

SIEMENS

SIMATIC PCS 7 Process Control System

Product Brief

January 2001

SIMATIC PCS 7 – the process control system for Totally Integrated Automation

Setting the standard in process automation, SIMATIC PCS 7® is the process control system with a unique, open platform which assures up-to-date, economical and future-oriented solutions for the processing industry.

Its modern design and architecture permit the cost-effective design and economical operation of a plant throughout all life cycles including planning, engineering, commissioning, training, operation and maintenance, including future extensions.

The SIMATIC PCS 7 process control system, together with SIMATIC® state-of-the-art technology, exceeds the requirements for performance, reliability, simplicity and safe operation – with ease.

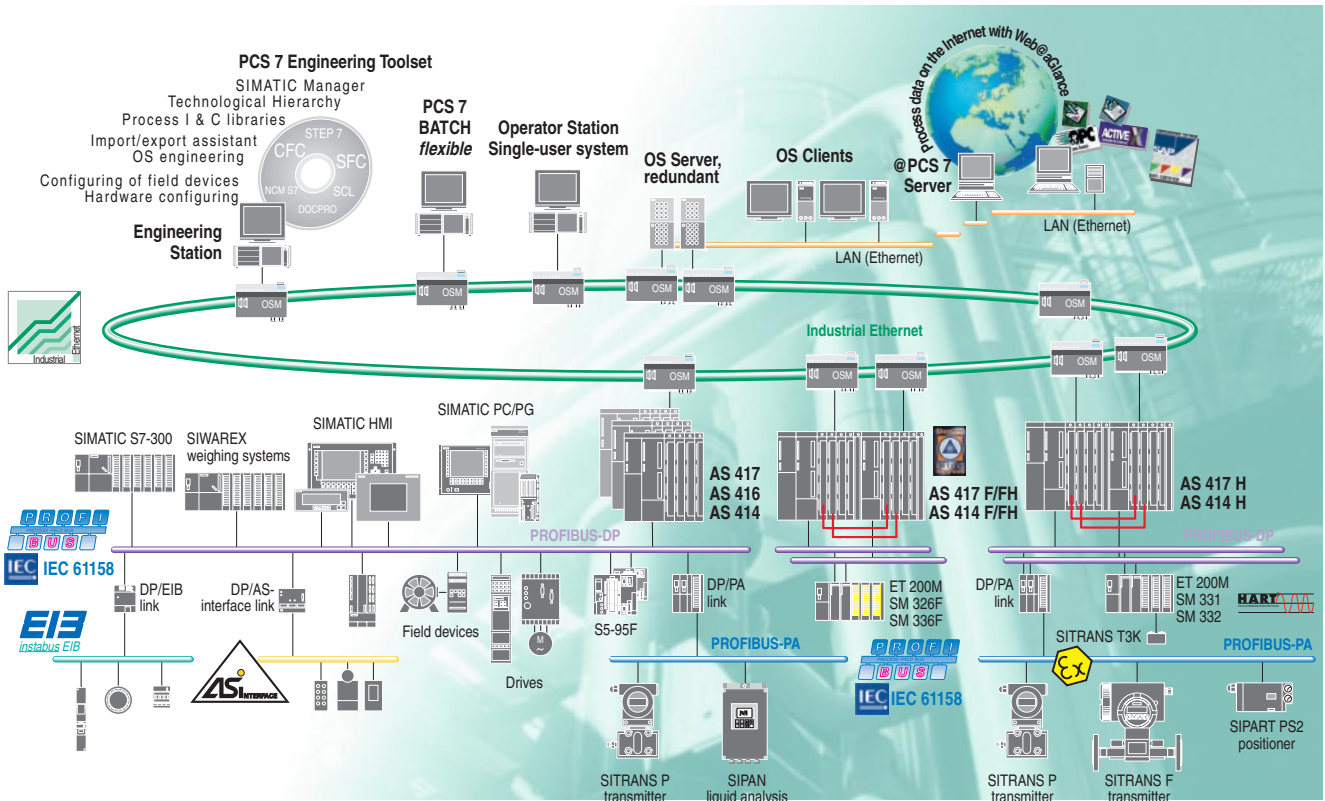
SIMATIC PCS 7 as the process control system of Totally Integrated Automation® offers triple uniformity in data management, communication and configuring. SIMATIC PCS 7 cannot therefore only be used for control tasks in the process engineering sectors, it also covers the complete automation of all upstream and downstream processes encountered in these sectors, e.g. material supply or packaging.

