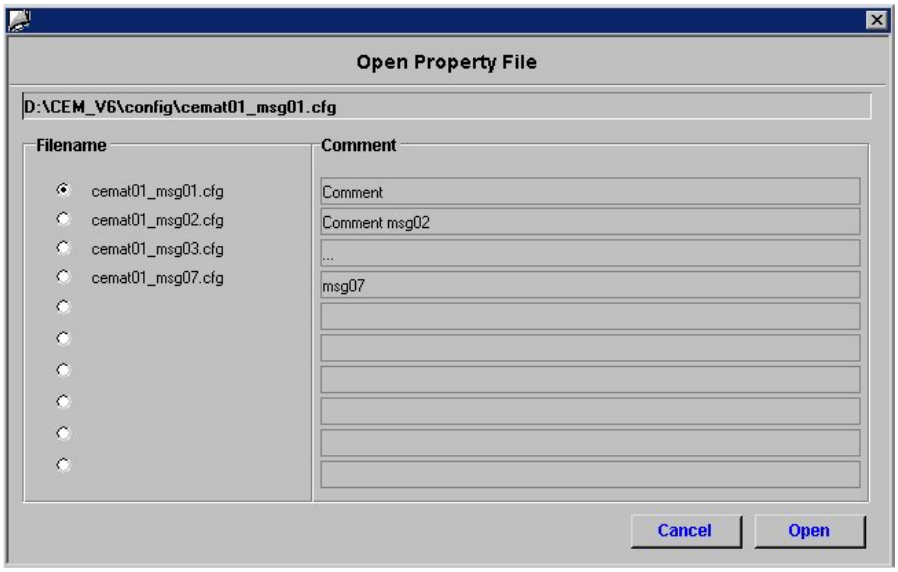


10 files are displayed. You can select only one.
The user can enter notes for the settings in the comment field. (max. 80 Char.).
The file name consists of the actual user name and the suffix _msg01.cfg to _msg10.cfg.
The file name can not be modified.

The actual settings in the CEMAT message system can be saved in the selected file.

Cancel: The dialog will be closed without saving in a file.
Accept: The actual settings are saved in the selected file.
Close: The dialog will be closed and the actual settings are saved in the selected file.

Click on the icon  to open existing selections



Up to 10 files with user defined selection are displayed. You can select only one.

Cancel: The dialog is closed without selection of a new file.
Open: The dialog will be closed and the selected file is used.

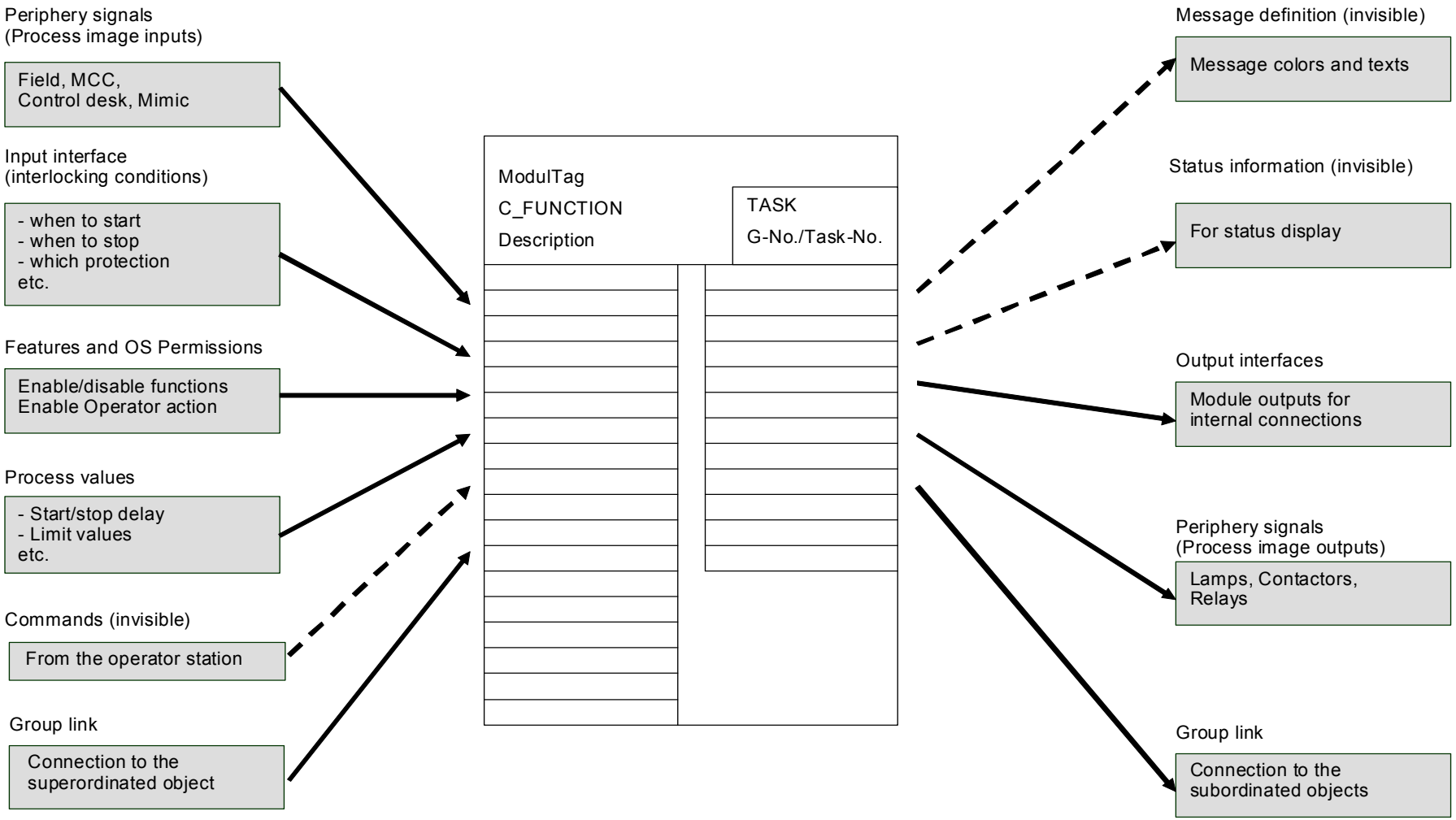
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Module Description (Function Overview)

General module structure

General Module Structure



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Each block has a list of input and output parameters, which can be connected either with a signal (from the symbols file or an output of another block) or parameterized with a value. Due to its utilization the inputs and outputs have different attributes which can be seen in the object properties in tab "I/Os".

In Cemat we distinguish between different parameter types:

Hardware Inputs and Outputs

These are the interfaces which are connected to the inputs and outputs of the periphery, as e. g. contactor feedback, electrical availability, overload, on command of the motor of the analog input of a measure. Normally a signal from the symbols file is assigned to this interface.
The Hardware inputs and outputs are of type "Signal". The assignment of the periphery signal can either be carried out in the CFC or in the process object view in tab "Signals".

Input Interfaces

The so-called interface flags are used for starting, stopping, changing operation modes or interlocking the blocks. They are mostly connected to an output of another Cemat block or to some logic.
The interface flags are of type "Parameter". The linking if the interface flags can either be done in the CFC or in the process object view in tab "Parameters".

Process Values

Limit values, supervision or delay times are called the process values of the blocks. You can retain the default values or if required you can adapt it according to the need of your application. The adaptation can be carried out either in the CFC or from the Operator Station.
We recommend to adapt the values as far as possible during the engineering and to leave the fine tuning for the commissioning.
The process values are of type "Parameter". The parameterization can be carried out in the CFC or in the process object view in tab "Parameters".

Group Links

Each drive, annunciation block and measure must be assigned to a group (Group link) in order to provide supervision functions. The link may be carried out directly to the group or via a route module. Annunciations and measures belonging to a drive function should be linked to a drive instead.
The links are of type "Parameter" and can be connected in the CFC or in the process object view in tab "Parameters".

Feature bits

Via feature bits the behavior of the block can be adapted and functions can be enabled or disabled during engineering.
The feature bits are of type "Parameter". The configuration can be carried out in the CFC or in the process object view in tab "Parameters".

OS Permissions

Via OS Permissions the Operator actions can be enabled or disabled.
The OS Permission bits are of type "Parameter". The configuration can be carried out in the CFC or in the process object view in tab "Parameters".

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Output Interfaces

The most important information of the blocks are transferred to block outputs and therefore available for the connection to other blocks.



A detailed functional description of the blocks you will find in the reference manual. There is a separate chapter for each object type.

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Operating modes for drive functions

Unidirectional drives, bi-directional drives, dampers and valves can be operated in three different **operating modes**:

- In **"automatic mode"** the drive is started/stopped by a superordinated group module.
  All process interlocks and protection interlocks are effective.
- The **"manual mode"** allows individual start/stop via operator faceplate of the drive.
  Different interlocking levels exist, which must be configured via feature bits.
- In **"local mode"** the drive can be started and stopped by the locally installed switches or pushbuttons.
  Only the general protection interlock and the essential interlocks are effective.



Note: The process feedback block is always linked to a drive block and gets the operating mode from the drive.

The following table shows which mode change is permitted:

to / **from**	Local mode	Manual mode
Automatic + stopped	yes	yes
Automatic + running	No	yes

to / **from**	Automatic mode	Manual mode
Local mode + stopped	yes	yes
Local mode + running	yes *)	yes *)

to / **from**	Automatic mode	Local mode
Manual mode + stopped	yes	yes
Manual mode + running	yes *)	no

*) keeps on running if the interlocking conditions are OK

Operating mode change can be achieved, dependent on feature bits and OS permissions

- only via the drive faceplate
- only group-wise via the *GR_LINK* interface
- only via input interfaces *AutModOn*, *ManModOn* and *LocModOn*
- or via a combination of the above listed possibilities.

The mode can only be changed by switching **into** another mode. There is no option for e.g. "Manual mode off".

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Out of Service mode

If the drive is switched to **"out of service"**, operation of the drive is inhibited, the outputs are set to "0", all messages are suppressed and only the status words are actualized. Memorized functions like Emergency Stop are reset.

A drive can be switched into "Out of service" via Operator faceplate or via program.

- Change into "Out of Service" via Operator faceplate is only possible if the drive is stopped.
- Via program interface *OoSAct* the drive can be forced into "Out of Service" at any time and will then be stopped.
- Switching back from Out of Service mode to Automatic, Manual or Local mode is only possible via Operator faceplate.

For details regarding operation mode settings refer to "Change of operation mode", "Feature bit options and OS permissions for mode change".

Change of Operation mode for individual drives

The operation modes can be enabled or disabled via Feature bits:

BitNr.	Function/Features	Default value
23	Enable mode change	TRUE
21	Automatic mode exists	TRUE
13	Manual mode exists	TRUE
0	Local mode exists	TRUE
20	Out of Service exists	TRUE

With **Feature bit 23** = TRUE mode change is generally permitted.
Feature bit 21, **Feature bit 13**, **Feature bit 0** and **Feature bit 20** enable the individual modes.

For the manual mode the interlocking level can be defined via Feature bits:

- All interlocks are active in manual mode
  (Feature bit 16, Feature bit 17 and Feature bit 18 = FALSE)
  Running Signal is created

- Manual mode is non-interlocked (only IntProtG active)
  (Feature bit 16 = TRUE, Feature bit 17 and Feature bit 18 = FALSE)
  No Running Signal is created

- Manual mode with only protection interlocks active (IntProtG and IntProtA active)
  (Feature bit 16 = FALSE, Feature bit 17 = TRUE, Feature bit 18 = FALSE)
  No Running Signal is created

- Manual mode with reduced interlocks (IntProtG, IntProtA, IntStaE and IntOpE active)
  (Feature bit 16 and Feature bit 17 = FALSE, Feature bit 18 = TRUE)
  Running Signal is only created if Feature bit 27 = TRUE.

BitNr.	Function/Features	Default value
16	Manual mode non-interlocked (only IntProtG active)	FALSE
17	Manual mode only protection interlocks (IntProtG and IntProtA active)	FALSE
18	Manual mode with reduced interlocks (IntProtG, IntProtA, IntStaE and IntOpE active)	FALSE
27	RunSig also in manual with reduced interlocks	FALSE

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Through additional feature bits and OS Permissions it can be decided how the operating modes can be changed:

The Individual mode change via Operator Faceplate requires the corresponding OS Permission:

OS Permissions for mode change:

BitNr.	Function/OS Permission	Default value
2	1 = Operator can change to "Automatic mode"	TRUE
0	1 = Operator can change to "Local mode"	TRUE
1	1 = Operator can change to "Manual mode" interlocked	TRUE
5	1 = Operator can change to "Manual mode" non-Interlocked	TRUE
6	1 = Operator can change to "Manual mode" with reduced interlocks	TRUE
7	1 = Operator can change to "Manual mode" only Protection interlocks	TRUE
3	1 = Operator can change to "Out of Service"	TRUE



Caution: For the manual modes with less interlocks (**OS Permission bit 5, 6 and 7**) the Permission for Manual mode "interlocked" (**OS Permission bit 1**) must be TRUE as well.

For mode change via Program different options exist:

- Mode change via rising edge at Interfaces *AutModOn*, *ManModOn*, *LocModOn* or forcing to "Out of Service" via 0-Signal at *OoSModOn*
- Mode change via *GR_LINK* Interface (mode change is directly derived from allocated group)
- switching back to Automatic mode with Automatic start command *StartAut* (this is only possible if *AutModLo* is not a Position switch.



Caution: If the drive is in Out of Service mode, mode change is only possible via Operator Faceplate.

Feature bits for mode change via program:

BitNr.	Function/Features	Default value
1	"Local release ON" from Interface possible	TRUE
2	"Local release OFF" from Interface possible	TRUE
14	"Manual release ON" from Interface possible	TRUE
15	"Manual release OFF" from Interface possible	TRUE
25	GR_LINK Interface used for mode change	TRUE
19	"StartAut" switches drive to Automatic mode	FALSE

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Change of operation mode via the group

Beside the individual mode change the drive functions can be switched into **Automatic mode**, **Manual mode** or **Local mode** via the group or route.



Caution: The **Out of Service** mode can only be selected for an individual drive/device.

For mode change via Group faceplate the following feature bits must be enabled:

BitNr.	Function/Features	Default value
23	Enable mode change	TRUE
21	Automatic mode exists	TRUE
13	Manual mode exists	TRUE
0	Local mode exists	TRUE

With **Feature bit 23** = TRUE mode change is generally permitted.
Feature bit 21, **Feature bit 13** and **Feature bit 20** enable the buttons for switching into the individual modes.

OS Permissions are needed in order to allow the mode change at the group:

BitNr.	Function/OS Permission	Default value
0	1 = Operator can release "Local mode" for connected objects	TRUE
1	1 = Operator can release "Manual mode" for connected objects	TRUE
2	1 = Operator can change back all objects to "automatic mode"	TRUE

The mode change commands can be transmitted from the group to the drives/devices in different ways:

- Mode change via rising edge at Interfaces *AutModOn*, *ManModOn*, *LocModOn*
  Connect output *AutModOn* of the group to in put *AutModOn* of the drive/device.
  Connect output *ManModOn* of the group to in put *ManModOn* of the drive/device.
  Connect output *LocModOn* of the group to in put *LocModOn* of the drive/device.
- Mode change via *GR_LINK* Interface (mode change is directly derived from allocated group or route). Feature bit 25 of the group/route and Feature bit 25 of the drive/device must be TRUE.
- Switching back to Automatic mode with Automatic start command *StartAut* (this is only possible if *AutModLo* is not a Position switch. Feature bit 19 of the drive/device must be TRUE.

For feature bit settings at the drive/device see corresponding object description.

Feedback of the Operating mode

Mode feedback from the objects to the group is needed in order to provide a summarizing indication for operating mode in the block icon/faceplate or the group.

Mode feedback can either be programmed individually or provided automatically via *GR_LINK* interface.

- For individual programming connect output *ManuAct*, *LocalAct* and *OsOAct* from the drive/device block to the group inputs *FbObjMan*, *FbObjLoc* and *FbObjOsO* (OR-Function)
- For automatic feedback Feature bit 26 of the drive/device must be TRUE.

For feature bit settings at the drive/device see corresponding object description.

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Operating modes for Annunciations, Measures, Select, Storage

For annunciation modules, measured values, selection and storage blocks the block functions are only active in **automatic mode**.

If the annunciation modules, measured values, selection or storage blocks block are switched to **Out of Service**, operation of the block is inhibited, the outputs are set to "0", all messages are suppressed and only the status words are actualized. All memorized functions, like Simulation, Bypass, etc. are reset.

Change of Operation mode for individual blocks

Two operation modes can be enabled or disabled via Feature bits:

BitNr.	Function/Features	Default value
23	Enable mode change	TRUE
20	Out of Service exists	TRUE
21	Automatic mode exists	TRUE

With **Feature bit 23** = TRUE mode change is generally permitted.
Feature bit 21 and **Feature bit 20** enable the individual modes.

Mode change is possible via Operator Faceplate or via Program:

The Individual mode change via Operator Faceplate requires the corresponding OS Permission:

OS Permissions for mode change:

BitNr.	Function/OS Permission	Default value
2	1 = Operator can change to "Automatic mode"	TRUE
3	1 = Operator can change to "Out of Service"	TRUE

Mode change via Program is only possible via interfaces *AutModOn* and *OoSModOn*

- Rising edge at Interfaces *AutModOn* changes the block to Automatic mode and 0-Signal at *OoSModOn* forces the block to Out of Service mode.
- An option for mode change via *GR_LINK* interface does not exist.

Feedback of the Operating mode (only for Annunciation, Measured values and Storage blocks)

Indicating the "Out of Service" status of the annunciations, Measured value or Storage block in the summarizing indication of the group block icon can only be achieved via GR_LINK interface. No output *OoSAct* exists.

The following feature bit is used to enable the function (e.g. for Annunciations):

BitNr.	Function/Features	Default value
26	GR_LINK Interface used for mode feedback from C_ANNUNC	FALSE

If **Feature bit 26** = TRUE the operation mode of the block is included in the summarizing indication of the group block icon.



Caution: Mode feedback from the selection block to the group is not foreseen.

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C_DRV_1D Unidirectional Drive

General Function description

Module Type C_DRV_1D can be used to control all kind of unidirectional drives.

Standard Signals

The following standard signals are monitored by the unidirectional drive block:

- Contactor feedback **FbkRun** in conjunction with the contactor output **ContOn**
- Electrical availability **ElAvail**
- Overload or Bimetal **Overload**

Additional field switch signals allow local control via field switches or pushbuttons:
- Field switch ready signal **AutModLo** (Position switch or Repair switch)
- Field switch stop signal **StopLoc** (Stop local)
- Field switch start signal **StartLoc** (Start local)

The function of the field switch signals may differ from plant to plant. Therefore the function must be configured via feature bits. Refer to "Hardware Inputs", "Feature bit options for Field switch (Local switch) signals"

If the drive is in automatic or in manual mode and the drive is in operation, a wrong status at any of the above mentioned signals leads to an **alarm message.**

Priorities for alarm messages:

Combination of faults	**Diagnosis and alarm line**
ElAvail, Overload, AutModLo = 0	Available *)
Overload, AutModLo = 0	Overload
AutModLo =0	Field switch

*) The priority between *ElAvail* and *Overload* can be reversed via input *MsgPrio.*

Process Feedback Signal

Process Feedback signals like speed monitor or pressure are monitored by the additional block C_PROFB, the output of which must be connected to the drive:

- Process feedback **ProFB** not effective in local mode

Protection Signals

If additional protections exist for the drive or for the equipment, those signals have to be linked to an Annunciation block C_ANNUNC or C_ANNUN8 in order to create an alarm. In order to stop the drive in case of a fault an output of the annunciation block has to be connected to the protection interlock of the drive. We distinguish between:

- Protection interlock **IntProtG** effective in all modes
- Protection interlock **IntProtA** not effective in local mode and manual mode non-interlocked

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Process interlocks

Process interlocks can be used in order to enable or disable the drive operation dependent on a process condition, like "previous drive/device is running" or a process signal. If the process interlocks are not fulfilled, no alarm is created. This implies that for diagnosis purpose the interlock blocks must be used (if necessary also additional C_ANNUNC blocks).
The following process interlocks are available and can be used as per definition. Refer to "Change of operation mode", "Feature bit options for mode change").

- Start interlock **IntStart**
- Essential start interlock **IntStaE**
- Operating interlock **IntOper**
- Essential operating interlock **IntOpE**

Not every interlocking condition is effective in each mode. For the Manual mode it can be configured via Feature bits which interlock should affect and which not.

The following table gives an overview which interlock is effective in each mode. This must be considered also in case of a mode change.

Operating mode	IntStart	IntStaE	IntOper	IntOpE	IntProtA	IntProtG
Automatic	X	X	X	X	X	X
Manual interlocked mode	X	X	X	X	X	X
Manual mode with reduced interlocks		X		X	X	X
Manual mode only protection interlocks					X	X
Manual mode non-interlocked						X
Local mode		X		X		X

X = effective

Sporadic mode

The sporadic mode allows start and stop of a device dependent on a process condition. With the start command in automatic mode (group start command) the device gets "activated" and will then be ready for start/stop via interface "Sporadic":

- Sporadic ON/OFF **Sporadic** only in auto mode and in manual mode

Process parameters

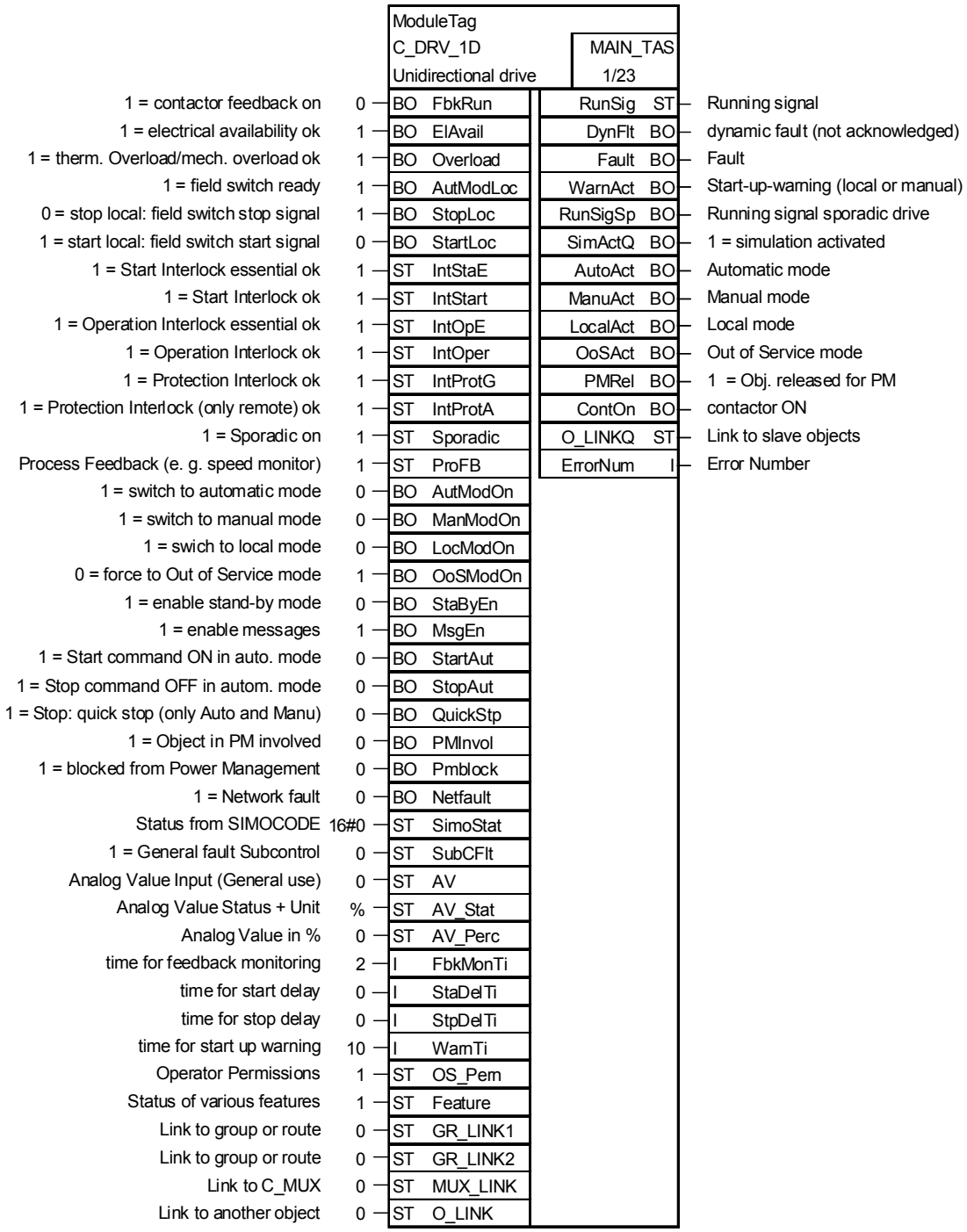
Through process parameters the following values can be configured online:

- Feedback time (s) for the feedback supervision of the main contactor
- Start delay (s) after group start command is given and IL conditions are fulfilled
- Stop delay (s) after group stop command is given
- Time for start-up warning (s) for manual mode and local mode (if enabled)

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Function block

The picture below shows the most important interfaces and process parameters of the drive function block. More detailed information you will find in the object description of the block.



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Additional Functions

Link to a measured value

- A measured value can be displayed in the drive faceplate, either through connection of the physical output of the C_MEASUR block or through connection of the output of C_ANASEL block to the drive.

- Motor current or power can be displayed in the drive faceplate as percentage value, if the percentage value from C_MEASUR block or from SIMOCODE Adapter block is connected to the drive.

SIMOCODE drives

If SIMOCODE is used, the communication between the drive block and the SIMOCODE can be carried out via adapter block C_SIMOS or C_SIM_AD.
An additional button in the drive faceplate opens the faceplate of the adapter block in order to display the SIMOCODE details.
The percentage value of current and power are directly displayed in the faceplate of the motor.

Subcontrol Function

Occasionally, function blocks and faceplates from sub suppliers are used, as e. g. for weigh feeders, filter, grate cooler etc. In order to have the same philosophy for all kind of equipment (block interfaces, summarizing indication in the group) a normal Cemat drive block can be used in order to give a start command to the subcontrol function. The general fault of the Subcontrol will be indicated in the diagnosis picture of the drive.
An additional button in the drive faceplate can be used to open the detail information for the Subcontrol.

Setpoint Function

This function can be used to enter a setpoint (e. g. the Speed of a Variable Speed Drive). If the function is enabled, the drive Faceplate shows the Setpoint and the Actual Value.
The Setpoint can directly be entered via drive faceplate or transmitted by the program, via External Setpoint *SP_Ex* (e. g. from a PID Controller).
The Setpoint is validated for Low and High Limits and written to the output *SP_Out* (which can be used for the connection to a VSD block).

Sequence Test mode

Via a setting in the System chart SYSPLCxx all drives/devices within the AS are switched into the Sequence test mode, for checking the start/stop sequence without periphery inputs and outputs. In the sequence test mode the contactor on command is not set, "motor running" is simulated internally.

- The contactor feedback for each direction is simulated in conjunction with the contactor on command.
- Additionally the Standard Signals ElAvail, Overload and AutModLo are set to the default level.

Simulation of the Standard signals and local switch simulation is not possible, but no additional simulation program is needed.

If driver blocks are used, the Output *SimActQ* of the drive can be connected to input *SimOn* of the driver blocks to enable the simulation.

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Power Management

The drive block can be linked to a Power Management System via input *PMinvol* in order to allow blocking the drive through Power Management.

A button appears in the drive faceplate which allows the operator to release the Power Management function. Of course, this requires an OS Permission:

BitNr.	Function/OS Permission	Default value
4	1 = Operator can release Power management	FALSE

With **OS Permission bit 4** = TRUE the Operator can release the Power Management.

After the Power Management is released the drive can be blocked via input *PMblock*.

Emergency Stop

Option for Emergency Stop via Operator Station exists. Via right mouse-click on the block icon the Emergency push-button appears.

The Emergency Stop Function must be enabled via feature bit setting:

BitNr.	Function/Features	Default value
30	Emergency Stop exist	FALSE

If **Feature bit 30** = TRUE the Emergency Stop function is enabled.

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Visualization

In the **block icon** of the unidirectional drive the most important operation status are displayed (stopped, running, operating mode, fault). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block icon and Faceplate (Representation in the Process Picture)



The block icon of the unidirectional drive shows the following information:

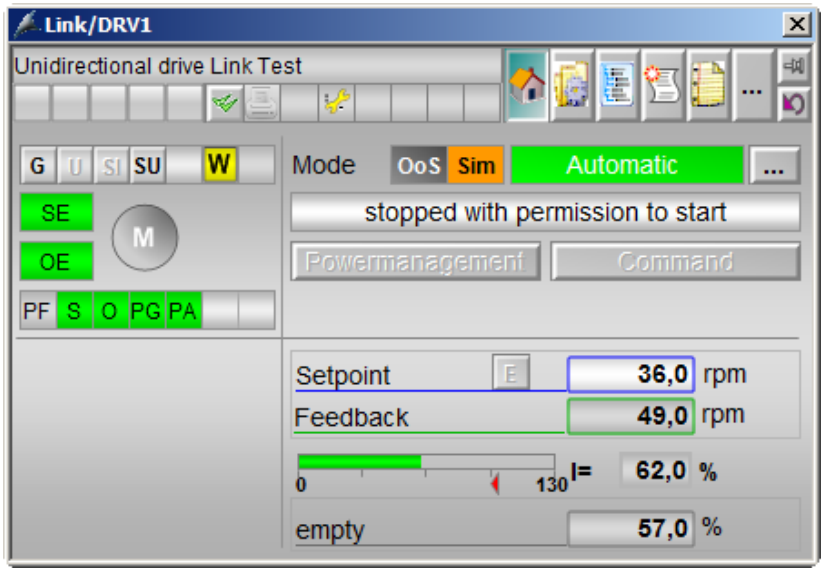
Symbol	Display	Description
	red flashing	fault not acknowledged
	red	fault
	green flashing	Start up/ opening
	green	running
	grey flashing	Shut down / closing
	grey	Stopped with permission to start
	magenta	Stopped without permission to start or not ready

All additional indications are optional.

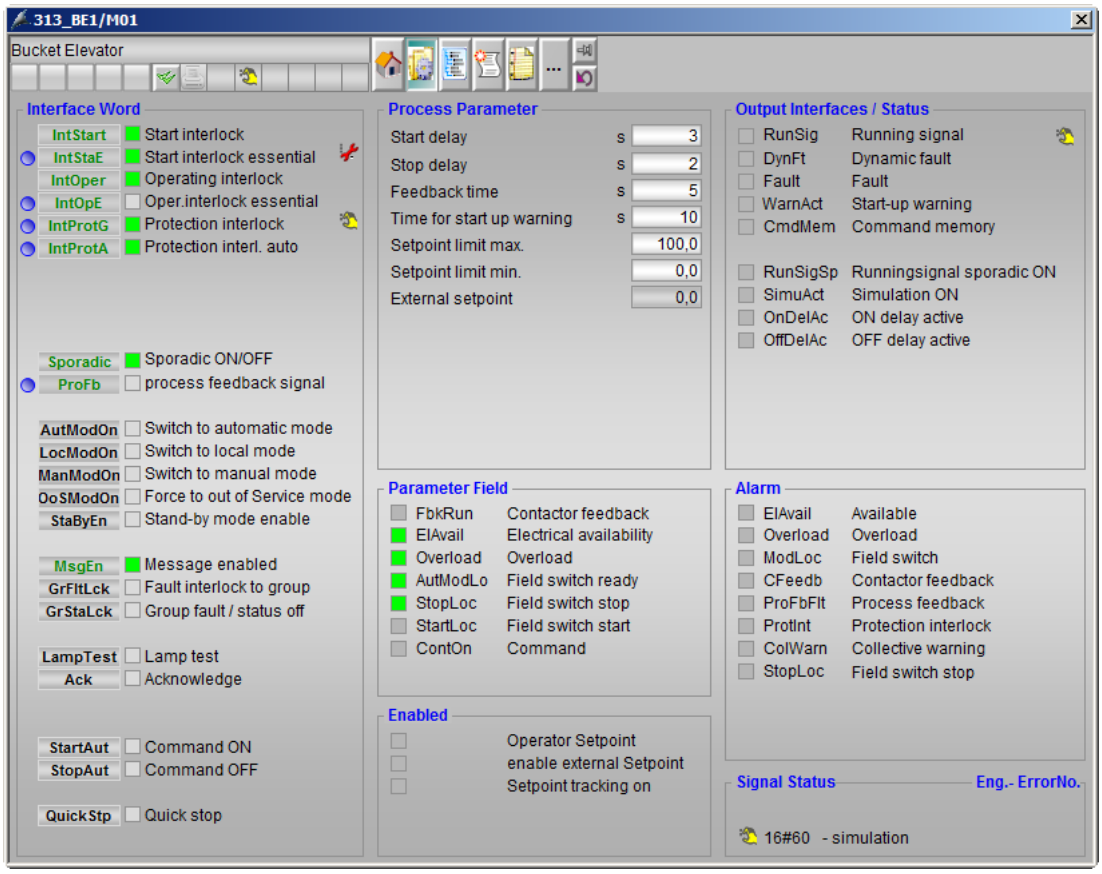
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Faceplate, Diagnosis, Object list and Preset Dialog

Faceplate Dialog:

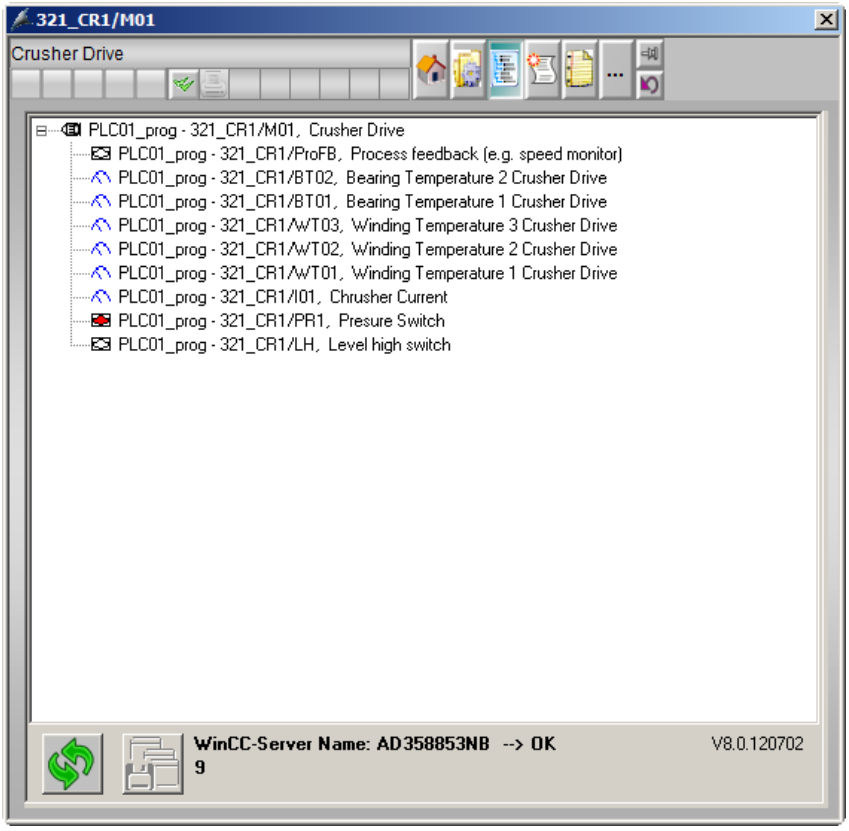


Diagnosis Dialog:

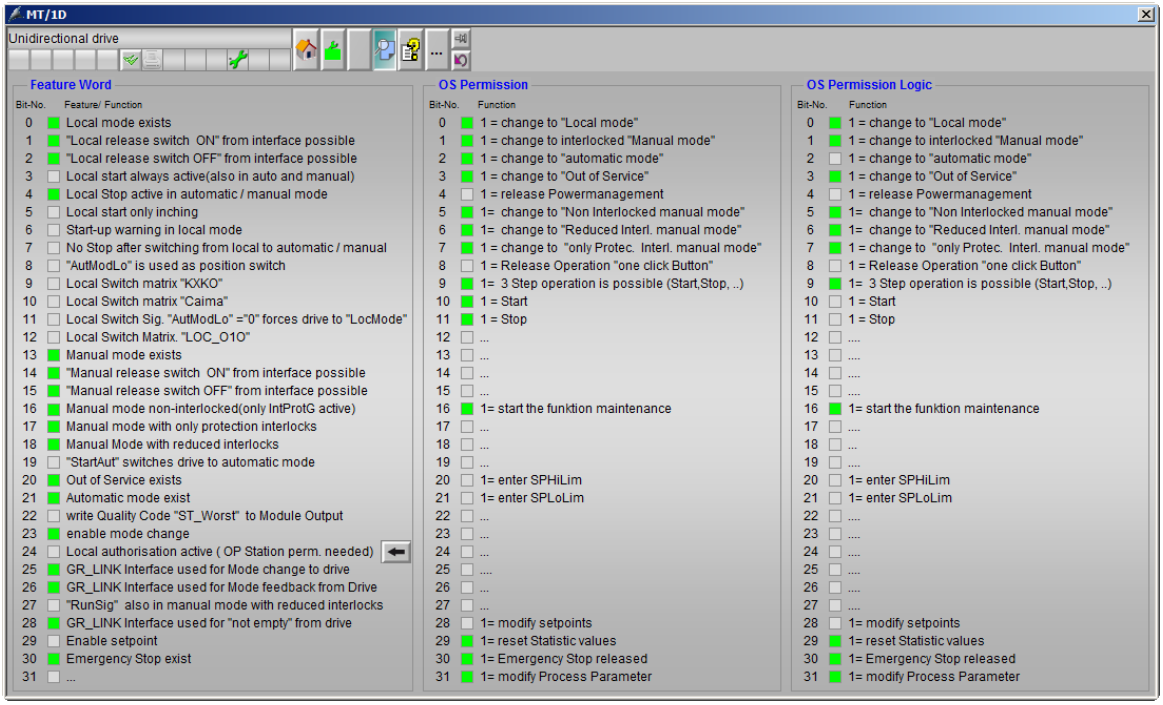


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Object list Dialog:



Preset Dialog:



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C_DRV_2D Bi-directional drive

General Function description

Module Type C_DRV_2D can be used to control all kind of bi-directional drives.

Standard Signals

The following standard signals are monitored by the Bi-directional drive block:

- Contactor feedback **FbkRun1** in conjunction with the contactor output **ContOn1**
- Contactor feedback **FbkRun2** in conjunction with the contactor output **ContOn2**
- Electrical availability **ElAvail**
- Overload or Bimetal **Overload**

Additional local switch signals allow local control via field switches or pushbuttons:
- Field switch ready signal **AutModLo** (Position switch or Repair switch)
- Field switch stop signal **StopLoc** (Stop local)
- Field switch start signal **StrtLoc1** (Start local to direction 1)
- Field switch start signal **StrtLoc2** (Start local to direction 2)

The function of the field switch signals may differ from plant to plant. Therefore the function must be configured via feature bits. Refer to "Hardware Inputs", "Feature bit options for Field switch (Local switch) signals"

If the drive is in automatic or in manual mode and the drive is in operation, a wrong status at any of the above mentioned signals leads to an **alarm message.**

Priorities for alarm messages:

Combination of faults	**Diagnosis and alarm line**
ElAvail, Overload, AutModLo = 0	Available *)
Overload, AutModLo = 0	Overload
AutModLo = 0	Field switch

*) The priority between *ElAvail* and *Overload* can be reversed via input *MsgPrio.*

Process Feedback Signal

Process Feedback signals like speed monitor or pressure are monitored by the additional block C_PROFB, the output of which must be connected to the drive:

- Process feedback	**ProFB**	not effective in local mode

Protection Signals

If additional protections exist for the drive or for the equipment, those signals have to be linked to an Annunciation block C_ANNUNC or C_ANNUN8 in order to create an alarm. In order to stop the drive in case of a fault an output of the annunciation block has to be connected to the protection interlock of the drive. We distinguish between:

- Protection interlock	**IntProtG**	effective in all modes
- Protection interlock	**IntProtA**	not effective in local mode and manual mode non-interlocked

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Process interlocks

Process interlocks can be used in order to enable or disable the drive operation dependent on a process condition, like "previous drive/device is running" or a process signal. If the process interlocks are not fulfilled, no alarm is created. This implies that for diagnosis purpose the interlock blocks must be used (if necessary also additional C_ANNUNC blocks).
The following process interlocks are available and can be used as per definition. Refer to "Change of operation mode", "Feature bit options for mode change").

- Start interlock dir. 1 and 2 **IntStrt1** and **IntStrt2**
- Essential start interlock dir. 1 and 2 **IntStaE1** and **IntStaE2**
- Operating interlock dir. 1 and 2 **IntOper1** and **IntOper2**
- Essential operating interlock dir. 1 and 2 **IntOpE1** and **IntOpE2**

Not every interlocking condition is effective in each mode. For the Manual mode it can be configured via Feature bits which interlock should affect and which not.

The following table gives an overview which interlock is effective in each mode. This must be considered also in case of a mode change.

Operating mode	**IntStrt 1 IntStrt 2**	**IntStaE 1 IntStaE 2**	**IntOper 1 IntOper 2**	**IntOp E1 IntOp E2**	**IntProt A**	**IntProt G**
Automatic	**X**	**X**	**X**	**X**	**X**	**X**
Manual interlocked mode	**X**	**X**	**X**	**X**	**X**	**X**
Manual mode with reduced interlocks		**X**		**X**	**X**	**X**
Manual mode only protection interlocks					**X**	**X**
Manual mode non-interlocked						**X**
Local mode		**X**		**X**		**X**

X = effective

Sporadic mode

The sporadic mode allows start and stop of a device dependent on a process condition. With the start command in automatic mode (group start command) the device gets "activated" and will then be ready for start/stop via interface "Sporadic":

- Sporadic ON/OFF **Sporadic** only in auto mode and in manual mode

Process parameters

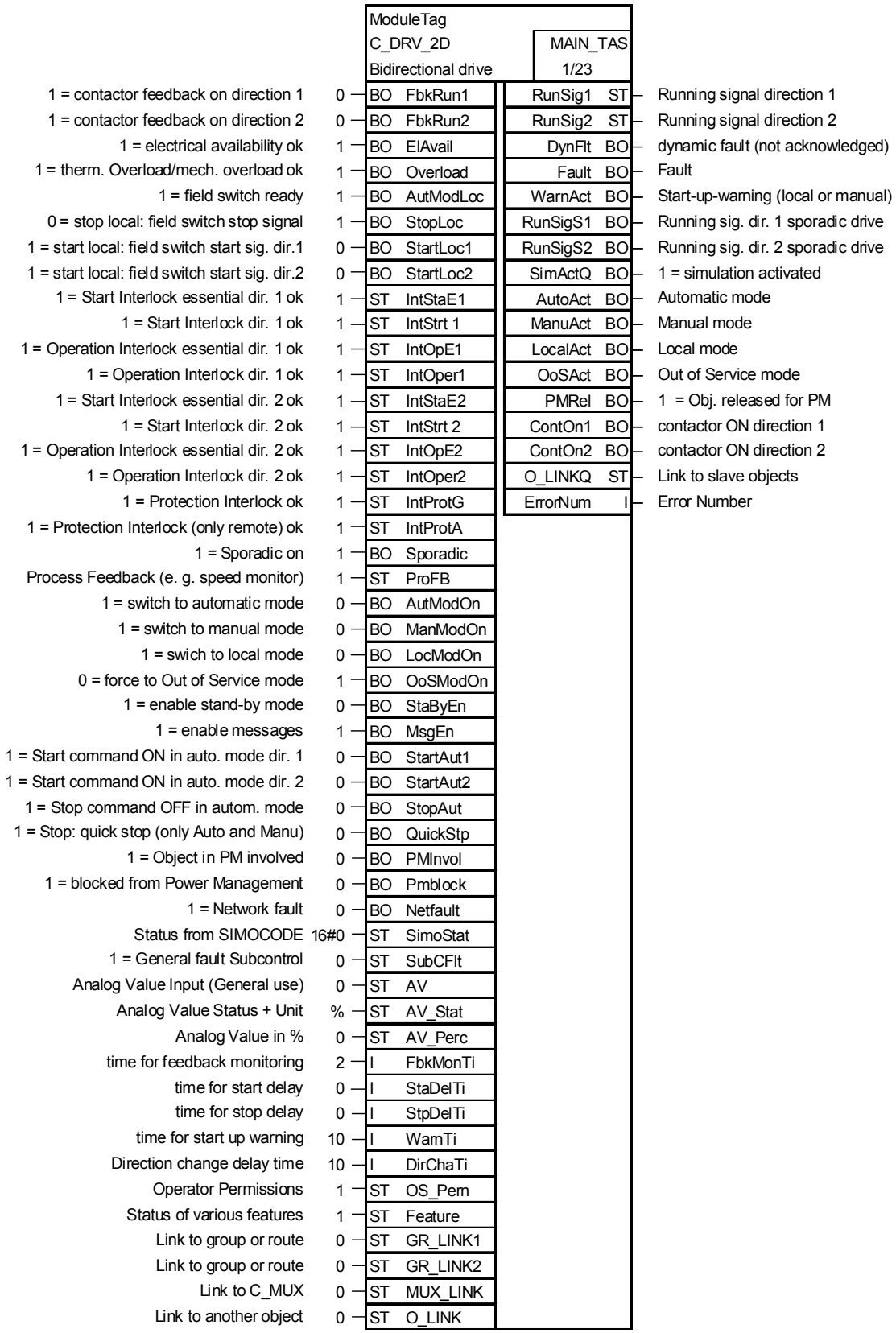
Through process parameters the following values can be configured online:

- Feedback time (s) for the feedback supervision of the main contactor
- Start delay (s) after group start command is given and IL conditions are fulfilled
- Stop delay (s) after group stop command is given
- Direction change delay (s) Waiting time in case of direction change
- Time for start-up warning (s) for manual mode and local mode (if enabled)

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Function block

The picture below shows the most important interfaces and process parameters of the drive function block. More detailed information you will find in the object description of the block.



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Additional Functions

Link to a measured value

- A measured value can be displayed in the drive faceplate, either through connection of the physical output of the C_MEASUR block or through connection of the output of C_ANASEL block to the drive.

- Motor current or power can be displayed in the drive faceplate as percentage value, if the percentage value from C_MEASUR block or from SIMOCODE Adapter block is connected to the drive.

SIMOCODE drives

If SIMOCODE is used, the communication between the drive block and the SIMOCODE can be carried out via adapter block C_SIMOS or C_SIM_AD.
An additional button in the drive faceplate opens the faceplate of the adapter block in order to display the SIMOCODE details.
The percentage value of current and power are directly displayed in the faceplate of the motor.

Subcontrol Function

Occasionally, function blocks and faceplates from sub suppliers are used, as e. g. for weigh feeders, filter, grate cooler etc. In order to have the same philosophy for all kind of equipment (block interfaces, summarizing indication in the group) a normal Cemat drive block can be used in order to give a start command to the subcontrol function. The general fault of the Subcontrol will be indicated in the diagnosis picture of the drive.
An additional button in the drive faceplate can be used to open the detail information for the Subcontrol.

Sequence Test mode

Via a setting in the System chart SYSPLCxx all drives/devices within the AS are switched into the Sequence test mode, for checking the start/stop sequence without periphery inputs and outputs. In the sequence test mode the contactor on commands are not set, "motor running" is simulated internally.

- The contactor feedback for each direction is simulated in conjunction with the corresponding contactor on command.
- Additionally the Standard Signals ElAvail, Overload and AutModLo are set to the default level.

Simulation of the Standard signals and local switch simulation is not possible, but no additional simulation program is needed.

If driver blocks are used, the Output *SimActQ* of the drive can be connected to input *SimOn* of the driver blocks to enable the simulation.

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Power Management

The drive block can be linked to a Power Management System via input *PMinvol* in order to allow blocking the drive through Power Management.

A button appears in the drive faceplate which allows the operator to release the Power Management function. Of course, this requires an OS Permission:

BitNr.	Function/OS Permission	Default value
4	1 = Operator can release Power management	FALSE

With **OS Permission bit 4** = TRUE the Operator can release the Power Management.

After the Power Management is released the drive can be blocked via input *PMblock*.

Emergency Stop

Option for Emergency Stop via Operator Station exists. Via right mouse-click on the block icon the Emergency push-button appears.

The Emergency Stop Function must be enabled via feature bit setting:

BitNr.	Function/Features	Default value
30	Emergency Stop exist	FALSE

If **Feature bit 30** = TRUE the Emergency Stop function is enabled.

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Visualization

In the **block icon** of the Bi-directional drive the most important operation status are displayed (stopped, running, operating mode, fault). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block icon (Representation in the Process Picture)



The block icon of the bi-directional drive shows the following information:

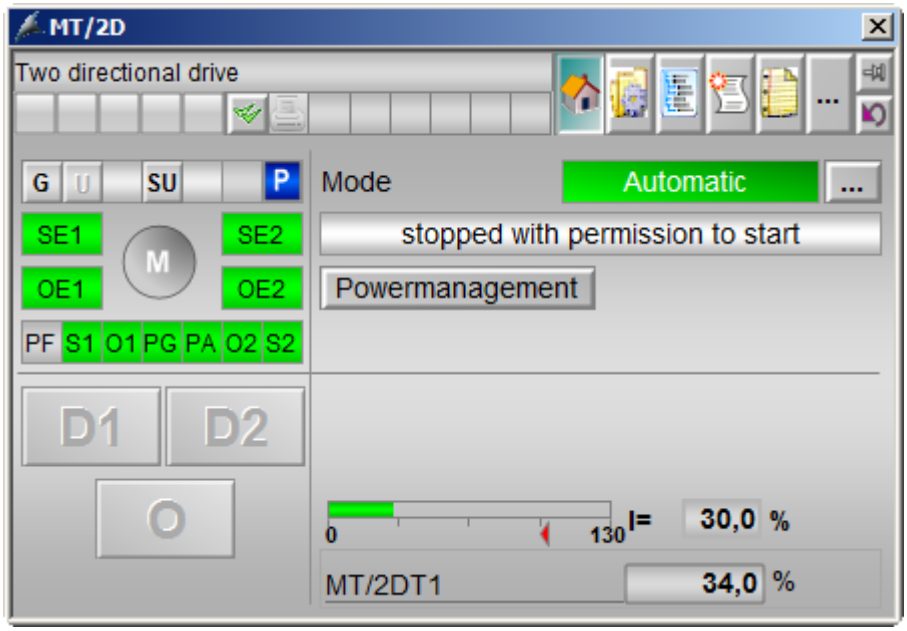
Symbol	Display	Description
	red flashing	fault not acknowledged
	red	fault
	green flashing	Start up D1
	green	running D1
	green flashing	Start up D2
	green	running D2
	gray flashing	Shut down
	grey	Stopped with permission to start
	magenta	Stopped without permission to start or not ready
	gray flashing	Shut down
	grey	Stopped with permission to start
	magenta	Stopped without permission to start or not ready

All additional indications are optional.

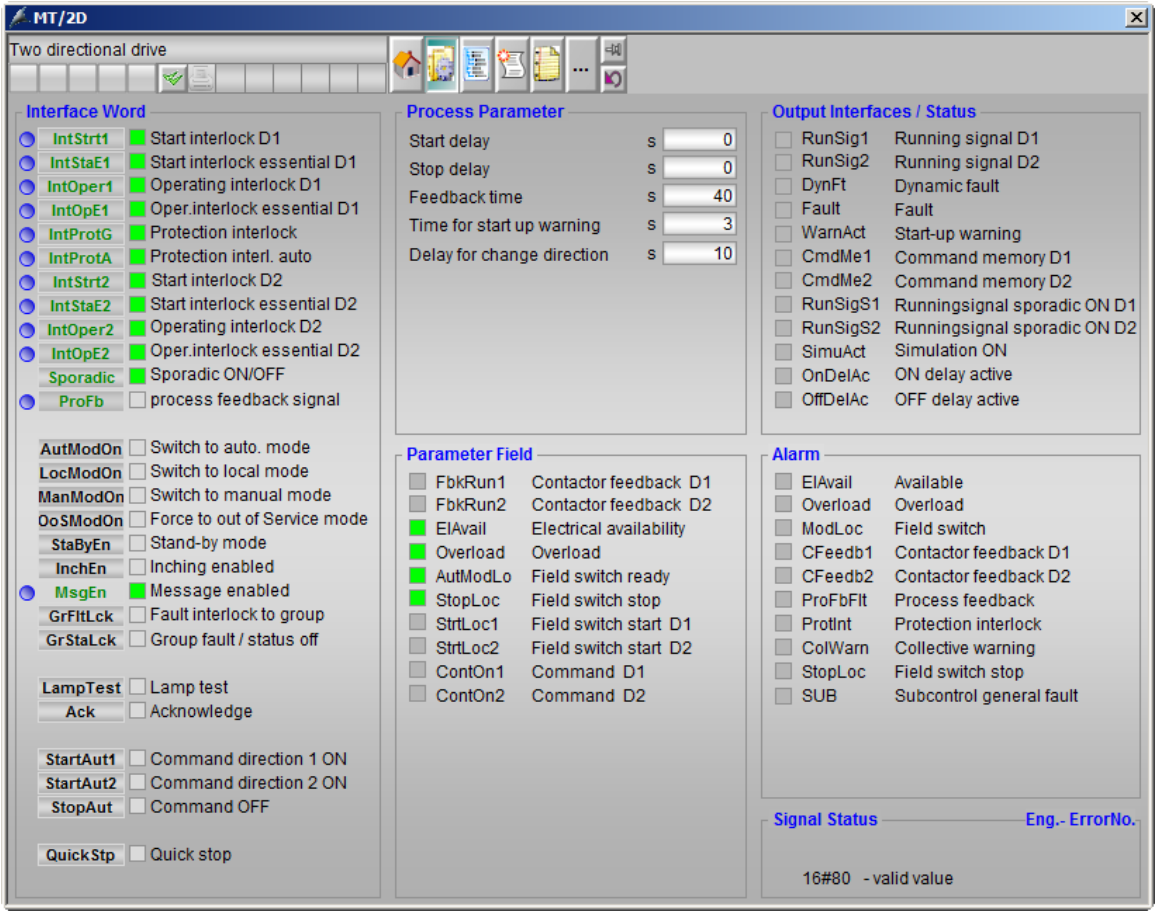
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Faceplate, Diagnosis, Object list and Preset Dialog

Faceplate Dialog:

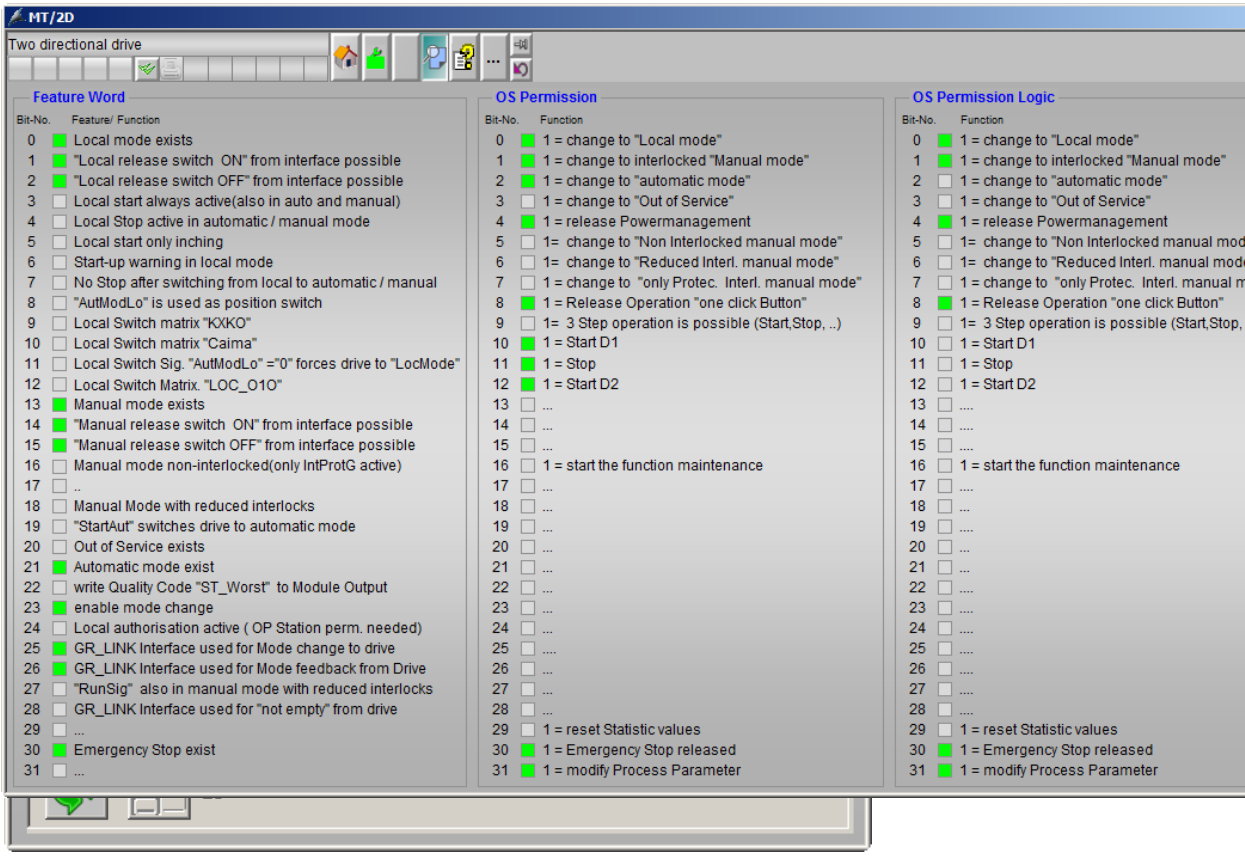


Diagnosis Dialog

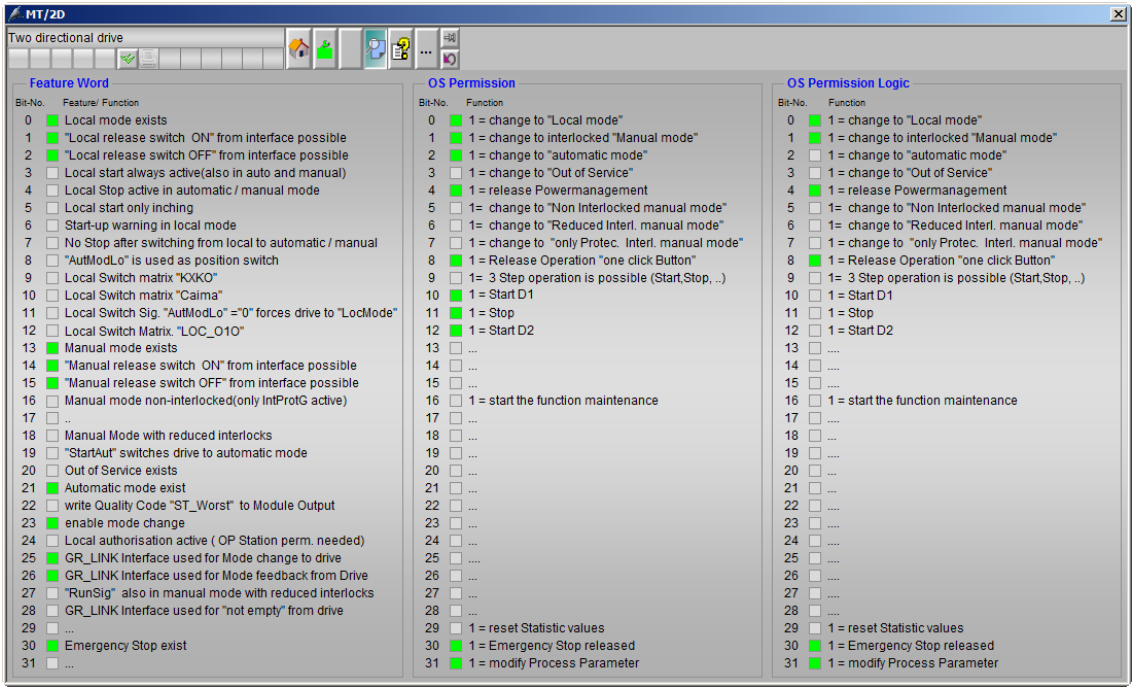


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Object list Dialog:



Preset Dialog:



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C_DAMPER Damper

General Function description

Module Type C_DAMPER can be used to control dampers, actuators or gates. As per definition, **direction 1 = close** and **direction 2 = open**.

