



# teleperm m



AS 488/TM  
automation systems

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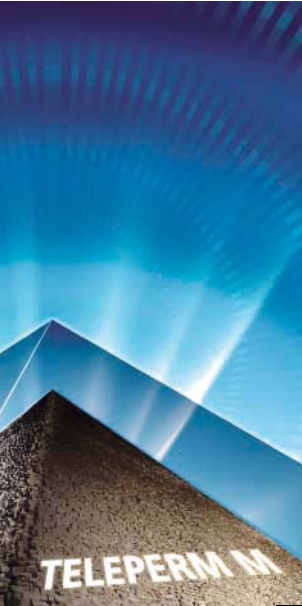
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# AS 488/TM automation systems



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# SIEMENS

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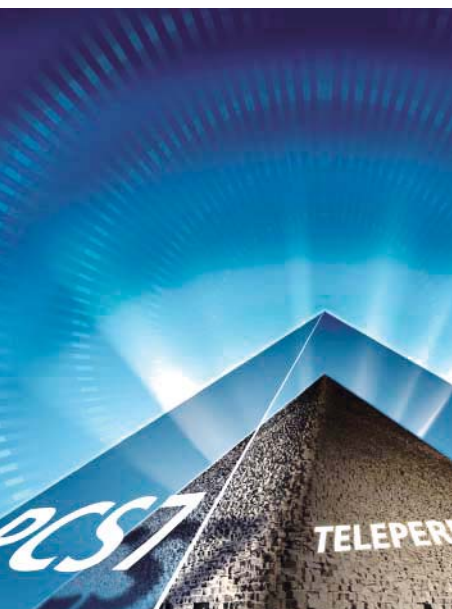
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## Introduction



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# Introduction

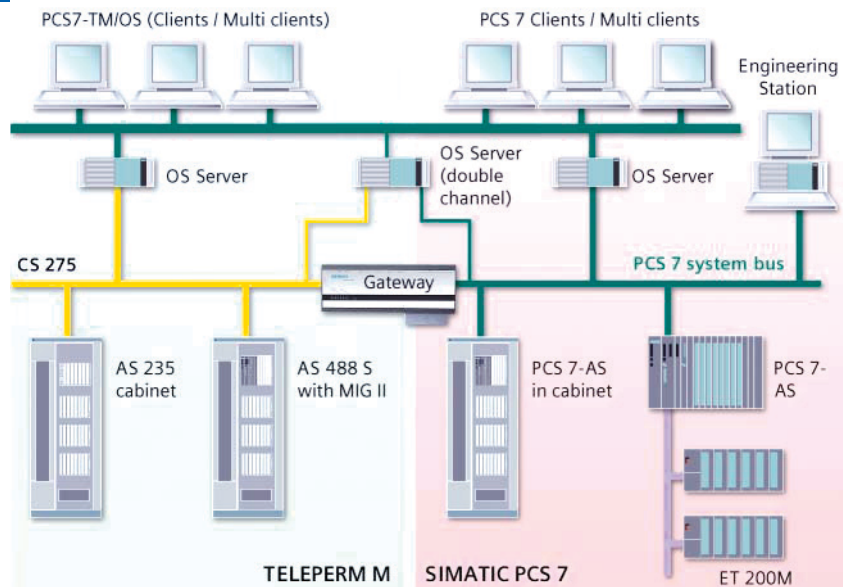
## TELEPERM M Process Control System

### Overview

The TELEPERM M process control system provides all functions required for process automation. It is highly suitable for the complete automation of continuous or discontinuous (batch) processes.

The TELEPERM M systems are divided into functional units optimized for different task encountered with process automation:

- Automation systems
- Operator systems
- Bus systems.



### Automation systems

The TELEPERM M automation system of type AS 488/TM based on the SIMATIC M7-400 hardware platform is available with two performance levels and four different design versions for program-controlled processing of process signals.

The system software functions of the AS 488/TM are compatible with the system software version G of the previous AS 235 system. Existing application software of the AS 230 / AS 235 automation systems can be used further, application software of AS 220 automation systems only following conversion.

The AS 488/TM can be operated on both the CS 275 and PROFIBUS-TM system buses. As a result of its variable configuration, it is equally suitable for TELEPERM M migration, for the expansion of existing systems, or the design of new systems.

Application details:

- Replacement of existing AS 220 / AS 230 / AS 235 automation systems during migration by replacement of the existing basic rack by a preassembled rack with the AS 488/TM system
- Expansion of existing systems on the CS 275 system bus
- Expansion of existing systems by PROFIBUS-TM system components using the CS-L2 bridge
- New systems

In the case of new systems, the PROFIBUS-TM based on the standardized PROFIBUS is preferably used as the system bus. Using TELEPERM M-specific communication, automation systems connected on the PROFIBUS-TM can communicate with one another and also with TELEPERM M components on the CS 275 system bus coupled via the CS-L2 bridge.

A wide range of TELEPERM M input/output modules is available for the AS 488/TM, some of which have their own processing functions or are configurable specific to the application. Via one or two PROFIBUS-DP interfaces it is additionally possible to connect SIMATIC ET 200B, ET 200M, ET 200S, ET 200X and ET 200U distributed I/O systems with a comprehensive selection of I/O modules. Within this range, the I/O modules of the ET 200M distributed I/O system which have been specially tailored to process engineering are particularly recommendable.

A large number of devices possessing a DP interface can be additionally operated on the PROFIBUS-DP of the AS 488/TM. For example, DP interfaces integrated in the CPU modules of the SIMATIC S7-300 permit a simple slave connection to the AS 488/TM. Gateway modules on the PROFIBUS-DP (DP/PA link, DP/AS-i link, DP/DP coupler) additionally permit access to the PROFIBUS-PA and AS-Interface fieldbuses and to the I/O buses of SIMATIC PCS 7, S7-300, S7-400 or systems from other vendors.

### Operator systems

The bus-based PCS7/TM-OS operator system is used for process communication. The PCS7/TM-OS is suitable as a HMI component for the AS 488/TM and the TELEPERM M AS 220 S / AS 220 H, AS 215, AS 230 / AS 230 K, AS 235 / AS 235 K / AS 235 H and AS 388/TM automation systems which are no longer actively marketed. It communicates with the subordinate TELEPERM M automation systems and with SIMATIC S5-155U via one of the CS 275 or PROFIBUS-TM field buses.

The variable configuration of the PCS7/TM-OS operator system from a single-user to multi-user system with single-client or multi-client functionality covers the complete bandwidth of the application spectrum from low-end to high-end performance.

The wide variety of operator-accessible automation systems together with the variability for communication and expansion mean that the PCS7/TM-OS is well qualified as a replacement for older TELEPERM M operator systems, for system extensions or for new systems.

## TELEPERM M Process Control System

**Engineering**

The PROGRAF AS+/NT configuring software which can be installed on personal computers with the Windows NT or Windows 2000 operating system is predestined for the engineering of TELEPERM M automation systems. An engineering PC with PROGRAF AS+/NT can be connected to one of the two TELEPERM M system buses using a bus-specific interface module. It can then be used to configure an AS 488/TM or equally well to configure the AS 230 / AS 230 K, AS 235 / AS 235 K / AS 235 H and AS 388/TM automation systems which are no longer actively marketed.

PROGRAF AS+/NT can be used to graphically configure, test, optimize and document the application software of the TELEPERM M automation systems. The configurations of previously installed automation systems can also be read in, recompiled and subsequently processed further or documented in graphic form. Any PCS7/TM-OS-Single single-user system with RC license (Runtime+Configuration) is suitable for configuring PCS7/TM-OS operator systems. It is alternatively possible to use a server equipped with an RC license and additional operator terminal for OS configuring. The PCS7/TM-OCX (NORA) display blocks (if used) and the PCS7/TM coupling package dependent on the types of AS used must be installed on both configuring systems.

**System bus**

The system bus is the central communication component of every distributed process control system. Two different bus systems are available for the TELEPERM M process control system, and can also be combined together within a plant:

- CS 275
- PROFIBUS-TM

The CS 275 bus system which has been proven in many automation plants functions according to the token passing principle and can also have a redundant configuration. Several buses can be combined together using bus couplers such that bus networks are produced corresponding to the plant structure. The bus system is provided with distributed control. The bus interface of each subsystem may take over the master function according to specific criteria.

The PROFIBUS-TM bus system also operates according to the token passing principle. It can be designed as an electrical or optical network. The two network structures can also be mixed together. A characteristic of the PROFIBUS-TM bus system is that it corresponds to the modern PROFIBUS communications standards according to EN 50170, but also uses the TELEPERM M dialog mechanisms of the CS 275 (AKS, BKS, MKS and PL/PS telegrams) at the application level (interface between bus interface module and application).

PROFIBUS-TM is preferably used for new systems, or also for the expansion of existing systems. When extending systems, existing components with CS 275 communication can be combined with new components using a CS-L2 bridge.

All automation systems and operator systems of the TELEPERM M process control system can be operated on the CS 275 system bus, but only the current AS 488/TM and PCS7/TM-OS systems as well as the AS 388/TM and OS 525 systems which are no longer actively marketed on the PROFIBUS-TM system bus.

**Migration strategy**

The purpose of migration of the proven TELEPERM M process control system into the new, future-oriented generation of the SIMATIC PCS 7 system within the Siemens automation concept "Totally Integrated Automation" is to retain customer investments made in hardware and software and to provide them with a graded, economical transition to newer, more productive technologies with minimum technical and financial risks.

Migration is divided into the following steps:

- Innovation
  - Migration of the TELEPERM M process control system by renewal of components close to the process (automation systems) and of system-internal communication with hardware of the SIMATIC M7 and PROFIBUS systems
  - Expansion of the process I/Os for the innovative automation systems by integration of the ET 200M, ET 200S, ET 200U and ET 200X distributed I/Os and of the PROFIBUS-PA and AS-Interface fieldbuses via PROFIBUS-DP
  - Linking of the existing CS 275 system bus to the new PROFIBUS-TM system bus via a CS-L2 bridge
  - Integration of SIMATIC S5, SIMATIC S7 and SIMATIC PCS 7 systems with data coupling via PROFIBUS-AG/AG independent of the system bus
- Combination
  - Standardization of the HMI components of the TELEPERM M and SIMATIC PCS 7 systems on the basis of the SIMATIC PCS 7 operator station, as well as combination of partial TELEPERM M and SIMATIC PCS 7 systems with these common HMI components
- Homogenization
  - Replacement of the TELEPERM M automation systems by SIMATIC PCS 7 automation systems with further use of existing TELEPERM M I/Os

# Introduction

## AS 488/TM

### Overview

The AS 488/TM automation system based on the SIMATIC M7-400 hardware platform combines the advantages of a modern hardware generation with the AS 235 functionality of the TELEPERM M process control system proven in numerous applications. It is suitable for automation of continuous processes or also of recipe-based batch processes.

The functions of the AS 488/TM system software are compatible with the G system software of the previous AS 235 system. Thus you can continue to use existing application software of the AS 220 / AS 230 / AS 235 automation systems with its standard function blocks, user function blocks, TML programs and STEP M programs. AS 220 application software, however, must first be converted (service is part of migration offer).

The AS 488/TM automation system is available in four different versions:

- AS 488 with modular, standard packaging system for connection at the rear according to the SIMATIC guidelines
- AS 488 S cabinet system for installation in TELEPERM M cabinets with 19" packaging system (cabinets not included in scope of delivery of AS 488 S, they must be ordered as options if required from Catalog PLT 111)
- AS 488, installed in SIMATIC PCS 7 cabinets (only with exclusive use of distributed SIMATIC I/Os; see Catalog ST PCS7.A, Add-ons for the SIMATIC PCS 7 process control system)
- AS 488 K compact system for installation in TELEPERM M wall housings or cabinets

The AS 488 K compact system and the AS 488 S cabinet system provide numerous possibilities for system expansion and modernization by replacement of TELEPERM M automation systems which are no longer available or marketed, with a simultaneous increase in the AS performance. The completely equipped AS 488 K / AS 488 S basic systems which have been pretested by means of a switch-on test can be individually adapted by numerous options, and ideally integrated into an existing system environment. System integration is carried out using so-called migration racks (MIG I / MIG II with AS 488 S and MIG K with AS 488 K). The migration rack is simultaneously the interface to the TELEPERM M I/Os in the extension units of the TELEPERM M cabinets and in the ES 100 K extension systems. Up to five I/O modules can be directly inserted into the MIG II and MIG K migration racks just like in the basic unit of an AS 235 or AS 235 K.

As with the AS 230 / AS 235, up to three extension units can be operated in the basic cabinet on I/O bus A of an AS 488 S as well as an external ES 100 K. Up to four extension units of an AS 230 / AS 235 extension cabinet can be connected to an AS 488 S via I/O bus B if the ribbon cable for the I/O bus is replaced. During migration off the AS 488/TM it is therefore possible to add a fourth extension unit to a maximally configured AS 235 extension cabinet. Limitation of the number of migratable I/O modules does not therefore exist for an AS 230 / AS 235 configured with the maximum number of TELEPERM M I/O modules.



The AS 488 K with its MIG K migration rack offers the same packaging system as an AS 235 K. The MIG K migration rack has five slots for TELEPERM M I/O modules. The serial coupling known from the AS 235 K permits connection of 2 x 4 ES 100 K compact extension systems. These can be positioned up to 500 m away from the AS 488 K automation system, and are therefore highly suitable for a distributed configuration.

In addition to the migration of existing TELEPERM M I/Os, all versions of the AS 488/TM automation system can also be extended by distributed I/Os on the PROFIBUS-DP. In addition to the ET 200M system with a comprehensive range of I/O modules specially designed for process engineering, it is also possible to use the SIMATIC ET 200B, ET 200S, ET 200iS, ET 200X and ET 200U I/O systems (the latter is no longer actively marketed). It is additionally possible to operate a wide range of devices possessing a DP interface on the PROFIBUS-DP of the AS 488/TM. For example, DP interfaces integrated in the CPU modules of the SIMATIC S7-300 permit a simple slave connection to the AS 488/TM. Using gateway modules on the PROFIBUS-DP (DP/PA link, DP/AS-i link, DP/DP coupler), it is also possible to access the PROFIBUS-PA and AS-Interface fieldbuses and the I/O buses of SIMATIC PCS 7, S7-300, S7-400 or systems from other vendors.

The homogeneous interfacing of the distributed SIMATIC I/Os forces distribution close to the process. Significant cost savings are therefore achieved for the process I/Os as well as for field wiring and routing.

The AS 488 S is optimized for installation in TELEPERM M cabinets with 19" packaging system, and therefore particularly suitable for the migration or expansion of existing TELEPERM M systems. The system is mounted on the front cabinet members. The TELEPERM M installation guidelines are applicable with respect to the CE marking wherever TELEPERM M I/O modules are operated in an AS 488 S. On the other hand, the SIMATIC S7/M7 guidelines apply to an AS 488 S exclusively operating with distributed I/Os on the PROFIBUS-DP.

AS 488/TM systems for new plants exclusively with distributed I/Os on the PROFIBUS-DP can also be installed in SIMATIC PCS 7 cabinets. The SIMATIC S7/M7 installation guidelines also apply to this version (see Catalog ST PCS7.A, add-ons for the SIMATIC PCS 7 process control system).

Customers can select between two CPUs with different performance levels for all design versions of the AS 488/TM:

- SIMATIC M7 CPU 486-3 with approx. 150% of the performance of an AS 235
- SIMATIC M7 CPU 488-3 with approx. 270 - 300% of the performance of an AS 235

A commissioning terminal based on PC/programming device can be used for commissioning of the AS 488/TM. The terminal is connected via a serial interface to the respective AS 488/TM and offers the user the same GUI and syntax as known from the AS 235. Because of the serial interface, not all HMI requirements can be fulfilled. Furthermore, the commissioning terminal is not suitable for operation/configuring of another AS using the AS bus configuration channel.

PROGRAF AS+/NT is a convenient configuring tool for the AS 488/TM automation systems. It is compatible with all AS 23x systems. PROGRAF AS+/NT executes on an appropriate PC/programming device with Windows NT/2000/XP operating system and connection to the CS 275/PROFIBUS-TM system bus. PROGRAF AS+/NT permits the creation of an online configuring station for AS 488/TM on the TELEPERM M system bus. On the CS 275 system bus, PROGRAF AS+/NT additionally offers HMI facilities corresponding to local operation of an AS 235.

## Highlights

### Classification in the TELEPERM M system environment

#### Note:

Some of the communications partners/systems referred to below are no longer available or no longer marketed. Reference to the systems in the context "Classification in the TELEPERM M system environment" does not permit any conclusions to be made on their availability.

#### • Communications capability with existing systems and I/O modules

All automation systems and operator systems of the TELEPERM M process control system can be operated on the CS 275 system bus. Only the current AS 488/TM and PCS7/TM-OS systems as well as the AS 388/TM and OS 525 systems which are no longer actively marketed can be operated on the PROFIBUS-TM system bus. Communication specific to TELEPERM M between bus stations on different system buses is possible via a CS-L2 bridge. The AS 388/TM and AS 488/TM systems respond on the system bus like an AS 235 system with compatible functions compared to the PCS7/TM-OS or OS 525 system. The AS 488/TM automation system can communicate with the following TELEPERM M systems:

- AS 388/TM or AS 488/TM automation systems on the PROFIBUS-TM system bus, or AS 215, AS 220 S/K/H, AS 230, AS 230 K, AS 235, AS 235 H, AS 235 K, AS 488/TM on the CS 275 system bus
- OS 525, OS 525 Local or PCS7/TM-OS operation and monitoring systems on the PROFIBUS-TM system bus, or CS 275, OS 252, OS 262, OS 265, OS 520 on the CS 275 system bus
- Engineering systems: personal computer with the PROGRAF AS+/NT program package, personal computer or ES 500 with the PROGRAF AS+ program package, on the CS 275 or PROFIBUS-TM system bus

- Other systems  
SIMATIC PCS 7, SIMATIC S7, SIMATIC S5 and systems from other vendors via the DP bus PROFIBUS-DP, the coupling bus PROFIBUS-AG/AG, or via a 3964R serial coupling with TM module 6DS1 333-8AB.

#### • Limitations in communication

- The response of the AS 488/TM and AS 388/TM systems in a homogeneous network with approved TELEPERM M stations on the CS 275 or PROFIBUS-TM system bus (AS 235, OS 525, PCS7/TM-OS etc.) maps the AS 235 system with the exception of CD mode (e.g. for data formats and block names on the bus). CD couplings (without acknowledgment) for AKx/BKx blocks are not implemented in the AS 388/TM and AS 488/TM systems. When carrying out migration or when importing user structures, the CD couplings must therefore be removed prior to loading into the automation system.

#### Note:

When communicating with other stations (e.g. systems from other vendors) via the N-AT interface module on the CS 275, not all functions of the AS 388/TM and AS 488/TM react identically to those in an AS 235 system. In individual cases, it must be checked from the viewpoint of the other systems prior to connection of an automation system to the system bus whether the required communications functions can be implemented with the AS 388/TM or AS 488/TM systems.

- Use of the STRUK-AS 220 EA program via the system bus is not released for the AS 388/TM and AS 488/TM systems.
- Use of the AS bus configuring channel for operation/configuring of another AS using a commissioning terminal is not released because of the serial communications mode of the commissioning terminal.
- Communication to the process I/Os is carried out via serial PROFIBUS-DP interfaces. These are operated according to the standard protocol. If devices from other vendors are connected, these must comply with the PROFIBUS-DP standard, and their data interfaces must be completely described. AS 388/TM and AS 488/TM automation systems each have two PROFIBUS-DP interfaces.
- The AS 488/TM communicates with existing I/O modules from the TELEPERM M range via a special interface module and the parallel I/O bus interface (ribbon cable) in the TELEPERM M cabinets.
- The process image is automatically generated by the interface module, and this module must therefore recognize the connected I/O modules. Only those modules and systems listed in the Section "Migration of existing systems" or published on the Internet "AS 488/TM configuration list" can be used.

#### • Non-migratable systems

The AS 488/TM automation system does not offer a compatible replacement for the fault-tolerant AS 235 H automation system; migration would only be possible with relinquishing of the redundancy. Furthermore, the FM 100 field multiplexer must continue to be operated on existing AS 230 / AS 235 automation systems.



# Introduction

## AS 488/TM

### Area of application

The main applications of the AS 488/TM are:

- **Replacement of existing AS 220, AS 230/230 K and AS 235/235 K automation systems**

With an AS 220 / AS 230 / AS 235, the subrack with the central processing units in the TELEPERM M cabinet is replaced by an AS 488 S with compatible functions. Existing extension units with installed TELEPERM M I/Os can be used further. With an AS 230 K / AS 235 K, migration is carried out by replacing the complete basic system in the TELEPERM M housing, rack or cabinet by an AS 488 K compact system with compatible functions. TELEPERM M I/O modules previously inserted in the AS 230 K / AS 235 K basic system can be used further following conversion and rewiring in the migration rack of the AS 488 K.

When replacing existing automation systems, the AS 488 S and AS 488 K migration systems are preferably connected to the existing CS 275 system bus. Alternatively possible is connection to the PROFIBUS-TM system bus.

- **Expansion of existing TELEPERM M systems on the CS 275 system bus**

Expansions on the CS 275 system bus are mainly the result of modernization by migration with AS 488/TM. Existing systems with TELEPERM M I/Os can also be expanded by SIMATIC distributed I/Os on the PROFIBUS-DP. In addition to the ET 200M with a comprehensive range of standard I/O modules for process engineering applications, it is also possible to use the complete range released for AS 488/TM.

- **Expansion of existing TELEPERM M systems by PROFIBUS-TM system components with use of the CS-L2 bridge**

Existing and new system components can be connected together using a CS-L2 bridge. The bridge couples the two CS 275 and PROFIBUS-TM buses, and converts the different parts of the TM protocol. The AS 235 and AS 488/TM systems on the CS 275 bus can then also be controlled by OS 525 operator systems or PCS7/TM-OS on the PROFIBUS-TM. Analog and binary values can be exchanged between automation systems on the two buses.

Distributed SIMATIC I/Os on the PROFIBUS-DP are primarily used for acquisition and output of process signals on the PROFIBUS-TM components used for the system expansion. In addition to the ET 200M with a comprehensive range of standard I/O modules for process engineering applications, it is also possible to use the complete range released for AS 488/TM.

- **New systems with the AS 488/T M automation system**

In the case of new systems, it is recommendable to use the PROFIBUS-TM based on the standardized PROFIBUS as the system bus. The AS 488/TM automation systems are operated centrally using bus-coupled PCS7/TM-OS operator systems, and configured via bus using the PROGRAF AS+/NT program package. The SIMATIC distributed I/Os from the ET 200 range are preferred as the process I/Os. Interfacing to the automation systems is carried out via the PROFIBUS-DP fieldbus.

The favorite standard within the ET 200 range is the ET 200M I/O system with a comprehensive range of I/O modules of SIMATIC S7-300 design, including special modules for process engineering. In addition, the complete range of distributed I/Os released for AS 488/TM can of course also be used.

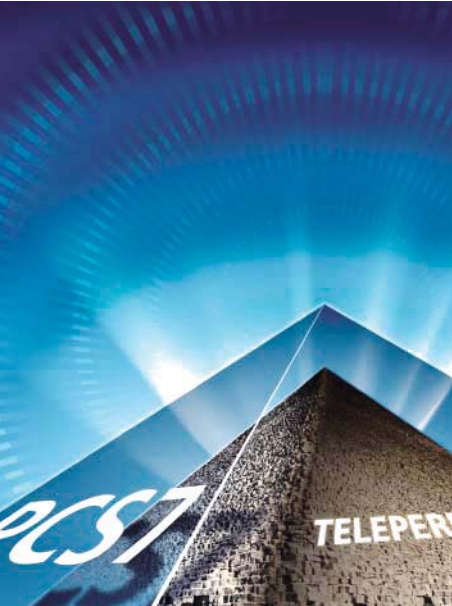
### Functions

#### Highlights

- Functions compatible with the proven AS 235 automation systems: existing application software and installed process I/Os can be used further
- Future-oriented system basis: continuous evolution to new technologies with the modern hardware platform of the SIMATIC M7 systems
- Two performance ranges: selectable CPU performance corresponding to 150% or 270 to 300% of the performance of an AS 235
- Four design systems:
  - AS 488 in modular standard packaging system according to SIMATIC guidelines
  - AS 488 S cabinet system for installation in TELEPERM M cabinets
  - AS 488, installed in SIMATIC PCS 7 cabinets
  - AS 488 K compact system for installation in TELEPERM M wall housing or cabinets
- Can be used for modernization and expansion of existing systems and also for new systems
- Flexible adaptation of automation system to the respective task:
  - Comprehensive range of distributed I/Os
  - ET 200M I/Os especially suitable for process engineering
  - Compact modules in adapter casings, operation without fans
  - Adaptable packaging system
  - Migration of existing TELEPERM M systems
- Modern communication standards:
  - PROFIBUS-TM system bus for connection of components close to the process or remote from the process, also with optical design (redundant media)
  - PROFIBUS-DP fieldbus for interfacing of distributed process I/Os and of systems from other vendors with a smaller data interface
- PROFIBUS-AG/AG coupling bus for interfacing of SIMATIC S5, SIMATIC S7, SIMATIC PCS 7 and systems from other vendors with data coupling (independent of system bus)
- Bridge for connection of CS 275 and PROFIBUS-TM system buses

# 2

## System architecture



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# System architecture

## System properties

### Overview

The AS 488/TM automation system consists of standard hardware components from the SIMATIC M7 systems, supplementary components for applications in TELEPERM M, and a memory card with system software whose functions are compatible with the AS 235 automation system.

All system programs are saved permanently on the memory card of the AS 488/TM automation system. The user configurations are also saved permanently on the same medium.

The main characteristic of the AS 488/TM system software is the complete simulation of the AS 235 functions on the basis of an RMOS32 real-time operating system on a SIMATIC M7 central processing unit CPU 486-3 or CPU 488-3.

The system software permits configuring of the automation functions as with the AS 235 system (using dedicated function blocks, TML and STEP M programs) as well as communication via a system bus.

The AS 488/TM automation systems are available in four different versions to permit optimum adaptation to different customer requirements:

- As AS 488 with the modular SIMATIC M7-400 packaging system for connection at the rear according to the SIMATIC guidelines
- As AS 488 S cabinet system: SIMATIC M7-400 packaging system optimized for installation in TELEPERM M cabinets with 19" packaging system
- As AS 488 with SIMATIC M7-400 packaging system, installed in SIMATIC PCS 7 cabinets (only with exclusive use of SIMATIC distributed I/Os; see Catalog ST PCS7.A, add-ons for the SIMATIC PCS 7 process control system).
- As AS 488 K compact system: SIMATIC M7-400 packaging system, migrated in TELEPERM M compact system and suitable for installation in TELEPERM M wall housings or cabinets.

The AS 488/TM system with the CPU 486-3 provides 150% automation performance (in the sense of computing performance) of an AS 235 system, and with the CPU 488-3 it provides 270% to 300% automation performance of an AS 235 system with an equivalent uniform communication performance on the system bus.

Exceptional features of the automation systems are their universal functions for automation tasks, compatibility with the AS 235 systems, as well as the communication capability with the PROGRAF AS+/NT configuring tool, the PCS7/TM-OS operator systems and other automation systems on the CS 275 and on the PROFIBUS-TM (incl. CS-L2 bridge communication with stations on the other system bus in each case).

Both continuous processes and comprehensive batch processes (production procedure repeated in same or modified form) can be automated by the AS 488/TM system.

The automation systems have a minimum cycle time of 125 ms for closed-loop and open-loop controls. The individually configured functions can be processed in a basic cycle (125 ms, 1 s and background level) or in a multiple thereof. An acyclic alarm processing level is present in addition.

### Functions

- Automation system with graded performance and communication via system bus
- PROFIBUS-TM system bus, or CS 275 as alternative
- Central operation and monitoring with the PCS7/TM-OS operator system
- Configuring with graphical user interface using the PROGRAF AS+/NT engineering tool on PC/programming device
- Commissioning support with commissioning terminal based on PC/programming device with known TELEPERM M syntax
- SIMATIC S7/M7 packaging system; integration in TELEPERM M cabinets/housing with MIG I, MIG II or MIG K migration racks
- Distributed I/Os with the modular ET 200M I/O stations (including Ex(i) modules), ET 200B, ET 200U, ET 200S, ET 200iS (available soon) and ET 200X
- TELEPERM M I/O modules in standard TELEPERM M cabinets with AS 488 S / AS 488 K migration packages
- The PROFIBUS-DP of the AS 488/TM is open for interfacing of certified PROFIBUS-DP devices
- System programs on memory card plus user area for archiving
- 4 Mbyte user memory
- 32-bit processing of analog values, identical to the AS 235 system
- Complete range of standard function blocks, identical to the AS 235 system
- User function blocks with convenient TML programming language, or also the STEP M programming language for open-loop controls
- Online configuring/programming with graphic support by PROGRAF AS+/NT
- Compatible with preconfigured SIGRID TM V5 (GF/GFE), BATCH X-TM and FUZZY TM program packages
- Reloadable software packages with couplings and I/O links:
  - PROFIBUS-AG/AG coupling
  - PROFIBUS-PA I/Os
  - AS-I I/Os
  - SIWAREX M PROFIBUS-DP I/Os
  - PROFIBUS-DP I/Os with extended analog formats
  - PROFIBUS-DP I/Os: panels based on Windows CE
  - PROFIBUS-DP I/Os: IP 262 closed-loop control module of ET 200U; reloadable driver block as standard on the memory card of the AS 488/TM
  - Options: special driver blocks for use of SIMOVERT, MICRODRIVES, SIPART DR, FM 350, CEAG devices, etc.

# System architecture

## System properties

### Technical Specifications

#### Quantity breakdown

The AS 488/TM automation systems have the following quantity breakdowns:

AS 488/TM	CPU 486-3	CPU 488-3
Control loops *)	45 to 120	90 to approx. 216
Additional analog value monitoring	45 to 180	90 to approx. 324
Sequential controls *)	8 to 20	16 to approx. 36
Logic controls *)	150 to 370	300 to approx. 666
User memory	4 Mbyte	4 Mbyte
Computing performance compared to AS 235	150 %	270 to 300 %

\*) The values identified by an asterisk apply as alternatives and are not for addition.





# System architecture

## System software

### Overview

A separate memory card with system software is required for each automation system. The system software of the AS 488/TM is completely present on this memory card, and only executes there. The software is reloaded each time the system is switched on or reset. The memory card is divided into a system memory and a user memory. The system memory is read-only, and contains the system software in the form of basic programs and standard function blocks.

The memory card is inserted into a special slot in the automation system's CPU. It must not be removed during operation, it must remain permanently inserted in the CPU.

### Standard function blocks

Dedicated function blocks, the so-called standard function blocks, are available in the automation systems for solving control engineering tasks. The AS 488/TM system contains the same standardized function blocks as the AS 235 automation system for measured-value acquisition, closed-loop control, open-loop control, calculation and monitoring.

Supported by the powerful PROGRAF AS graphic configuring tool, the standard function blocks present in the system software are activated by means of configuring instructions and linked into an automation structure which is partially processed cyclically by the automation system's CPU, and partially also acyclically.

The standard function blocks of the AS 488/TM system are listed in the tables under "Configuring". Blocks have been omitted which are still in the system software for compatibility reasons but have no significance any longer for applications with the AS 488/TM.

### Optional function blocks

Various preconfigured standard software packages are available which can be subsequently loaded and executed on the AS 488/TM. Compatibility with the AS 488/TM system software is guaranteed for the following packages:

AG/AG coupling	Standard data coupling of SIMATIC S5/S7, SIMATIC PCS 7 as well as devices from other vendors via the PROFIBUS-AG/AG bus system
SIWAREX M (driver)	Standard driver for the SIWAREX M weighing/dosing unit as distributed I/O on PROFIBUS-DP
ZEIT	Utilization measuring program for all AS cycles
FENS	Reloadable window block for diagnostics of module data on PROFIBUS-DP
Special blocks	On request; including optional special driver blocks for use with SIMOVERT, MICRO-DRIVES, SIPART DR, FM 350, CEAG devices

#### Note:

The following software packages can also be used, but are no longer actively marketed:

- SIGRID TM V5 (basic process engineering functions and basic function elements)
- BATCH X-TM (program system for automation of recipe-controlled batch processes)
- FUZZY TM (configuration of fuzzy controls)

The SIGRID TM V5, BATCH X-TM and FUZZY TM function blocks belong to software class C.

### User function blocks

If the standard function blocks are insufficient to fulfil the control, operation, monitoring and communication tasks, the TML process language (TELEPERM M Language) can be used for analog and binary processing operations, and the STEP M control language for binary logic operations. TML and STEP M can be used to define new function blocks optimally tailored to the respective automation task.

Functions which can only be solved with difficulty using standard function blocks, e.g. optimization, startup and shutdown, or open-loop controls, can be solved more simply using these optimized function blocks.

### TML language

TML is used to produce more complex blocks for comprehensive analog, binary and character processing functions with individual test and processing algorithms. TML is particularly suitable if many functions of the same type are to be linked with different signals, addresses or parameters (multiplex system).

### STEP M language

Binary functions such as linking, saving and time delays are required for sequential and logic controls. The main component of STEP M is the logic operation with which scanning, linking, setting, resetting and assignment instructions can be formulated. Parts of the program which are used repeatedly can be transferred into subroutines.