Setting the standard in process automation, SIMATIC PCS 7 is the complete automation solution, geared to plant-wide integration of all processes in any manufacturing and process environment.



Totally Integrated Automation

System overview



Uniform and homogeneous total system

As a modern process control system, SIMATIC PCS 7 forms an integrated, homogeneous total system. System-typical properties ranging from engineering up to operating guarantee that the demands typical for a process control system are comprehensively fulfilled:

- Simple and safe process control
- Convenient operation and visualization
- Powerful, fast and uniform system-wide engineering
- Comprehensive integration of field bus
- Flexible solution for batch processes
- System openness
- Direct interfacing to the IT world.

Examples of functionalities offered by SIMATIC PCS 7:

- Defined startup of plant
- Operating strategy with technological view of plant
- I & C alarm concept
- Access protection/control and operating privileges
- Sign-of-life monitoring and diagnostics system
- Time synchronization
- Comprehensive libraries with ready-made control system blocks
- Import and export functions for project data to and from CAD/CAE systems
- Integration of safety-oriented applications
- Software package for batch processes (BATCH *flexible*, complies with ISA S88.01).

Horizontal integration

The horizontal integration of the main process with subsidiary processes is based on the one hand on the fact that SIMATIC PCS 7 uses the same standard SIMATIC components, in particular the SIMATIC controllers which are suitable for both manufacturing industry and process engineering.

For the first time, a process control system therefore combines all advantages only known otherwise in the successful SIMATIC automation systems manufactured in large quantities:

- Low hardware costs
- Modular design and fine scalability
- Proven quality and stability
- Simple, fast definition and selection of system components
- Low stockkeeping and spare part costs since fewer types exist
- Short delivery times for spare parts and when expanding the system
- Worldwide availability of components.

On the other hand, different approaches can be combined in SIMATIC PCS 7 thanks to Totally Integrated Automation, e.g. systems engineering or OEM equipment based on SIMATIC components.

Furthermore, SIMATIC PCS 7 can be expanded by a wide range of different components from the extensive automation and drives range from Siemens.

Vertical integration

The vertical integration of the system in the company environment comprises two aspects:

- Integration into the company-wide information network
- Integration of field systems.

The consistent observation of international industrial standards for data exchange with the operations management level, such as Ethernet, TCP/IP, OPC, @aGlance or SAP R3/PP-PI, has made it possible to link the SIMATIC PCS 7 process control system into the company-wide information network without problem.

Thus the company-wide availability of the process data for a wide range of applications such as

- MIS (management information system)
- MES (manufacturing execution system)
- ERP (enterprise resource planning)
- Advanced process control
- Asset management & maintenance.

is guaranteed at all times and all locations.

SIMATIC PCS 7 provides an SAP-certified interface for linking to the PP-PI module of SAP/R3. This interface connects SAP/R3 to the PCS 7 software package BATCH *flexible* for recipe-controlled automation of batch processes.

SIMATIC PCS 7 highlights

- The process control system for "Totally Integrated Automation"
- The hardware components are standard SIMATIC components with the known quality and reliability
- Universal application: suitable for continuous and batch plants, also with fail-safe and fault-tolerant applications
- Central engineering system for all system components
- Intuitive and effective configuring
- Simple and convenient process control, clear and safe plant operation

Scaleability: only as much as you really require !