Standard Signals

The following standard signals are monitored by the damper block:

- Contactor feedback **FbkRun1** in conjunction with the contactor output **ContOn1**
- Contactor feedback **FbkRun2** in conjunction with the contactor output **ContOn2**
- Limit Position **PbkPos1**
- Limit Position **PbkPos2**
- The torque switch **TorqSw1** in conjunction with the contactor output **ContOn1**
- The torque switch **TorqSw2** in conjunction with the contactor output **ContOn2**
- Electrical availability **ElAvail**
- Overload or Bimetal **Overload**

Additional local switch signals allow local control via field switches or pushbuttons:
- Field switch ready signal **AutModLo** (Position switch or Repair switch)
- Field switch stop signal **StopLoc** (Stop local)
- Field switch start signal **StrtLoc1** (Start local to direction 1)
- Field switch start signal **StrtLoc2** (Start local to direction 2)

The function of the field switch signals may differ from plant to plant. Therefore the function must be configured via feature bits. Refer to "Hardware Inputs", "Feature bit options for Field switch (Local switch) signals"

If the damper is in automatic or in manual mode and the damper is in operation, a wrong status at any of the above mentioned signals leads to an **alarm message.**

Priorities for alarm messages:

Combination of faults	**Diagnosis and alarm line**
ElAvail, Overload, AutModLo = 0	Available *)
Overload, AutModLo = 0	Overload
AutModLo =0	Field switch

*) The priority between *ElAvail* and *Overload* can be reversed via input *MsgPrio.*

Protection Signals

If additional protections exist for the damper, those signals have to be linked to an Annunciation block C_ANNUNC or C_ANNUN8 in order to create an alarm. In order to stop the damper in case of a fault an output of the annunciation block has to be connected to the protection interlock of the damper.

- Protection interlock Dir. 1 **IntProt1** effective in all modes
- Protection interlock Dir. 2 **IntProt2** effective in all modes

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Process interlocks

Process interlocks can be used in order to enable or disable the damper control dependent on a process condition, like "previous drive/device is running" or a process signal. If the process interlocks are not fulfilled, no alarm is created. This implies that for diagnosis purpose the interlock blocks must be used (if necessary also additional C_ANNUNC blocks).
The following process interlocks are available and can be used as per definition. Refer to "Change of operation mode", "Feature bit options for mode change").

- Start interlock dir. 1 and 2 **IntStrt1** and **IntStrt2**
- Essential start interlock dir. 1 and 2 **IntStaE1** and **IntStaE2**
- Operating interlock dir. 1 and 2 **IntOper1** and **IntOper2**
- Essential operating interlock dir. 1 and 2 **IntOpE1** and **IntOpE2**

Not every interlocking condition is effective in each mode. For the Manual mode it can be configured via Feature bits which interlock should affect and which not.

The following table gives an overview which interlock is effective in each mode. This must be considered also in case of a mode change.

Operating mode	**IntStrt 1 IntStrt 2**	**IntStaE 1 IntStaE 2**	**IntOper 1 IntOper 2**	**IntOp E1 IntOp E2**	**IntProt 1 IntProt 2**
Automatic	**X**	**X**	**X**	**X**	**X**
Manual interlocked mode	**X**	**X**	**X**	**X**	**X**
Manual mode with reduced interlocks		**X**		**X**	**X**
Manual mode non-interlocked					**X**
Local mode		**X**		**X**	**X**
Inching mode			**X**	**X**	**X**
Positioning mode			**X**	**X**	**X**

X = effective

Process parameters

Through process parameters the following values can be configured online:

- Feedback time (s) for the feedback supervision of the main contactor
- Move time supervision (s) limit position must be reached after this time
- Limit switch delay time (s) damper must not drift away from limit position for more than this time
- Time for start-up warning (s) for manual mode and local mode (if enabled)

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Inching and Positioning function

In automatic mode and in manual mode, beside normal the control from limit position to limit position, it is possible to control the damper to a certain intermediate position. The damper can be controlled step-wise (through **inching function**) or through entering a setpoint (**positioning function**).



Note: Also in inching mode or positioning mode the damper is controlled via binary output signals *ContOn1* and *ContOn2.*

- The **Inching mode** is enabled via parameter *InchEn*

  A 1-Signal at parameter *InchEn* disables the open/close commands *StrtAut1* and *StrtAut2* and the manual open/close commands via the damper faceplate. At the same time the faceplate of the damper shows the actual damper position and two buttons (arrow up an arrow down) which allow step-wise opening and closing of the damper.

  Inching is also possible via conventional control desk buttons *CmdInch1* and *CmdInch2.*

- The **Positioning mode** is enabled via parameter *PosMoEn* and *InchEn*

  If both parameters *PosMoEn* and *InchEn* have 1-Signal the damper can be controlled via a given setpoint. The setpoint can either be entered by the operator (through the damper faceplate) or it can be provided as an external setpoint (e. g. from a controller).
  If *PosMoEn* has 1-Signal the inching buttons disappear and instead of this an input field for entering the setpoint is displayed.

- **Inching in positioning mode**

  If the positioning mode is enabled and the damper in not in a limit position (neither completely closed nor completely open), the damper can be switched into the inching mode through a button in the diagnosis window. This function allows manual adjustments while the damper is in positioning mode.

  Inching in Positioning mode is only allowed if **OS Permission 22** = TRUE:

BitNr.	Function/OS Permission	Default value
22	1 = inching is positioning mode released	TRUE

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- **Calibration function**

  For positioning dampers it often happens that the limit position open or closed is reached before the analog value shows 0% or 100%. This is confusing for the plant operator.

  Through a calibration function the Start and End values can be adjusted. After the calibration, the position value is calculated based on the calibration values for position 1 and 2 *CaliPos1* and *CaliPos2*.

  To start the calibration the damper must be in manual mode and closed (*FbkPos1* must be reached), inching mode and positioning mode must be disabled. Through button 'Calibration' in the damper faceplate the damper will be started into direction 2. As soon as the limit position 2 *FbkPos1* is reached the calibration is completed and the start and end value is entered into *CaliPos1* and *CaliPos2.*

  Calibration values must be enabled trough feature bit:

BitNr.	Function/Features	Default value
31	use calibrated Position Value	FALSE

  Only if **Feature bit 31** = TRUE the calibrated position values are used.

Analog actuators

Some Actuators are not controlled via binary signals (contactor on commands *ContOn1* and *ContOn2)* but directly via analog output.

In this case the Setpoint output *SP_Out* can be used and connected to the analog output, e. g. via channel driver block Pcs7AnOu). See description for *SP_Out.*

Wagging function

For the wagging function the damper must be in automatic mode and manual mode and inching or positioning function must be disabled.

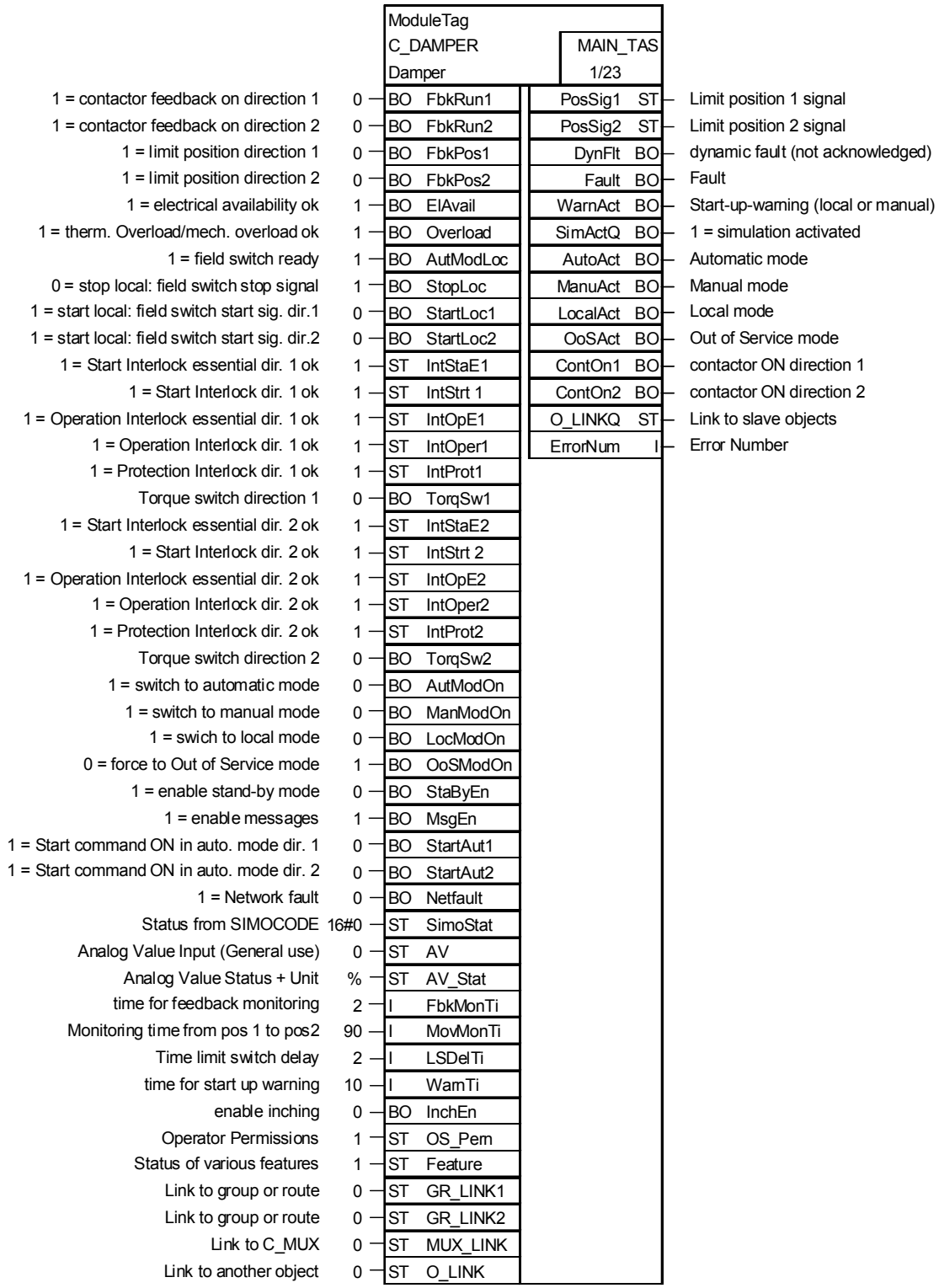
If the wagging function is enabled and a run-time fault occurs (*MovMonTi* exceeded) or the torque switch *TorqSw1* (or *TorqSw2)* is activated, the damper is controlled back to the start position and then tries to run again in the required direction.

The number of attempts can be set via process parameter *WaggNo*. After an unsuccessful number of wagging attempts, the damper block creates the alarm message 'Mechanical D1' or 'Mechanical D2'.

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Function block

The picture below shows the most important interfaces and process parameters of the damper function block. More detailed information you will find in the object description of the block.



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Additional Functions

Link to a measured value

- A measured value can be displayed in the damper faceplate, either through connection of the physical output of the C_MEASUR block or through connection of the output of C_ANASEL block to the damper.

SIMOCODE drives

If SIMOCODE is used, the communication between the damper block and the SIMOCODE can be carried out via adapter block C_SIMOS or C_SIM_AD.
An additional button in the damper faceplate opens the faceplate of the adapter block in order to display the SIMOCODE details.

Sequence Test mode

Via a setting in the System chart SYSPLCxx all drives/devices within the AS are switched into the Sequence test mode, for checking the start/stop sequence without periphery inputs and outputs. In the sequence test mode the contactor on commands are not set, the contactor feedback and the limit switches are simulated internally.

- The contactor feedback for each direction is simulated in conjunction with the corresponding contactor on command.
- Latest after 7 seconds after the command is given the position signal for the corresponding direction is simulated.
- Additionally the Standard Signals *ElAvail*, *Overload* and *AutModLo* are set to the default level.

Simulation of the Standard signals and local switch simulation is not possible, but no additional simulation program is needed.

If driver blocks are used, the Output *SimActQ* of the damper can be connected to input *SimOn* of the driver blocks to enable the simulation.

Emergency Stop

Option for Emergency Stop via Operator Station exists. Via right mouse-click on the block icon the Emergency push-button appears.

The Emergency Stop Function must be enabled via feature bit setting:

BitNr.	Function/Features	Default value
17	Emergency Stop exist	FALSE

If **Feature bit 17** = TRUE the Emergency Stop function is enabled.

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Visualization

In the **block icon** of the damper the most important operation status are displayed (limit position, moving, operating mode, fault). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block icon (Representation in the Process Picture)

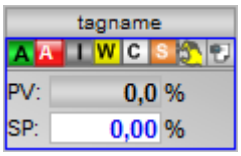


The block icon of the damper shows the following information:

Symbol	Display	Description
	red flashing	fault not acknowledged
	red	fault
	green flashing	Start up D1 closing
	green flashing	Start up D2 opening
	green	Position D1
	green	Position D2
	magenta	Stopped without permission to start or not ready

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Status display of the Damper Analog Symbol:



1st column: **A** (green) = damper in automatic mode
L (white) = damper in local mode
M (cyan) = damper in manual mode
 = damper in Out of Service

2nd column: **A** (red) = (summarizing fault)

3rd column: **I** (gray) = internal setpoint
E (blue) = external setpoint

4th column: **W** (yellow) = external Object warning

5th column: **C** (white) = damper in Control mode
I (white) = damper in inching mode
P (white) = damper in Positioning mode

6th column: **S** (brown) = damper in simulation
E(red) = emergency stop on

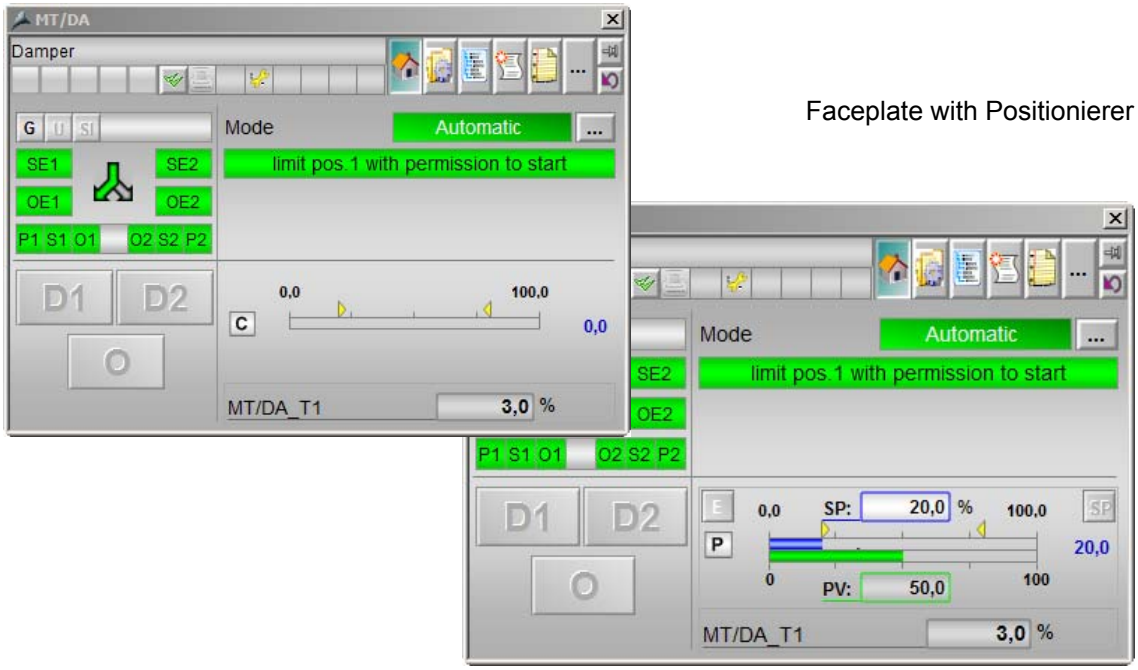
7th column: **Symbols of Quality**
Quality Status of Inputs

8th column: **memo exist**

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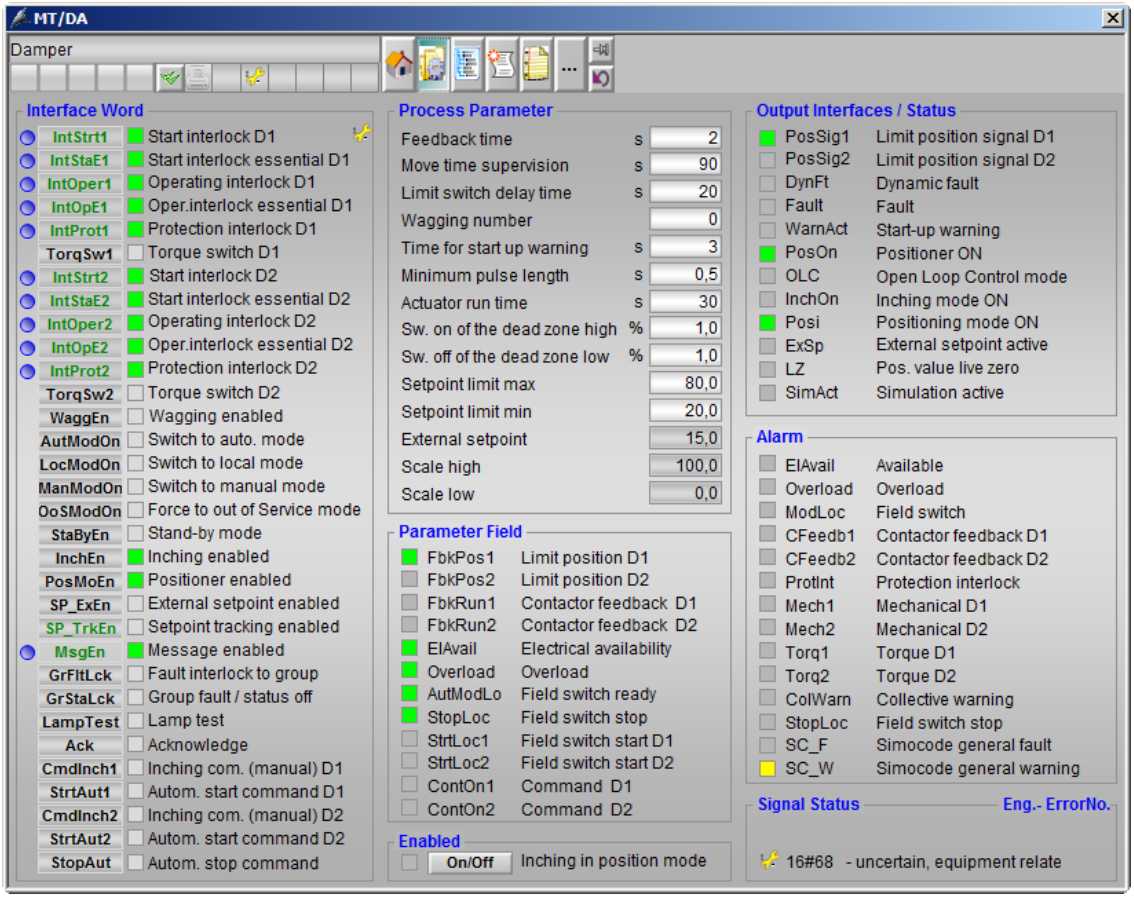
Faceplate, Diagnosis, Object list and Preset Dialog

Faceplate Dialog:



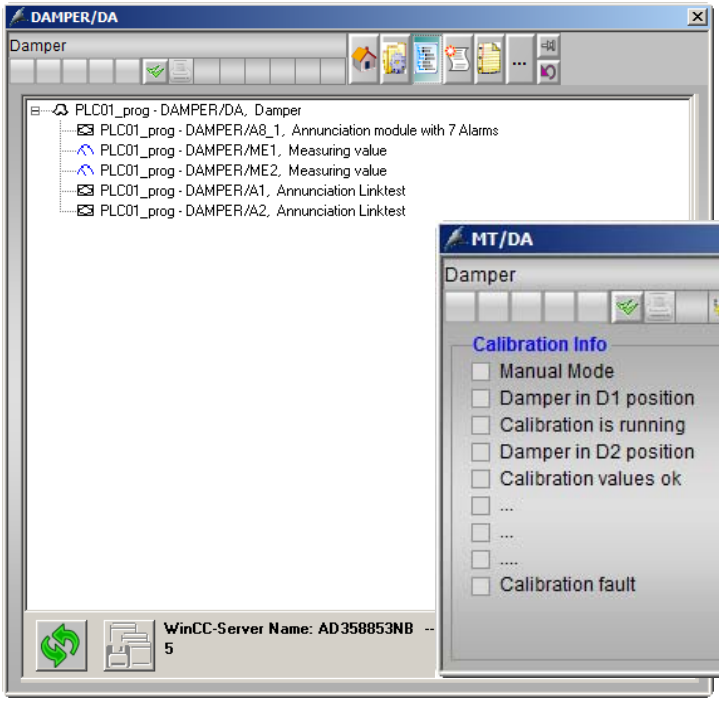
Faceplate with Positionierer

Diagnosis Dialog

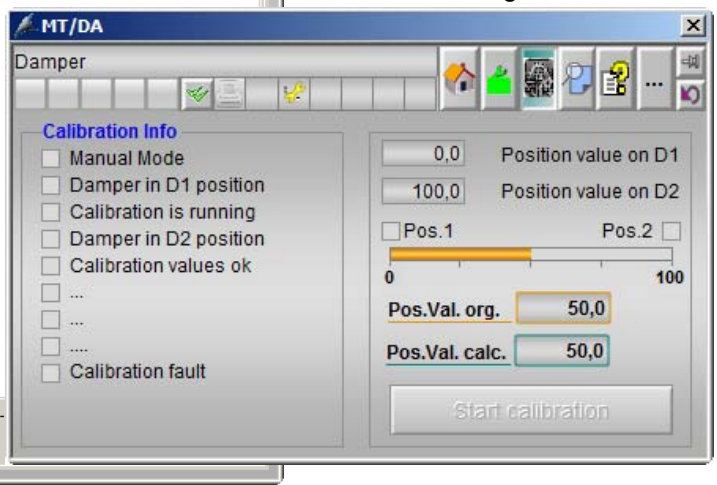


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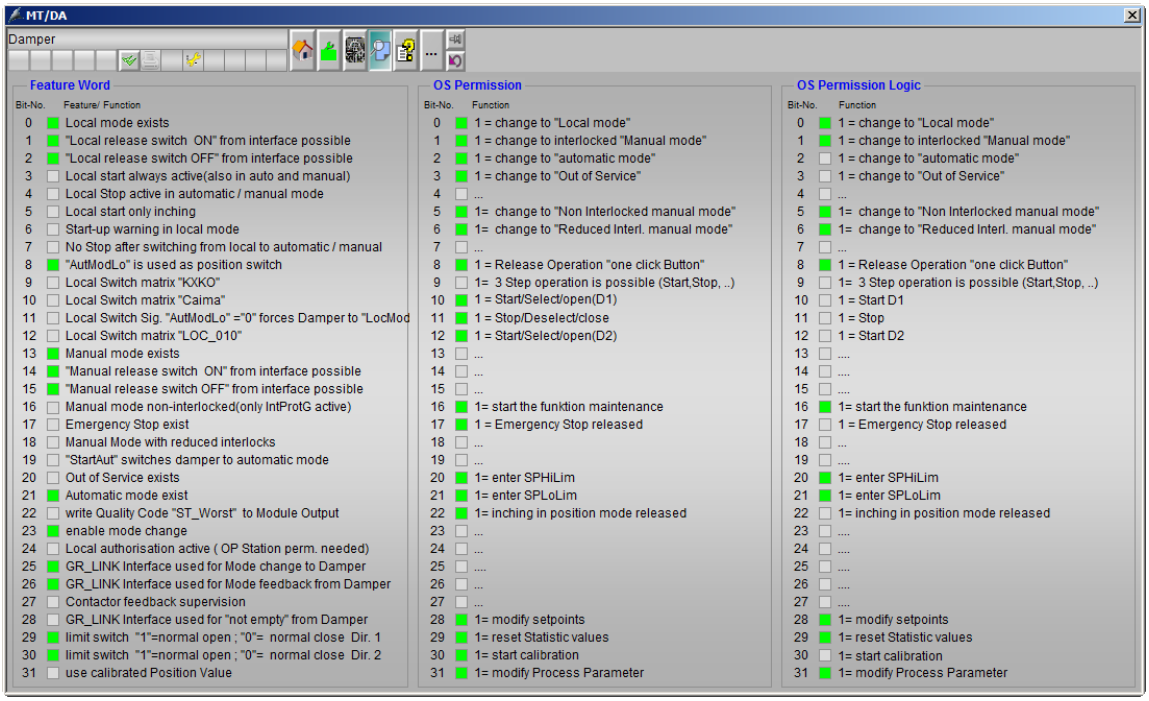
Object list Dialog:



Calibration Dialog:



Preset Dialog:



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C_VALVE Valve

General Function description

Module Type C_VALVE can be used to control all kind of Valves.By default the active direction is direction 2 (open). Through parameterization direction 1 (close) can be defined as active as well.

Standard Signals

The following standard signals are monitored by the Valve block:

- Contactor feedback **FbkRun** in conjunction with the contactor output **ContOn**
- Limit Position **FbkPos1** (closed)
- Limit Position **FbkPos2** (open)
- Electrical availability **ElAvail**
- Overload or Bimetal **Overload**



Limit Positions:
Per definition the limit position FbkPos1 is "closed" and the limit position FbkPos2 is open, but it can be configured, which is the active (energized) direction.
The valve block is able to handle valves with two limit positions, with a single limit position or without limit positions. In case of a single limit position, the position switch for the active (energized) position switch must exist.

Additional field switch signals allow local control via field switches or pushbuttons:
- Field switch ready signal **AutModLo** (Position switch or Repair switch)
- Field switch stop signal **StopLoc** (Stop local)
- Field switch start signal **StartLoc** (Start local)

The function of the field switch signals may differ from plant to plant. Therefore the function must be configured via feature bits. Refer to "Hardware Inputs", "Feature bit options for Field switch (Local switch) signals"

If the valve is in automatic or in manual mode and the valve is energized, a wrong status at any of the above mentioned signals leads to an **alarm message.**

Priorities for alarm messages:

Combination of faults	**Diagnosis and alarm line**
ElAvail, Overload, AutModLo = 0	Available *)
Overload, AutModLo = 0	Overload
AutModLo =0	Field switch

*) The priority between *ElAvail* and *Overload* can be reversed via input *MsgPrio.*

Protection Signals

If additional protections exist for the valve, those signals have to be linked to an Annunciation block C_ANNUNC or C_ANNUN8 in order to create an alarm. In order to stop the valve in case of a fault an output of the annunciation block has to be connected to the protection interlock of the valve.

- Protection interlock **IntProtG** effective in all modes

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Process interlocks

Process interlocks can be used in order to enable or disable the valve operation dependent on a process condition, like "previous drive/device is running" or a process signal. If the process interlocks are not fulfilled, no alarm is created. This implies that for diagnosis purpose the interlock blocks must be used (if necessary also additional C_ANNUNC blocks).
The following process interlocks are available and can be used as per definition. Refer to "Change of operation mode", "Feature bit options for mode change").

- Start interlock **IntStart**
- Essential start interlock **IntStaE**
- Operating interlock **IntOper**
- Essential operating interlock **IntOpE**

Not every interlocking condition is effective in each mode. For the Manual mode it can be configured via Feature bits which interlock should affect and which not.

The following table gives an overview which interlock is effective in each mode. This must be considered also in case of a mode change.

Operating mode	**IntStart**	**IntStaE**	**IntOper**	**IntOpE**	**IntProtG**
Automatic	**X**	**X**	**X**	**X**	**X**
Manual interlocked mode	**X**	**X**	**X**	**X**	**X**
Manual mode with reduced interlocks		**X**		**X**	**X**
Manual mode non-interlocked					**X**
Local mode		**X**		**X**	**X**

X = effective

Sporadic mode

The sporadic mode allows opening and closing of the valve dependent on a process condition. With the start command in automatic mode (group start command) the valve gets "activated" and will then be ready for open/close via interface "Sporadic":

- Sporadic ON/OFF **Sporadic** only in auto mode and in manual mode

Process parameters

Through process parameters the following values can be configured online:

- Move time supervision (s) limit position must be reached after this time
- Limit switch delay time (s) valve must not drift away from limit position for more than this time
- Start delay (s) after group start command is given and IL conditions are fulfilled
- Stop delay (s) after group stop command is given
- Time for start-up warning (s) for manual mode and local mode (if enabled)

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Limit Position switches

By default, when the valve is energized, the position 2 (open position) must be reached. The behavior can be changed via feature bit options.

BitNr.	Function/Features	Default value
29	Normally open valve (direction 1 active)	FALSE

With **Feature bit 29** = TRUE, the position 1 (close position) must be reached when energizing the valve.

Feature bit 29 = FALSE: direction 2 is active (default setting)

Automatic start/stop

Parameter StartAut	Parameter StopAut	ContOn	FbkPos1 (closed)	FbkPos2 (open)
0	**1**	**0**	**1**	**0**
1	**0**	**1**	**0**	**1**

Manual start/stop from faceplate

Button Start (left button)	Button Stop (right button)	ContOn	FbkPos1 (closed)	FbkPos2 (open)
-----	**pressed**	**0**	**1**	**0**
pressed	**----**	**1**	**0**	**1**

Start/stop with local buttons

Parameter StartLoc	Parameter StopLoc	ContOn	FbkPos1 (closed)	FbkPos2 (open)
x	**0**	**0**	**1**	**0**
1	**1**	**1**	**0**	**1**

Please note that the push button for the non-active mode (StopLoc) must be a normal-close contact.

Feature bit 29 = TRUE: direction 1 is active

Automatic start/stop

Parameter StartAut	Parameter StopAut	ContOn	FbkPos1 (closed)	FbkPos2 (open)
0	**1**	**0**	**0**	**1**
1	**0**	**1**	**1**	**0**

Manual start/stop from faceplate

Button Start (left button)	Button Stop (right button)	ContOn	FbkPos1 (closed)	FbkPos2 (open)
pressed	**----**	**0**	**0**	**1**
----	**pressed**	**1**	**1**	**0**

Start/stop with local buttons

Parameter StartLoc	Parameter StopLoc	ContOn	FbkPos1 (closed)	FbkPos2 (open)
x	**0**	**0**	**0**	**1**
1	**1**	**1**	**1**	**0**

Please note that the push button for the non-active mode (StopLoc) must be a normal-close contact.

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Simulation of the Limit Positions

Limit positions (active and idle position) can be simulated. In this case the status of the limit switch is not evaluated and the valve simulates the correct position after the Monitoring time from pos1 to pos2 *MovMonTi* has elapsed.

The simulation function must be enabled via feature bit setting:

BitNr.	Function/Features	Default value
31	simulate active and idle position switch	FALSE

Feature bit 31 **= TRUE enables the simulation function.**

The enable buttons in the diagnosis window are active if the corresponding OS Permission is given:

BitNr.	Function/OS Permission	Default value
27	1 = simulate active position switch	FALSE
28	1 = simulate idle position switch	FALSE

OS Permission 27 **= TRUE allows the operator to simulate the active position switch.**

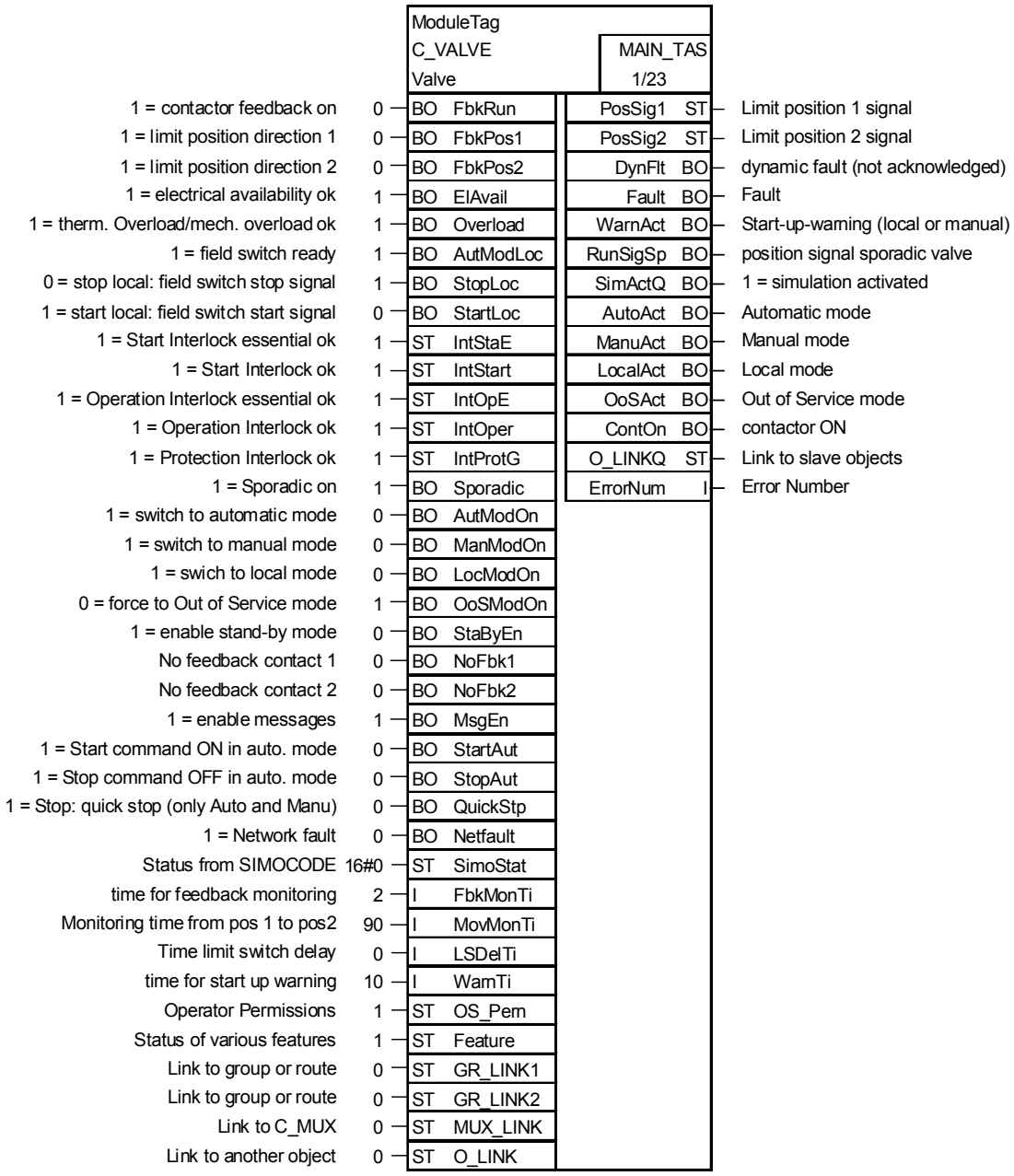
OS Permission 28 **= TRUE allows the operator to simulate the idle position switch.**

If the simulation is enabled for any of the limit position switches, the block icon changes to orange color (simulation).

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Function block

The picture below shows the most important interfaces and process parameters of the valve function block. More detailed information you will find in the object description of the block.



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Additional Functions

SIMOCODE drives

If SIMOCODE is used, the communication between the valve block and the SIMOCODE can be carried out via adapter block C_SIMOS or C_SIM_AD.
An additional button in the valve faceplate opens the faceplate of the adapter block in order to display the SIMOCODE details.

Sequence Test mode

Via a setting in the System chart SYSPLCxx all drives/devices within the AS are switched into the Sequence test mode, for checking the start/stop sequence without periphery inputs and outputs. In the sequence test mode the contactor on commands is not set, the limit switches are simulated internally.

- After the command is given the position signal for the corresponding direction is simulated.
- Additionally the Standard Signals *ElAvail*, *Overload* and *AutModLo* are set to the default level.

Simulation of the Standard signals and local switch simulation is not possible, but no additional simulation program is needed.

If driver blocks are used, the Output *SimActQ* of the valve can be connected to input *SimOn* of the driver blocks to enable the simulation.

Emergency Stop

Option for Emergency Stop via Operator Station exists. Via right mouse-click on the block icon the Emergency push-button appears.

The Emergency Stop Function must be enabled via feature bit setting:

BitNr.	Function/Features	Default value
30	Emergency Stop exist	FALSE

If **Feature bit 30** = TRUE the Emergency Stop function is enabled.

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Visualization

In the **block icon** of the valve the most important operation status are displayed (open, closed, operating mode, fault). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block icon (Representation in the Process Picture)



The block icon of the valve shows the following information:

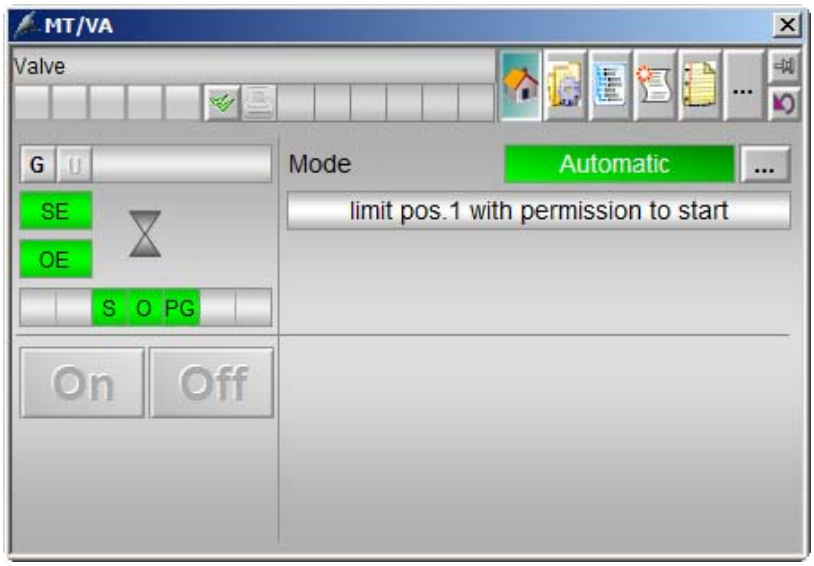
Symbol	Display	Description
	red flashing	fault not acknowledged
	red	fault
	green flashing	closing
	grey	closed
	green flashing	opening
	green	open
	green flashing	stopped
	magenta	Stopped without permission to start or not ready

All additional indications are optional.

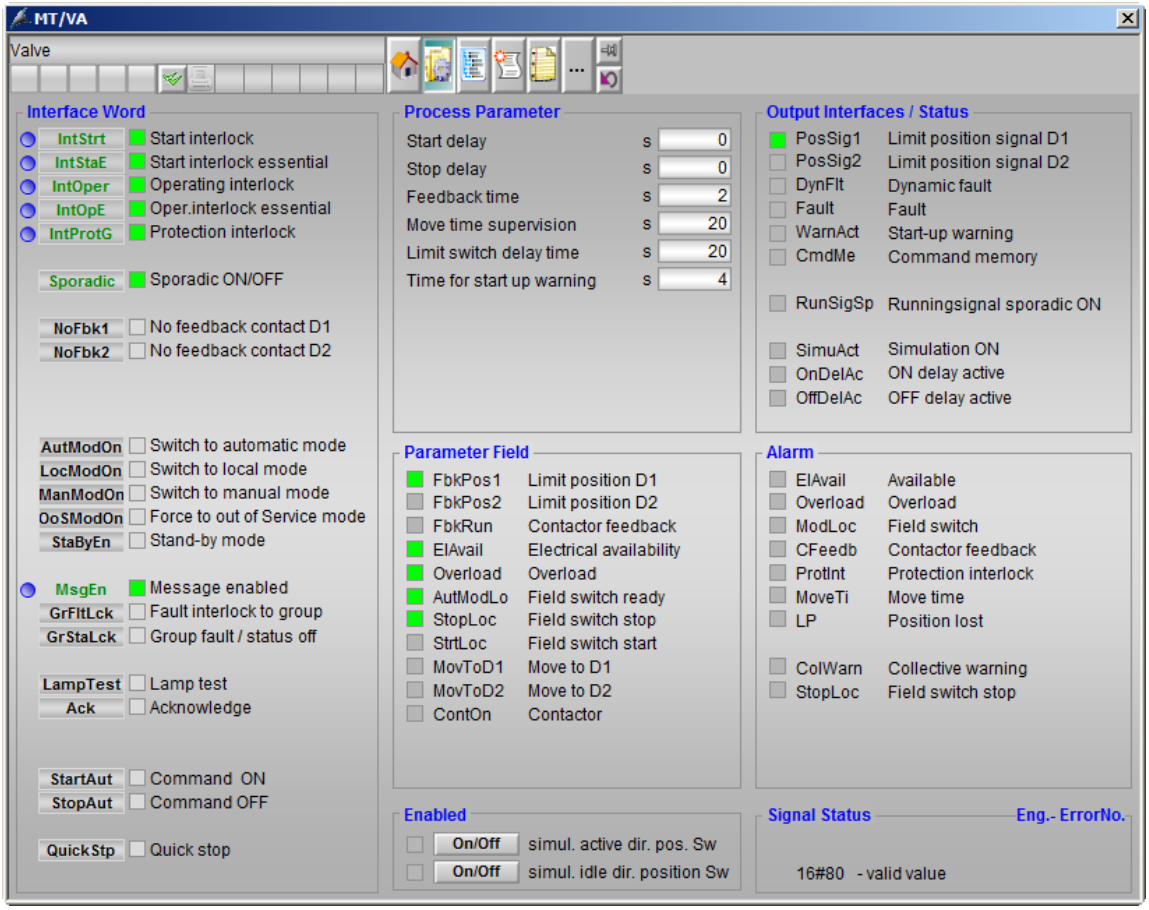
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Faceplate, Diagnosis, Object list and Preset Dialog

Faceplate Dialog:

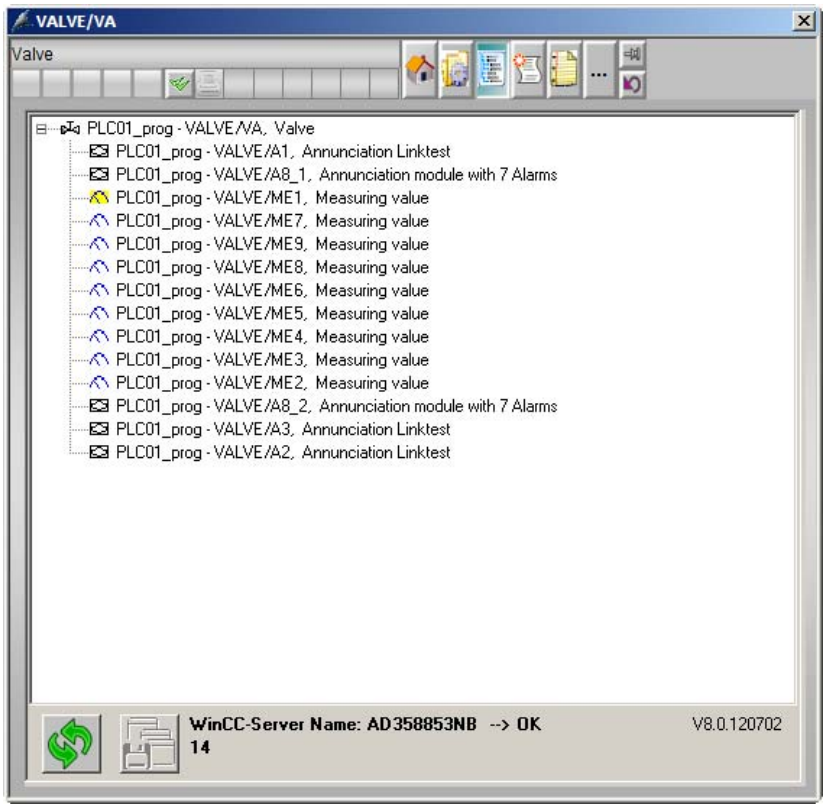


Diagnosis Dialog

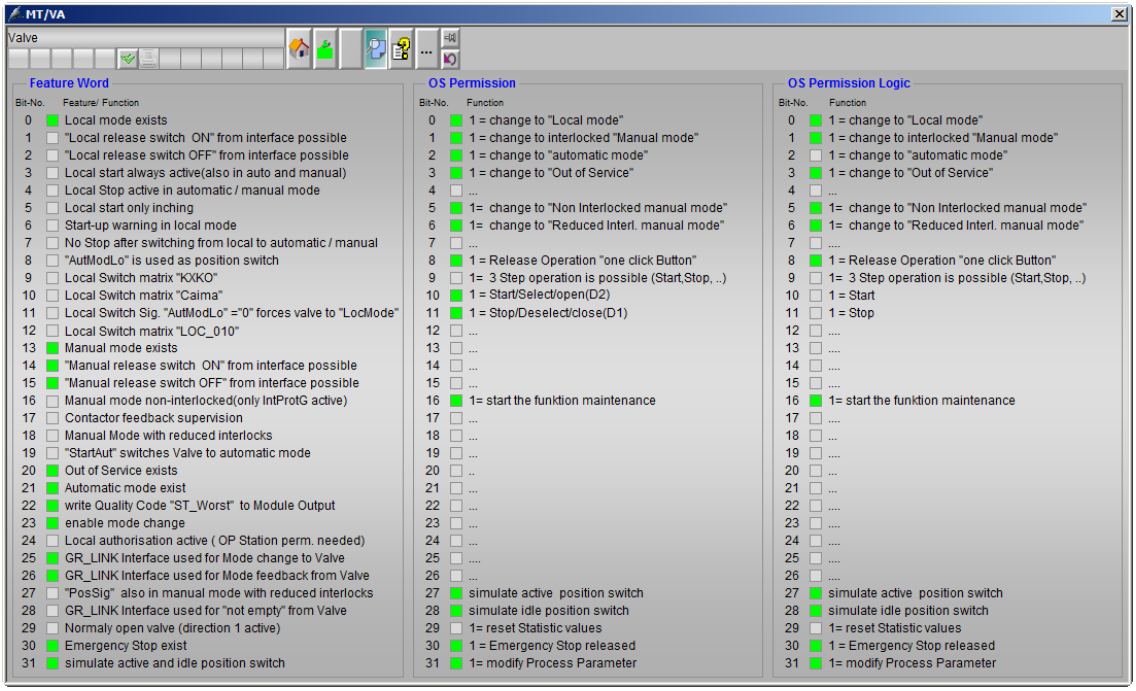


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Object list Dialog:



Preset Dialog:



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C_SIMOS Adapter for SIMOCODE

General Function description

Module Type C_SIMOS, the SIMOCODE Adapter block can be used in order to establish a connection between the CEMAT blocks and the SIMOCODE. Due to the modular concept the SIMOCODE Adapter block can be used for Uni-directional drives, Bi-directional drives, valves and dampers.

The four input signals of the SIMOCODE are provided at as block outputs of C_SIMOS and can be used individually (e. g. for Field Switch Signals or Available).

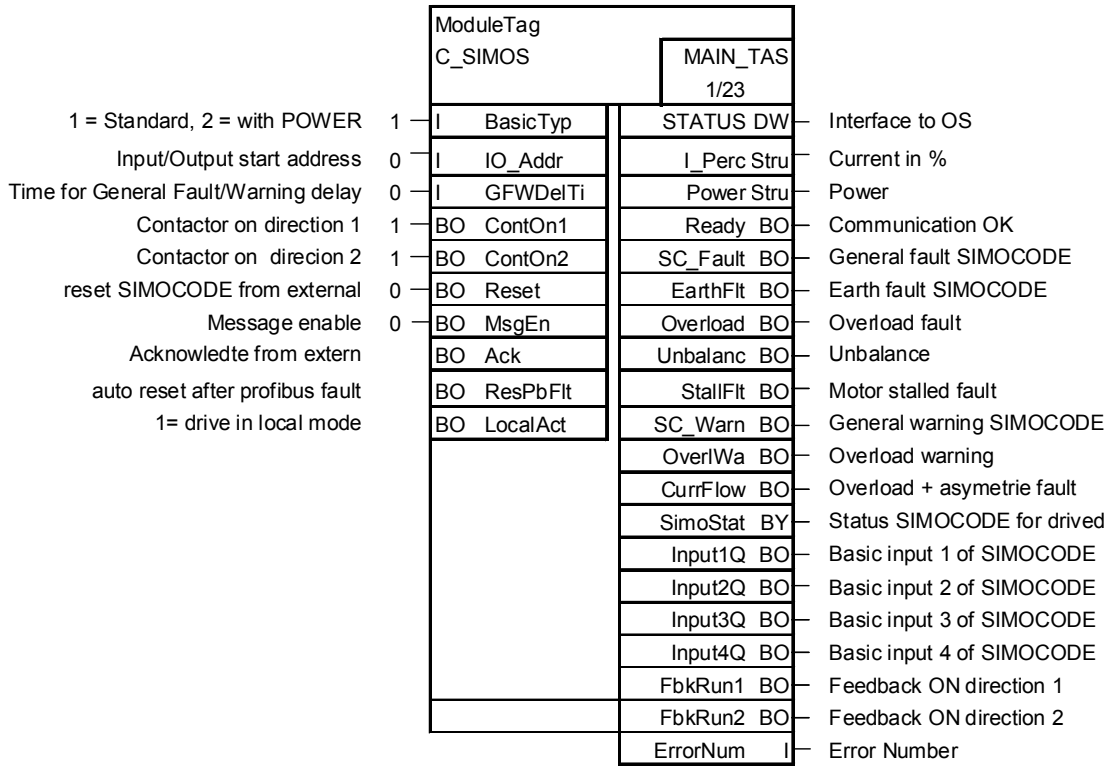
The SIMOCODE adapter block is open (no KNOW_HOW_PROTECT) and you can modify the block according to your requirements.

Important: No warranty can be given for changes of the block, because this is entirely the responsibility of the user. It is always recommended to make a backup of the block before proceeding.

For all further information refer to SIMOCODE Manual.

Function block

The picture below shows the most important interfaces and process parameters of the C_SIMOS function block. More detailed information you will find in the object description of the block.



The C_SIMOS can be used for **BasicTyp 1 or 2**.
BasicTyp1 = Standard
BasicTyp 2 = with Power

The **start address** for Inputs and Outputs has to be configured via Parameter IO_Addr

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Links between C_SIMOS and drive block:

The Start command of the drive has to be connected to ContOn1 or ContOn2.

The Feedback signals FbkOn1 or FbkOn2 from the SIMOCODE block have to be connected to the contactor feedback of the drive block.

The status of the C_SIMOS must be transmitted to the drive via parameter SimoStat.

Four additional outputs Input1Q to Input4Q contain the information from INPUT 1-4 of the SIMOCODE and can be freely configured. The outputs must be connected to the drive block according to its function.

Block icon (Representation in the Process Picture)

There is no separate block icon for C_SIMOS block. The faceplate of the C_SIMOS is opened via button "SI" in the faceplate of C_DRV_1D, C_DRV_2D, C_DAMPER or C_VALVE.

Faceplate

The Dialog shows on top the “Displays and operator controls” (1) area followed by indication of the “BasicTyps” (15), the mode information (3) and Mode change button (4) which allowed changing over in “automatic”, “simulation” and ”Emergency start enable” mode.