# System architecture

## System software

### Configuration

#### Listing of TELEPERM M standard function blocks

##### Data blocks

Type	Name	Function
GA	Data block for global analog values	Storage of 256 analog values with error $10^{-3}$ ; storage of process image, historical values etc.
GB	Data block for global binary values	Saving, scanning and linking of 256 binary values; preferably for binary process inputs and outputs
GM	Data block for global flags	Saving, scanning and linking of 256 internal binary statuses
GT	Data block for global times (timer)	Saving and generation of times/timers for execution of time-dependent functions
FA	Data field block for analog values	Saving of internal/external analog values with error $10^{-9}$ ; preferably for internal results; extension of GA block
FSA	Data field block for analog values	Saving of internal/external analog values with error $10^{-4}$ ; preferably for internal results
FB	Data field block for binary data	Saving of internal/external binary values; extension of GB/GM blocks
FC	Data field block for characters	Saving of alphanumeric characters (texts)

##### Blocks for analog and digital processing

Type	Name	Function
SUM	Adder	$Y = X1 + X2 - X3 - X4$
MUL	Multiplier	$Y = X1 \cdot X2$
DIV	Divider	$Y = X1/X2$
RAD	Square root extractor	$Y = \sqrt{X}$ or $Y = K \cdot \sqrt{X}$
LN	Logarithm extractor	$Y = K \cdot \ln  X $
EXP	Exponential value	$Y = e^X$
ABS	Absolute value	$X =  X $
INT	Integrator	$Y = K \cdot \int X dt$ , $K = 1/T$
DIF	Differentiator	$Y(s)/X(s) = (T \cdot s)/(1 + (T \cdot s/v))$
PT	Delay	$Y(s)/X(s) = 1/(1 + T \cdot s)$
TOZ	Dead time	$Y(s)/X(s) = e^{-s \cdot T}$
MIN	Minimum-value selection	$Y = \text{minimum of } X1, X2, X3$
MAX	Maximum-value selection	$Y = \text{maximum of } X1, X2, X3$
TOB	Dead band	$Y = X - \text{TOBU}$ for $X < \text{TOBU}$ $Y = 0$ for $\text{TOBU} \leq X \leq \text{TOBO}$ $Y = X - \text{TOBU}$ for $X > \text{TOBO}$
PLG	Progression block	Linear interpolation between 6 pairs of turning points
GW	Limit monitor	Limit check between 2 switching points
ASL	Analog-value switch	$Y = X1$ for $S = "0"$ $Y = X2$ for $S = "1"$
SPEI	Analog-value monitor	Saving of max. 256 analog values

### Blocks for binary processing

Type	Name	Function
VU	AND	$A = E1 \text{ AND } E2 \text{ AND } E3$
VO	OR	$A = E1 \text{ OR } E2 \text{ OR } E3$
VN	Negation	$A = \text{NOT } E$
VM	Flag	Flag of binary input signals (flip-flop)
VZ	Time delay	Delay for switching on and off
VS + STEP	STEP M block	Freely programmable in STEP M
MPX	Multiplexer	To supply the STEP commands in the following VS/KS block
BW	Binary selection	Selection of status combination from max. 3 binary signals
INKU	Increment converter	Converts analog values into opening or closing pulses
BCE	BCD input	Conversion of a BCD signal into an analog value
BCA	BCD output	Conversion of an analog value into a BCD signal
KA	Sequence start	Marks the beginning of an ON/OFF branch of a subgroup control
KAK	Sequence start	As KA, with additional functions
KB	Sequence	Conditions of a control step, for power plant systems
KBK	Sequence	As KB, with additional functions
KS	Sequence step	As KB, for process engineering systems
KV	Sequence branch	Branching of a sequence into max. 6 branches, with process engineering systems
KE	Sequence end	Last block in a sequence
KEK	Sequence end	As KE, with additional functions
HA	Auxiliary oil	Controls electric auxiliary oil pumps for supply of bearing oil to aggregates
EAR	Single analog-value marshalling	Allocates analog values from block outputs in GA blocks
EBR	Single bit marshalling	Links individual binary outputs to GB/GM data blocks
UBR	Universal binary marshalling	Links 16 binary blocks to GB/GM data blocks

# System architecture

## System software

### Blocks for processing with standardized operation and monitoring

Type	Name	Function
R	Controller	PID controller, e.g. for disturbance variable feedforward; tracking of setpoint and manipulated variable; limit generation
RN	Controller	As R, with additional functions
M	Data monitoring	<ul style="list-style-type: none"> <li>Monitors a measured value for 3 pairs of limits</li> <li>Extension of controller block for limit monitoring</li> <li>Limiting of measured value to error limits</li> </ul>
V	Ratio	<ul style="list-style-type: none"> <li>Generation of a ratio, e.g. with ratio control</li> <li>Proportional adjuster, e.g. with synchronization control or for influencing the command variable of a cascade</li> </ul>
B	Operator communication	<ul style="list-style-type: none"> <li>Display of analog values (e.g. internal results)</li> <li>Modification of analog and binary values (e.g. input of constants)</li> </ul>
S	Control circuit	Operation and monitoring of a sequence in process engineering systems
G	Subgroup control	Operation and monitoring of sequences in power plant systems
GK	Group control	As G, with additional functions
A	Output for binary data	Display and modification of a binary value
F	Window block	Display of 5 measured values; each of the 5 values is monitored for a pair of limits
FN	Window block	<ul style="list-style-type: none"> <li>Display and limit monitoring of 5 measured values</li> <li>Input of 5 pairs of limits with associated hysteresis and of 5 measuring ranges for the display</li> </ul>
T	Trend	<ul style="list-style-type: none"> <li>Display of the trend of two measured values as a bargraph; timebase between 1.625 s and 36 h</li> <li>Display on commissioning terminal or in PROGRAF AS+/NT engineering tool</li> </ul>
SR	Recorder	<ul style="list-style-type: none"> <li>Summary of max. 4 series of measurements displayed as dashed curves on screen; 4 pairs of limits for monitoring the measured values</li> <li>Display on commissioning terminal or in PROGRAF AS+/NT engineering tool</li> </ul>
C	Switchover	For switching over of binary signals, e.g. manual/automatic mode
PKM	Message recording	Records configured messages from binary input module/GB block
PKF	Message sequence display	<ul style="list-style-type: none"> <li>Output of PKM messages; new messages of PKM blocks</li> <li>Display on commissioning terminal or in PROGRAF AS+/NT engineering tool</li> </ul>

### Blocks for signal exchange via the CS 275 or PROFIBUS-TM system bus

Type	Name	Function
AKS	Analog coupling and transmitter block	Transmission of max. 28 analog values and abbreviated time (minutes and seconds) from an automation system to max. 6 or 32 receivers (AKE blocks)
AKE	Analog coupling and receiver block	Reception of max. 28 analog values via the system bus from the data set of an AKS block of another bus station
BKS	Binary coupling and transmitter block	Transmission of max. 128 binary signals and abbreviated time from an automation system to max. 6 or 32 receivers (BKE blocks)
BKE	Binary coupling and receiver block	Reception of max. 128 binary values via the system bus from the data set of a BKS block of another bus station
ZKS	Character coupling and transmitter block	Transmission of max. four S16 strings from an automation system to max. 6 or 32 receivers (ZKE blocks)
ZKE	Character coupling and receiver block	Reception of max. four S16 strings from another automation system
MKS	Signal coupling and transmitter block	Transmission of 32 binary signals as messages (with time of signal change from "0" → "1" or "1" → "0") to other bus stations
MEL	Signalling	Output of configured plain text messages with time (resolution 1 s)
SKS	Status coupling and transmitter block	Transmission of status information to higher-level systems (operation and monitoring systems, computers)
PLPS	Read and write parameters	Read or write up to 20 parameters with a bus-coupled AS 388/TM or AS 488/TM system

# System architecture

## System software

### Blocks for distributed process I/Os on the PROFIBUS-DP fieldbus

Type	Name	Function
DPAE	Analog input DP	Acquisition of analog signals via the distributed process I/O modules
DPAA	Analog output DP	Output of analog signals via the distributed process I/O modules
DPBE	Binary input DP	Acquisition of binary signals via the distributed process I/O modules
DPBA	Binary output DP	Output of binary signals via the distributed process I/O modules
SIWA	SIWAREX M	Reloadable driver block for integration of SIWAREX M weighing and dosing electronics for custody transfer into the TELEPERM M process control system
DP4E	4-byte analog-value input	Recording of analog values of type IEEE/S7 floating-point numbers, S5 floating-point numbers and 4-byte integers from S7, S5 and external stations
DP4A	4-byte analog-value output	Output of analog values of type IEEE/S7 floating-point numbers, S5 floating-point numbers and 4-byte integers to S7, S5 and external stations
HMI	HMI server block	Block for interfacing of panels based on Windows CE (e.g. OP170B/MP270/MP370)
PAAI	Analog input for PROFIBUS-PA	Recording of analog and status values of a PROFIBUS-PA field device (transmitter)
PAAO	Analog output for PROFIBUS-PA	Output of analog and status values as well as readback of analog and binary statuses of a PROFIBUS-PA field device (representative for actuators, drives, controllers, etc.)
PADI	Discrete-value input for PROFIBUS-PA	Recording of discrete values including the status value of a PROFIBUS-PA field device
PADO	Discrete-value output for PROFIBUS-PA	Output of discrete and status values as well as readback of binary statuses of a PROFIBUS-PA field device (representative for actuators, drives, controllers etc.)
KRIP, RIP	IP 262 driver block	Interfacing of IP 262 closed-loop control module via PROFIBUS-DP

### Blocks for PLC/PLC coupling with PROFIBUS-AG/AG

Type	Name	Function	Interface
S5KS [AGAG]	Transmitter and coupling block for connection of SIMATIC S5/S7 automation systems	Data transfer to PLC/AS via PROFIBUS-AG/AG, standard driver with extended functions for PLC/PLC coupling	IF 964-DP
S5KE [AGAG]	Receiver and coupling block for connection of SIMATIC S5/S7 automation systems	Data reception from PLC/AS via PROFIBUS-AG/AG, standard driver with extended functions for PLC/PLC coupling	IF 964-DP

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# System architecture

## System software

### Driver blocks for I/O modules of the TELEPERM M system via the TPM 478 communications module

Type	Name	Function	For modules with Order No.
AE	Analog input Suitable for PROFIBUS-DP process image Not with SIMATIC S7 I/O modules	Acquisition of an analog signal via a channel of an analog input module (0 to 20 mA, 4 to 20 mA, 0 to $\pm 10$ V; Pt 100 resistance thermometers, thermocouples) or an analog input module of the SIMATIC S5 programmable controller systems (series U)	6DS1 701-8AA, -8AB 6DS1 730-8AA 6DS1 731-8AA/ -8BA/-8EA/-8FA/-8RR 6DS1 703-8AB, -8RR 6DS1 321-8AA coupling module 6DS1 700-...
AR	Analog input marshalling	Acquisition of 8 analog process values, conversion into physical variables; saving in GA blocks or direct linking	6DS1 701-8AA, -8AB 6DS1 730-8AA 6DS1 731-8AA/ -8BA/-8EA/-8FA/-8RR 6DS1 703-8AB, -8RR 6DS1 321-8AA coupling module 6DS1 700-...
AA	Analog output Suitable for PROFIBUS-DP process image	Output of an analog signal via a channel of an analog output module or an analog output module of the SIMATIC S5 programmable controller systems (series U)	6DS1 702-8AA, -8RR 6DS1 321-8AA coupling module
BEI	Binary input	Acquisition of binary signals via a binary input module; saving of binary signals in the GB block	6DS1 601-... 6DS1 602-... 6DS1 615-8AA
BRA	Binary marshalling Suitable for PROFIBUS-DP process image	Acquisition of 8 binary signals via a binary input module; allocation of signals to defined linking addresses	6DS1 601-... 6DS1 602-... 6DS1 615-8AA
BAU	Binary output	Output of max. 32 binary signals to a binary output module	6DS1 603-... 6DS1 604-8AA 6DS1 605-8BA
RZ	Input block for dual-channel controllers	Acquisition of analog and binary signals from a channel of a dual-channel controller module	6DS1 402-... 6DS1 403-...
RZA	Output block for dual-channel controllers	Transfer of positioning increment DY or setpoint increment DW coming from a controller block R or RN to a channel of a controller module	6DS1 402-... 6DS1 403-...
BU8	Binary transmitter monitoring block	Acquisition and monitoring of 8 binary signals via a binary input module	6DS1 620-8AA 6DS1 621-8AA
BU16	Binary transmitter monitoring block	Acquisition and monitoring of 16 binary signals via a binary input module	6DS1 600-8AA
ZE	Metered pulse input	Acquisition of a channel of a metered pulse input module	6DS1 607-8AB
E110	Binary input for SIMATIC S5 input modules Suitable for PROFIBUS-DP process image	Reading in of 16 binary values from an interface module for input modules of the SIMATIC S5 programmable controllers S5-110 or for input modules of the SIMATIC S5 programmable controller systems (series U) or for standard binary input modules	6DS1 310-8AA/-8AB coupling module 6DS1 321-8AA coupling module 6DS1 600-8AA 6DS1 601-8BA 6DS1 602-8BA 6DS1 615-8AA
A110	Binary output for SIMATIC S5 output modules Suitable for PROFIBUS-DP process image	Output of 16 binary values from an interface module for output modules of the SIMATIC S5 programmable controllers S5-110 or for output modules of the SIMATIC S5 programmable controller systems (series U) or for standard binary output modules	6DS1 310-8AA/-8AB coupling module 6DS1 321-8AA coupling module 6DS1 603-8BA 6DS1 604-8AA 6DS1 605-8BA
S5KE	Coupling to SIMATIC S5/S7 programmable controllers - receive -	Acquisition of signals from the interface module via telegrams with point-to-point connection, standard driver	6DS1 333-8AB coupling module
S5KS	Coupling to SIMATIC S5/S7 programmable controllers - transmit -	Transmission of signals to the interface module via telegram with point-to-point connection, standard driver	6DS1 333-8AB coupling module
MSB	Motor/valve and actuator control	Acquisition and transfer of binary signals to the binary calculation module	6DS1 717-8AA/-8RR 6DS1 719-8AA/-8RR
TVB	Preselection and subloop control	Acquisition and transfer of binary signals to the binary calculation module for operation and monitoring of a preselection or subloop control	6DS1 717-8AA/-8RR
BRBK	Organization and binary input and output block	Acquisition of binary signals from the flag area of the binary calculation module, coordination together with ABR, MSB or TVB	6DS1 717-8AA/-8RR
ABR	Analog input and output	Acquisition and transfer of analog signals via the binary calculation module to the analog extension module	6DS1 717-8AA/-8RR 6DS1 720-8AA

**Blocks for I/O modules with standardized display**

Type	Name	Function	For modules with Order No.
RE	Controller, single-channel	Acquisition of signals from single-channel controller modules; transfer of commands and standardized increments to the controller modules	6DS1 400-8BA (S controller) 6DS1 401-8BA (K controller)
RK	Controller, single-channel	As RE, with additional functions	6DS1 400-8BA (S controller) 6DS1 401-8BA (K controller)
EM	Individual control drive, motor	Acquisition of signals from the individual control drive modules and passing on of signals to the binary outputs, e.g. for a subgroup control; transfer of commands to the individual control drive modules	6DS1 500-8BA 6DS1 502-8BA
EU	Individual control drive, motor	As EM, with additional functions	6DS1 500-8BA 6DS1 502-8BA
EV	Individual control drive, valve	As EM, for the corresponding modules	6DS1 501-8BA/-8BB 6DS1 503-8BA
EK	Individual control drive, valve	As EV, with additional functions	6DS1 501-8BA/-8BB 6DS1 503-8BA
DZ	Proportional counter	Acquisition of signals from proportional counter modules (2/4 channels), connection of these signals to the block outputs; transfer of commands and standardized analog values	6DS1 613-8BB
EG	Individual control drive modules (4 to 8 channels)	Acquisition of signals from modules, connection of these signals to the binary outputs; transfer of commands	6DS1 504-8AA 6DS1 505-8AA

**Organization blocks**

Type	Name	Function
XB	Processing, cyclic	For disabling/enabling a group of function blocks and for enabling each n-th cycle
XA	Processing, acyclic	For disabling/single enabling a sequence of function blocks. When installed in the alarm level (ZYK 1) as an ALARM block: 1 x processing of subsequent block sequence
XZ	Time start	For time-dependent switching on/off of blocks and block sequences
FUTA	Function keys	For switching on/off of blocks and block sequences using operator input
RNAM	Name change	Modification of type or block name
APRO + PROB	TML connection (connection of PROBLEM blocks)	For "insertion" of an application-specific TML program into the sequence list

**Test blocks**

Type	Name	Function
TANZ	Test display	Monitoring of binary and analog variables; selective modification of variables possible (max. 16 analog variables and 16 binary variables within a standard display)
TUEB	Test monitoring	For sequence monitoring of TML programs: <ul style="list-style-type: none"> <li>• Cyclic sequence monitoring</li> <li>• Single monitoring of a program cycle (up to 248 TML programs can be monitored)</li> </ul>
WART	Test and maintenance	Menu-based calling of maintenance subroutines (switchover of XB, status of coupling block, activate error message, TML)

# System architecture

## Commissioning

### Overview

A commissioning terminal is required for commissioning and system configuring of the AS 488/TM or the CS-L2 bridge. A personal computer/programming device with the commissioning terminal software ASBEDIEN belonging to the system software can be used as the commissioning terminal. The commissioning terminal software is delivered in two versions for MS-DOS and Windows NT operating systems.

### Commissioning terminal

The commissioning terminal is required for the following tasks:

- System configuring for bus communication and I/Os
- To edit initialization files on the memory card, e.g. to set the bus and station addresses
- To describe hardware configurations, e.g. I/O stations on the PROFIBUS-DP fieldbus and their configuration (see Section "Process I/Os").
- Archiving of user software on the memory card
- Commissioning
- Downloading of initialization and driver software onto the memory card, e.g. for the 2nd PROFIBUS-DP line, for SIWAREX M or PLC/PLC coupling, and for the IP 262 in ET 200U.

Together with the commissioning terminal software belonging to the system software, any personal computer/programming device can be used as the commissioning terminal if it satisfies the following requirements:

#### DOS version of commissioning terminal software

- CPU with 80386, 80486 or Pentium processor
- Vacant main memory min. 320 Kbyte
- VGA graphics (min. resolution 640 x 480)
- One vacant serial COM port
- MS-DOS operating system version 5.0 or later for commissioning terminal software
- Microsoft Windows 3.1 or Windows for Workgroups 3.11 operating system for the COM PROFIBUS configuring software (if required, see Section "Process I/Os").

#### NT version of commissioning terminal software

- CPU with Pentium processor
- Vacant hard disk capacity approx. 5.1 Mbyte
- One vacant serial COM port
- MS-DOS operating system version 5.0 or later for commissioning terminal software
- Microsoft Windows NT (V 4.0 or later) or Windows 2000 operating system.

Both versions are included in the delivery of the system software.

### Design

#### Cable for connection of the commissioning terminal

The commissioning terminal for the AS 488/TM automation systems and the CS-L2 bridge is connected via a cable 6ES7 902-... to the IF 962-COM serial interface module in the CPU.



### IF 962-COM serial interface module

The IF 962-COM serial interface module is required to connect a commissioning terminal to an AS 488/TM automation system and to the CS-L2 bridge. It is inserted into the system CPU.

### Notes on operation of the commissioning terminal

The commissioning terminal supports use of the known operation and monitoring interface of the automation system for commissioning and servicing purposes, but without offering the quality of an operation and monitoring system.

The commissioning terminal can be permanently connected to the automation system. The serial data transmission rate is 19.2 kbit/s.

Communication between the AS and the commissioning terminal is automatically resynchronized following an interruption, e.g. as a result of message interferences.

For diagnostics purposes or for setting parameters, AS operations according to AS 235 conventions are also possible using the commissioning terminal. However, the operation/configuration of another automation system using the AS bus configuring channel is not permissible. As a result of the serial interface, the commissioning terminal is certainly not an adequate substitute for an operator system or engineering system.

The AS and PC systems must be electrically isolated from one another if the distances between the earth potentials are greater than 10 m.

### Ordering Data

	Order No.
<b>Connecting cable for commissioning terminal</b>	
SIMATIC S7/M7 cable for point-to-point connections RS 323 C - RS 232 C, in each case with 9-contact Sub-D socket	
• 5 m long	<b>6ES7 902-1AB00-0AA0</b>
• 10 m long	<b>6ES7 902-1AC00-0AA0</b>
<b>IF 962-COM serial interface module</b>	<b>6ES7 962-3AA00-0AC0</b>
for commissioning terminal, with two RS 232 interfaces	

# System architecture

## Engineering with PROGRAF AS+

### Overview

PROGRAF AS+/NT is a powerful PC-based engineering tool for the TELEPERM M AS 230/230 K and AS 235/235 K/235 H as well as AS 388/TM and AS 488/TM automation systems (including the AS 488 S and AS 488 K versions with a varying design). It is equipped with a convenient graphical user interface based on Microsoft Windows NT 4.0/2000/XP. This tool permits significant simplification, acceleration and rationalization of engineering, testing and commissioning, software updating and documentation, as well as training.

PROGRAF AS+/NT can be used to graphically configure, test, optimize and document the application software of the TELEPERM M automation systems. In contrast to comparable products from other vendors, PROGRAF AS+/NT also permits reading, recompilation and subsequent further graphical processing or documentation of the structures of already installed automation systems. Features such as the function diagram editor with online testing and curve display, the libraries for elements for repeated use, and the import functions make PROGRAF AS+/NT an indispensable aid for AS engineering.

PROGRAF AS+/NT also offers operation and monitoring facilities on the CS 275 system bus, corresponding to local operation of an AS 235.

PROGRAF AS+/NT supersedes the proven PROGRAF AS+ engineering tool which only executes on the Microsoft Windows 3.1 operating system. The new tool has complete function and data compatibility with the previous product. User data generated with PROGRAF AS+ can be processed further with PROGRAF AS+/NT, and vice versa.

As a result of its versatile functions as well as supporting of testing, commissioning and optimization, PROGRAF AS+/NT is particularly suitable

- for TELEPERM M customers carrying out self-configuring,
- for consultants specialized in TELEPERM M configuring, and
- for Siemens-internal configuring, testing and commissioning departments.

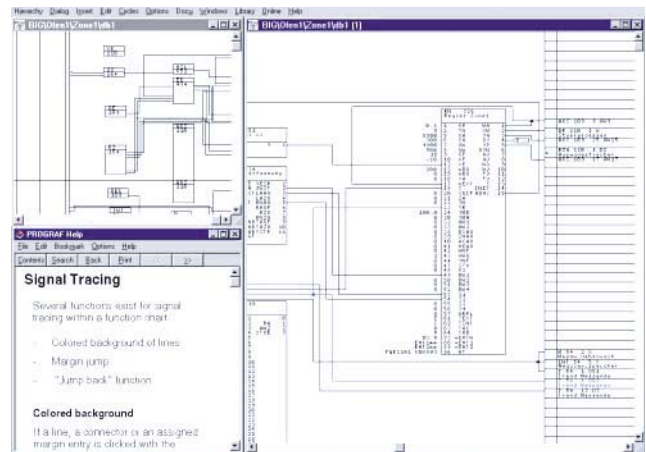
### Bus connection

PROGRAF AS+/NT supports the new N-PCI (for CS 275 system bus) and CP 5613 (for PROFIBUS-TM system bus) bus interface modules envisaged for PCI slots. The DP-5613/Windows NT 4.0, 2000 PRO/V2.1 software, Order No. 6GK1 713-5DB21-3AA0, is additionally required for the PROFIBUS-TM connection using CP 5613.

Just like PROGRAF AS+, the PROGRAF AS+/NT can also be used together with the N-AT (for CS 275 system bus) and CP 5412(A2) (for PROFIBUS-TM system bus) bus interface modules designed for ISA slots.

#### Note:

The CP 5412(A2) communications processor is still available under Order No. 6GK1 541-2BA00. You additionally require the DP-5412/NT 4.0 software, Order No. 6GK1 702-5DW52-3AA0.



### Functions

The PROGRAF AS+/NT program features the following functions:

#### Powerful graphic function diagram editor

The function diagram editor provides a hierarchical breakdown, zoom functions, and fully-automatic generation of connection lines, connectors and margins.

All standard function blocks are available as well as user function blocks generated using PROGRAF AS+/NT or read out of an automation system.

PROGRAF AS+/NT provides a breakdown into function areas, function groups and function diagrams for individual process functions in order to map hierarchical identification systems. The window system permits two pages to be displayed on the screen, e.g. in order to link function blocks from different groups.

One of the most important functions is the autorouter which rapidly and automatically draws the links between function blocks.

If a block is shifted - even onto another page - the autorouter automatically updates the connection lines, connectors and also the contents of the margins.

#### Closed data cycle

All entered user data are immediately checked by the integral database, and saved centrally. Subsequent modifications can always be read into PROGRAF AS+/NT and updated there automatically. The data thus remain consistent in both systems.

The database uses this information to automatically generate a loading sequence with instructions for the automation system. This loading sequence is transmitted to the automation system via the system bus.

It is also possible to load an AS-RAM dump read using PROGRAF AS+/NT into an AS 488/TM using the commissioning terminal, or, in the opposite direction, to read an AS-RAM dump using the commissioning terminal and to transfer this to PROGRAF AS+/NT.



# System architecture

## Engineering with PROGRAF AS+

### Configuration of customer-specific and branch-specific libraries

PROGRAF AS+/NT can be used to generate customer-specific or branch-specific libraries with elements which are used repeatedly when configuring. This is also possible for several workstations with PC network support.

These library elements include process functions, user function blocks and programs.

When storing on a server, central libraries can be produced for networked PCs, thus permitting several engineers to access the current library objects.

Special library elements in PROGRAF AS+/NT are the so-called standard diagrams with which identical or similar AS functions can be rapidly generated.

Standard diagrams are generated by transferring an individual function diagram into a library. They are automatically assigned general diagram variables. The configuring engineer can also define his own variables. The desired standard diagrams can be called from the library and assigned the respectively required data for the variables.

### Complete, automatically generated documentation

Complete documentation includes the following individual documents:

- List of contents
- Graphic documentation of block configurations (function diagrams)
- Graphic function diagrams of the STEP programs
- Structograms of the TML programs for user function blocks
- Documentation of TML and STEP programs and process display instructions in the form of lists
- Documentation of the block sequence, the blocks not inserted into the processing sequence, as well as the driver and coupling blocks in the form of lists
- Various cross-reference lists.

The documentation is independent of whether PROGRAF AS+/NT was used for configuring or whether the data have been read out of an automation system and decompiled.

Documentation of individual parts of the AS configuration is also possible.

### Central workstation for control engineer

Complete configurations, delta loading lists (only changes in configuration) and partial configurations (for test purposes) can be loaded by PROGRAF AS+/NT into the automation systems.

PROGRAF AS+/NT also permits the central exchange of AS-RAM dumps with the PC. The user data can then be read from the automation system into PROGRAF AS+/NT, stored there centrally as a file, and reloaded back into the automation system.

During the commissioning phase, PROGRAF AS+/NT is the central engineering workstation for the control engineer. A local AS configuration desktop is emulated on his monitor like with the AS 235 system (AS terminal emulation). The process variables are updated cyclically.

### Central online commissioning

with AS terminal emulation and display of dynamic values and curves directly in the function diagram editor, e.g. for optimization of control loops. Up to four process values can be displayed as curves. Parameters modified in this online mode can also be written into the database of PROGRAF AS+/NT in order to guarantee data consistency.

### Data import and export

There are external interfaces from the database: data from external planning tools can be imported into PROGRAF AS+/NT. Cross-reference data can be generated and exported in the process for the configuring tools of the OS 265-3, OS 520, OS 525 and PCS7/TM-OS operator systems.

## Technical Specifications

### Hardware requirements

- Graphics card resolution min. 1024 x 768, min. 32768 colors
- High-resolution color monitor; for ergonomic reasons we recommend a screen diagonal of at least 19 inches (49 cm)
- 3.5" diskette drive as well as a 5.25" drive for reading the AS diskettes
- PostScript laser printer.

### Software requirements

- MS Windows NT 4.0 or MS Windows 2000 or Windows XP operating system
- Note: no operating system software is included in the delivery of PROGRAF AS+/NT.

### Automation systems released for PROGRAF AS+/NT:

- AS 230, AS 230 K, AS 235, AS 235 K, AS 235 H as well as AS 388/TM and AS 488/TM automation systems
- The system software release F3.02 is required for unlimited use of PROGRAF AS+/NT with the above-mentioned AS 23x automation systems.

The following limitations otherwise apply:

- With AS 230, version B, C or D, the AS diskette format must first be converted to the format of the AS 230, version E.
- Bus-coupled operation of PROGRAF AS+/NT is not possible with AS 230/230 K, version B, C, D or E.

# System architecture

## Engineering with PROGRAF AS+

### Ordering Data

#### PROGRAF AS+/NT

comprising:

- 1 software CD with program package in German and English
- Software protection (dongle)

#### PROGRAF AS+/NT upgrade

for PROGRAF AS+, comprising software CD with program package in German and English as well as software protection (dongle)

- From version V2.x/V3.x to version V4.x
- From version V4.0 to version V4.x

#### PROGRAF AS+ Instructions (German)

#### PROGRAF AS+ Instructions (English)

#### Order No.

6DL5 255-1CX

6DL5 255-1CX00-4XX4

6DL5 255-1CX00-4XX3

C79000-G8000-C450

C79000-G8076-C450

### Accessories

#### PC components (ISA) for connection to TELEPERM M system bus

##### CP 5412 (A2) communications processor for connection to the PROFIBUS-TM bus system

comprising:

- CP 5412 (A2)
- Firmware on 3.5" diskette

Obsolescent product

##### DP-5412/NT 4.0

Configuring software for CP 5412 (A2) on CD-ROM, executes with Windows 98 and NT 4.0

Obsolescent product

#### Order No.

6GK1541-2BA00

6GK1702-5DW52-3AA0

#### PC components (PCI) for connection to TELEPERM M system bus

##### CP 5613 communications processor for connection to the PROFIBUS-TM bus system

comprising:

- CP 5613 (PCI card)
- CD-ROM with driver for Windows NT 4.0 / Windows 2000, configuration software and electronic manual

##### DP-5613/NT 4.0

Configuring software for CP 5613 on CD-ROM, executes with Windows NT 4.0 / Windows 2000

#### Order No.

6GK1 561-3AA00

6GK1 713-5DB60-3AA0

2

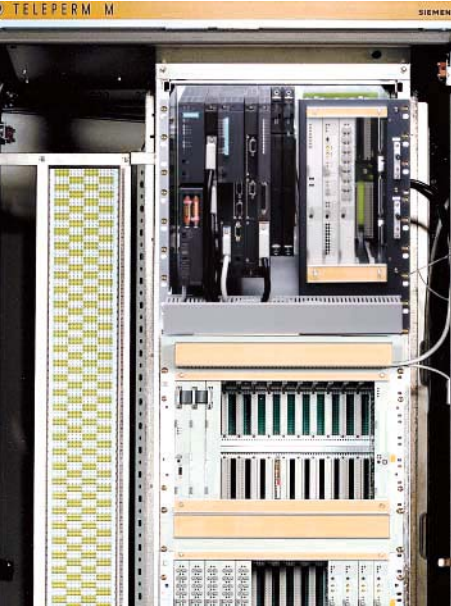
# System architecture



2

# 3

## AS 488 S Cabinet system



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3/2	Overview
3/2	Ordering data
3/2	Scope of delivery of AS 488 S systems
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# Cabinet system

## AS 488 S

### AS 488 S cabinet system



3

#### Overview

The AS 488 S cabinet system is one of four design versions of the AS 488/TM automation system.

The AS 488 S is specially designed for migration or expansion of existing TELEPERM M systems, and therefore optimized for installation in TELEPERM M cabinets with 19" packaging systems. The AS 488 S preassembled on an MIG I or MIG II migration rack is mounted on the front cabinet members of a TELEPERM M cabinet. The TELEPERM M installation guidelines are applicable with respect to the CE marking wherever TELEPERM M I/O modules are operated in an AS 488 S. On the other hand, the SIMATIC S7/M7 guidelines apply to an AS 488 S exclusively operating with distributed I/Os on the PROFIBUS-DP.

In contrast to a system order in the form of individual components (the orderer is responsible for logistics and assembly), a completely equipped and pretested AS 488 S is ordered using a single Order No. specified by the selection of defined standards. The standards differ depending on whether TELEPERM M I/O modules are used (cabinet packaging system according to TELEPERM M guidelines) or not (cabinet packaging system according to SIMATIC guidelines), and vary with respect to the type of CPU (120 MHz or 75 MHz), the power supply (DC 24 V or AC 230 V) and the migration rack (MIG I or MIG II). In addition, supplementary components and parts – including any TELEPERM M cabinets required – can be ordered as individual options as previously.

Please order any TELEPERM M cabinets required using Catalog PLT 111. You can download this catalog from the Internet.