- Modular, flexible and scaleable design at all levels:
 - Operator stations
 - Engineering stations
 - Automation systems
 - I/Os
- Suitable for plant sizes with 50 to approx. 18,000 tags
- Scaleable from a starter system up to distributed multi-client/server configurations
- Simple assembly of system using ordering units for ready-to-use engineering systems, operator stations and automation systems

Openness

- Openness resulting from consistent application of industrial standards:
 - Microsoft Windows NT environment
 - Configuring (e.g. IEC 61131)
 - Communication and data transfer
- Direct interfacing to the IT environment using the @PCS 7 option packages

Flexibility

- Large range of tested standard function blocks, customer-specific adaptation using freely-configurable function blocks
- Branch-specific expansion using branch add-ons

The matching hardware for all requirements

- Uniform, efficient communications concept for all plant levels with Ethernet, PROFIBUS-DP/PA, HART, AS-Interface
- Wide selection of field devices since PROFIBUS-DP/PA, HART and AS-Interface are supported
- Uniform redundancy for OS, AS, communication, I/Os and field
- AS 414 H and AS 417 H fault-tolerant automation systems
- Fail-safe applications with AS 414 F/FH or AS 417 F/FH and communication using ProfiSafe protocol
- Comprehensive solutions for Ex I/Os

Just to be absolutely sure !

- In use in more than 1000 plants worldwide
- Worldwide presence and service
- Comprehensive support, also on the Internet
- Electronic catalog CA01 on CD-ROM and on the Internet; electronic ordering system using Siemens Mall on the Internet

System overview

The @PCS 7 Server and the corresponding Web@aGlance/IT-Client mean that processes can be globally monitored online via intranet or Internet. The @PCS 7 Server also means that host information systems possessing an @aGlance interface can be connected to SIMATIC PCS 7 without problem.

SIMATIC PCS 7 thus opens up access to the IT environment in a simple manner.

Integration of field systems

SIMATIC PCS 7 is particularly suitable for integration of field systems into the process control system. It is unimportant whether the plant is equipped with classical or intelligent field devices (e.g. with HART protocol) or with state-of-the-art, bus-based field devices.

The bus-based field devices are connected on the basis of the PROFIBUS-DP/PA – now an international standard to IEC 61158 – and can also be redundant.

Using PROFIBUS-PA, field devices in the Ex zone can also be incorporated. With PROFIBUS-DP, an isolating transformer is used for distributed I/Os in the Ex zone. Incorporation in the Ex zone is also possible for classical field devices and HART field devices.

Using the SIMATIC PDM Process Device Manager it is possible to use a central engineering system to parameterize fieldbuses with a PROFIBUS-DP/PA or HART interface throughout the system.

Communication standards such as PROFIBUS and HART open up the system for components from other vendors. In addition, simple actuators and sensors can be linked into the system via AS-Interface or building automation components using *EIB instabus*.

No wish remains unsatisfied: customer-specific adaptation of SIMATIC PCS 7

- The openness of SIMATIC PCS 7 guarantees
 - flexible, branch-specific expansion,
 - customer-specific adaptation and
 - integration into the IT environment.
- The openness is based on the consistent use of industrial standards for data and communications interfaces:
 - OPC, ODBC
 - API interface for operator systems
 - OCX objects (Visual Basic and Industrial X)
 - Option package @PCS 7 for reading/writing other client/server applications on the same computer or on partner systems (based on @aGlance interface ISA SP 72)
 - @PCS7 for reading/writing process data via Internet/intranet (based on Web@aGlance interface)
 - SAP R3 / PP-PI
- Cost-efficient configuring by importing data from CAD/CAE systems (CSV, Excel and Access files).

Scaleability, flexibility and openness

In addition to its software specific to process control systems, SIMATIC PCS 7 is based on selected standard SIMATIC components.

You can then

- select from various, powerful automation systems depending on the project and plant requirements,
- incorporate distributed and central I/Os step-by-step,
- extend operation and monitoring from a single-user starter system up to a distributed multi-user system with client/server architecture, and
- specifically extend the functionality of the operator stations by adding various software and hardware functions. For example, the OS I & C control software is available scaled according to the number of tags required.