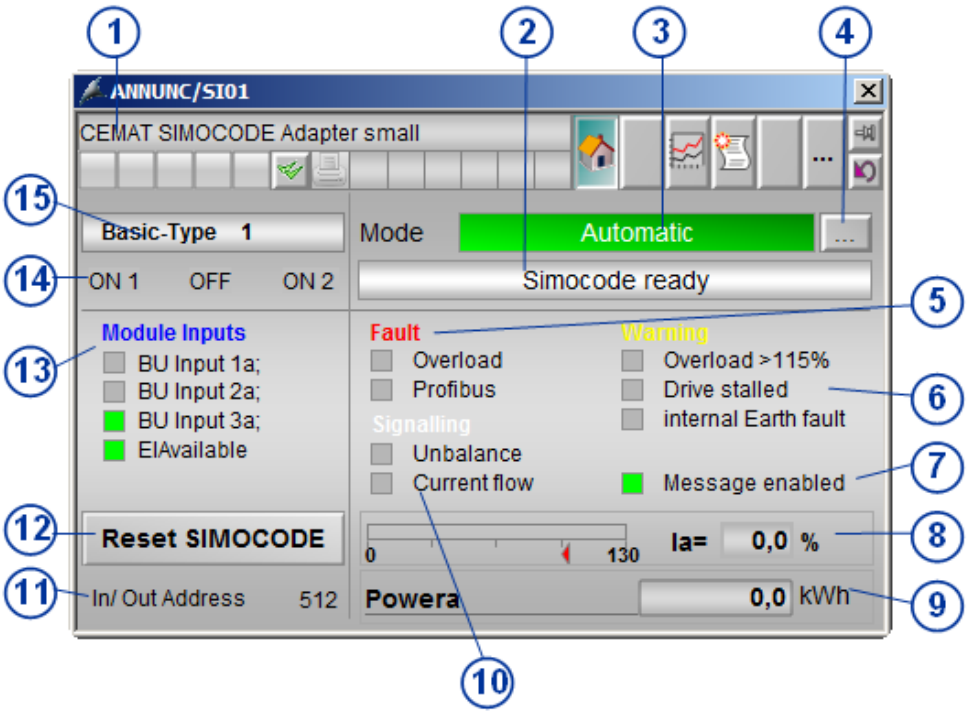
Then in the next lines are shown:
(14) Simocode Run Status On1/Off/On2
(2) Text Status line with “General Fault, General Warning and SIMOCODE ready indication.
(13) Digital Input signals from the SIMOCODE Module with text and status are indicated.
The text can be changed on the PLC Block on Outputs “Input1Q - Input1Q” always in Text0.

All other SIMOCODE Status Signal are shown under Fault (5), Warning (6) and Signaling (10).

With the “Reset SIMOCODE” (12) button it is possible to send a Reset command to the SIMOCODE in case the SIMOCODE has been dropped with a “General fault” or “Overload”.

(11) Input – and Output Address of SIMOCODE.

(8) Current indication as bar and Value in % .
The Text “I=” is adjustable on the block Output “I_Perc” -> Value -> Identifier .
(9) Power indication in kWh.
The Text is adjustable on the block Output “Power” -> Value -> Identifier .

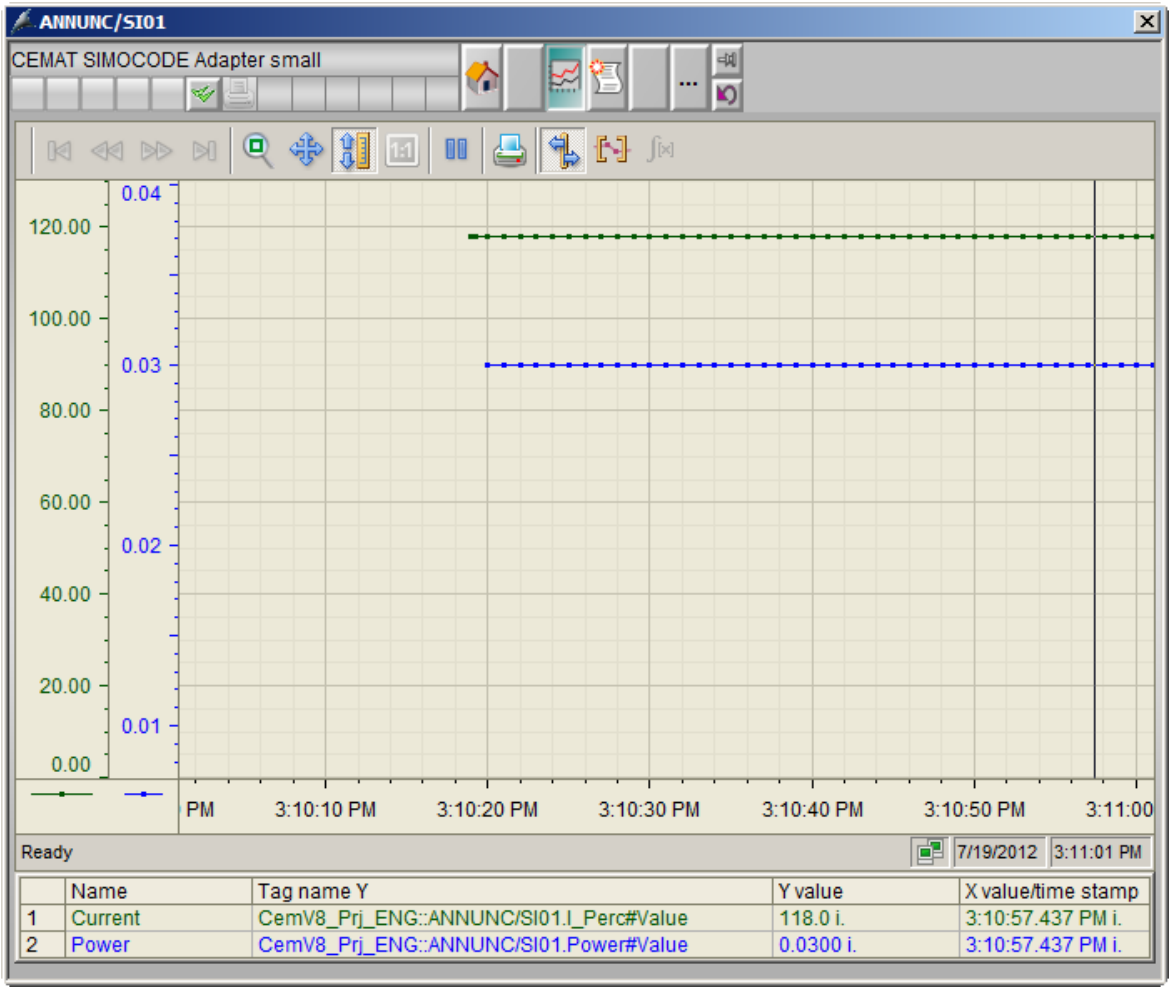


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C_SIMOS Trend

With click on the button “Trend” in the Toolbar the SIMOS Trend dialog will be shown.

There is only the online Trend for Current and Power shown. (no long term trends)



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C_GROUP Group

General Function description

Module Type C_GROUP is a superordinated module for starting and stopping of technologically grouped plant sections in automatic mode. Group start and stop commands must be connected to the drives. The information "drives running" and "drives stopped" must be transmitted to the group again.

The group module allows the visualization of the operational conditions of a plant section, displayed as a status display, and a detailed fault diagnosis (status call).

By linking all the drives, annunciations and measures of a plant section to the group module, the block icon of the group shows the summarizing indications for faults and warnings and it interrupts the start procedure in case of a fault.

- With a **group status call** function (Button 'Status'), all the present faults and interlocks of the affiliated drives, measured values and process signals in this plant section can be queried at anytime. For a group with routes, the status call affects only the pre-selected routes of the group.
- The **group instance list** (Button 'Objects') shows all objects (drives, annunciations, measures), belonging to the group or plant section. All objects are shown with "Actual status", "Tagname" and "Comment". In case of an active "Simulation" the object is highlighted with orange color.

Starting a group

The group can be started via the Operator Faceplate, via program or via conventional control desk push buttons.

With the group start a start-up warning is triggered. After the start-up warning has elapsed, the group generates the ON-command to start the drives. The ON-command is limited by the release time, i.e. the start process is aborted after the release time has elapsed.

Phases during the start-up of the group:

After the group start a start-up warning is given.
- The output *WarnLAct* is set to 1-Signal. It will be reset when the start-up is completed (or if the release time has elapsed). *WarnLAct* can be used for a start-up warning lamp.
- A **horn time** can be configured via parameter *WarnTim*. The horn time starts together with the group start. Within the horn time the output *WarnHAct* has 1-Signal. This output can be used for an acoustical signal.
- A **waiting time** can be configured via parameter *WaitTim*. The waiting time starts together with the group start command. After the waiting time has elapsed the group gives the ON-command to the drives. (The waiting time should be a little longer than the horn time)

After the start-up warning is completed (horn time and waiting time have elapsed) the ON-command is given to the drives.
- A **startup command release time** can be configured via parameter *CoURelTi*, which is triggered after the start-up warning has elapsed. A warning message is created if the startup has not been completed after *CoURelTi* elapsed.
  Only within the release time the start command is given to the drives.

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Via interrupt button the start can be interrupted at any time. Press the start button again to continue. The start also gets interrupted by a fault. In this case acknowledgement is needed before the start command can be given again.
If the group start is continued within the release time, two different behaviors can be configured via feature bit setting:

BitNr.	Function/Features	Default value
29	start retrigger always with startup warning	TRUE

If **Feature bit 29** = TRUE, after interrupt or fault a new start-up-warning is given.

If **Feature bit 29** = FALSE, within the release time the start can be retriggered without startup warning. The release time *CoURelTi* will be retriggered as well.

Stopping a group

The group can be stopped via Operator Faceplate, via program or via conventional control desk push buttons.

The stop command is given to the drives and the drives are stopped in sequence, considering stop delays and program interlockings.

Via interrupt button the sequential stop can be interrupted at any time. Press stop button again to continue.

- A **shut down supervision time** can be configured via parameter *CoDRelTi*, which is triggered after the stop button is pressed. A warning message is created if the showdown has not been completed after *CoDRelTi* elapsed.

Beside the normal stop command, immediate stop is also possible via Operator Faceplate or via program. In this case the stop delay of the drives is not considered. With an immediate stop all drives are switched to automatic mode.

The group module generates operating messages for start and stop.

Interlocks

Interlocks can be used in order to enable or disable the group operation dependent on a process condition, like "previous group is running" or a process signal. If a group interlock is not fulfilled, no alarm is created. This implies that interlock blocks must be used for diagnosis purpose and if necessary also additional C_ANNUNC blocks.



Refer to engineering examples, interlocking annunciations

The following process interlocks are available and can be used as per definition:

- Start interlock	**IntStart**
- Operating interlock	**IntOper**
- Switch-off interlock	**IntSwOff**

Process parameters

Through process parameters the following values can be configured online:

- Time for startup warning (s)	triggers the Horn output *WarnHAct* for acoustic alarm.
- Waiting time (s)	between group start and ON command for the drives
- Start up command release time (s)	for limitation of the ON command for the drives
- Shut down command release time(s)	for supervision of shut down

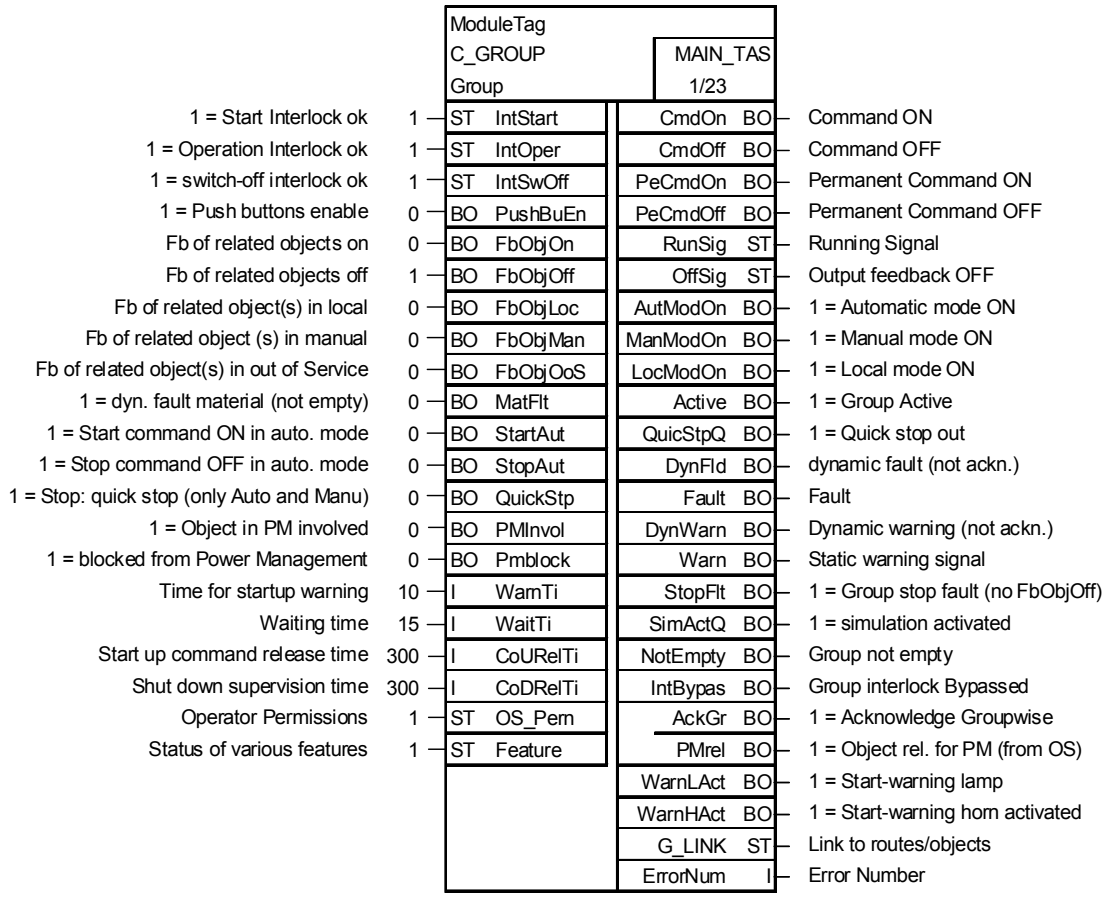
The following process parameters can be configured only in the CFC:

- Highlight objects time (s)	for highlighting objects in the process picture

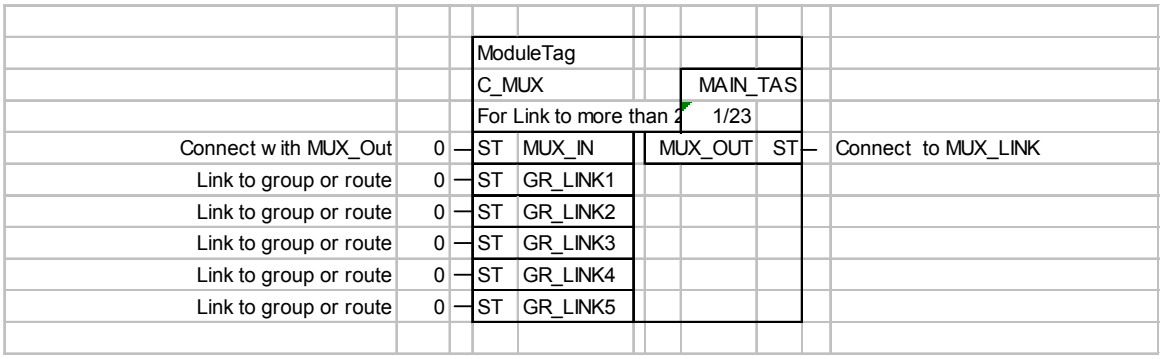
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Function block

The picture below shows the most important interfaces and process parameters of the group function block. More detailed information you will find in the object description of the block.



If a drive, annunciation or measurement belongs to more than one group or route, the multiplexer function C_MUX must be used:



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Power Management

The group block can be linked to a Power Management System via input *PMinvol* in order to allow blocking the group through Power Management.

A button appears in the group faceplate which allows the operator to release the Power Management function. Of course, this requires an OS Permission:

BitNr.	Function/OS Permission	Default value
4	1 = Operator can release Power management	FALSE

With **OS Permission bit 4** = TRUE Operator can release the Power Management.

After the Power Management is released the group can be blocked via input *PMblock*.

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Visualization

In the **block icon** of the group the most important operation status are displayed (stopped, start-up, running, shut-down, fault, warning, interlocking). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block Icon (representation in the process picture)



The block icon of the group shows the following information:

Symbol	Group status	Description
L	Mode	local mode
M	Mode	manual mode
A	Mode	automatic mode
⇧	Operation	startup green / flashing
⇧	Operation	startup white / flashing
O	Operation	operation
⇩	Operation	shut down / flashing
A	Fault	static fault
A	Fault	dynamic fault / flashing
W	Warning	warning
W	Warning	dynamic warn/ flashing
P	Interlock	blocked
I	Interlock	interlocked
I	Interlock	manual mode

All additional indications are optional.

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Faceplate, Diagnosis, Object list, Status call and Preset Dialog

Faceplate Dialog:

The Dialog will be opened from the Group symbol. On top the “Displays and operator controls” (1) area is shown.

(2) Indication that a Power management is connected to the Group and can be released with button “Powermanagement” **(11)**

(3) The Object mode of all connected and released Objects are shown in this area.
If all objects are in “Automatic mode” an “Aut” Symbol will be shown on pos. **(3)**.
If one object is in “Manual mode” the Symbol “Man” **(4)** is shown.
If one object is in “Local mode” the Symbol “Loc” **(5)** is shown.
If one object is in “Out of Service mode” the Symbol “OoS” **(6)** is shown.
If one object is in “Simulation mode” the Symbol “Sim” **(7)** is shown.
If one object has an “Emergency stop” the Symbol “Eme” **(8)** is shown.

With the button “mode” **(9)** it is possible to force the connected objects to “Automatic”-, “Manual”-, and “Local” mode.
(10) Statusline with information about startup, running, shut down etc.

(13) actual timer with time value**(12)**. (startup warning, waiting time, release time)
(14) with the required release and permission settings it is possible to bypass the Interlock signals of the Group or reset the” not empty” **(15)** indication or give the “Immediate stop” Command **(16)**.

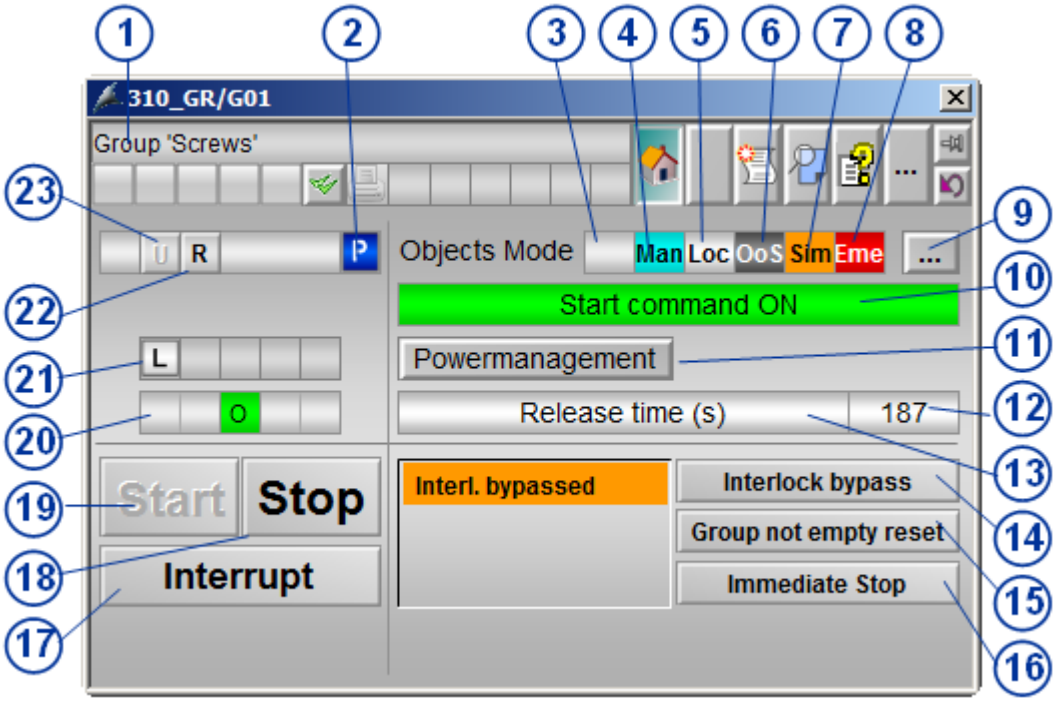
The normal Operation button for “Start” **(19)**, “Stop” **(18)** and Interrupt **(17)** a shown on the left hand side.

(20) indication of interlock Signal connection and status

(21) general Status information as in the Symbol explained

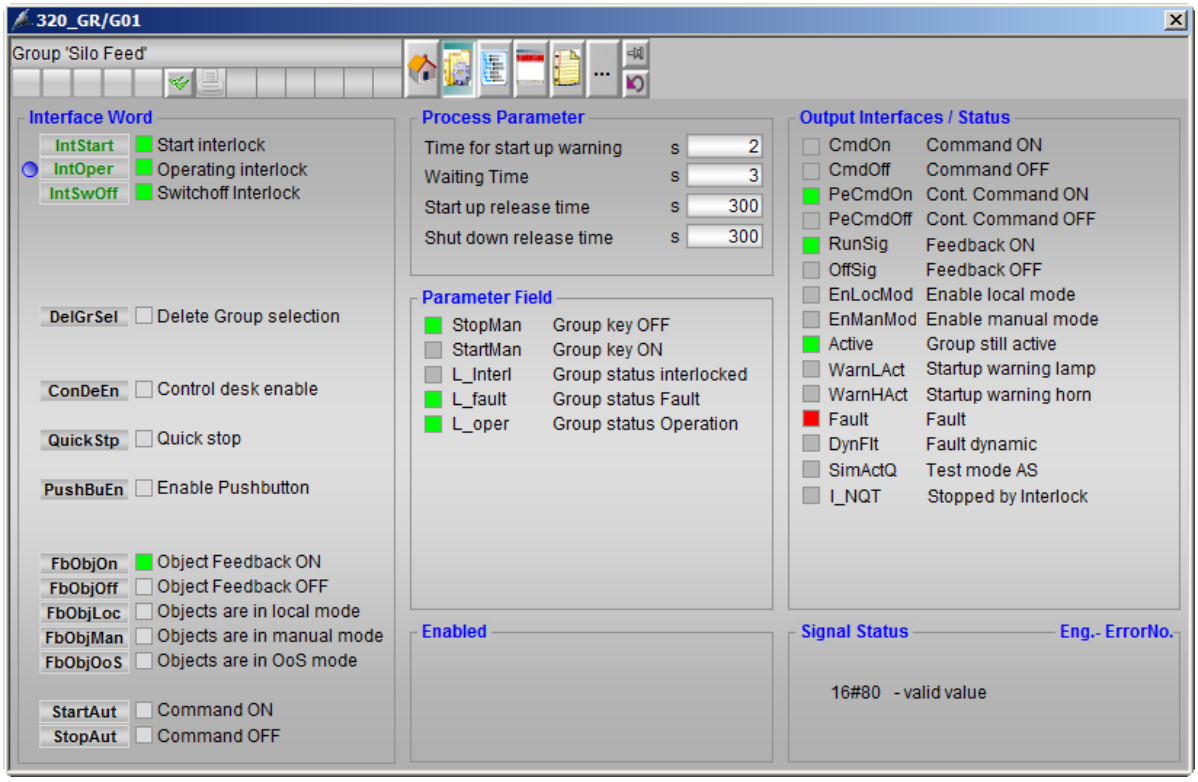
(22) click on the button “R” shows the “group related objects” on the process picture.

(23) click on the button “U” shows the “User defined Dialog”

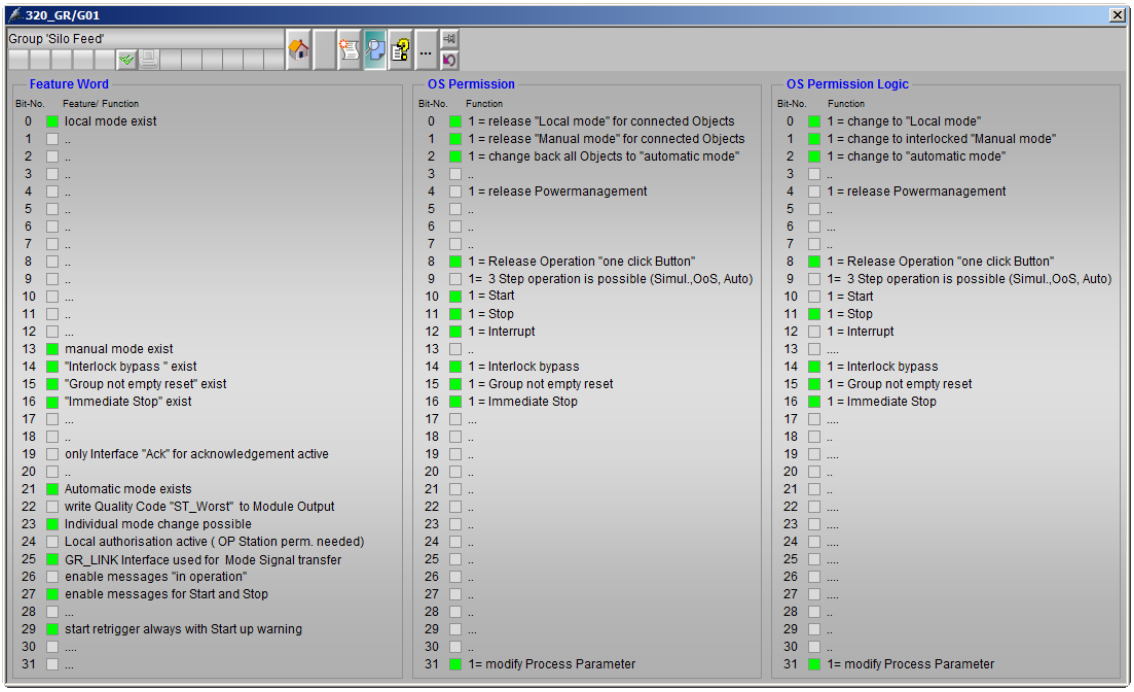


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Diagnosis Dialog



Preset Dialog:



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Special Functions

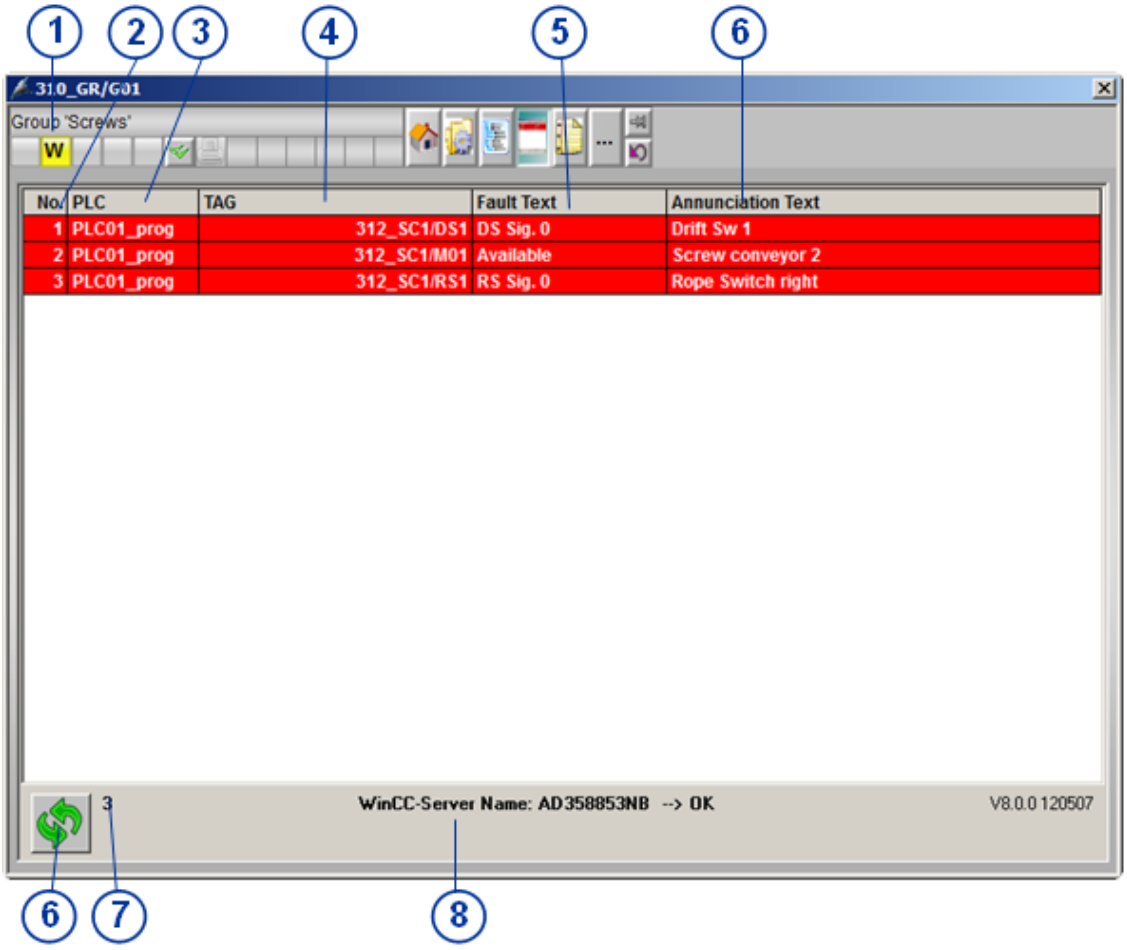
Group Status call

The status call of the group can be used in order to list all existing faults, warnings or interlocking conditions of the drives, measuring values and process signals assigned to this group.

If the group has routes, the status call of the group is related to the selected routes of that group. The elements of the not selected route will not be displayed.

The information will not be taken from the message system, but directly requested from the AS.

The Dialog can be opened from the “Displays and operator controls” (1) area with click on button “Status”.



The following will be indicated in the table (from the left to the right):

(2) Index, (3) Tag of PLC, (4) Tag of the faulty object, (5) fault text, (6) comment from the module.

The actualization button,(6) number of messages (7)and the WinCC server name (8) are indicated at the bottom side.

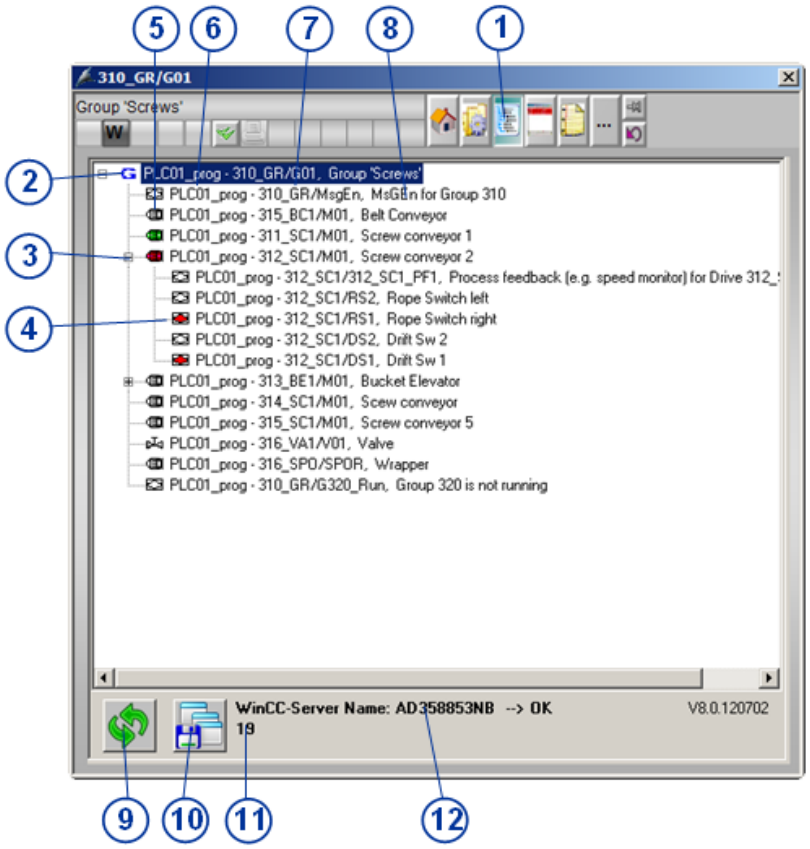
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Group Object list

The group instance list or Object list shows all drives, measuring values and process signals which are assigned to the group.

The first time you open the group instance list the information will be read from the AS and with the save button it is stored into the user archive. If you open the list again the information is read from the user archive.

The Dialog can be opened from the “Displays and operator controls” (1) area with click on button “Object”.



The tree structure shows (from left to right):

Group information (2), Node symbol if an route or drive object is included (3)
Objects belong to a Drive, Damper, Valve (4)
the symbol of the object type with the status 'off', 'on', 'fault' (5)
the PLC Tag (6), the Object Tag (7), the comment to the object (8)

Selecting an object with the left mouse key it can be shifted to any position. Thus, the real start-up sequence as per the interlocking can be indicated.

A click on the soft key „save“(10) stores the new tree structure to the user archive.

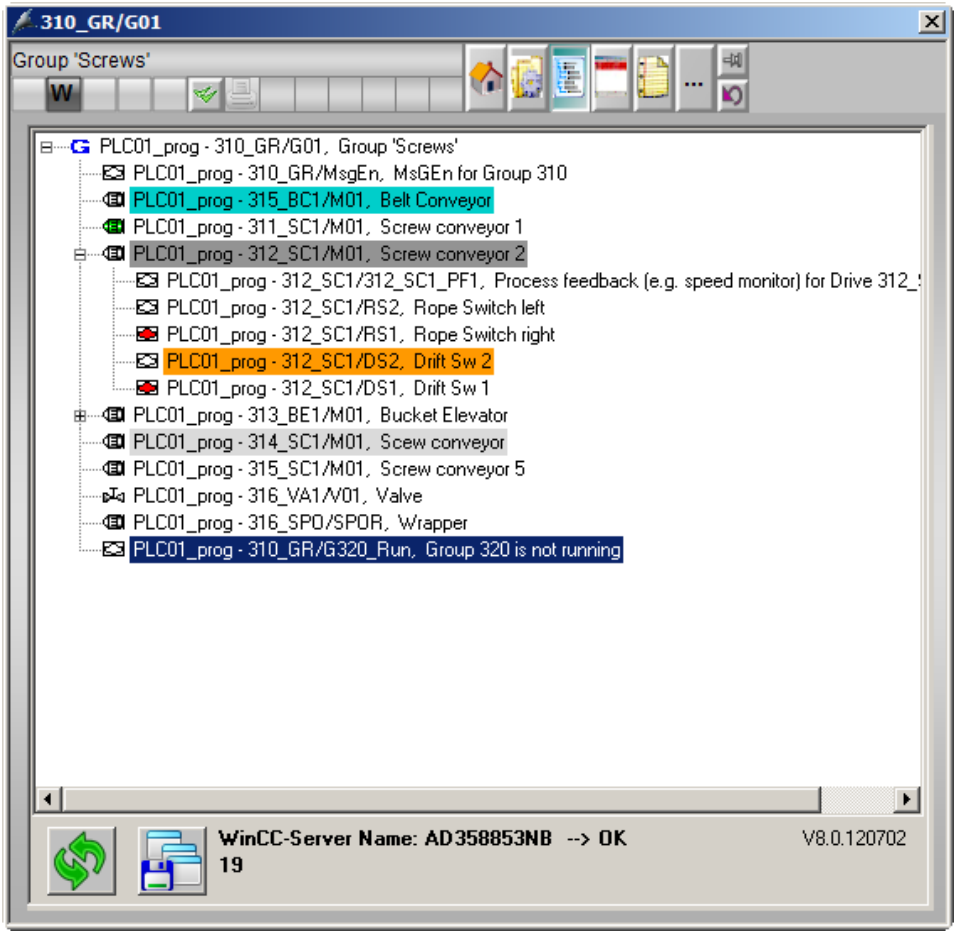
Single click on the soft key (9), reads the objects again from the AS and shows them unsorted in the tree structure.

A double-click on the line opens the faceplate of the corresponding object.

Amount of lines (11), WinCC server name (12) are indicated if the connection is ok

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If the mode of an object is not “Automatic” it will be shown with a colored line:
- bypass/ simulation -> brown
- local mode -> light gray
- manual mode -> cyan
- Out of Service -> dark gray.



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C_ROUTE Route

General Function description

Module Type C_ROUTE is a module for the selection of transport directions within a group. Route selection can be carried out via Operator station (route faceplate), via program or via conventional control desk push buttons.

Using routes the start/stop command from the group is not directly given to the drives, it is connected to the routes and the selected route forwards the signal to the drive.

The feedback signal of the drives is also connected to the routes and the selected route transmits the feedback signal to the group.

The route module allows the visualization of the operational conditions for a transport direction within group, displayed as a status display, and a detailed fault diagnosis (status call).

Linking the drives and annunciation blocks to the route instead of the group also allows filtering for diagnosis functions:

- The summarizing fault and warning indications in the group block icon only considers the drives and annunciations which belong to "selected" routes. The operator is not disturbed by plant objects which are not "in use".
- The status call of the group only shows the faults for selected plant objects.
- The group instance list shows the routes and in the second level the drives and annunciations within each route.

All diagnosis functions such as summarizing fault and warning indications, status call function and instance list are also available for the route itself. This means that diagnosis is possible also if the route is not yet selected:

- With a r**oute status call** function (Button 'Status'), all the present faults and interlocks of the affiliated drives, measured values and process signals in this route can be queried at anytime.
- The **route instance list** (Button 'Objects') shows all objects (drives, annunciations, measures), belonging to the route. All objects are shown with "Actual status", "Tagname" and "Comment". In case of an active "Simulation" the object is highlighted with orange color.

The route selection must be carried out before the group start.

The route can be selected and deselected via the Operator faceplate or through the program, e. g. by a process signal.

The route module generates operating messages for selection and de-selection.

Interlocks

Interlocks can be used in order to enable or disable the route selection or operation dependent on a process condition or a process signal. If a route interlock is not fulfilled, no alarm is created. This implies that interlock blocks must be used for diagnosis purpose and if necessary also additional C_ANNUNC blocks.



Refer to engineering examples, interlocking annunciations

The following process interlocks are available and can be used as per definition:

- Start interlock	**IntStart**
- Operating interlock	**IntOper**
- Manual interlock	**IntManu**

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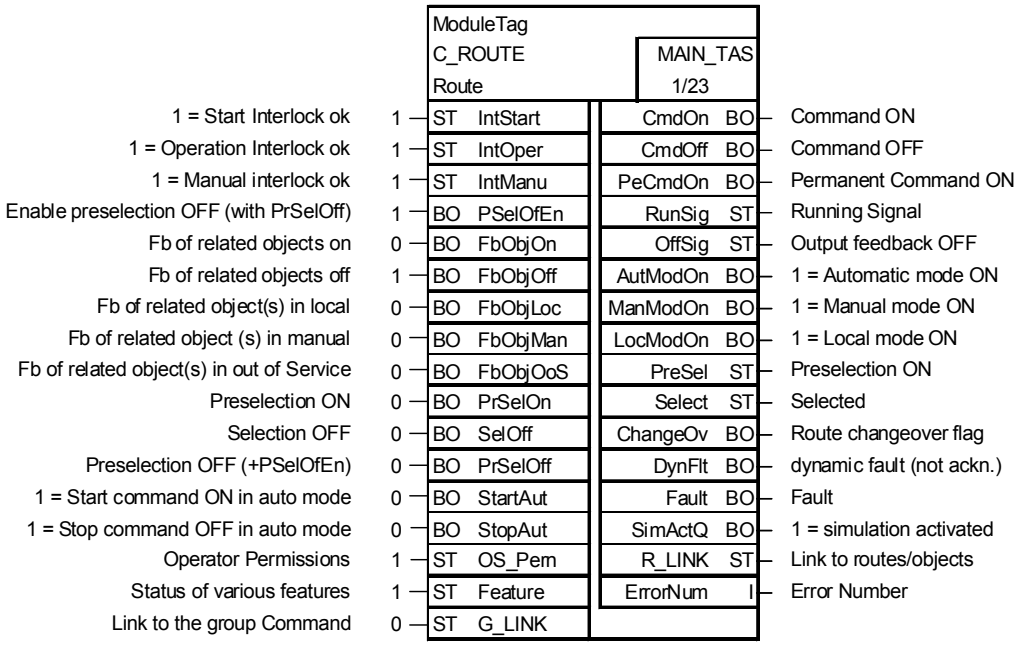
Process parameters

The following process parameters can be configured only in the CFC:

- Highlight objects time (s) for highlighting objects in the process picture

Function block

The picture below shows the most important interfaces and process parameters of the route function block. More detailed information you will find in the object description of the block.



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Visualization

In the **block icon** of the route the most important operation status are displayed (selected, deselected, running, fault, warning, interlocked). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block Icon (representation in the process picture)



The block icon of the route shows the following information:

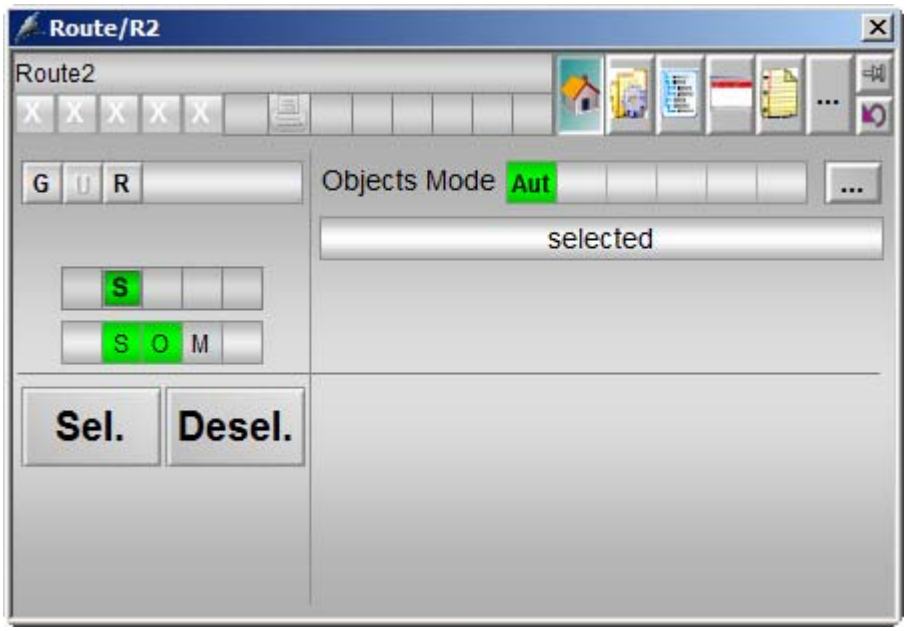
Symbol	Route status	Description
L	Locked	locked
D	Operation	deselected
P	Operation	preselected
S	Operation	selected
S	Operation	selected
O	Operation	operation
A	Fault	static fault
A	Fault	dynamic fault / flashing
W	Warning	warning
W	Warning	dynamic warn/ flashing
P	Interlock	blocked
I	Interlock	interlocked
I	Interlock	Interlocked/ flashing

All additional indications are optional.

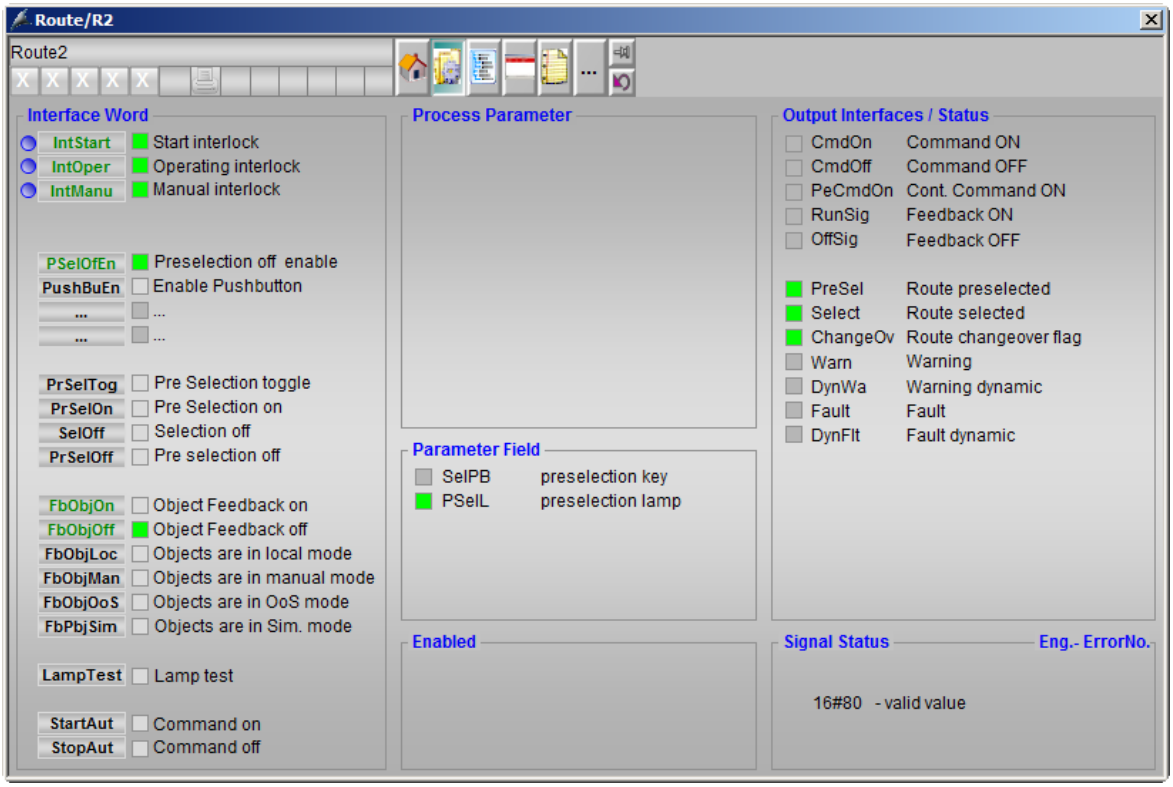
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Faceplate, Diagnosis, Object list and Preset Dialog

Faceplate Dialog:

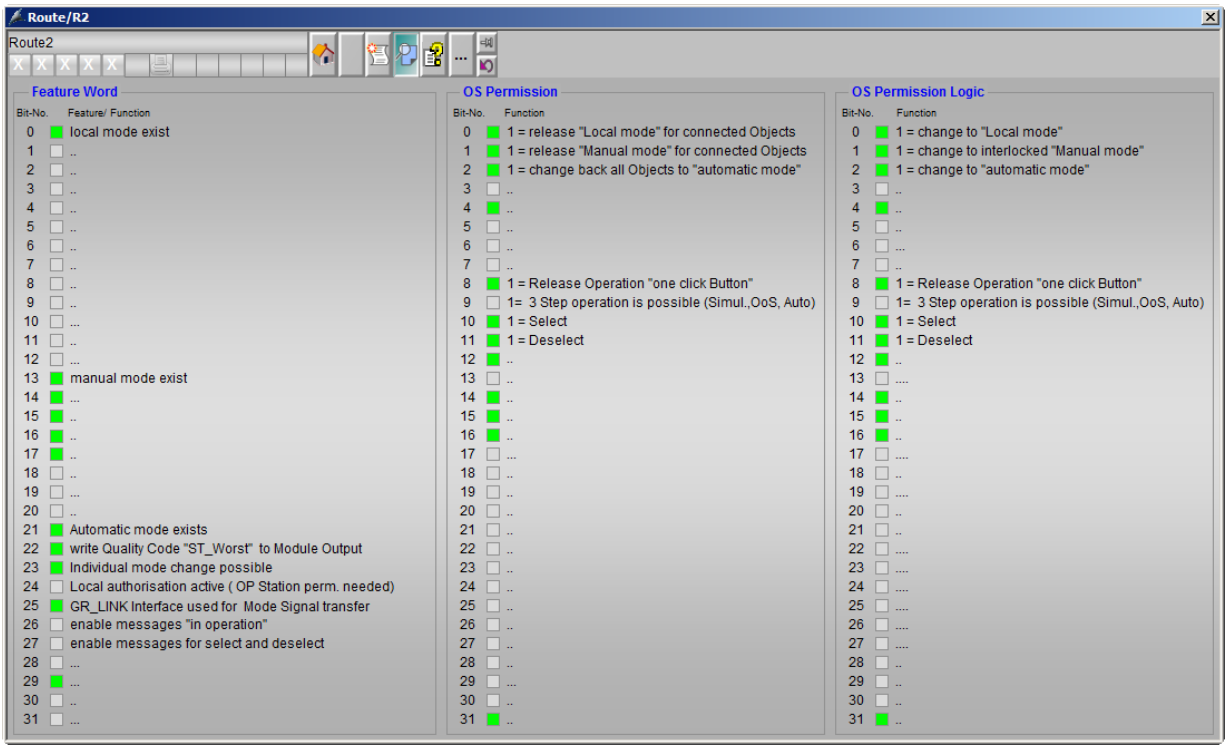


Diagnosis Dialog



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Preset Dialog:



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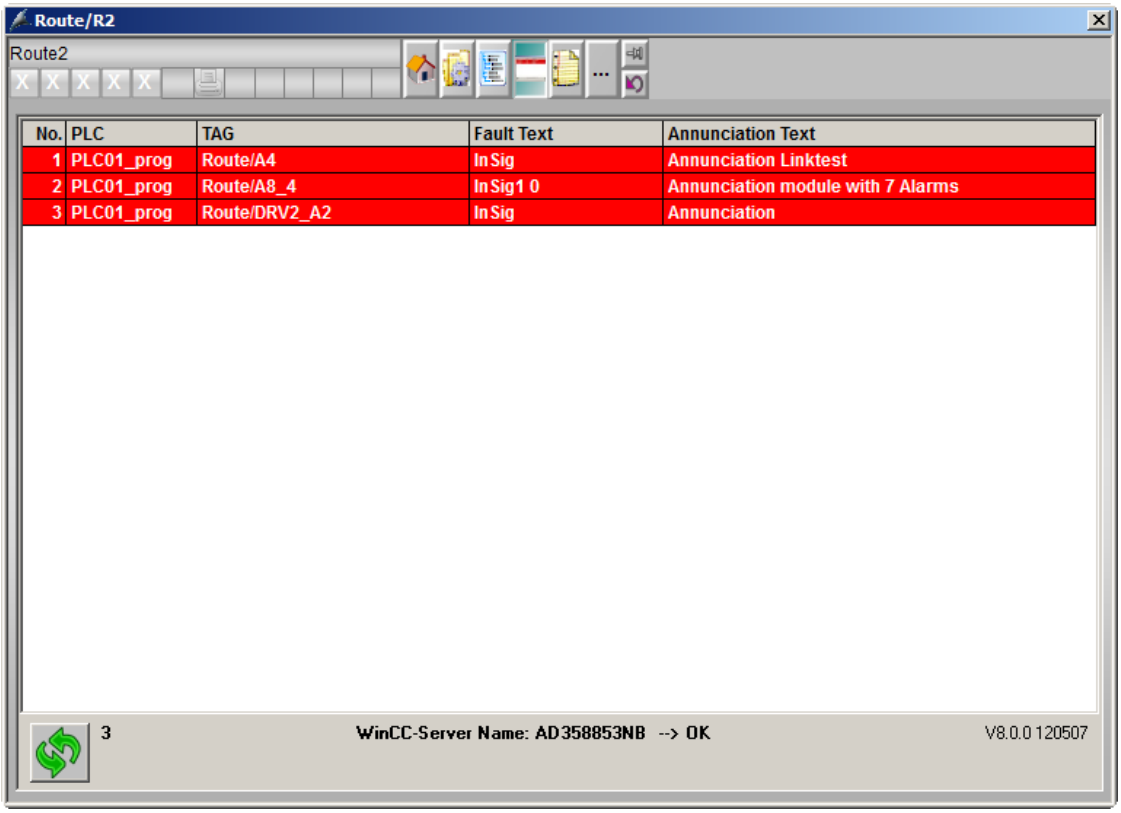
Special Functions

Route Status call

The status call of the route can be used in order to list all existing faults, warnings or interlocking conditions of the drives, measuring values and process signals assigned to this route.

The information will not be taken from the message system, but directly requested from the AS.

The Dialog can be opened from the “Displays and operator controls” area with click on button “Status”.



The following will be indicated in the table (from the left to the right):

Index, Tag of PLC, Tag of the faulty object, fault text, comment from the module.

The actualization button, number of messages and the WinCC server name are indicated at the bottom side.

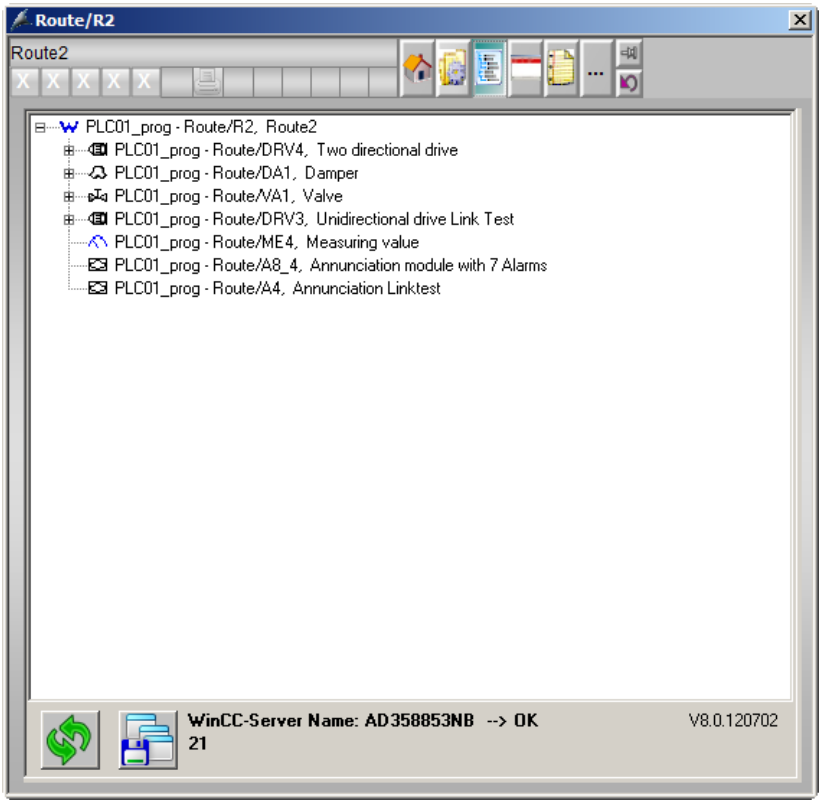
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Route instance list

The route instance list or Object list shows all drives, measuring values and process signals which are assigned to the route.

The first time you open the route instance list the information will be read from the AS and with the save button it is stored into the user archive. If you open the list again the information is read from the user archive.

The Dialog can be opened from the “Displays and operator controls” area with click on button “Object”.



The tree structure shows (from left to right):

Route information, Node symbol if an drive object is included **(3)**
Objects belong to a Drive, Damper, Valve
the symbol of the object type with the status 'off', 'on', 'fault'
the PLC Tag , the Object Tag, the comment to the object

Selecting an object with the left mouse key it can be shifted to any position. Thus, the real start-up sequence as per the interlocking can be indicated.

A click on the soft key „save“ stores the new tree structure to the user archive.

Single click on the soft key, reads the objects again from the AS and shows them unsorted in the tree structure.

A double-click on the line opens the faceplate of the corresponding object.

If the mode of an object is not “Automatic” it will be shown with a colored line:
- bypass/ simulation -> brown
- local mode -> light gray
- manual mode -> cyan
- Out of Service -> dark gray

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C_SELECT Selection

General Function description

Module Type C_SELECT can be used for any kind of selection function. In contrast to the route, it does not provide detailed fault analysis (status call). But, on the other hand, the selection is relatively simple to handle and can be easily used for the selection of individual drives.