Additional information is available in the Internet under:



[www.siemens.com/teleperm](http://www.siemens.com/teleperm)

#### Ordering Data

##### Basic cabinet system

Versions 1AA to 4AA for installation in TELEPERM M 19" cabinets according to TELEPERM M guidelines and for operation with TELEPERM M I/O modules

AS 488 S cabinet system

- DC 24 V power supply
- System software
- CPU 120 MHz
  - Migration rack II
  - Migration rack I
- CPU 75 MHz
  - Migration rack II
  - Migration rack I

##### Order No.

**6DL2 141-1AA**  
**6DL2 141-3AA**

**6DL2 141-2AA**  
**6DL2 141-4AA**

Versions 4AA to 8AA for installation in TELEPERM M 19" cabinets/racks according to SIMATIC guidelines and for operation with distributed I/Os on the PROFIBUS-DP (without TELEPERM M I/O modules)

AS 488 S cabinet system

- Migration rack I
- PROFIBUS-DP interface
- SIMATIC 19" packaging system
- System software
- CPU 120 MHz
  - AC 230 V power supply
  - DC 24 V power supply
- CPU 75 MHz
  - AC 230 V power supply
  - DC 24 V power supply

**6DL2 141-5AA**  
**6DL2 141-7AA**

**6DL2 141-6AA**  
**6DL2 141-8AA**

#### Scope of delivery of AS 488 S systems

The complete Order Nos. defined above contain the following components:

##### Basic system

- SIMATIC M7 CPU 486-3 (CPU alternative 1)  
CPU 486-3 with 75 MHz Pentium processor and 2 slots for interface modules; width: 2 standard slots
- SIMATIC M7 CPU 488-3 (CPU alternative 2)  
CPU 488-3 with 120 MHz Pentium processor and 2 slots for interface modules; width: 2 standard slots
- Memory modules for CPU 486-3 or CPU 488-3, integrated, 2 x 8 Mbyte; 3.3 V
- Expansion and interface modules:
  - 1 x IF 961-DIO digital I/O module for I & C signalling functions
  - 1 x IF 962-COM serial interface module for commissioning terminal, with two RS 232 interfaces



# Cabinet system AS 488 S

## AS 488 S cabinet system

### Power supply

- AS 488 S systems, versions 1, 2, 3 and 4, for operation with TELEPERM M I/O modules
  - PS 405 load power supply, 20 A, TELEPERM M packaging system
    - Input: DC 24 V, output: DC 24 V/DC 5 V, 20 A, width: 3 standard slots
  - 2 backup batteries type AA; 3.6 V; 1.9 Ah (for buffering of time)
- AS 488 S systems, versions 5 and 6, with PROFIBUS-DP, for operation without TELEPERM M I/O modules; AC 230 V power supply, 19" packaging system
  - PS 407 load power supply, 10 A
    - Input: AC 230 V, output: DC 5 V, 10 A, width: 2 standard slots
  - 2 backup batteries type AA; 3.6 V; 1.9 Ah (for buffering of time)
- AS 488 S systems, versions 7 and 8, with PROFIBUS-DP, for operation without TELEPERM M I/O modules; DC 24 V power supply, 19" packaging system
  - PS 405 load power supply, 10 A
    - Input: DC 24 V, output: DC 24 V/DC 5 V, 10 A, width: 2 standard slots
  - 2 backup batteries type AA; 3.6 V; 1.9 Ah (for buffering of time)

### Packaging system/migration racks

- MIG II migration rack for AS 488 S (design alternative 1, system versions 1 and 2) with integral UR2 rack, 5 slots for TELEPERM M I/O modules
- MIG I migration rack for AS 488 S (design alternative 2, system versions 3 to 8) with integral UR2 rack, without TELEPERM M I/O slots

### TELEPERM M I/Os connection, with versions 1 to 4 (migration racks I and II)

- Connection of TELEPERM M I/Os to AS 488 S versions 1 to 4, comprising:
  - TPM 478-1 interface module (1 x for TELEPERM M I/Os and for connection to CS 275)
  - TBX 478 interface module, for connection of TELEPERM M I/O buses

### Cables for connection of two I/O buses with versions 1 and 2

- Set of ribbon cables for two I/O buses with 3 or 2 slots: for AS 488 S versions 1 and 2 (with migration rack II)

### Connection of distributed I/Os to PROFIBUS-DP, with versions 5 to 8 (migration rack I)

- Connection of PROFIBUS-DP I/Os to AS 488 S versions 5 to 8, comprising:
  - EXM 478 interface module, for connection of PROFIBUS-DP interferences (max. 2), e.g. ET 200M
  - 1 x PROFIBUS IF 964-DP interface module, for DP 1

### Connection to CS 275 system bus with versions 5 to 8

- Connection to TELEPERM M CS 275 system bus, comprising:
  - TPM 478-1 interface module (1 x for TELEPERM M I/Os and for connection to CS 275)

### System software

- AS 488/TM system software, comprising:
  - Function blocks, TML and STEP M on memory card, storage capacity 8 Mbyte (user memory 4 Mbyte)
  - Commissioning terminal software for PC/programming device on 3.5" diskette (DOS and NT versions)

# Cabinet system

## AS 488 S

### AS 488 S cabinet system

#### Accessories

	Order No.
<b>Hardware options</b>	
<b>Cable for connection of a commissioning terminal PC</b>	
• 5 m long	6ES7 902-1AB00-0AA0
• 10 m long	6ES7 902-1AC00-0AA0
<b>Set of ribbon cables for I/O bus with 5 slots</b>	C79451-A3496-D1
For AS 488 S as alternative for versions 1, 2 (with migration rack II) or as supplement for migration rack I	
<b>Set of ribbon cables for two I/O buses with 3 + 2 = 5 slots</b>	C79451-A3496-D2
For AS 488 S with migration rack II or as supplement for migration rack I (component of versions 1 and 2)	
<b>Software options</b>	
<b>Service package for AS 488/TM system software, version M01.X/M02.X,</b>	6DS2 410-0XX00-0XC2
including ASBEDIEN commissioning terminal software (German/English) and associated handling instructions	
<b>Applications/expansions for PROFIBUS-DP</b>	C79451-A3496-D900
DP expansions, documentation, driver SW	
<b>AS 488/TM-Doku-Plus, English</b>	C79451-A3496-D901
Supplementary English documentation on diskette	
<b>ASx88/TM-AUSLAST,</b>	C79451-A3496-D902
workload measurement on AS 488/TM with ZEIT program for downloading	
<b>PROFIBUS-AG/AG coupling</b>	6DS5 124-1AA
Coupling software for downloading	
<b>SIWAREX M driver</b>	6DS5 470-1AD
SIWA block, software for downloading	
<b>PROFIBUS-PA full license</b>	6DS5 130-8AA
Coupling package, software for downloading	
<b>PROFIBUS-PA partial license</b>	6DS5 130-8AB
Coupling package, software for downloading	

#### Accessories

	Order No.
<b>System documentation</b>	
<b>Supplementary system documentation for AS 488/TM</b>	
• Manual, German	C79000-G8000-C700
• Manual, English	C79000-G8076-C700
<b>Automation system, system software version G</b>	
• Description, German	C79000-G8000-C416
• Description, English	C79000-G8076-C416
<b>Information and guidelines for planning, installation and operation</b>	
• Manual, German	C79000-G8000-C417
• Manual, English	C79000-G8076-C417
<b>Options for expansion with interfaces for PROFIBUS-DP1, -DP2, -AG/AG and -TM</b>	
<b>EXM 478 expansion module</b>	6ES7 478-2AC00-0AC0
for 3 IF interface modules	
<b>PROFIBUS IF 964-DP interface module</b>	6ES7 964-2AA01-0AB0
for PROFIBUS-DP, PROFIBUS-AG/AG, PROFIBUS-TM	
<b>Connecting cables and accessories for PROFIBUS</b>	See Section "Bus communication" - "PROFIBUS-TM" and Catalog IK PI
<b>Bus components and options for CS 275</b>	
<b>AS cables for 20-m local bus, remote bus cable and accessories</b>	See Section "Bus communication" - "CS 275" and Catalog PLT 130
<b>Connection distributor for 20-m local bus,</b>	6DS9 207-8AA
e.g. for migrated AS 220/230 systems	
<b>Packaging system</b>	
<b>TELEPERM M 19" cabinets</b>	See Catalog PLT 111

# 4

## AS 488 K Compact system



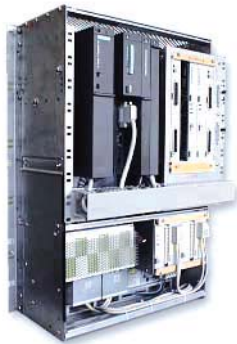
4/2	<b>AS 488 K compact system</b>
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4/2	Ordering data
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4/3	Accessories

# Compact system

## AS 488 K

### AS 488 K compact system

#### Overview



The AS 488 K compact system is a design version of the AS 488/TM automation system which is compatible with the previous AS 235 K system. With this design version, the AS 488/TM is integrated in a MIG K compact migration rack corresponding to the compact rack of the AS 235 K. The MIG K migration rack is shielded by a metal plate at the rear, and can be fitted in a TELEPERM M wall housing (mounted at rear) or in 19" cabinets (mounted on front members). It provides five slots for TELEPERM M I/O modules, three of which are assigned to I/O bus A and two to I/O bus B. A line with up to four ES 100 K extension systems can be operated on each of these I/O buses via serial interface modules - analogous to the AS 235 K.

In contrast to a system order in the form of individual components (the orderer is responsible for logistics and assembly), a completely equipped and pretested AS 488 K is ordered using a single Order No. specified by the selection of defined standards. The standards differ with respect to the power supply (DC 24 V or AC 230 V) and the type of CPU (120 MHz or 75 MHz). In addition, supplementary components and parts – including any TELEPERM M wall housings or cabinets required – can be ordered as individual options.

Please order any TELEPERM M wall housings or cabinets required using Catalog PLT 111. You can download this catalog from the Internet.

Additional information is available in the Internet under:



[www.siemens.com/teleperm](http://www.siemens.com/teleperm)

#### Ordering Data

	Order No.
<b>Compact basic system</b> Versions 1AA to 4AA in TELEPERM M compact design and for operation with TELEPERM M I/O modules  AS 488 K compact system <ul style="list-style-type: none"> <li>• 5 I/O slots</li> <li>• System software</li> </ul>	<b>6DL2 140-1AA</b> <b>6DL2 140-3AA</b>
<ul style="list-style-type: none"> <li>• CPU 120 MHz               <ul style="list-style-type: none"> <li>- AC 230 V power supply</li> <li>- DC 24 V power supply</li> </ul> </li> </ul>	
<ul style="list-style-type: none"> <li>• CPU 75 MHz               <ul style="list-style-type: none"> <li>- AC 230 V power supply</li> <li>- DC 24 V power supply</li> </ul> </li> </ul>	<b>6DL2 140-2AA</b> <b>6DL2 140-4AA</b>

#### Scope of delivery of AS 488 K systems

The complete Order Nos. defined above contain the following components:

##### Basic system

- SIMATIC M7 CPU 486-3 (CPU alternative 1)  
CPU 486-3 with 75 MHz Pentium processor and 2 slots for interface modules; width: 2 standard slots
- SIMATIC M7 CPU 488-3 (CPU alternative 2)  
CPU 488-3 with 120 MHz Pentium processor and 2 slots for interface modules; width: 2 standard slots
- Memory modules for CPU 486-3 or CPU 488-3, integrated, 2 x 8 Mbyte; 3.3 V
- Expansion and interface modules:
  - 1 x IF 961-DIO digital I/O module for I & C signalling functions
  - 1 x IF 962-COM serial interface module for commissioning terminal, with two RS 232 interfaces

##### Power supply

- AS 488 K systems, DC 24 V or AC 230 V power supply:
  - PS 405 load power supply, 10 A  
Input: DC 24 V, output: DC 24 V/DC 5 V, 10 A, width: 2 standard slots
  - 2 backup batteries type AA; 3.6 V; 1.9 Ah (for buffering of time)
- AS 488 K system, AC 230 V power supply:  
plus integral PS SITOP POWER load power supply, 24 V/10 A as standard  
Input: AC 230 V, output: DC 24 V, 10 A

##### Packaging system/migration racks

- MIG K compact migration rack for AS 488 K (design alternative 1)
  - With integral UR2 rack, 5 slots for TELEPERM M I/O modules
  - With integral AC 230 V/DC 24 V power supply, 6EP1 334-1AL11
- MIG K compact migration rack for AS 488 K (design alternative 2)
  - With integral UR2 rack, 5 slots for TELEPERM M I/O modules
  - With DC 24 V power supply

# Compact system

## AS 488 K

### AS 488 K compact system

#### TELEPERM M I/Os connection

- Connection of TELEPERM M AS I/Os to 488 K, comprising:
  - TPM 478-1 interface module (1 x for TELEPERM M I/Os and for connection to CS 275)
  - TBX 478 interface module, for connection of TELEPERM M I/O buses
  - Set of ribbon cables for I/O buses with 3 or 2 slots

#### Connection to CS 275 system bus

- TPM 478-1 interface module (1 x for TELEPERM M I/Os and for connection to CS 275; see under TELEPERM I/Os connection)
- CS 275 compact cable for connection of AS 488 K to the integral local bus island with redundant CS 275; preassembled, two UI connectors

Note: further CS 275 bus components such as bus converters UI, remote bus connection board AF etc. are not part of the delivery (can be ordered as options).

#### System software

- AS 488/TM system software, comprising:
  - Function blocks, TML and STEP M on memory card, storage capacity 8 Mbyte (user memory 4 Mbyte)
  - Commissioning terminal software for PC/programming device on 3.5" diskette (DOS and NT versions)

#### Accessories

	Order No.
<b>Hardware options</b>	
<b>Cable for connection of a commissioning terminal PC</b>	
• 5 m long	6ES7 902-1AB00-0AA0
• 10 m long	6ES7 902-1AC00-0AA0
<b>Software options</b>	
<b>Service package for AS 488/TM system software, version M01.X/M02.X,</b>	6DS2 410-0XX00-0XC2
including ASBEDIEN commissioning terminal software (German/English) and associated handling instructions	
<b>Applications/expansions for PROFIBUS-DP</b>	C79451-A3496-D900
DP expansions, documentation, driver SW	
<b>AS 488/TM-Doku-Plus, English</b>	C79451-A3496-D901
Supplementary English documentation on diskette	
<b>ASx88/TM-AUSLAST,</b>	C79451-A3496-D902
workload measurement on AS 488/TM with ZEIT program for downloading	
<b>PROFIBUS-AG/AG coupling</b>	6DS5 124-1AA
Coupling software for downloading	
<b>SIWAREX M driver</b>	6DS5 470-1AD
SIWA block, software for downloading	
<b>PROFIBUS-PA full license</b>	6DS5 130-8AA
Coupling package, software for downloading	
<b>PROFIBUS-PA partial license</b>	6DS5 130-8AB
Coupling package, software for downloading	



# Compact system

## AS 488 K

### AS 488 K compact system

#### Accessories

	Order No.
<b>System documentation</b>	
<b>Supplementary system documentation for AS 488/TM</b>	
• Manual, German	<b>C79000-G8000-C700</b>
• Manual, English	<b>C79000-G8076-C700</b>
<b>Automation system, system software version G</b>	
• Description, German	<b>C79000-G8000-C416</b>
• Description, English	<b>C79000-G8076-C416</b>
<b>Information and guidelines for planning, installation and operation</b>	
• Manual, German	<b>C79000-G8000-C417</b>
• Manual, English	<b>C79000-G8076-C417</b>
<b>Options for expansion with interfaces for PROFIBUS-DP1, -DP2, -AG/AG and -TM</b>	
<b>EXM 478 expansion module</b>	<b>6ES7 478-2AC00-0AC0</b>
for 3 IF interface modules	
<b>PROFIBUS IF 964-DP interface module</b>	<b>6ES7 964-2AA01-0AB0</b>
for PROFIBUS-DP, PROFIBUS-AG/AG, PROFIBUS-TM	
<b>Connecting cables and accessories for PROFIBUS</b>	See Section "Bus communication" - "PROFIBUS-TM" and Catalog IK PI
<b>Bus components and options for CS 275</b>	
<b>Bus components for single CS 275</b>	<b>1 x each</b>
• Bus converter UI with coaxial cable	<b>6DS4 400-8AB</b>
• Connection board AF with terminating resistor (required for UI)	<b>6DS9 203-8CA</b>
These components are not included in the scope of delivery of the AS 488 K. They are usually already present when migrating.	
<b>Bus components for redundant CS 275</b>	<b>2 x each</b>
• Bus converter UI with coaxial cable	<b>6DS4 400-8AB</b>
• Connector board AF with terminating resistor (required for UI)	<b>6DS9 203-8CA</b>
These components are not included in the scope of delivery of the AS 488 K. They are usually already present when migrating.	
<b>AS cables for 20-m local bus, remote bus cable and accessories</b>	See Section "Bus communication" - "CS 275" and Catalog PLT 130
<b>Connection distributor for 20-m local bus</b>	<b>6DS9 207-8AA</b>
<b>Packaging system</b>	
<b>TELEPERM M 19" cabinets and TELEPERM M wall housing</b>	See Catalog PLT 111

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# 5

## AS 488 in SIMATIC design



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5/10	System software
5/10	Documentation



# AS 488 in SIMATIC design Introduction

## AS 488/TM



### Overview

The AS 488 automation system comprises:

- CPU 486-3/488-3 with memory modules, memory card and interface modules for commissioning, diagnostics and I & C monitoring
- DC 24 V power supply (standard); a module for AC 120/230 V can be inserted as an option (the AC 120/230 V power supply is only possible if no TELEPERM M I/O modules are used)
- One or two EXM 478 extension modules (depending on system design and configuration) with IF 964-DP interface modules for connection of ET 200 distributed I/Os (one or two lines) and the PROFIBUS-TM system bus (PROFIBUS-TM and CS 275 local bus can only be connected as alternatives) and for the PLC/PLC coupling
- TPM 478 as additional option in conjunction with a further TBX 478 module, located between the DC 24 V power supply module and the CPU, for connection of up to seven I/O units with I/O modules of the TELEPERM M process control system
- As an alternative to the PROFIBUS-TM, the CS 275 system bus can also be connected via the TPM 478 module.

### Technical Specifications

#### System configuration

Basic system	SIMATIC M7-400 with CPU 486-3 (75 MHz Pentium), rack and AC or PC power supply module
Extensions	IF 961-DIO, IF 962-COM, IF 964-DP (max. 4), EXM 478 (max. 2), TPM 478 and TBX 478 interface modules
Option	CPU 488-3 as alternative (120 MHz Pentium)

#### Power supply

Supply voltage	Current consumption	Dissipated power
AC 120/230 V, 10 or 20 A	0.8 to 2.5 A	45 to 60 VA
DC 24 V, 10 or 20 A	1.5 to 4.5 A	45 to 60 W
Backup battery for time/date	2 Li batteries type AA: 3.6 V, 1.9 Ah	
Maintenance cycle	2 years	

#### System data

##### TELEPERM M I/Os

• Function modules, arithmetic modules	Yes
• Signal modules	Yes
• Counter modules	Yes
• Coupling modules	Yes
• Max. number of TELEPERM M extension units	7
• Max. number of ES 100 K extension systems	Max. 1 in addition
Distributed I/Os	Max. 2 x 122 units (stations)
Transfer data	Max. 122 byte in/out per station

##### ET 200M

• Function modules	Yes, e.g. counters, SIWAREX M (option)
• Signal modules	Yes
• Counter modules	Yes
• Coupling modules	Yes, e.g. IM 157 (PROFIBUS-PA), CP 340 (RS 232), CP 343-2 (AS-I), CP 342-5 (DP slave interface)

##### ET 200S

• Function modules	Yes, e.g. counters Required special drivers on request <sup>1)</sup>
• Signal modules	Yes
• Coupling modules	Yes

##### ET 200iS (available soon)

• Function modules	Yes, e.g. counters Required special drivers on request <sup>1)</sup>
• Signal modules	Yes
• Coupling modules	Yes

##### ET 200X

• Signal modules	Yes
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# AS 488 in SIMATIC design Introduction

AS 488/TM

## Coupling to other systems with DP interface

• SIMATIC S7 CPU 315-2 DP	When using floating-point numbers, see supplementary package "DP extensions for AS x88/TM"
• SIMATIC S7 CPU 316-2 DP	When using floating-point numbers, see supplementary package "DP extensions for AS x88/TM"
• SIMATIC S7 CPU 318-2 DP	When using floating-point numbers, see supplementary package "DP extensions for AS x88/TM"
• SIMATIC S7 CP 340	When using floating-point numbers, see supplementary package "DP extensions for AS x88/TM"
• DP/DP coupler	When using floating-point numbers, see supplementary package "DP extensions for AS x88/TM"
• S5-95	When using floating-point numbers, see supplementary package "DP extensions for AS x88/TM"
• S5-95F	

## Coupling to PROFIBUS-PA

• Coupling of PA devices using DP/PA coupler	Max. 122 stations on 45.45 kbit/s DP bus Special drivers required; see supplementary package "Connection of PROFIBUS-PA to AS x88/TM"
• Coupling of PA devices using DP/PA link	Max. 122 links; up to 10 or 30 PA devices can be connected per DP/PA link depending on the device type Special drivers required; see supplementary package "Connection of PROFIBUS-PA to AS x88/TM"

## Coupling to intelligent DP field devices and to DP devices from other vendors

• SIPART DRxx controller	Required special drivers on request <sup>1)</sup>
• SIMOCODE motor control	Required special drivers on request <sup>1)</sup>
• SIMOVERT converter	Required special drivers on request <sup>1)</sup>
• I.S.1 field stations from Stahl	Required special drivers on request <sup>1)</sup>
• Analog modules from CEAG	Required special drivers on request <sup>1)</sup>
• ACS 600 frequency converter	Required special drivers on request <sup>1)</sup>

## ET 200U

• Function modules	Yes, controllers
• Signal modules	Yes
• Coupling modules	Yes

## ET 200B

• Signal modules	Yes
------------------	-----

## Quantity breakdown

Automation performance	Approx. 150 % or 270 to 300 % of AS 235 automation system performance depending on CPU
Memory for user-specific applications	4 Mbyte
Typical quantity breakdown data	
• Number of control loops	45 to 120
• Additional analog value monitoring	45 to 180
• Sequential controls	8 to 20
• Logic controls	150 to 370

## Redundancy

AS 488/TM CPU	No
CS 275	Yes, as option
PROFIBUS-TM, PROFIBUS-DP	Yes, with OLM P/G12 optical link module

## Configuring

Tools	PROGRAF AS+/NT, commissioning terminal software, COM PROFIBUS
Connection	PROGRAF AS+/NT via PROFIBUS-TM/CS 275, commissioning terminal software via COM1 interface of IF 962-COM interface module

## Ambient conditions

Degree of protection to EN 60 529	IP 20
Permissible ambient temperature	
• Operation (horizontal installation)	0 to 60 °C
• Transport and storage	-40 to +70 °C
Permissible relative humidity	5 to 95 %
Operation without fans	Yes
Electrical isolation	
• On PROFIBUS-TM	Yes
• On PROFIBUS-DP	Yes

## Design

Dimensions (H x W x D) in mm	
With SIMATIC S7/M7 rack	290 x 240 x 220 (plus plug)
With migration rack	380 x 483 x 273

1) Required special drivers on request from Roland.Heid@siemens.com, Tel. +49 721 595-6380, Fax. +49 721 595-6383

All modules configurable with COM PROFIBUS can be connected via PROFIBUS-DP, and are recorded in the process image of the AS 488/TM system.

## Further requirement:

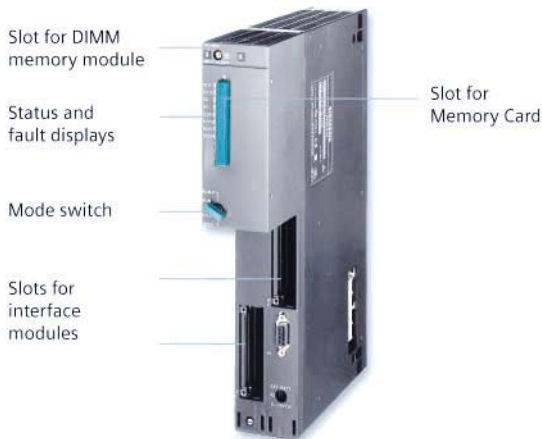
The data interface of a station on the PROFIBUS-DP fieldbus must be described. Please contact our support line for driver blocks for other DP devices from the SIMATIC range or from other Siemens Groups or also from other vendors:

SupportLine,  
Tel. +49 180 5050 222,  
Fax +49 180 5050 223,  
E-mail: adsupport@siemens.com.



# AS 488 in SIMATIC design

## Central processing unit



### Overview

#### CPU 486-3

The CPU 486-3 is equipped with an Intel 75-MHz Pentium processor. The performance is equivalent to the computing power of an AS 235 multiplied by a factor of 1.5.

The front of the robust, compact plastic housing contains:

- LEDs for status and fault displays
- Mode switch
- Slot for a memory card from which the system and application software is loaded into the main memory during startup
- 2 slots for interface modules.

#### CPU 488-3

The CPU 488-3 is equipped with an Intel 120-MHz Pentium processor. The performance of this CPU is approximately equivalent to the computing power of an AS 235 multiplied by a factor of 2.7 to 3. It is used as an alternative to the CPU 486-3, and is fully compatible with respect to hardware configuration, engineering and execution of the system and application software without further measures.

The front of the robust, compact plastic housing contains:

- LEDs for status and fault displays
- Mode switch
- Slot for a memory card from which the system and application software is loaded into the main memory during startup
- 2 slots for interface modules.

#### Memory module (set with 2 x 8 Mbyte)

The CPUs 486-3 and 488-3 of the AS 488 automation system (and the CS-L2 bridge) are delivered with an integral main memory (RAM). The memory module used as the main memory is a set of 2 x 8-Mbyte RAMs. A complete set must always be inserted. 4 Mbyte are available as the user memory.

### I & C monitoring

The IF 961-DIO interface module for digital input/output is used for I & C monitoring functions. It is inserted into the EXM 478-3 module in the CPU 486-3/488-3 of the AS 488 automation system. The IF 961-DIO module can be used to record I & C signals e.g. for:

- Door contact
- Overtemperature
- Monitoring of optical link module OLM

or to trigger a cabinet lamp or horn.

Line monitoring, e.g. to detect an open-circuit, is not possible.

The inputs and outputs have an electrically isolated design. The module electronics (ASIC) is protected against overvoltages by appropriate measures on the circuit.

The digital inputs comprise 8 channels arranged in groups of 4 x 2 channels. The current consumption is 8.4 mA with an input level of DC 24 V.

An input delay of 500 µs or 3 ms can be parameterized for all input channels together.

Possible cable lengths:

- Unscreened 200 m (with 500 µs) or 600 m (with 3 ms)
- Screened 1000 m.

The digital outputs also comprise 2 x 4 channels. The max. output current is 100 mA with DC 24 V. The outputs are protected against short-circuits by an electronic fuse.

A 25-contact Sub-D socket is used as the interface.

### IF 962-COM serial interface module

The IF 962-COM interface module is required to connect a commissioning terminal to an AS 488/TM automation system and to the CS-L2 bridge. The interface module is plugged into a prepared slot in the CPU 486-3/488-3.

### Ordering Data

	Order No.
<b>CPU 486-3</b> with 75 MHz Pentium processor, 2 slots for interface modules, 2 standard slots wide	<b>6ES7 486-3AA00-0AB0</b>
<b>CPU 488-3</b> with 120 MHz Pentium processor, 2 slots for interface modules, 2 standard slots wide	<b>6ES7 488-3AA00-0AB0</b>
<b>IF 961-DIO interface module</b> Digital input/output for I & C monitoring functions	<b>6ES7 961-1AA00-0AC0</b>
<b>IF 962-COM serial interface module</b> for commissioning terminal, with two RS 232 interfaces	<b>6ES7 962-3AA00-0AC0</b>



# AS 488 in SIMATIC design

## Power supply modules



### Overview

#### PS 405 and PS 407 load power supplies

The modules of the AS 488/TM automation system are provided with the DC 5 V and DC 24 V operating voltages from the PS 405 and PS 407 power supply modules via the backplane bus.

A PS 407 power supply module (for AC 120/230 V; only for operation without TELEPERM M I/O modules) or a PS 405 power supply module (for DC 24 V) is required depending on the input voltage.

The power supply module is inserted on the left in the rack. It is fitted in a casing and is cooled by natural convection. The front of the module contains:

- LEDs for display of correct output voltages, correct backup battery voltage and internal faults
- Button for acknowledgment of faults
- On/off switch for output voltages
- Battery compartment (hidden) for backup battery
- Switch (hidden) for activation of battery monitoring
- Mains voltage selector (hidden) for AC 120/230 V
- Mains connection (hidden) with 3-pin plug.

The DC 24 V load power supplies are each available in 10-A and 20-A versions. The 20-A version is only required in conjunction with TELEPERM M I/O modules.

The AC 120/230 V load power supply must not be used together with TELEPERM M I/O modules.

#### Backup battery

A backup battery is additionally required for the AS 488/TM automation system. The PS 405 and PS 407 load power supplies are fitted with a battery compartment. If the power supply fails, the time and date in the CPU are buffered.

### Ordering Data

	Order No.
<b>PS 405 load power supply</b> DC 24 V; DC 5 V, 24 V • PS 405, 10 A, 2 slots wide • PS 405, 20 A, 3 slots wide	<b>6ES7 405-0KA01-0AA0</b> <b>6ES7 405-0RA01-0AA0</b>
<b>PS 407 load power supply</b> AC 120/230 V; DC 5 V, 24 V • PS 407, 10 A, 2 slots wide	<b>6ES7 407-0KA01-0AA0</b> <b>6ES7 971-0BA00</b>
<b>Backup battery</b> Type AA (for time and date), 3.6 V; 1.9 Ah (1 unit)	

# AS 488 in SIMATIC design

## Connection of distributed I/Os



EXM 478



### Overview

All versions of the AS 488/TM automation system can be operated with distributed process I/Os on the PROFIBUS-DP. The PROFIBUS-DP fieldbus is standardized according to EN 50 170, Part 3. It permits communication between the automation systems and distributed I/O devices from the ET 200 range, simple DP-oriented operation and monitoring devices, as well as PROFIBUS field devices conforming to the standard.

In addition to the ET 200 M I/O devices specially tailored for process engineering with a wide selection of signal and function modules from the SIMATIC S7-300 range, it is also possible to use SIMATIC ET 200B, ET 200S, ET 200iS (available soon), ET 200X or ET 200U (no longer actively marketed) systems as process I/Os on PROFIBUS-DP. When using the DP interfaces integrated in the CPU modules of the SIMATIC S7-300, it is also possible to implement a simple slave connection to the AS 488/TM. Gateway modules on the PROFIBUS-DP (DP/PA link, DP/AS-i link, DP/DP coupler) additionally permit access to the PROFIBUS-PA and AS-I fieldbuses and to the I/O buses of SIMATIC PCS 7, S7-300, S7-400 or systems from other vendors.

Up to 122 stations can be connected via each of the two physically isolated lines of the PROFIBUS-DP to an AS 488/TM automation system. The AS 488/TM functions in this case as the master. Data transmission is possible via a two-wire cable or fiber-optic cable.

Each of the two PROFIBUS-DP lines is connected to the AS 488/TM via an IF 964-DP interface module inserted in the EXM 478 extension module.

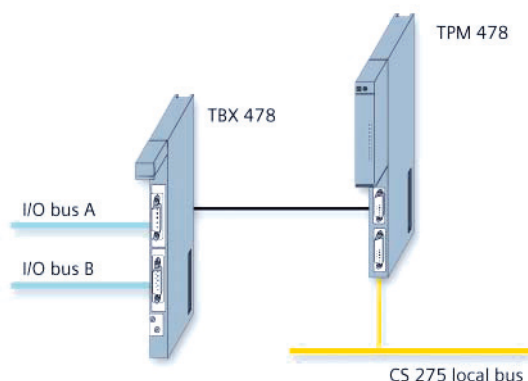
The second PROFIBUS-DP line is optional. To activate the AS interface for the second PROFIBUS-DP line, DP2-INI initialization must be loaded onto the memory card with the system software using the commissioning terminal. The DP2-INI initialization must be ordered separately on a 3.5-inch diskette.

### Ordering Data

	Order No.
<b>EXM 478 expansion module</b> to accommodate 3 interface modules	<b>6ES7 478-2AC00-0AC0</b>
<i>Required 1 x for each of the max. 2 DP lines with electrical version of PROFIBUS-DP:</i>	
<b>IF 964-DP interface module</b>	<b>6ES7 964-2AA01-0AB0</b>
<i>Required 1 x for each of the max. 2 DP lines with fiber-optic cable version of PROFIBUS-DP:</i>	
<b>IF 964-DP interface module</b>	<b>6ES7 964-2AA01-0AB0</b>
<b>OLM/G12 optical link module</b>	<b>6GK1 502-3CB10</b>
<b>Connecting cable 830-1 for PROFIBUS, 3 m</b>	<b>6XV1 830-1CH30</b>
<i>Additionally required for 2nd DP line (can be repeatedly used):</i>	
<b>DP2-INI initialization</b> 3.5-inch diskette with initialization files and documentation in German and English	<b>C79451-A3496-D900</b>

## AS 488 in SIMATIC design

### Connection to TELEPERM M I/Os



#### Ordering Data

	Order No.
<b>TPM 478 interface module</b> for connection to CS 275 and for TELEPERM M I/Os	<b>6ES7 478-2DA01-0AC0</b>
<b>TBX 478 interface module</b> for connection to TELEPERM M I/Os (I/O bus A/B)	<b>6ES7 478-2DX00-0AA0</b>

#### Overview

Together with the TPM 478 interface module, the TBX 478 interface module connects the I/O modules of the TELEPERM M process control system to the AS 488/TM system.

The following interfaces are present on the TBX 478 module:

- Interface to TPM 478 module for implementation of the two TELEPERM M I/O buses A and B
- Two interfaces connected via cables to the rear of the migration rack for connection of the I/Os in the basic cabinet (I/O bus A) and extension cabinet (I/O bus B), with use of the I/O slots of the MIG II migration rack
- Interface for "+5 V bus" for supply of the TELEPERM M extension units (cabinet connections)
- Interface to backplane bus for supply of "+5 V bus" from the power supply module of the automation system.

The TBX 478 module need not be parameterized. It is provided with data from the TPM 478 module.

The configuration parameters for the I/O area are defined by the PROGRAF AS+/NT configuring tool and the SYST.WART maintenance block and subsequently saved permanently on the memory card by archiving. The new or modified parameters are activated during the next restart.

The TPM 478 interface module is not only required for connection of the TELEPERM M I/Os to the AS 488/TM, but also for connection of the AS 488/TM and the CS-L2 bridge to the CS 275 system bus. However, only one TPM 478 module is required for both functions (see also "Connection to CS 275").

# AS 488 in SIMATIC design

## Connection to CS 275 Connection to PROFIBUS-TM

### Connection to CS 275

#### Overview

The AS 488/TM and the CS-L2 bridge can be connected to the CS 275 bus system via the TPM 478 interface module. Two functions are integrated on this interface module:

- **CS 275 functionality**  
A powerful CPU processes the communications functions to the CS 275 bus system. The functionality of the TPM 478 interface module corresponds to the functionality of the standard N-AS local bus interface module in the AS 235 automation system. Exception: CD operation is not supported.  
Note:  
An AS 488/TM automation system can only be connected to one of the two PROFIBUS-TM or CS 275 system buses.

- **TELEPERM I/O functionality**  
In the AS 488/TM automation system, the TPM 478 module together with the TBX 478 module also provides the interfacing for the TELEPERM M I/Os. The two modules provide two I/O bus interfaces for TELEPERM M basic and extension cabinets, and supply the I/O bus logic with +5 V bus.

Only one TPM 478 module is required for both the CS 275 and TELEPERM M functionalities.

#### Ordering Data

	Order No.
<b>TPM 478 interface module</b> for connection to CS 275 and for TELEPERM M I/Os	<b>6ES7 478-2DA01-0AC0</b>

### Connection to PROFIBUS-TM

#### Overview

See Section "Process I/Os" for components for connection of distributed process I/Os such as the IF 964-DP interface module, optical link module for fiber-optic cables etc. via PROFIBUS-DP.

See Section "Bus communication" for components for connection of the CS 275 and PROFIBUS-TM system buses.

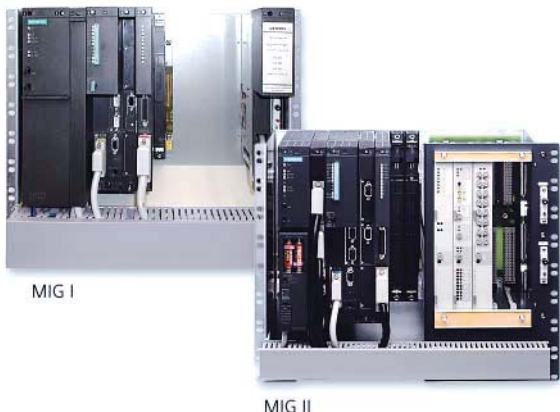
See Sections "Coupling of systems" and "Bus communication" for components for connection of the PROFIBUS-AG/AG for coupling with SIMATIC S5 and SIMATIC S7 automation systems.