This means that SIMATIC PCS 7 can be optimally matched to the functionality and requirements of the plant as a result of the fine scaleability and wide variety of expansion possibilities, and all this at low cost.

The "PCS 7 Starter Pack" is available as a starter solution, and is a complete PCS 7 system comprising a common engineering/operator station and an automation system. The Starter Pack need only be supplemented by the required I/Os and a monitor.

SIMATIC PCS 7 can be expanded up to the quantity breakdowns of large plants, or from single configurations up to distributed multi-client/server configurations.

The openness of SIMATIC PCS 7 extends over all levels. In addition to the communication and design aspects already referred to, these include the programming and data transfer interface for application programs as well as facilities for importing and exporting graphics, texts and data, e.g. from CAD/CAE applications.

Redundancy in all levels

SIMATIC PCS 7 provides a redundancy concept which extends over all levels of automation.

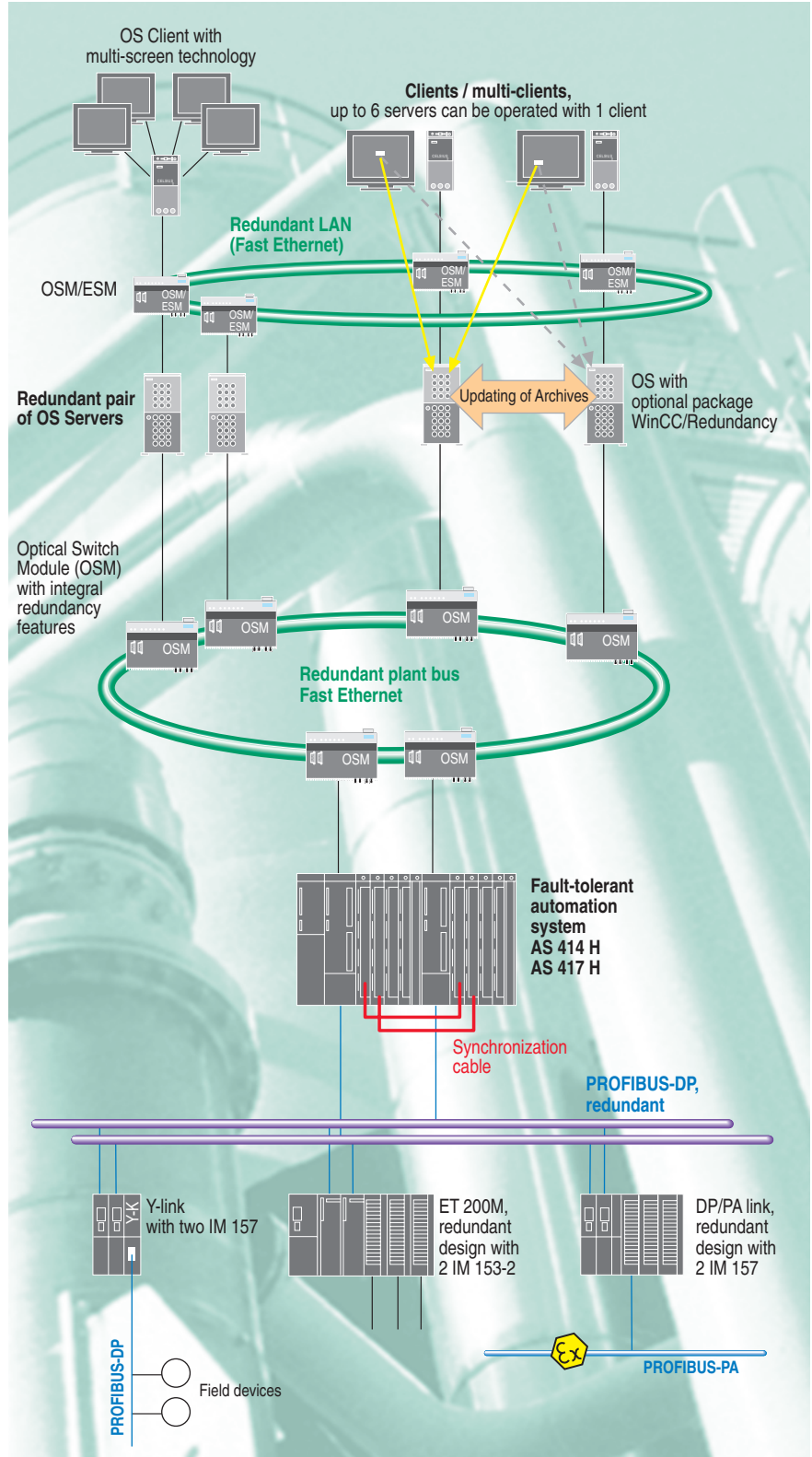
This begins with the multi-client architecture where several clients can access the data of one OS server. The OS servers themselves can also be of redundant design if necessary.