Block functions are only active in **automatic mode.**
If the block is switched to **Out of Service**, operation of the selection block is inhibited, the outputs are set to "0", all messages are suppressed and only the status words are actualized. Memorized functions are reset.

Selection and de-selection can be done via the Operator Station or through the program. During selection signal *Select* is set, which may be used, e.g. to interlock drives.

The status of the selection module (Selection On, Selection Off, interlocked) is visualized.

The selection module generates operating messages for selection and de-selection.

In addition to the Operator commands **selection and de-selection** can be carried out by program using interfaces *SelOn* and *SelOff.*

Interlocks

Interlocks can be used in order to enable or disable the selection or de-selection dependent on a process condition or a process signal. If a selection interlock or de-selection interlock is not fulfilled, no alarm is created. This implies that interlock blocks must be used for diagnosis purpose and if necessary also additional C_ANNUNC blocks.



Refer to engineering examples, interlocking annunciations

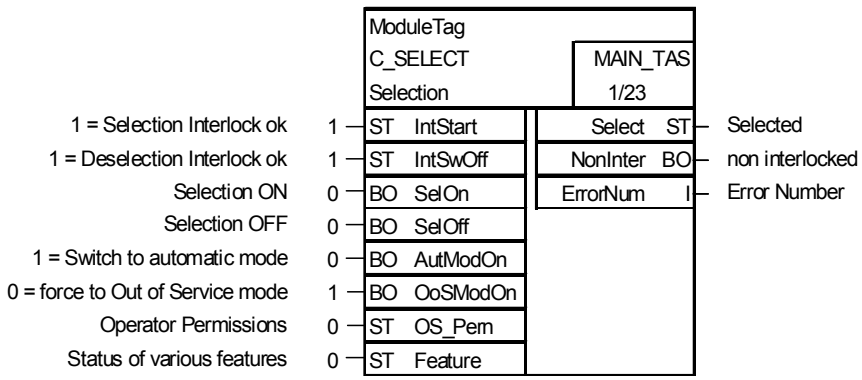
The following process interlocks are available and can be used as per definition:

- Start interlock	**IntStart**	(Selection interlock)
- Switch-off interlock	**IntSwOff**	**(**De-selection interlock)

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Function block

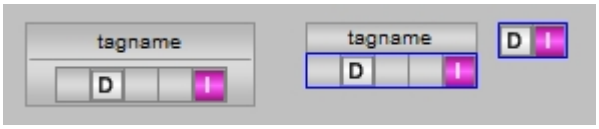
The picture below shows the most important interfaces and process parameters of the selection block. More detailed information you will find in the object description of the block.



Visualization

In the **block icon** of the selection block the most important operation status are displayed (selected, deselected, running, fault, warning, interlocked). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block icon (Representation in the Process Picture)



The block icon of the selection block shows the following information:

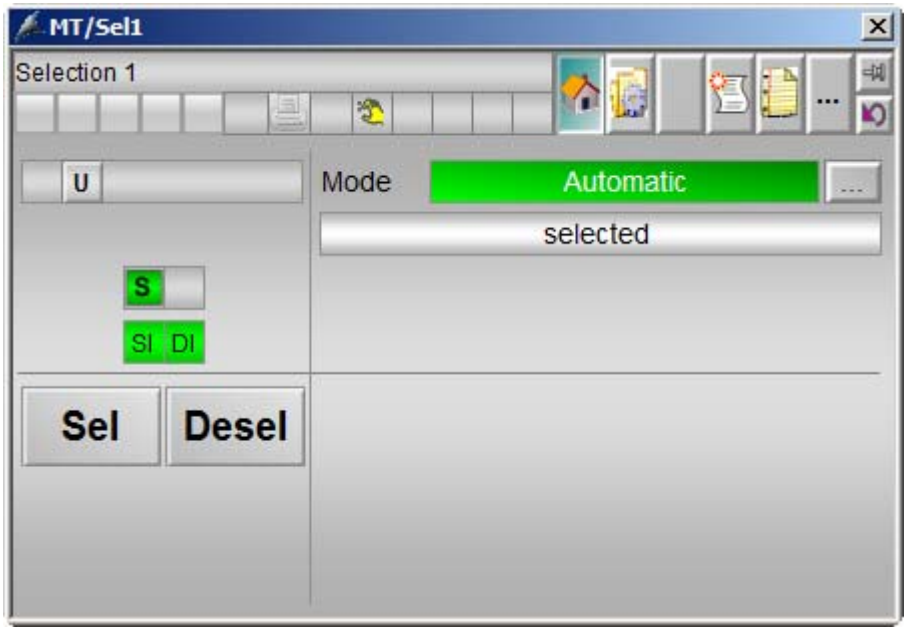
Symbol	Selection status	Description
	Selection	startup green / flashing
	Operation	startup white / flashing
	Operation	operation
	Interlock	interlocked
	Interlock	manual mode

All additional indications are optional.

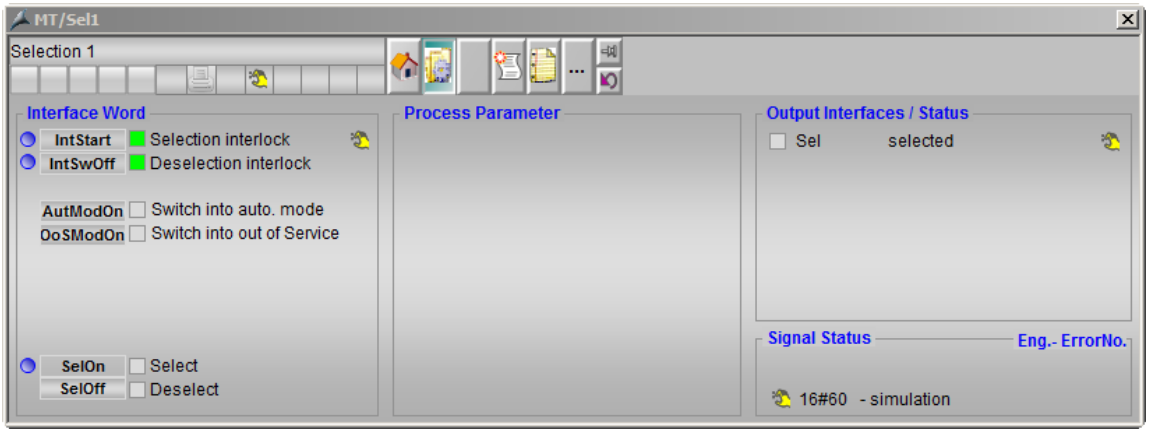
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Faceplate, Diagnosis, Object list and Preset Dialog

Faceplate Dialog:

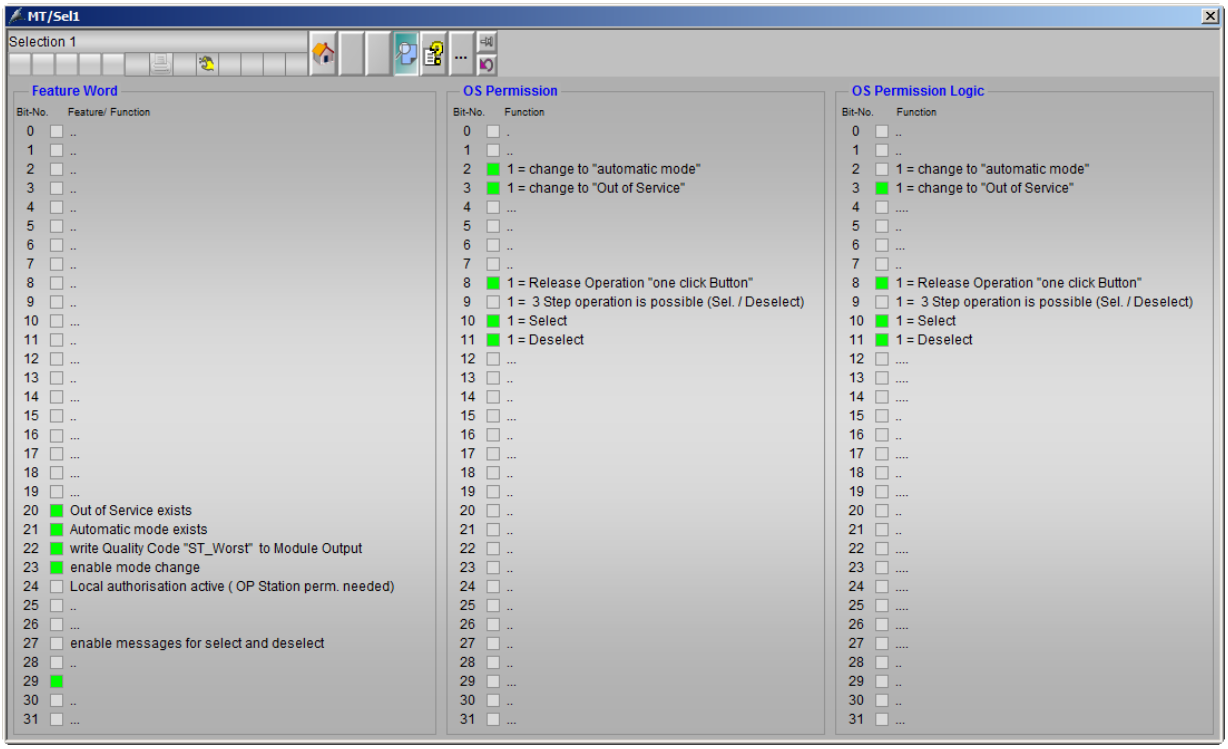


Diagnosis Dialog



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Preset Dialog:



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C_ANNUNC Annunciation Module

General Function description

With block C_ANNUNC a binary process signal can be displayed. If the process signal is not healthy, a fault or warning message can be created.



Block functions are only active in **automatic mode.**
If the block is switched to **Out of Service**, operation of the annunciation block is inhibited, the outputs are set to "0", all messages are suppressed and only the status words are actualized. Memorized functions like Simulation, etc. are reset.

Most common applications for C_ANNUNC modules:

Drive faults:

The protection signals of a motor (e.g. belt drift, pull-rope, bearing temperature etc.) cannot be signaled by the Cemat drive block itself. In this case the annunciation block is used to create the additional messages. The output of the annunciation block is used in order to stop the drive in case of a fault.

Process signals:

An annunciation block is used to display binary process signals such as silo levels, pressure supervisions etc. A fault or warning message will be created of the signal is missing.

Interlocking conditions:

Annunciation blocks are used in order to show the interlocking conditions for groups and routes in the group/route status call. These can be interlocks through process signals as well as "internal" interlocking conditions, such as route selections or the operation status of another group.

Read Process signal:

Via the *InSig* binary process signal can be read. *InSig* has structure format and can not directly be linked to the Periphery (process image). Either a PCS7 driver block Pcs7DiIn or a converter block (*StruDiOu*) must be inserted for format conversion. Connection to a binary output from another block is possible

In case of connecting the Digital input to the C_ANNUNC via a converter block no information about the quality of the signal is available. The quality code is preset to "valid value".

In case of connecting the Digital input to the C_ANNUNC via PCS7 driver block Pcs7DiIn, the driver block does the validation check and provides the Signal status together with the value in the Structure output. If the Structure variable ST contains value 16#00, the value is invalid.

In the block icon and in the faceplate the signal status is shown. The code is additionally displayed in the diagnosis window.

Output of the Process signal:

If the signal is not suppressed or delayed by process parameter settings, the input value is available at output *OutSig*.

Exception: In case of warnings only the output Warn is set because warnings should not influence the process.

All further functions are optional and can be defined through corresponding parameterization of the feature bits and block parameters.

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Signal evaluation:

The display and alarm behavior of the block can be configured through parameterization. Some functions need to be enabled or can be modified via Feature bit settings:

BitNr.	Function/Features	Default value
16	O_LINK used for Message activation (internal MsgTrigg)	FALSE
17	internal warning activation (internal ActWarn)	FALSE
29	Warn mode active	FALSE

- In case of an incoming fault, resetting of output *OutSig* can be delayed via parameter *OutOnDTi*.
- In case of an outgoing fault, setting of output *OutSig* can be delayed via parameter *OutOfDTi*.
- In order to achieve for the protections signals of a drive the same message behavior as for the faults which are annunciated by the drive itself, the alarms can be triggered via interface *MsgTrigg* or via O_LINK connection (if the corresponding feature bit is set).
- With interface *DynFltEn* alarms and dynamic faults can be suppressed in general. (In case of a fault the block shows only static indications).
  This behavior can be desired during the start-up or for non running equipment.
- The annunciation release *MsgEn* can be used in order to prevent an onrush of messages in case of power failure. The message generation in the block is frozen and neither incoming nor outgoing messages are created.
- Via interface *GrFltLck* the block can be deselected for the summarizing indication in group and route. In the status call the fault and warnings can still be seen.
- Via interface *GrStaLck* the block can also be deselected form the summarizing indication in group and route. In this case the block faults and warnings are not entered in the status call.
- Important messages can be repeated. This is done through configuration of an annunciation repeat time *RepTi.*
- Via configuration of the delay time *WarnDelTi* in case of a fault the block generates first a warning message and then an alarm message (after the time has elapsed).
  Two-level-alarms can be enabled via interface *ActWarn* or via *O_LINK*, depending on the feature bit setting.
- Via parameter *MemTrip* it can be decided to memorize the fault until the acknowledgement.
- Via feature bit settings, the block can be configured to create a warning message instead of a fault message. In this case the two-level-alarm function is disabled.

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Release, block or simulation functions:

Under certain circumstances it can be necessary to suppress the supervision completely or to switch the annunciation block to simulation mode. Functions depend on feature bit settings.

BitNr.	Function/Features	Default value
18	O_LINK used for Supervision enable (Drive on)	FALSE
28	Status of Simulation value	TRUE

Switching to simulation requires an OS Permission:

BitNr.	Function/OS Permission	Default value
15	1 = Operator can change to simulation	TRUE

- Via interface "Supervision enable" *SupOn* or via O_LINK connection (depending on the feature bit setting) the complete supervision can be enabled or disabled. If the supervision is disabled, the fault bit is reset.
  The enable can be delayed via timer *SupOnTi*, e. g. suppress faults in the start-up phase of a motor.
- If the block is switched to simulation, instead of the input value the simulation value is displayed and transferred to the output *OutSig*.
  The simulation value ("1" or "0") can be configured via feature bit settings.
  The change to simulation is carried out via diagnosis window or automatically if the AS is switched to sequence test mode.
  OS Permission bit 15 must be TRUE to enable switching to simulation via OS.

Process parameters

Through process parameters the following values can be configured online:

- Supervision delay time (s) Time delay for evaluating the process signal
- OutSig On delay time (s) After InSig changes from "1" to "0"
- OutSig Off delay time (s) After InSig changes from "0" to "1"
- Warning delay (s) Delay between warning and fault message
- Annunciation repeat time (s) For re-trigger of the message after a certain time

Message Classes:

Alarm:

By default setting the annunciation block creates (red) fault messages (Alarm High).

Two-level-alarm (Warning before Alarm):

This option exists only for drive faults and only in case the motor is already running. If al fault occurs a warning is created first and only if the fault stays longer than a specified time it leads to a fault message + switch off of the drive (e. g. in case of drift switches).
If the fault exists at the moment of drive start, no warning message is created and the fault message is created immediately.

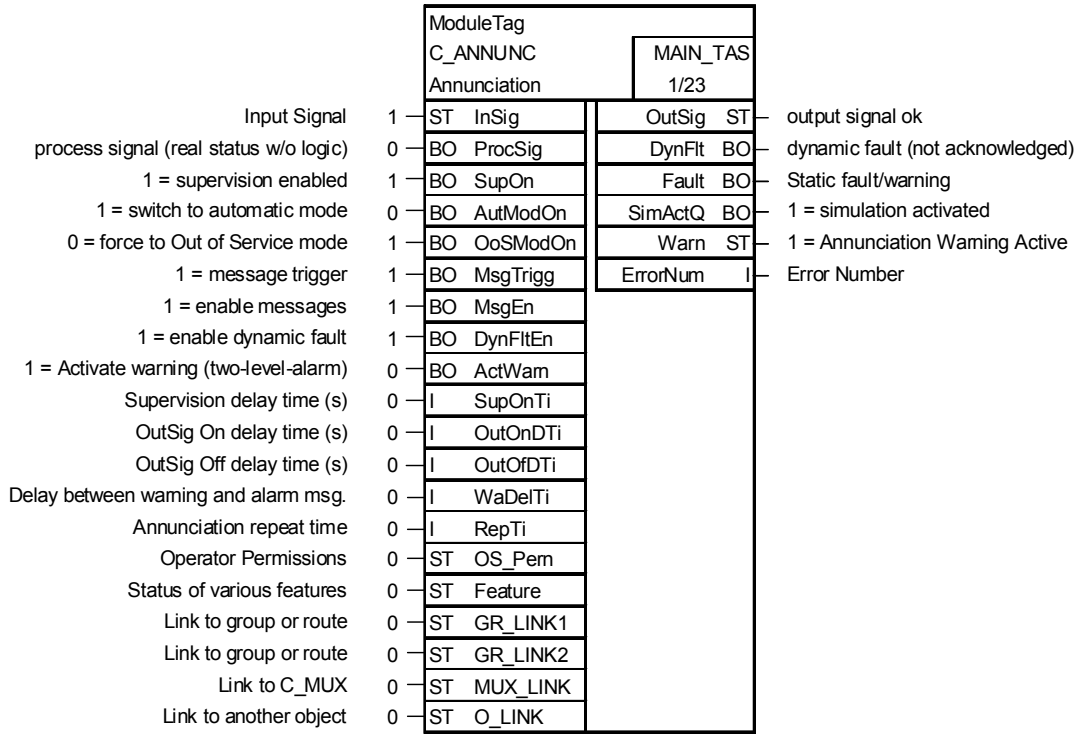
Warning:

If the warn mode is active, the annunciation block will always create warning messages. In warn mode no two-level-alarming is possible.

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Function block

The picture below shows the most important interfaces and process parameters of the annunciation block. More detailed information you will find in the object description of the block.



Sequence Test mode

Via a setting in the System chart SYSPLCxx all Annunciation blocks within the AS are switched into Simulation. Instead of the input value the simulation value (Feature bit 28) is transferred to outputs *OutSig.* Output *SimActQ* indicates that the simulation is activated.

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Visualization

In the **block icon** of the annunciation block the most important operation status are displayed (signal status, fault, warning). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block icon (Representation in the Process Picture)



The block icon of the annunciation block shows the following information:

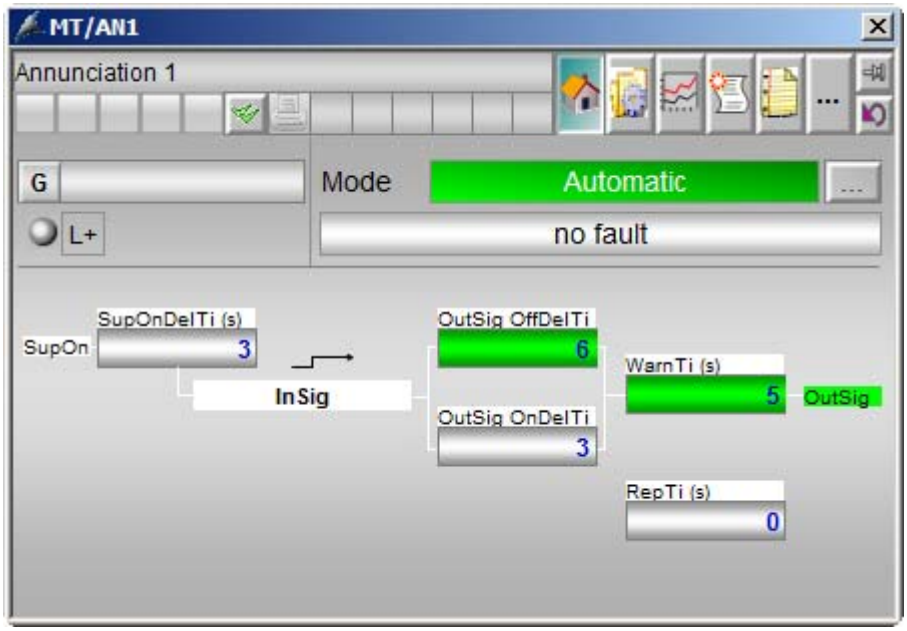
Symbol	Display	Description
	red	fault
	red flashing	fault not acknowledged
	green	on
	grey	off
	yellow	warning
	yellow flashing	dynamic warning

All additional indications are optional.

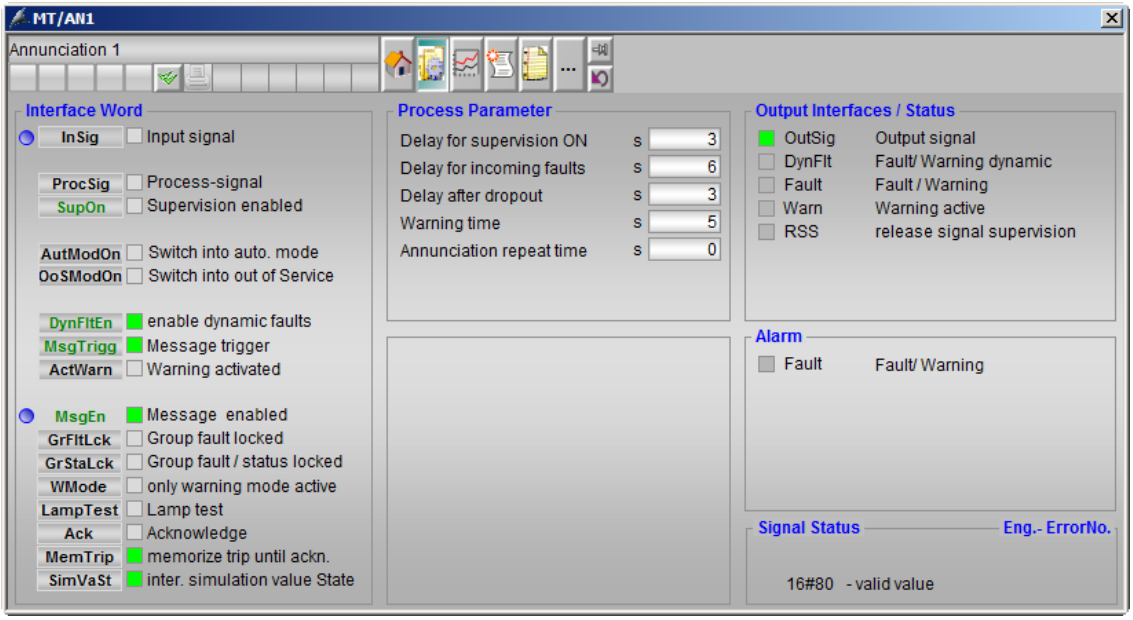
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Faceplate, Diagnosis and Preset Dialog

Faceplate Dialog:

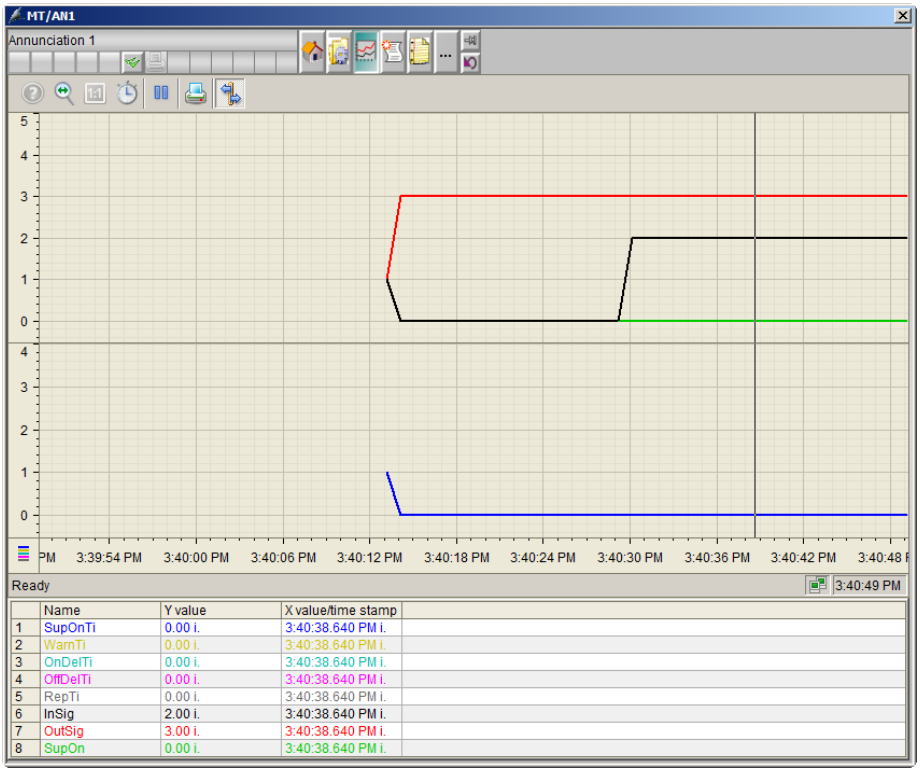


Diagnosis Dialog



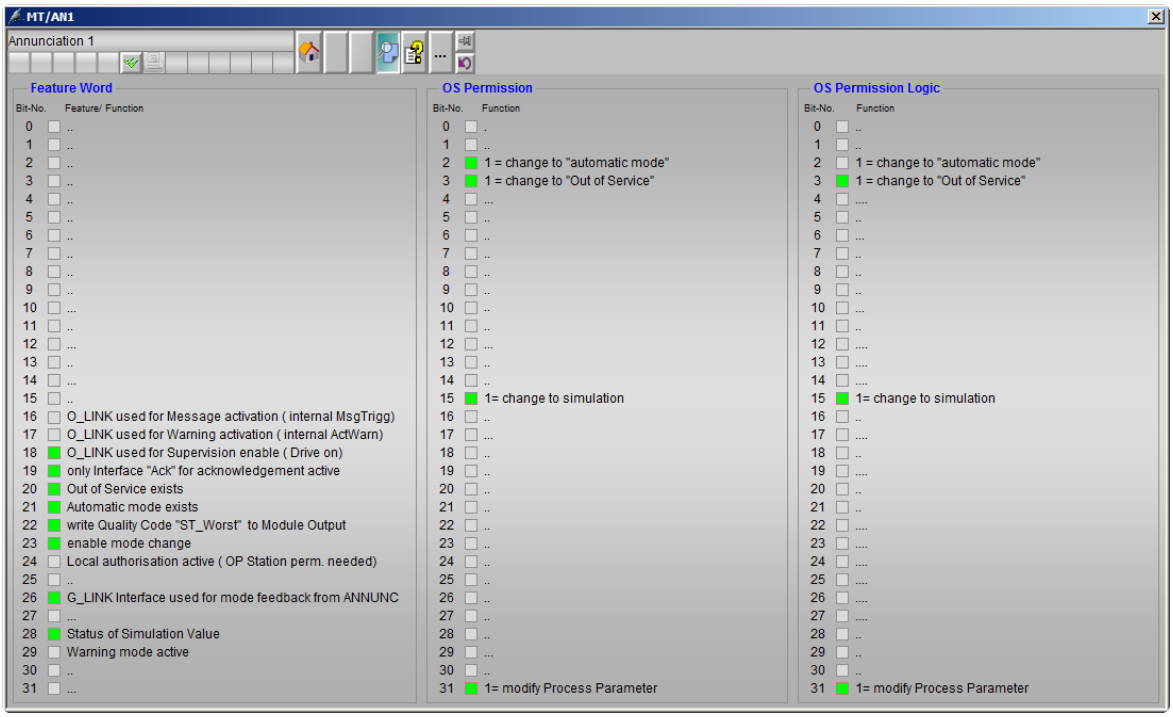
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Trend Dialog:



	Name	Y value	X value/time stamp
1	SupOnTi	0.00 i.	3:40:38.640 PM i.
2	WarnTi	0.00 i.	3:40:38.640 PM i.
3	OnDelTi	0.00 i.	3:40:38.640 PM i.
4	OffDelTi	0.00 i.	3:40:38.640 PM i.
5	RepTi	0.00 i.	3:40:38.640 PM i.
6	InSig	2.00 i.	3:40:38.640 PM i.
7	OutSig	3.00 i.	3:40:38.640 PM i.
8	SupOn	0.00 i.	3:40:38.640 PM i.

Preset Dialog:



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C_ANNUN8 Annunciation8 module

General Function description

With block C_ANNUN8 up to 7 binary process signals can be displayed. If the one of the process signals is not healthy, a fault or warning message can be created.



Block functions are only active in **automatic mode.**
If the block is switched to **Out of Service**, operation of the annunciation block is inhibited, the outputs are set to "0", all messages are suppressed and only the status words are actualized. Memorized functions like Simulation etc. are reset.

Most common applications for C_ANNUN8 modules:

Drive faults:

The protection signals of a motor (e.g. belt drift, pull-rope, bearing temperature etc.) cannot be signaled by the Cemat drive block itself. In this case the annunciation block is used to create the additional messages. The output of the annunciation block is used in order to stop the drive in case of a fault.

Process signals:

An annunciation block is used to display binary process signals such as silo levels, pressure supervisions etc. A fault or warning message will be created of the signal is missing.

Read Process signal:

Via the *InSig1* to *InSig7* up to 7 binary process signals can be read. *InSig1* to *InSig7* have structure format and can not directly be linked to the Periphery (process image). Either a PCS7 driver block Pcs7DiIn or a converter block (*StruDiOu*) must be inserted for format conversion. Connection to a binary output from another block is possible

In case of connecting the Digital input to the C_ANNUNC via a converter block no information about the quality of the signal is available. The quality code is preset to "valid value".

In case of connecting the Digital input to the C_ANNUNC via PCS7 driver block Pcs7DiIn, the driver block does the validation check and provides the Signal status together with the value in the Structure output. If the Structure variable ST contains value 16#00, the value is invalid.

In the block icon and in the faceplate the signal status is shown. The code is additionally displayed in the diagnosis window.

Output of the Process signal:

If the signal is not suppressed or delayed by process parameter settings, the input values are available at outputs *OutSig1* to *OutSig7*.

Exception: In case of warnings only the output Warn is set because warnings should not influence the process.

All further functions are optional and can be defined through corresponding parameterization of the feature bits and block parameters.

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Signal evaluation:

The display and alarm behavior of the block can be configured through parameterization. Some functions need to be enabled of can be modified via Feature bit settings:

BitNr.	Function/Features	Default value
0	signal no. 1 is used as a warning	FALSE
1	signal no. 2 is used as a warning	FALSE
2	signal no. 3 is used as a warning	FALSE
3	signal no. 4 is used as a warning	FALSE
4	signal no. 5 is used as a warning	FALSE
5	signal no. 6 is used as a warning	FALSE
6	signal no. 7 is used as a warning	FALSE
16	O_LINK used for Message activation (internal MsgTrigg)	FALSE

- In case of an incoming fault, resetting of outputs *OutSig1* to *OutSig7* can be delayed via parameter *OutOnDTi*.
- In order to achieve for the protections signals of a drive the same message behavior as for the faults which are annunciated by the drive itself, the alarms can be triggered via interface *MsgTrig1 to MsgTrig7* or via O_LINK connection (if the corresponding feature bit is set).
- The annunciation release *MsgEn* can be used in order to prevent an onrush of messages in case of power failure. The message generation in the block is frozen and neither incoming nor outgoing messages are created.
- Via interface *GrFltLck* the block can be deselected for the summarizing indication in group and route. In the status call the fault and warnings can still be seen.
- Via interface *GrStaLck* the block can also be deselected form the summarizing indication in group and route. In this case the block faults and warnings are not entered in the status call.
- Via feature bit settings, each input can be configured for warning instead of fault. The message definition must be adapted accordingly. If a fault is present the block icon will be red, if only warnings are present the block icon will be yellow.

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Release, block or simulation functions:

Under certain circumstances it can be necessary to suppress the supervision completely or to switch the annunciation block to simulation mode. Functions depend on feature bit settings.

BitNr.	Function/Features	Default value
18	O_LINK used for Supervision enable (Drive on)	FALSE
28	Simulation Value ("1" or "0")	TRUE

Switching to simulation requires an OS Permission:

BitNr.	Function/OS Permission	Default value
15	1 = Operator can change to simulation	TRUE

- Via interface "Supervision enable" *SupOn1* to *SupOn7,* or via O_LINK connection (depending on the feature bit setting) the complete supervision can be enabled or disabled. If the supervision is disabled, the fault bit is reset.
  The enable can be delayed via timer *SupOnT1* to *SupOnT7*, e. g. suppress faults in the start-up phase of a motor.
- If the block is switched to simulation, instead of the input value the simulation value is displayed and transferred to the output *OutSig1* to *OutSig7*.
  The simulation value ("1" or "0") can be configured via feature bit settings.
  The change to simulation is carried out via diagnosis window or automatically if the AS is switched to sequence test mode.
  OS Permission bit 15 must be TRUE to enable switching to simulation via OS.

Process parameters

Through process parameters the following values can be configured online:

- Supervision delay time Signal 1(s) — Time delay for evaluating the process signal 1
- OutSig 1 On delay time (s) — After InSig1 changes from "1" to "0"
- Supervision delay time Signal 2(s) — Time delay for evaluating the process signal 1
- OutSig 2 On delay time (s) — After InSig2 changes from "1" to "0"
- Supervision delay time Signal 3(s) — Time delay for evaluating the process signal 1
- OutSig 3 On delay time (s) — After InSig3 changes from "1" to "0"
- Supervision delay time Signal 4(s) — Time delay for evaluating the process signal 1
- OutSig 4 On delay time (s) — After InSig4 changes from "1" to "0"
- Supervision delay time Signal 5(s) — Time delay for evaluating the process signal 1
- OutSig 5 On delay time (s) — After InSig5 changes from "1" to "0"
- Supervision delay time Signal 6(s) — Time delay for evaluating the process signal 1
- OutSig 6 On delay time (s) — After InSig6 changes from "1" to "0"
- Supervision delay time Signal 7(s) — Time delay for evaluating the process signal 1
- OutSig 8 On delay time (s) — After InSig7 changes from "1" to "0"

Message Classes:

Alarm:

By default setting the annunciation block creates (red) fault messages (Alarm High).

Warning:

If the warn mode is activated for individual inputs (Feature bit 0 to Feature bit 6 = TRUE), the annunciation block will create a warning message for the corresponding input signal.

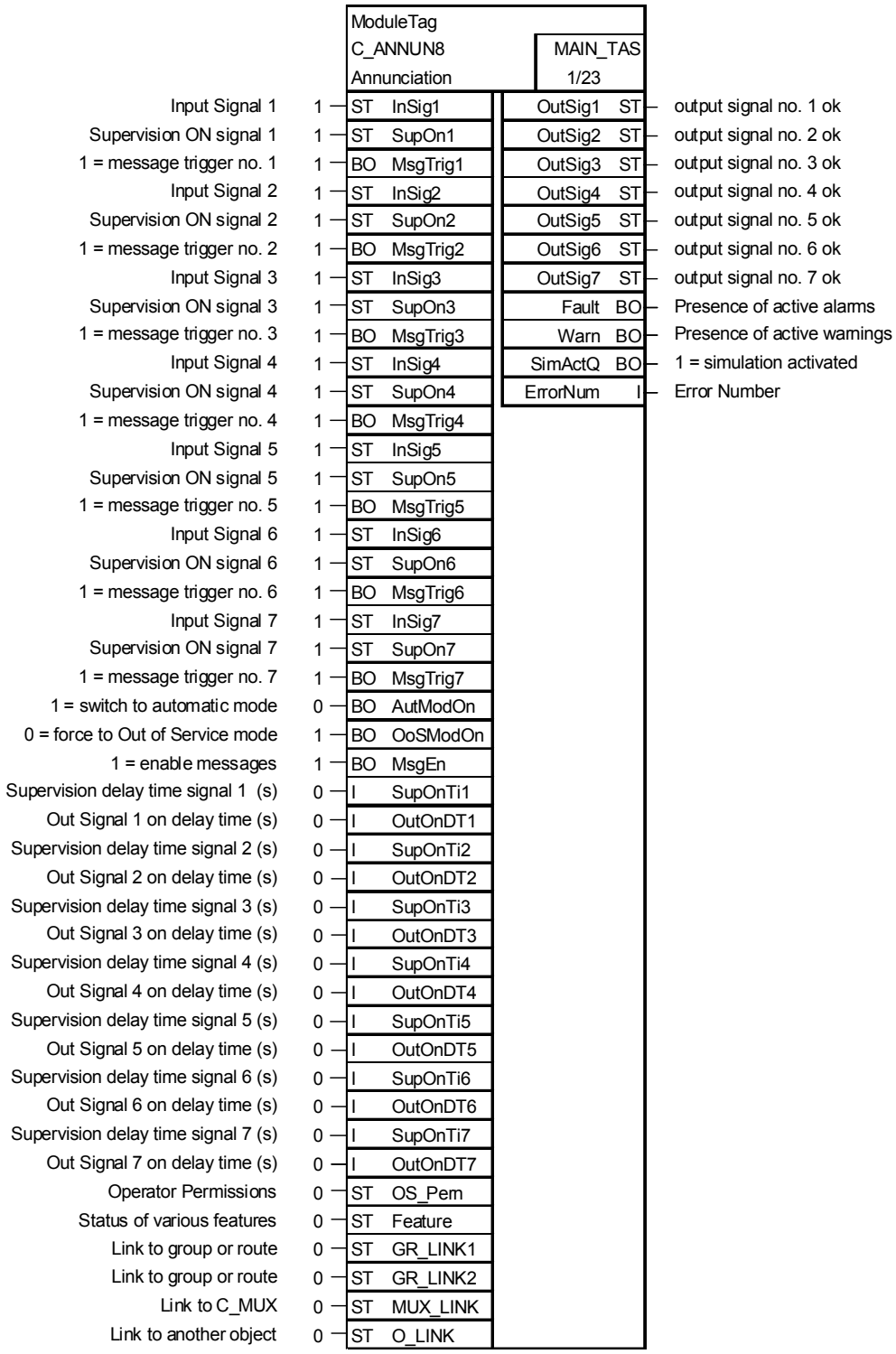


Caution: The message configuration for the block has to be adapted as well.

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Function block

The picture below shows the most important interfaces and process parameters of the annunciation8 block. More detailed information you will find in the object description of the block.



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Sequence Test

Via a setting in the System chart SYSPLCxx all Annunciation blocks within the AS are switched into Simulation. Instead of the input value the simulation value (Feature bit 28) is transferred to outputs *OutSig1* to *OutSig7.* Output *SimActQ* indicates that the simulation is activated.

Visualization

In the **block icon** of the annunciation block the most important operation status are displayed (signal status, fault, warning). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block icon (Representation in the Process Picture)



The block icon of the annunciation block shows the following information:

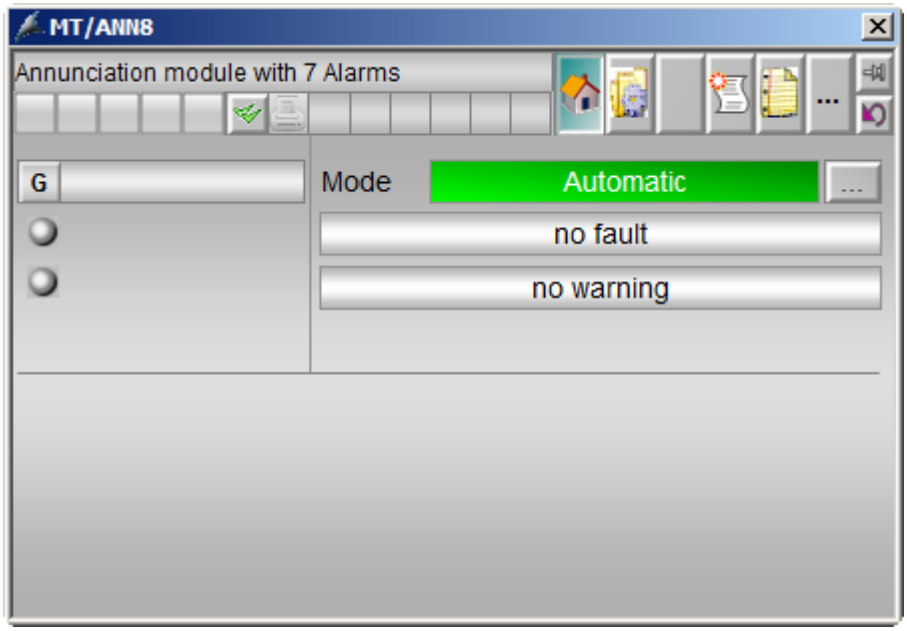
Symbol	Display	Description
	red flashing	fault not acknowledged
	red	fault
	yellow flashing	dynamic warning
	yellow	warning
	grey	off

All additional indications are optional.

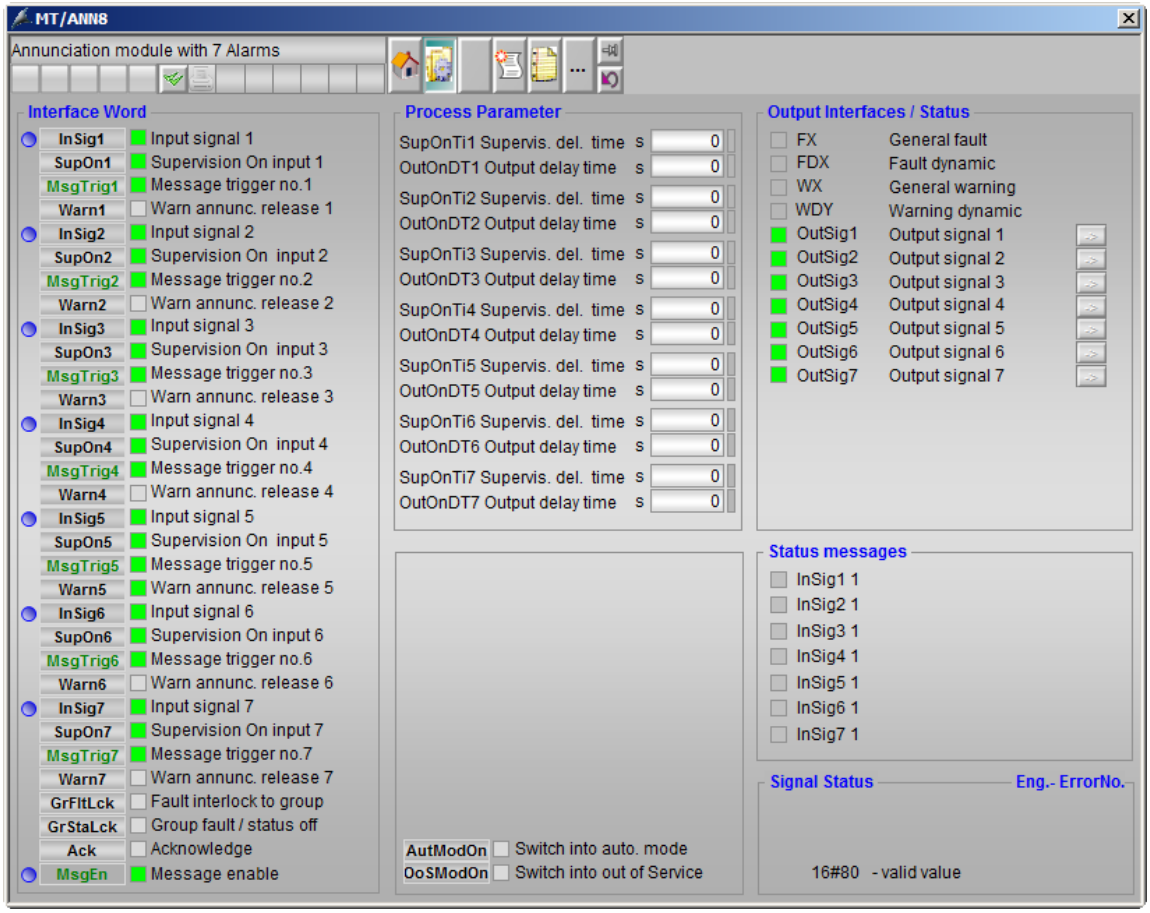
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Faceplate, Diagnosis and Preset Dialog

Faceplate Dialog:

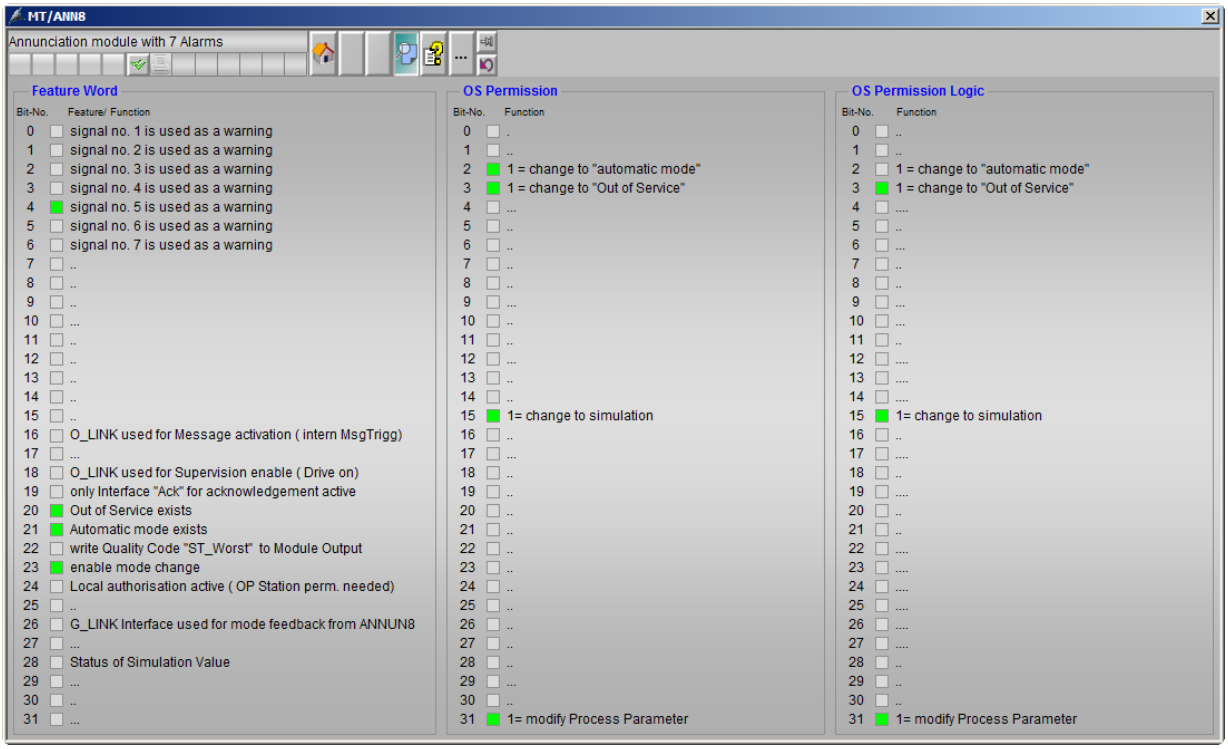


Diagnosis Dialog



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Preset Dialog:



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C_PROFB Process Feedback block

General Function description

Block C_PROFB can monitor binary or analog process feedback signals of a drive, such as speed monitor or pressure signals. C_PROFB must always be linked to a drive block C_DRV_1D or C_DRV_2D, because it needs to exchange information with the drive block.

In case of a process feedback fault the drive will be stopped via protection interlock. The alarm is created by the process feedback block.

Depending on the configuration of the block, the input may either be evaluated during drive start only, or as well when the drive is stopped.

Read Process feedback signal:

The process feedback block can either evaluate a digital input or an analog value. The digital input may be a continuous signal or pulses. The configuration is done via feature settings:

BitNr.	Function/Features	Default value
15	Enable analog process value monitoring	FALSE
27	Enable Process Feedback pulse evaluation	FALSE

If **Feature bit 15** = FALSE the binary input *InSig* is evaluated as process feedback signal. The process feedback may be available as continuous signal (1-Signal after the drive is running) or pulses, depending on Feature bit 27:

- If **Feature bit 27** = FALSE, input *InSig* must be a continuous signal. The input must get "1" after the drive is running and it must get "0" after the drive has been stopped (except "Off delay monitoring" is disabled).
- If **Feature bit 27** = TRUE, input *InSig* must be pulsing after the drive is running and pulses must stop after the drive has been stopped (except "Off delay monitoring" is disabled).

If **Feature bit 15** = TRUE, the analog input signal *PV* is evaluated as process feedback signal. The value must exceed the startup OK limit *StUpLim* after the drive is running and must be below Shut down OK limit *ShDoLim* after the drive has been stopped (except "Off delay monitoring" is disabled).

Output of the Process signal:

The process feedback block has two outputs, which must be connected to the drive:

Output *ProFB* is set to 1-Signal as soon as the process feedback is available. After this bit is set the drive status is changed from "startup" to "running".

Output *ProFB* is either set immediately after process feedback has arrived or after the on delay for monitoring *PFOnDTi* has elapsed. This can be configured via feature bit setting:

BitNr.	Function/Features	Default value
31	ProFB = 1 when Process feedback input = 1 signal	TRUE

Output *OutSig* has 0-Signal in case of a trip. This signal must be connected to the protection interlock *IntProtA* of the drive, in order to stop the drive in case of a process feedback fault (only in Automatic and in Manual mode).

All further functions are optional and can be defined through corresponding parameterization of the feature bits and block parameters.

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Signal evaluation:

The display and alarm behavior of the block can be configured through parameterization. Some functions depend on Feature bit settings:

BitNr.	Function/Features	Default value
14	keep fault status up to new startup of drive	FALSE
16	O_LINK used for Message activation (MsgEn) from Drive	FALSE
29	Warn mode active	FALSE
30	Enable off delay monitoring Process Feedback	TRUE

- After starting the drive in Automatic or in Manual mode, the process feedback must be available within "On delay for monitoring" *PFOnDTi.*
- The off delay monitoring can be enabled via Feature bit setting. In this case, after the drive has been stopped, the process feedback must be off within "Off delay monitoring time" *PFOnDTi.*
- The annunciation release *MsgEn* can be used in order to prevent an onrush of messages in case of power failure. The message generation in the block is frozen and neither incoming nor outgoing messages are created.
  Via feature bit setting the "message enable" can be carried out internally, via O_LINK connection.
- The fault status can be memorized (kept up to the next successful startup of drive) or not, depending on a feature bit setting.
- Via feature bit settings the process feedback block can be switched into warn mode. In this case Output *OutSig* remains "1" in case of a process feedback fault.

Release, block or simulation functions:

Under certain circumstances it can be necessary to switch the process feedback block to simulation mode. Switching to simulation requires an OS Permission:

BitNr.	Function/OS Permission	Default value
15	1 = Operator can change to simulation	TRUE

- If the block is switched to simulation, OutSig is set to 1-Signal and output ProFB corresponds to the status of the drive (1-Signal if drive has been started, 0-Signal if drive has been stopped).
  The change to simulation is carried out via diagnosis window or automatically if the AS is switched to sequence test mode.
  OS Permission bit 15 must be TRUE to enable switching to simulation via OS.

Process parameters

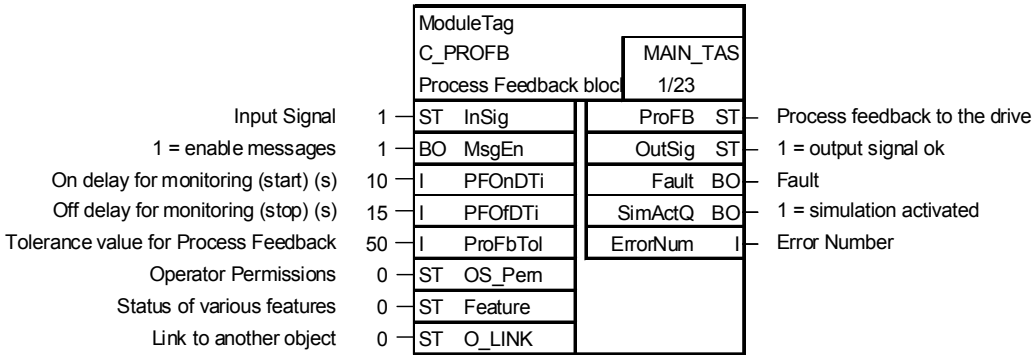
Through process parameters the following values can be configured online:

- On delay for monitoring (s) Process feedback supervision during drive start
- Off delay for monitoring (s) Process feedback supervision during drive stop
- Tolerance value (cycles) Tolerance value in case of pulse evaluation
- Startup OK limit PV must exceed this limit after Startup
- Shut down OK limit PV must go below this limit after Shutdown.

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Function block

The picture below shows the most important interfaces and process parameters of the process feedback block. More detailed information you will find in the object description of the block.



Sequence Test mode

Via a setting in the System chart SYSPLCxx all Process feedback blocks within the AS are switched into Simulation and the process feedback is no longer evaluated. Output *SimActQ* indicates that the simulation is activated.

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Visualization

In the **block icon** of the process feedback block the most important operation status are displayed (signal status, fault, warning). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block icon (Representation in the Process Picture)



The block icon of the process feedback block shows the following information:

Symbol	Display	Description
	red	fault
	red flashing	fault not acknowledged
	green	on
	grey	off
	yellow	warning
	yellow flashing	dynamic warning

All additional indications are optional.

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Faceplate, Diagnosis and Preset Dialog

C_ProFB Faceplate with release of digital Input Signal

The Dialog shows on top the “Displays and operator controls” **(1)** area followed by the “drive mode information **(3)** and Mode change button **(4)** which allowed changing over in “simulation mode”.

In the next lines are shown:
(12) Status symbol , green = ok, red = faulty, yellow = warning
(13) abbreviation of Signal Typ
The Text “S+” is adjustable on the block Output “OutSig” -> Value -> Text1

(11) digital Input signal with Text and Status
The Text “InSig1” is adjustable on the block Input “InSig” -> Value -> Text0/Text1

(2) Status text with indication of “no fault”, “fault” and “Warning”

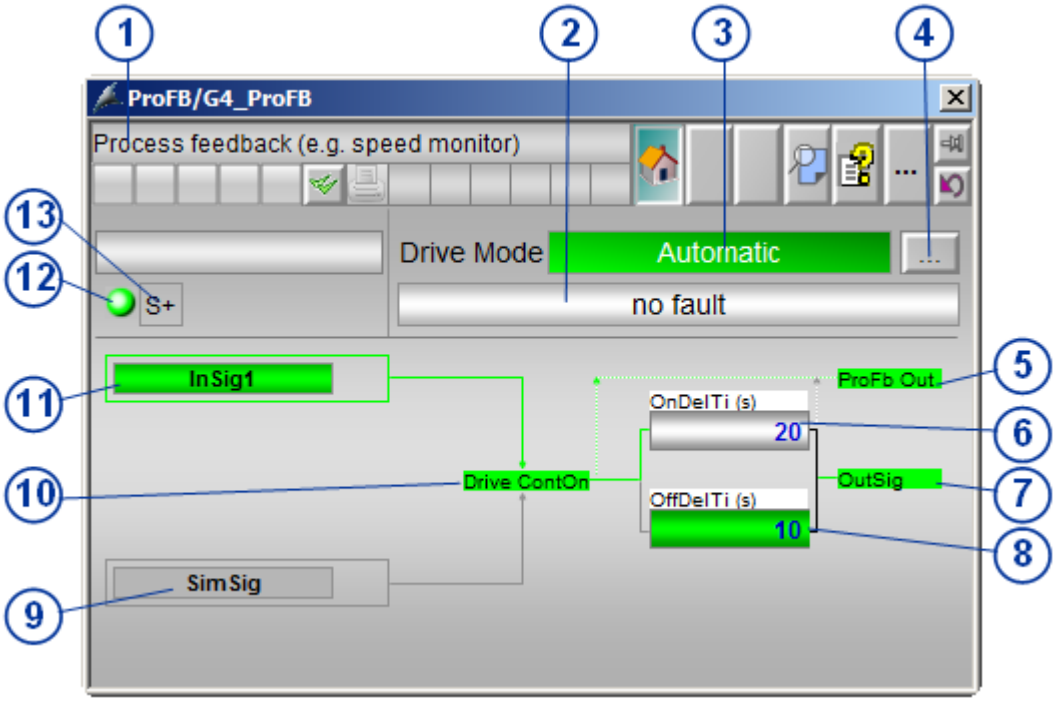
(10) Indicate the drive run status

(5) “ProFbOut” will be green if “DrivContOn” and “InSig1” = “1” That Signal is used in the drive block to build up the “RunSig”.