#### Ordering Data

	Order No.
<i>With electrical version of PROFIBUS-DP:</i> <b>IF 964-DP interface module</b>	<b>6ES7 964-2AA01-0AB0</b>
<i>With glass fiber-optic cable version of PROFIBUS-DP: Preferably for redundancy, EMC problems, or longer distances</i> <b>IF 964-DP interface module</b>	<b>6ES7 964-2AA01-0AB0</b>
<b>OLM/G12 optical link module</b>	<b>6GK1 502-3CB10</b>
<b>Connecting cable 830-1 for PROFIBUS, 3 m</b>	<b>6XV1 830-1CH30</b>
<i>If a slot is not available for the IF 964-DP, order in addition:</i> <b>EXM 478 expansion module</b> to accommodate 3 interface modules	<b>6ES7 478-2AC00-0AC0</b>

# AS 488 in SIMATIC design

## Packaging system



### Overview

#### UR2 rack

The UR2 universal rack is the mechanical support for the AS 488 automation system. It accommodates the system modules (CPU, load power supply, EXM 478, TPM 478 and TBX 478), provides the modules with operating voltages, and links the individual modules via the backplane bus.

The rack comprises:

- Aluminium support rails with threaded bolts for securing the modules, and cut-outs at the side for assembly of the rack
- Plastic parts as guide when swinging in the modules
- Connection for protective earth conductor
- Backplane bus with plug connectors.

#### Migration rack

An AS 488/TM system can be installed in an existing TELEPERM M cabinet by using an MIG I or MIG II migration rack.

The MIG I migration rack (simple version) is designed using 19" technology and equipped with the SIMATIC S7-400 backplane bus to accommodate the AS 488/TM system modules (power supply, CPU and interface modules). Its dimensions correspond to those of the basic subrack of the TELEPERM M automation system to be migrated, and can be fitted instead of the latter in the TELEPERM M cabinet. Existing extension units with TELEPERM M I/O modules can be connected using ribbon cables.

The MIG II migration rack (extended version) is also designed using 19" technology, and integrates the AS 488/TM system modules in the same manner as the MIG I migration rack. It additionally contains 5 slots for I/O modules which can be optionally set for slot addressing. As with the AS 235, these I/O slots are wired using wire-wrap connections at the rear. Existing extension units with TELEPERM I/O modules are connected to the rear of the right-hand migration rack panel using ribbon cable interfaces for I/O buses A and B.

The ability to accommodate up to 5 I/O modules and to set slot addressing for these modules means that the MIG II migration subrack is the first choice for migration of TELEPERM M automation systems.

### Ordering Data

	Order No.
<b>UR2 rack</b> for design of an AS 488 automation system, 9 slots  <i>For installation of an AS 488 in a TELEPERM M cabinet:</i>	<b>6ES7 400-1JA01-0AA0</b>
<b>MIG I migration rack</b> with preassembled 19-inch UR2 rack	
<b>MIG II migration rack</b> with preassembled 19-inch UR2 rack; plus 5 TELEPERM M I/O slots	





# AS 488 in SIMATIC design

## System software, documentation

### System software

#### Overview

For operation as well as loading and archiving of the system and user functions, the CPU provides an interface for a memory card in addition to the integral main memory (RAM).

The non-volatile memory on the memory card of the AS 488/TM automation systems is divided into system and user memories. The system memory which is read-only from the AS viewpoint contains the system software in the form of basic programs and standard function blocks. The user memory available for archiving the application software has a capacity of 4 Mbyte.

The memory card with the AS 488/TM system software and the commissioning terminal software are combined in one ordering unit.

The commissioning terminal can be used to download initialization and driver software to the memory card, e.g. for a second PROFIBUS-DP line, for SIWAREX M, PLC-PLC coupling or IP 262 in ET 200U.

#### Additional configuring tools

- PROGRAF AS+/NT for AS 488/TM: see Section "System architecture"
- COM PROFIBUS for PROFIBUS-DP: see Section "Process I/Os".

#### Ordering Data

	Order No.
<b>AS 488/TM system software</b> comprising: <ul style="list-style-type: none"> <li>• Function blocks, TML and STEP M, on memory card, 8 Mbyte</li> <li>• Commissioning terminal software for PC/programming device, on 3.5-inch diskette, with handling description in German and English</li> </ul>	<b>6DS2 410-0XX00-0XA0</b>
<b>System software service package</b> Upgrade/update, as system software, for upgrading to M02, update and for restoration	<b>6DS2 410-0XX00-0XC2</b>

### Documentation

#### Overview

The system documentation of the AS 488/TM comprises the description "AS 235 automation system, software version G" and the manual "Supplementary system documentation for AS 388/TM, AS 488/TM and CS-L2 bridge" which describes the hardware/software modifications/extensions of the AS 488/TM with respect to the AS 235, version G.

Important supplementary information in German is present in Microsoft Word format on the diskette with the "Commissioning terminal software for PC/programming device". In English, these supplementary documents are available as "AS x88/TM-Doku-Plus" on a separate diskette.

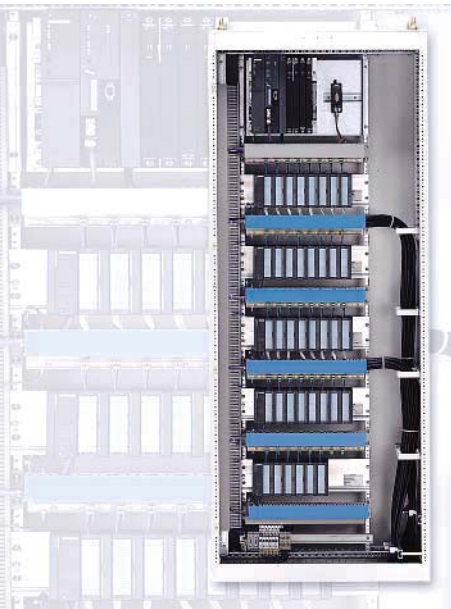
#### Ordering Data

	Order No.
<b>Manual</b> Supplementary system documentation for AS 388/TM, AS 488/TM and CS-L2 bridge <ul style="list-style-type: none"> <li>• German</li> <li>• English</li> </ul>	<b>C79000-G8000-C700</b> <b>C79000-G8076-C700</b>
<b>Description</b> AS 235 automation system, system software version G <ul style="list-style-type: none"> <li>• German</li> <li>• English</li> </ul>	<b>C79000-G8000-C416</b> <b>C79000-G8076-C416</b>
<b>Supplementary documentation</b> AS x88/TM-DokuPlus <ul style="list-style-type: none"> <li>• German Present on 3.5-inch diskette "Commissioning terminal software"</li> <li>• English</li> </ul>	<b>C79451-A3496-D901</b>

# 6

This catalog is out of date, see note on page 3

## SIMATIC PCS 7 cabinet design

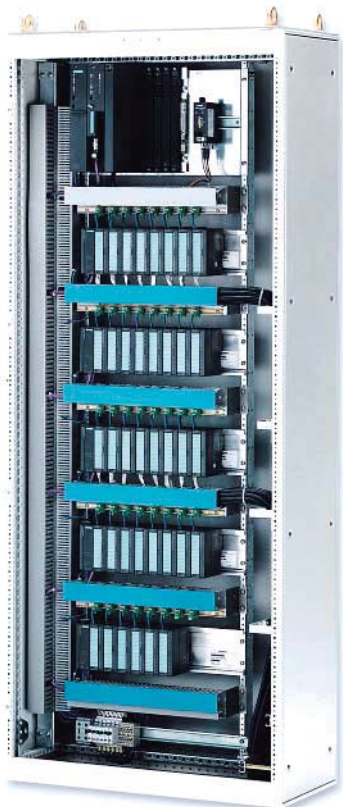


6/2	<b>Introduction</b>
6/2	Overview
6/3	Basic cabinet
6/4	ET 200M I/O unit
6/5	System unit

# SIMATIC PCS 7 cabinet design

## Introduction

### Cabinet packaging system



#### Modular design

##### System-specific modules

- AS 488/TM system unit
- ET 200M I/O unit (ET 200U/ET 200B on request)

##### System-neutral modules

- Basic cabinet, consisting of framework, door, outer walls, internal mechanical parts and power supply assembly with:
  - Compartment for documents
  - Trim
  - AC 230 V socket
  - AC 230 V or DC 24 V cabinet illumination
  - I & C monitoring via automation system or cabinet lamp

##### Options

- Circuit-breaker for protection of max. 6 cabinet tiers
- I/O modules for ET 200M I/O unit

#### High flexibility

- Future compatibility as result of universal, system-neutral modules
- Modular packaging system permits flexible adaptation to the respective application
- Basic and expansion cabinets based on the same set of modules
- Up to 4 system units or 6 I/O units can be fitted in a cabinet
- System units and I/O units can be combined within the cabinet
- Side walls or partitions can be selected specific to the application
- Cabinets can be screwed together into double units or rows
- Design supports installation, commissioning, servicing and repairs
- Design supports correct handling when replacing modules
- All installation, commissioning, servicing and repair work can be carried out from the front of the cabinet
- Design of power supply assembly: either with Siemens circuit-breakers or with circuit-breakers with monitoring contact for connection to receptacles (from company ETA)
- Wiring for electronics supply as well as load power supply to I/O modules
- Wiring of PROFIBUS-DP either with copper or fiber-optic cables

#### Consideration of Ex(i)-specific requirements

- The construction of the system and I/O units permits a cabinet design which satisfies the Ex(i)-specific requirements
- Uniform installation and replacement for all I/O modules from the ET 200M range, including Ex(i) modules (plug connection for load power supply above the modules).

#### Design guidelines

- The SIMATIC S7-300 and S7-400 design guidelines apply when installing the AS 488 in PCS 7 cabinets (only with exclusively distributed SIMATIC I/Os).

#### Preparation of quotation, consulting and ordering

- Siemens AG  
D-76187 Karlsruhe  
Tel.: +49 721 595-3776  
Fax: +49 721 595-4711  
E-mail: helmut.heib@siemens.com

### Overview

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The cabinet design for components close to the process (automation systems and I/Os) fulfills the technical and economical demands placed on the AS 488/TM automation systems.

The cabinets consisting of system-specific modules (system and I/O units) and system-neutral modules (basic cabinets and options) comply with CE requirements and conform to the guidelines for electromagnetic compatibility. They are designed according to the VGB 4 guidelines, and provide exceptional protection against unauthorized interventions, mechanical effects, contamination and corrosion.

As a result of their variable modular design, the cabinets can be readily adapted to different types of system (for batch processes or continuous processes) and system sizes.

The Siemens standard cabinet 8MC with degree of protection IP 40 is the preferred basic cabinet. Cabinets with degree of protection IP 20 and IP 55 are alternatively available.

# SIMATIC PCS 7 cabinet design

## Basic cabinet



### Overview

The Siemens standard cabinet 8MC is the preferred basic cabinet. The Siemens standard cabinet 8MC is a sheet-steel cabinet with rear panel and front door which can be assembled individually or also in rows with further cabinets of this type.

Side walls and partitions are optional, thus permitting variable adaptation of the cabinet to different installation possibilities.

Up to four system units or six I/O units can be fitted in a cabinet in conjunction with a DC 24 V or AC 230 V power supply assembly. System and I/O units can also be combined together within a cabinet. The cables are introduced into the cabinet from below.

### Mechanical design

Each delivered cabinet contains:

- 19-inch mounting frame
- Rear panel
- Door
- Transport lugs
- Clips for routing of process cables
- Cable duct for cabinet-internal wiring

### Options for the mechanical design

When ordering the basic cabinet, the following options are available for the mechanical design of the cabinet:

- Plinth: a cabinet plinth should be used if cables cannot be connected through the floor. The plinths are preassembled, and available with a height of 100 or 200 mm
- Pocket for documents
- Trim
- Side walls/partitions: the basic cabinets are suitable for individual assembly or in rows. Therefore side walls and/or partitions can be selected when ordering.

### Electrical design

Each delivered cabinet contains:

- Power supply assembly AC 230 V or DC 24 V
- Cable clamps and screen bars for I/O and bus cables
- Prewiring of power supply cables for central and I/O units
- Wiring of PROFIBUS-DP fieldbus
- Connector board for cabinet earth

### Options for the electrical design

- AC 230 V socket (installed in power supply assembly)
- I & C monitoring (2 versions):
  - I & C monitoring via cabinet lamp. A blown fuse is signalled by a lamp in the cabinet door. OLM failure can be additionally displayed on the cabinet lamp
  - or
  - I & C monitoring via AS 488/TM and cabinet lamp. Temperature violations in the cabinet, an open door contact, a blown fuse and an OLM failure can be recorded by the IF 961-DIO interface module and additionally signalled by a lamp in the cabinet door
  - Single/redundant design of power supply assembly, optionally with 6 or 14 circuit-breaker receptacles
- Cabinet illumination

### Preparation of quotation, consulting and ordering

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Fax: +49 721 595-4711

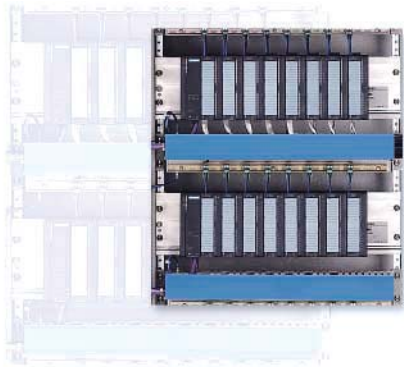
E-mail: [helmut.heib@siemens.com](mailto:helmut.heib@siemens.com)

### Technical Specifications

Siemens standard cabinet	
Dimensions ( <i>H x W x D</i> ) in mm	2000 x 800 x 400
Framework, completely welded	Sheet-steel, 2 mm, frame profile with 10 edges, cross-member profile with 5 edges
Rear panel	Sheet-steel, 1.5 mm, canted
Roof	Sheet-steel, 1.5 mm, canted
Side wall (option)	Sheet-steel, 1.5 mm, canted
Partition (option)	Sheet-steel, 1.5 mm, canted
Single-leaf door on front of cabinet with hinge on right	Sheet-steel, 1.5 mm, opening angle approx. 180°; including rod lock with 3 mm lock insert and double-barb key DIN 43 668
Degree of protection to EN 60 529	IP 40, with single installation or together with cabinets of the same type
Color	Ergo gray to SN 30 920-C611-B13
Permissible ambient temperature	Max. 40 °C
Permissible temperature inside cabinet	Max. 55 °C
Permissible heat dissipation without fan	350 W, referred to maximum values of ambient temperature and temperature inside cabinet

# SIMATIC PCS 7 cabinet design

## ET 200M I/O unit



### Overview

Complete ET 200M I/O stations are available for the cabinet packaging system. The station includes the power supply, components for connection to the PROFIBUS-DP fieldbus (electrical or optical design), selection of modules for hot swapping, and wiring of load current connections.

The modular ET 200M I/O station with degree of protection IP 20 can be equipped with signal and function modules from the SIMATIC S7-300 automation system. These modules must be additionally ordered as required.

### Power supply

The ET 200M I/O station can be operated with DC 24 V or AC 120/230 V. With a DC 24 V supply, the I/O station is powered directly from the cabinet's power supply assembly, with an AC 120/230 V supply, a PS 307 power supply module is additionally required upstream of the IM 153 interface module in the I/O station in order to convert the AC 120/230 V into DC 24 V. The DC 24 V input voltage provided by the power supply assembly or the PS 307 power supply module is used to power the IM 153 and is the load power supply for the I/O modules.

The PS 307 power supply module is available in 5 A and 10 A versions. The PS 307-1E version with a rated output current of 5 A is standard. If the configuration of the I/O station with I/O modules results in a higher load, it is recommendable to use the PS 307-1K with a rated output current of 10 A. Note, however, that the PS 307-1K width of 200 mm (compared to 80 mm with the PS 307-1E) means that a maximum of six I/O modules can be plugged onto the rail.

One fuse is fitted in the power supply assembly for each I/O station. With a DC 24 V supply, the IM 153 module and the L+/M-power supply for I/O modules are fused together.

With an AC 120/230 V supply, the PS 307 power supply module is fused. The L+/M voltage for the I/O modules is also obtained from the PS 307.

### Hot swapping

When ordering an ET 200M I/O station, it is additionally possible to order the hot swapping function.

In an I & C system, it may be necessary to replace modules during operation for reasons of increased availability. The I/O subsystem for hot swapping is available for this as a version of the ET 200M. This version permits replacement of modules without having to switch off the associated ET 200M subsystem. The functions of the inserted modules are not affected. The hot swapping subsystem consists of backplane modules which can be assembled to form a backplane of the required length, and a matching mounting rail.

Special bus modules are required for the hot swapping function. In addition to the PS/IM bus module for the IM 153-1, IM 153-2 and IM 153-3 modules, these are the bus module 2 x 40 for accommodation of two I/O modules with a width of 40 mm each and the bus module 1 x 80 for accommodation of one module with a width of 80 mm. Up to four bus modules for I/O modules can be plugged onto each rail in addition to the PS/IM bus module. Bus module covers can be ordered separately for unused I/O slots.

### Ex(i) design

The cable duct with the Ex(i) version is designed as standard in blue. Ex process cables are routed separately from other cables in the cable duct. Furthermore, a mechanical separation is required between the IM 153 module and the first Ex I/O module. An Ex partition is fitted for the hot swapping function to guarantee the specified insulation distance between intrinsically-safe and non-intrinsically-safe areas of the ET 200M distributed I/Os.

The DM 370 spacer module is used for this purpose if the hot swapping function is not required.

### Load power supply for I/O modules

The load power supply for the I/O modules is connected via plugs located above the I/O modules. One plug is provided for each I/O module. The load power supplies are available in versions for four or eight I/O modules. With fewer than four or eight I/O modules, the unused plug connectors are supplied separately should subsequent installation of I/O modules become necessary.

### Preparation of quotation, consulting and ordering

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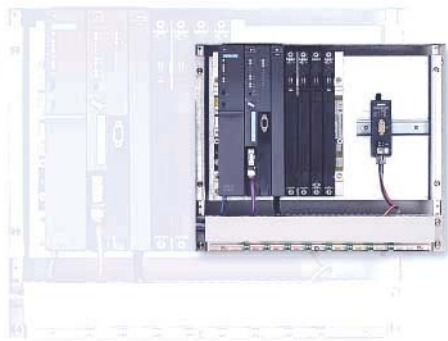
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## SIMATIC PCS 7 cabinet design

### AS 488/TM system unit



- DC 24 V or AC 120/230 V power supply: depending on the input voltage, the AS 488/TM can be equipped either with a PS 407 power supply module (AC 120/230 V supply) or a PS 405 power supply module (DC 24 V supply), each rated at 10 A. These supply the AS 488/TM modules with the DC 5 V and DC 24 V operating voltages via the backplane bus. The PS 405 and PS 407 power supply modules also contain the backup batteries for buffering the time and date.
- Supplementary system documentation consisting of a manual for AS 388/TM, AS 488/TM and CS-L2 bridge in German or English.

### Overview

The scope of delivery of the AS 488/TM is variable, and is defined specific to the order.

Fundamental components of the AS 488/TM are:

- Mounting board for the UR2 rack and the rail for the OLM optical link module
- AS 488/TM CPU, comprising:
  - SIMATIC M7 CPU 486-3 or CPU 488-3
  - Memory module set with 2 x 8 Mbyte
  - UR2 rack (9 slots)
  - IF 962-COM serial interface module for commissioning terminal with two RS 232 interfaces
  - IF 961-DIO interface module for I & C monitoring functions
  - AS 488/TM system software on 8-Mbyte memory card
  - Commissioning terminal software on 3.5-inch diskette
- PROFIBUS-DP connection for distributed I/Os via EXM 478 extension module, as electrical or optical design. The components for a second PROFIBUS-DP line must be ordered separately.
- Components for connection to the CS 275 or PROFIBUS-TM system bus, components for PROFIBUS-TM as electrical or optical design.

### Preparation of quotation, consulting and ordering

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# SIMATIC PCS 7 cabinet design



# Migration of existing systems



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7/3	<b>Migration packages</b>
7/3	AS 488 S migration package
7/5	AS 488 K migration package
7/7	MIG I migration rack
7/8	MIG II migration rack
7/9	MIG K migration rack
7/10	Retrofitting services
7/11	Check list prior to retrofitting
7/12	Configuring lists
	Migratable TELEPERM M modules in AS 488/TM



# Migration of existing systems

## Introduction

### Migration of existing systems

#### Overview

Two different design versions of the AS 488/TM migration packages are available for migrating existing TELEPERM M AS 220 S, AS 230, AS 230 K, AS 235 and AS 235 K automation systems: AS 488 S and AS 488 K.

Migration of the AS 220 H and AS 235 H automation systems is only possible specific to projects, with relinquishing of redundancy

The *AS 488 S* migration package for migrating AS 220 S/H, AS 230/ AS 230 K or AS 235/ AS 235 K/ AS 235 H with AS 488/TM in cabinet packaging system and the *AS 488 K* migration package for migrating AS 230 K/ AS 235 K with AS 488/TM in compact design guarantee, on the one hand, maintenance compatibility of existing plants with systems which have already been deleted or will soon no longer be available, and, on the other hand, offer numerous facilities for modernizing and expanding these plants with a simultaneous increase in AS performance.

The application software has compatible functions, and can be used further providing it is generated and used in line with the standards described in the manuals. This also applies to all downloadable special drivers of standard I/O modules which have been explicitly released for AS 488/TM.

AS 488 S or AS 488 K automation systems for new plants or for the expansion of existing plants can be defined using an Order No. with associated configurator, and are then supplied completely equipped and pretested.

On the other hand, when migrating existing systems with AS 488 S or AS 488 K migration packages, it is necessary to examine the specifications of the output systems, the local conditions, and further historical-based conditions more exactly. Special ordering and handling procedures therefore apply to the AS 488 S and AS 488 K migration packages.

The AS 488 S/AS 488 K migration packages have a fixed, defined scope of delivery and performance with alternatives with respect to the CPU performance (75 MHz or 120 MHz) and the type of migration rack (with or without slots for TELEPERM M I/O modules for AS 488 S or with a DC 24 V or AC 230 V supply for AS 488 K). This means that only TELEPERM M I/Os can be used. Previous experience has shown that migration solutions are usually extremely specific, and deviate from the standard scope of the AS 488 S and AS 488 K migration packages. Components or system extensions, e.g. with distributed I/Os on the PROFIBUS-DP, which are not included in the standard scope can either be ordered as individual options (see section on AS 488 S cabinet system or AS 488 K compact system) or can be the content of individual additional agreements with additive services. Additional agreements always require an individual quotation. In order to simplify the production of quotations, and to improve the cost transparency, special performance packages have been defined for frequently requested additional services.

#### Configuration

##### General marginal conditions

During migration of *AS 220 S, AS 230 and AS 235* automation systems to AS 488/TM, the subrack with the central modules in the TELEPERM M cabinet is replaced by an AS 488 S with compatible functions based on the MIG I or MIG II migration rack. The *AS 230 K and AS 235 K* compact automation systems can also be directly migrated using the AS 488 K of identical packaging design. During this, the complete basic system including the power supply and the slots for connection to the CS 275 are replaced by an AS 488 K with compatible functions based on the MIG K migration rack.

Existing AS extension units (max. 7) or ES 100 K extension systems (max. 8) with I/O modules of the TELEPERM M process control system, including any subordinate SIMATIC S5 I/Os, can be connected to an AS 488/TM. With mixed configurations consisting of extension units and systems, max. 8 (2 x 4) extension units/ES 100 K extension systems are permissible per AS 488/TM.

The following assignments are possible per I/O bus:

- 3 extension units and one ES 100 K extension system
- At least 1 extension unit and up to three ES 100 K extension systems
- Up to 3 extension units in the basic cabinet, or up to 4 extension units in the extension cabinet of an AS 230 or AS 235 system. The ribbon cable must be replaced when using 3 or 4 extension units for AS 230.

*Field multiplexers* and FM driver blocks (together with links) cannot be used.

When using the MIG I migration rack, the I/O modules inserted in the basic unit of an *AS 220 S, AS 230 K or AS 235 K automation system* must be converted into extension units/systems, or they are omitted. Up to 5 I/O modules can be transferred to a MIG II or MIG K migration rack if the process signal cables are reconnected.

The *AS 220 H and AS 235 H automation systems can only be incorporated into the migration with relinquishing of redundancy*. The conversion is carried out specific to the project by replacing the AS 220 H basic unit (without EE1 extension unit) or the AS 235 H basic unit by an AS 488 S with additional adaptation to the redundant solution. In the case of the AS 235 H, technical clarification is necessary because of the different I/O conditions; these are not covered by a standard conversion.

The AS 488/TM has no local *terminal* for direct operation and monitoring or for configuring. Operation and monitoring functions comparable with the local terminal of the AS 235 are provided by the PROGRAF AS+/NT configuring tool when connecting via the CS 275 system bus. A further alternative is the use of bus-coupled OS systems such as *PCS7/TM-OS*.

The *conversion* of the application software from a source AS into a target AS is carried out 1:1. The standard service does not include testing for any special drivers which may be present, subsequently loaded structures which are incompatible (system blocks in the RAM), or overload configurations.

The application structure must be provided on diskette to enable software conversion.

## Migration of existing systems Migration packages

### AS 488 S migration package



#### Overview

The AS 488 S migration package is an optimized, cost-effective and lump sum offer for migration of AS 220 S/H, AS 230/ AS 230 K and AS 235/ AS 235 K automation systems (AS 220 H and AS 235 H with limitations) with AS 488/TM in cabinet packaging system.

#### Scope of delivery and services

The scope of delivery and services of the AS 488 S migration package is defined as follows:

- AS 488 S automation system (cabinet system) incl. system software
- Standard conversion service „Conversion of AS 220 S/H into AS 488 S“
  - Removal of subrack with the AS 220 S/H basic unit
  - Installation of AS 488 S in the associated system cabinet, connection and commissioning
  - Conversion, transfer and adaptation of the application software on the basis of the standard blocks, without testing of software functions
- or standard conversion service „Conversion of AS 230/ AS 230 K or AS 235/ AS 235 K into AS 488 S“
  - Removal of subrack with the AS 230/ AS 230 K or AS 235/ AS 235 K basic unit
  - Installation of the AS 488 S in the system cabinet, connection and commissioning (alternate solution required for CS 275 connection when replacing AS 230 K/ AS 235 K in system cabinets)
  - Transfer and adaptation of the application software on the basis of the standard blocks, without testing of software functions The application software – providing it corresponds to the standards described in the manuals – has compatible functions and can be used further.

#### Additive supplementary components and services

Previous experience has shown that migration solutions are usually extremely specific, and deviate from the standard scope of the AS 488 S migration packages. Components or system expansions, e.g. with distributed I/Os on the PROFIBUS-DP, which are not included in the standard scope can either be ordered as individual options (see section on AS 488 S cabinet system) or can be the content of individual additional agreements with additive services. Additional agreements always require an individual quotation. In order to simplify the production of quotations, and to improve the cost transparency, special performance packages have been defined for frequently requested additional services.

- Conversion of I/O modules (max. 5) from the basic unit/system of AS 220 S/ AS 230 K/ AS 235/ AS 235 K into the MIG II migration rack and rewiring of the associated process signal cables
- Reconfiguring of CD into DI couplings
- Structure analysis of application for illegal blocks or structure faults
- Documentation of the AS 23x application software according to the block sequence (following XB) with help of PROGRAF AS/AS+
- Hardware adaptation/conversion resulting from elimination of redundancy when converting AS 220 H/ AS 235 H systems
- Extended configuring (SYST.WART) with connection of ET 100 or S5 I/Os
- Configuration and activation of the AG/AG coupling (additional hardware required)
- Configuration and activation of the MODBUS coupling (additional hardware required)
- Basic installation of PROFIBUS-DP coupling (additional hardware required)
- Reconfiguration and adaptation of an existing PROFIBUS-DP coupling (additional hardware required)

The necessity for packages for supplementary services may result in one or all three phases of the migration process:

- Phase 1: production of quotation
- Phase 2: data conversion
- Phase 3: commissioning on site

Since it is necessary to recognize the supplementary services packages early to permit high planning accuracy, the information required for the analysis (see checklist for migration) must be available early enough.

#### Production of quotation and ordering

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# Migration of existing systems

## Migration packages

### AS 488 S migration package

#### Configuration

##### General marginal conditions/limitations

The conversion of an AS 220 S/AS 230/AS 235 into an AS 488 S is carried out 1:1, i.e. the respective basic unit in the existing TELEPERM M cabinet (without I/O modules for AS 220 S and AS 235, or without extension unit EE1 for AS 230) is replaced by a migration rack with the AS 488 S with compatible functions. Expansions or extensions carried out simultaneously, as well as modifications and adaptations which do not belong to the standard scope of the conversion services, e.g. the new wiring of I/O modules inserted in a basic unit GE, will be charged separately.

Existing TELEPERM M extension units EE (max. 7) or ES 100 K extension systems (max. 8) can be connected to the AS 488 S. In the case of mixed configurations of extension units and extension systems, max. 8 (2 x 4) EE/ES 100 K are permissible per AS 488 S. The following assignments are possible per I/O bus:

- Three extension units and one ES 100 K extension system
- At least one extension unit and up to three ES 100 K extension systems
- Up to 3 extension units in the basic cabinet, or up to four extension units in the extension cabinet of an AS 230 or AS 235 system. The ribbon cable must be replaced when using 3 or 4 extension units for AS 230.

Only those TELEPERM M/ME I/O modules listed in Catalog PLT 112 and published on the TELEPERM M site on the Internet (including any subordinate SIMATIC S5 I/Os from Catalog PLT 111) can be used in the extension units/systems. Please observe the limitations!

Additional information is available in the Internet under:



<http://pcs.khe.siemens.de/index.asp?Nr=2644>

Two versions of the migration rack are available for conversion to AS 488 S. Migration rack II, Order No. 6DS2 410-0XX00-4XX0, is equipped with 5 I/O module slots as an extension to migration rack I, Order No. 6DS2 410-0XX00-2XX0, which has no I/O slots. When using the migration rack I, the I/O modules inserted in the basic unit of the AS 220 S or in the AS 235 system must be converted into existing extension units/systems, or they are omitted. On the other hand, up to 5 I/O modules – with one or two I/O buses – can be operated in a migration rack II if the process signal cables are reconnected.

The AS 488 S migration rack is available in two CPU versions (75/120 MHz). Thus two performance levels are available.

The replaced basic units or the central components, i.e. the licensed components of the automation system, must be returned to Siemens AG.

#### Ordering Data

The migration of existing automation systems using AS 488 S migration packages is a complex process comprising a quotation and ordering phase with detailed clarification based on a checklist, the data conversion phase, delivery and commissioning on site, and the return of licensed components. The planning and coordination of such a migration requires intensive contact as well as exact arrangements and agreements between all involved parties.

The following information is basically required for ordering AS 488 S migration packages by DP system or fax:

- Order No. and quantity of migration packages including detailed information on the migration rack (MIG I or MIG II) and on the CPU (CPU 486-3 with 75 MHz or CPU 488-3 with 120 MHz)
- Type of AS 220, AS 230 or AS 235 automation system to be migrated in each case
- Quantity and length of connecting cables 6DS8 215-8... required for connection of the AS 488 S to a CS 275 local bus island. One conversion package is required per connecting cable
- Dates for conversion and commissioning work on site
- Quantity and language of AS 235 system software description and of supplementary system documentation for AS 488/TM.

	Order No.
<b>Migration package</b> <b>AS 488 S migration package,</b> comprising: • AS 488 S automation system • Standard conversion service	<b>GWK-PAS-AS-UPAS488</b>
<b>Documentation</b> <b>Supplementary system documentation for AS 488/TM</b> • Manual, German • Manual, English	<b>C79000-G8000-C700</b> <b>C79000-G8076-C700</b>
<b>AS 235 automation system, system software version G</b> • Description, German • Description, English	<b>C79000-G8000-C416</b> <b>C79000-G8076-C416</b>

The checklists, ordering forms, addresses for returned goods, and conditions are available on request (see summary on production of quotations and ordering).



## Migration of existing systems

### Migration packages

#### AS 488 K migration package



#### Overview

The AS 488 K migration package is an optimized, cost-effective and lump sum offer for migration of AS 230 K and AS 235 K automation systems with AS 488/TM in a compact and compatible design saving space and costs.

#### Scope of delivery and services

The scope of delivery and services of the AS 488 K migration package is defined as follows:

- AS 488 K automation system (compact system ) incl. system software
- Standard conversion services:  
Service "Conversion of AS 230 K or AS 235 K into AS 488 K"  
- Removal of the complete AS 230 K/ AS 235 K basic system  
- Installation of AS 488 K in the system housing or system cabinet, connection and commissioning  
- Transfer and adaptation of the application software on the basis of the standard blocks, without testing of software functions

#### Additive supplementary components and services

Previous experience has shown that migration solutions are usually extremely specific, and deviate from the standard scope of the AS 488 K migration packages. Components or system expansions, e.g. with distributed I/Os on the PROFIBUS-DP, which are not included in the standard scope can either be ordered as individual options (see section on AS 488 K compact system) or can be the content of individual additional agreements with additive services. Additional agreements always require an individual quotation. In order to simplify the production of quotations, and to improve the cost transparency, special performance packages have been defined for frequently requested additional services.

- Conversion of I/O modules from the basic system of the AS 230 K (max. 3) or AS 235 K (max. 5) into the MIG K compact migration rack and rewiring of the associated process signal cables
- Reconfiguring of CD into DI couplings
- Structure analysis of application for illegal blocks or structure faults
- Documentation of the AS 23x application software according to the block sequence (following XB) with help of PROGRAF AS/AS+
- Adaptation of the packaging system required for the AS 230 K/AS 235 K migration, and conversion of the CS 275 remote bus connection (if present)
- Extended configuring (SYST.WART) with connection of ET 100 or S5 I/Os

- Configuration and activation of the AG/AG coupling (additional hardware required)
- Configuration and activation of the MODBUS coupling (additional hardware required)
- Basic installation of PROFIBUS-DP coupling (additional hardware required)
- Reconfiguration and adaptation of an existing PROFIBUS-DP coupling (additional hardware required)

The necessity for packages for supplementary services may result in one or all three phases of the migration process:

- Phase 1: production of quotation
- Phase 2: data conversion
- Phase 3: commissioning on site

Since it is necessary to recognize the supplementary services packages early to permit high planning accuracy, the information required for the analysis (see checklist for migration) must be available early enough.