A further aspect is the multi-screen function in the operator stations which permits up to 4 process monitors to be connected to one operator station via a multi-VGA card.

Communication between the automation systems and operator stations/ engineering stations and between one another is carried out via the redundant Industrial Ethernet plant bus which can be operated at 10 Mbit/s or 100 Mbit/s. The AS 414 H and AS 417 H automation systems are connected using an Ethernet communications processor (CP) for each partial AS. The standard AS, OS and ES systems are connected to the plant bus using only one CP.

Several PROFIBUS-DP lines (from each partial AS) can be connected to distributed I/Os via the internal PROFIBUS-DP interface or using further communications processors. Central I/Os can be inserted into the AS 414 H / AS 417 H subrack.

A redundant ET 200M distributed I/O system can be connected where the head of the ET 200M station is generated from two IM 153-2 modules on a special bus module. For connection of the PROFIBUS-PA I/Os, two IM 157 modules are fitted on a special bus module and connected to the redundant PROFIBUS-DP using DP/PA links. To round off the redundancy solutions, the Y-link provides the possibility for connecting non-redundant DP devices to the redundant fieldbus (available soon).



Operation and monitoring

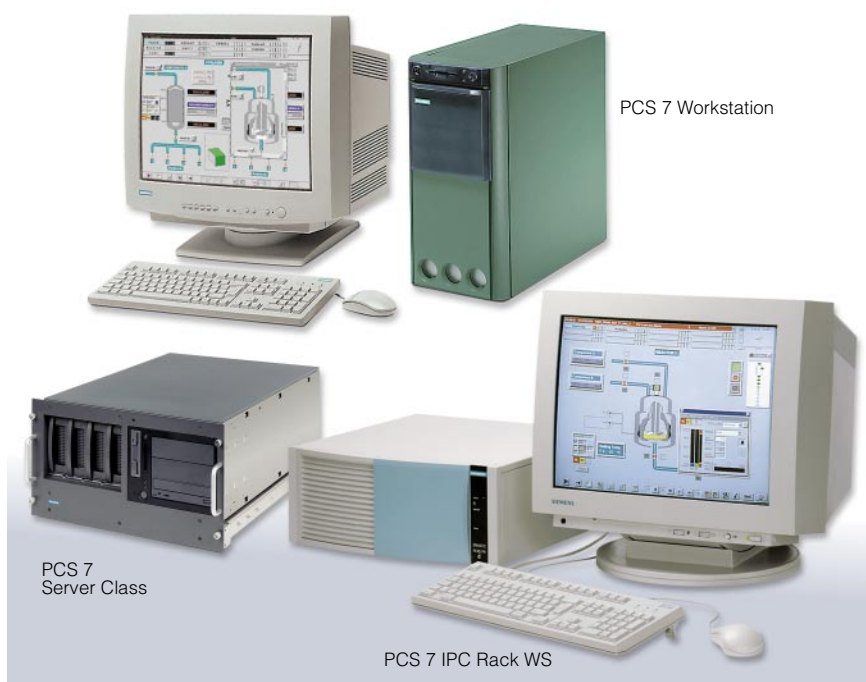
Operator stations

Operator stations

The SIMATIC PCS 7 process control system offers a wide and flexible range of operator stations to permit you to operate and monitor a plant. These stations are preconfigured, preinstalled and tested as complete units on the basis of a personal computer with corresponding control system software. Resulting from the use of PC technology, operator stations offer state-of-the-art hardware based on the Windows NT operating system together with a wide range with finely-graded performance and variable design (rack or tower) adapted to industrial or office environments. The various versions cover all possible applications: from single-user system (Single Station) up to distributed client/server configurations, from a standard server up to the high-performance OS Server Class with dual Pentium processors.