(6) “OnDelTi” is started if the DriveContOn **(10)** Signal is = “1” and the “InSig1” **(11)** is = “0” In case the Inputsignal is not “1” in that time an alarm will be appear and switch of the Interlock signal “OutSig” **(7)**.

(8) “OffDelTi”, In case also the switch off monitoring process is enabled and the “DriveConOn” is =”0” the timer is running down. In this time period the “InSig1” has to changed to “0” otherways an Alarm will be appear.

(9) “SimSig” Signal, If the Simulation Signal is active it will be shown with a brown color.



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C_ProFB Faceplate with release of analog Input Signal

The Dialog shows on top the “Displays and operator controls” (1) area followed by the “drive mode information **(3)** and Mode change button **(4)** which allowed changing over in “simulation mode”.

In the next lines are shown:
(14) Status symbol , green = ok, red = faulty, yellow = warning
(15) abbreviation of Signal Typ
The Text “S+” is adjustable on the block Output “OutSig” -> Value -> Text1

(2) Status text with indication of “no fault”, “fault” and “Warning”

(13) Startup limit , (11) Shut down limit, adjustable in Diagnosis dialog

(12) analog Input signal with Value and Unit
The Unit is adjustable on the block Input “PV” -> Value -> Identifier

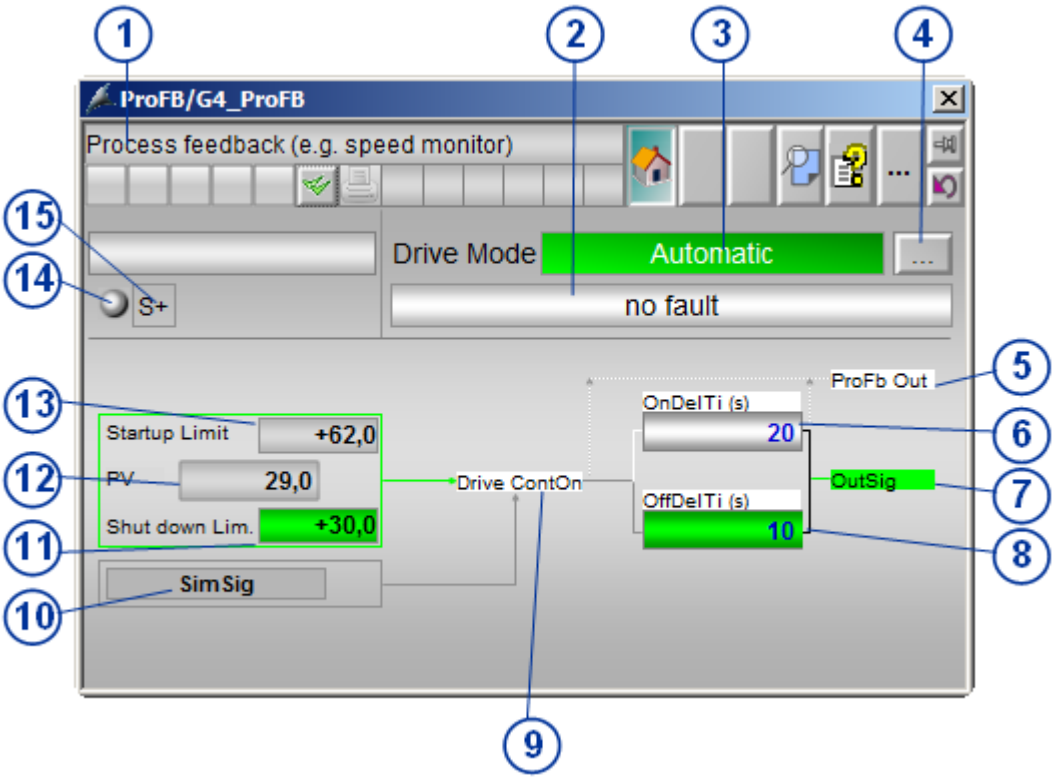
(10) Indicate the drive run status

(5) “ProFbOut” will be green if “DriveContOn” and “PV” Value is higher then the “Start up Limit” That Signal is used in the drive block to build up the “RunSig”.

(6) “OnDelTi” is started if the DriveContOn **(10)** Signal is = “1” and the “PV” Value is not higher then the “Start up Limit”
If the Timer is “0” an alarm will be appear and switch of the Interlock signal “OutSig” **(7)**.

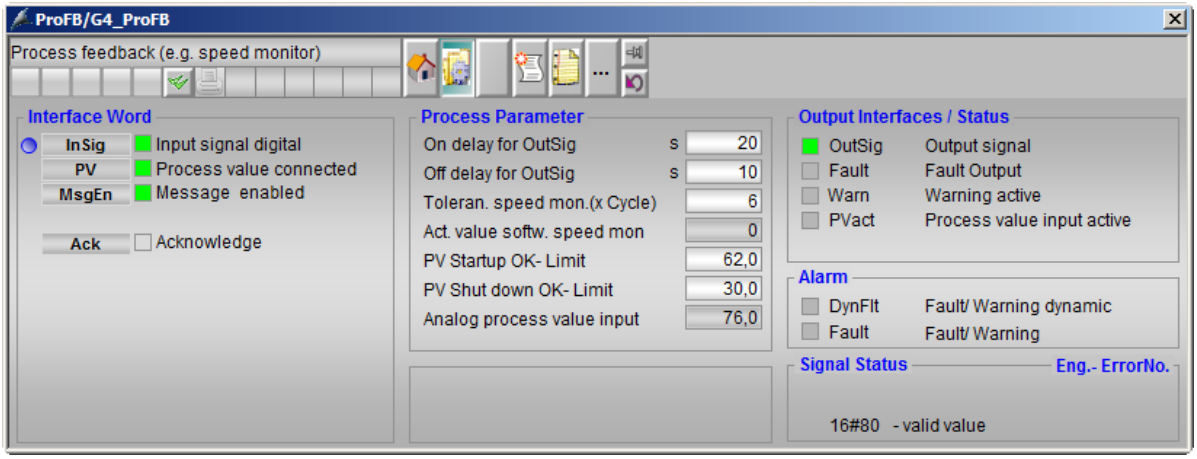
(8) “OffDelTi”, In case also the switch off monitoring process is enabled and the “DriveConOn” is =”0” the timer is running down. In this time period the “PV” Value has to underflow the “Shut down Limit” Value, other ways an Alarm will be appear.

(9) “SimSig” Signal, If the Simulation Signal is active it will be shown with a brown color.

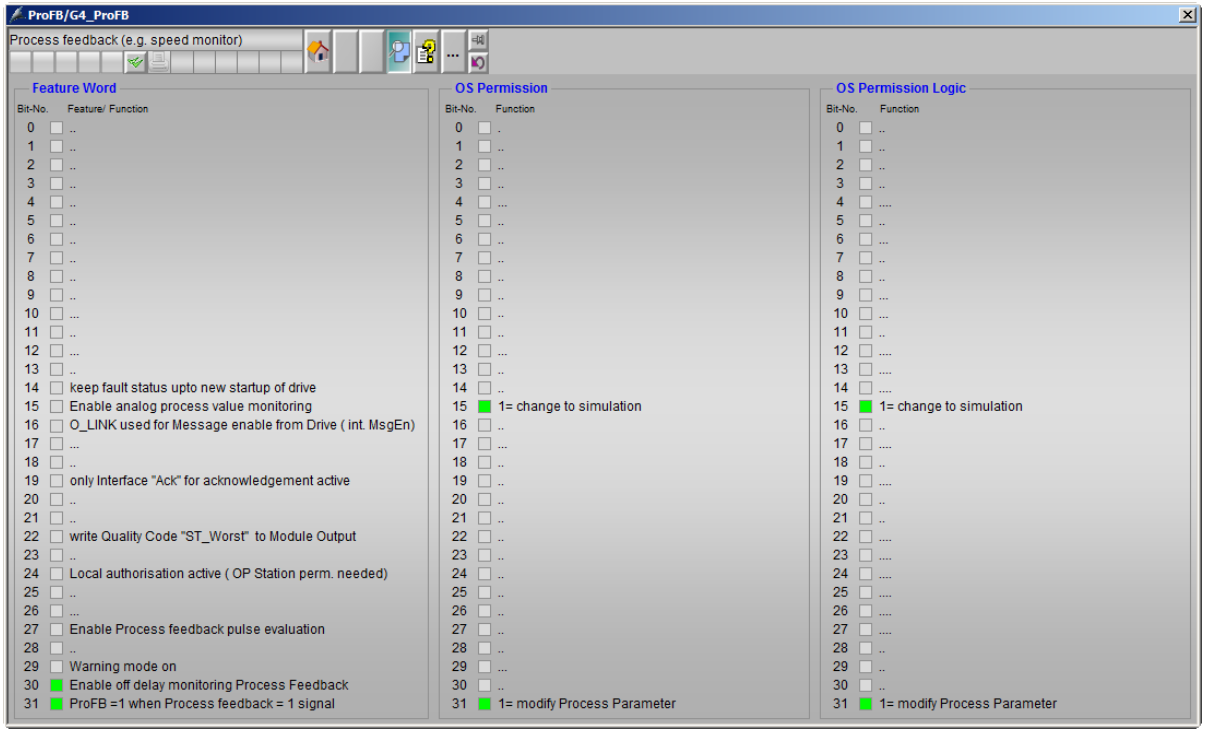


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Diagnosis Dialog



Preset Dialog:



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C_MEASUR Maesuring value block

General Function description

Block C_MEASUR can be used in order to read analog process values and to monitor up to 8 limit values. 4 limits values can be configured to create warning / fault messages, the other 4 limits are switching limits and do not generate any alarm.

In the block symbol and in the faceplate the value and the signal status is shown.



Block functions are only active in **automatic mode.**
If the block is switched to **Out of Service**, operation of the measured value block is inhibited, the outputs are set to "0", all messages are suppressed and only the status words are actualized. All memorized functions, like Simulation, Bypass, etc. are reset.

Reading the Measuring value:

The measured value block can either read an analog process value in REAL format via Structure Input PV or a card value via Input in WORD format via input MV_Card.

For reading the card value the parameter ReadCard must be switched to 1-Signal.

Reading a Card value in WORD format

Via input MV_Card the analog value can be read as input word directly from the S7 Periphery (process image). In this case the measured value block converts the card value into the physical value.

For the calculation the following formula is used:

$$\frac{(PV\_OpSca.High - PV\_OpSca.Low) * (MV\_Card - Card\_SCB)}{(Card\_SCE - Card\_SCB)} + PV\_OpSca.Low$$

PV_OpSca.Low = Scale low value
PV_OpSca.High = Scale high value
CaLZ_SCB = Start value of the card's low bad range
Card_SCB = Start value of the card's nominal range
Card_SCE = End value of the card's nominal range
CaLZ_SCE = Start value of the card's high bad range

Using a direct connection to the Analog input card, the validation check of the read in analog value is as follows:

- If the Card value MV_Card is between Card_SCB and Card_SCE it is ok.
- If the Card value MV_Card is between (CaLZ_SCB and Card_SCB) the output is forced to Scale low value PV_OpSca.Low, but still without fault.
- If the Card value MV_Card is between (Card_SCE and CaLZ_SCE) the output is forced to Scale high value PV_OpSca.High, but still without fault.
- If the Card value MV_Card is <= CaLZ_SCB or >= CaLZ_SCE the output is forced to PV_OpSca.High and output LZ (Live Zero) is set to 1-Signal for an invalid measured value. An alarm message is created for "Bad Quality".
  At the same time all limit outputs PV_HH, PV_H, PV_L, PV_LL, PV_SHH, PV_H, PV_L and PV_LL are set to 1-Signal.



S5-Periphery can not be read directly. The measuring value block is not able to read the coding of the S5 Periphery card.

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Reading a physical value as REAL Structure

Via input PV the measured value block can read the physical value as REAL Structure. (The driver block Pcs7AnIn of the APL Library provides a structure output which contains the value in REAL format and the signal status.)

In case of connecting the Analog input to the measure via PCS7 driver block Pcs7AnIn, the driver block does the validation check and provides the Signal status together with the value in the Structure output *PV_Out*.

If the structure variable *ST* has value 16#00, the value is invalid and the measuring value block sets block output *LZ* (Live Zero) to 1-Signal. An alarm message is created for "Bad Quality".

If the structure variable *ST* has value 16#60, it may be a simulated value, a substitute value or the last valid value. In case of a substitute value or the last valid value output *Bad* is set at the same time and the C_MEASUR block uses this information to create a warning message for "Last valid or Substitute value".

Output of the measuring value:

The physical value (raw value) is transferred to output *MV_I* and it is displayed in the diagnosis window.

If the behavior of the block is not changed via parameterization, the same physical value is transferred to output *MV* and structure output *PV_Out*.
Additionally the physical value is calculated into a percentage value (upper limit 1 = 100%) and available at output *MV_Perc*.

All further functions are optional and can be defined through corresponding parameterization of the feature bits and block parameters.

Limit Supervision:

The analogue value can be monitored at 8 limits. With violation of Value L limit *L_Lim* or Value H limit *H_Lim* a warning message is generated. With violation of Value LL limit *LL_Lim* or Value HH limit *HH_Lim*, a fault message is created. The status "limit violated" is additionally available as block outputs *PV_L, PV_H, PV_LL* and *PV_HH*.

With the limit violation for switching limits (*SHH_Lim, SH_Lim, SL_Lim* and *SLL_Lim*) only a block output is set. No alarm is created.

The display and alarming for HH limit, H limit, L limit and LL limit can be configured through parameterization of the measuring value block. Some functions need to be enabled via Feature bit settings:

BitNr.	Function/Features	Default value
1	Enable function gradient	FALSE
2	Enable function Root extraction	FALSE
3	Enable function smoothing	FALSE
4	Enable function spike suppression	FALSE
5	Enable function Square	FALSE

- Via functions *PV_HH_En, PV_H_En, PV_L_En, PV_LL_En* and *LZ_En* the message can be suppressed and the lower and upper limits behave like switching limits and, in case of Live Zero, only the output is set.
- Via the interface *PV_OI_En* the behavior of *PV_HH_En, PV_H_En, PV_L_En* and *PV_LL_En* can be changed in a way that in case of a limit violation even the block output are not set.
- With interface *DynFltEn* alarms and dynamic faults can be suppressed in general. (In case of a limit violation the block shows only static indications).
  This behavior can be desired during the start-up or for non running equipment.

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- The annunciation release *MsgEn* can be used in order to prevent an onrush of messages in case of power failure. The message generation in the block is frozen and neither incoming nor outgoing messages are created.
- Via interface *GrFltLck* the block can be deselected for the summarizing indication in group and route. In the status call the fault and warnings can still be seen.
- Via interface *GrStaLck* the block can also be deselected form the summarizing indication in group and route. In this case the block faults and warnings are not entered in the status call.
- Through configuration of a hysteresis at parameter *Hysteres* it can be prevented that a process value which is very close to the limit (sometimes below, sometimes above) continuously creates incoming and outgoing messages. The outgoing message will only be created if the value goes above the hysteresis value.
- Via parameter *LZDelTi* the live zero message can be delayed. If the Value is invalid for a short time, no message is created.
- Via parameter *MemTrip* it can be decided to memorize the fault until the acknowledgement.
- Via feature bit settings the smoothing function can be enabled. This is useful for values which change very fast or for controller values. The smoothing time must be configured via parameter *SmooT*i.
- If the spike suppression is enabled via feature bit settings, peaks can be suppressed via configuration of a time delay at parameter *SpSupTi*.
- If the gradient supervision is enabled via feature bit settings, the block outputs *GradPosQ* or *GradNegQ* indicate that the process value increases or decreases to fast.
  The gradient parameters must be configured via parameter *GradPos* (Gradient Positive), *GradNeg* (Gradient Negative) and *GradDTi* (Gradient delay time).
- If the square function or the root extraction function is enabled via the corresponding feature bit settings, the calculated value is transmitted to outputs *MV* and *PV.Out*.

Adaptations in the Display functions:

Via Feature bit setting the display can be adapted for Suction measurements:

BitNr.	Function/Features	Default value
7	Suction measurement	FALSE

- With **Feature bit 7** = TRUE the measurement can be defined as Suction Measurement. In this case the faceplate will show the bar upside down (Starting from top and growing towards the bottom). An additional text "Suction Measurement!" will be displayed.

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Release, block or simulation functions:

Under certain circumstances it can be necessary to suppress the supervision completely. Here fore the measured value block has different options. Some functions depend on feature bit settings:

BitNr.	Function/Features	Default value
0	Bypass Button active (Service)	FALSE
18	O_LINK used for Supervision enable (Drive on)	FALSE

Switching to simulation requires an OS Permission:

BitNr.	Function/OS Permission	Default value
15	1 = Operator can change to simulation	TRUE

- Via interface "Supervision enable" *SupOn* or via O_LINK connection (depending on the feature bit setting) the complete supervision can be enabled or disabled.
  The enable can be delayed via timer *SupOnTi*, e. g. to suppress faults in the start-up phase of a motor. Only the live zero supervision remains active.
  Via feature bit setting the measured value can be forced to 0 if the supervision is disabled.
- Via interface "Force MV to scale low" *FoScaLo* the outputs *MV* and *PV.Out* can be forced to scale beginning. E. g. in order to avoid the display of small current values if the drive is stopped.
- The bypass function depends on a Feature bit setting. Two options exist:
  a) If the bypass button is activated, the measured value can be switched into service mode via diagnosis window (or via input *PV_Bypass*). In this mode the outputs *MV* and *PV_Out* of the measured value block are still actualized but the limit bits and the fault bits are forced to "0".
  b) If the bypass button is deactivated, the measuring channel can be blocked via interface *PV_Bypass*. In this case the outputs *MV* and *PV_Out* of the measured value block are not actualized any more and the limit bits and fault bits are frozen.
- If the block is switched to simulation, instead of the input value the simulation value is displayed and transferred to the outputs *MV* and *PV_Out*.
  The change to simulation is carried out via diagnosis window or automatically if the AS is switched to sequence test mode.
  OS Permission bit 15 must be TRUE to enable switching to simulation from the OS.

For priorities between the release, block and simulation functions see description of *PV_Out.ST*.



Caution: Switching to simulation resets all other functions!

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Reaction of the block Outputs in case of supervision disable, forcing, bypass or simulation:

	Output *MV/PV_Out*	**Limit bits**	**Output *LZ***
SupOn + Feature bit 17 = FALSE	shows real value	Supervision suppressed; Trips are memorized until acknowledgement	Live zero supervision active all limits bits set to 1-signal
SupOn + Feature bit 17 = TRUE (Force to 0)	forced to 0	forced to 0; Supervision suppressed	forced to 0
Force MV to Scale Low	forced to Scale low	active	forced to 0
Bypass function + Feature bit 0 = FALSE	frozen	frozen	frozen
Bypass function + Feature bit 0 = TRUE (SERVICE Mode)	shows real value	forced to 0; Supervision suppressed	forced to 0
Simulation	shows simulated value	active	forced to 0

Process parameters

Through process parameters the following values can be configured online:

- Value HH limit — Violation for the HH limit generates a fault
- Value H limit — Violation for the H limit generates a warning
- Value L limit — Violation for the L limit generates a warning
- Value LL limit — Violation for the LL limit generates a fault
- Time delay Live Zero (s) — Message for Live Zero will be suppressed for this time
- Time spike suppression delay (s) — To suppress the message for limit violation
- Hysteresis (%) — Outgoing message will be suppressed
- Gradient positive (%) — Percentage value for fast increase
- Gradient negative (%) — Percentage value for fast decrease
- Gradient delay time (s) — Time for suppressing gradient supervision
- Time smoothing (s) — Time value for filter function
- Supervision delay time (s) — Time delay for evaluating the process signal
- Value SHH limit — Violation for the SHH limit generates an output
- Value SH limit — Violation for the SH limit generates an output
- Value SL limit — Violation for the SL limit generates an output
- Value SLL limit — Violation for the SLL limit generates an output
- Substitute value from OS — Substitute value (for manipulation in case of bad quality)
- Simulation value from OS — Value for internal simulation

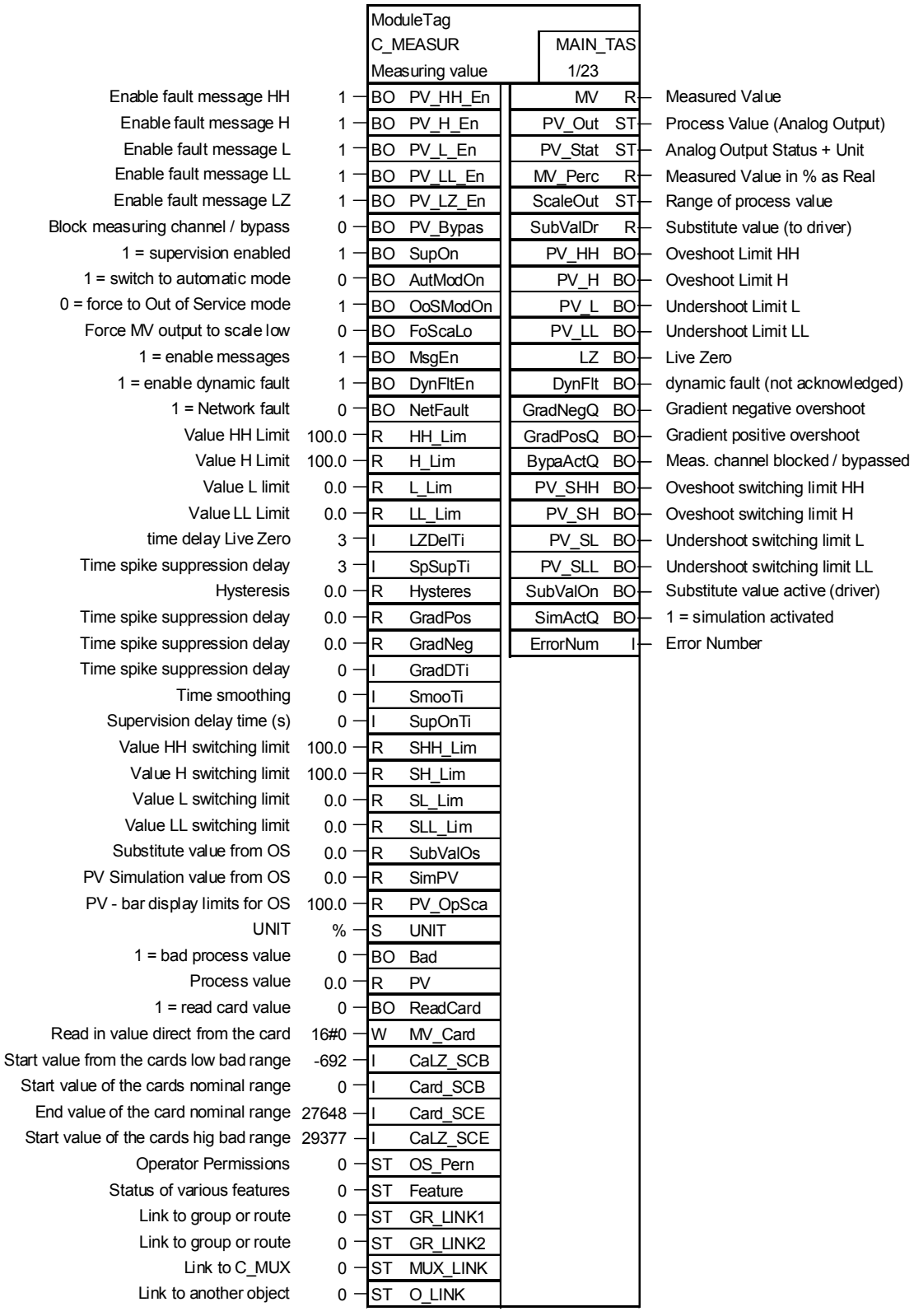
The following process parameters can be configured only in the CFC:

- Scale low — Measuring range low value
- Scale high — Measuring range high value
- Unit — Physical unit
- Start value Card — Start value of the card's nominal range
- End value Card — End value of the card's nominal range

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Function block

The picture below shows the most important interfaces and process parameters of the measured value block. More detailed information you will find in the object description of the block.



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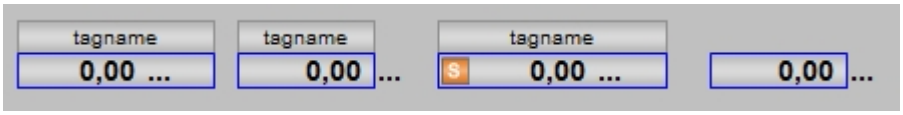
Sequence Test mode

Via a setting in the System chart SYSPLCxx all Measurements within the AS are switched into Simulation. Instead of the input value the simulation value *SimPV* is transferred to outputs *MV* and *PV_Out*. Output *SimActQ* indicates that the simulation is activated.

Visualization

In the **block icon** of the measured value block the most important operation status are displayed (ok, fault, warning, simulation). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block icon (Representation in the Process Picture)



The block icon of the measured value block shows the following information:
TAG, Value, Unit, Quality Status.

All additional indications are optional.

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Faceplate, Diagnosis, Trend and Preset Dialog

Faceplate Dialog:

The Dialog shows on top the “Displays and operator controls” **(1)** are.
With click on button “O” **(2)** the related Object could be opened, (Drive, Anasel,..)
Click on “PV” **(3)** button follow the Input signal if it is a Object.
The Text line **(4)** shows the actual mode, and Mode change button **(7)** allowed the changing over in “Automatic-, bypass-, simulation- and Out of Service mode”.

In the next lines are shown:
(5) Status information like : “Life zero”, “Gradient neg./ pos. exceeded”, “ last valid value” and “Network fault”
(6) actual timer value if the “Supervision on delay time” is running

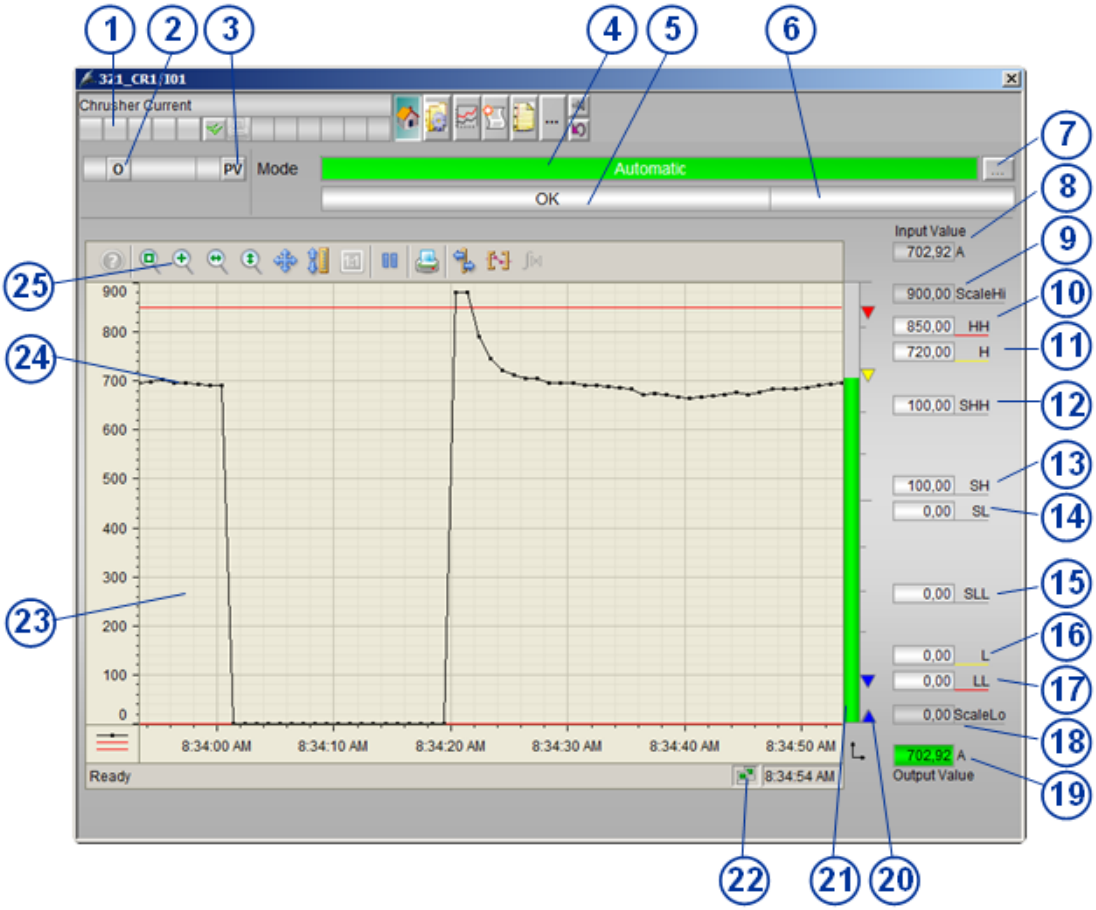
(8) actual input Value without any modifications and the related unit
(9) Scale High Value
(10) Limit HH Value with the possibility to change
- the Tooltip text in the Input interface HH_Lim -> Identifier
- the Operator authorization level (preset on 19)

(11) Limit H Value with the possibility to change
- the Tooltip text in the Input interface H_Lim -> Identifier
- the Operator authorization level (preset on 18)

(16) Limit L Value with the possibility to change
- the Tooltip text in the Input interface L_Lim -> Identifier
- the Operator authorization level (preset on 18)

(17) Limit LL Value with the possibility to change
- the Tooltip text in the Input interface LL_Lim -> Identifier
- the Operator authorization level (preset on 19)

(12,13,14,15) Switching point Limit Values with the possibility to change
- the Tooltip text in the Input interfaces Sxx_Lim -> Identifier
- the Operator authorization level (preset on 20)



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(18) Scale Low Value
(19) actual Output Value,
that could be modified by released calculation functions or simulation Values

(20) Colored limit indicator, yellow = warning, red = alarm, blue = switching limits

(21) Output Value as bar with different colors depending on the limit status.
green = ok , yellow = Warning, red = alarm

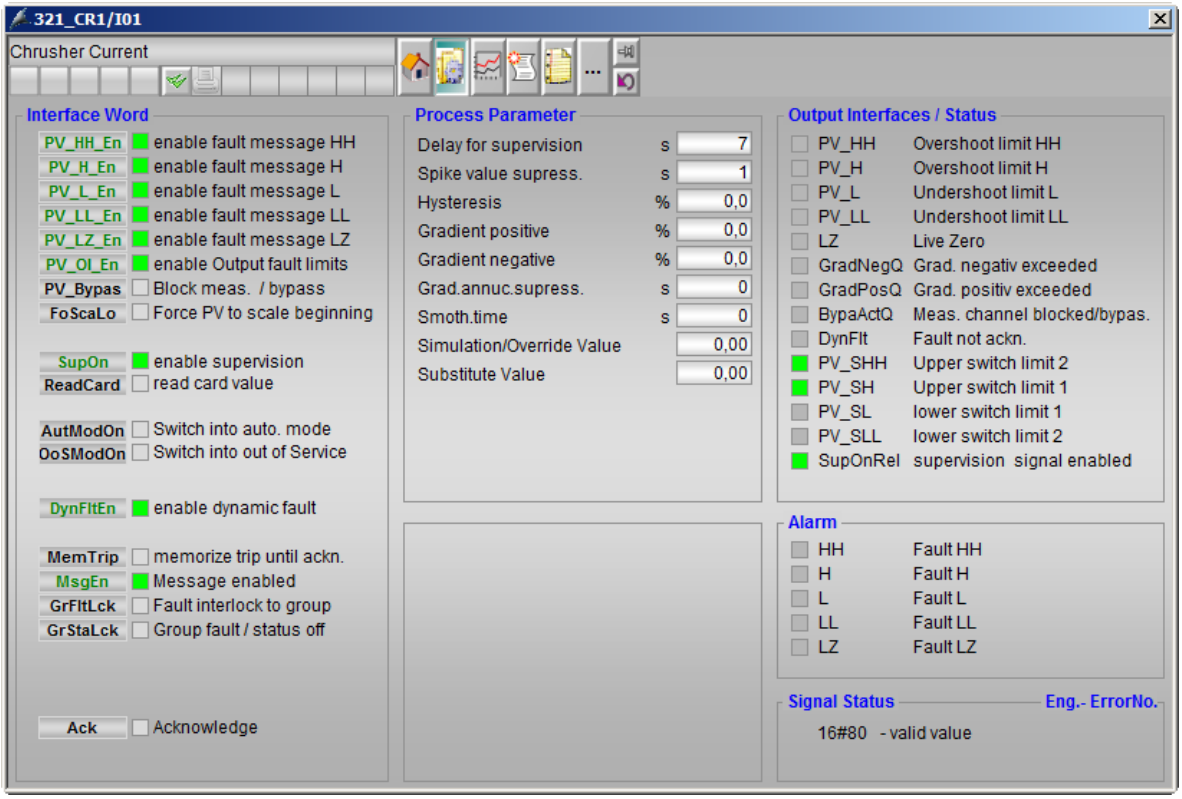
(22) status of the Curve data connection

(23) Curve Control

(24) Curve (with right Mouse click on a curve point the timestamp, value and Data connection will be shown)

(25) Curve Control operation button (see general description of curve control in PCS7 Docu.)

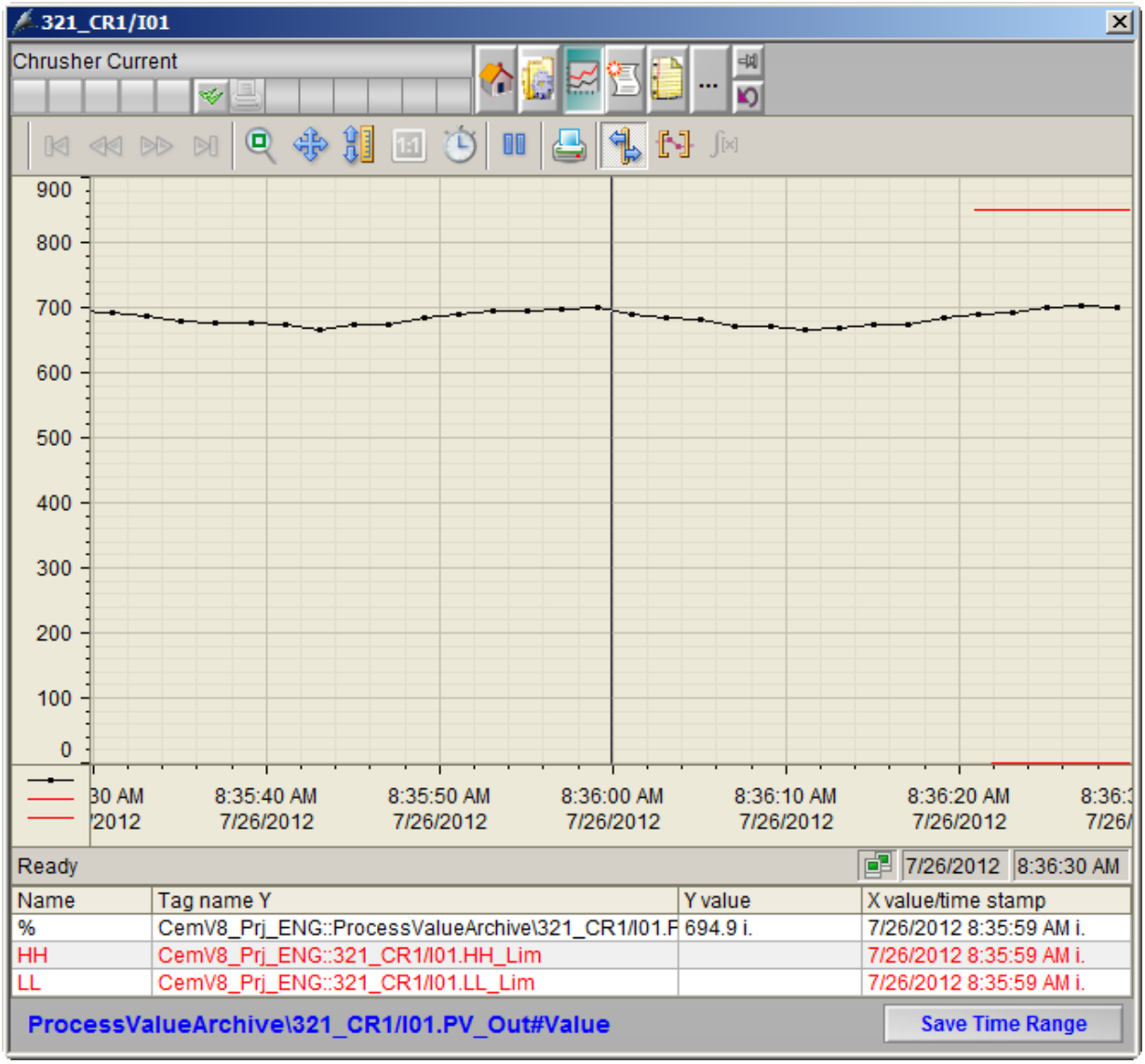
Diagnosis Dialog



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Trend Dialog:

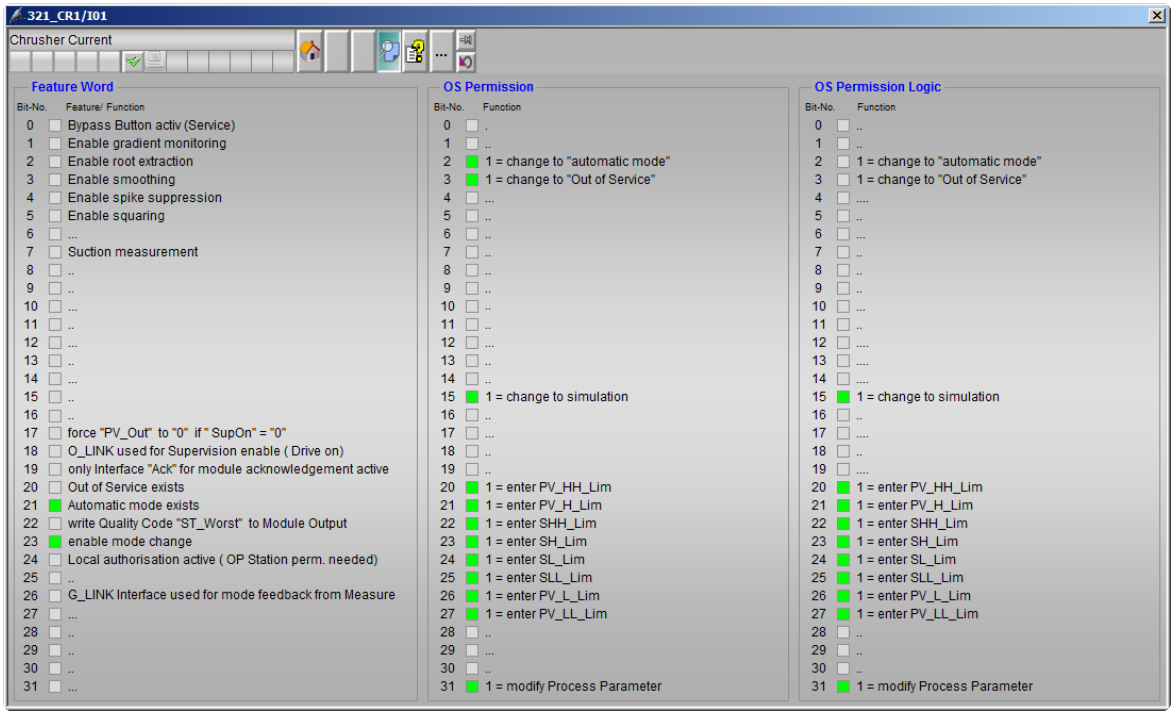
If an archive exists for the measure the "Trend" button can be used in order to show the history of the measure.



If the time range was changed, it is possible to save these settings with the button “Save Time Range”

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Preset Dialog:



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C_ANASEL Analog Value Selection

General Function description

Module Type C_ANASEL is used for the following applications:

- Display of Analog Values which belong to an technological Object (e.g. Mill Drive)
- Selecting one of 16 analog values and switching it through to the output. (The most important Process Value can be shown in the Drive Symbol and in the Faceplate).
- generation of overall limit values (“OR” function for the limits of all input values)

The block transfers the value of one of the input parameters “In01” to “In16” to the output parameter “Out_Val”. The selection is carried out via input parameter SelInt.

The corresponding unit and limit status must be provided via inputs In01Stat to In16Stat. The unit and the limits of the selected input value are transferred to output parameter Out_Stat.

Additional functions

- The worst signal status of all connected inputs is detected and provided at output ST_Worst.
- The summarizing information for the limits HH, H, L, LL is built and transferred to the corresponding outputs. (These can be used as protection interlock of a motor.)

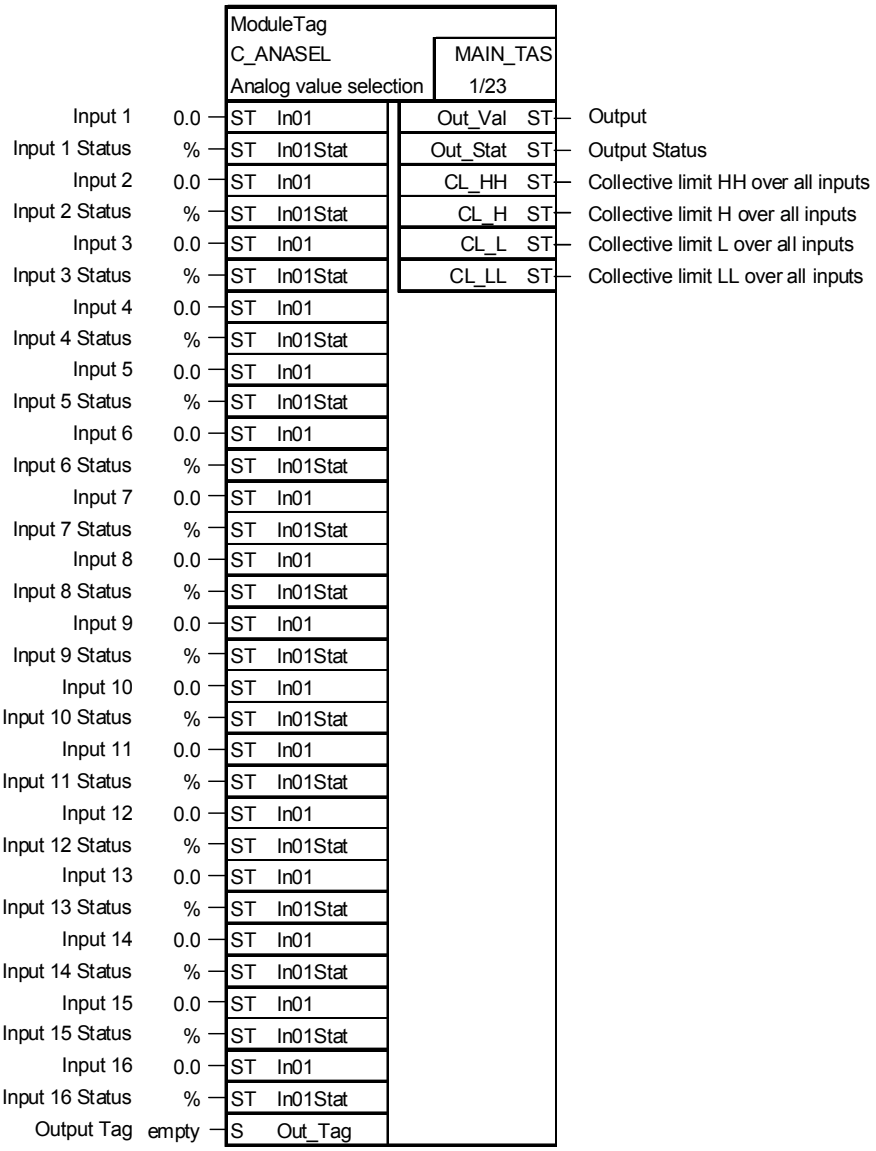
Operation:

- Selection of Input which should be switched to the Output
- Opening the Faceplates of Input Object (Measure, Controller)
- Opening the Faceplates of Output Object (Drive)

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Function block

The picture below shows the most important interfaces and process parameters of the Analog value selection block. More detailed information you will find in the object description of the block.



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Visualization

There is no block icon for the C_ANASEL block itself, it does not appear in the process picture and can only be called via other objects.

Block icon (Representation in the Process Picture)

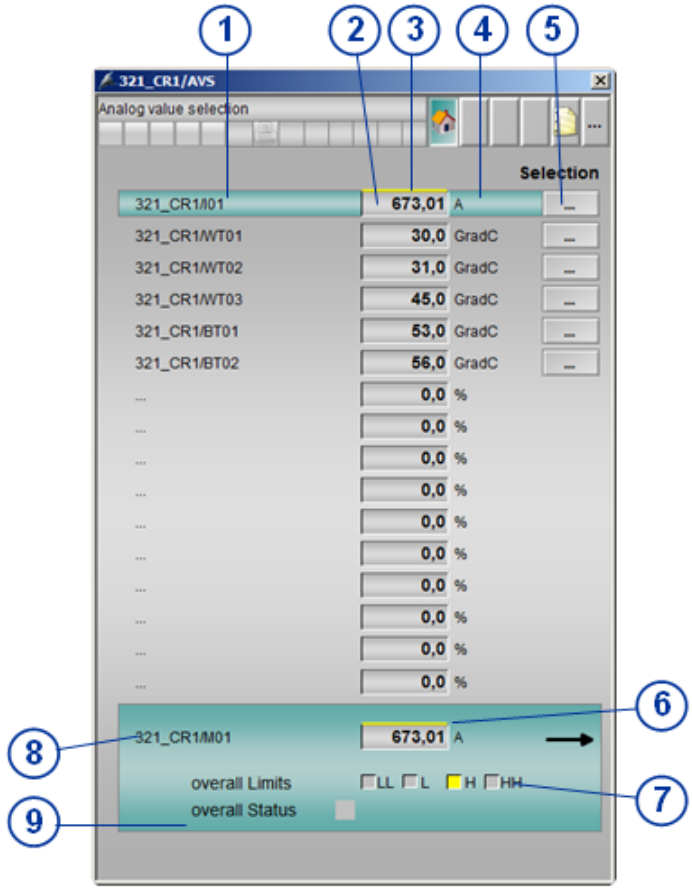
There is no block icon of the C_ANASEL block shown on Process Picture.

Faceplate

Display in the Faceplate:

In one input line the following information's are shown:

- the TAG (1),
- the Analog Value (2)
- Limit faulty indication (3)
- UNIT(4)
- the related comment as Tooltip Text
- the selection button(5)



In the bottom area the selected Input is shown with

- (8) the TAG name of the Object which is connected to the Output.(e.g. Drive)
- the Limit violation(6) of the Input parameter and the signal status
- (7) the summarizing information of each limit (HH, H, L, LL)
- (9) the worst signal status of all Input parameter

Operation:

- click on Selection (5) button, that Input should be switched to the Output
- click on TAG area (1), opening the Faceplates of Input Object (Measure, Controller)
- click on Output area (8), opening the Faceplates of Output Object (Drive)

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C_STORAG Storage

General Function description

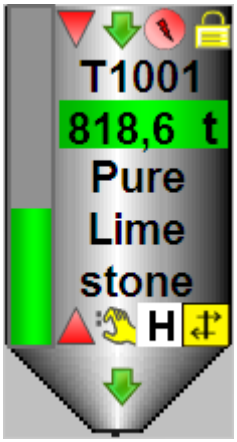
Block C_STORAG provides the Operator with status information of the storage locations and gives information about the contained material and the filling level. The storage type definition defines whether it is a bunker, a silo, a multi chamber silo, a pile, or a water tank (visualization information.)

In addition to that, there is the possibility of calling external applications like Stockpile manager, Multi chamber charging or homogenization modules directly from the Faceplate.

As standard interfaces are used:
- analog value of the silo filling level,
- a release, filling, and discharge signal
- static parameters like limits or timers.

The following Values are evaluated and announced depending on the release of the corresponding Storage Symbols:

- current storage filling level as digital value with a corresponding dimension
- current storage filling level as bar
- Storage full
- Storage empty
- alarm limit full
- warning limit full
- warning limit empty
- alarm limit empty
- Storage locked
- charging on
- discharging on
- no dedusting
- material differs from assigned material
- homogenization on
- material name
- brief name storage





Block functions are only active in **automatic mode.**
If the block is switched to **Out of Service**, operation of the storage block is inhibited, the outputs are set to "0", all messages are suppressed and only the status words are actualized. All memorized functions are reset.

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Limit Supervision:

If an external level instrument is available, supervision is possible for two binary inputs "Storage empty" and "Storage full".

The analog process value of the filling level is monitored for 4 limits. With violation of Value L limit *L_Lim* or Value H limit *H_Lim* a warning message is generated. With violation of Value LL limit *LL_Lim* or Value HH limit *HH_Lim*, a fault message is created. The status "limit violated" is additionally available as block outputs *PV_L, PV_H, PV_LL* and *PV_HH*.

- With interface *DynFltEn* alarms and dynamic faults can be suppressed in general. (In case of a limit violation the block shows only static indications).
  This behavior can be desired during the start-up or for non running equipment.
- The annunciation release *MsgEn* can be used in order to prevent an onrush of messages in case of power failure. As long as *MsgEn* has 0-Signal the message generation in the block is frozen and neither incoming nor outgoing messages are created.
- Via interface *GrFltLck* the block can be deselected for the summarizing indication in group and route. In the status call the fault and warnings can still be seen.
- Via interface *GrStaLck* the block can also be deselected form the summarizing indication in group and route. In this case the block faults and warnings are not entered in the status call.
- Through configuration of a hysteresis at parameter *Hysteres* it can be prevented that a process value which is very close to the limit (sometimes below, sometimes above) continuously creates incoming and outgoing messages. The outgoing message will only be created if the value goes above the hysteresis value.
- Via parameter *LZDelTi* the live zero message can be delayed. If the Value is invalid for a short time, no message is created.

Additional Supervisions:

Additionally to the limits the following supervisions are possible:

- Dedusting running: If the group is running the dedusting must be ON (*DedustOn* must have 1-Signal). Missing dedusting leads first to a warning message and after expiring of time *DedDelTi* it leads to an alarm message.
- Different Material: If the charging material is different from the assigned materiel the storage block creates a warning message.
- Storage locked: If the storage is locked it leads to an alarm message.

Release, block or simulation functions:

Under certain circumstances it can be necessary to switch the storage block to simulation mode. Switching to simulation requires an OS Permission:

BitNr.	Function/OS Permission	Default value
15	1 = Operator can change to simulation	TRUE

- If the block is switched to simulation, instead of the input value the simulation value is displayed and transferred to the output *PV_Out*.
  The change to simulation is carried out via diagnosis window or automatically if the AS is switched to sequence test mode.
  OS Permission bit 15 must be TRUE to enable switching to simulation via OS.

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Process parameters for storage level supervision:

The following values can be configured online:

- Value HH limit	Violation for the HH limit generates a fault
- Value H limit	Violation for the H limit generates a warning
- Value L limit	Violation for the L limit generates a warning
- Value LL limit	Violation for the LL limit generates a fault
- Time delay Live Zero (s)	Message for Live Zero will be suppressed for this time
- Hysteresis (%)	Outgoing message will be suppressed
- Simulation value from OS	Value for internal simulation

The following process parameter can be configured only in the CFC:

- Unit for Storage level	Physical unit for filling level of the storage

Storage parameters

The following values can be configured online:

- Storage height	Storage range high value
- Storage width	only for information
- Storage length	only for information
- Storage diameter	only for information
- Storage capacity	Storage capacity in tons
- Time delay for Dedusting	Message for Dedusting off will be suppressed for this time

The following process parameter can be configured only in the CFC:

- Scale low	Storage range low value
- Unit for Material quantity	Physical unit for charging and discharging material
- Chamber number	Chamber number of multi chamber silo
- Storage hour	hours for filling or emptying completely

Material parameters

The following values can be configured online:

- Material quality	Quality of charging material
- Charging material quantity	Material quantity for storage charging
- Discharging material quantity	Material quantity for storage discharging
- Assigned Material	Name of Material assigned to the Storage
- Charging Material	Name of currently charged Material

The following values can be configured with APF (function not yet implemented)

- Material class	Material class storage
- Material type	Material type storage
- Material	Material storage
- Storage class	Storage class
- Storage	Storage No.

Batch parameters

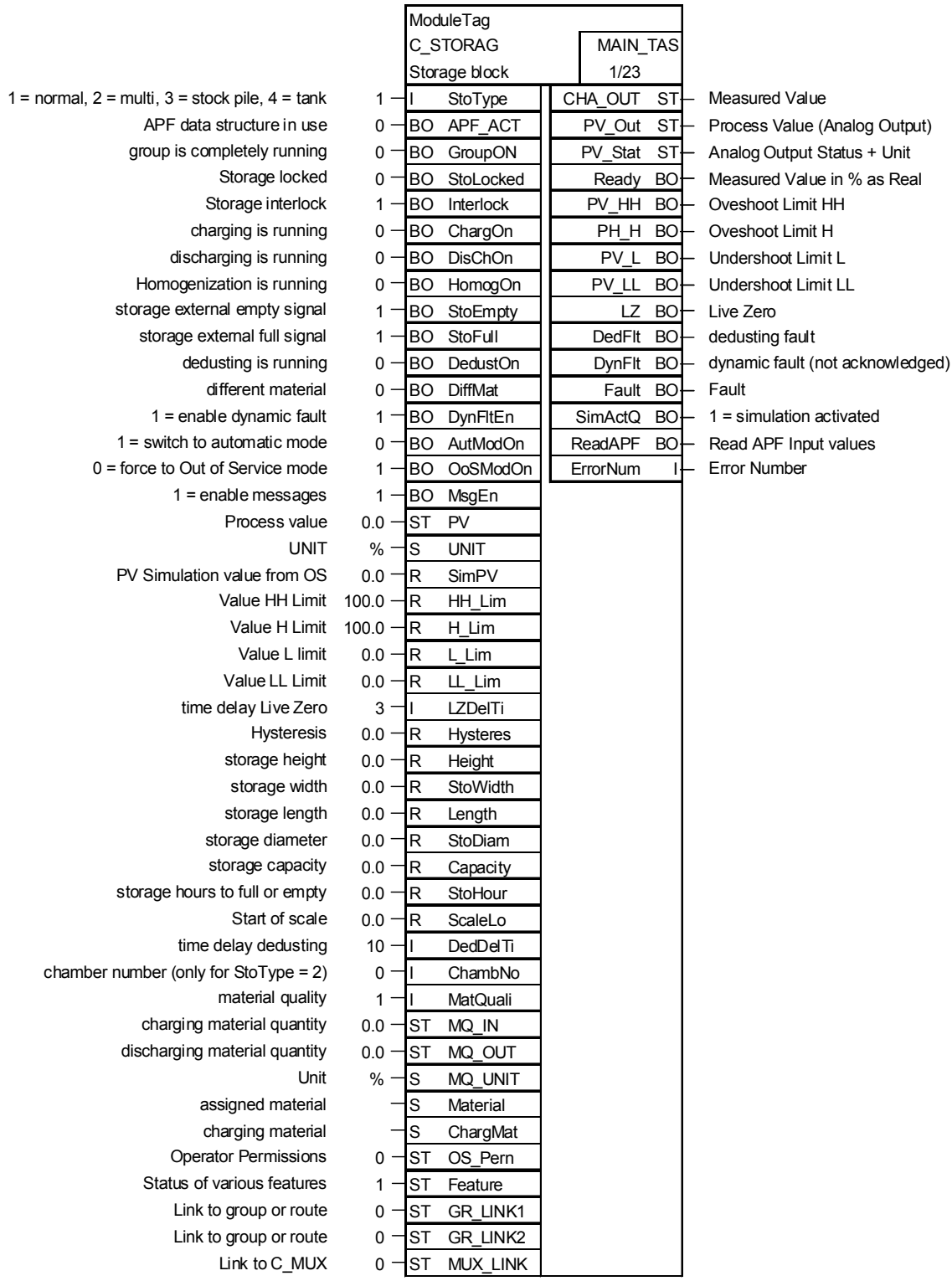
The following values can be configured online:

- Batch enabled	Enable batch information
- Batch ID	Batch number
- Batch name	Batch name for this storage

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Function block

The picture below shows the most important interfaces and process parameters of the Storage function block. More detailed information you will find in the object description of the block.