#### Production of quotation and ordering

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#### Configuration

##### General marginal conditions/limitations

The conversion of an AS 230 K/ AS 235 K into an AS 488 K is carried out 1:1, i.e. the existing AS 230 K/AS 235 K basic system is completely replaced in the TELEPERM M housing, rack or cabinet by an AS 488 K with compatible functions. The TELEPERM M I/O modules operated in the original systems (max. 3 with AS 230 K or max. 5 with AS 235 K) can be converted by the MIG K migration rack of the AS 488 K. Expansions or extensions carried out simultaneously, as well as modifications and adaptations which do not belong to the standard scope of the conversion services, e.g. the new wiring of I/O modules, will be charged separately.

The AS 488 K migration package is available with two power supply versions (DC 24 V or AC 230 V) and with two performances (with 75/120-MHz processor). Since up to 2 x 4 ES 100 K systems can be connected to an AS 488 K just like to an AS 488/TM, existing ES 100 K extension systems can be used further.

Only one migration rack version with 5 I/O slots is available for conversion to AS 488 K. These slots are divided with 3 on the I/O bus A and 2 on the I/O bus B.

Additional information is available in the Internet under:



<http://pcs.khe.siemens.de/index.asp?Nr=2644>

The replaced AS 230 K/AS 235 K basic systems with the central components, i.e. the licensed components of the automation system, must be returned to Siemens AG.



# Migration of existing systems

## Migration packages

### AS 488 K migration package

#### Ordering Data

The migration of existing automation systems using AS 488 K migration packages is a complex process comprising a quotation and ordering phase with detailed clarification based on a checklist, the data conversion phase, delivery and commissioning on site, and the return of licensed components. The planning and coordination of such a migration requires intensive contact as well as exact arrangements and agreements between all involved parties.

The following information is basically required for ordering AS 488 K migration packages by DP system or fax:

- Order No. and quantity of migration packages including detailed information on the power supply (DC 24 V direct or AC 230 V/ DC 24 V integral) and on the CPU (CPU 486-3 with 75 MHz or CPU 488-3 with 120 MHz)
- Type of AS 230 K or AS 235 K automation system to be migrated in each case
- Dates for conversion and commissioning work on site
- Quantity and language of AS 235 system software description and of supplementary system documentation for AS 488/TM.

#### Migration package

**AS 488 K migration package**, comprising:

- AS 488 K automation system
- Standard conversion service

#### Documentation

**Supplementary system documentation for AS 488/TM**

- Manual, German
- Manual, English

**AS 235 automation system, system software version G**

- Description, German
- Description, English

#### Order No.

**GWK-PAS-AS-UPAK488**

**C79000-G8000-C700**  
**C79000-G8076-C700**

**C79000-G8000-C416**  
**C79000-G8076-C416**

The checklists, ordering forms, addresses for returned goods, and conditions are available on request (see summary on production of quotations and ordering).

## Migration of existing systems Migration packages

### MIG I migration rack

The migration racks are the core components of the AS 488 S and AS 488 K migration packages. They integrate the AS 488/TM automation systems as replacements for existing basic units/systems in an existing TELEPERM M system environment.

The following migration racks are available:

- MIG I migration rack  
for AS 488 S (without slots for TELEPERM I/O modules)
- MIG II migration rack  
for AS 488 S (5 slots for TELEPERM I/O modules)
- MIG K migration rack  
for AS 488 K (5 slots for TELEPERM I/O modules)



#### Overview

The **MIG I migration rack** is a subrack of the ES 902 packaging system with assembled SIMATIC S7-400 backplane bus and connection units. It is provided for conversion of existing cabinets of the AS 220 S, AS 230 and AS 235 automation systems into an AS 488/TM system.

The migration rack has the same dimensions as the basic unit of the automation systems, and replaces this in an AS cabinet. Existing extension systems with installed I/O modules can still be connected to the migration rack and used with it.

The migration rack contains a guide for preassembled cables as well as a fuse for L+ 24 V/16 A.

The MIG I migration rack has no slots for I/O modules. When using this migration rack for conversion of a TELEPERM M automation system into an AS 488/TM, the I/O modules inserted in the AS basic unit must therefore be converted into an extension unit or an additional ES 100 K extension system. A prerequisite, however, is that sufficient slots are still available there for these I/O modules.

2 plugs are located at the rear of the migration rack for connection of the I/O buses A and B using the existing ribbon cables.

In the migration rack, the TPM 478 module processes up to two I/O buses (A and B) with a maximum of 8 extension units/ES 100 K extension systems via the TBX 478 module.

The following assignments are possible per I/O bus:

- 3 extension units and one ES 100 K extension system
- At least 1 extension unit and up to three ES 100 K extension systems
- Up to 3 extension units in the basic cabinet, or up to four extension units in the extension cabinet of an AS 230 or AS 235 system. The ribbon cable must be replaced when using 3 or 4 extension units for AS 230.

7

# Migration of existing systems

## Migration packages

### MIG II migration rack



#### Overview

The **MIG II migration rack** has been developed further, and is a completely assembled ES 902 subrack for accommodating an AS 488/TM system which can be directly installed in the TELEPERM M standard cabinet instead of an AS 220 S, AS 230 or AS 235 basic unit.

It is designed as a 19-inch system, and equipped with the SIMATIC S7-400 backplane bus for accommodating the AS 488/TM system modules (power supply, CPU and interface modules). Compared to the MIG I migration rack, it offers 5 slots for TELEPERM M I/O modules which are fitted on the right side of the rack. When converting, it is therefore possible to transfer 5 I/O modules from the basic unit of the automation system into the migration rack, making it unnecessary to find new slots for these. However, it is necessary to disconnect the process signal cables from the I/O slots, and to reconnect them. To do this, they must be separated between the cabinet connection element SAE and the basic unit. If no SAEs were previously installed for the I/O slot wiring of the basic unit, they must now be inserted in order to also compensate differences in length. The process signal cables are connected at the rear using wire-wrap connections, and are routed to the cabinet connection element SAE in a preassembled cable duct.

Two interface plugs for connection of the two I/O buses A and B are fitted at the rear on the right-hand wall. In general, the I/O bus ribbon cables already present in the cabinet are used further. A flexible assignment of the 5 I/O slots to the two I/O buses A and B is possible.

The previous addresses of the I/O buses can be used further in most cases, especially if slot addressing was not used. Slot addressing is possible for the I/O slots available in the MIG II migration rack, and is essential for certain modules. The slot addresses of the two I/O areas A and B can be selected just like frame addresses by setting jumpers in predefined groups. The settings are made from the front.

The circuit-breakers for the DC 24 V supply and for the signalling voltage PM are located at the front, and are readily accessible.

The interface for I & C messages of the cabinet has been designed in the MIG I migration rack as a preassembled cable for connection to the power supply assembly. With the MIG II migration rack, a plug interface with screw terminals has been provided similar to in the AS 235 system.

#### Design

##### Configuration possibilities for I/Os

System-specific configuring of the I/Os means that the MIG II migration rack can be used extremely flexibly either for the migration of AS 230 systems or for AS 220 S and AS 235 systems with up to 5 I/O modules each in the basic unit.

When migrating an AS 220 S system, the 5 I/O modules of the migration rack can be combined with up to 3 extension units by pressing 2 ribbon cable plugs onto the existing I/O bus cable or by using the additional ribbon cable for 5 slots (see hardware options).

When migrating an AS 230 system, users can freely decide whether the 5 new I/O slots are to be operated together on the I/O bus, i.e. together with up to 3 extension units of the basic cabinet, or divided between the two I/O buses (e.g. 3 on I/O bus A of the basic cabinet, and 2 on I/O bus B of the extension cabinet). In addition, up to 4 extension units can be connected using a new ribbon cable to I/O bus B of the AS 230 system.

As with the AS 230 system, users can also freely decide for the AS 235 system whether all 5 I/O slots in the migration rack are to be operated on I/O bus A, or whether they are to be divided amongst I/O buses A and B. In contrast to the AS 235 system, even 4 extension units can be directly used in the extension cabinet of the AS 488/TM system. The same technical conditions apply to migration of the AS 235 system as to migration of the AS 230 system.

The 5 I/O slots in the migration rack are assigned so-called frame addresses using plug-in jumpers, possibly resulting in different slot addresses in each case.

As with the AS 230 K and AS 235 K systems, this flexible method permits the configuration of two I/O slots for connection of ES 100 K extension systems (without compact housing). ES 100 K interface modules 6DS1 322-8AA are then used in each case for the link. A total of 8 extension units or ES 100 K extension systems can therefore be operated parallel to the ET 200M distributed I/O system (any mixture of 4 on each I/O bus).

## Migration of existing systems Migration packages

### MIG K migration rack

#### Technical Specifications

Design	ES 902 subrack (19-inch system), screwed connection of subrack from front
Backplane	9 slots for AS 488/TM central modules, 5 slots preassembled for TELEPERM M I/O modules
Number of I/O buses	2 I/O buses, division of 5 I/O slots in ratio 3:2 possible using ribbon cable
Slot addresses	<ul style="list-style-type: none"> <li>• Slot addressing; frame addresses selectable using plug-in jumpers</li> <li>• Bus selectable using ribbon cable; mixed buses possible</li> <li>• Slot addresses Module number = 13, 14, 15, 29, 30, 31, 45, 46, 47 (61 also possible) or the equivalents in the range from 100 to 160 (depending on I/O bus)</li> </ul>
Power supply	DC 24 V (PS 405, 20 A, must also be fitted!)
Fuses	L+ and PM (in subrack)



#### Overview

The MIG K migration rack has a design equivalent to that of the AS 235 K subrack. It integrates an AS 488/TM, and offers 5 additional slots for TELEPERM M I/O modules.

The MIG K migration rack is already equipped with slots for modules used for connection to the CS 275 system bus.

Two alternatives are available for the power supply. The MIG K can be designed either for direct connection of DC 24 V or with an integral AC 230 V/ DC 24 V power supply.

# Migration of existing systems

## Retrofitting services

### Overview

The following contract conditions apply to all services (standard or supplementary services) provided in the context of a migration:

- The services are based on the conditions of the "General installation conditions"
- The application software will be converted 1:1, i.e. from a source AS system into a target AS system in each case, without analysis of the functionality of the existing system software
- The work will be carried out within normal working hours (Monday to Friday, 9 hours daily)
- The customer must ensure by means of appropriate measures that the wall housing or the front and rear of the AS cabinets or racks are freely accessible for the conversion work

- Travel costs will be charged in addition
- To support smooth conversion, the details resulting from the "Checklist for migration" must be clarified in advance, and the required information provided
- The replaced basic units/systems or the central components, i.e. the licensed components of the automation system, must be returned to Siemens AG.

Conversion, transmission and adaptation of the application software as well as the conversion measures on site will be carried out by:

Siemens AG, Dept. I&S IS KHE 4,  
Tel.: +49 721 595-5816,  
Fax: +49 721 595-5121,  
E-mail: ludger.schroeer@siemens.com

## Migration of existing systems

### Check list prior to retrofitting

#### Overview

##### Details required for a quotation for migration:

##### Plant configuration (structure diaphragm)

- OS systems:
  - Types, quantity
- Engineering systems:
  - Types, quantity, connection
- AS systems:
  - Types, quantity
- Bus topology (CS 275):
  - Bus segments, bus couplers, station addresses

##### AS configuration for cabinet/compact system for migration with AS 488 S

##### Basic cabinet/basic system:

- Basic unit
  - Central unit type, version
  - Types of I/O modules in central unit
  - Releases of I/O modules in central unit
  - Addressing of I/O modules in central unit
  - Process alarm structure
  - Coupling interfaces and their drivers
  - Special modules, special drivers
- Standard devices
  - Local terminals and printers (logs, messages)

##### Basic and extension cabinet/basic system:

- Extension units/ES 100 K
  - Types, quantity
- I/O modules in extension units and ES 100 K
  - Types, assignment (configuration)
  - Releases
  - Addressing
  - Coupling interfaces and their drivers
  - Special modules, special drivers

##### AS configuration for compact system for migration with AS 488 K

##### Basic system:

- Basic unit
  - Central unit type, version
  - Power supply, fusing
  - Types of I/O modules in central unit
  - Releases of I/O modules in central unit
  - Addressing of I/O modules in central unit
  - Process alarm structure
  - Coupling interfaces and their drivers
  - Special modules, special drivers
- Standard devices
  - Local terminals and printers (logs, messages)
- ES 100 K extension systems
  - Types, quantity
- I/O modules in ES 100 K
  - Types, assignment (configuration)
  - Releases
  - Addressing
  - Coupling interfaces and their drivers
  - Special modules, special drivers

##### AS configuration for cabinet/compact system for migration with AS 488 S

##### Basic cabinet/basic system:

- Accessibility of cabinet/system
- Packaging system, special built-on and built-in accessories

##### Extension cabinet/extension systems:

- Accessibility of cabinet/system
- Packaging system, special built-on and built-in accessories

##### AS configuration for compact system for migration with AS 488 K

##### Basic system:

- Accessibility of housing, rack or cabinet
- Actual packaging system, special built-on and built-in accessories

##### Extension systems:

- Accessibility of systems and their AS connections

##### AS user configuration for cabinet/compact system for migration with AS 488 S

- Data medium with current release of application structure (cleared of CD mode and non-existent stations for logging off from system bus)
- System software release and archiving method
- Processing cycle 250 ms or 500 ms (with AS 220 S/H)
- Special software features
  - E.g. special drivers, software packages, special interfaces
  - Decompilation capability with PROGRAF AS+/NT

##### AS user configuration for compact system for migration with AS 488 K

- Data medium with current release of application structure (cleared of CD mode and non-existent stations for logging off from system bus)
- System software release and archiving method
- Special software features
  - E.g. special drivers, software packages, special interfaces
  - Decompilation capability with PROGRAF AS+/NT



# Migration of existing systems

## Configuring lists

### Migratable TELEPERM M modules in AS 488/TM

#### Migratable TELEPERM M modules in AS 488/TM

Designation	Order No. of module	Release	Remarks
<b>Closed-loop control modules</b>			
S controller, single-channel, with individual control unit	6DS1 400-8AA	≥ 12	1) 14)
	6DS1 400-8BA	≥ 1	14)
K controller, single-channel, with individual control unit	6DS1 401-8AA	≥ 7	1)
	6DS1 401-8BA	≥ 1	14)
S controller, two-channel	6DS1 402-8AA	≥ 10	1) 14)
	6DS1 402-8BA	≥ 1	14)
K controller, two-channel	6DS1 403-8AA	≥ 19	1) 14)
	6DS1 403-8BA	≥ 1	14)
	6DS1 403-8CA	≥ 1	14)
K controller, two-channel, with NAMUR limits	6DS1 403-8CB	≥ 1	14)
<b>Individual control drive modules</b>			
for 1 motor or 1 solenoid valve	6DS1 500-8AA	≥ 10	
	6DS1 500-8BA	≥ 1	
for actuator	6DS1 501-8AA	≥ 13	
	6DS1 501-8AB	≥ 13	
for actuator, without feedback	6DS1 501-8BA	≥ 1	
for actuator, with feedback	6DS1 501-8BB	≥ 1	
for motors or solenoid valves, three-channel	6DS1 502-8AA	≥ 12	
	6DS1 502-8BA	≥ 2	
for actuators, three-channel	6DS1 503-8AA	≥ 11	
	6DS1 503-8BA	≥ 2	
for 4 final control elements with 1 rest position, with monitoring	6DS1 504-8AA	≥ 3	
for 8/4 final control elements with 1 or 2 rest positions, without monitoring	6DS1 505-8AA	≥ 2	
<b>Binary output modules</b>			
32 outputs, 100 mA each, non-floating	6DS1 603-8AA	≥ 2	
	6DS1 603-8AB	≥ 1	
	6DS1 603-8BA	≥ 7	1) 13)
	6DS1 603-8RR	≥ 1	
16 outputs, 400 mA each, non-floating	6DS1 604-8AA	≥ 1	8)
16 relays, floating	6DS1 605-8AA	≥ 1	
	6DS1 605-8BA	≥ 2	

See overleaf for explanations on the table

Designation	Order No. of module	Release	Remarks
<b>Binary input modules</b>			
for 16 NO/NC contacts, non-floating, with monitoring and simulation	6DS1 600-8AA	≥ 5	1)
48 inputs, DC 24 V, non-floating	6DS1 601-8AA	≥ 3	1) 6)
	6DS1 601-8AC	≥ 2	1) 7)
with INT and process alarm	6DS1 601-8BA	≥ 2	7)
32 inputs, DC 24 V, floating	6DS1 602-8AA	≥ 1	1)
	6DS1 602-8BA	1; 2; ≥ 4	5) 6) 11)
Interrupt, 48 inputs as common alarm module	6DS1 615-8AA	≥ 4	7)
for 8 changeover contacts	6DS1 620-8AA	≥ 5	
for 8 BERO DC 24 V switches	6DS1 621-8AA	≥ 5	
<b>Counter modules</b>			
Metering pulse input module with 8 channels for DC 24 V signals, floating	6DS1 607-8AB *)	≥ 1	5)
Proportioning counter module with 2 or 4 channels	6DS1 613-8AB	≥ 1 SW=5	1)
	6DS1 613-8BB	≥ 6	1)
<b>Analog output modules</b>			
4 channels, floating	6DS1 702-8AA	≥ 5	1)
	6DS1 702-8RR	≥ 1	
<b>Analog input modules</b>			
8 channels and power supply for transmitters, floating	6DS1 700-8AA	≥ 10	1) 14)
	6DS1 700-8AB	≥ 16 SW:1	14)
	6DS1 700-8BA	≥ 1	14)
	6DS1 700-8BB	≥ 1 SW:1	14)
with NAMUR limits	6DS1 701-8AA	≥ 1 SW:1	14)
	6DS1 701-8AB	≥ 2 SW:1	14)
Measurement-point extension with 14 channels for thermocouples and resistance thermometers	6DS1 703-8AB	= 1	14) 17)
	6DS1 703-8RR	= 1	14) 17)
4 channels for thermocouples and resistance thermometers	6DS1 713-8AB	≥ 1	14)
8 channels and power supply for transmitters, non-floating	6DS1 730-8AA	≥ 1	5) 9) 14)
4 channels for thermocouples, resistance thermometers and process signals, floating, configurable	6DS1 731-8AA	≥ 1	5) 9) 14)
	6DS1 731-8BA	≥ 1 SW: ≥ 1	5) 9) 14)
	6DS1 731-8EA	≥ 1	5) 9) 14)
	6DS1 731-8FA	≥ 1	5) 9) 14)
	6DS1 731-8RR	≥ 4 SW:3	5) 9) 14)

\*) in certain circumstances there are some special features for these modules, please ask your Siemens contact

# Migration of existing systems

## Configuring lists

### Migratable TELEPERM M modules in AS 488/TM

Designation	Order No. of module	Release	Remarks
<b>Binary calculation modules</b>			
Binary calculation module	6DS1 717-8AA *)	≥ 8 SW:08	16) 24)
Binary/analog calculation module (max. 31 channels)	6DS1 717-8RR	≥ 1 SW:3	16) 24)
Binary extension	6DS1 719-8AA	≥ 2	15)
Analog extension	6DS1 720-8AA	≥ 1	15)
Binary extension (for 6DS1 717-8RR)	6DS1 719-8RR	≥ 1	
<b>Coupling modules</b>			
S5-110A, with 4 channels	6DS1 310-8AA *)	≥ 8	
S5-110A, with 1 channel	6DS1 310-8AB *)	≥ 8	
S5 coupling, serial	6DS1 318-8AB *)	≥ 3 SW: 1	1) 24)
S5 coupling (expansion unit)	6DS1 321-8AA *)	≥ 4	
S5 coupling, serial	6DS1 333-8AB *)	≥ 1	
S7 coupling, serial	6DS1 333-8AB *)	≥ 1	22) 24)
MODBUS coupling (on request)	6DS1 333-8AB *) with M1328-V5	≥ 1 SW=5	3) 24)
I/O bus remote coupling AS - I/O bus - ES 100 K	6DS1 322-8AA	≥ 5	1) 12)
S5 coupling, serial, ET 100, EU / I/Os, TM-S5 coupling module	6DS1 327-8AA *)	≥ 4	
Coupling of external computer via CS 275 / N-V.24	6DS1 202-8AB *)	≥ 5	19) 20)
<b>CP 581 TM interface modules</b>			
CP 581 TM communications module	6DS1 337-1AD *) with S5KE, S5KS	≥ 1 SW: ...	2) 19) 20) 21)
CP 581 TM-L2 (DP/FDL)	6DS1 341-1AD *) with S5KE, S5KS	≥ 1 SW: ...	2) 19) 20) 21)
CP 581 TM FUZZY	6DS1 342-1BD *) with S5KE, S5KS	≥ 1 SW: ...	2) 19) 20) 21) 23) 24)

\*) in certain circumstances there are some special features for these modules, please ask your Siemens contact

#### Explanations for the column „Remarks“

- 1) Earlier release versions not permissible!
- 2) Special product
- 3) Not a standard product, no system test carried out
- 5) Application only without interrupt!
- 6) No application as common alarm module (SF 61)
- 7) Approved for common alarm modules, the latest product release is required.
- 8) Note current balance of subrack:  
max. 4 A per module, max. 16 A per subrack
- 9) Combination modules for use in TELEPERM M standard systems and in TELEPERM ME systems. Application in AS 235/488 extension units only as TELEPERM ME module with slot addressing.
- 11) Note: Release 3 is not allowed!
- 12) Cycle time in TPM 478 for processing of modules in ES 100 K can be delayed (dependent on the cable length); coupling modules are used at best in the basic unit.
- 13) Application in ES 100 K not allowed (timing)
- 14) Connection of transmitters with two-wire system not permissible with AS 488 K and ES 100 K in AC 230 V! The ripple of the power supply in the AS is too high for these transmitters and the connection system.
- 15) Module only functions together with 6DS1 717-8AA
- 16) Only alarm function
- 17) Module only functions together with 6DS1 713 or 6DS1 731.
- 19) A maximum of 1 module of type Typ N-V.24 or CP 581 TM are permissible in a AS 488/TM system (in basic and extension cabinet)
- 20) Application in ES 100 K not allowed (5 V power)
- 21) Hardware/software releases on request:  
Siemens Karlsruhe,  
I&S IT PS KHE3,  
D-76181 Karlsruhe, Germany
- 22) S7 coupling with 3964 R / RK 512 procedure,  
SEND/RECEIVE, SIMATIC S5 analog value format
- 23) only CP 581/TM versions with S5Kx drivers can be used. Power balance of the module can vary up to max. 3 A (with +5 V)
- 24) cycle time of the process image min. 1 s

#### Explanations for the column „Release“

- ≥ 5 recommended minimum release (for technical reasons). With earlier releases it's possible to have some loss of functions and problems with I/Os; use without guarantee
- 1; 2; permissible releases
- =5 valid release of a module
- ≥ 6 ≥ and remark 1) mean an imperative minimum release (6 in this case), i.e. upgrading is essential at least up to release 6.

Observe the respective indexed remarks for the individual modules.

Observe the details described in the manual „Supplementary System Documentation AS 388/TM and AS 488/TM“ (Chapter 6).■



## Migration of existing systems



# 8

## Process I/Os



8/2	<b>Introduction</b>
8/3	Connecting TELEPERM M I/Os
8/4	Connecting SIMATIC I/Os
8/6	DP extensions for AS 488/TM
8/7	<b>ET 200M packaging system</b>
8/9	ET 200M modules
8/11	ET 200M Ex I/O modules
8/12	Function and communication modules
8/13	ET 200S
8/15	ET 200X
8/15	ET 200U
8/15	ET 200B
8/16	SIWAREX M
8/17	<b>Connecting PROFIBUS-PA to AS 488/TM</b>



# Process I/Os

## Introduction

### Overview

A wide range of SIMATIC ET 200B, ET 200M, ET 200S, ET 200X and ET 200U <sup>1)</sup> distributed I/O systems with a comprehensive selection of I/O modules is available for the AS 488/TM for the acquisition and output of process signals via sensors and actuators. The I/O modules of the ET 200M distributed I/O system specially tailored for process engineering are particularly recommendable. The distributed I/O systems are connected to the automation systems via the PROFIBUS-DP fieldbus. Up to two PROFIBUS-DP lines with up to 122 stations each (max. 976 I/O modules) can be connected per automation system via IF 964-DP interface modules.

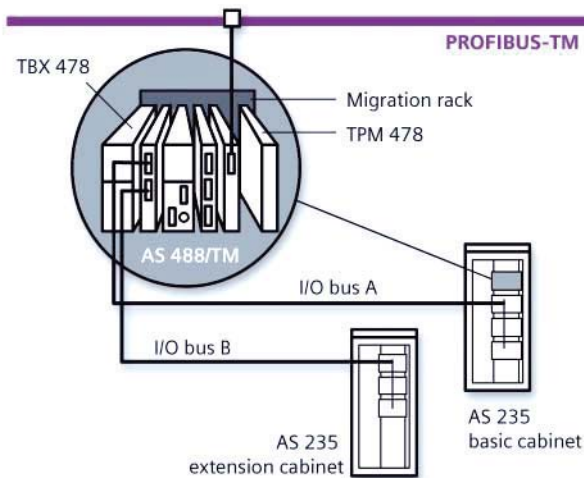
SIWAREX M function modules of SIMATIC S7-300 design can also be used in the ET 200M distributed I/O system for weighing and dosing tasks.

In addition, a large number of devices possessing a DP interface can also be operated on the PROFIBUS-DP of the AS 488/TM. For example, DP interfaces integrated in the CPU modules of the SIMATIC S7-300 permit simple connection of slaves to the AS 488/TM. Using gateway modules on the PROFIBUS-DP (DP/PA link, DP/AS-i link, DP/DP coupler), access to the PROFIBUS-PA and AS-I fieldbuses and to the I/O buses of SIMATIC PCS 7, S7-300, S7-400 or systems from other vendors is made possible.

The migration facilitates with the AS 488/TM automation system also permit existing TELEPERM M I/O modules to be connected via two I/O bus interfaces and used further.

1) ET 200U is no longer actively marketed

## Connecting TELEPERM M I/Os



## Overview

In existing TELEPERM M systems, AS 220 S, AS 230, AS 230 K, AS 235 or AS 235 K automation systems are replaced by migration with AS 488 S (cabinet design) or AS 488 K (compact design). System integration is carried out in each case using so-called migration racks (MIG I/MIG II for AS 488 S or MIG K for AS 488 K). The migration rack together with the TPM 478 and TBX 478 interface modules also comprises the interface to the TELEPERM M I/Os in the extension units of the TELEPERM M cabinets and in the ES 100 K extension systems. Data exchange is via the I/O buses A and B of the TBX 478 interface module.

As with the AS 230 / AS 235, up to three expansion units in the basic cabinet as well as an external ES 100 K can be operated on the I/O bus A of an AS 488 S. Following replacement of the ribbon cable for the I/O bus, up to four extension units of an AS 230 / AS 235 extension cabinet can be connected via the I/O bus B. When carrying out migration with AS 488/TM it is therefore possible to add a fourth extension unit to an AS 235 extension cabinet of maximum configuration. There is therefore no limitation with respect to the number of migratable I/O modules for an AS 230 / AS 235 configured with the maximum number of TELEPERM M I/O modules.

The AS 488 K with its MIG K migration rack has a design equivalent to that of an AS 235 K. The MIG K migration rack has five slots for TELEPERM M I/O modules. 2 x 4 compact ES 100 K extension systems can be connected via these 5 slots using the serial coupling known from the AS 235 K. These extension systems can be located up to 500 m away from the AS 488 K automation system, and are therefore highly suitable for a distributed design.

The TPM 478 interface module additionally permits connection of an AS 488/TM system to the CS 275 bus system. However, the AS 488/TM automation system must not be connected simultaneously to the PROFIBUS-TM bus system.

## TBX 478 interface module

The TBX 478 interface module together with the TPM 478 interface module links the I/O modules of the TELEPERM M system to the AS 488/TM system.

The following interfaces are present on the TBX 478 module:

- Interface to the TPM 478 module for implementation of the two TELEPERM M I/O buses A and B
- 2 remote interfaces connected via cables:
  - for connecting the I/Os in the basic cabinet (I/O bus A) and extension cabinet (I/O bus B), with incorporation of the I/O slots of the MIG II migration rack (cabinet design) or
  - for connecting the I/O slots of the MIG K migration rack to I/O bus A and I/O bus B (compact design)
- Interface for "+5 V bus" for power supply to TELEPERM M extension units (cabinet connections)
- Interface to the backplane bus for power supply to the "+5 V bus" from the power supply module of the automation system.

The TBX 478 module need not be parameterized. It is provided with data from the TPM 478 module.

The configuration parameters for the I/O area are defined using the PROGRAF AS+/NT configuration tool and the SYST.WART maintenance component, and subsequently saved permanently on the memory card. The new or modified parameters are activated when recalled.

Two sets of ribbon cables are available for assigning the 5 I/O slots of the MIG II migration rack to I/O buses A and B. The assignment of the 5 I/O slots of the MIG K migration rack to I/O buses A and B is fixed, and cannot be changed.

A list of the TELEPERM M I/O modules which can be operated with the AS 488/TM automation system is available on the Internet.

Additional information is available in the Internet under:



[www.siemens.com/teleperm](http://www.siemens.com/teleperm)

## Ordering Data

## TPM 478 interface module

for connection to the CS 275 system bus and the TELEPERM M I/O modules

## TBX 478 interface module

for connection to TELEPERM M I/O modules (I/O buses A/B)

Cables for connection to 20 m local bus

## Set of ribbon cables

for assigning the 5 I/O slots of the MIG II migration rack to I/O buses A and B

## Set of ribbon cables

for connecting the 5 I/O slots of the MIG II migration rack to I/O bus A

## Order No.

**6ES7 478-2DA01-0AC0**

**6ES7 478-2DX00-0AA0**

See Section „Bus communication“ - „CS 275“

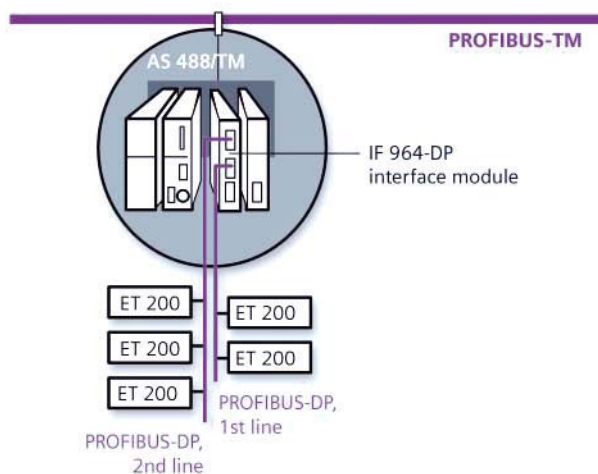
**C79451-A3496-D2**

**C79451-A3496-D1**



# Process I/Os

## Connecting SIMATIC I/Os



### Overview

In addition to the migration of existing TELEPERM M I/Os, all versions of the AS 488/TM automation system can also be extended by distributed I/Os on the PROFIBUS-DP. In addition to the ET 200M system with a comprehensive range of I/O modules especially tailored for process engineering, the SIMATIC ET 200B, ET 200S, ET 200iS (available soon), ET 200X and ET 200U (no longer actively marketed) systems are also suitable. A comprehensive range of compact modules in casings and for operation without fans is therefore available in the form of modular, distributed units for automation.

The ET 200M I/O system designed for the complex demands of process engineering is suitable for both cabinet and wall mounting. The system has a comprehensive range of input/output modules:

- Standard signal modules with module-specific diagnostics
- Standard function modules with autonomous preprocessing, e.g. for dosing and counting
- Ex signal modules for connection of intrinsically-safe sensors and actuators in zone 1 or 2 of hazardous plants.

Two PROFIBUS-DP interfaces are available for connecting the SIMATIC distributed I/Os to the AS 488/TM automation systems. Up to 122 stations, and thus max. 976 I/O modules, can be connected per PROFIBUS-DP line.

### Interface module for connection to PROFIBUS-DP

The IF 964-DP interface module, which can be plugged into the EXM 478 extension module, is required to connect the PROFIBUS-DP fieldbus to the automation systems and the AS 488/TM.

### Communication via the PROFIBUS-DP fieldbus

The PROFIBUS-DP fieldbus is standardized according to EN 50 170, Part 3. It permits communication between the AS 488/TM automation systems and ET 200 distributed I/O systems, CPUs/CPs with DP interface, DP-oriented operation and monitoring devices, and PROFIBUS field devices conforming to the standard.

Up to 122 stations can be connected to an automation system via each of the 2 physically isolated lines of the PROFIBUS-DP fieldbus. The AS 488/TM system functions as the master. Data transmission is possible on two-wire cables or fiber-optic cables.

The second PROFIBUS-DP line is already available as standard. It is connected via a further IF 964 interface module on the EXM 478 module. A DP2-INI initialization file is loaded by the commissioning terminal onto the memory card with the system software in order to activate the AS interface for the second PROFIBUS-DP line.

### Bus stations on the DP bus

The AS 488/TM automation system is the DP master and thus the active station in each case. Passive stations (DP slaves) can be:

- ET 200M, ET 200S, ET 200iS (to the extent of a standard slave; available soon), ET 200X, ET 200B and ET 200U distributed I/O systems
- SIMATIC S7 CPU 31x-2 DP automation systems with DP slave interface
- SIMATIC S7-300 communications modules with DP slave interface
- DP/DP coupler for connecting the PROFIBUS-DP of a system from other vendor
- SIMATIC S5-115U, S5-135U and S5-155U programmable controllers (with IM 308-C as DP slave)
- SIMATIC S5-95U/DP slave automation system
- Windows-based HMI systems such as OP170S, MP290, MP370
- Field devices (also from other vendors), e.g. drives, valves and process controllers
- SIMATIC S7-315-2 DP (slave) automation system

### Configuring

The tools available for configuring, parameterization, commissioning and diagnostics of the PROFIBUS-DP are easy to use. The master interfaces of the automation systems can be configured using the COM PROFIBUS parameterization software. PROGRAF AS+/NT is preferably used to configure the driver blocks in the CPU. The commissioning terminal can also be used for this during the commissioning phase.

### Process image

The central processing unit of the automation systems communicates with the I/O modules via a process image (current process data). Module assignments and addresses are defined by the configuration. To achieve this, the associated driver block is parameterized with the module number via the process image in the same manner as for the AS 235 system. SYST.WART is used to assign the module number to the station address.

### Network configuration

The possible network configurations of the PROFIBUS-DP correspond to those of the PROFIBUS-TM system bus (see Section "Bus communication").

## Connecting SIMATIC I/Os

### COM PROFIBUS

COM PROFIBUS is a tool used for fieldbus configuring and for parameterization of the bus stations prior to commissioning. COM PROFIBUS can be installed on the commissioning terminal or on a PC/programming device with Microsoft Windows 95/98/Me/NT/2000.