The operator stations are connected to the Industrial Ethernet plant bus either via a communications processor or a simple LAN card (Basic Communication Ethernet for max. 8 stations). If further operation channels are required, it is also possible to operate additional single-user systems in parallel on the plant bus. A multi-user system consists of operator terminals (clients) which are provided with data from one or more OS servers via an LAN (local area network). The LAN can be integrated in the plant bus or be a bus which is independent of the plant bus (Ethernet with TCP/IP).

An intrinsically-safe operator panel is additionally available for use in hazardous areas of zone 1 and 2, and can be connected to an operator station at a distance of up to 500 m.



Operator station highlights

- Scalable from PCS 7 Starter Pack (simple complete system with ES/AS/OS) up to distributed client/server structure with up to 18,000 tags
- Flexibility in selection of hardware platform: variable packaging system for office and industrial environments
- Multi-client/server architecture with up to 16 multi-clients per server or redundant pair of servers; up to 6 servers or redundant pairs of servers possible
- Common hardware platform for operator and engineering stations, completely preinstalled with the PCS 7 software; the applications of the stations can be converted at any time to an operator station or engineering station
- Interfacing to the IT environment using the @PCS 7 option packages
- Openness and flexibility for customer/branch-specific adaptation of the operator stations
- Uniform OS redundancy
- Convenient process control and high operational safety; also as a result of the optional multi-screen technology

OS redundancy

- Automatic switching over of clients on failure of server
- Updating of archive using the standby server on restart

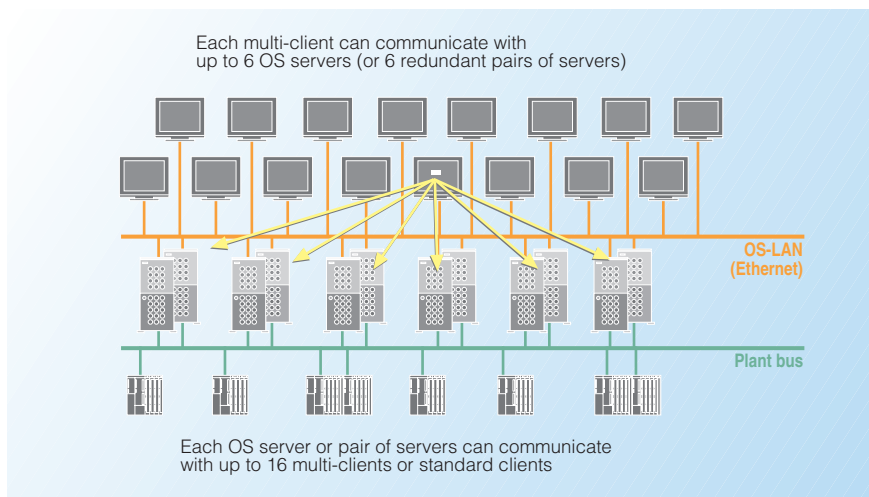
Multi-client/server architecture

This architecture permits multi-clients to access the data of several OS servers; these access operations can also be carried out simultaneously. The project data, process values, archives, alarms and messages are made available by the OS server for the multi-clients.

This permits distribution of the data amongst several servers, and one common access operation via multi-clients. The plant is thus divided into several technological units. Each unit can have its own OS server. In addition to scalability, the advantage of distributed systems is the decoupling of plant sections with an associated increase in availability.