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Sequence Test

Via a setting in the System chart SYSPLCxx all Storage blocks within the AS are switched into Simulation. Instead of the input value the simulation value *SimPV* is transferred to output *PV_Out*. Output *SimActQ* indicates that the simulation is activated.

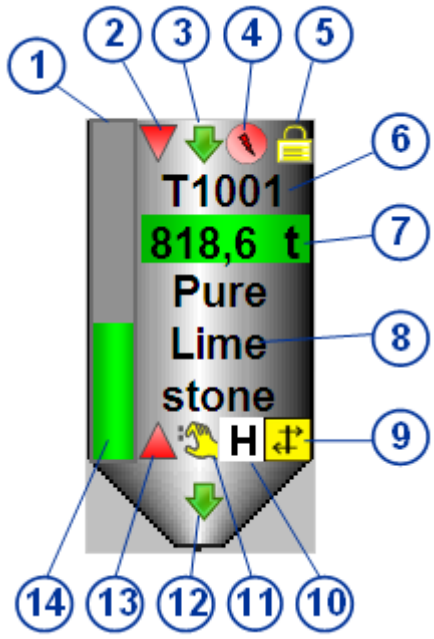
Visualization

In the **block icon** of the storage block the most important operation status are displayed (ok, fault, warning, simulation). Refer to Variable Details. Control functions and detail information are only available after opening the **faceplate**.

Block icon (Representation in the Process Picture)

Example for a small Silo

.



(1) Current storage filling level as bar

(2) Binary indication Storage full.

(3) Charging on

(4) Dedusting fault

(5) Storage locked

(6) Short description Storage

(7) Current storage filling level as digital value with a corresponding dimension and change of background color (same as bar)

(8) Material Name

(9) Actual filling Material is not equal the assigned Material

(10) Homogenization is active

(11) Measurement of filling level is on Simulation

(12) Storage discharge active

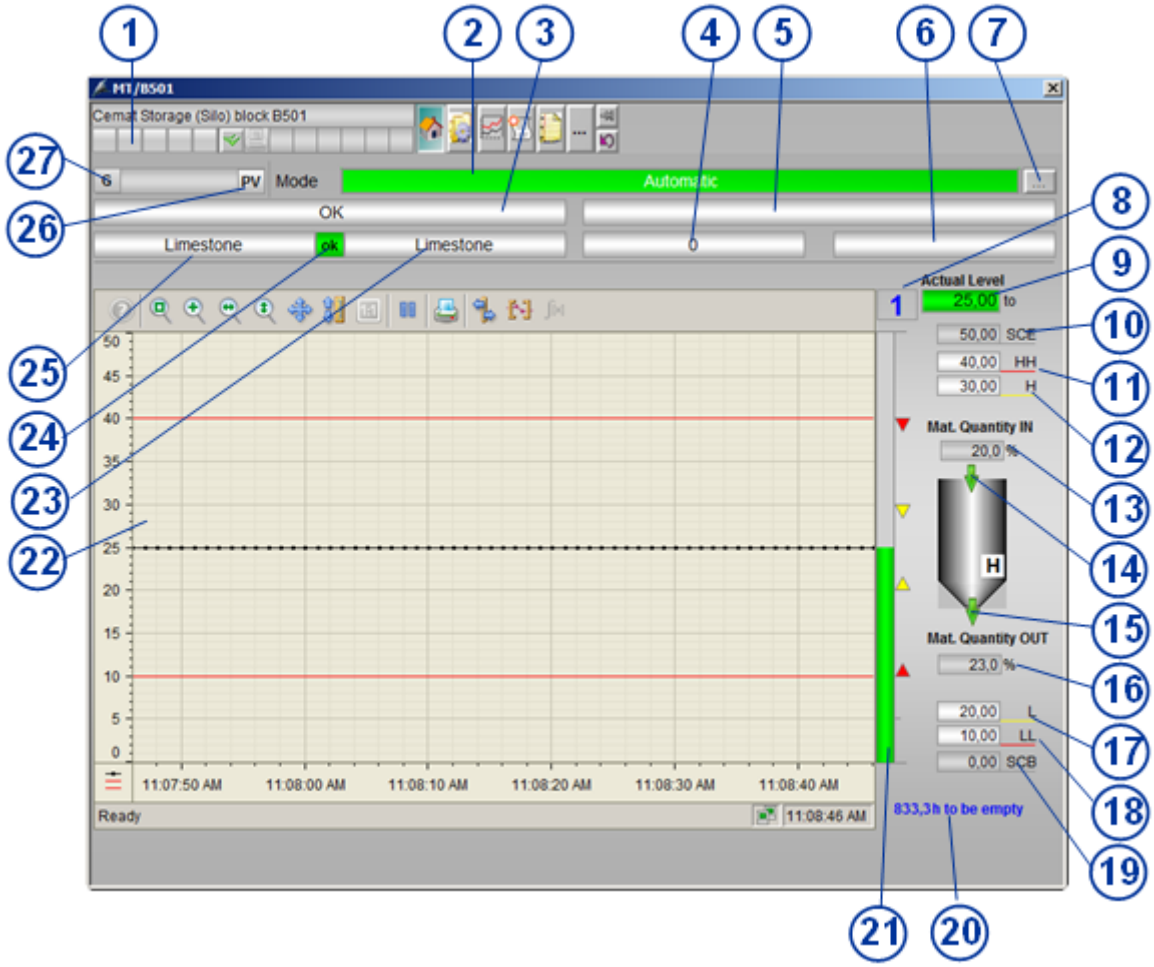
(13) Binary indication Storage empty

(14) The level indication will change the color if the corresponding limit has reached.

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Faceplate

With mouse click on the module symbol the Faceplate will be open.



The following functions and information are shown there:

(1) The Dialog shows on top the “Displays and operator control” area

(2) Mode text (automatic, locked, simulation, Out of Service)

(7) Mode change button (automatic, locked, simulation, Out of Service)

(3) Note texts output (no dedusting, Life zero, different material, ...)

(5) Time value counter (Dedusting fault)

(4) Batch ID

(6) Batch Name

(8) Chamber no., if the Storage belongs to a “Multichamber Silo”

(9) Actual level as % , m , Tons

(10) measurement scale end

(11) Alarm level full

(12) Warning level full

(13) Material quantity charging

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(14) Charging on (additional can be shown: :

- Storage full
- no dedusting
- Storage locked
- no original material
- Homogenization on
- Simulation on
- Storage empty

(15) Silo discharge active

(16) Material quantity discharge

(17) Warning level empty

(18) Alarm level empty

(19) Measurement scale begin

(20) Remaining time (h) till the Storage is full or empty.

(21) Bar with limit indicator

(22) Curve window with the measurement and the two alarm limits

(23) Actual charge Material

(24) Material quality 0 = "ok", 1 = worse "<", 2 = ">" better

(25) Assigned Material

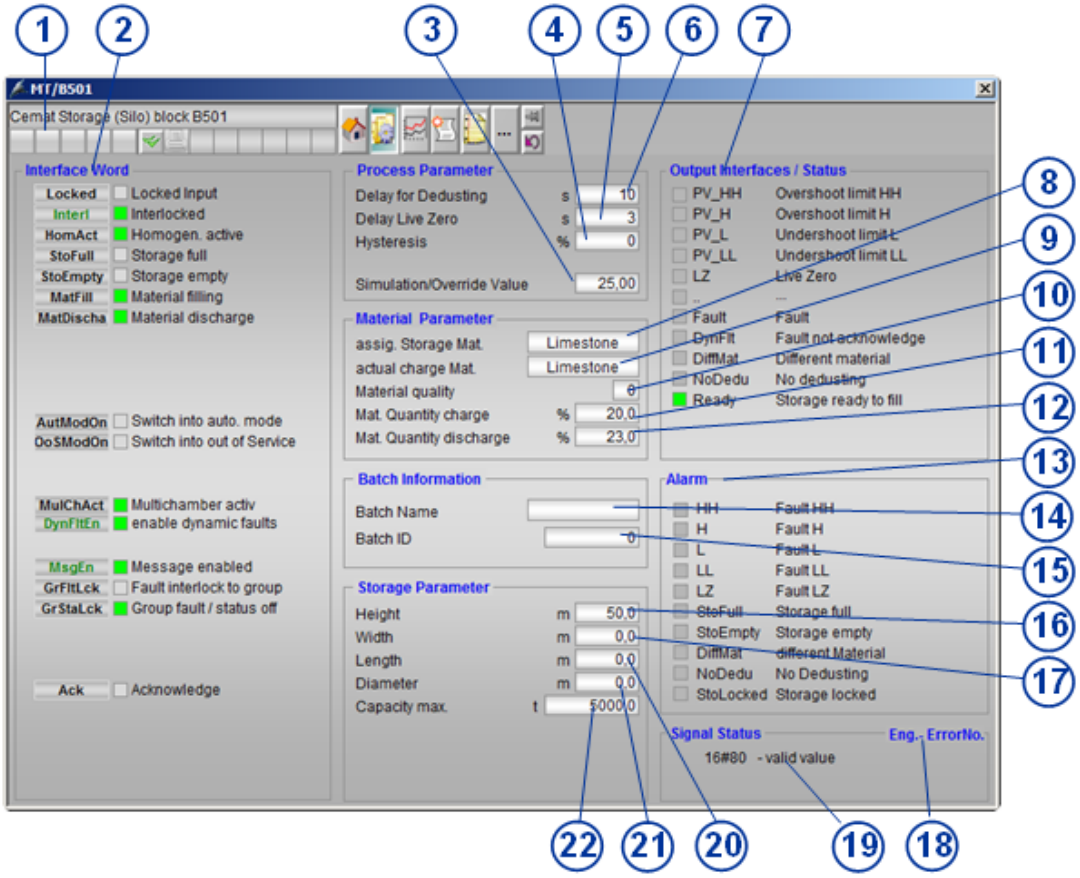
(26) Click on “PV” button follow the Input signal if it is a Object.

(27) With click on button “G” the related Group could be opened,

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Diagnosis Dialog

With Mouse click on button „Diagnosis“, a dialog with all Status information and Parameter values from the Storage instance will be shown.



The following functions and information are shown:

(1) The Dialog shows on top the “Displays and operator control” area

(2) Interface word with the binary status of input signals

(3) Simulation- Value. (with user right 24)

(4) Hysteresis of limit monitoring (with user right 22)

(5) Delay time for „Live Zero“ (with user right 22)

(6) Delay time for dedusting fault (with user right 22)

(7) Output- Interface- Status of AS module

(8) Assigned Material (with user right 22)

(9) Actual charging material (with user right 22)

(10) Material- Quality- identifier (with user right 22)

(11) Material quantity charging (with user right 22)

(12) Material quantity discharging (with user right 22)

(13) Listing and status display of alarm messages

(14) Batch ID (with user right 22)

(15) Batch Name (with user right 22)

(16) Storage Dimension parameter „height“(with user right 22)

(17) Storage Dimension parameter „Width“(with user right 22)

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(18) Engineering Error Number

(19) Signal status of filling level – Analog signal

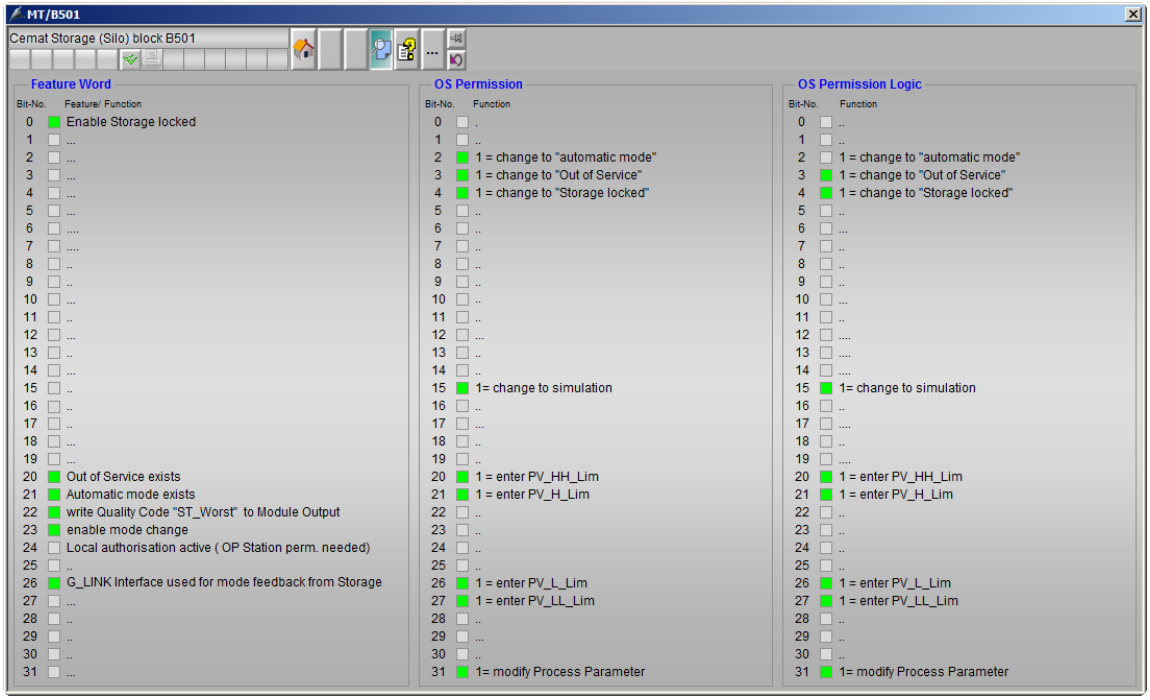
(20) Storage Dimension parameter „Length“(with user right 22)

(21) Storage Dimension parameter „Diameter“(with user right 22)

(22) Defining a maximum amount of material (with user right 22) with that value the remaining fill or emptying time is calculated.

(User Right 22 permits changing process parameters)

Preset Dialog:



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C_STO_MA Storage Master module

General Function description

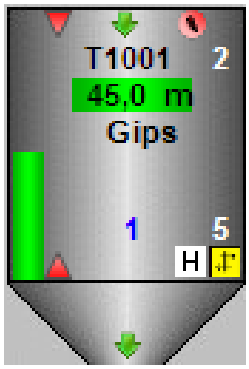
Block C_STORAGE provides information about the storage location, the contained material and the filling level for an individual chamber.

In case of multi chamber storages, the information from up to 10 individual chambers can be transmitted to block C_STO_MA for a common visualization.

Via the faceplate of C_STO_MA the individual chamber can be selected and the information of the selected chamber is then displayed in the block icon of the Multi Chamber block.

For the selected chamber the following information is displayed:

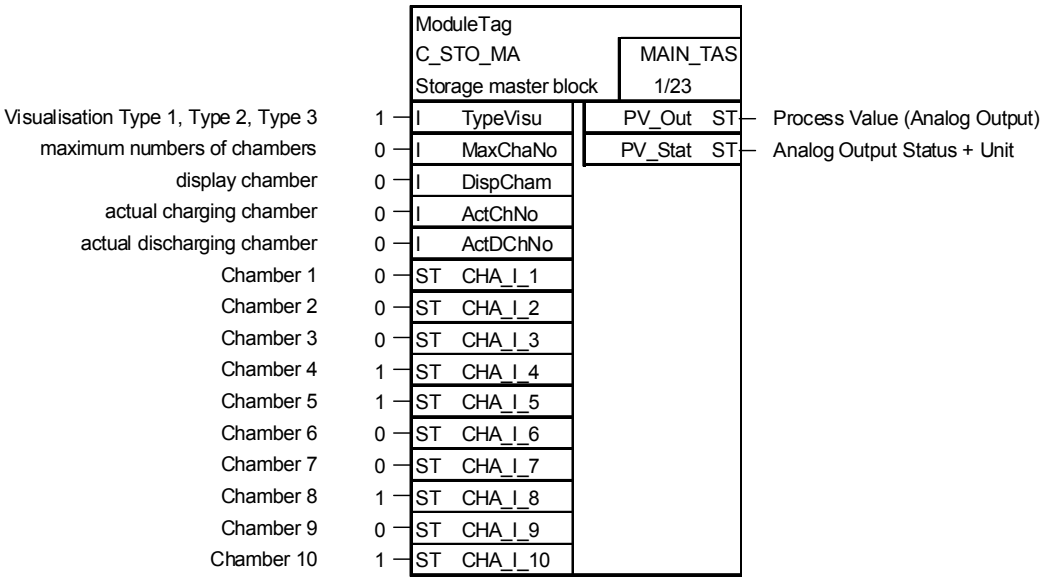
- current storage filling level as digital value with a corresponding dimension
- current storage filling level as bar
- Storage full
- Storage empty
- alarm limit full
- warning limit full
- warning limit empty
- alarm limit empty
- Storage locked
- charging on
- discharging on
- no dedusting
- material differs from assigned material
- homogenization on
- material name
- brief name storage
- active chamber discharge
- active chamber charge
- No. of shown chamber values



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Function block

The picture below shows the most important interfaces and process parameters of the Storage MA function block. More detailed information you will find in the object description of the block.

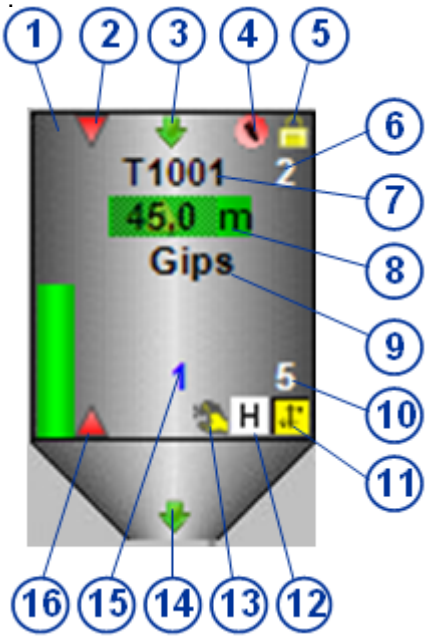


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Block icon (Representation in the Process Picture)

Example for a multi chamber silo symbol

.



(1) Current storage filling level as bar

(2) Binary indication Storage full.

(3) Charging on

(4) Dedusting fault

(5) Storage locked

(6) Chamber x will be charged

(7) Short description Storage

(8) Current storage filling level as digital value with a corresponding dimension and change of background color (same as bar).

(9) Material Name

(10) Chamber x will be discharged

(11) Actual filling Material is not equal the assigned Material

(12) Homogenization is active

(13) Measurement of filling level is on Simulation

(14) Discharging on

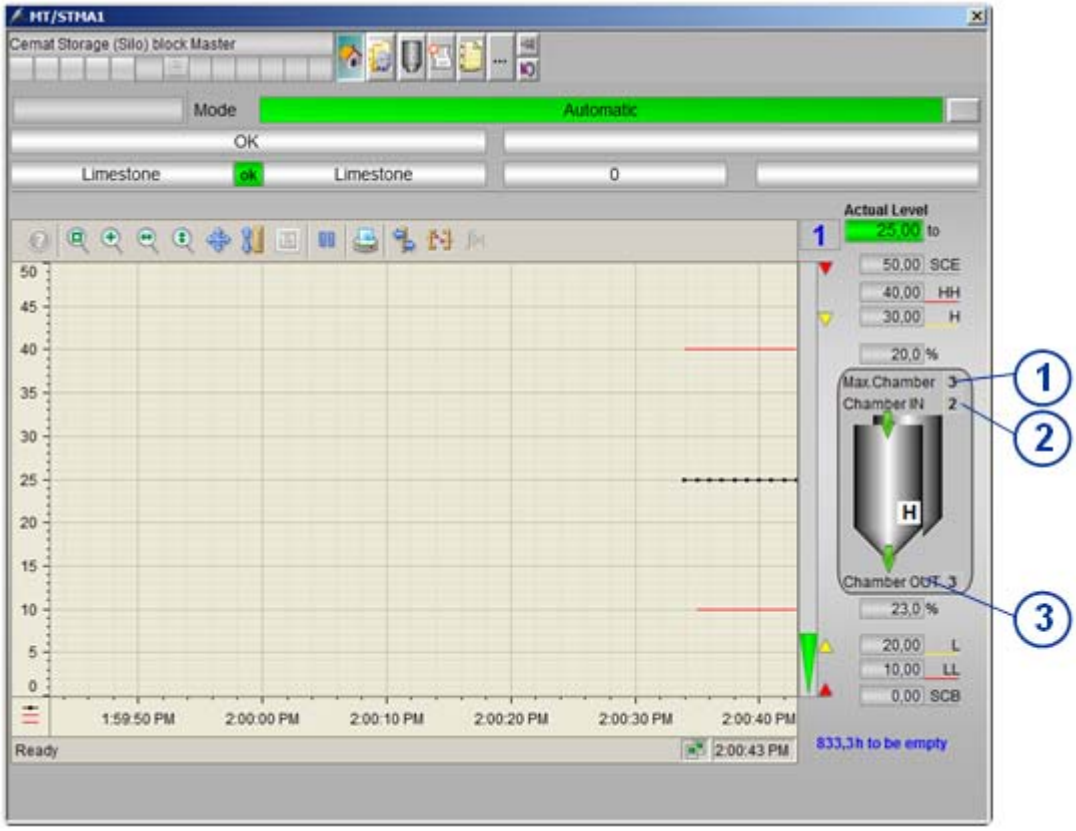
(15) selected Chamber (to show the specific parameter)

(16) Binary indication Storage empty

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Faceplate

With mouse click on the module symbol the Faceplate will be open.



The following additional information are shown there:

(1) Maximum amount of Chamber

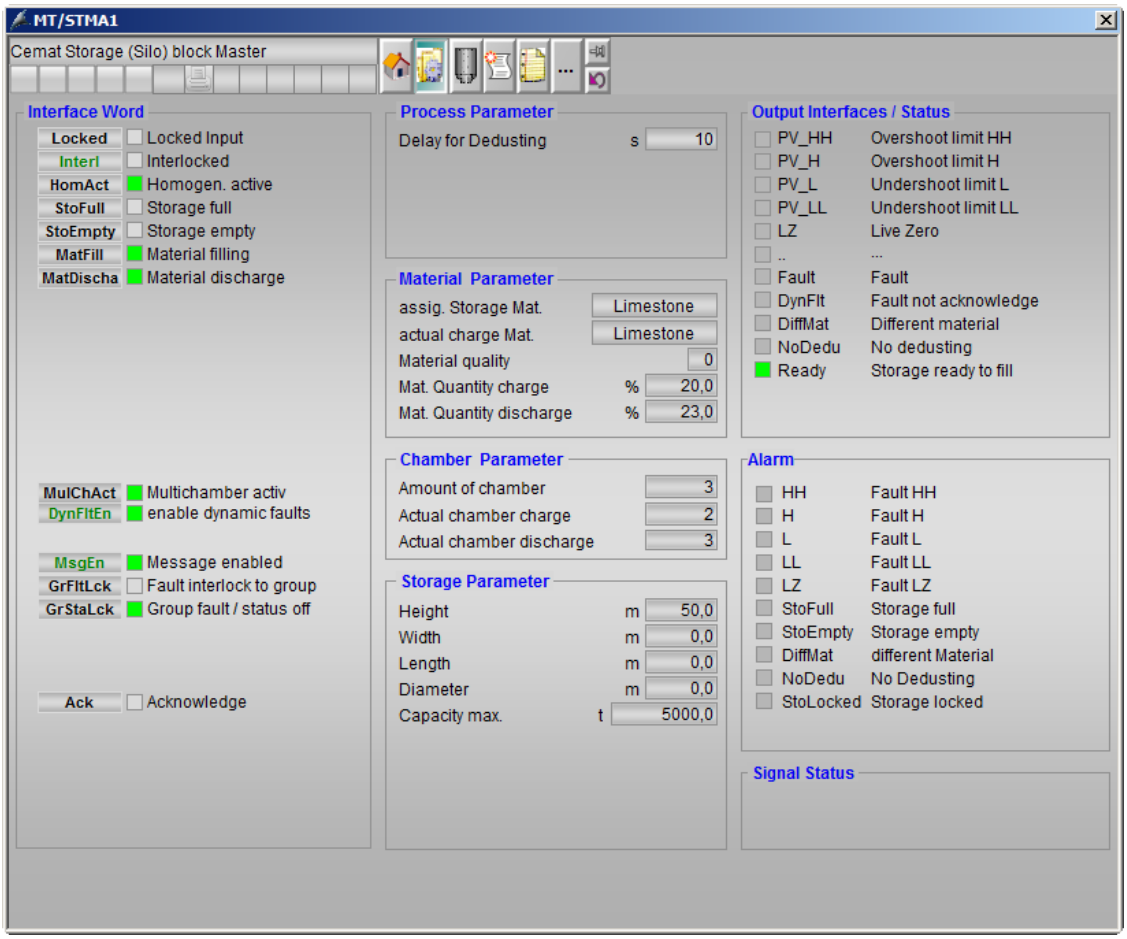
(2) charged chamber no.

(3) discharged chamber no.

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Diagnosis Dialog

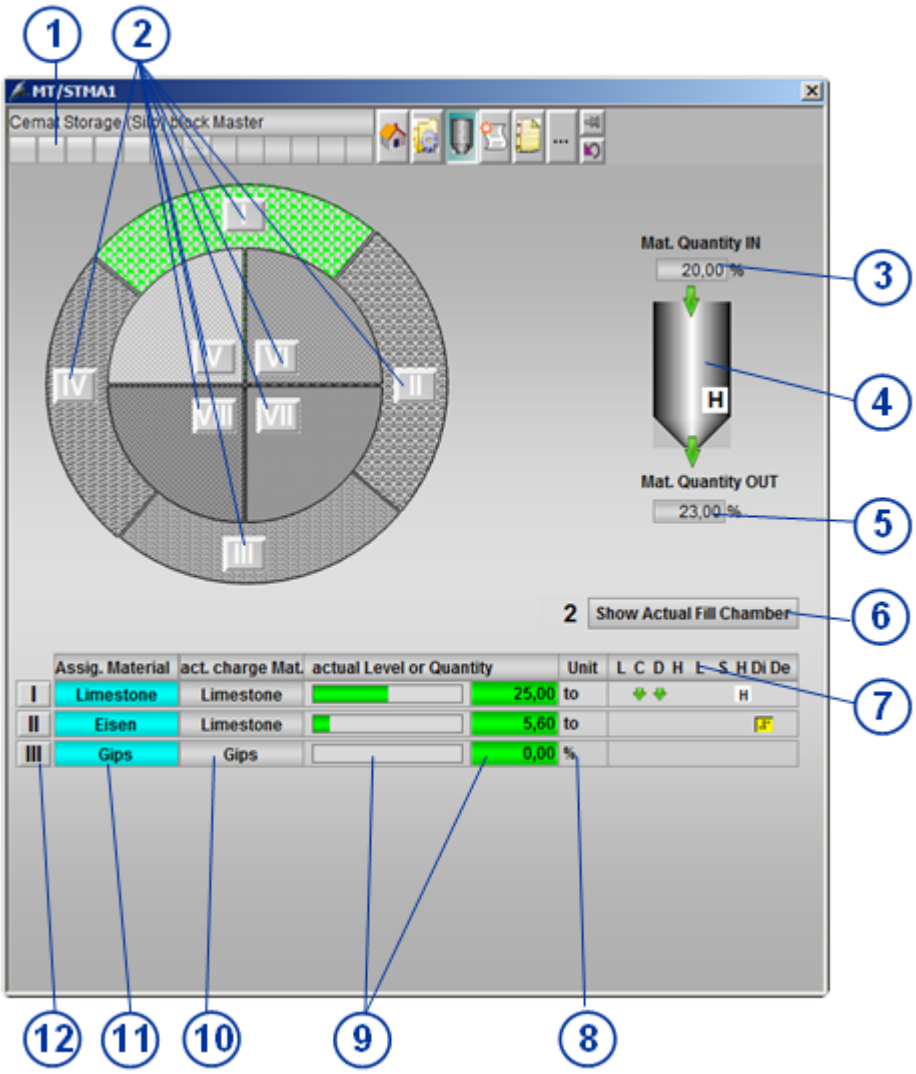
With Mouse click on button „Diagnosis“, a dialog with all Status information and Parameter values from the Storage instance will be shown. There is no Input possible.



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Multi- Chamber overview

This dialog is called over the button "chamber" in the Toolbar dialog.
He shows a tabular view of all chamber data and permits the selection of a certain chamber.
The chambers can in addition be called also as independent dialogs.



(1) The Dialog shows on top the “Displays and operator control” area

The Multi chamber representation into dependence of the input parameter "SC_TYPE"

1 = 5 chamber Silo
2 = 8 chamber Silo

(2) Selection button to show the specific Chamber Information in the symbol and Faceplate.

(3) Material quantity charging of selected chamber

(4) Silo Information as in the Symbol:

- charging on
- Storage full
- no dedusting
- Storage locked
- no original material
- Homogenization on
- Simulation on
- Storage empty
- discharging on-

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(5) Material quantity discharging of selected chamber

(6) Button to show the actual fill chamber,
Selected Chamber no., which is connected to the Input „AC_CHA_C“

(7) Tabular status overview of all chambers

(12) Faceplate call of the single chambers.

(11) Assigned Material (Chamber)

(10) Actual charge Material

(9) Filling level Indication as bar and value

(8) Dimension of analog input

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C_POLY3 POLYGON with 3 Output values

General Function description

After fixing the Interpolation Points by setting the parameter of Interface "Num" a second and third polygon can be switched on from the OS Faceplate.

With the definition of the min and Max Values of Input and Output values the scope is enclosed for the parameter setting.

Is the Input [Release] is set and an Input value [IN] or the internal Time is carried out between the defined bases the calculation of the Outputs can start.

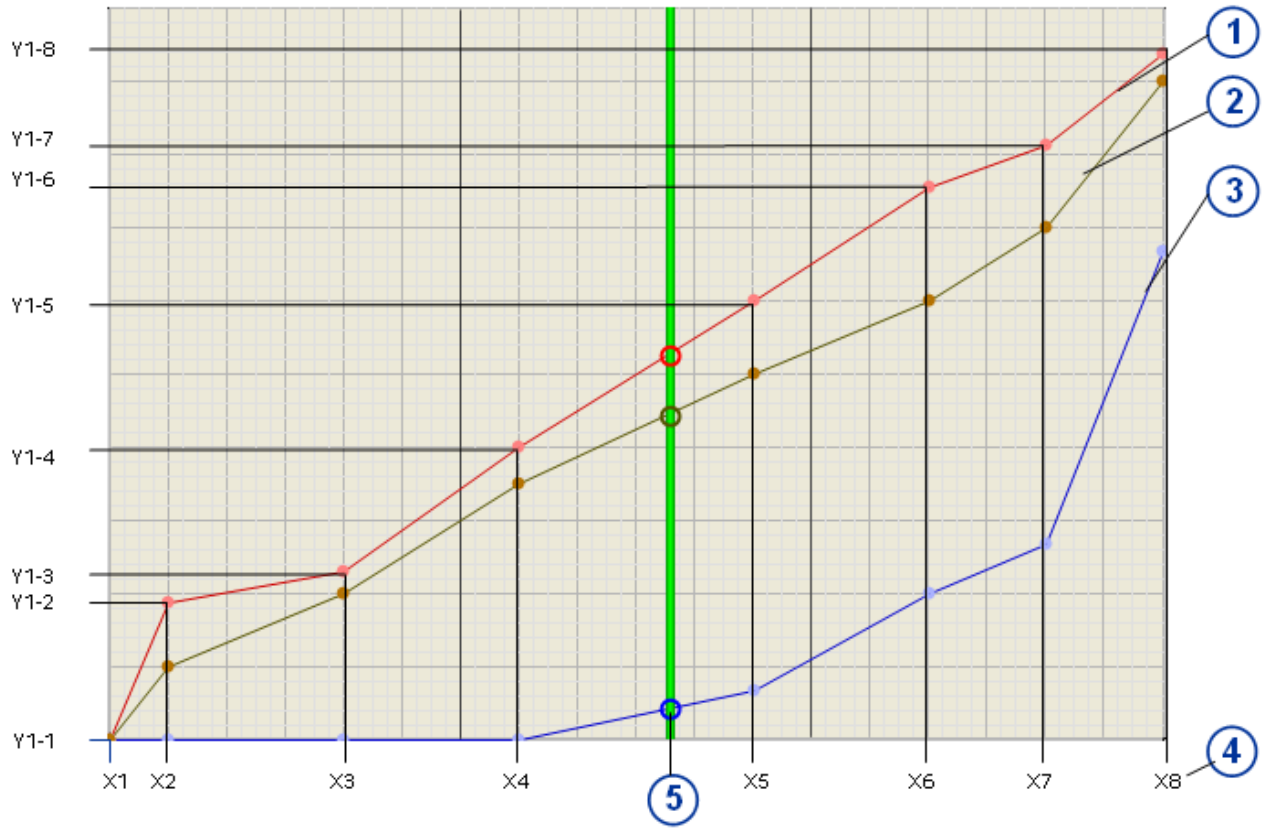
In dependence of the Input signal [IN] and the defined Interpolation Points [X1/Y1(1) as well as X8/Y8(1) (1) and X1/Y1(2) to X8/Y8(2) (2) and X1/Y1(3) to X8/Y8(3) (3)] the Outputs Out1, Out2 and Out3 become a linearly value between the IP.

Is the last IP [X/Y] reached, the Output value will be frozen and the binary Output signal [Complete] set.

Only with the change of input [Release] to “0” the output values are also changed to “0”.

Is a fault is appeared on one of the Inputs or Parameter the corresponding Quality code is shown and a plain text will be reported in the parameter dialog.

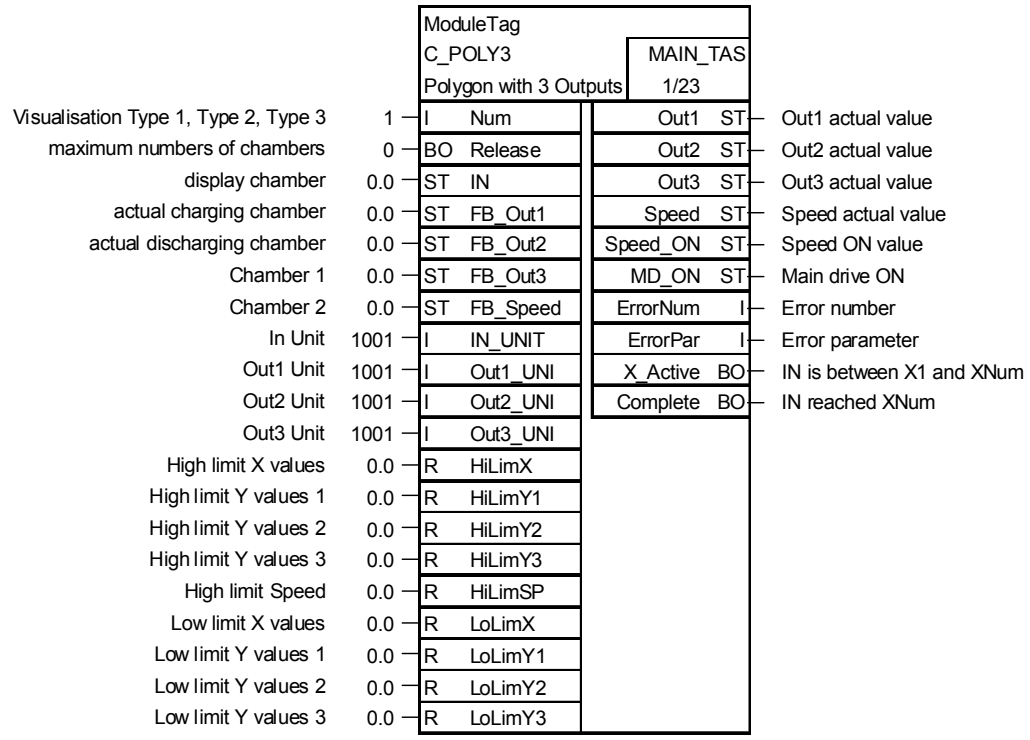
The current [X] position (5) and the intersection points with the polygons are represented by a reading line as well as circle symbols with tool tip information and corresponding digital outputs.



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Function block

The picture below shows the most important interfaces and process parameters of the Polygon3 function block. More detailed information you will find in the object description of the block.



The **standard signals** of the storage like PV, Unit, Group ON, Interlock, storage full/empty, dedusting on, etc. have to be linked to the corresponding interfaces .

Through **process parameters** the values can be configured online:

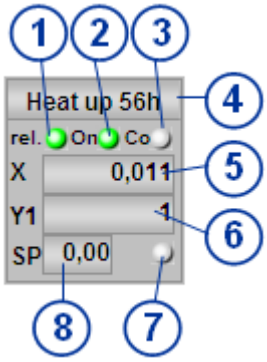
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Block icon (Representation in the Process Picture)

There is one C_POLY3 Symbol in the C_@PCS7Typicals_CemV8xxx.pdl.
It will be automatically generated if the box “create block icon” is marked.

In that case the properties are connected automatically

If you need more Information on the Symbols it is possible to create additional Symbols.



(1) Release operation

(2) X active, Calculation is active on the X Value (5) below.

(3) Polygon calculation is on the last Interpolations point (complete)

(4) Active Dataset description

(6) Y1 Value on the actual X Position

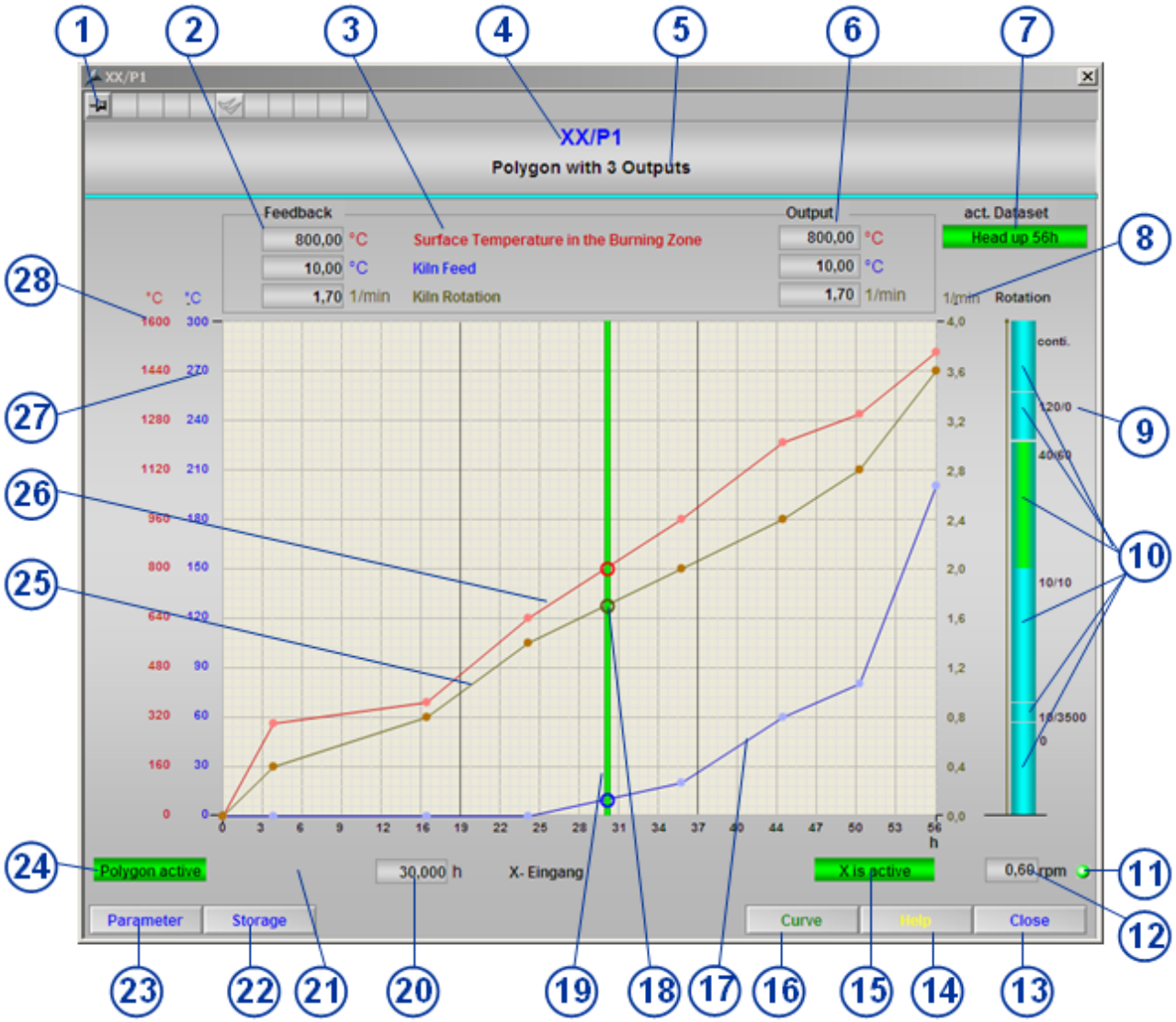
(7) “Move on” binary output. (E.g. for auxiliary drive.)

(8) Speed Setpoint

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Faceplate

With mouse click on the constituent symbol the Faceplate opens.



The following functions and information are shown there:

(1) Fix the Dialog

(2) Actual value feedback belongs to the Output.

(3) The comment text will be read from the feedback Input

(4) TAG of Poly module

(5) Comment of Poly module

(6) Output value on the current calculation position (19)

(7) Name of the loaded parameter data set

(8) Y-Axis of the 3. Output values

(9) View the run-/ idle period of the auxiliary drive

(10) The time response of the exit speed is defined the 6 areas in these. The active one Area is green highlighted. This one becomes the height of the areas about the separate X values "Speed" charged to definition and the polygon 1

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(11) „Speed active“Indication. (Green active)

(12) Speed value belongs to „Speed active“Indicator

(13) Close Dialog

(14) Call Help Dialog

(15) Calculation of Output values are active (is also an Output on CFC- module)

(16) Call Curve Dialog

(17) Polygon 2

(18) Intersection points of the X/Y values which are displayed as a tool tip

(19) Input value position as reading lines representation

(20) Actual Input value

(21) Start of internal timer (if released)

(22) Overview dialog of stored parameter values

(23) Call Parameter dialog

(24) CFC Input „Release“= „1“.

(25) Polygon 3

(26) Polygon 1

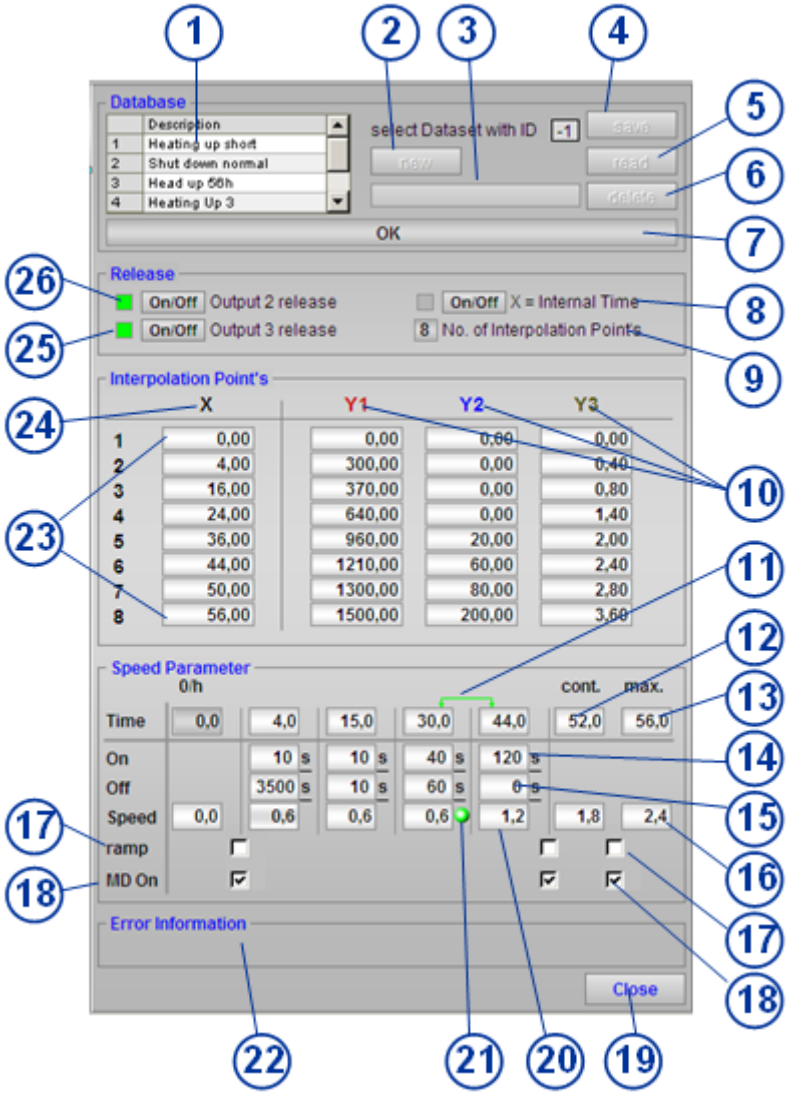
(27) Y-Axis of 2. Output value

(28) Y-Axis of 1. Output value s

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Parameter- Dialog

With mouse click on button "parameter" the following dialog will be open. All parameter values can be modified. In addition it is possible to store or read the Parameter from a database. These write and also the read operation is only possible with the user right “21” and Input "Release" = "0", i.e. no Output values are calculated.



The following functions and information are shown:

(1) Selection dialog box of the stored parameters data sets. With the button “new” (2)and input of a description(3) followed by pressing the button “save” (4), a new dataset will be inserted. With the button "delete" (6) the selected data set is deleted.
(7) In case of faults the corresponding error message are shown here.

(8) With the button „Internal Time“the “start of internal time “will be released. Instead of CFC Input signal „IN“ the internal timer can be started/stopped with the button „Start/Stop Time“ (21).

(9) Number of interpolation points defined in the CFC on the X axis.

(10) Interpolation points of the 3 Y axes

(11) Speed Area active

(12) X values for speed Output (only ascending from 0 till max. possible)

(13) Maximum X value

(14) Run period of the auxiliary drive in seconds

(15) Stop period of the auxiliary drive in seconds

(16) Maximum speed per min

(17) Ramp calculation of base X to Y.

(18) Use main drive

(19) Close Dialog

(20) Speed set points in rpm

(21) Output "speed active" is shown green for the duration of the running time

(22) Parameter fault or faulty status information of the Input structures

(23) X Values climb for the interpolation points of 1 to max.8. The upper limit is "HiLimX".

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(24) X axes definition values.

(25) Releasing polygon 3.

(26) Releasing polygon 2

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Storage- Dialog

This dialog shows only the individual parameters of the stored data sets (1). Editing is not possible.

The individual data sets of the stored Module parameters can be read and displayed from the user archives. Use the button set (2).

The following representation was chosen.

(3) TAG of Poly3 Module as Search string

(4) Description of the data set.

(5) Polygon Interpolation definition values with lower- and upper limit in the following order from left to right: - X value/Y1/Y2/Y3

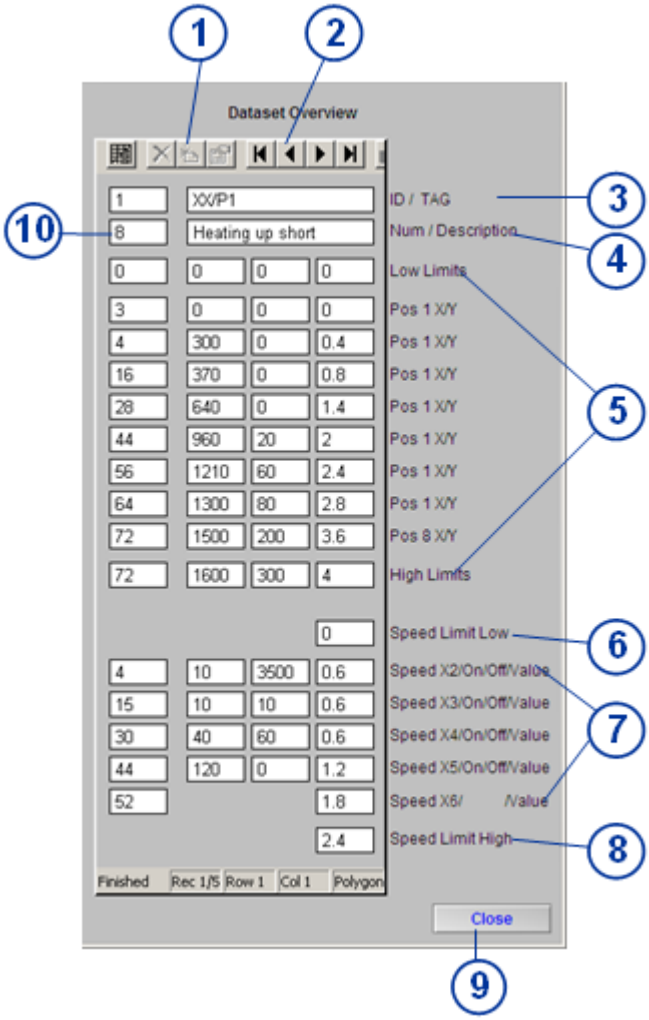
(6) Speed low limit

(7) Revolutions per minute parameter set in the following order from left to right: - X value/On time/off time/speed

(8) Speed high limit

(9) Close Dialog

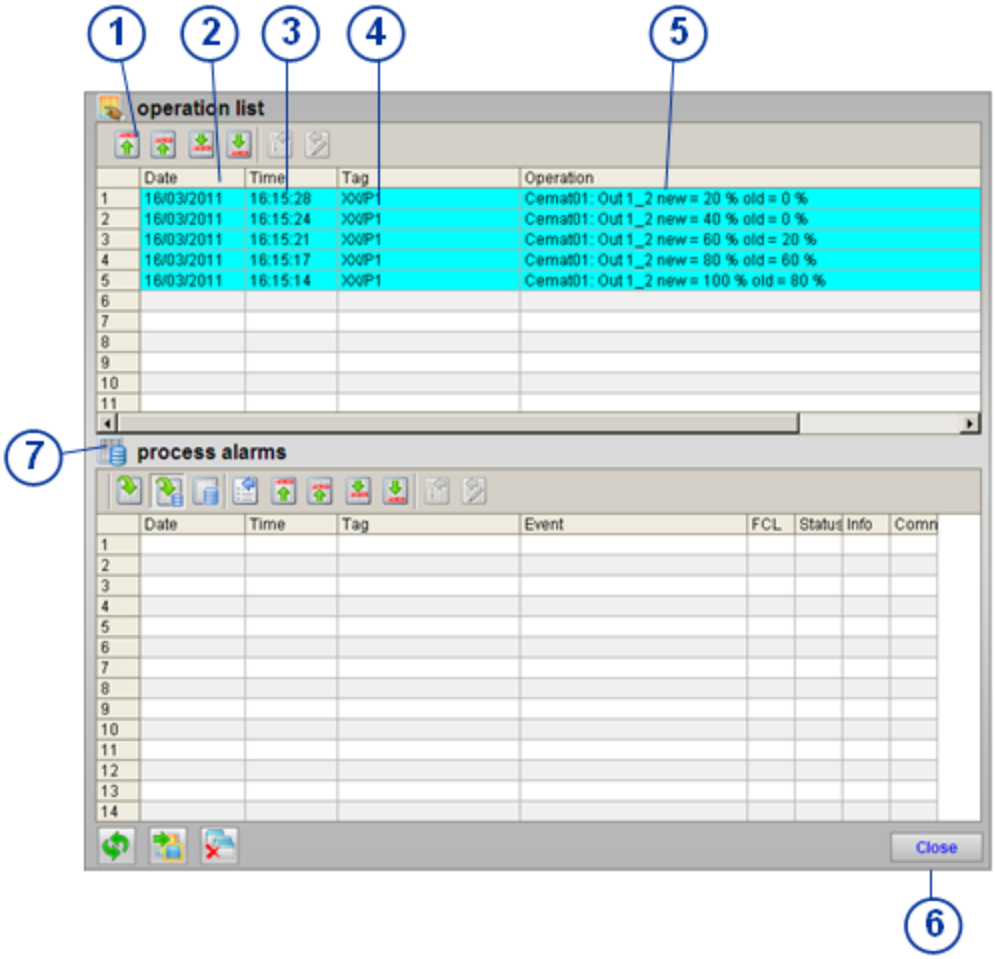
(10) Number of interpolation points



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Operation/Alarm- Dialog

This dialog shows the Operator annunciations. Alarms are not caused.



The following representation and operating options are available.

(1) Scroll in the Operation list

(2) Date of the operating message

(3) Time of the operating message

(4) TAG of Poly3 module.

(5) Operating message with user input name, new value, and old value

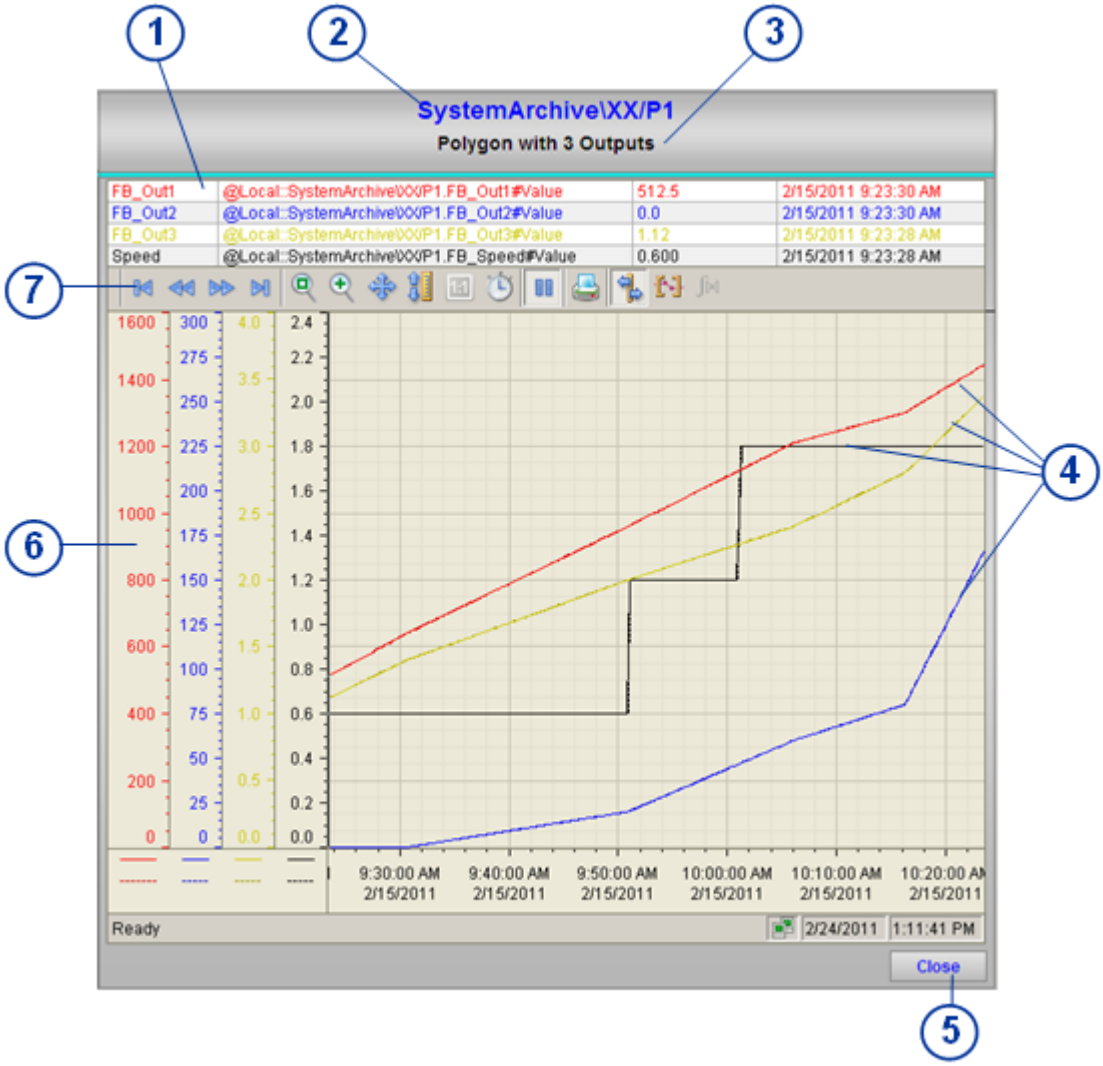
(6) Close dialog

(7) Process Alarm window (will be not used for this module)

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Curve- Dialog

This dialog shows the 4 Output values (Out1, Out2, Out3, speed) and the actual curve values, if there is a definition for this Poly3 object in the curve archives.