The tasks of COM PROFIBUS include configuration of the fieldbus, generation of the address list, parameterization of slave modules, setting of the transmission rate on the fieldbus, and setting of the failure response.

Slave modules from other vendors can also be parameterized. The vendors usually enclose type/GSD files with their products for linking into the parameterization tools. If these type/GSD files are not available, you can also obtain them using the support services on the Internet sites of the respective vendors or of the PNO (PROFIBUS International). According to EN 50 170, Part 3, these files can also be generated using the master device data if you are sufficiently knowledgeable.

### Technical Specifications

#### PROFIBUS-DP quantity breakdown

PROFIBUS-DP according to standard	EN 50 170, Part 3
Quantity	
• DP lines	2
• Stations per line	Up to 122
• I/O modules per line	Max. 976
Inputs and outputs per slave	Max. 122 byte
Transmission rate	1.5 Mbit/s

#### Note:

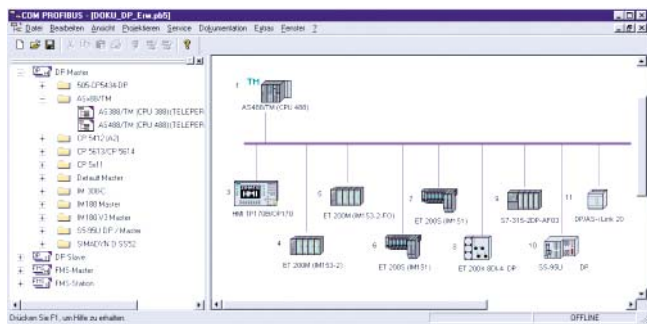
Max. 7 analog input modules (AI) can be plugged into an ET 200M because of the consistent data transmission requirements and the corresponding limit of 122 byte. The 8th module can be a binary input module (BI), a binary output module (BO) or an analog output module (AO).

### Ordering Data

	Order No.
<b>IF 964-DP interface module</b> for connecting an AS 388/TM or AS 488/TM automation system to PROFIBUS-DP	<b>6ES7 964-2AA01-0AB0</b>
<b>COM PROFIBUS parameterization software</b> for Windows 95/98/Me/NT/2000, on CD-ROM, five languages, with manual on CD-ROM, German	<b>6ES5 895-6SE03</b>

# Process I/Os

## DP extensions for AS 488/TM



### Overview

Starting with the AS 488/TM system software M01.00, the ET 200M, ET 200U and ET 200B distributed I/O systems are explicitly released for the AS 488/TM as remote I/Os on the PROFIBUS-DP. Use of these systems on the AS 488/TM was supported by the DP4E/DP4A and DPBE/DPBE driver blocks right from the beginning. S5 and S7 formats could be used for the raw analog values.

Connection of other standard DP slaves from the product ranges of Siemens and other vendors was assured as far as communication was concerned; however, support with respect to conversion of analog values and acquisition of diagnostics data could not be assured in all cases.

The DP extensions for AS 488/TM, which require the AS 488/TM system software M01.06 or M02.00, extend the AS x88/TM by the following functions:

- Support of further DP ranges and devices
  - ET 200S, ET 200X
  - Links with DP/AS-i conversion (link 20 and link 65) as well as CP 342-2 communications processor for ET 200M for linking of the AS-I fieldbus
  - IM 153-2 and IM 153-2 FO
  - SIMATIC S7 CPU 315-2 DP and SIMATIC S5-95U
- Additional DP4E/DP4A driver blocks with new types of format for analog values
  - 4-byte integers (long integers)
  - S7/IEEE floating-point numbers (only supported if at least the small PROFIBUS-PA license is present)
  - S5 floating-point numbers
- HMI driver block with server functions for the TP170B, OP170B, MP270 and MP370 panels based on Microsoft Windows
- Increase in number of DP slaves per DP line to 122
- The user documentation includes information and examples on configuring and diagnostics.

**Note:**

The system software M02.01 or M01.07 already supports the AS 488/TM as standard for the maximum number of 122 DP slaves per DP line as well as hot swapping of ET 200S and ET 200M with IM 153-2 or IM 153-2 FO.

The HMI driver block is not suitable for use of panels belonging to the older generation (e.g. OP37). These cannot be directly connected to the DP line of the AS 488/TM via their DP interface, but have to be linked, for example, via an intermediate S7-300 station with CPU 315-2DP. An example configuration is shown in the user documentation.

### Mode of operation

#### Driver blocks

Driver name	Description
DP4E	Input block for four input values as long integer, S7/IEEE and S5 floating-point numbers, and conversion into TM floating-point numbers
DP4A	Output block for four TM floating-point numbers following previous conversion into long integer, S7/IEEE and S5 floating-point numbers
HMI	Downloadable block (version V3.0 onwards) with server functions for operation of Windows-based TP170B and OP170B panels and MP270 and MP370 multipanels

The DP4E/DP4A driver blocks support use of the COUNT module of ET 200S, amongst others.

The DP4E/DP4A driver blocks directly convert TM floating-point numbers and floating-point numbers in SIMATIC S5 format (KG format) so that S5 components or components from other vendors which support the KG format can be directly operated. If the AS 488/TM has a PROFIBUS-PA license, the direct exchange of IEEE floating-point numbers is possible between AS 488/TM and the SIMATIC S7 station or the device from another vendor. Without a PROFIBUS-PA license for the AS 488/TM, the floating-point numbers must be converted on the S7 station or the device from another vendor into the KG format if they are to be transported via the DP interface.

The maximum number of 122 DP slaves on a DP line can only be reached if each DP slave does not occupy more than 64 byte input data and 64 byte output data.

### Ordering Data

**Program package "DP extensions for AS x88/TM"**

comprising:

- 3.5" program diskettes
  - Driver blocks (partially integrated in system program, partially downloadable)
  - Extension of PROFIBUS-DP communications interface
  - User documentation in German and English
  - Initialization software for operation of the second DP line
- Product documentation in German and English

The program package "DP extensions for ASx88/TM" can be used for AS x88/TM from version M01.06 or M02.00 onwards

**Order No.**  
**C79451-A3496-D900**

## ET 200M packaging system

**ET 200M**

The following types of I/O modules can be operated in ET 200M systems on AS 488/TM automation systems:

- Standard S7-300 signal modules
- I & C I/O modules with enhanced diagnostics capability
- Ex input/output modules

DP driver blocks are assigned to the modules when configuring with PROGRAF AS+/NT or ASBEDIEN.

The I & C modules with diagnostics capability offer channel-based fault displays, internal module monitoring, diagnostics alarms, or the freezing of the last value or connection of a default value upon failure of the CPU or the load power supply. They recognize channel faults and module-internal faults, and can signal these events to the AS 488/TM automation systems where they are made available at a user interface for further evaluation.

**Overview**

The ET 200M modular I/O system with degree of protection IP 20 can be extended by signal modules and function modules of the SIMATIC S7-300 automation system. The wide range of modules means that it is suitable for individual or complex automation tasks.

The ET 200M is a passive station (slave) on the PROFIBUS-DP fieldbus. Communication via the bus system is by means of the master interface module in the automation system and the IM 153 interface module (IM 153-1, IM 153-2 or IM 153-2 FO).

The ET 200M I/O system has diagnostics functions for:

- Module faults
- Short-circuit of outputs
- Bus faults, i.e. faulty data transmission
- DC 24 V load power supply
- Hot swapping of I/O modules.

Diagnostics data are evaluated decentrally using diagnostics LEDs on the ET 200M, or centrally by means of the CPU in the automation system (station-specific or code-specific diagnostics). All acquired diagnostics data are additionally available at a diagnostics interface.

The ET 200M can be operated with two types of design:

- Design with bus connectors
- Design with active bus modules (swapping of modules possible during operation).

The ET 200M comprises:

- IM 153 interface module for connection to PROFIBUS-DP  
A connection to PROFIBUS-DP with fiber-optic technology is possible via integral interfaces on the IM 153-2 FO or via additional OLMs (optical link modules) or OBTs (optical bus terminals).
- Various I/O modules connected by means of bus connectors, or plugged onto active bus modules.
- A power supply if necessary.

The modules are mounted on a DIN rail. The arrangement is set during the hardware configuring with COM PROFIBUS.

# Process I/Os

## ET 200M packaging system

### Design

#### Simple packaging system with bus connectors

The simple packaging system with SIMATIC S7-300 bus connectors makes the ET 200M flexible and easy to service:

- **Module installation**  
Simply hook the modules into the DIN rail, swing into place, and screw tight.
- **Integral backplane bus**  
The backplane bus is integrated into the modules. Bus connectors which are plugged into the rear of the housing are used to connect the modules.

The DIN rail is available in various lengths. The 482-mm rail is recommended for the ET 200M.

#### Packaging system with active bus modules (with hot swapping function)

If it is necessary to replace modules during operation of a system for reasons of increased availability, the hot swapping system is appropriate as an ET 200M version with active bus modules.

This system permits hot swapping of modules without having to switch off the associated ET 200M. The hot swapping system consists of backplane modules from which a backplane of the required length can be produced, and a matching rail. A complete system can be ordered for the standard length of 19 inches (482 mm).

Please refer to the individual components listed in the ordering data for further configuration with bus connectors, bus modules etc.

#### Note:

Please note that a PS 307 load power supply must be inserted per hot swapping system if a central DC 24 V supply is absent.

#### Installation

The bus modules are swung into the DIN rail, pushed next to one another, or secured by plug connections at the side. The modules can then be swung into the bus modules and screwed tight, whereupon they make contact with the plug of the bus module.

Plugs of unused slots are protected by backplane covers, and a bus module cover is plugged onto the side of the last bus module.

#### Components for both packaging systems

When using the ET 200M I/O system in power supplies with AC 120 V/230 V, the PS 307 load power supply is connected prior to the IM 153 interface module.

The IM 153 interface module is required to connect the ET 200M modular I/O system to PROFIBUS-DP. With this module, the ET 200M I/O system operates as a slave on the PROFIBUS-DP. Up to 8 I/O modules from the SIMATIC S7 range can be connected to the IM 153 interface module.

### Ordering Data

	Order No.
<u>Packaging system with bus connectors</u>	
<b>DIN rail</b> 482 mm long	<b>6ES7 390-1AE80-0AA0</b>
<u>Packaging system with active bus modules</u>	
<b>DIN rail for active bus modules</b> for max. 5 active bus modules, for hot swapping function 482 mm long (19 inch)	<b>6ES7 195-1GA00-0XA0</b>
<u>Active bus modules</u>	
<b>BM PS/IM for power supply and IM 153, incl. 1 bus model cover</b>	<b>6ES7 195-7HA00-0XA0</b>
<b>BM 2x40 for two 40-mm modules</b>	<b>6ES7 195-7HB00-0XA0</b>
<b>BM 1x80 for one 80-mm module</b>	<b>6ES7 195-7HC00-0XA0</b>
<b>Covers</b> Pack with 4 backplane covers and 1 bus module cover	<b>6ES7 195-1JA00-0XA0</b>
<b>Ex partition</b>	<b>6ES7 195-1KA00-0XA0</b>
<u>Alternative to single components</u>	
<b>I/O subsystem ZuS</b> ET 200M with hot swapping of modules, comprising DIN rail for 482-mm (19-inch) active bus modules, IM 153-1 interface module and PS/IM bus module for IM 153	<b>6ES7 654-0XX01-1XA0</b>
<u>Components for both packaging systems</u>	
<b>PS 307 load power supply</b> incl. power connector; primary AC 120/230 V, secondary DC 24 V	
<b>PS 307-1E</b> <b>5 A; 80 mm wide</b>	<b>6ES7 307-1EA00-0AA0</b>
<b>PS 307-1K</b> <b>10 A; 200 mm wide</b>	<b>6ES7 307-1KA00-0AA0</b>
<b>PS 307-1B</b> <b>2 A; 50 mm wide</b>	<b>6ES7 307-1BA00-0AA0</b>
<b>IM 153-1 interface module</b> DP slave interface module for connecting an ET 200M to PROFIBUS-DP; max. 8 S7-300 modules	<b>6ES7 153-1AA03-0XB0</b>
<b>IM 153-1 interface module</b> DP slave interface module for connecting an ET 200M to PROFIBUS-DP; for extended temperature range; max. 8 S7-300 modules	<b>6ES7 153-1AA83-0XB0</b>
<b>IM 153-2 interface module</b> DP slave interface module for connecting an ET 200M to PROFIBUS-DP; max. 8 S7-300 modules	<b>6ES7 153-2AA02-0XB0</b>
<b>IM 153-2 FO interface module</b> DP slave interface module for connecting an ET 200M to PROFIBUS-DP; with integral fiber-optic interface; max. 8 S7-300 modules	<b>6ES7 153-2AB01-0XB0</b>
<b>RS 485 bus connector</b> with angled cable outlet, max. transmission rate 12 Mbit/s, with PG interface	<b>6ES7 972-0BB41-0XA0</b>



**Overview**

In conjunction with the AS 488/TM automation systems, the following I/O modules of the SIMATIC S7-300 automation system can be used in ET 200M I/O systems:

**SM 321 digital input modules**

Digital input modules convert the levels of the external digital signals from the process into the internal signal level of the automation system. They are suitable for connection of standard switches and two-wire proximity switches (BERO).

**SM 322 digital output modules**

Digital output modules convert the internal signal level of the automation system into the external signal levels required for the process. They are suitable e.g. for connecting solenoid valves, contactors, small-power motors, lamps and motor starters.

**SM 323 digital input/output modules**

Digital input/output modules have both digital inputs and digital outputs on one module.

**SM 331 analog input modules**

Analog input modules convert analog signals from the process into digital signals for internal processing within the automation system. Connectable sensors include voltage and current transmitters, thermocouples, resistors and resistance thermometers.

**SM 332 analog output modules**

Analog output modules convert digital signals from the automation system into analog signals for the process.

**Ordering Data****SM 321 digital input modules**

- 16 inputs, DC 24 V
- 16 inputs, DC 24 V, active low
- 16 inputs, DC 24 V, extended temperature range
- 32 inputs, DC 24 V
- 32 inputs, DC 24 V, extended temperature range
- 16 inputs, DC 48 to 120 V, extended temperature range

- 32 inputs, AC 120 V
- 8 inputs, AC 120/230 V
- 8 inputs, AC 120/230 V, extended temperature range
- 16 inputs, DC 24 V
- 16 inputs, DC 24 V, extended temperature range

**SM 322 digital output modules**

- 8 outputs, DC 24 V/2 A
- 16 outputs, DC 24 V/0.5 A
- 16 outputs, DC 24 V/0.5 A, extended temperature range
- 32 outputs, DC 24 V/0.5 A
- 8 outputs, DC 48 to 120 V/1.5 A, extended temperature range
- 32 outputs, AC 120 V/1 A
- 8 outputs, AC 120/230 V/1 A
- 8 outputs, relay contacts
- 8 outputs, relay contacts, 5 A
- 8 outputs, relay contacts, AC 230 V/5 A, extended temperature range
- 16 outputs, relay contacts, 8 A
- 8 outputs, DC 24 V/0.5 A, redundancy possible
- 8 outputs, DC 24 V/0.5 A, extended temperature range

**Order No.**

6ES7 321-1BH02-0AA0  
 6ES7 321-1BH50-0AA0  
 6ES7 321-1BH82-0AA0  
 6ES7 321-1BL00-0AA0  
 6ES7 321-1BL80-0AA0  
 6ES7 321-1CH80-0AA0  
 6ES7 321-1EL00-0AA0  
 6ES7 321-1FF01-0AA0  
 6ES7 321-1FF81-0AA0  
 6ES7 321-7BH00-0AB0  
 6ES7 321-7BH80-0AB0  
 6ES7 322-1BF01-0AA0  
 6ES7 322-1BH01-0AA0  
 6ES7 322-1BH81-0AA0  
 6ES7 322-1BL00-0AA0  
 6ES7 322-1CF80-0AA0  
 6ES7 322-1EL00-0AA0  
 6ES7 322-1FF01-0AA0  
 6ES7 322-1HF01-0AA0  
 6ES7 322-1HF10-0AA0  
 6ES7 322-1HF80-0AA0  
 6ES7 322-1HH00-0AA0  
 6ES7 322-8BF00-0AB0  
 6ES7 322-8BF80-0AB0



# Process I/Os

## ET 200M modules

### SM 323 digital input/output modules

- 8 inputs, 8 outputs
- 8 inputs, 8 outputs, extended temperature range
- 16 inputs, 16 outputs

**6ES7 323-1BH01-0AA0**

**6ES7 323-1BH81-0AA0**

**6ES7 323-1BL00-0AA0**

### SM 331 analog input modules

- 2 inputs, 12 to 14 bit
- 2 inputs, 12 to 14 bit, extended temperature range
- 8 inputs, 14 bit, 20 ms conversion time/channel
- 8 inputs, 15 bit
- 8 inputs, 16 bit
- 8 inputs, for thermal resistors, 16 bit
- 8 inputs, for thermocouples, 16 bit

**6ES7 331-7KB02-0AB0**

**6ES7 331-7KB82-0AB0**

**6ES7 331-7KF02-0AB0**

**6ES7 331-7NF00-0AB0**

**6ES7 331-7NF10-0AB0**

**6ES7 331-7PF00-0AB0**

**6ES7 331-7PF10-0AB0**

### SM 332 analog output modules

- 2 outputs, 12 bit
- 2 outputs, 12 bit, extended temperature range
- 4 outputs, 12 bit
- 4 outputs, 15 bit

**6ES7 332-5HB01-0AB0**

**6ES7 332-5HB81-0AB0**

**6ES7 332-5HD01-0AB0**

**6ES7 332-7ND00-0AB0**

### SM 334 analog input/output modules

- 4 inputs, 2 outputs
- 4 inputs, 2 outputs, Pt 100 resistance measurement
- 4 inputs, 2 outputs, Pt 100 resistance measurement, extended temperature range

**6ES7 334-0CE01-0AA0**

**6ES7 334-0KE00-0AB0**

**6ES7 334-0KE80-0AB0**

### SM 335 analog input/output modules

- 4 inputs, 4 outputs, 1 pulse input and sensor supply

**6ES7 335-7HG01-0AB0**

### Overview

The following Ex I/O modules can be used in ET 200M I/O systems operated together with AS 488/TM automation systems:

#### Ex digital input/output modules [EEx ib]

Ex digital input module 321-7RD	4 inputs, floating, NAMUR
Ex digital output module 322-5SD	4 outputs, floating, DC 24 V, 10 mA
Ex digital output module 322-5RD	4 outputs, floating, DC 15 V, 20 mA

#### Intrinsically-safe equipment which can be connected

Digital input	Initiators according to DIN 19 234, wired mechanical contacts
Digital output	Solenoid valves, signalling lamps, LEDs

#### Ex analog input/output modules [EEx ib]

Ex analog input module 331-7RD	4 inputs, floating, 0/4 to 20 mA, 15 bit
Ex analog input module 331-7SF	8/4 inputs, floating, for thermocouples and Pt 100, Pt 200, Ni 100
Ex analog output module 332-5RD	4 outputs, floating, 0/4 to 20 mA

### Ordering Data

#### SM 321 Ex digital input module [EEx ib]

4 inputs, floating, NAMUR

#### SM 322 Ex digital output module [EEx ib]

4 outputs, floating, DC 15 V/20 mA

4 outputs, floating, DC 24 V/10 mA

#### SM 331 Ex analog input module [EEx ib]

4 inputs, floating, DC 0 V/4 20 mA; 15 bit

8/4 inputs, floating, for thermocouples and Pt 100, Pt 200, Ni 100; 15 bit

#### SM 332 Ex analog output module [EEx ib]

4 outputs, floating, 0/4 to 20 mA; 15 bit

#### Order No.

**6ES7 321-7RD00-0AB0**

**6ES7 322-5RD00-0AB0**

**6ES7 322-5SD00-0AB0**

**6ES7 331-7RD00-0AB0**

**6ES7 331-7SF00-0AB0**

**6ES7 332-5RD00-0AB0**

# Process I/Os

## Function and communications modules

### Overview

Special function and communications modules can be operated in the ET 200M I/O systems connected to the AS 488/TM automation system via PROFIBUS-DP. These include:

- SIWAREX M function module with weighing and dosing electronics for implementation of scales and for controlling dosing units**  
 The AS 488/TM automation system additionally requires the SIWA driver block for this function module. See the section on SIWAREX M for further information and ordering data on the SIWA driver block.
- CP 343-2 communications processor for linking the AS-I fieldbus**  
 See section on DP extensions for AS 488/TM for information on configuring and diagnostics.  
 Note: It is also possible to use the CP 342-2 communications processor (which is no longer available) instead of the CP 343-2.
- FM 350-1 single-channel counter module**  
 The AS 488/TM requires special driver blocks for operation of the FM 350 counter module.  
 These can be obtained on request from:  
 I&S IT PS, Karlsruhe  
 Mr. Heid  
 Tel. +49 721 595-6380  
 Fax. +49 721 595-6383  
 E-mail: Roland.Heid@siemens.com

### Ordering Data

#### FM/CP modules

##### CP 343-2 communications processor

for connection of SIMATIC S7-300 and ET 200M to AS-Interface; without front connector

##### SIWAREX M function module

Weighing and dosing system

##### FM 350-1 counter module

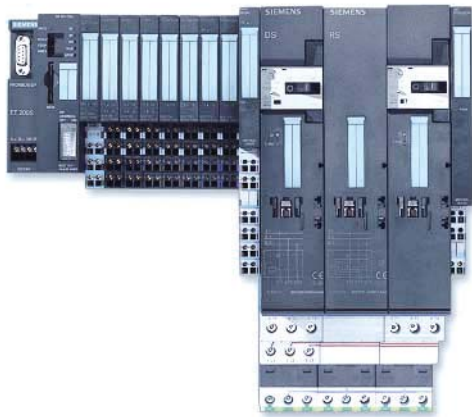
with 1 channel, max. 500 kHz; for incremental sensor

#### Order No.

**6GK7 343-2AH00-0XA0**

**7MH4 553-1AA41**

**6ES7 350-1AH02-0AE0**



### Overview

The ET 200S is a bit-modular distributed I/O system with degree of protection IP 20. The bit modularity of the ET 200S permits optimum, rapid adaptation to the respective automation task. The setting-up times can be minimized even with frequently changing demands by replacing or combining various I/O modules. The range of I/Os includes analog and digital signal modules, process modules and consumer feeders (modules for switching and protecting three-phase consumers up to 5.5 kW).

The ET 200S has a design with independent wiring, i.e. the wiring is carried out using terminal modules which function as a supporting system for power modules, electronics modules and consumer feeders. The terminal modules are latched onto a rail according to EN 50 022 and can be prewired and tested without I/O modules. This design also supports hot swapping of I/O modules.

### Design

The following components are available for the ET 200S distributed I/O system:

- Interface module to connect the ET 200S to the PROFIBUS-DP (IM 151 or IM 151 FO), or alternatively
- IM 151/CPU or IM 151/CPU FO with additional integrated CPU 314 for preprocessing of process data
- Terminal modules for DIN rail mounting including terminals (keyed connection system permits increased vibration resistance of 5 g); rail system for power modules, electronics modules and consumer feeders
- Power modules for electronics modules and consumer feeders; for monitoring and fusing the load and sensor power supplies, and for monitoring the auxiliary voltages for a group of consumer feeders
- Electronics modules: analog and digital I/O modules, as well as special process modules (e.g. for recording SSI sensor values, or for universal counter functions)
- Consumer feeders (modules for switching and protecting any three-phase consumers up to 5.5 kW)
  - Direct starters
  - Reversing starters

#### Configuration limits when used on AS 488

Up to 32 modules can be inserted per I/O system.

The maximum address range of all inserted I/O modules is 122 byte for input data and 122 byte for output data. This limit is irrelevant to the CPU version.

The maximum number of parameters is limited to 244 byte per station. Process modules such as the counter module have long parameter sets, permitting the parameter limit to be reached prior to the limiting length of the process data.

### Configuration

#### Configuration and parameterization

The ET 200S distributed I/O systems are configured and parameterized using COM PROFIBUS.

# Process I/Os

## ET 200S

### ET 200S

#### Ordering Data

##### PROFIBUS interface modules

- IM 151 interface module for connection of ET 200S to PROFIBUS-DP; with RS 485 interface
- IM 151 FO interface module for connection of ET 200S to PROFIBUS-DP; with fiber-optic interface
- IM 151/CPU interface module
- IM 151/CPU FO interface module

##### Digital input modules

- 2 DI DC 24 V standard
- 2 DI DC 24 V high feature
- 4 DI DC 24 V
- 4 DI DC 24 V high feature
- 2 DI AC 120 V
- 2 DI AC 230 V

##### Digital output modules

- 2 DO DC 24 V/0.5 A standard
- 2 DO DC 24 V/0.5 A high feature
- 2 DO DC 24 V/2 A
- 2 DO DC 24 V/2 A high feature
- 4 DO DC 24 V/0.5 A
- 4 DO DC 24 V/2 A standard
- 2 DO AC 120/230 V/1 A
- 2 DO DC 24 V to AC 230 V/5 A relay

##### Order No.

**6ES7 151-1AA02-0AB0**

**6ES7 151-1AB01-0AB0**

**6ES7 151-7AA00-0AB0**

**6ES7 151-7AB00-0AB0**

**6ES7 131-4BB00-0AA0**

**6ES7 131-4BB00-0AB0**

**6ES7 131-4BD00-0AA0**

**6ES7 131-4BD00-0AB0**

**6ES7 131-4EB00-0AB0**

**6ES7 131-4FB00-0AB0**

**6ES7 132-4BB00-0AA0**

**6ES7 132-4BB00-0AB0**

**6ES7 132-4BB30-0AA0**

**6ES7 132-4BB30-0AB0**

**6ES7 132-4BD00-0AA0**

**6ES7 132-4BD30-0AA0**

**6ES7 132-4FB00-0AB0**

**6ES7 132-4HB00-0AB0**

##### Analog input modules

- 2 AI U standard
- 2 AI U high speed
- 2 AI U high feature
- 2 AI I standard 2-wire
- 2 AI I high speed 2-wire
- 2 AI I standard 4-wire
- 2 AI I high speed 4-wire
- 2 AI I high feature 2/4-wire (15 bit + sign)
- 2 AI RTD standard
- 2 AI TC standard

**6ES7 134-4FB00-0AB0**

**6ES7 134-4FB50-0AB0**

**6ES7 134-4LB00-0AB0**

**6ES7 134-4GB00-0AB0**

**6ES7 134-4GB50-0AB0**

**6ES7 134-4GB10-0AB0**

**6ES7 134-4GB60-0AB0**

**6ES7 134-4MB00-0AB0**

**6ES7 134-4JB50-0AB0**

**6ES7 134-4JB00-0AB0**

##### Analog output modules

- 2 AO U standard
- 2 AO U high feature
- 2 AO I standard
- 2 AO I high feature

**6ES7 135-4FB00-0AB0**

**6ES7 135-4LB00-0AB0**

**6ES7 135-4GB00-0AB0**

**6ES7 135-4MB00-0AB0**

##### Process modules

- 1COUNT  
24 V/100 kHz counter module for universal counting and measuring tasks with ET 200S; DP4E/DP4A driver blocks required
- 1COUNT  
5 V/500 kHz counter module for universal counting and measuring tasks with ET 200S; DP4E/DP4A driver blocks required  
The module interface is compatible with a released module.
- 1SI interface module  
ASCII and 3964(R) protocols

**6ES7 138-4DA01-0AB0**

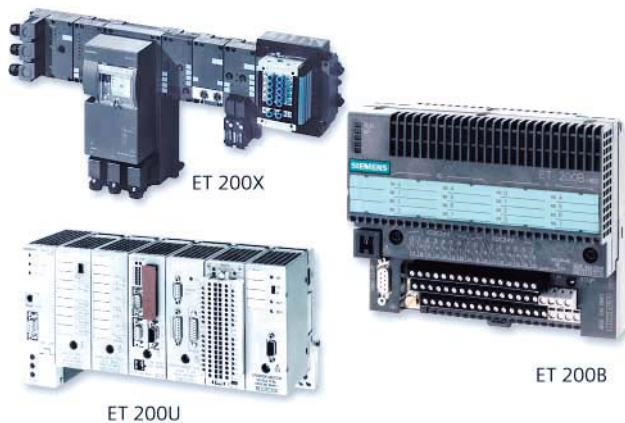
**6ES7 138-4DE00-0AB0**

**6ES7 138-4DF00-0AB0**

# Process I/Os

## ET 200S

### ET 200X, ET 200U and ET 200B



#### ET 200X

The ET 200X distributed I/O system with its modular design and degree of protection IP 65/67 is predestined for use at machine level outside the control cabinet. The ET 200X consists of a basic module for connection to PROFIBUS-DP (optionally with PLC functionality) and max. 7 extension modules.

The extension modules are mounted side-by-side using integral connectors. All signal cables and supply voltages required for inputs and outputs are looped through. The modules can be replaced when servicing without having to dismount the complete station.

The following extension modules are available:

- Digital inputs/outputs
- Analog inputs/outputs
- Communications processor for linking to AS-Interface
- Pneumatics module with integral valves
- Pneumatics interface to accommodate a CPV valve island from FESTO (max. 1 per unit)
- Load feeders to control any three-phase consumers up to 5.5 kW at AC 400 V (max. 6 per unit)
- SITOP power DC 24 V power supply (option)

See Section "Distributed I/Os" in the mall/CA01 or Catalog IK PI for further information and ordering data.

#### ET 200U

ET 200U is a modular I/O system with degree of protection IP 20 which is no longer actively marketed. It comprises:

- An IM 318 interface module for connection to PROFIBUS-DP
- An internal bus designed using bus modules and with slots for I/O modules
- I/O modules from the SIMATIC S5-100U programmable controller range
- A power supply module if necessary.

The IM 318 interface module, bus modules and power supply module are mounted on a DIN rail.

The power supply module is only required if a DC 24 V supply is not available for the IM 318 interface module.

The ET 200U is a passive station (slave) on the PROFIBUS-DP.

I/O modules from the SIMATIC S5-100U programmable controller range can be used with the ET 200U.

#### Design

##### Standard modules

- Digital input/output module with 4, 8 or 16 channels
- Relay output module with 4 or 8 channels
- Analog input/output module with 2 or 4 channels

##### Ex modules

- Digital input/output module
- Analog input/output module

##### Function modules

- IP 262 closed-loop control modules for continuous controllers or pulse controllers

The RIP and KRIP drivers for the IP 262 closed-loop control modules are present as standard on the memory card of the AS 488/TM, and are installed each time commissioning is carried out.

##### Other modules

For all other I/O modules, you must check in each individual case whether operation with standard drivers is possible (on request).

See Catalog ST 50 from 1998 for further information and technical data on ET 200U (including I/O modules).

#### Ordering Data

##### IP 262 closed-loop control module

- With 3 analog outputs for 3 continuous controllers with analog output signals
- With 8 digital outputs for 4 continuous controllers with mark-space signals or for step controllers

##### Order No.

**6ES5 262-8MA13**

**6ES5 262-8MB13**

#### ET 200B

The ET 200B is a small, compact I/O system with degree of protection IP 20. It consists of a terminal block and an electronics block. The terminal block is the supporting assembly for an electronics block, and is available in various versions. Many different versions of electronics blocks are available with digital or analog input and output channels.

The ET 200B is primarily used where only a few inputs/outputs are required or where only a small mounting depth is available.

The interface for PROFIBUS-DP is integrated in the ET 200B. The ET 200B is a passive station (slave) on the PROFIBUS-DP.

The following electronics blocks are provided for use of the ET 200B as a distributed I/O system for AS 488/TM automation systems:

- Digital input, 16/32 channels, DC 24 V, non-floating
- Digital output, 16/32 channels, DC 24 V, floating/non-floating
- Relay module, 8 outputs, DC 24 V/60 V, floating
- Analog input, 4/8 channels, floating, for Pt 100/thermocouple,  $\pm 1.25$  V,  $\pm 2.5$  V,  $\pm 5$  V,  $\pm 10$  V, 0(4) to 20 mA
- Analog output, 4 channels,  $\pm 10$  V, +10 V,  $\pm 20$  mA, 0(4) to 20 mA

See Section "Distributed I/Os" in the mall/CA01 for further information, technical data and ordering data on the ET 200B.



# Process I/Os SIWAREX M

## SIWAREX M



### Overview

In a process engineering application, SIWAREX M handles execution of all weighing functions as well as the time-critical control of the dosing units (valves etc.) of dosing scales, independent of the time cycle of the automation system. Exact switching-off of the dosing valves is achieved in this manner, and thus an optimum of dosing accuracy.

SIWAREX M can be used to design net weight scales, single-component or multi-component scales, as well as multi-scale systems.

The downloadable SIWA driver block integrates the SIWAREX M weighing and dosing electronics with verification capability into the TELEPERM M process control system.

The SIWAREX M function modules are operated in ET 200M distributed I/O systems. It is irrelevant whether the ET 200M is connected to the automation system via line 1 or 2 of the PROFIBUS-DP. Up to seven SIWAREX M function modules can be plugged into an ET 200M of standard design with bus connectors. Up to four SIWAREX M function modules can be plugged into an ET 200M with active bus modules (for the hot swapping function).

### Configuration

#### SIWA driver block

The AS 388/TM and AS 488/TM automation systems additionally require the SIWA driver block for connection of SIWAREX M. SIWA is a standard AS function block with the system type number 138, and can be downloaded into the automation system via a commissioning terminal.

Users can call the following functions using so-called jobs:

- "Measure"
- "Tare"
- "Start"
- "Pause" (stopping of a dosing procedure)
- "Continue" (continuation of a dosing procedure)

Status scanning is additionally possible for diagnostics.

The listed jobs can be activated using operator-accessible elements and via configurable inputs. Following termination of a job by SIWAREX M, the driver block assumes the "Measure" status. Just like other operator-accessible blocks, SIWA also offers a status word which can be acknowledged by an operator system.

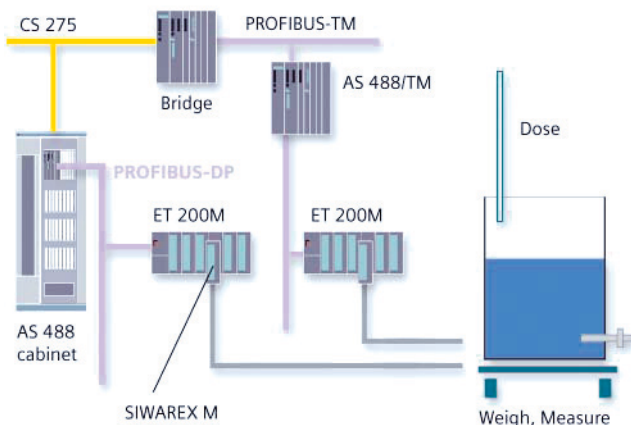
#### Note:

The SIWA driver block can only execute on the automation system whose serial number is stored in the SIWA software. If the SIWA driver block is subsequently ordered, it is therefore necessary to specify the memory card serial number of the automation system on which the SIWA is to be installed.