The following representation was chosen.

(1) Shows actual values at the ruler

(2) TAG of Poly3 module and curve archive name

(3) Description of Poly3 module

(4) Curve view of the current or archived Output values and necessary Input values.

(5) Close Dialog

(6) Curve control

(7) Navigation buttons of Curve window

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C_ADAPT Adapter block

General Function description

Via C_ADAPT non-CEMAT modules can be connected to CEMAT groups and routes.

In case of faults or warnings of the non-CEMAT module, this information is displayed in the collective display for group / route.

In the Group Instance list the non-CEMAT module is displayed. With a double-click on the non-CEMAT module the faceplate is opened.

For more details the non-CEMAT block must have a status word, providing the information "Device running", "Fault", "Warning" and individual fault/warning definitions. This information can be seen in the status display and in the status call function of the group.

The status word of the non-CEMAT block must be defined in a configuration file, which has to follow a certain structure and must be located under D:\CEMAT_CS\Config.

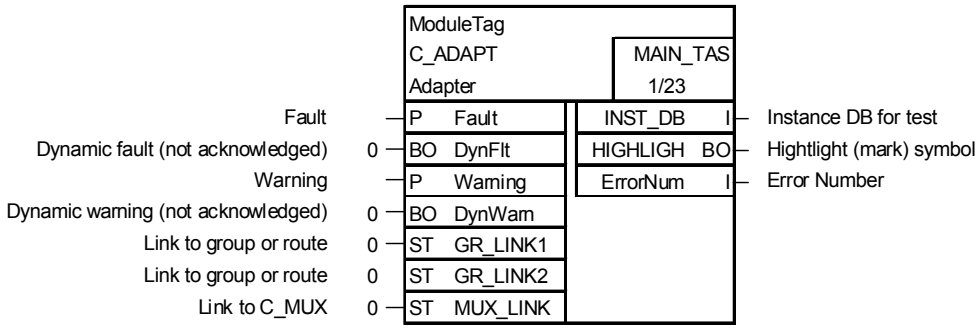
The **Group instance list** shows the status:

- Device stopped (white)
- Device running (green)
- Device summarizing fault (red)
- Device summarizing warning (yellow)

In case of a fault or warning, the **Status call function** shows each individual fault/warning with Tag and Comment from the non-CEMAT block and with the fault/warning text, defined in the config file.

Function block

The picture below shows the most important interfaces and process parameters of the adapter block. More detailed information you will find in the object description of the block.



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Visualization

The C_ADAPT block is an invisible link between non-CEMAT modules and Cemat groups/routes and it does not appear in the visualization system.

Block icon (Representation in the Process Picture)

The block has no operator interface.

Faceplate

The block has no operator interface.

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C_ODA Operation Data Acquisition

General Function description

Via the CEMAT ODA (Operation Data Acquisition) block, the shift- or daily-values can be provided for an operating data protocol through preconfigured CFC-data acquisition blocks.

An operating data protocol usually has the following structure:

Data acquisition:

The data acquisition means the detection of all values which are necessary for the construction of the BDP.

To these above mentioned values belongs a. o.:

- operating time (RT module, Motor)
- operating cycle (Counter, Damper, Valve)
- amounts
- electrical Energy
- temperatures
- pressure
- states of plants or plant components

The main characteristic of the data acquisition is that information comes from the plant itself and is processed via independent acquisition modules or CEMAT control blocks.

Data storage:

The data storage serves the purpose to deposit the information coming from the plant, and it can be done hierarchically.

Viz.: Each acquisition block can handle a maximum of 15 values for local intermediate storage of 24 hourly values and a summarizing for the current day.

The input values are also subdivided by the data format into 5 DWords and 10 REAL.

The information is stored in a data block, whose Data words are available as WinCC variable on the OS.

The hourly values can be stored as continuing values or as differential values.

If you use the difference values you can additionally consider a conversion factor (e.g. conversion in hours).

The next storage level is made then on the OS level in a data base (User archive or TAG Logging)

Data handling:

The data handling is the processing of the recorded information from the data acquisition.

Here you can carry out additional conversions or totalizing for shift-, week- or month- protocols.

Data output:

The data output is the print of the Operation data protocol in a previously defined form at a defined time.

Via PCS7 Reports or in the AddOn "WinCC Data Monitoring" the Output format can be designed.

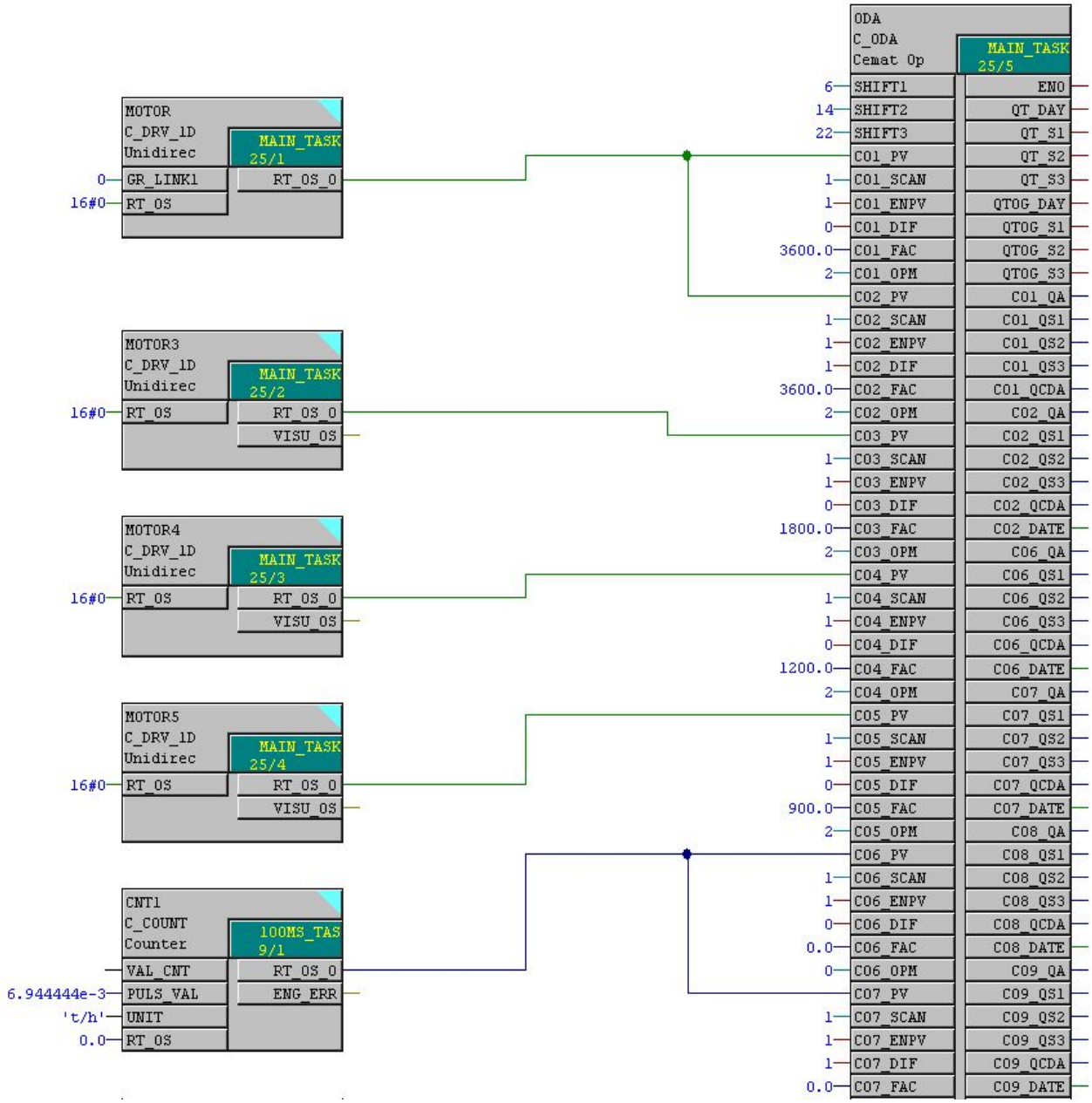
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Alarm messages:

None

Function block

The picture below shows the most important interfaces and process parameters of the Runtime block. More detailed information you will find in the object description of the block.



Connect the Input signal to the Cxx.PV Interface of the channel

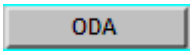
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Visualization

The **block icon** of C_ODA is only a button which opens the faceplate C_ODA_STANDARD.pdl.

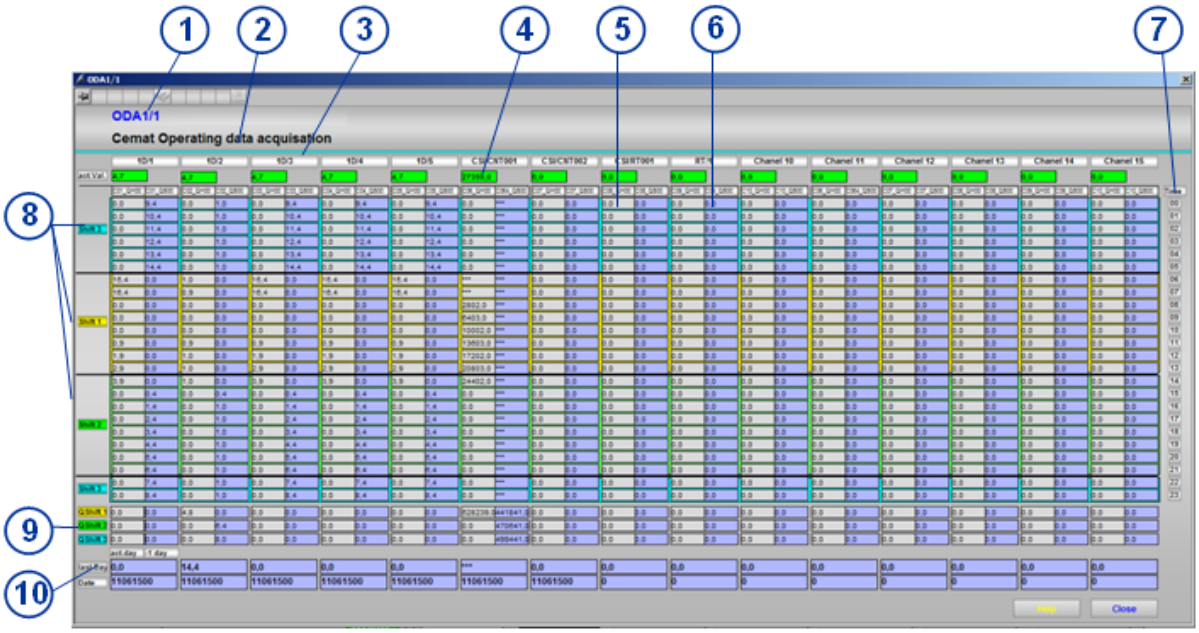
Faceplate C_ODA_STANDARD.pdl is connected to the 15 values of the C_ODA object and shows the values of the current day and the last day.

Block icon (Representation in the Process Picture)



The block icon of the ODA block shows only a free Text.

Faceplate



(1) TAG of ODA Object

(2) Comment of ODA Object

(3) TAG of connected object to that channel

(4) Actual Value of channel

(5) Actual Values per hour

(6) Values per hour from the day before

(7) Hour

(8) Shift indication

(9) Sum of shift values

(10) Sum of the day

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CEMAT Engineering

Setup of the PCS7 Project



Before you start with the Engineering, please follow the Preparations in the Cemat Engineering Manual, Chapter 2..



For the setup of the PCS7 Project the Engineering rules of the Cemat Engineering Manual, Chapter 3 must be followed.

A MultiProject must be created according to the actual plant configuration.

AS Engineering

After the setup of the project the CEMAT blocks are available and the application program can be created.

For repeating functions process tag types can be created in PCS7. Excel Tools can be used to convert the engineering data from external database into import files for PCS7 and to create part of the program automatically using the IEA-Assistant of PCS7.

The rest of the Programming is carried out in the continuous function chart (CFC). Sequence function chart (SFC) is not needed in CEMAT.



The block interfaces are described in the Reference Manual of CEMAT (Object descriptions).



For AS Engineering Rules refer to the Cemat Engineering Manual, Chapter 5.

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OS Engineering

What is shown WHERE and HOW?

Complete plant overview

Representation:	Schematic representation of the complete plant
Content:	Overview of the production plant with global status display from the running plant sections
Operation:	Selection of a production section / a sub-plant

System monitoring, plant configuration diagrams

Representation:	Schematic representation of the complete control system
Content:	Overview of the network connection of the individual control system devices with global status display of the individual components.
Operation:	Selection of an individual component for detailed analysis

Plant sections:

Representation:	Material flow of a complete production plant without secondary aggregates and details
Content:	Display of all physical variables relevant for the process control.
Operation:	Start and stop of the plant Specification of set points Assignment of recipes Invoke overviews for flow diagrams, measured values, closed-loop controllers, curves Tabular measured value listing

Process diagram overviews:

Representation:	Schematic representation of the diagram hierarchy with group states
Content:	Overview of the production plant with display of the operational groups/paths
Operation:	Selection of a process diagram

Grouping overview

Representation:	Tabular representation of the measured values, closed-loop controllers, curves
Content:	Overview of the grouping of the measured values, closed-loop controllers, curves either general or operator-specific
Operation:	Selection of a group diagram

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Groups, routes, selection overview

Representation:	Tabular representation of the plant-specific groups, routes, selections
Content:	Overview of the states of the production plant
Operation:	Selection of the process diagram in which the groups, routes, selections are displayed

Process diagrams:

Representation:	Representation of the plant sections with all aggregates
Content:	Display of the operational modes, measured values, states, curves, filling levels
Operation:	Selection, operation of individual aggregates and diagnosis, information and object parameter invocations

Detail diagrams:

Representation:	Representation of the individual aggregates
Content:	Display of the operational modes, measured values, states
Operation:	Selection, operation of individual aggregates and diagnosis, information and object parameter invocations

Help:

Representation:	User's guide for the CEMAT system User's guide for the plant User key assignment
Content:	Explanations and examples of the system handling.
Operation:	Complete table of contents and search key control



For OS Engineering Rules refer to the Cemat Engineering Manual, Chapter 8.

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Project planning example

Project Execution

Typically the vendor's responsibility within a project includes but is not limited to the following items:

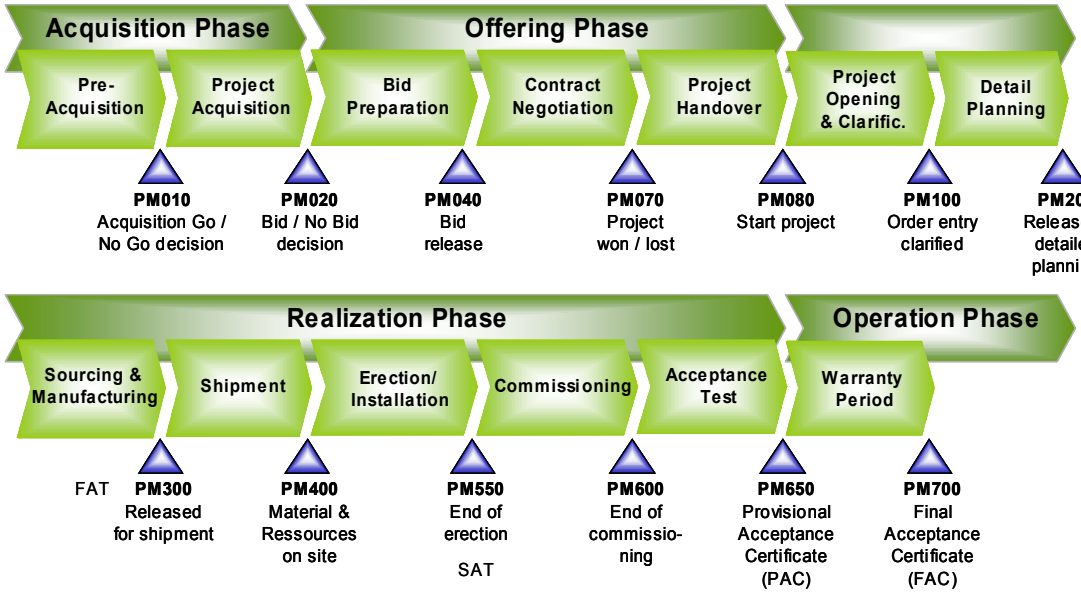
- System engineering
- System hardware including basic operating software
- Software interfacing all foreign devices
- Application software and configuration
- All system interconnecting cabling for each plant
- System documentation
- Recommended spare parts
- Factory acceptance testing
- Packing and shipping
- Installation supervision
- Site acceptance test including site integration test
- Pre-commissioning
- Handover of a complete working system
- Warranty
- Training
- Optimization of the system resources

Failure of specifications and attachments and/or drawings to state or show materials, which are essential to make specified equipment complete, does not relieve the vendor from the responsibilities for furnishing such material.

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Project Management

Projects at Siemens are carried out according to the phases and milestones defined by the PM@Siemens project management initiative.



The project manager is the contact person and coordinator for all technical and commercial issues throughout the period of project execution. He communicates with the project manager of the purchaser.
With the quotation, a summary project schedule, a project loading chart and an organization chart will be attached.

Milestones and Time schedule

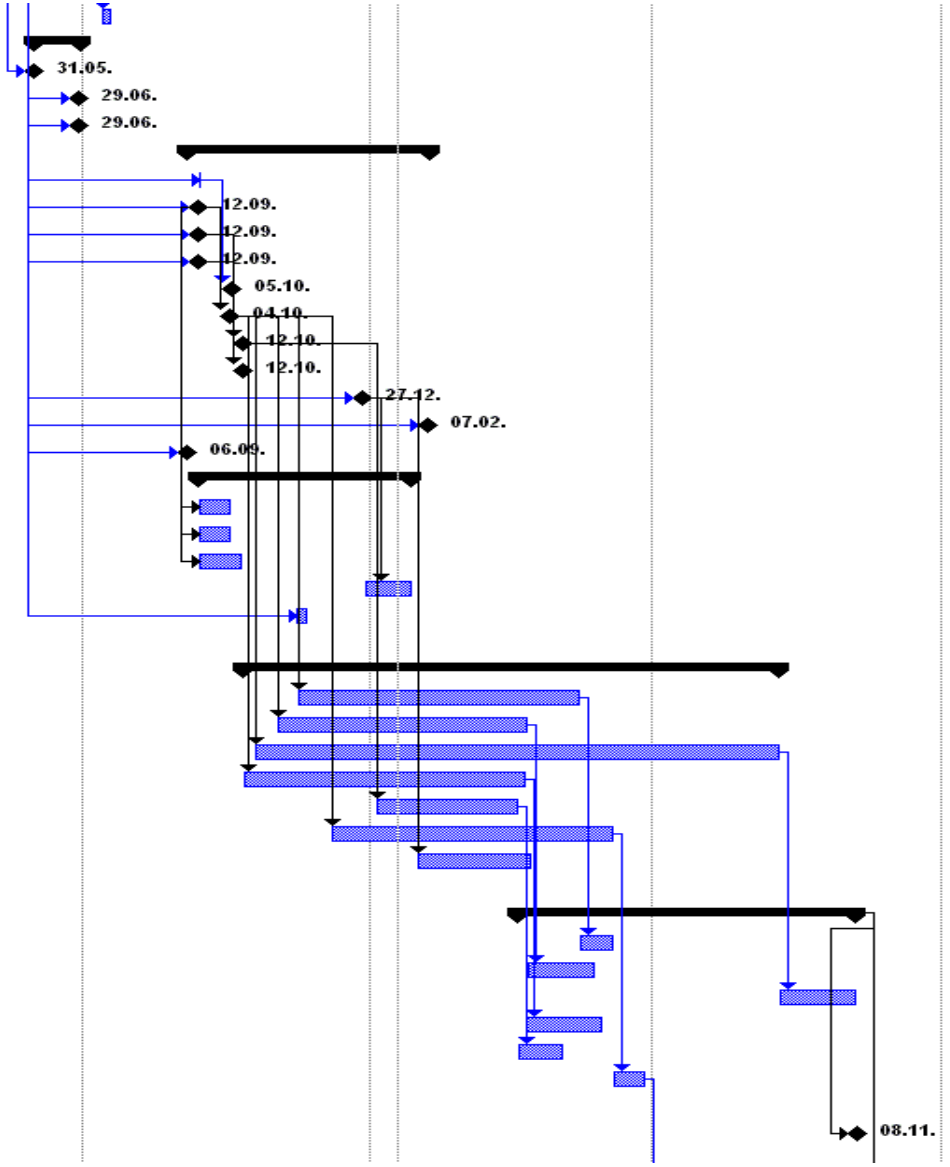
The project manager defines milestones for the project execution while indicating scheduled (completion) dates. Milestones will include, but not be limited to the following:

- Delivery of documents by vendor and by purchaser.
- Kickoff meeting
- Checking the project-related specifications for completeness
- Discussion about templates, images/displays, operator control authorization
- Finalization of Design (Hardware & Software)
- Preliminary testing of selected single functions prior to copying
- Submittal of the functional specification, project-specific part
- Submittal of the report of the internal test before FAT
- FAT
- Backup before delivery
- Physical delivery of the system
- Installation of the system
- Commissioning of the system
- SAT
- Start-up of the system

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Dependent on the Project see the Example below

Kick Off Meeting	4 Tage
Engineering planning	**22 Tage**
Basic data and Requirements CNSAL	1 Tag
Receiving Updated Project Flow Sheet	1 Tag
Receiving Mechanical Flow Sheet	1 Tag
Electrical Engineering, Receiving Input data	**111 Tage**
Flow Sheet with Measuring and Control Loops (PID) (preli	1 Tag
List of Motors and Consumers (prelim.)	0 Tage
List of Measuring points (prelim.)	0 Tage
List of dig. Sensors (prelim.)	0 Tage
Flow Sheet with Measuring and Control Loops (PID) (final	1 Tag
List of Motors and Consumers (final)	1 Tag
List of Measuring points (final)	1 Tag
List of dig. Sensors (final)	1 Tag
Arrangement Drawings with Location and Measuring Poin	1 Tag
Process Functional Diagram (PFD)	1 Tag
Technical data for Subcontrol (dwgs. And dimensions)	1 Tag
Electrical Basic Engineering	**98 Tage**
Requirements for E-Rooms	15 Tage
Power distribution design (power consuption)	15 Tage
Dimensions of main drives (outline dwg., prelim.)	20 Tage
Main Cable routes	21 Tage
Earthing and Lightning requirements	5 Tage
Electrical Detail Engineering and Manufacturing	**245 Tage**
MV-Switchgear	128 Tage
LV-Switchgear (MCC)	115 Tage
MV-Drives w. auxill. Equipment	240 Tage
LV-Drives	128 Tage
Instrumentation	64 Tage
Automation / Control System	128 Tage
Cable routes	53 Tage
Delivery (FoB)	**155 Tage**
MV-Switchgear	15 Tage
LV-Switchgear (MCC)	30 Tage
MV-Drives w. auxill. Equipment	35 Tage
LV-Drives	35 Tage
Instrumentation	21 Tage
Automation / Control System	15 Tage
Liquidated Damages	0 Tage



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As follow-up see:

Example of Scope of Supply Schedules

		Engineering & Documentation		QS331A App 3.2					A
Rev	Item	Description	Qty	Performed by					
				Siemens			Others		
				Issue	Update	Due	Issue	Update	Due
		General notes							
		* All documentation will be in English							
		* Engineering documents for review / approval will be provided in paper hardcopy							
		* Final Engineering documents shall be provided in paper hardcopy and software files on CD							
		* Manufacturer's standard documentation (manuals etc) will be provided in paper hardcopy only unless otherwise noted							
		* All documents provided for updating shall be provided as:							
		ACAD Release 14 or higher							
		MS office '2003 or higher							
		* Client review period for all document submissions is 2 weeks including document return to Siemens							
		Engineering & Documentation Scope							
	1	***Project***							
		Master schedule					x		
		DCS system schedule		x					
		Project Execution Plan		x					
		Engineering document list & submittal schedule		x			x		
	2	Project control							
		Monthly progress report		x					
		Monthly progress claim		x					
	3	***Shipping***							
		Preliminary shipping weights & dimensions		x					
		Packing list		x					
	4	***Client data***							
		P&ID's					x		
		Symbols & nomenclature standards					x		
		Process control description, sequence / logic function description					x		
		Emergency & Shutdown cause & effect					x		

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		charts							
		Instrument Index					x		
		I/O data file (*MS Excel format - includes Tag No, I/O type, range, alarm limits, history archive requirement, trend view requirement - SIEMENS DATA FORMAT PREFERRED)*					x		
		Electrical equipment interface drawings (MCC control diagrams etc)					x		
		Typical instrument loop drawings					x		
		Interface specifications for 3rd party equipment & systems *-as listed*							
		(System 1)							
	5	***System Engineering***							
		System architecture drawing		x					
		I/O Rack / slot allocation & network address list		x					
		I/O card assignment & address list		x					
		System loading calculation		x					
		System bill of materials		x					
	6	***Application Software Generation***							
		Functional Design Specification (FDS)		x					
		Database design & configuration		x					
		Sequence & logic configuration		x					
		Dynamic graphics displays - basic sketches / area definition					x		
		Dynamic graphics displays - *PCS*		x					
		Dynamic graphics displays - *SGS*		x					
		Reports design - basic definition					x		
		Reports design		x					
		Data archiving design - *type as listed*							
		PCS7 WinCC standard		x					
		Trend pages - 8 trends per page		x					
		Communication configuration with other systems - *as listed*							
		PCS / SGS communications - Modbus		x					
		MIS Functional Design Specification							
		MIS configuration							
		Advanced control Functional design Specification							
		Advanced control configuration							
	7	***Hardware Design***							
		Console layout drawings							
		Console wiring diagrams							
		Auxiliary console layout drawings							
		Auxiliary console wiring diagrams							
		Control room layout					x		
		System, I/O, marshalling, interposing relay cabinet layouts		x					

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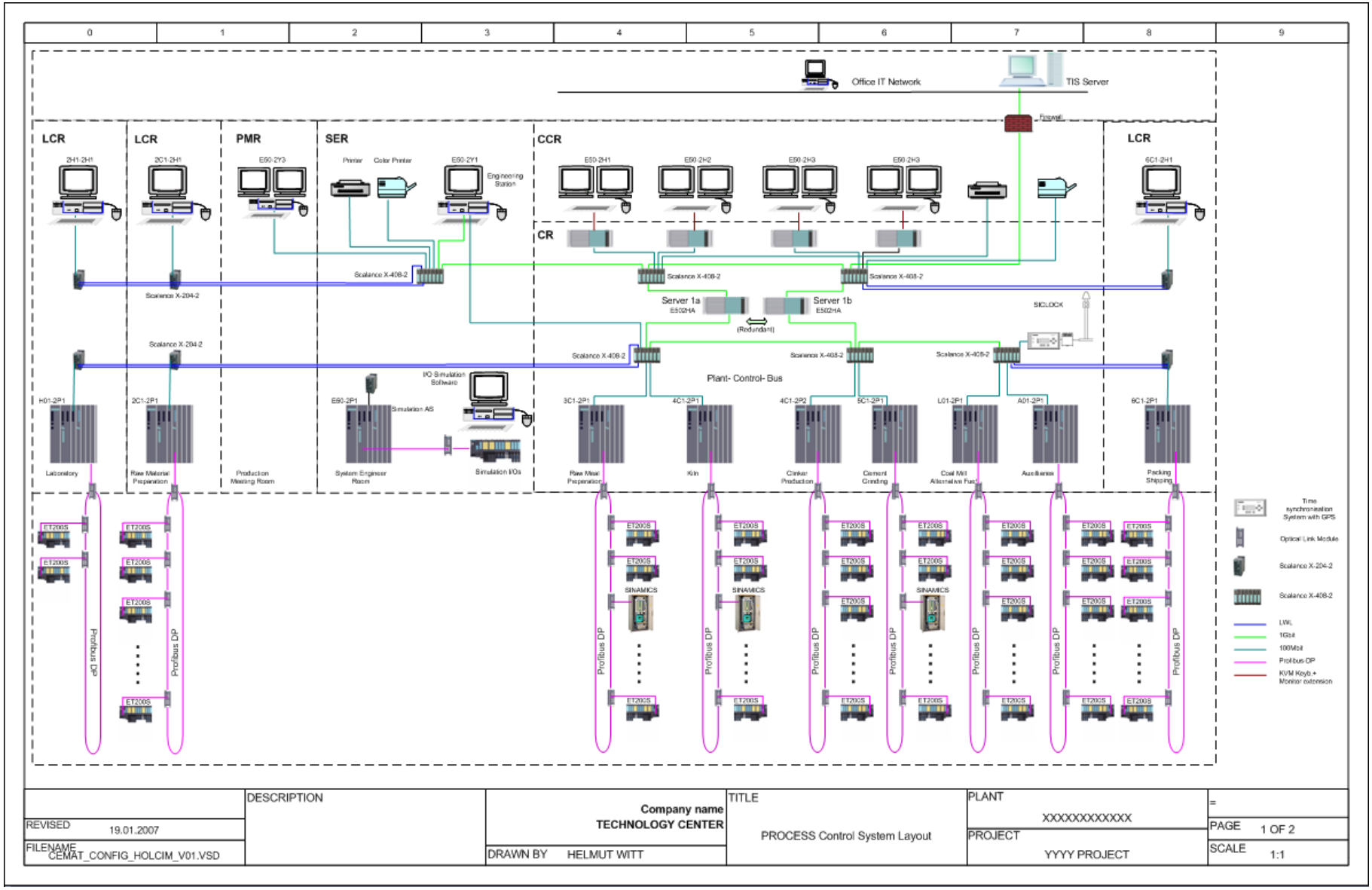
		System, I/O, marshalling, interposing relay cabinet wiring diagrams		x					
		Power consumption & heat dissipation		x					
		Power distribution & earthing block diagram		x					
		System cable schedule		x					
		AC UPS data sheet					x		
		DC Supplies specification					x		
		Large screen / Projection system details							
	8	***Testing***							
		FAT procedure		x					
		FAT report		x					
		SAT procedure		x					
		SAT report		x					
	9	***Final documentation***							
		Standard hardware, operation & maintenance manuals		x					
		Standard system self documentation (I/O schedule, SFC / CFC charts etc)		x					
		System operating manual		x					
		Hardware design documents		x					
			Legend						
				w	= weeks after award				
				m	= months after award				
				<F	= before FAT				
				<S	= before SAT				

With use of CUSTOMER Standard Configuration and the" General Consumers/Drive/Signal List" together with the CEMAT Configuration Tool it will possible to create a budget price and Material List.

The following Steps are necessary to fill up the Configuration tool.

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Step 1 -> definition of the general plant Configuration



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Step 2-> Amount of Consumers/Signals for a typically CUSTOMER Line

		Raw Mat. Prep.	Raw Meal Prep.	Coal Mill	AFR Prep.	Clinker Prod.1	Clinker Prod.2	Grindin g	Packing Shippin g	Auxiliary	Total
Consumers /Drive	Unidirectional Drive(6000VAC)	1	2	2	2	2		2	0	0	11
	Unidirectional Drive(400VAC)	50	75	90	60	262		150	50	30	767
	Variable Speed Drive (SinaGS)	5	6	10	15	10		5	0	0	51
	Actuator (Damper)	2	11	12	13	70		3	20	2	133
	Valve	23	22	24	20	100		15	40	20	264
	Subcontrol Systems big	4	2	4	2	7		15	5	20	59
	Total	85	118	142	112	451	0	190	115	72	1285
Control	Clontrol Loop	3	10	14	7	24		10	0	0	68
(IN) Signals	Digital	450	900	650	700	2100		1400		500	6700
	Analog	20	78	50	90	300		180	20	40	778
(OUT) Signals	Digital	200	250	200	400	800		500	135	135	2620
	Analog	2	20	10	34	40		25	10	6	147
											0
Summary	Digital Total	650	1150	850	1100	2900	0	1900	135	635	9320
	Device	8	10	6	10	6		9		9	58
	Analog Total	22	98	60	124	340	0	205	30	46	925
	Device	0	1	0	1	1		1	1	1	6

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Step 3 -> Transfer the Information from the Consumer List to the CEMAT Object table
(witch we have to use later in the CEMAT Configuration Tool)

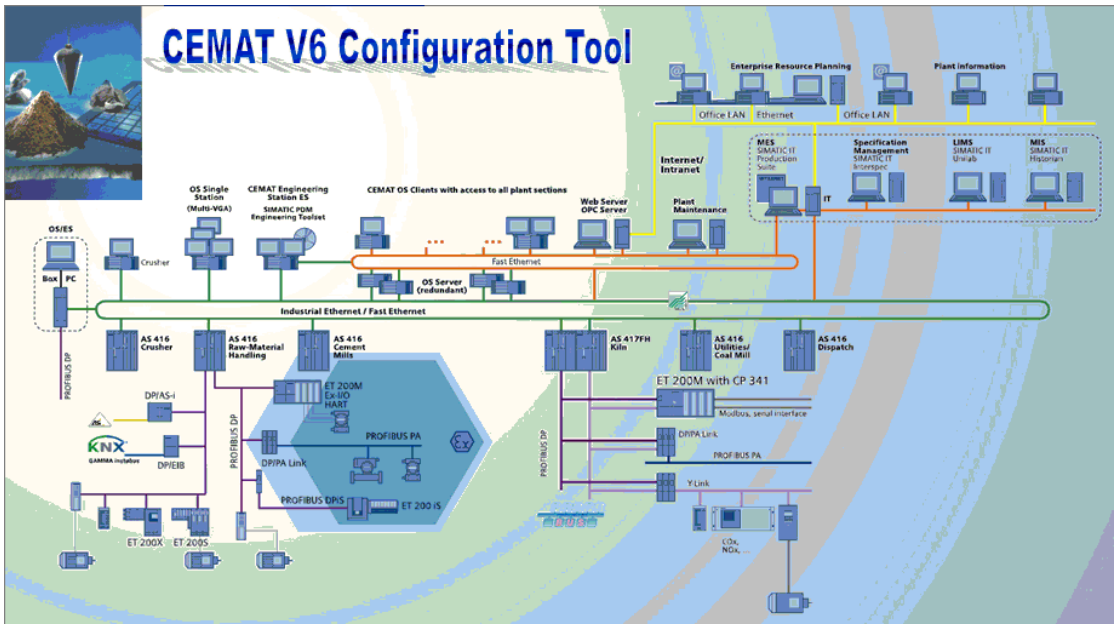
	Raw Mat. Prep.	Raw Meal Prep.	Coal Mill	AFR Prep.	Clinker Prod.1	Clinker Prod.2	Grinding	Packing Shipping	Auxiliary
Unidirectional	47	72	89	59	144	120	148	45	30
Actuator (Damper)	2	11	12	13	70	30	3	20	2
Bidirectional Drive	4	5	3	3			4	5	0
Annunciation	152	220	256	190	288	300	340	220	104
Analog Input	20	78	50	90	150	150	180	20	40
Valve	23	22	24	20	80	20	15	40	20
Route	5	5	5	5	4	5	6	6	0
Group	4	6	6	6	4	4	5	4	2
Selection Module	10	10	10	10	10	10	10	20	
Process Feedback(H)	10	15	18	12	14	15	30	9	6
Variable Speed Drive	5	6	10	15	2	8	5	0	0
Subcontrol Systems small								3	
Subcontrol Systems big	4	2	4	2	7	3	15	5	20
Counter	10	10	10	10	10	10	10	10	20
Run Time	5	5	5	5	5	5	5	0	10
AS-Object	1	1	1	1	1	1	1	1	1
Integrator									
SIMOCODE Adapter									
Closed Loop Contr. PCS7	3	10	14	7	24	18	10	0	0
Analog Output	2	20	10	34	40	30	25	10	6
Bool Variable(H)	10	10	10	10	10	10	10	10	20
Interger Variable(H)	5	5	5	5	5	5	5	5	5

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String Variable(H)	5	5	5	5	5	5	5	5	5
Interlock	152	220	256	190	288	300	340	220	104
Interlock5									

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Step 4 -> Open the CEMAT V8 Configuration Excel Tool and move to the page "Configuration"



.

Step 5 -> Type in the required Hard- and Software

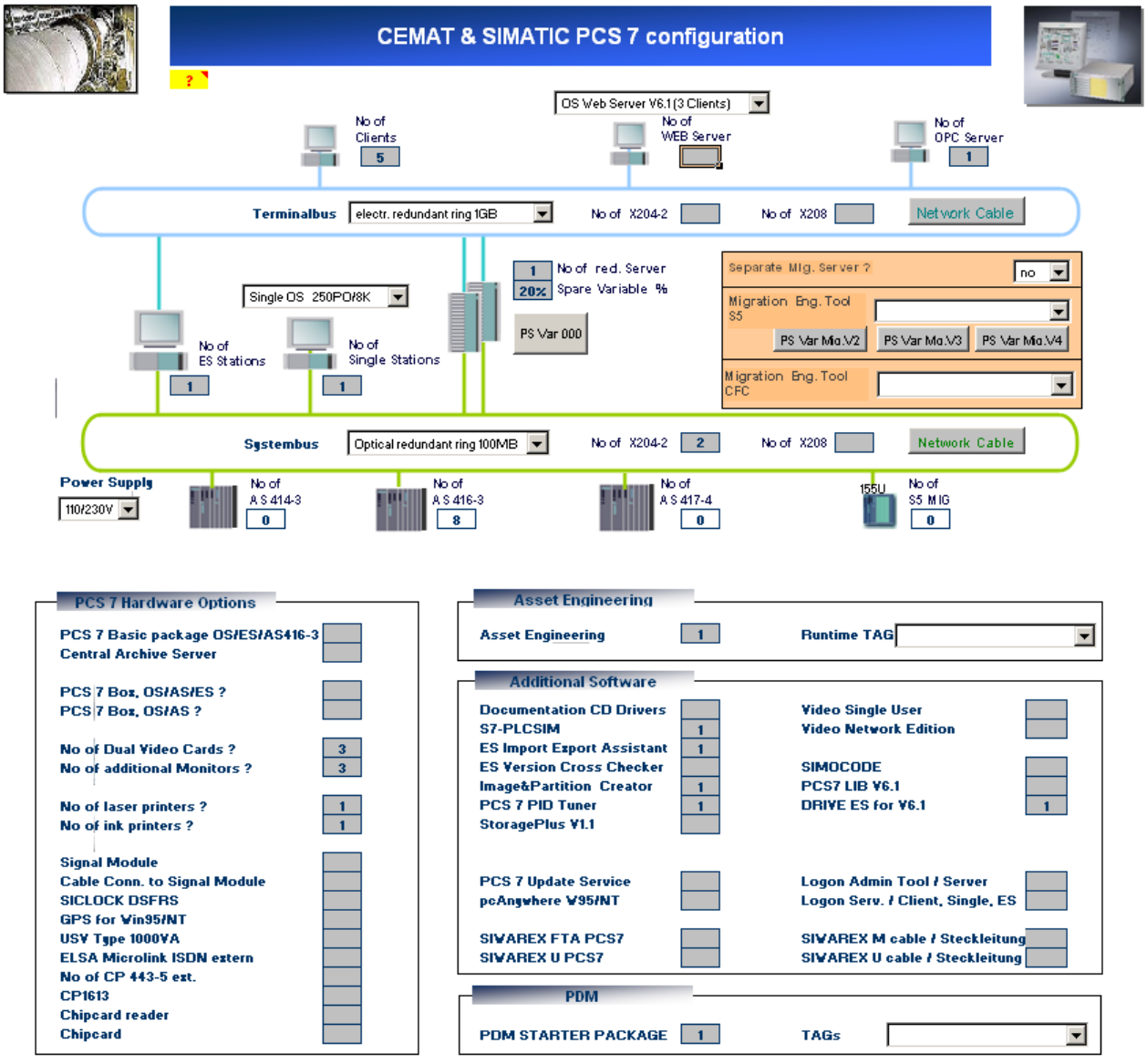
The Configuration Example used:

5 Clients with dual Monitor
3 Clients
1 red. Server , Amount of License spare
1 Single station
1 ENG Station
1 SPOSA Station
Network components
9 PLCs
Add. Hardware and Software

Test/Training Hardware

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Configuration Input



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Step 6 -> Open “License & AS Hardware” Page and select “Standard 000”

then copy over the Values from Step 3 and give additional values if it is necessary.

At the end press “Calculate Server and ES License” and then “Return”.

Volume of Project Data for CEMAT V6.1 based on PCS7 V6.1

Description	AS01	AS02	AS03	AS04	AS05	AS06	AS07	AS08	AS09	AS10	AS11	AS12	AS13	AS14	AS15	AS16	AS17	AS18	AS19	AS20	Number of Variables
Unidirectional Drive	150	150	150	150	150	150	150	150													21.600
Damper	20	20	20	20	20	20	20	20													4.160
Bidirectional Drive	5	5	5	5	5	5	5	5													800
Annunciation	250	250	250	250	250	250	250	250													18.000
8 Annunciation	0	0	0	0	0	0	0	0													0
Analog Input	200	200	200	200	200	200	200	200													49.600
Valve	20	20	20	20	20	20	20	20													2.400
Route	10	10	10	10	10	10	10	10													3.040
Group	15	15	15	15	15	15	15	15													4.920
																					0
Selection Module	20	20	20	20	20	20	20	20													800
Process Feedback(H)	30	30	30	30	30	30	30	30													1.440
Variable Speed Drive (SinaGS)	5	5	5	5	5	5	5	5													1.960
Subcontrol Systems small	5	5	5	5	5	5	5	5													120
Subcontrol Systems big	5	5	5	5	5	5	5	5													400
Counter	10	10	10	10	10	10	10	10													480
Run Time	10	10	10	10	10	10	10	10													320
AS-Object	1	1	1	1	1	1	1	1													2.688
Integrator																					0
SIMOCODE Adapter																					0
Closed Loop Contr. PCS7	15	15	15	15	15	15	15	15													8.640
Analog Output	30	30	30	30	30	30	30	30													240
Bool Variable(H)	10	10	10	10	10	10	10	10													160
Interger Variable(H)	5	5	5	5	5	5	5	5													40
String Variable(H)	5	5	5	5	5	5	5	5													40
Interlock	200	200	200	200	200	200	200	200													17.600
Interlock5	150	150	150	150	150	150	150	150													2.400
Number of Objects	1171	1171	1171	1171	1171	1171	1171	1171	0	0	0	0	0	0	0	0	0	0	0	0	9.368
Number of PBK *)	740	740	740	740	740	740	740	740	0	0	0	0	0	0	0	0	0	0	0	0	**5.920**
Cycle Time [ms]	58	58	58	58	58	58	58	58	0	0	0	0	0	0	0	0	0	0	0	0	
																				Total Variables	**141.848**
																				Number of Servers recommended	**1**

Calculated for 6ES7 416-3XL04-0AB0 V4.0

Standard 000 | HOLCIM 004 | LAFARGE 027

Calculate Server and ES License

Return

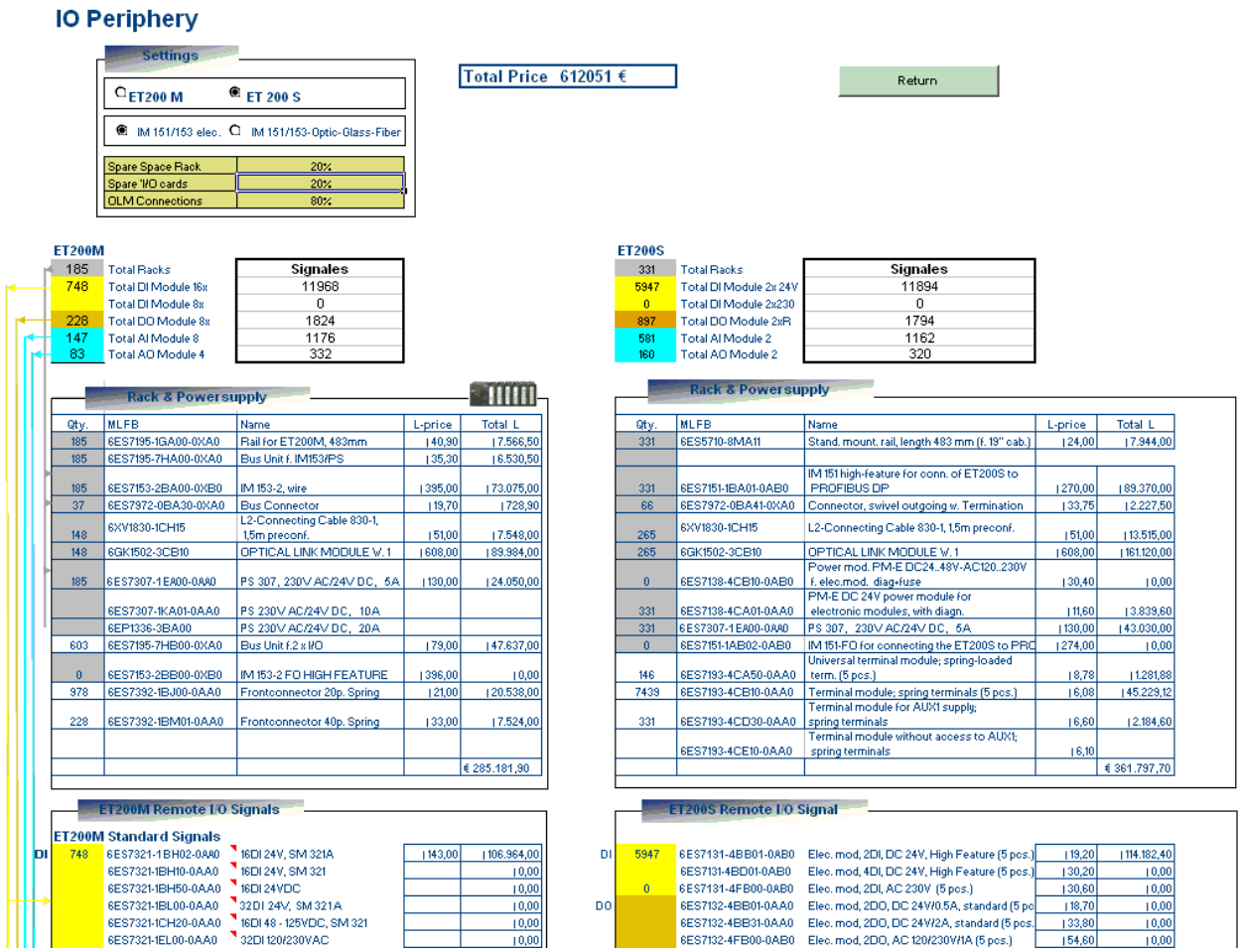
*) Remark: Maximum number of Alarmobjects and Memory for:	Mem	PBK
CPU 414-3 V4	1,4 MB	600
CPU 416-3 V4	5,6 MB	1800
CPU 417-4	20 MB	10000

Maximum Number Variables per Server
256.000

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Step 7 -> Open Page “I/O System” and adjust the Settings.

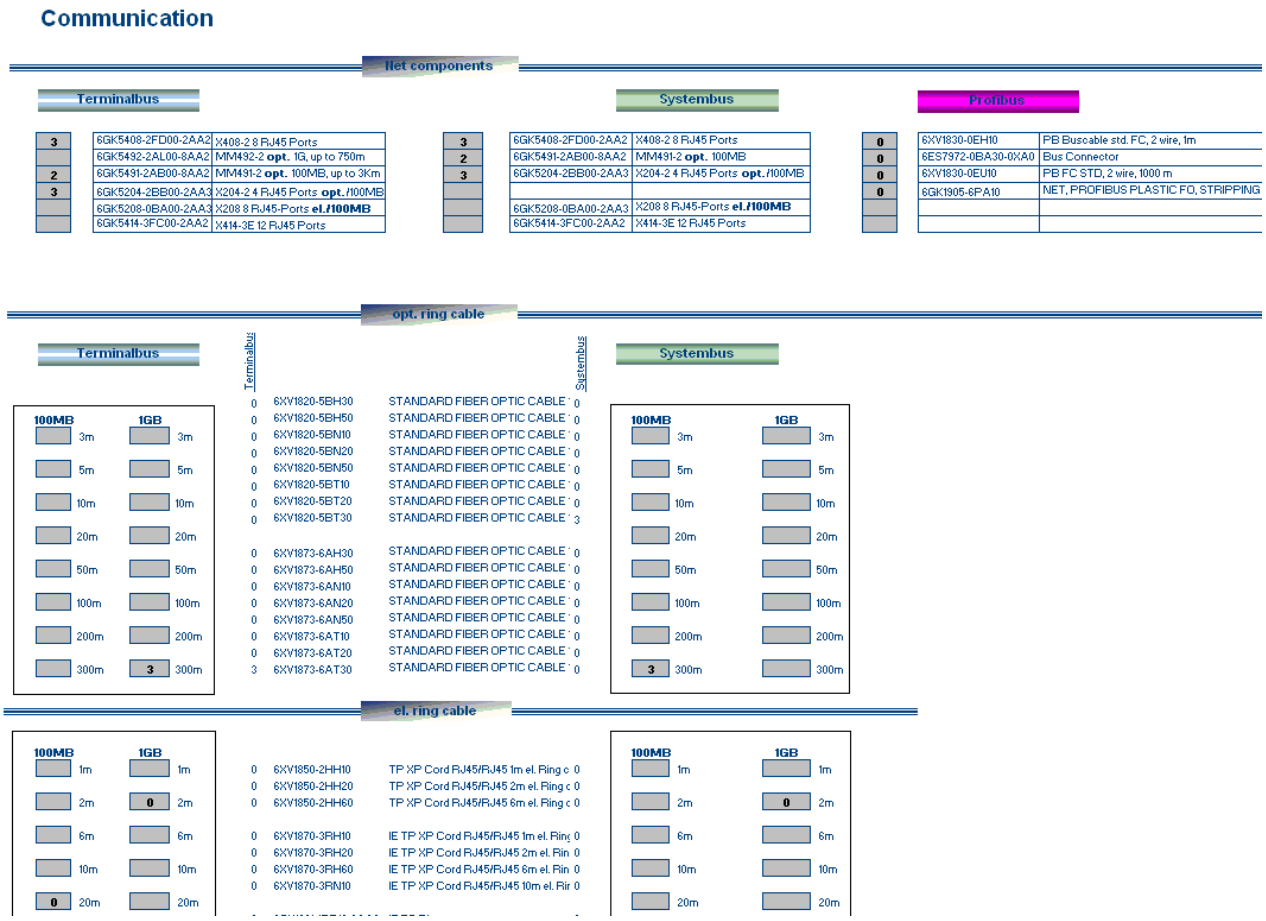
If you want to use an other I/O module please change the code in column “D” or “K“



Go back with “Return”

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Step 8-> Open Page "Communication" and write the values for switches and cable depending your configuration.



Go back with "Return"

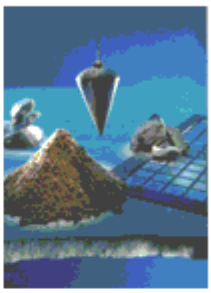
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Step 9 -> Open Page "Engineering expanses" and adjust the values in all fields with gray background.

Engineering

Project	h total		
Project Management	0		
Project Meetings	0		
Subtotal Project	**0,00 h**	**90,--/h**	**0,--**

General Requirements	h total
Requirements Specification	0
Preliminary Design Specification	0
Final Design Specification	0
Requirements for E-Rooms	0
Control Room Design	0
Screen Design, Report Design	0
Third Party Interface Design	0
Communication Systems Design	0
Power Supply, Grounding, Shielding	0
Shut Down Strategy, Alarm Ack.	0
Failure Strategies	0
Subtotal Requirements Specification	**0,00 h**



90,--/h **0,--**

Hardware/Software Engineering	pcs	h/pcs	Complex. a. copy factor	h total
Definition of Hardware	0	8	1	0
System Software installation				
OS Client	5	2	1	10
OS Server	1	6	1	6
Engineering Station	1	4	1	4
Single Station	0	4	1	0
PCS7 Open Server (OPC)	0	4	1	0
WEB Server	0	4	1	0
Assembly of Hardware				
HW-Box I/O Field	265	2	1	530
HW-I/O MCC/Cabinets	66	2	1	132
AS Hardware cabinet	3	4	1	12
OS Hardware cabinet	2	4	1	8
Net components cabinet	0	1	1	0
Operator Console	5	4	1	20
KVM extesion	5	2	1	10
Cable assembly				
FO Cable / m		0,05	1	0
FO Socked		2	2	0
Data cable / m		0,05	1	0
	0			
Subtotal Hardware/Software Engineering			**732,00 h**	**70,--/h**	**51.240,--**

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AS SW Engineering	pcs	h/pcs	Complex. a. copy factor	h total
Discrete Binary Input	2070	0,5	1	1035
Discrete Binary Output	0	0,5	1	0
Discrete Analog Output	177	0,2	1	35,4
Motor Control	771	4,1	1	3161,1
Motor Control 2 direction	24	4,1	1	98,4
Valve Control	264	4,1	1	1082,4
Damper Control	163	4,1	1	668,3
Motor variable Speed	51	5	1	255
Measured Value Indicator	792	0,5	1	396
Subcontrols	65	5	1	325
Closed Loop Control	86	3	1	258
Cascade Control	3	3	1	9
Ratio Control	2	3	1	6
Sequence Control (Group,Route,Select)	172	2	1	344
Third Party Interface Programming, # of Signals	4	8	1	32
Dosing	5	3	1	15
Typical Design	2	16	1	32
Customized Functions	4	16	1	64
	0	1	1	0
Subtotal AS SW Engineering			**7816,60 h**	**70,--/h**	**547.162,--**

OS SW Engineering	pcs	h/pcs	Complex. a. copy factor	h total
additional Faceplate	5	8	1	40
Static Screen Contents	40	8	1	320
Dynamic Screen Contents	10	3	1	30
additional Message	0	0,2	1	0
Historical Trend	200	0,1	1	20
Report Pages	0	8	1	0
Customized Functions	3	8	1	24
Subtotal OS SW Engineering			**434,00 h**	**70,--/h**	**30.380,--**

Documentation	h total
Brief technical description	0
Description of the engineering concept	
Hardware engineering	0
Software engineering	0
Installation instructions	0
Instructions for operation of the DCS	0
Maintenance Manual	0
Subtotal Documentation	**0,00 h**	**50,--/h**	**0,--**

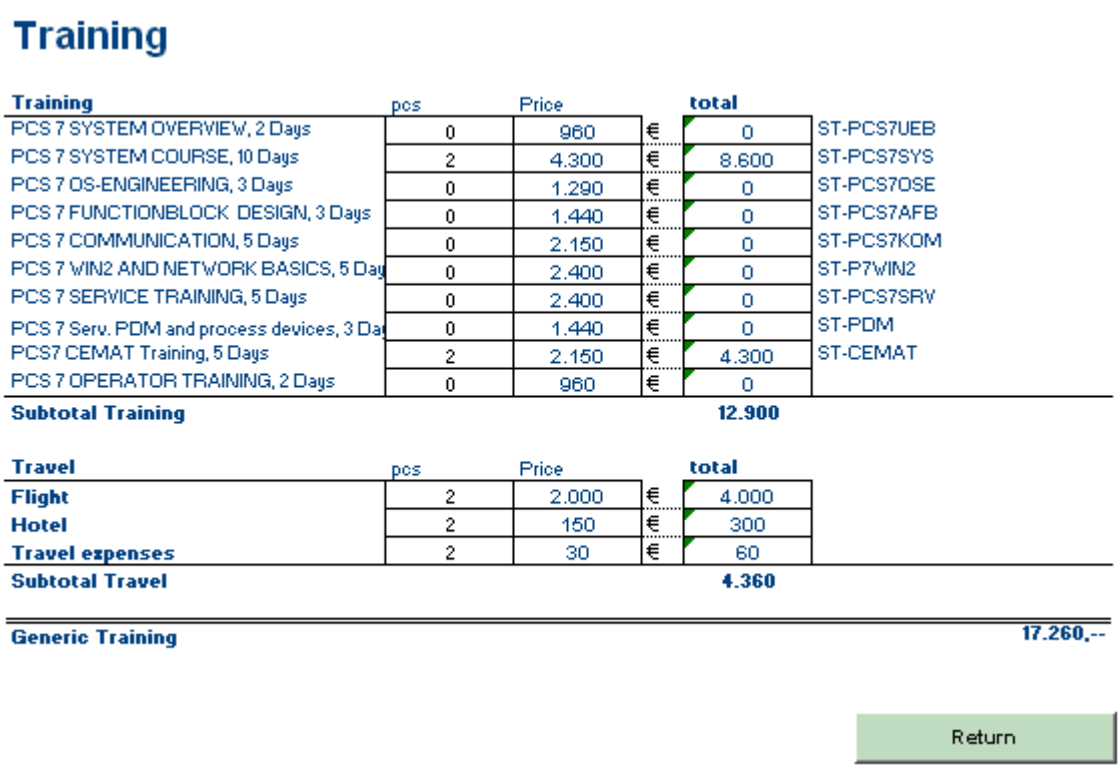
Plant Engineering	h total
FAT	80
Continuity Check Power Up	0
Loop-Check	360
Commissioning	360

Catalog | Info | Config | Var. Calc. 000 | IO | Communication | **Engineering** | Training | Clock Sec | L

Go back with “Return”

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Step 10 -> Open Page "Training" and adjust the values in all fields with gray background.