### Ordering Data

	Order No.
<b>SIWAREX M function module</b> Weighing and dosing system	<b>7MH4 553-1AA41</b>
<b>SIWA driver block</b> for AS 388/TM and AS 488/TM automation systems	<b>6DS5 470-1AD</b>

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Connection of SIWAREX M modules, configuration example

ET 200M with SIWAREX M function modules can be operated on lines 1 and 2 of the PROFIBUS-DP. Only one PROFIBUS-DP line is shown in this configuration example.

# Process I/Os PROFIBUS-PA

## Connecting PROFIBUS-PA to AS 488/TM



### Properties and application features of the PROFIBUS-PA

- Networking of transmitters, valves, actuators etc. via a serial bus system
- Communication-compatible extension of PROFIBUS-DP by transmission technology optimized for field devices
- Integration possible into existing fieldbus applications based on PROFIBUS-DP
- Power supply to field devices via data cable
- "Intrinsic safety" (type of protection EEx[i]) permits applications in hazardous area
- Transfer of automation functions (intelligence) into the field devices
- Remote parameterization, e.g. using Process Device Manager (PDM)
- Preventive maintenance and diagnostics
- Reduction in hardware and engineering costs by saving of I/O modules, cabling and connections
- Satisfies the requirements of the chemical and processing industries.

PROFIBUS-PA can be connected to the PROFIBUS-DP lines of the AS 488/TM either via the DP/PA link interface module IM 157 or via DP/PA couplers.

### Delivery forms

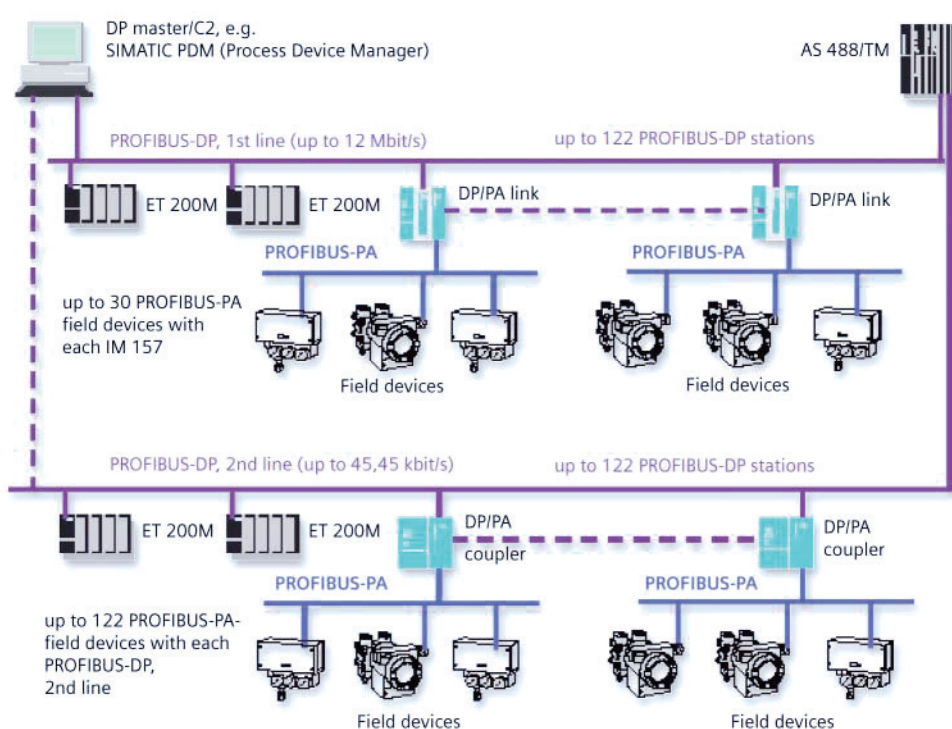
Connection of the PROFIBUS-PA to AS 488/TM is protected by a license program which is linked to the serial number of the AS 488 memory card. Licensing is available in two stages:

- Full license for connection of the PROFIBUS-PA via DP/PA link with transmission rate up to 12 Mbit/s and via DP/PA coupler with transmission rate of 45.45 kbit/s.
- Partial license for connection of the PROFIBUS-PA only via DP/PA coupler with transmission rate of 45.45 kbit/s.

### Overview

PROFIBUS-PA is a fieldbus specially designed for process engineering for networking field devices (sensors and actuators) over large distances, even in hazardous areas. Its communication is compatible with PROFIBUS-DP, and it is connected to the automation system via the latter. With the TELEPERM AS 488/TM automation system, connection of two PROFIBUS-DP lines with up to 122 stations each is possible.

The transmission technology of the PROFIBUS-PA corresponds to the international standard IEC 1158-2. A two-wire cable as the transmission medium permits connection of a power supply to the field devices in addition to data communication.



Configuration example of the PROFIBUS-PA connection to TELEPERM M

# Process I/Os

## PROFIBUS-PA

### Connecting PROFIBUS-PA to AS 488/TM

#### Design

##### Connection of PROFIBUS-PA using DP/PA coupler

The PROFIBUS-DP is connected to the AS 488/TM via an IF 964-DP interface module which can be plugged into an EXM 478 extension module.

DP/PA couplers are available in two versions: an Ex version with max. 100 mA output current and a non-Ex version with 400 mA output current. The DP/PA couplers are mounted together with a load power supply for DC 24 V on an S7-300 rail outside the hazardous area. A 9-pin Sub-D plug is used for connection to the PROFIBUS-DP.

Four screw terminals are available for the PROFIBUS-PA connection with the non-Ex version. The PROFIBUS-PA cable can be looped through if required, or terminated by a selectable resistor. With the intrinsically-safe Ex version, the DP/PA coupler is always at the end of the cable, and the terminating resistor is activated. Only two screw terminals are available for the PROFIBUS-PA connection.

Each PA field device occupies a PROFIBUS address on the DP line.

##### Connection of PROFIBUS-PA using DP/PA link

The PROFIBUS-DP is connected to the AS 488/TM via an IF 964-DP interface module which can be plugged into an EXM 478 extension module.

The DP/PA link comprises the IM 157 interface module and up to 5 DP/PA couplers which are connected together via S7-300 standard bus plugs. By combination of the IM 157 with Ex or non-Ex versions of the DP/PA coupler, DP/PA link versions can be generated for use in hazardous and non-hazardous areas. The DP/PA link is mounted together with a load power supply for DC 24 V on an S7-300 rail outside the hazardous area. A 9-pin Sub-D plug on the IM 157 interface module is used for connection to the PROFIBUS-DP.

Four screw terminals are available on the DP/AP couplers of the non-Ex version for the PROFIBUS-PA connection. The PROFIBUS-PA cable can be looped through if required, or terminated by a selectable resistor. With the intrinsically-safe Ex version, the DP/PA coupler is always at the end of the cable, and the terminating resistor is activated. Only two screw terminals are available for the PROFIBUS-PA connection.

Only the DP/PA links occupy a PROFIBUS address on the DP line. Each DP/PA link provides a separate address range for each of the subordinate PA field devices.

#### Mode of operation

Users have access to the field devices on the PROFIBUS-PA using downloadable PA driver blocks which are combined in a driver library. These driver blocks support the cyclic services of the PA profile, and permit productive operation of a large number of PA field devices from various vendors (e.g. Siemens, Endress+Hauser, Bürkert, Krohne, VEGA, NELES, etc.) which comply with this PA profile.

##### Limitation:

When linking PA field devices via the DP/PA link, the DP device must accept parameterization telegrams with a length of 10 byte.

Driver block	Description
PAAI	Analog input block for PROFIBUS-PA (representative of transmitter)
PAAO	Analog output block for PROFIBUS-PA (representative of actuators such as drives, controllers etc.)
PADI	Discrete value input block for PROFIBUS-PA
PADO	Discrete value block for PROFIBUS-PA (representative of actuators such as valves etc.)

The communications interface permits operation of the PROFIBUS-PA on the AS 488/TM, and thus also the coexistence of additional masters of class 2 on the PROFIBUS-DP, setting of 45.45 kbit/s as the transmission rate, as well as higher transmission rates up to 12 Mbit/s.

## Connecting PROFIBUS-PA to AS 488/TM

### Technical Specifications

Technical data	DP/PA link (IM 157)	DP/PA coupler only
Max. number of DP lines	2	2
Max. number of slaves per DP line	122	122
Number of bytes for inputs per DP slave	122	122
Number of bytes for outputs per DP slave	122	122
Max. number of PA field devices on an IM 157:		
• Digital	30	-
• Analog (process value: 4 bytes; status: 1 byte)	24	-
Average number of connectable PA field devices	122 * 10 = 1220	122
Exception: 12/8 bytes inputs/outputs per field device		
Max. number of PA transmitters on DP line	122 * 24 = 2928	122
Max. updating cycle on DP bus between master/slaves with 62 slaves	130 ms (I/O data: 120/40 bytes)	1700 ms (I/O data: 12/4 bytes)
Average updating cycle on DP bus between master/slaves with 62 slaves	90 ms (I/O data: 120/40 bytes)	870 ms (I/O data: 12/4 bytes)
Max. updating cycle on PA bus (IM 157/field devices) with 10 field devices	600 ms (I/O data: 120/40 bytes)	600 ms (I/O data: 12/4 bytes)
Average updating cycle on PA bus (IM 157/field devices) with 10 field devices	140 ms (I/O data: 120/40 bytes)	140 ms (I/O data: 12/4 bytes)

### Ordering Data

#### IM 157 interface module for DP/PA link

for extended temperature range

#### DP/PA coupler as non-intrinsically-safe version (non-Ex)

for transition in transmission technology from RS 485 to IEC 1158-2

#### DP/PA coupler as intrinsically-safe version (Ex)

for transition in transmission technology from RS 485 to IEC 1158-2

#### AS x88/TM-PA coupling software, full license

for connection of the PROFIBUS-PA to AS x88/TM via DP/PA link and DP/PA coupler, comprising

- Program diskette with
  - PA driver blocks
  - Extension of the AS x88/TM communications interface
  - Master type file for COM PROFIBUS
  - User's documentation
  - License program, full license
- Product information in German

#### AS x88/TM-PA coupling software, partial license

for connection of the PROFIBUS-PA to AS x88/TM via DP/PA coupler, comprising

- Program diskette with
  - PA driver blocks
  - Extension of the AS x88/TM communications interface
  - Master type file for COM PROFIBUS
  - User's documentation
  - License program, partial license
- Product information in German

#### Order No.

6ES7 157-0AA81-0XA0

6ES7 157-0AC80-0XA0

6ES7 157-0AD80-0XA0

6DS5 130-8AA

6DS5 130-8AB

# Process I/Os



# 9

## Bus communication



9/2	<b>PROFIBUS-TM</b>
9/5	<b>CS 275</b>
9/7	<b>CS-L2 bridge</b>
9/9	Central processing unit
9/10	Power supply modules
9/11	Connection to PROFIBUS-TM
9/11	Connection to CS 275
9/12	Packaging system
9/12	System software
9/12	Documentation





# Bus communication PROFIBUS-TM

## PROFIBUS-TM



### Overview

The AS 488/TM and AS 388/TM automation systems are connected to one another, to OS 525 or PCS7/TM-OS operator systems and to PCs/programming devices with the PROGRAF AS+/NT configuration software via the PROFIBUS-TM system bus.

The connection to PROFIBUS-TM is made:

- Using an EXM 478 extension module with IF 964 interface module for AS 488/TM systems and CS-L2 bridge
- Using an EXM 378-2 module with IF 964 interface module for AS 388/TM systems.

### Mode of operation

The PROFIBUS access procedure is similar to that of the CS 275 bus system, and operates according to the "Token passing" procedure corresponding to EN 50 170 (PROFIBUS). Characteristic for PROFIBUS-TM is that the TELEPERM M communication mechanisms of the CS 275 bus system are used, e.g. AKS, BKS, MKS and PL/PS telegrams, at the application level (interface between bus interface module and application) as an extension to the bus protocol according to EN 50 170. Since configuring of communication is identical for both system buses, the PROFIBUS-TM bus can be connected to the CS 275 bus via the CS-L2 bridge.

A data transmission rate of 1.5 Mbit/s is used for communication between the TELEPERM M components via the PROFIBUS-TM bus.

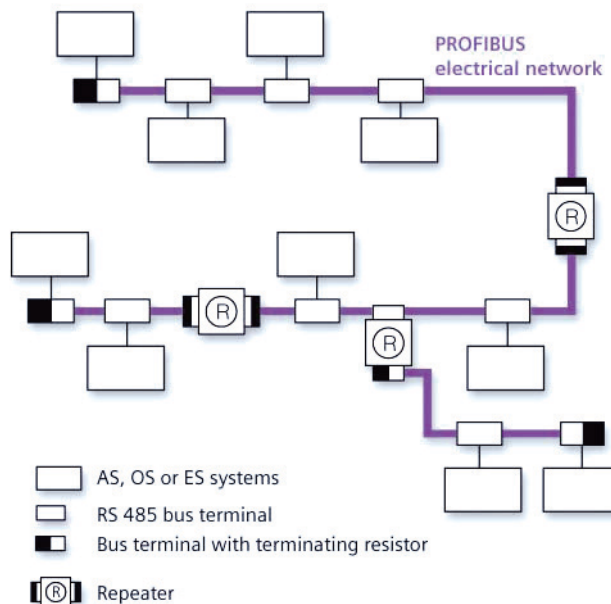
Despite the much higher data transmission rate compared to the CS 275, only the same performance data are guaranteed for the PROFIBUS-TM as for the CS 275 bus system. The reason is that multi-address orders such as AKS, BKS and MKS are resolved into individual telegrams in the case of PROFIBUS-TM, and these types of telegram therefore require far higher communication resources.

However, if the multi-address orders only have a few addresses, and if more single address orders (e.g. read/write parameters) are present compared to the multi-address orders, the performance of the PROFIBUS-TM bus system is higher than that of the CS 275. However, the degree can only be determined by a bus analysis.

### Transmission systems

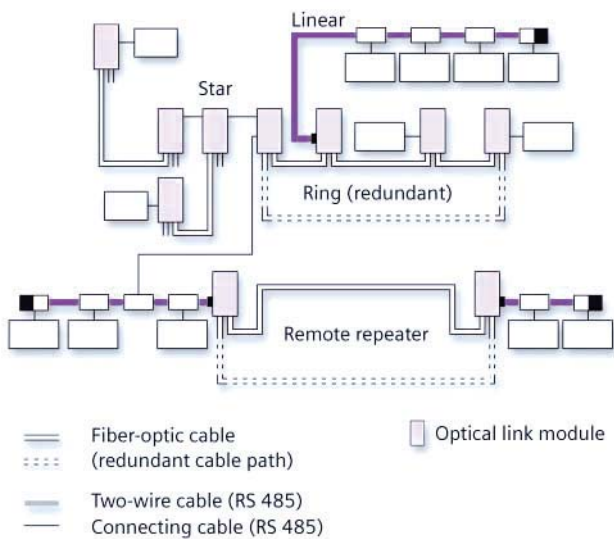
PROFIBUS offers a comprehensive range of network components for electrical and optical transmission systems.

- **Electrical network**  
Shielded, twisted two-wire cables are used for electrical PROFIBUS networks. The RS 485 interface operates using voltage differences. It is therefore less sensitive to interferences than a voltage or current interface. With PROFIBUS, the stations are connected to the bus cable via a bus connector or bus terminal.  
The individual segments are connected using repeaters.
- **Optical network**  
The optical version of the PROFIBUS is suitable for long distances, and is insensitive to electromagnetic interferences. Glass fiber-optic cables are preferably used. Plastic fiber-optic cables can also be used for lower demands (short distances). The stations are connected to the optical PROFIBUS network via an optical link module (OLM). The optical transmission link can be up to 21 km long, or up to 16 km when using a CS-L2 bridge.  
The OLM can be used to design an optical network with a multipoint, ring or star structure.
- **Mixed network**  
Mixed structures are possible comprising electrical and optical PROFIBUS networks. OLMs are used for the transition between the two media.  
There is no difference between the electrical two-wire and optical systems as far as communication between the stations is concerned.



Possible bus configuration: linear and tree structures of the PROFIBUS electrical network

# Bus communication PROFIBUS-TM

**PROFIBUS-TM**


Possible bus configurations: Linien-, Stern- und Ringstruktur bei gemischt elektrisch/optischen Netzen

You can find further information and conditions on the PROFIBUS in the Catalog IK PI "Industrial communications and field devices".

## Configuration

The electrical PROFIBUS network can be configured with a multipoint or tree structure. The most important features of the electrical network are:

- High-quality bus cable
- RS 485 transmission procedure (according to EIA)
- Bus connector (alternative: bus terminals) for connection of PROFIBUS stations
- Simple, uniform mounting and earthing concept
- Simple installation

The electrical network can also be operated together with an optical PROFIBUS network. The optical network can be configured with optical link modules OLM in a multipoint, ring or star structure. The most important features of the optical network are:

- High availability for redundant optical ring with OLM
- Wide range
- Cascading of OLMs possible
- Insensitive to electromagnetic interferences
- Electrical isolation
- Either glass or plastic fiber-optic cables
- High degree of adaptation to local conditions

### Recommendation:

Independent of the technical possibilities, we recommend that you use one optical link module OLM per station (AS/OS/ES) for availability reasons.

## Bus connector

The bus connector can be used to directly connect the stations on the PROFIBUS together in loop-through mode. The connector is easy to mount, and has an integral terminating resistor.

With the AS 388/TM automation system, the bus connector is plugged onto the IF 964 interface module on the EXM 378-2 module; with the AS 488/TM automation system, it is plugged onto the IF 964 interface module of an EXM 478 extension module.

An optical link module OLM can also be connected to the bus connector.

The bus connectors are available with a pivoted or axial cable outlet, in each case with degree of protection IP 20.

The standard connection for PROFIBUS-TM in the AS 488/TM automation system is the interface module in the second extension module. However, an interface module in the first extension module can also be used if vacant, and if the interface assignment in the initialization files is adapted.

## Electrical bus terminal

The RS 485 bus terminal is used if a variable design is desired for the bus connections. The bus terminal is snapped onto a DIN rail for assembly. As the result of a selectable, integral terminating resistor, no additional installation is required.

### Note:

The total length of the bus terminal spur lines per segment (max. 200 m PROFIBUS cable) can be up to 10 m; i.e. max. 6 bus terminals are permissible for the recommended bus terminals with 1.5 m spur line; additional stations must be connected using bus connectors. The PROFIBUS design guidelines must be observed (see SIMATIC NET manual "PROFIBUS networks" (6GK1 970-5CA20-0AA0)).

## Optical link module

PROFIBUS networks can be configured with the optical link modules OLM in a multipoint, ring or star structure. They permit high availability by means of a redundant power supply and redundant cables.

The solution with optical link modules is more appropriate than the electrical network for signal transmission over longer distances, and is insensitive to overvoltages, e.g. resulting from lightning. The equipotential bonding which is required when using an electric two-wire cable between two buildings for operator safety according to VDE 0100 can also be omitted in this case.

Up to 41 OLMs can be connected in series permitting a distance of 21 km to be covered at the used data transmission rate of 1.5 Mbit/s and the resulting max. cable length of 530 m.

When using a CS-L2 bridge, the max. number of OLMs in a ring is reduced to 32, and the covered distance to 16 km.

There are several designs of OLM (see Catalog IK PI); the type OLM/G12 for glass fiber-optic cables, 4-channel design, 6GK1 502-3CB10 is recommended for use with TELEPERM M, and also permits the design of redundant rings.

# Bus communication

## PROFIBUS-TM

### PROFIBUS-TM

#### Optical bus terminal (OBT) for PROFIBUS

The OBT (optical bus terminal) is used to connect a PROFIBUS station without an integral optical interface to an optical line with PROFIBUS stations with integral interface and OBT.

The PROFIBUS station is connected to an RS 485 interface of the OBT via a cable terminated at both ends, e.g. connecting cable 830-1T. The OBT is linked into the optical cable using two optical interfaces.

Please refer to Catalog IK PI "Industrial communications and field devices" and the SIMATIC NET manual "PROFIBUS networks" (6GK1 970-5CA20-0AA0) for detailed information on these components and on further components for PROFIBUS networks.

#### Transmission media

The ordering data include the transmission media for all types of PROFIBUS connection referred to above and recommended for use with the AS 388/TM and AS 488/TM automation systems.

Please refer to Catalog IK PI "Industrial communications and field devices" for further components and for information on possible bus configurations.

The following table lists the max. permissible cable lengths which can be achieved with the used data transmission rate of 1.5 Mbit/s:

Max. cable length of an RS 485 segment	200 m
Max. distance between 2 stations (with 3 RS 485 repeaters in series)	800 m
Max. cable length between 2 OBTs with PCF fiber-optic cable	300 m
Max. distance between 2 OLMs/G12 and fiber-optic cable (wavelength 860 nm)	3 km

#### System connection for AS 488/TM EXM 478 module with IF 964 interface module

An AS 488/TM automation system can only be connected to either the PROFIBUS-TM or CS 275 system bus.

The AS 488/TM automation system is connected to PROFIBUS-TM via an IF 964 interface module in an EXM 478 extension module. The standard connection is the interface module in the second extension module. One of the three slots in the first EXM 478 module can be used if they are not all occupied already. However, this requires adaptation of the interface assignment in the initialization files when configuring.

Bus connectors or bus terminals can be plugged directly onto the IF 964 interface module.

#### Ordering Data

##### RS 485 bus connector for PROFIBUS with 35° cable outlet

Max. transmission rate 12 Mbit/s, degree of protection IP 20

- Without programming device interface
- With programming device interface

##### RS 485 bus connector for PROFIBUS with axial cable outlet

Max. transmission rate 1.5 Mbit/s, degree of protection IP 20

##### RS 485 bus terminal for PROFIBUS

with 1.5-m connecting cable

- Without programming device interface
- With built-on programming device interface

##### Optical link module for PROFIBUS, OLM/G12

Optical link module for glass fiber-optic cable, with signalling contact, 4-channel version

##### Optical bus terminal for PROFIBUS, OBT

Optical bus terminal for connection of a PROFIBUS station, without integral optical interface to the optical PROFIBUS, without Simplex connector

##### 830-1 cable connector for PC/programming device and OLM for PROFIBUS

1.5 m long

3 m long

##### Bus cables for PROFIBUS

2-core, shielded, cut to length: Max. delivery unit 1000 m, minimum ordering length 20 m

- Standard cable
- Bus cable with PE sheath, for food and drink industry

##### Fiber-optic cable

Standard cable, can be fanned out, cut to length

(specify length in .... m)

Max. available length 4000 m

##### BFOC connector

for standard fiber-optic cable, 20 units

##### EXM 478 extension module

to accommodate 3 interface modules

##### IF 964-DP interface module

#### Order No.

6ES7 972-0BA40-0XA0

6ES7 972-0BB40-0XA0

6GK1 500-0EA02

6GK1 500-0AA10

6GK1 500-0DA00

6GK1 502-3CB00

6GK1 500-3AA00

6XV1 830-1BH15

6XV1 830-1BH30

6XV1 830-0EH10

6XV1 830-0GH10

6XV1 820-5AH10

Length: ... m

See Catalog IK PI for precut/pre-assembled cables

6GK1 901-0DA20-0AA0

6ES7 478-2AC00-0AC0

6ES7 964-2AA01-0AB0

### Overview

In the following, you will be provided with information relevant to connection of the AS 488/TM to the CS 275 bus system. Please refer to Catalog PLT 130 for detailed information on the TELEPERM M CS 275 bus system, in particular on design and mode of operation.

### Configuration

#### TPM 478 interface module

The AS 488/TM automation system and the CS-L2 bridge can be connected to the CS 275 bus system via the TPM 478 interface module. Two functions are integrated on this interface module:

- **CS 275 functionality**  
A powerful CPU processes the communications functions to the CS 275 bus system. The functionality of the TPM 478 interface module corresponds to that of the N-AS standard local bus interface module in the AS 235 automation system. Exception: CD mode is not supported.  
An AS 488/TM automation system can only be connected to either the PROFIBUS-TM or CS 275 system bus.
- **TELEPERM I/O functionality**  
In the AS 488/TM automation system, the TPM 478 module together with the TBX 478 module also provides the interface to the TELEPERM M I/Os. The two modules provide two I/O bus interfaces for TELEPERM M basic and extension cabinets, and provide the +5 V bus for the I/O bus logic.

Only one TPM 478 module is required for both functionalities, i.e. for the CS 275 functionality and the TELEPERM M I/O functionality.

#### Configuring

Configuring depends on whether the TPM 478 module is used in the AS 488/TM automation system or in the CS-L2 bridge. The system parameters as well as the bus and station addresses are defined when configuring.

The commissioning terminal is used as the configuring tool. The commissioning terminal software is included in the scope of delivery of the system software for the AS 488/TM system and the CS-L2 bridge.

The configuring data are transmitted from the commissioning terminal to the memory card of the AS 488/TM system using a transfer file. The current system parameters are loaded into the system memory of the CPU when the system is restarted, and the AS 488/TM system executes automatically on the CS 275 system bus.

When configuring the CS-L2 bridge, the bus and station addresses are defined on the CS 275 bus system, and the address range is also specified via which the stations on the PROFIBUS-TM can be accessed.

### Ordering Data

#### TPM 478 interface module

for connection to the CS 275 system bus and the TELEPERM M I/O modules

##### Note:

Only use TPM 478 interface module once per AS 488/TM system. If the module has already been selected for the I/O connection, you need not order it again for the connection to the system bus.

#### Connecting cable for 20-m local bus

for connection of an AS 488/TM system or CS-L2 bridge to the bus converters UI1 and UI2 and to the connection distributor for 20-m local bus AV

Length between 1 and 2:

- 2.5 m (preferred type)
- 8.0 m
- 16.0 m

#### Connecting cable for 20-m local bus

for connection of two AS 488/TM systems or CS-L2 bridges to a local bus island; with 2 connections for TPM 478 interface module and connection to a cable 6DS8 213-8.., 6DS8 215-8.. or a further cable 6DS8 214-8..

Length between 1 and 2:

- 3.5 m (preferred type)
- 8.0 m
- 16.0 m

#### Connecting cable for 20-m local bus

for connection of an AS 488/TM system or CS-L2 bridge to a local bus island; 1 cable end open (for connection to ES 902 plug)

- Length: 5.0 m (preferred type)
- Length: 16.0 m

#### Connecting cable for I & C monitoring

for transmission of cabinet alarms to AS 388/TM or AS 488/TM (IF 961-DIO digital I/O module)

- Length: 2.7 m (preferred type)
- Length: 5.6 m

#### Connection distributor for 20-m local bus

#### Order No.

**6ES7 478-2DA01-0AC0**

**6DS8 213-8KC**

**6DS8 213-8WC**

**6DS8 213-8FD**

**6DS8 214-8PC**

**6DS8 214-8WC**

**6DS8 214-8FD**

**6DS8 215-8SC**

**6DS8 215-8FD**

**6DS8 320-8LC**

**6DS8 320-8TC**

**6DS9 207-8AA**

# Bus communication

## CS 275

### CS 275

#### Remote bus cable

##### Standard remote bus cable <sup>1)</sup>

Specify length in plain text  
(max. 4 km)

##### In-house remote bus cable <sup>1)</sup>

Specify length in plain text  
(max. 2 km)

##### Note:

When mixed with standard remote bus cable, the total length of both cables must not exceed 4 km.

##### Remote bus cable with additional armoring <sup>1)</sup>

- To increase the tensile strength to 25000 N
- To protect against mechanical damage and rodents

Specify length in each case in plain text (max. 4 km)

#### Order No.

**V45466-D21-B35**

**Length ..... m**

**V45466-D17-B135**

**Length ..... m**

**V45466-D21-B65**

**Length ..... m**

**V45466-D21-B55**

**Length ..... m**

1) Ordering address:

LEONI SPECIAL CABLES FRIESOYTHE GmbH & Co KG  
Pehmertanger Weg 1-3  
D-26169 Friesoythe

Tel: +49 (4491) 292 171 or

Tel: +49 (4491) 292 122

# Bus communication CS-L2 bridge

## CS-L2 bridge



The hardware of the CS-L2 bridge is largely identical to that of the AS 488/TM system (UR2 rack, power supply modules, CPU, interface modules and components for connection to CS 275 and PROFIBUS-TM). Connection to the CS 275 local bus is via the TPM 478 communications module, connection to the PROFIBUS-TM via the EXM 478 extension module with IF 964 interface module.

**Limits:**

The CS-L2 bridge only connects the CS 275 bus system to the PROFIBUS-TM bus system; it does not support interfacing to other PROFIBUS networks such as e.g. PROFIBUS-DP or PROFIBUS-FMS. However, PROFIBUS-TM and PROFIBUS-DP can be operated in parallel on a common PROFIBUS medium in friendly coexistence.

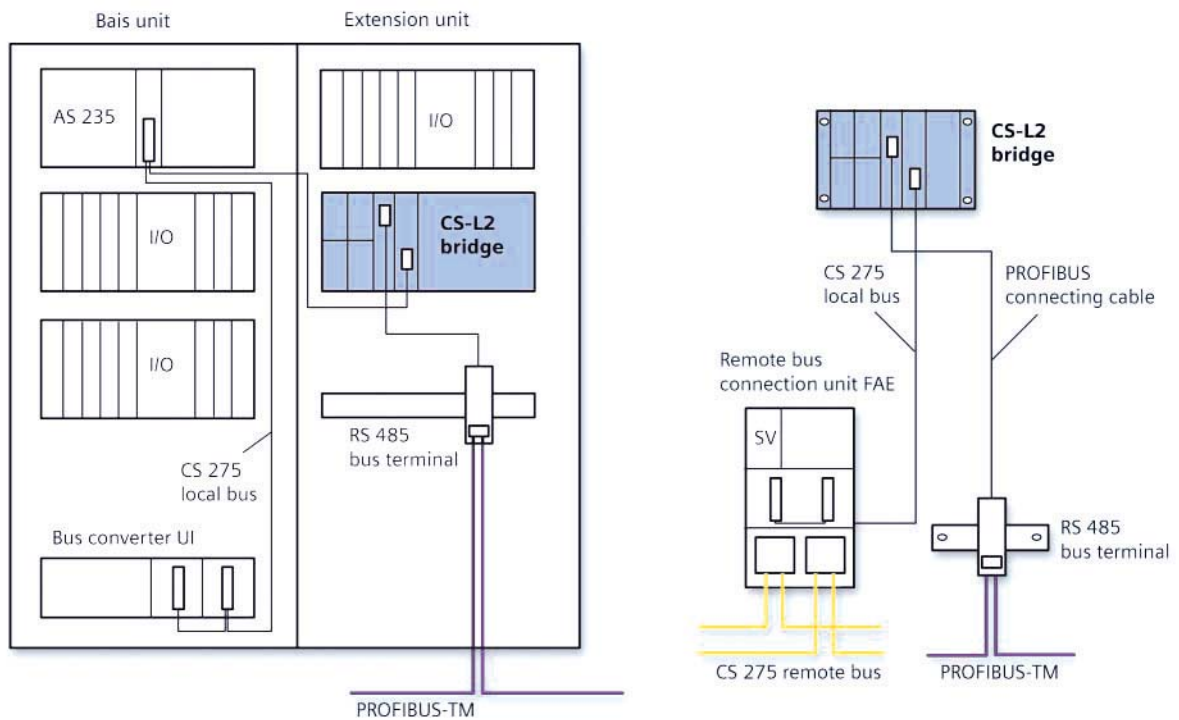
The PROFIBUS-AG/AG coupling is an open solution based on PROFIBUS for data exchange between AS 488/TM and S7 automation systems.

### Overview

The CS-L2 bridge connects the CS 275 and PROFIBUS-TM bus systems, converts their protocols, and permits analog and binary value coupling between automation systems on the two bus systems, e.g. send/receive AKS, BKS and MKS telegrams in both directions.

The CS-L2 bridge receives status and I & C messages from stations on the CS 275 bus, and passes them on to PROFIBUS-TM stations. The same applies in the opposite direction. The bridge passes on time telegrams in both directions.

The CS-L2 bridge is also used to transmit telegrams for the "Read parameters" and "Write parameters" functions between stations on the CS 275 bus and the operation and monitoring systems on the PROFIBUS-TM bus.



Design of CS-L2 bridge for installation in cabinet (left) and for wall mounting (right)



# Bus communication

## CS-L2 bridge

### CS-L2 bridge

#### Configuration

##### Station addresses

The address range defines the stations which are accessible on the PROFIBUS-TM from the CS 275 bus system via the CS-L2 bridge. From the viewpoint of PROFIBUS-TM, all stations whose addresses are not within the address range must be stations on the CS 275 bus. The first address of the range is always the station address of the CS-L2 bridge. This must be left vacant when configuring the two buses.

##### Example:

If max. 20 stations with addresses 40 to 59 are to be connected on the PROFIBUS, the CS-L2 bridge must be configured as follows:

- CS 275 bridge station address (TA) = 39
- Address range: 21

With the max. possible number of 31 stations on the PROFIBUS-TM, 32 vacant station addresses must therefore be present in ascending order on the CS 275 bus. Double assignment of station addresses on the CS 275 bus and on the PROFIBUS-TM is not permissible.

##### Performance data:

The bridge provides the following data throughput [telegrams/s]: either 30 long telegrams or 60 short telegrams in both directions together. There is a reserve for acyclic message transmission of 75 messages/s over a period of 10 s, where 5 messages are assumed per MKS/status telegram.