Training

Training	pcs	Price		total	
PCS 7 SYSTEM OVERVIEW, 2 Days	0	960	€	0	ST-PCS7UEB
PCS 7 SYSTEM COURSE, 10 Days	2	4.300	€	8.600	ST-PCS7SYS
PCS 7 OS-ENGINEERING, 3 Days	0	1.290	€	0	ST-PCS7OSE
PCS 7 FUNCTIONBLOCK DESIGN, 3 Days	0	1.440	€	0	ST-PCS7AFB
PCS 7 COMMUNICATION, 5 Days	0	2.150	€	0	ST-PCS7KOM
PCS 7 WIN2 AND NETWORK BASICS, 5 Day	0	2.400	€	0	ST-P7WIN2
PCS 7 SERVICE TRAINING, 5 Days	0	2.400	€	0	ST-PCS7SRV
PCS 7 Serv. PDM and process devices, 3 Da	0	1.440	€	0	ST-PDM
PCS7 CEMAT Training, 5 Days	2	2.150	€	4.300	ST-CEMAT
PCS 7 OPERATOR TRAINING, 2 Days	0	960	€	0	
Subtotal Training				**12.900**	

Travel	pcs	Price		total
Flight	2	2.000	€	4.000
Hotel	2	150	€	300
Travel expenses	2	30	€	60
Subtotal Travel				**4.360**

Generic Training **17.260,--**

Return

Go back with "Return"

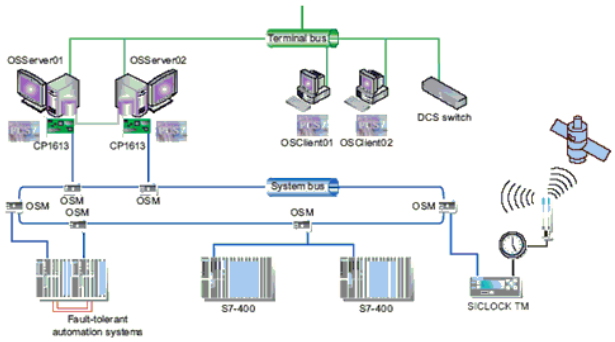
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Step 11 -> Open Page "Clock/Firewall" and adjust the values if necessary.

Clock

Qty.		MLFB	L-Price	Total-Price EUR
1	SICLOCK TM 230V GPSDEC PACKAGE FOR RECEIVING GPS, COMPRISING: SICLOCK TM PLANT CENTRAL CLOCK 90-230V AC/DC AND SICLOCK GPSDEC RADIO CLOCK PACKAGE	2XV9450-1AR25	5986,00	5986,00
2	TP CORD RJ45/RJ45, CAT 6	6XV1870-3QH60	26,00	52,00
0				0,00
				6038,00

Example configuration – Windows workgroup with a central plant clock

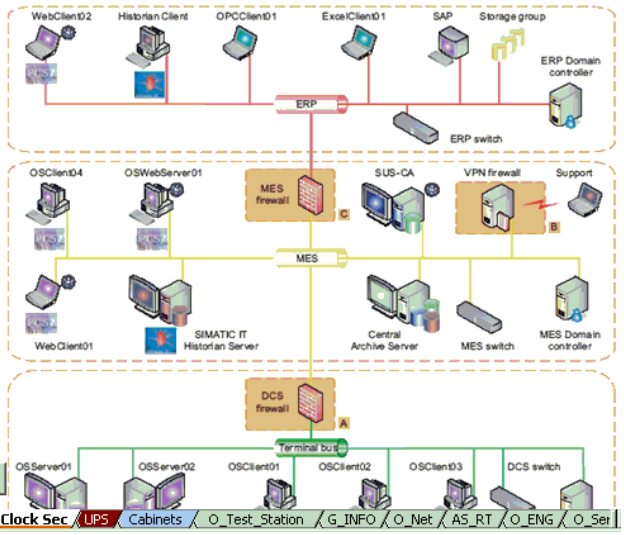


Firewall

Qty.		MLFB	L-Price	Total-Price EUR
1	SIMATIC NET SCALANCE S602 MODULE, FOR PROTECTION OF DEVICES AND NETS IN AUTOMATION AND FOR PROTECTION OF INDUSTRIAL COMMUNICATION WITH FIREWALL FURTHER FUNCTIONS: ADDRESS CONVERSION (NAT/NAPT), DHCP-SERVER, SYSLOG, SYMBOL NAMES FOR IP-ADDRESSES	6GK5602-0BA00-2AA3	990,00	990,00
2	TP CORD RJ45/RJ45, CAT 6	6XV1870-3QH60	26,00	52,00
0				0,00
				1042,00
	Total			**7080,00**



Return



Catalog / Info / Config / Var. Calc. 000 / IO / Communication / Engineering / Training / Clock Sec / UPS / Cabinets / O_Test_Station / G_INFO / O_Net / AS_RT / O_ENG / O_Ser

Go back with "Return"

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Step 12 -> Open Page "UPS" and adjust the values if necessary.

UPS System

Control Room

AS DCS DEVICE	piece	[W] per unit	total [W] AC
Client	5	300	1500
ES,Single,Open PCS7	1	600	600
OS Server,WEB Server	2	600	1200
LCD 19" TFT Monitor	10	50	500
19" Server Monitor	0	100	0
Laser Printer	2	80	160
Ink Printer	3	70	210
AS 416 Cabinet	0	300	0
Scalance X414-3		48	0
Scalance X408-2	7	45	315
Scalance X208		4,4	0
Scalance X204-2	6	5,16	30,96
E/A rack (full equipped)	331	20	6620
SICLOCK	1	50	50
FIELD INSTRUMENTS		**[W] per unit**	**total [W] AC**
- Temperature		1	0
- Flow meters		15	0
- Pressure		0,75	0
- Dif. Pressure		0,75	0
- Level		15	0
- Pressure switches		2	0
- Rotameter		15	0
- Gas Analyzer		35	0
-pH Analyzer		1	1000
			0
			0
ADDITIONAL DEVICES		**[W] per unit**	**total [W] AC**
			0
			0
			0
			0
		Total	**12185,96**
		Reserve	**30%**
Total			**15842** W

6SU6065-4AA00 MASTERGUARD UPS UNIT E 60
6KVA/4.2KW,DOUBLE-CONVERTER,LCD
PARALLELABLE
BATT-BACKUP: 10 MIN, EXTENDABLE
COM A INTERFACE, SERVICEBYPASS
I/O SINGLE-PHASE 50/60HZ 230V
MAINS CONNECTION FIXED
LOAD CONNECTION FIXED AND
2 X IEC 320-16A SOCKET

6SU6066-4AA00 MASTERGUARD UPS UNIT E 100
10KVA/7KW,DOUBLE-CONVERTER,LCD
PARALLELABLE
INP: AUTO SELECTION
1-PH/3-PH, 230V/400V, 50/60HZ
OUTP: 1-PH, 230V, 50/60HZ
BATT-BACKUP: 5 MIN, EXTENDABLE
COM A INTERFACE, SERVICEBYPASS

6SU5120-2BA00 MASTERGUARD UPS UNIT E I 200-3
20KVA/14KW, DOUBLE-CONVERTER
INPUT 3/N AC 50/60HZ 400V
OUTPUT 1/N AC 50/60HZ 230V
BATTERY BACKUP TIME 10 MIN
BATTERY EXTENDABLE
FIXED CONNECTION

Qty.		nominal power	overall power			idle capacity	Spare	L-Price	Total-Price
2	**USV-Typ**	kW	kW	MLFB	Input/out	kW	in %	EUR	EUR
1	**6 kVA**	4,2	4,2	6SU6065-4AA0	1ph./1ph.	0,000	0,00	5049,00	5049,00
0	**10 kVA**	7,0	0	6SU6066-4AA0	1ph./1ph.	0,000	0,00	8079,00	0,00
1	**20 kVA**	14,0	14	6SU5120-2BA00	3ph./1ph.	0,000	0,00	13075,00	13075,00
			18,2			2,358	0,00		**18124,00**

Return

Go back with "Return"

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Step 13 -> Open Page "Cabinets" and adjust the values if necessary.

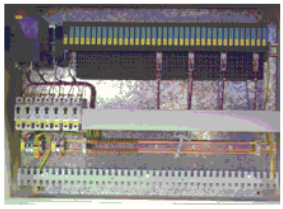
Cabinets

Describtion	piece	used	LP per unit	total LP
System cabinets (Servers, SPOSA ,WEB-Server)	1	1	2200,00	2.200,00
System cabinets (Client)	2	1	2200,00	4.400,00
System cabinets (SingleStation)	0	1	2200,00	0,00
System cabinets (AS)	3	1	2200,00	6.600,00
I/O & Marshalling cabinets				
Remote I/O cabinets ET200	62	0	2800,00	0,00
Remote I/O Box ET200S	265	1	600,00	159.000,00
Remote I/O cabinets ET200S	17	1	2000,00	33.000,00
Marshalling cabinets	9	1	2500,00	22.500,00
Spare	0	1	2500,00	0,00
			Total	227.700,00

Return



ET200M



ET200 S BOX

System cabinet OS

Description	Manuf.	Order No..	Quantity
Cubicle 2000x600x600	Eldon	MCS 20066	1
Base Frame 200x600x600	Eldon	PF2060	1
Side Wall (1 VE=2Pieces)	Eldon	SPM 2006	1
Ventilated shelf	Eldon	SHC 0606	4
Telescopic ventilated shelf	Eldon	SHT 0606	
Drawing Bag	Rittal	PS 4116.00	1
Termostat	Rittal	SK 3110	2
Neozed-Element 1pol. D01	Lindner	1720	1
Pass Ring 10A	Lindner		1
Fuse 10A			1
Auxiliary Contact Breaker	Siemens	5SX9100	9
Breaker C2A 1pol.	Siemens	5SX2102-7	4
Breaker C6A 1pol.	Siemens	5SX2106-7	5
Power Supply SITOP 5 A	Siemens	6EP1333-2AA01	1
Cubicle Lighting	Rittal	PS 4155.100	1
Cubicle Fan	Rittal	SK 3325100	1

System cabinet AS

Description	Manuf.	Order No..	Quantity
Cubicle 2000x800x600	Eldon	MCS 20086	1
Base Frame 200x800x600	Eldon	PF2080	1
Side Wall (1 VE=2Pieces)	Eldon	SPM 2006	1
Drawing Bag	Rittal	PS 4116.00	1
SIMATIC PCS7 416-2	Siemens	6ES7654-1JE58-0XX0	0
Termostat	Rittal	SK 3110	2
Neozed-Element 1pol. D01	Lindner	1720	1
Pass Ring 10A	Lindner		1
Fuse 10A			1
Auxiliary Contact Breaker	Siemens	5SX9100	9
Breaker C2A 1pol.	Siemens	5SX2102-7	4
Breaker C6A 1pol.	Siemens	5SX2106-7	5
Power Supply SITOP 5 A	Siemens	6EP1333-2AA01	1
Cubicle Lighting	Rittal	PS 4155.100	1
Cubicle Fan	Rittal	SK 3325100	1

Remote I/O cabinets ET200S, Basic installation

Description	Manuf.	Order No..	Quantity
Cubicle	Eldon	AS 06083	1
Breaker C2A 1pol.	Siemens	5SX2102-7	6
Breaker C6A 1pol.	Siemens	5SX2106-7	1
Shield Connector	Siemens	6ES7 193-4GA00-0AA0	2
Shield Clamp	Siemens	6ES7 193-4GB00-0AA0	2

Go back with "Return"

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Step 14 -> Open Page "Test&Simulation Station" and adjust the values if necessary.

Test & Training Station

	Description	PART NO.	QTY.	
Hardware Engineering Station	SIMATIC PCS 7 ES/OS IL43 IE	6ES7 650-0LF07-0YX1	1	St
	KEYBOARD INTERNATIONAL	6ES7648-0CB00-0YA0	1	St
	TP CORD RJ45/RJ45, CAT 6	6XV1870-3QN10	2	St
	SCENICVIEW P19-2 19" LCD TFT Monitor ,	S26361-K983-V150	1	St
AS 416	SIMATIC PCS7 AS416-2; AC 120/230V 10A;	6ES7654-1JE58-0XX0	1	St
	CP 443-5 EXTENDED COMMUNICATIONSPROZESSOR	6GK7443-5DX03-0XE0	1	St
	Buffer battery	6ES7971-0BA00	1	St
Net	TP CORD RJ45/RJ45, CAT 6, L=10m	6XV1870-3QN10	3	St
	Scalance X408-2 8 RJ45 Ports	6GK5408-2FD00-2AA2	1	St
I/O	Stand. mount. rail, length 483 mm (f. 19" cab.)	6ES5710-8MA11	1	St
	Electronic module, 2DI, DC 24V, High Feature (5 pcs.)	6ES7131-4BB01-0AB0	1	St
	Electronic module, 2DO, AC 120/230V/5A; relay (5 pcs.)	6ES7132-4HB01-0AB0	1	St
	Electronic module, 2AI, RTD, high-feature	6ES7134-4NB51-0AB0	1	St
	Electronic module, 2AO, I	6ES7135-4GB01-0AB0	1	St
	PM-E DC 24V power module for electronic modules, with diagn.	6ES7138-4CA01-0AA0	1	St
	IM 151 high-feature for conn. of ET200S to PROFIBUS DP	6ES7151-1BA01-0AB0	1	St
	Terminal module; spring terminals (5 pcs.)	6ES7193-4CB10-0AA0	1	St
	Terminal module for AUX1 supply; screw connection	6ES7193-4CD20-0AA0	1	St
	SITOP Modular 24 V DC/10 A□	6EP1334-3BA00	1	0
Rack	Floor Standing Rack for ET200S and AS 416		1	St
Printer	HEWLETT PACKARD LASERJET 2300N,□	HPT:Q2473A-401	1	St
	EPSON STYLUS C84N INKJET-□	MISCO	1	St
Software	PCS 7, SOFTWARE ENGINEERING AS/OS V7.0 **PO unlimited** with **600 PO AS-Runtime,**	6ES7658-5AF07-0YA5	1	St
	PCS 7, SOFTWARE ENGINEERING AS/OS V7.0 **inc. OS-Runtime License for 1000 PO**	6ES7658-5AB07-0YA5	0	St
	WinCC/ User Archives V6.0	6AV6 371-1CB06-0DX0	1	St
	CEMAT, SOFTWARE, ENGINEERING V6.1□	6DL5436-8AX16-0XA0	1	St
				St
	SIMIT Basic for PCS7	9AP1413-2AA40	1	St
	SIMIT IM-2 with SIMBApro PCI 2-chanel	9AP2424-2AA10	1	St

Return

Go back with "Return"

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Step 15 -> Press "create material list" and the list will be created for each of the Stations.

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Engineering Stations**												1
2	**POS**	**Description**	**PART NO.**	**ALT ECCN**	**L/EUR**	**QTY.**		**UNIT PRICE**	**lump sum**	**D%**	**UNIT PRICE**	**Total NET**	
3	1.1	SIMATIC PCS 7 ES/OS IL43 IE **VXP** P4 3,4GHZ, 2 X 1GB RAM, SOUND DYNAMIC VIDEO MEMORY, DVD+-RW, FD 1,44 MB SATA-RAID1 2 X 120GB 1X FAST ETHERNET RJ45 ON BOARD 1X IE (CP 1613), WIN XP PROF. MUI (D, E, F, S, I, J, CN) with Mouse, without Keyboard, Monitor	6ES7 650-0LF07-0YX1	N/5D992B1	4.990,--	1	St	4.990,--	4.990,--	0,00%	4.990,--	4.990,--	EUR
4	1.2	KEYBOARD INTERNATIONAL	6ES7648-0CB00-0YA0	N/EAR99H	89,--	1	St	89,--	89,--	0,00%	89,--	89,--	EUR
5	1.3	TP CORD RJ45/RJ45, CAT 6	6XV1870-3QN10		33,--	2	St	33,--	66,--	0,00%	33,--	66,--	EUR
6	1.4	SCENICVIEW P20-2 20" LCD TFT Monitor , High resulation 1600x1200 Pixel, Brightness typical 300 cd/m2 Contrast typical 700 : 1, Analog / Digital incl. Both Datacable TCO99	BDL:TOP-P20-2	N/N	610,--	1	St	610,--	610,--	0,00%	610,--	610,--	EUR
7	1.5	Gutschrift RT AS 400 PO je ENG			-2400,00	1		-2.400,--	-2.400,--	0,00%	-2.400,--	-2.400,--	EUR
8	1.6	PCS 7, SOFTWARE ENGINEERING AS/OS V7.0 **PO unlimited** with **600 PO AS-Runtime.** Floating LICENSE for 1 INSTALLATION E-SW, SW and DOKU on CD LICENSE KEY on FD, CLASS A 3-Languages (G, E, F), executabel under Windows XP Prof./Server Reference HW: see PC	6ES7658-5AF07-0YA5	N/N	11.229,--	1	St	11.229,--	11.229,--	0,00%	11.229,--	11.229,--	EUR
9	1.7	WinCC/ User Archives V6.0	6AV6 371-1CB06-0DX0	N/EAR99S	725,--	1	St	725,--	725,--	0,00%	725,--	725,--	EUR
10	1.8	CEMAT, SOFTWARE, ENGINEERING V6.1 SINGLE LICENSE F.1 INSTALLATION E-SW, SW UND DOKU. AUF CD LICENSE KEY AUF FD, KLASSE A 2-SPRACHIG (D,E), ABLAUFFAEHIG UNTER WIN2000PROF/XPPROF REFERENZ-HW: SIEHE PCS7 README	6DL5436-8AX16-0XA0	N/N	2.800,--	1	St	2.800,--	2.800,--	0,00%	2.800,--	2.800,--	EUR
11												**18.109,--**	
12	**AS Runtime License**												
13	**POS**	**Description**	**PART NO.**	**ALT ECCN**	**L/EUR**	**QTY.**		**UNIT PRICE**	**lump sum**	**D%**	**UNIT PRICE**	**Total NET**	
14	2.1	PCS 7, AS Runtime License V7.0 **PO 100** SINGLE LICENSE F.1 USER LICENSE KEY AUF FD, KLASSE A 3-SPRACHIG (D, E, F), ABLAUFFAEHIG UNTER WINXPprof LKZ: D	6ES7653-2BA07-0XB0	N/N	600,--	67	St	600,--	40.200,--	0,00%	600,--	40.200,--	EUR
15												**40.200,--**	
16	**OS Server Stations**												
17	**POS**	**Description**	**PART NO.**	**ALT ECCN**	**L/EUR**	**QTY.**		**UNIT PRICE**	**lump sum**	**D%**	**UNIT PRICE**	**Total NET**	
18	3.1	SIMATIC PCS7 OS SERVER IL43 IE SRV SRV03 P4 3,4GHZ, 2 X 1 GB RAM, SOUND DYNAMIC VIDEO MEMORY, DVD-ROM, FD 1,44 MB, SATA-RAID1 2 X120GB 1X FAST ETHERNET RJ45 ONBOARD 1X IE (CP 1613), **WIN SERVER 2003** MUI (D, E, F, S, I, J, CN) with Mouse, without Keyboa	6ES7650-0LH07-0YX1	N/5D992B1	6.460,--	2	St	6.460,--	12.920,--	0,00%	6.460,--	12.920,--	EUR
19	3.2	KEYBOARD INTERNATIONAL	6ES7648-0CB00-0YA0	N/EAR99H	89,--	2	St	89,--	178,--	0,00%	89,--	178,--	EUR
20	3.3	TP CORD RJ45/RJ45, CAT 6	6XV1870-3QH60		26,--	2	St	26,--	52,--	0,00%	26,--	52,--	EUR
21	3.4	SCM 1797, MONITOR 17" 30-96KHZ, 50-160HZ, 250MHZ, 1280X1024, FUNCTION OVER OSD POWERMANAGEMENT, MRP II, TCO 99, IP20, Customs Tariff No. : 84716090 LKZ: 728	6GF6120-1ME	N/N	650,--	2	St	650,--	1.300,--	0,00%	650,--	1.300,--	EUR
	3.5	PCS 7, SOFTWARE REDUNDANT SERVER PACK (PO **8.500**) V7.0 SINGLE LICENSE F.2 INSTALLATION R-SW, SW and DOKU on CD LICENSE KEY on FD, CLASS A 5-Languages (G, E, F,I,S), executabel under WIN2003 Server Reference HW: see PCS7 Readme Customs Tariff No.	6ES7652-3BF07-2YA0	N/N	39.819,--	1	St	39.819,--	39.819,--	0,00%	39.819,--	39.819,--	EUR

Var. Calc. Mig V2 / Var. Calc. Mig V3 / Var. Calc. Mig V4 / C_START / C_BoxPC / C_Mini / C_Small / C_Medium / C_Medium S5 MIG / C_Large / C_Unlimit / Mate

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Training

Necessary Courses for PCS 7/ Cemat

SIMATIC PCS 7 System Course	**ST-PCS7SYS**	**10 days**
PCS7 with PCS7-SCL programming	ST-PCS7SCL	5 days
CEMAT V8 for beginners	**ST-CEMAT**	**5 days**

If there are more training required please look to the following Courses.

SIMATIC PCS 7 Communication	ST-PCS7KOM
SIMATIC PCS 7, Block Creation	ST-PCS7AFB
SIMATIC PCS 7, OS Engineering	ST-PCS7OSE
SIMATIC PCS 7, System Overview	ST-PCS7UEB
SIMATIC PCS7 Service Course, AS, I/O System and Process Cell Bus	ST-PCS7SRV
Windows NT/2000 and Network Fundamentals for PCS 7 Systems	ST-PCS7WIN2

Many courses are available online at: http://www.siemens.de/sitrain

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Requirements for Cemat Training

Hardware and Software requirements

One **Engineering Station** per two participants.

- For some Applications as e. g. IEA Assistant, Microsoft Excel is required. If Microsoft Office is installed on the Engineering stations the Office Installation must be carried out before the PCS7 Installation.
  Caution: Don't install the ODBC-Drivers during the Microsoft Office installation. After the installation of the ODBC-Drivers the Cemat installation is no longer possible!!!!
- **PCS7 V8.0** and **PLCSim** must be installed, including the licenses.
  (Additionally to the Engineering Licenses of PCS7 we need the **License for WinCC User Archive** and the **PLCSim License**).
- The **Cemat Software and Licenses** are provided by the Competence Center and will be installed before/during the training.
- Cemat Runtime System needs at minimum a **screen resolution of 1280x1024**
- This Engineering Station must have a C and a D Drive with sufficient memory space. (**Cemat must be installed on D Drive** and requires about 127 MB. Our Training Project will also be installed on D and will need about 1 GB).

If the training is carried out for more than two participants, a **Projector** is needed.

- The projector must be **capable for a screen resolution of 1280x1024**

If HDRS should be trained

1 IEA license for PCS7

If a real PLC is used the following Hardware and Software must be supplied additionally:

PCS7 AS:

1	Rack UR2	6ES7 400-1JA00-0AA0	
1	PS 407 10A	6ES7 407-0KA00-0AA0	
1	CPU 416-2	6ES7 416-2XK02-0AB0	(minimum)
1	CP443-1	6GK7 443-1EX11-0XE0	

Process Bus:

2 Network Cables
1 HUB

Simulation Software and Hardware

1 WinMOD – XT Systemsoftware V5.0 with Single License for Windows NT/2000/XP
1 WinMOD - Recorder V5.0
1 WinMOD Configuration A78 V5.x for S7/PCS7
1 WinMOD PCI Profibus DP Card 2 channel
2 Profibus cables (if both DP channels are used, otherwise 1 cable)
1 PC

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Required knowledge

Basic knowledge of PCS7 is essential for the Cemat Training. We recommend joining a PCS7 V8 Training before the Cemat Training.

- The participants should know the Structure of a PCS7 Project/MultiProject
- Participants should know the Simatic Manager with Component view, Plant view and Process Object view.
- Participants should know how to program with CFC.
- Participants should also have some WinCC knowledge (WinCC Explorer, Construction of Pictures, Customized Objects)

Training Schedule and Documentation

The **training schedules** and the **training manual** will be provided by the Competence Center in PDF format. It has to be printed and copied for each participant.

We additionally recommend a print-out of chapter 3 of the Engineering Manual "Installation of a PCS7 Project". The procedure will be explained during the training and the document should be available for each participant as well.

The rest of the Cemat documentation is available online after the installation of Cemat. Printing is not needed (at least not for each participant).

Training duration and number of participants

The **duration of the Cemat training is one week**, presuming that the required PCS7 knowledge is available. The Cemat Training includes the operating philosophy, the functions of the Cemat blocks and the set-up of a new PCS7 Project (1 AS and 1 ES) for Cemat.

If additional support is required (e. g. for the set-up of the real project) this has to be calculated additionally.

The **maximum number of participants for a Cemat Training is 8 to 10 Persons** (= 5 Engineering Stations). For bigger groups it becomes difficult to get through with the material.

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Training/Test/Simulation

Training/Test System

The test system is mounted on a mobile test rack and contains all elements of a departmental control system (PS, OS). The test rack contains a minimum of one piece of each type of PS/OS system component and one or several input and output cards used for the Process control system. An operation console with simulation push-buttons, lamps and analog signal sources and a separate software simulation package shall allow the simulation of I/O via the Plant field bus and testing of any department application

Simulation Software

SIMBApro FAT

SIMBApro FAT is based on the SIMBApro PCI simulation system. This permits simulation of the distributed I/O (PROFIBUS DP and PA) up to unit level.

Aggregate typicals (valves, motors, etc.) are preassembled for the factory acceptance test of plants.

Import functions for the construction of the distributed I/O (hardware configuration) and for aggregate wiring (symbol table) enable FAT solutions to be created quickly and conveniently.

Function

- PCI technology
- Baud rate: max.12 Mbit/s for PROFIBUS DP
- 2 x 125 slaves can be simulated
- Redundancy or 2 PROFIBUS DP buses
- Standard slaves and S7 slaves
- Library available for standard typicals
- Generation of own simulation functions (typicals)
- Import functions (HW-Config., symbol table)
- Definition of import filters
- Generation of distributed I/O faults

The PC module SIMBApro PCI simulates the complete behavior of I/O devices on the fieldbus. The simulation is reaction-free, i.e. for the bus master there is no difference between communication with real and with simulated I/O devices. During the Factory Acceptance Test it is therefore possible to test the entire automation structure from the operator station to the driver connection and the hardware configuration.

The simulation of the distributed I/O is extended in SIMBApro

FAT to include functions for the Factory Acceptance Test (FAT).

Using the PC program, feedback signals from units (valves, pumps, switches) can be generated in less time by importing them from the STEP 7 / PCS 7 symbol table. Apart from normal plant operation, fault states can also be simulated. All diagnostic options of the PROFIBUS are available, ranging from missing or incorrect feedbacks to distributed I/O faults (failure of module, station or line).

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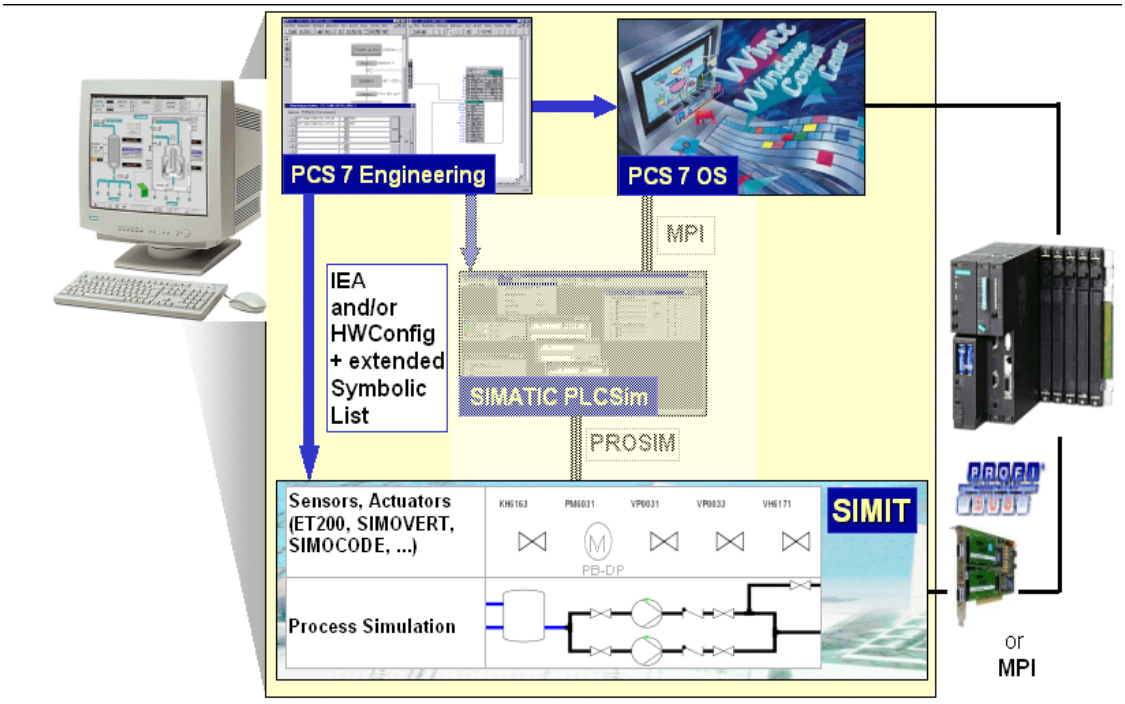
SIMBApro FAT offers a library of easily configurable unit typicals for fast and reliable simulation of units. This enables feedbacks from valves, motors etc. to be generated in a simple manner, and this process can be automated by importing a symbol table. It is possible to set up a simulation for the factory acceptance test (FAT) in a very short time.

Users also have the option of creating their own library elements in order to take the special requirements of their plant into account.

If the requirements for the simulation extend beyond the FAT functions (e.g. overall plant test), a plant simulation system (e.g. SIMIT) can have read and write access to the data in the I/O devices.

SIMIT, can utilize the SIMBApro card directly, and it is a simple matter to change the I/O connection references within SIMIT from PLCSim to SIMBApro as shown in the following figure. In this case, the Engineering Station Hardware Configuration export is used to provide the I/O channel configuration to SIMIT. As with PLCSim, SIMBApro-based operator windows for manipulating and monitoring the I/O channels are automatically created in SIMIT. Since the I/O channel references are identical, any I/O channels used in the process simulation created while using PLCSim are automatically relinked to the SIMBApro card references when the SIMIT simulation is recompiled.

Since the SIMBApro products are closely related to PROFIBUS devices, the SIMBApro products typically support new PROFIBUS devices before the Hardware Configuration export or SIMIT import may provide support. In this case, SIMIT can be configured to communicate with the SIMBApro application program instead of directly with the cards for implementing process simulation. When used in this manner, however, SIMIT is not able to automatically create operator windows of the I/O channels, and the SIMBApro program would be used for this purpose.



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System Performance

System Configuration Technical Data

System Configuration

	Typical	Maximum	Comments
Control systems per shared process bus	1 to2	4	Switches can be desirable for bus loading reasons.
Operator stations per control system	6 to 10	32	OS stations to maximum 12 server/redundancy pairs.
Engineering stations per control system	2	6	At least one engineering station per plant.
AS per control system	6 to 10	20	Preconfigured
AS communications channels	2	6	
Server per control system	2 (redundant)	12	
Curve server per control system	2 (redundant)	2	Two separate curve servers (redundant) are needed when more than 5000 values are archived.

Bus Systems Technical Data

Plant Automation Bus System

Type designation	Industrial Ethernet	
Manufacturer	Siemens / Hirschmann	
Protocol	IEEE 802.3	
Transfer speed	10 / 100/ 1000 Mbit/s	
Number of possible nodes	1024	
Maximum bus length	Up to 150 km	
Cable type		
- Coaxial	Yes	
- Optical-fiber 50/125 glass fiber	Yes	
- Miscellaneous	Industrial Twisted Pair	
Bus components	Network cards 3COM Intel	
Redundancy	Yes	bus in ring structure

PFK = Process Remote Component
PNK = Process Local Component

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Plant Control Bus System

Type designation	Industrial Ethernet	
Manufacturer	Siemens / Hirschmann	
Protocol	IEEE 802.3	
Transfer speed	10 / 100 Mbit/s	Fast Ethernet
Number of possible nodes	1024	
Maximum bus length	Up to 150 km	
Cable type		
- Coaxial	Yes	
- Optical-fiber 50/125 glass fiber	Yes	
- Miscellaneous	Industrial Twisted Pair	
Bus components	Network cards CP443-1 for S7 400 CP1413, CP1613 for PCs	with AUI/Tp and RJ 45
Redundancy	Yes	bus in ring structure with super vision components

Field Bus System

Type	Profibus DP
Manufacturer	Siemens
Protocol	IEC 1158-2, EN 50170
Transfer speed	Max. 12 Mbit/s
Number of possible nodes	96 or 125 nodes
Max. bus length	2-wire: 1000 m Optical-fiber: up to 15 km
Cable type	
- Coaxial	No
- Optical-fiber 50/125 glass fiber	Yes
- Miscellaneous	2-wire (Profibus type)
Bus components	Optical Link Module Interfaces

Type	Profibus PA
Transfer speed	max. 31 kbit/s
Protocol	IEC 1158-2
Manufacturer	Siemens
Number of possible field devices	31 not ex-area31 10 Ex-zone 1

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Process Stations Technical Data

Process Station

Type designation	SIMATIC S7-400	
Manufacturer	Siemens	
Processor type	CPU 416 – 3DP / 417 / 417H	
Power supply:	24 VDC or 120/230 VAC	(redundancy capability)
Operating temperature:	0 to +60 °C	(no fan)
Storage temperature:	-40°C to +70°C	
Relative humidity:	Max. 95 % at +25 °C	
Protection against ingress of solid foreign bodies and water:	IP 20	
CPU clock frequency	Instruction cycle time from 0.04 µs	
Processor loading	Max. cycle time	
Total:	100 ms	
Of which:		
- Base load:	20 ms	
- Application programs.:	50 ms	
Cycle times	<= 100 ms	
- Parameterizable in steps	Yes	
- Step size?	10 ms	
Installed RAM memory	2 x 2.8 MB	
Spare in MB	2 x 0.8 MB	
RAM, max. expansion	2 x 1.6 MB	
Load memory	min. 4 MB	
RAM battery backup		
- Type	2x Lithium AA 1.9 Ah	
- Bridging time	712 days	With PS + CPU
- Lifetime	5 Years	
Real-time clock?	Yes	
Calendar ?	Yes	
Timestamp resolution	<= 100 ms	
Where does the timestamp take place?	In the CPU	
Plant bus		
- Type:	Industrial Ethernet, Fast Ethernet	
- Protocol:	IEEE 802.3	
Field bus		
- Type:	Profibus DP EN50170	
- Protocol	IEC 1158-2	
Full-graphic documentation	Yes	
current program	CFC function plan	
Field bus		
Profibus DP		
- Max. number / PNK:	10 loops	
- Max. nodes / bus:	96 / 125	
- Full functionality?	Yes	
- Fiber-optic between buildings.	Yes	

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Other field buses:	
- Profibus DP/PA	Yes
- Profibus FMS	Yes
- Interbus S	No
Peripherals	
Central modules	
- Maximum expansion	16382 byte DI 16382 byte DO 1024 byte AI 1024 byte AO
Diagnostic capability of the I/O modules	
- Except I/O module?	Yes
- Except channel?	Yes
Decentral modules	
- ET200S	
- All modules usable?	yes
- ET200M	
- All modules usable?	Yes
Analog modules	
- Type	
- Single potential separation	Yes
- 0 – 20 and 4- 20 mA	Yes
High-performance modules, manufacturer-dependent	Counter, positioning, path acquisition modules, etc.

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OS Hardware for ES, Server and Client

Hardware Information for Engineering Station, Server and OS Clients you will find in the PCS7 Catalog or “brochure_simatic_industrial_pc_en.pdf”.

PCS7 Rack PC’s

Features		SIMATIC PCS 7 Industrial Workstation			
		IPC547C[1)]	IPC547D	IPC647C	IPC847C
					
Available SIMATIC PCS 7 pre-installations	V6.1+SP4	●	–	–	–
	V7.0+SP3	●	–	–	–
	V7.1+SP3	●	–	●	●
	V8.0	–	●	●	●
Available versions	ES/OS Single Station	●	●	●	●
	OS Server	●	●	●	●
	OS Client	●	●	●	–
Height		4 HU	4 HU	2 HU	4 HU
ECC work memory		–	–	●	●
Software RAID controller (onboard)	RAID1	●	●	●	●
Hardware RAID controller with battery backup unit	RAID1	–	–	●	●
	RAID5	–	–	–	●
Hard disks/ Solid State Drive (SSD)	SATA	●	●	●	●
	SAS	–	–	●	●
	SSD	–	●	–	–
No. of slots	PCIe x16	1	1 + 1 physical (4 lanes connected)	1	1
	PCIe x8	1 physical (1 lane connected)	1 physical (1 lane connected)	1 physical (4 lanes connected)	–
	PCIe x4	–	–	–	3
	PCIe x1	1	–	–	–
	PCI	4	4	1	7
Redundant power supply	with diagnostics	–	–	●	●
	Without diagnostics	●	●	–	–
Lifecycle	Marketing	1.5 to 2 years	1.5 to 2 years	3 years	3 years
	Replacement parts/ repair	3 years	3 years	5 years	5 years

The SIMATIC PCS 7 Industrial Workstation of the type IPC547C is no longer being offered for SIMATIC PCS 7 V8.0. It is only available for the predecessor versions V6.1, V7.0 and V7.1 until further notice (see chapter Previous versions).

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SIMATIC IPC547D – Maximum performance at an attractive price with 2nd generation Intel Core processors



SIMATIC IPC547D is a high-performance industrial PC in 19" format (4 HU). It offers maximum computing, system and graphics performance for high-speed processing of large volumes of data, e.g. in industrial image processing or process visualization at ambient temperatures up to 40 °C.

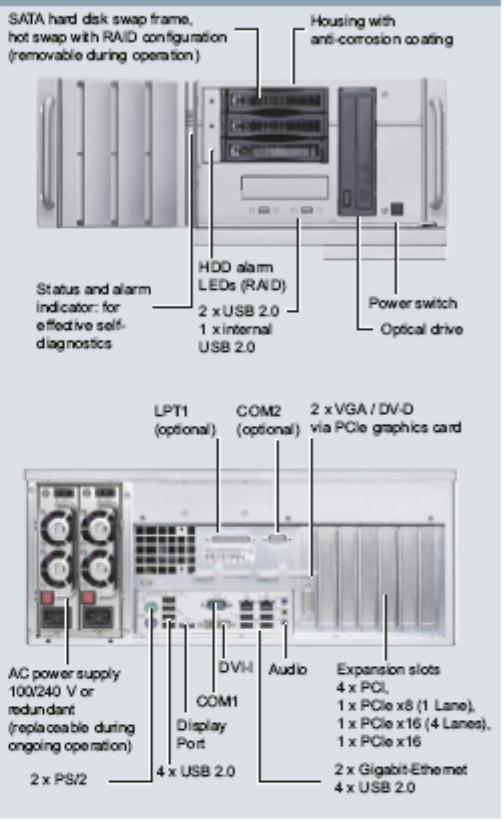
With its 7 spare PCI/PCIe slots for long extension cards, it has a flexible expansion capability:

- 4 x PCI
- 1 x PCIe x8 (1 lane), 1 x PCIe x16 (4 lanes), 1 x PCIe x16

SIMATIC IPC547D – Advantages:

- Maximum performance and fast system response:
  - Intel Core processors 2nd gen. (up to i7 with 4C/8T)
  - Powerful onboard HD graphics integrated into the CPU
  - DDR3 memory technology up to 32 GB
  - 64-bit operating systems Windows 7 and Windows Server 2008 R2
- Extremely high system availability and data security
  - RAID controller onboard for up to 3 hard disks in RAID 5 network in hot-swap frame
  - Solid-state Drive (SSD) with 50 GB (High Endurance)
  - Redundant power supply (hot-swap)
  - Front LED display for efficient diagnosis of temperature, fan and hard disks in the RAID network
- Remote access via Intel AMT (see page 37)
- High data transmission rates and redundancy thanks to two teaming-capable Intel Gigabit Ethernet connections
- Multi-monitoring with up to 4 monitors via optional PCI-Express x16 graphics card and onboard graphics
- 11 x Hi-Speed USB 2.0 ports, two of which on the front and one internal port with optional locking, e.g. for a software dongle
- Wake-on-LAN functionality for timed start-up from a central point, over the network
- High-quality industrial design:
  - Full-metal enclosure with high electromagnetic compatibility
  - High level of dust protection and low noise generation through fan-controlled overpressure ventilation

SIMATIC IPC547D: Connections and Expansions



With the optional tower kit, the IPC547D can be converted for use as an industrial workstation or server in control rooms and technical offices.
The minimal enclosure depth enables space-saving installation in 19" cabinets of 500 mm depth and above.



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SIMATIC IPC647C – Maximum compactness and industrial functionality with Intel Core processors (i7, i5, i3)



The SIMATIC IPC647C is a rugged and extremely compact industrial PC in 19" design (2 HU). It is particularly suitable for space-saving implementation of fast computing and visualization tasks, e.g. image and data processing or industrial server applications and shipbuilding.

With a height of only 2 HU and a shallow mounting depth, it optimally utilizes the space in 19" standard control cabinets (from 500 mm).

Despite its high compactness, it can be flexibly scaled and expanded due to three long slots:

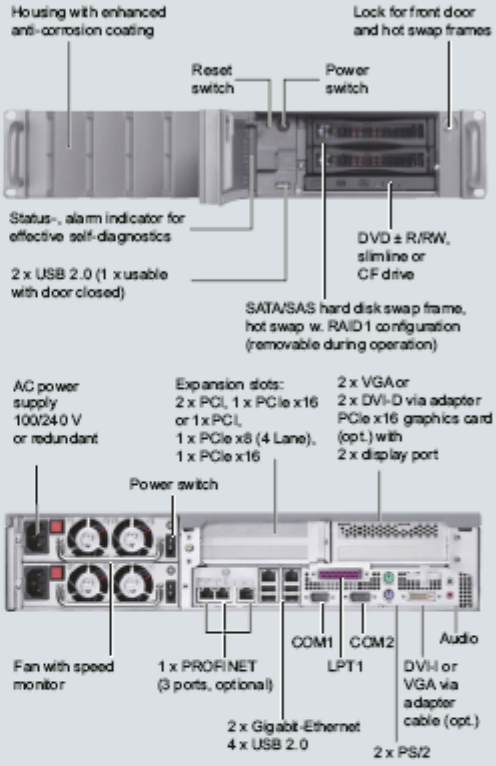
- 2 x PCI, 1 x PCIe x16 or
- 1x PCI, 1x PCIe x8 (4 lane), 1x PCIe x16

SIMATIC IPC647C/847C – One platform, many advantages:

- High performance and extremely fast system response:
  - Intel Core processors (i7, i5, i3)
  - Powerful onboard HD graphics integrated into the CPU
  - DDR3 memory technology
- Maximum system availability and data security
  - RAID controller onboard or hardware RAID SAS controller (PCIe x8)[1] with 1 TB SAS HDD
  - Solid-state Drive (SSD) with 50 GB (High Endurance)
  - ECC RAM, work memory with error correction
  - Redundant power supply (hot-swap)
- Remote access via Intel AMT (see page 37)
- Optional PROFIBUS or PROFINET interface with three ports for cost-effective connection of distributed field devices or to couplings with SIMATIC S7
- High data transmission rates and redundancy thanks to two teaming-capable Gigabit Ethernet connections
- Multi-monitoring with up to 4 monitors via optional PCI-Express x16 graphics card and onboard graphics
- DVI-VGA adapter for analog monitor (optional)
- 7 x Hi-Speed USB 2.0 ports, two of which on the front and one internal port, e.g. for a software dongle
- Energy-efficient industrial PCs:
  - Low power consumption thanks to the latest mobile technology
  - Wake-on-LAN functionality for timed start-up of the IPCs from a central point, over the network

[1] Zero-Maintenance Cache Protection Module

SIMATIC IPC647C: Connections and Expansions



Special features of SIMATIC IPC647C/847C:



Innovative USB interface concept: This enables a USB flash drive inserted into the internal interface or at the front to be operated with the door closed, e.g. as software dongle. This offers considerable protection against misuse, also for the drives, On/Off buttons and Reset buttons that are accessible from the front.



Front LED display for efficient self-diagnostics, e.g. for simple identification of a faulty hard disk in the RAID group by HDD1, HDD2 or HDD3 ALARM (IPC847C).

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SIMATIC Rack PC 847C

Technical Data

SIMATIC IPC847C – Maximum expandability and industrial functionality with Intel Core processors (i7, i5, i3)



The SIMATIC IPC847C is a rugged and extremely expandable industrial PC in 19" design (4 HU). It offers high investment protection thanks to outstanding long-term availability and ensures reliable operation in particularly harsh industrial environments, e.g. with high dust, temperature and shock loads.

Due to its high computing power and PCI-Express technology, the IPC847C is the perfect platform for high-performance applications, for example in measuring systems, test bays, or industrial image processing applications or server applications.

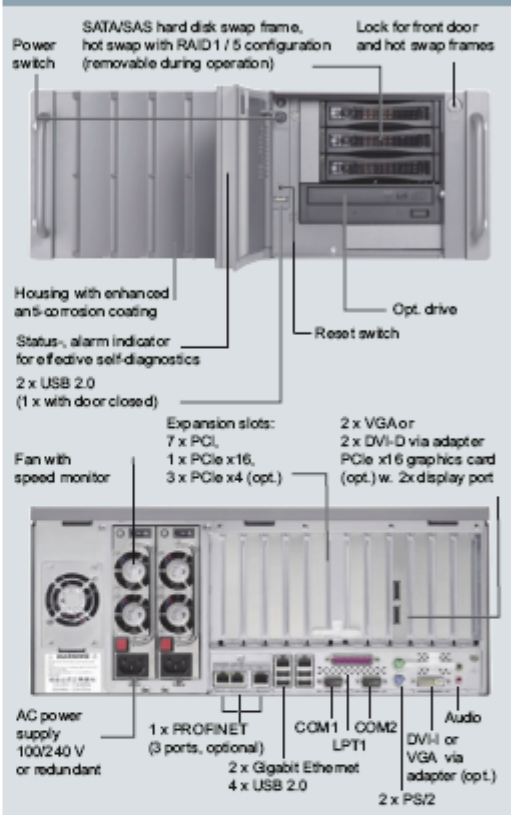
The SIMATIC IPC847C is extremely flexible and expandable due to its 8 or optionally 11 free PCI/PCI-Express slots:

- 7 x PCI, 1 x PCIe x16 or
- 7 x PCI, 1 x PCIe x16 and 3 x PCIe x4

SIMATIC IPC647C and IPC847C can be flexibly implemented thanks to:

- Minimal housing depth for space-saving installation in 19" control cabinets of 500 mm depth and more
- Removable 19" brackets for use as desktop IPC, as well as an optional tower kit for the IPC847C (see page 48)
- Preparation for telescopic rail mounting for service-friendly installation in the control cabinet

SIMATIC IPC847C: Connections and Expansions



Options for industrial server applications

- Rugged, with long-term availability and identical performance features, the same footprint, and installation, interface and software compatibility.
- High-quality industrial design:
  - Vibration and shock-absorbing hard disk holder
  - Reliable dust protection and low noise due to fan-controlled pressurized cooling
- Easy servicing:
  - Front fan can be replaced without tools
  - Only one screw needs to be removed to quickly open the enclosure
  - Hard disks and power supply unit can be replaced during operation
- Additional internal USB interface for protection against unauthorized removal of a USB flash drive, e.g. for a software dongle.

Maximum system performance/availability and data security:

- SAS hard disks with 1 TB in RAID1/5 configuration in hot-swap frame
- Hardware RAID controller (PCIe x8) with Serial Attached SCSI (SAS) and Zero-Maintenance Cache Protection Module (ZMM)
- Monitoring of the redundant power supply (each module) and the SAS hard disks / hardware RAID controller using the SIMATIC IPC DiagMonitor diagnostics software
- 64-bit operating system Windows Server 2008 R2

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Volume of Project Data

	Typical	Maximum	Comments
Communication / control system			
Process objects	5500	60 000	(drives ,counter and measured values)
Events (message bits)			Depending on the number of objects
Number of AS on The IE (SINEC H1)	8	64	
Telegrams per second	10	approx. 15	
Acquisition cycles for measured valued (concurrently)	10%/sec. 90% > 5sec.		10 % curves with 1s 90 % curves with 5 s / 10 s
Updating cycle in the picture	< 1 s	1 - 2 s	
Pictures			
Number of pictures	120	Unlimited -	
Number of controls (stat. and dyn.) per picture	250	approx. 800	
Picture level	3	32	
Picture size in pixel	1280x1024	10000x10000	
Drive functions			
- per control system	2400	6000	Distributed over several servers
- per AS	300	400	
Measured value			
- per control system	1600	5000	Distributed over several servers
- per AS	200	300	
Quantity values (counters (CNT), runtimes (RT))			
- per control system	800	3000	Distributed over several servers
- per AS	100	250	
Controllers			
- per control system	120	400	Distributed over several servers
- per AS	15	35	
Short trend			
- per control system	500	2000	Distributed over several servers
Short trend			
- per control system	500	2000	Distributed over several servers
Trend curves (OS)			
- per control system	1000	5000	Typical distribution: 10% with 1s archiving cycle 40% with 5s archiving cycle 50% with 10s archiving cycle

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	Typical	Maximum	Comments
User Archive			
Amount of archives		Unlimited	
Archive fields		500	The product from no. of fields and Data Records
Data records		3000	Must not exceed the value 320000
Archive view		Unlimited	
Curves			
Number of curve frames per graphics picture	2	25	
Number of curves per curve frame	6	80	
Number of curves per picture	12	80	
Archives per Server/ Single Station	20	100	
Archiving Values	2000	80000	Archive server necessary
Number of measured values per measuring points on HD		All	Depends on the acquisition cycle, for recording longer than 1 week
Number of measured values per measuring point in main memory	30	Time duration 10 minutes	Depends on the acquisition cycle
Archiving in database	200 values/sec	5000 values/sec.	10000 values/sec. with Archive server
Logs			
Number of logging printers	1	3	
Message sequence logs (active)	No	yes	
Number of message archive logs	3	5	
Number of log lines per message	3	3	
Number of variables in the log element	2	2	
Recipes	25 to 50	Unlimited	Limits set by running times
Alarms / messages			
Configurable massages per server	20000	150000	Object dependent
Message classes	10	18	
Message types		16	
Message priorities	2	17	
Process tags per message line	1	10	
User text blocks per message line	4	10	
Number of message archives	1	1	
Number of current message archives	1000	2000	
Number of long-term message archives	8 days	30 days	
Message burst without message loss	10/sec.	100/sec.	
Messages permanent	20/h	10/ sec.	

Note: Some of the maximum values are significantly larger than the typical values and can normally be "approached" when other requirements are reduced. The typical values apply in combination and have been tested in this form.

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System Performance CEMAT V8

The times listed here have been measured in a test. Note that some of the test pictures used here have a complexity that is seldom reached in practice:
Test conditions:
- OS Stations with PDL-Cache
- Network Hardware CP1623, CP443-1 / 100Mbit , OMS
- cyclic service active

	Typical	Maximum	Comments
Picture selection time			Incl. initial update of the picture without additional background loading
Picture with purely static content	< 1 s	1 s	
Picture with 140 controls, 100 bitmaps	< 1 s	2 s	
Picture with 240 controls	2 s	4 s	
Picture with 70 digital and 2 curve displays each with 6 curves	3 s	5 s	
Dialog selection in the process picture	< 1 sec	1 sec	
Variable updating	1 sec	2 sec	Process event -> screen
Operator response	1 sec	2 sec	Operation and confirmation
AS response time			
AS response time S5	300 ms	800 ms	1 cycle
AS response time S7	80 ms	200 ms	1 cycle
Curve output			
Output/selection trend archive	2 sec	2 sec	6 curves
Output/selection long-term archive	10 sec		Max. value depends on the selection criterion
Output/selection message archive	3 sec	30 sec.	Max. value depends on the selection criterion
Establish protocol	10 sec	60 sec.	Max. value depends on the log type and interval

Memory Requirement

	Typical	Maximum	Comments
Pictures			
Storage capacity on HD	600 kB	> 4000kB	
Measured value archive			
Hard disc space			
- TagLogging Slow		32byte	
- TagLogging Fast		15byte	with 10-times compression
Message			
Hard disc space RT			
- Message without accompanying values and comments		172 byte	with 10-times compression
- Message with max.amount of accompanying values and comments		4012 byte	

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Support

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  E-mail: support.automation.siemens.com
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  Fax: +86 10 6474-7474
  E-mail: support.asia.automation@siemens.com

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General Information about the System

Extensive information about process automation is available on the Internet:
http://www.siemens.de/prozessautomatisisrung or http://www.pcs7.com

Information about field devices:
http://www.feldgeraete.de

Periodicals:
Process News online:
http://www.processnews.com

Totally Integrated Automation
http://www.siemens.com/tia/

Product support, hotfixes, online documentation, FAQs online:
http://www.automation.siemens.com/_en/portal/index.htm
→ Product support
→ Product information
→ Process automation
→ Process control systems
→ SIMATIC PCS 7 process control system

CEMAT information
http://www.siemens.com/cemat

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