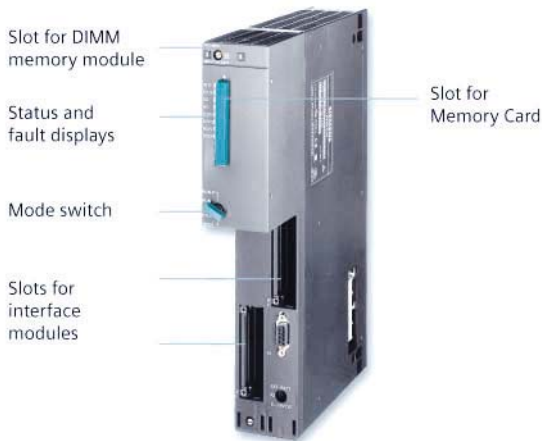
#### Technical Specifications

##### CS-L2 bridge

<u>Basic device</u>		
• Basic system	SIMATIC M7-400 with CPU 486-3, subrack and AC or DC power supply module	
• Extensions	Interface modules IF 961-DIO, IF 962-COM, EXM 478 with IF 964, TPM 478	
<u>Power supply</u>		
Supply voltage	Current consumption	Power loss
• AC 120 V	Max. 1.14 A	Max. 22.4 VA
• AC 230 V	Max. 0.57 A	Max. 22.4 VA
• DC 24 V	Max. 4.5 A	Max. 33 W
<u>Quantity breakdown</u>		
Data throughput (telegrams/s, cyclic)	30 long or 60 short telegrams per second	
Processing a rush of alarms	75 alarms/s within a period of 10 s, where 5 alarms are accepted per MKS/status message	
Delay by the bridge	Max. 100 ms	
Bridges connected in series	No	
<u>Bus system</u>		
	CS 275	PROFIBUS-TM
Data transfer rate	250 kbit/s	1.5 Mbit/s
Number of stations	99 (less PROFIBUS stations)	Max. 32 (incl. bridge)
Max. distances	Local bus: 20 m Remote bus: 4 km	Electrical: 200 m Optical: 16 km
<u>Redundancy</u>		
Bridge	No	
CS 275	Yes, as option	
PROFIBUS-TM	Yes, with optical link module OLM/G12	
<u>Configuring</u>		
Tools	Commissioning terminal software, ASCII editor	
Connection	COM1 interface of IF 962-COM interface module, zero modem cable, 9-conductor	
<u>Ambient conditions</u>		
Degree of protection to EN 60 529	IP 20	
Permissible ambient temperature		
• Operation (horizontal mounting)	0 to 60 °C	
• Transport and storage	-40 to +70 °C	
Permissible relative humidity	5 to 95%	
Fan-free operation	Yes	
<u>Electrical isolation</u>		
• On the CS 275	Yes	
• On the PROFIBUS-DP	Yes	
<u>Design</u>		
Dimensions (H x B x T) in mm		
• With SIMATIC S7/M7 subrack	290 x 240 x 220 (plus connector)	
• With migration rack	380 x 483 x 273	

# Bus communication CS-L2 bridge

## Central processing unit



### Overview

#### CPU 486-3

The CPU 486-3 is equipped with an Intel Pentium 75-MHz processor.

The front panel of the rugged, compact plastic housing contains:

- LEDs for status and fault display
- Operating mode switch
- Slot for a memory card from which the coupling software and bus parameters are loaded into the main memory when starting up
- 2 slots for interface modules

### Design

#### Memory module (set with 2 x 8 Mbyte)

The CPU 486-3 used in the CS-L2 bridge is supplied with an integral RAM. The module used as the main memory comprises a set with 2 x 8-Mbyte RAMs. The complete set must always be inserted.

#### I & C monitoring

I & C monitoring functions can be implemented using the IF 961-DIO interface module for digital input/output.

The interface module is inserted in the EXM 478-3 module of the AS 488 automation system.

The IF 961-DIO can be used to record I & C signals e.g. for

- door contact
- excess temperature
- monitoring of optical link module OLM

and to activate a cabinet lamp or horn.

Cable monitoring, e.g. to detect an open-circuit, is not possible.

The inputs and outputs are electrically isolated. The module electronics (ASIC) is protected against overvoltages by appropriate circuitry measures.

The digital inputs comprise 8 channels organized in groups of 4 x 2 channels. The current consumption is 8.5 mA with an input level of DC 24 V.

An input delay of 500 ms or 3 ms can be parameterized for all input channels together.

The cable length is:

- unshielded 200 m (for 500 ms) or 600 m (for 3 ms)
- shielded 1000 m.

The digital outputs also comprise 2 x 4 channels. With DC 24 V, the max. output current is 100 mA. The outputs are protected against short-circuit by an electronic fuse.

A 25-contact Sub-D socket is used as the interface.

#### IF 962-COM serial interface module

The IF 962-COM serial interface module is required to connect a commissioning terminal to the CS-L2 bridge. The module is inserted into a prepared slot in the CPU 486-3.

### Ordering Data

	Order No.
<b>CPU 486-3 central module</b> with Pentium 75 MHz CPU, 2 slots for interface modules, 2 standard slots wide	<b>6ES7 486-3AA00-0AB0</b>
<b>IF 961-DIO interface module</b> Digital input/output for I & C monitoring functions	<b>6ES7 961-1AA00-0AC0</b>
<b>IF 962-COM serial interface module</b> for commissioning terminal, with 2 RS 232 interfaces	<b>6ES7 962-3AA00-0AC0</b>

# Bus communication CS-L2 bridge

## Power supply modules



The power supply module is inserted in the subrack on the left. It is designed in a casing, and is cooled by natural convection. The front panel of the module contains:

- LEDs for display of correct output voltages, correct backup battery voltage, and internal fault
- Key for fault acknowledgment
- On/off switch for output voltages
- Battery compartment (hidden) for backup battery (not relevant to CS-L2 bridge)
- Switch (hidden) for activation of battery monitoring
- Power supply selector (hidden) for AC 120/230 V
- Power supply connection (hidden) with 3-pin plug

### Overview

#### *PS 405 and PS 407 load power supplies*

The modules of the CS-L2 bridge are supplied with DC 5 V and DC 24 V by the PS 405 and PS 407 power supply modules via the backplane bus.

Depending on the input voltage, either the PS 407 (for AC 120/230 V) or PS 405 (for DC 24 V) power supply module is required.

### Ordering Data

**PS 405 load power supply, 10 A**  
DC 24 V; DC 5 V, 24 V, 2 standard slots wide

**PS 407 load power supply, 10 A**  
AC 120/230 V; DC 5 V, 24 V, 2 standard slots wide

#### Order No.

**6ES7 405-0KA01-0AA0**

**6ES7 407-0KA01-0AA0**

# Bus communication

## CS-L2 bridge

Connection to PROFIBUS-TM  
Connection to CS 275

### Connection to PROFIBUS-TM

#### Overview

The CS-L2 bridge is connected to PROFIBUS-TM using an IF 964 interface module in an EXM 478 extension module.

#### Ordering Data

	Order No.
<b>EXM 478 extension module</b> to accommodate 3 interface modules for electrical version of PROFIBUS-DP	<b>6ES7 478-2AC00-0AC0</b>
<b>IF 964-DP interface module</b> for glass fiber-optic cable version of PROFIBUS-DP	<b>6ES7 964-2AA01-0AB0</b>
<b>IF 964-DP interface module</b>	<b>6ES7 964-2AA01-0AB0</b>
<b>Optical link module OLM/G12</b>	<b>6GK1 502-3CB10</b>
<b>Connecting cable 830-1 for PROFIBUS, 3 m</b>	<b>6XV1 830-1CH30</b>

See Catalog IK PI for further PROFIBUS components.

### Connection to CS 275

#### Overview

The CS-L2 bridge can be connected to the CS 275 bus system via the TPM 478 interface module. On this interface module, a powerful CPU processes the communications functions to the CS 275 bus system. The CS 275 functionality of the TPM 478 interface module corresponds to that of the N-AS standard local bus interface module in the AS 235 automation system. Exception: CD mode is not supported.

#### Ordering Data

	Order No.
<b>TPM 478 interface module</b> for connection to CS 275 and for TELEPERM M I/Os	<b>6ES7 478-2DA01-0AC0</b>

# Bus communication

## CS-L2 bridge

### Packaging system

#### Packaging system

##### Overview

###### UR2 rack

The UR2 rack is the basic mechanical frame of the AS 488/TM automation system. It accommodates the system modules (CPU, load power supply, EXM 478, TPM 478 and TBX 478), provides the operating voltages for the modules, and connects the individual modules via the backplane bus.

The rack comprises:

- Aluminium rail with threaded bolts for securing the modules, and lateral recesses for mounting the rack
- Plastic components as guides when swinging in the modules
- Connection for PE conductor
- Backplane bus with plug connections

###### Migration rack

The migration rack for CS-L2 bridge can be used to install the bridge in an existing TELEPERM M cabinet.

##### Ordering Data

###### UR2 subrack

for design of AS 488/TM automation system, 9 slots

For installation of the CS-L2 bridge in a TELEPERM M cabinet:

###### Migration rack for CS-L2 bridge

with preassembled UR2 19-inch rack

###### Order No.

**6ES7 400-1JA01-0AA0**

**6DS2 510-0XX00-3XX0**

### System software

##### Overview

The system software of the CS-L2 bridge consists of runtime and commissioning terminal software.

The runtime software is supplied on a memory card, and contains the system coupling software, the initialization data, and the configuring parameters for the bus configuration.

The commissioning terminal software for PCs/programming devices is supplied on a 3.5-inch diskette.

##### Ordering Data

###### System software for CS-L2 bridge,

comprising:

- Runtime software "CS-L2 bridge", on memory card, 4 Mbyte
- Commissioning terminal software for PC/programming device, on 3.5-inch diskette, with handling description in German and English

###### Order No.

**6DS2 510-0XX00-0XA0**

### Documentation

##### Overview

The system documentation of the CS-L2 bridge consists of the manual "CS 275 bus system" and the manual "Supplementary system documentation for AS 388/TM, AS 488/TM and CS-L2 bridge".

##### Ordering Data

###### Manual

Supplementary system documentation for AS 388/TM, AS 488/TM and CS-L2 bridge

- German
- English

###### Manual

"CS 275 bus system"

- German
- English

###### Order No.

**C79000-G8000-C700**

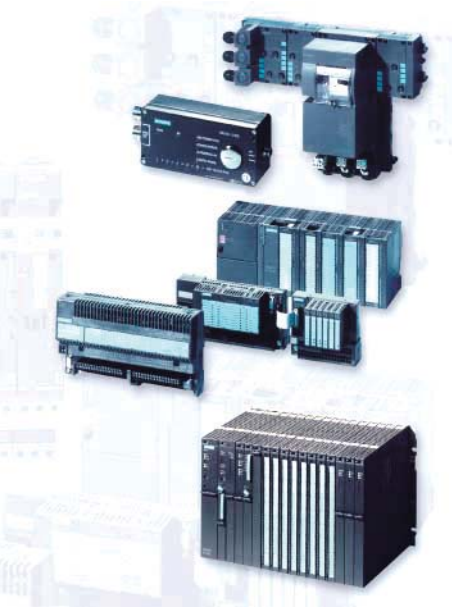
**C79000-G8076-C700**

**C79000-G8000-C006**

**C79000-G8076-C006**

# 10

## Data couplings with other systems



10/2	<b>Introduction</b>
10/3	<b>AG-AG coupling software</b>
10/5	<b>Serial coupling</b>





# Data couplings with other systems

## Introduction

### Data couplings

Interface module	Type of coupling	Interface	Procedure	Electrical isolation	Coupling partner
IF 964-DP	Data bus connection	PROFIBUS	FDL	Yes	SIMATIC S5 programmable controllers with CP 4531 or CP 451 communications processor, S5-95U
IF 964-DP	Data bus connection	PROFIBUS	FDL	Yes	SIMATIC S7-400 programmable controllers with CP 443-5 communications processor
IF 964-DP	Data bus connection	PROFIBUS	FDL	Yes	SIMATIC S7-300 programmable controllers with CP 342-5 or CP 343-5 communications processor
IF 964-DP	Data bus connection	PROFIBUS	FDL	Yes	Systems from other vendors, PC with CP 5613 communications processor
6DS1 333-8AB	Serial multipoint connection	TTY	3964R/ RK 512	Yes	SIMATIC S5 programmable controllers with CP 544 communications processor
6DS1 333-8AB	Serial multipoint connection	TTY	3964R/ RK 512	Yes	SIMATIC S7-400 programmable controllers with CP 441-2 communications processor
6DS1 333-8AB	Serial multipoint connection	TTY	3964R/ RK 512	Yes	SIMATIC S7-300 programmable controllers with CP 341 communications processor
6DS1 333-8AA with special EPROM M1328-V6	Serial multipoint connection or data bus connection	TTY	MODBUS	Yes	Special product for 4 x 9 stations/devices from other vendors with MODBUS functions Special product on request

### Overview

A basic differentiation is made for data coupling of the AS 488/TM with other systems between:

- System couplings via PROFIBUS as the data bus and
- direct couplings via special interface modules.

The overview table shows the current interfaces for system and direct couplings together with the most important features of the interface modules.

Interface modules are operated in a slot for I/O modules or in an extension unit of the CPU (EXM 478).

With the serial coupling, the interface modules automatically handle data transfer with the coupling partner. Data transfer for the serial coupling is via the transfer RAM of the interface module and the process image of the AS 488/TM. With the alternative data bus coupling with PROFIBUS, the data are transferred between the drivers and the respective coupling partners via the special AG/AG coupling software in the AS operating system and the interface module.

When selecting the type of coupling suitable for the respective application, the following factors can also be important in addition to the type of coupling partner:

- Distance from coupling partner
- System topology, number of partner systems, and type of partner system
- Earthing concept and lightning protection measures
- Migration strategy: retention of existing configuration, or reconfiguration
- Performance

If the coupling is between different buildings or over large distances within buildings, it is recommendable for potential difference reasons to use optical transmission techniques (fiber-optic cables) for the PROFIBUS connection or to alternatively use a serial coupling.

The serial coupling supports any protective measures against static and dynamic potential differences (earthing, lightning protection) because of the low number of conductors and electrical isolation. The data transmission rate can be varied within certain limits for this type of coupling. On the one hand, this influences the transmission rate and thus the cycle time, in addition the selected data transfer rate has an influence on the maximum distance which can be covered.

The drivers of block type S5KE/S5KS required for system and direct couplings are components of the standard system software in the case of the serial coupling. For the AG/AG coupling via PROFIBUS as the data bus, extended S5KE/S5KS drivers are provided as components of the optional AG/AG coupling software for downloading.

### Coupling with systems from other vendors

The serial coupling with interface module 6DS1 333-8AB can be used for coupling systems from other vendors (scales, data collectors, process chromatographs etc.). A prerequisite is that these systems have a 20-mA current loop interface (TTY) and support the 3964R protocol and the RK 512 procedure. Other protocols and procedures for the serial coupling are not supported (exception: systems with MODBUS procedure). Coupling of devices from other vendors with MODBUS procedure is available as a special product on request.

# Data couplings with other systems

## System couplings

### AG-AG coupling software

#### Overview

##### AG/AG coupling with SIMATIC S5/S7 central controllers

The devices of the SIMATIC S7-300 and S7-400 automation systems and those of the SIMATIC S5-95F, S5-95U, S5-115U, S5-135U and S5-155U automation systems can be coupled to AS 388/TM and AS 488/TM automation systems via an additional PROFIBUS-AG/AG parallel to the PROFIBUS-TM or CS 275 TELEPERM M system bus.

To reduce the load on the CS 275 or PROFIBUS-TM system bus, AS x88/TM automation systems can also be connected together via the PROFIBUS-AG/AG data bus.

Via an AS 488/TM automation system with AG/AG coupling, system-independent and data-oriented connections are additionally possible between TELEPERM M and SIMATIC PCS 7. The AS 488/TM collects the data received via the TELEPERM M system bus, and distributes them either to the SIMATIC PCS 7 automation systems on the PROFIBUS-AG/AG or transfers them to a SIMATIC PCS 7 automation system with data collection and distribution function on this bus, from which they are then distributed further via the SIMATIC PCS 7 system bus.

PROFIBUS-AG/AG represents communication via configurable connections, and permits simple exchange of linked data blocks between the communication partners, without acknowledgment at the user level. The transmission is carried out with PROFIBUS FDL services. The user handles the services with the assistance of communication blocks:

- SIMATIC S7 stations: FC blocks AG\_SEND and AG\_RECV; these blocks are part of the NCM S7 package
- SIMATIC PCS 7 stations: blocks FR\_AGSEN and FR\_AGRCV
- SIMATIC S5 stations: handling blocks SEND and RECEIVE
- TELEPERM AS x88: standard function blocks S5KS [AGAG] and S5KE [AGAG]
- With OPC stations and those from other vendors, the blocks/procedures are referred to in the associated documentation.

Access to the FDL interface is usually only possible for the coupling partners via a specifically installed communications processor:

Coupling partner	Communications processor
SIMATIC S7-400	CP 443-5 Basic
SIMATIC S7-300	CP 342-5
SIMATIC S5-155U, S5-135U, S5-115U	CP 5430/CP 5431
S5-95U with PROFIBUS-AG/AG interface	Already integrated
S5-95F	CP 541
PC (Windows NT)	CP 5613

An IF 964 interface module in the EXM 478 extension module as well as the additionally loaded AG-AG coupling software is required to connect the AS 488/TM automation system to the PROFIBUS-AG/AG.

With the AS 488/TM automation system, the IF 964 interface module should preferably be connected to the bottom of the three EXM 478 slots. If all EXM slots are already occupied, e.g. by retrofitted modules, a second EXM 478 extension module is additionally required.

##### EXM 478 extension module

If all slots in the first EXM 478 extension module are already occupied, a second EXM 478 extension module is required for connection of the IF 964 interface module. This second EXM 478 module has three locations for interface modules.

#### Mode of operation

The AG-AG coupling software is loaded into the automation system using the commissioning terminal. Together with the standard AS driver blocks S5KE [AGAG] and S5KS [AGAG] it organizes the telegram traffic between the AS 488/TM automation system and the coupling partners.

Using the FDL services SDA (send data to one station, with acknowledgment of receipt) and SDN (send data to one or all stations, without acknowledgment of receipt; broadcast) of the European standard EN 50 170, data blocks with a maximum length of 240 byte are transmitted in the send and receive directions, where the receive telegrams occupy the first 4 byte with the internal AS 488 address (i.e. max. 236 byte useful data). An initialization file can be used to set the transmission rate between 9.6 kbit/s and 1.5 Mbit/s.

##### Note:

A coupling partner is addressed using its PROFIBUS station address and one of the connection endpoints (SAP) configured for communication with the AS 488. With SIMATIC, the connections are either configured completely (SIMATIC S7: specified connections; SIMATIC S5: AG/AG connections) or only partially (SIMATIC S7: non-specified connections; SIMATIC S5: FDL connections). With the partial configuration, the communications parameters are entered automatically, permitting free access to the FDL layer of PROFIBUS. This also permits the optional assignment of the SAP subaddresses.

# Data couplings with other systems

## System couplings

### AG-AG coupling software

#### Technical Specifications

Released coupling partners for AS 388/TM and AS 488/TM	SIMATIC S7-300, S7-400 SIMATIC S5-155U, S5-135U, S5-115U, S5-95U, S5-95F (in each case as PROFIBUS master)
Bus system	PROFIBUS-AG/AG
• Version	Glass fiber-optic cables or electric (Cu)
Bus interface module for AS 388/TM and AS 488/TM	IF 964-DP interface module
• Mechanical interface	Sub-D socket, 9-contact
• Electrical interface	RS 485
Adjustable transmission rates	1500 kbit/s 500 kbit/s 187.5 kbit/s 93.75 kbit/s 19.2 kbit/s 9.6 kbit/s
Telegram length	
• Send direction	Max. 240 byte
• Receive direction	Max. 240 byte (236 byte net)
Data throughput	24 telegrams/s
• In the 500-ms cycle	12 telegrams/s
Bus stations	Max. 126
Number of connections (SAP)	Max. 32 connection endpoints
"AG-AG coupling" service	SDA
"Free FDL access" services	SDA, SDN
Data sources, sinks	GA, GB and FC fields
Data formats	Bit, integer (2 byte), S5 floating-point numbers, S7/IEEE floating-point numbers, characters (1 byte)
Driver blocks for AS x88/TM	Standard blocks S5KS, S5KE
Configuring	PROGRAF AS+/NT, SYST.WART, commissioning terminal, ASCII editor

#### Ordering Data

##### AG/AG coupling software

for coupling AS 488/TM automation systems with SIMATIC S5-155U, S5-135U, S5-115U, S5-95U as well as SIMATIC S7-300 and S7-400, AS 488/TM and systems from other manufacturers  
German, English,  
on 3.5-inch diskette, with license, documentation and product information

##### Accessories for AG-AG coupling

##### IF 964-DP interface module

##### EXM 478 extension module

##### Order No.

**6DS5 124-1AA**

**6ES7 964-2AA01-0AB0**

**6ES7 478-2AC00-0AC0**

#### Important note:

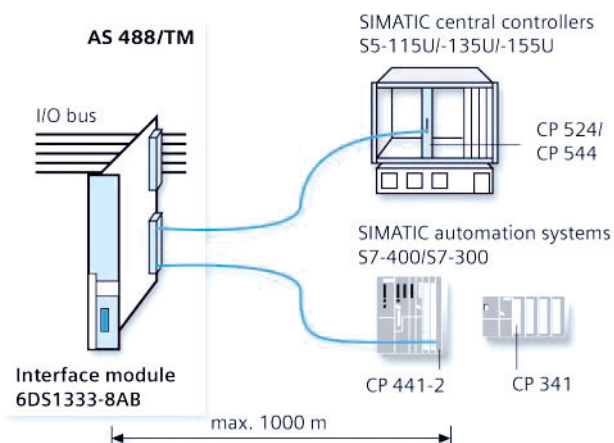
When subsequently ordering the AG/AG coupling software, it is essential to specify the serial number of the memory card for the automation system on which this functional extension is to be installed. The AG-AG coupling software is copy-protected and can only be used on the automation system whose serial number is present in the software.

The current version of the AG/AG coupling software can be used starting with version M02.00 or M01.06 of the AS x88/TM system software. In order to use the full functionality of PROFIBUS-AG/AG, it is necessary to have the version M02.01 or M01.07 of AS x88/TM.

## Data couplings with other systems

### Direct couplings

#### Serial coupling



#### Overview

In certain cases it may be meaningful to accommodate complete sections of an automation program in a subordinate automation level. This reduces the load on the automation system, saving valuable computing time. This is particularly important for automation tasks with short cycle times which place a high load on the computing capacity of a CPU. Furthermore, subordinate programs can also be generated and tested independent of other parts of the program.

The following are required to couple the AS 488/TM automation system with SIMATIC S5 S5-115U, S5-135U and S5-155U central controllers as well as SIMATIC S7 S7-300 and S7-400 automation systems:

- Interface module for SIMATIC S5/S7 central controllers
- Connecting cable
- For SIMATIC S5:
  - CP 524 or CP 544 communications processor
  - See Catalog ST 50 for interface modules, parameterization tools and accessories
- For SIMATIC S7-300:
  - CP 341 communications processor with 20-mA (TTY) interface
  - See Catalog ST 70 for interface modules, parameterization tools and accessories
- For SIMATIC S7-400:
  - CP 441-2 communications processor
  - See Catalog ST 70 for interface modules, parameterization tools and accessories

#### Design

The interface module for SIMATIC S5/S7 central controllers, 6DS1 333-8AB, is a double-height compact assembly. The front panel width is 30.48 mm (2 standard slots). The module has 2 backplane connectors for the I/O bus interface, and two serial interfaces for connecting a SIMATIC S5/S7 central controller.

The interface module for SIMATIC S5/S7 central controllers can be inserted into any slot for I/O modules of an AS 488/TM automation system or an ES 100 K extension system. SIMATIC S5/S7 central controllers can be connected to each of the two channels.

A shielded, four-wire cable twisted in pairs is used for data transmission. The maximum permissible distance between the interface module and the central controller is 1000 m. Data exchange is via a serial coupling with 20-mA current loop. The channel-specific transmission rate can be adjusted in steps:

Transmission rate	Max. cable length
300, 600, 1200, 2400 bit/s	1000 m
4800 bit/s	500 m
9600 bit/s	300 m

#### Mode of operation

The data arriving in parallel via the I/O bus of the automation system are saved cyclically in the transfer RAM of the interface module for SIMATIC S5/S7 central controllers. SIMATIC S7 central controllers operate with SEND/RECEIVE and S5 analog value format. The SIMATIC S5 central controllers can read the transfer RAM using fetch telegrams. The send component of the interface module reads the data from the transfer RAM, supplements them into a complete telegram, and passes this on to the SIMATIC S5/S7 central controller via the serial interface.

The telegrams sent by the SIMATIC S5/S7 central controller are checked for reliability in the receive component of the interface module, and the contained data are saved in the transfer RAM. The automation system reads this data cyclically out of the transfer RAM.

The data transfer between the AS 488/TM CPU and the interface module for SIMATIC S5/S7 central controllers is handled via the S5KS and S5KE driver blocks in the automation system. Either the 3964 or 3964 R transmission procedure (selectable) is used for the data transmission between interface module and SIMATIC S5/S7 central controller.

RK 512 is used as the protocol. In the process, the SIMATIC S5 central controller sends or fetches the data using telegrams. The TELEPERM M interface module is the passive communication station. SIMATIC S7 central controllers operate with SEND/RECEIVE and S5 analog value format.

# Data couplings with other systems

## Direct couplings

### Serial coupling

#### Technical Specifications

Power supply	
• L+	DC 24 V, 260 mA
• PM	DC 24 V, 40 mA
Number of channels/interfaces	
	2
Interface to the SIMATIC S5 central controller	
	20-mA current loop, transmitter and receiver either active, non-floating or passive, isolated
Max. telegram length	
	128 bytes net data + 10 bytes header data
Permissible ambient temperature	
• Operation	0 to +55 °C
• Transport and storage	-40 to +70 °C
Weight	
	Approx. 0.5 kg

#### Ordering Data

##### Interface module for SIMATIC S5/S7 central controllers

Order No.  
**6DS1 333-8AB**

##### Instruction Manual for interface module for SIMATIC S5/S7 central controllers

**C79000-B8000-C297**  
**C79000-B8076-C297**

- German
- English

##### Connecting cable

for connection of a communications processor to the interface module for SIMATIC S5/S7 central controllers

**6DS8 137-8AD**  
**6DS8 137-8SD**  
**6DS8 137-8AE**  
**6DS8 137-8ME**  
**6DS8 137-8SE**  
**6DS8 137-8AF**

- 10 m
- 50 m
- 100 m
- 300 m
- 500 m
- 1,000 m

##### [SIMATIC S5 coupling](#)

##### CP 524 communications processor

**6ES5 524-3UA15**

See Catalog ST 50 for interface modules, parameterization tools and accessories

##### CP 544 communications processor

**6ES5 544-3UA11**

See Catalog ST 50 for interface modules, parameterization tools and accessories

##### [SIMATIC S7-300 coupling](#)

##### CP 341 communications processor

**6ES7 341-1BH00-0AE0**

incl. 20-mA (TTY) interface  
See Catalog ST 70 for interface modules, parameterization tools and accessories

##### [SIMATIC S7-400 coupling](#)

##### CP 441-2 communications processor

**6ES7 441-2AA02-0AE0**

See Catalog ST 70 for interface modules, parameterization tools and accessories

SIMATIC S5 S5-115U, S5-135U, S5-155U programmable controllers

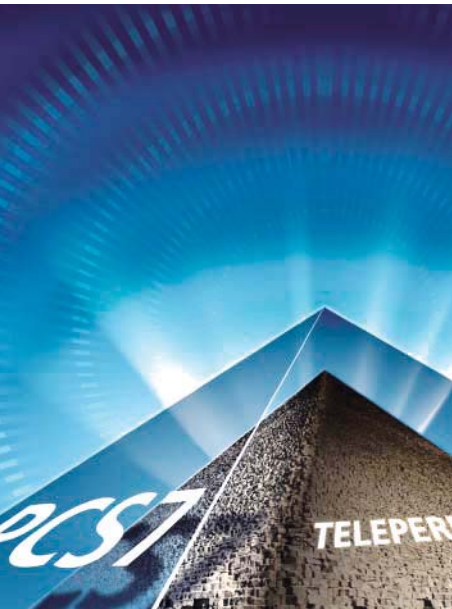
See Catalog ST 50

SIMATIC S7 S7-300 and S7-400 automation systems

See Catalog ST 70

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## Appendix



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# Appendix

## Software licenses

### Software

#### Software types

Software requiring a license is categorized into types. The following software types have been defined:

- Engineering software
- Runtime software

##### Engineering software

This includes all software products for creating (engineering) user software, e.g. for configuring, programming, parameterizing, testing, commissioning or servicing.

Data generated with engineering software and executable programs can be duplicated for your own use or for use by third-parties free-of-charge.

##### Runtime software

This includes all software products required for plant/machine operation, e.g. operating system, basic system, system expansions, drivers, etc.

The duplication of the runtime software and executable programs created with the runtime software for your own use or for use by third-parties is subject to a charge.

You can find information about license fees according to use in the ordering data (e.g. in the catalog). Examples of categories of use include per CPU, per installation, per channel, per instance, per axis, per control loop, per variable, etc.

Information about extended rights of use for parameterization/configuration tools supplied as integral components of the scope of delivery can be found in the readme file supplied with the relevant product(s).

#### License types

Siemens Automation & Drives offers various types of software license:

- Floating license
- Single license
- Rental license
- Trial license

##### Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started.

A license is required for each concurrent user.

##### Single license

Unlike the floating license, a single license permits only one installation of the software.

The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per device, per axis, per channel, etc.

One single license is required for each type of use defined.

##### Rental license

A rental license supports the "sporadic use" of engineering software. Once the license key has been installed, the software can be used for a specific number of hours (the operating hours do not have to be consecutive).

One license is required for each installation of the software.

##### Trial license

A trial license supports "short-term use" of the software in a non-productive context, e.g. for testing and evaluation purposes. It can be transferred to another license.

#### Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

#### Delivered versions

Software is constantly being updated. The following delivery versions

- PowerPack
- Upgrade

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

##### PowerPack

PowerPacks can be used to upgrade to more powerful software. The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed.

A separate PowerPack must be purchased for each original license of the software to be replaced.

##### Upgrade

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held.

The licensee receives a new license agreement and CoL with the upgrade. This CoL, together with the CoL for the previous product, proves that the new version is licensed.

A separate upgrade must be purchased for each original license of the software to be upgraded.

##### ServicePack

ServicePacks are used to debug existing products. ServicePacks may be duplicated for use as prescribed according to the number of existing original licenses.



Detailed explanations concerning license conditions can be found in the "Terms and Conditions of Siemens AG" (see last page) or with the A&D Mall Online-Help System under



<http://www.siemens.com/automation/mall>

#### License key

Siemens Automation & Drives supplies software products with and without license keys.

The license key serves as an electronic license stamp and is also the "switch" for activating the software (floating license, rental license, etc.).

The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).

#### Certificate of License

The Certificate of License (CoL) is the licensee's proof that the use of the software has been licensed by Siemens.

A CoL is required for every type of use and must be kept in a safe place.

## Information and order option in the Internet and on CD-ROM

### A&D at WWW



A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

The Siemens Automation and Drives Group (A&D) has therefore built up a comprehensive range of information in the World Wide Web, which offers quick and easy access to all data required.

Under the address

[www.siemens.com/automation](http://www.siemens.com/automation)

you will find everything you need to know about products, systems and services.

### Product selection with interactive catalogs



Detailed information together with convenient interactive functions:

The interactive catalogs CA 01 and ET 01 cover more than 80,000 products and thus provide a full summary of the Siemens Automation and Drives product base.

Here you will find everything that you need to solve tasks in the fields of automation, switchgear, installation and drives.

All information is linked into a user interface which is easy to work with and intuitive.

After selecting the product of your choice you can order at the press of a button, by fax or by online link.

Information on the interactive catalogs can be found in the Internet under

[www.siemens.com/automation/ik](http://www.siemens.com/automation/ik)

or on CD-ROM:

Automation and Drives, CA 01  
Order No.:  
E86060-D4001-A100-B7-7600

Electrical installation technology, ET 01  
Order No.:  
E86060-D8200-A107-A2-7600

### Easy Shopping at the Siemens Mall



The Siemens Mall is the virtual department store of Siemens AG in the Internet. Here you have access to a huge range of products presented in electronic catalogs in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure from selection through ordering to tracking of the order to be carried out online via the Internet.

Numerous functions are available to support you.

For example, powerful search functions make it easy to find the required products, which can be immediately checked for availability. Customer-specific discounts and preparation of quotes can be carried out online as well as order tracking and tracing.

Please visit the Siemens Mall on the Internet under:

[www.siemens.com/automation/mall](http://www.siemens.com/automation/mall)

# Appendix

## Internet, Training

### Internet

Informations about the TELEPERM M process control system and the migration to SIMATIC PCS 7 are now presented in our new Internet site

[www.siemens.com/teleperm](http://www.siemens.com/teleperm)

On the TELEPERM M Site you will find

- Product informations for the complete TELEPERM M system
- Catalog and Online Ordering System (Mall)
- FAQs (Frequently Asked Questions) for automation systems and operator stations
- Catalogs
- Informations on TELEPERM M training
- Data sheets for TELEPERM M I/O modules
- Newsletter for Process Automation
- Portal Process Automation with informations about SIMATIC PCS 7, Automation in the Chemicals, Pharmaceuticals, Glass as well as Process Instrumentation and Analytics.



### Training

Effective utilization of a process control system depends on the knowledge and skills of the people who use and operate it. Comprehensive training of these employees has become one of the most important production factors in the case of high-performance process control systems such as TELEPERM M.

Training for TELEPERM M therefore means:

- Fast, low-cost training for your employees
- Comprehensive knowledge and utilization of the complete system
- Exchange and ideas for solving individual application problems

You can obtain further information on course contents, dates, prices etc. at the following address on the Internet:

[www.sitrain.com](http://www.sitrain.com)

Should you have special questions, please directly contact the A&D Training Center in Karlsruhe:

Tel.: +49 721 595-4125

Fax: +49 721 595-6087

Alternatively, contact your local Siemens office or representative to obtain information on local training.

### Courses in the Training Center Karlsruhe

Course name	Target group	Duration (Days)	Course code
<b>TELEPERM M automation systems</b>			
AS 388/TM and AS 488/TM, workshop	■ ■	2	TE-TAS88
AS 235 automation system, part 1	■ ■	5	TE-TO1
AS 235 automation system, part 2	■ ■	5	TE-TO2
<b>Migration of TELEPERM M</b>			
Migration TELEPERM M to SIMATIC PCS 7	■ ■ ■	5	ST-WINCCTM
<b>Process Control Systems</b>			
Process control engineering for beginners	■ ■ ■	3	ST-PZA

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6DS2 410-0XX00-0XC2.....	3/4, 4/3, 5/10	6ES7 307-1EA00-0AA0.....	8/8				
6DS2 410-0XX00-2XX0.....	5/9	6ES7 307-1KA00-0AA0.....	8/8				
6DS2 410-0XX00-4XX0.....	5/9						
6DS2 510-0XX00-0XA0.....	9/12						