SIMATIC PCS 7 supports the access of a multi-client to up to 6 servers or 6 redundant pairs of servers.

Each server/pair of servers can communicate with up to 16 clients. If multi-VGA cards are used in the clients, with which 2 or 4 process monitors can be connected per client, the number of clients per server is corresponding smaller, e.g. 8 clients with 2 process monitors each.



PCS 7 Starter Pack

The starter version "PCS 7 Starter Pack" is ideal for use in small plants, in technical colleges and for training purposes. It offers the same range of PCS 7 functions at an attractive price; the only limitation is that the number of variables is limited at approx. 250 tags.

This version is immediately ready for use, and includes a powerful, pre-installed PC for use as an engineering and operator station as well as an automation system based on a SIMATIC S7 CPU 414-3. The required licenses are included in the pack.

The PCS 7 Starter Pack need only be supplemented by the required I/Os (central/distributed I/O modules, field devices etc.).

The Starter Pack is a complete SIMATIC PCS 7 system, and can therefore be expanded as required or integrated into a distributed architecture.

System performance			
Max. number of variables per server	150,000 (3,000 tags)	Follow-up archiving of process data (per server)	300 values/s
Max. number of messages per server	13,800	Cyclic backup archiving (per server)	100 values/s 400 values/s
Selection time for OS area display for 100 process symbols (mixed types with approx. 250 variables)	2.5 s	• Sybase format • dBASE format	
Selection time for message display with 1000 messages in the archive	4 s	Max. number of OS areas	16
Number of OS servers/redundant pairs of servers	Max. 6	Number of messages to be archived (per server)	1/s (continuous) rush of messages: 500 messages
Number of OS clients per OS server/pair of servers	Max. 16		
Number of automation systems per OS server	Max. 64		
• With communication via CP 1613	Max. 8		
• With communication via Basic Communication Ethernet			

Operation and monitoring OS control system software and options

OS control system software

The OS control system software provides the basic data and functions of a typical I & C operator station.

This software is available graded according to the number of required variables, and can thus be matched to the plant requirements.

The standard graphical user interface has a clear, well-structured and ergonomic design. Plant operators gain a rapid view of the process and can navigate easily between the plant views. Events are recognized quickly, and the required operator inputs can be carried out simply and rapidly, thus permitting safe plant operation.

The faceplates can also include windows in which standard office applications such as spreadsheet programs can be used simultaneously or in which video images can be displayed. Use of worldwide data/interface standards such as OPC, OXC, ODBC etc. as well as Web functions means that even specific requirements can be solved in the PCS 7 stations.

The OS control system software includes:

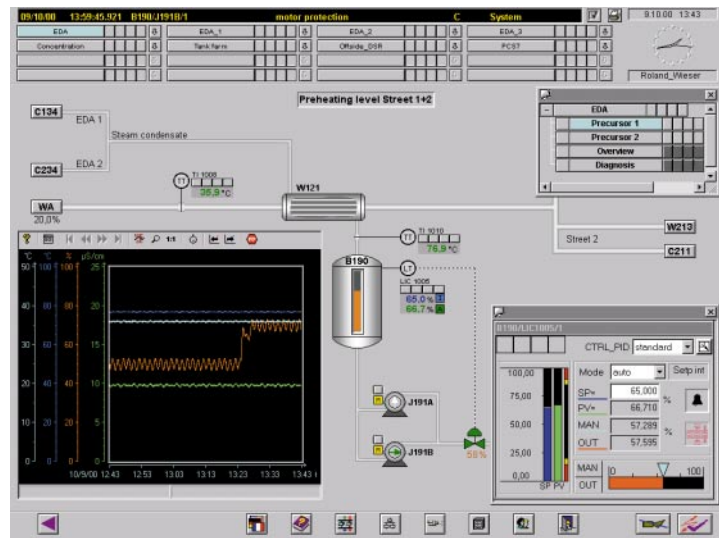
- The **Split Screen Wizard** is an assistant with which application-specific user interfaces for process control, the screen resolution, and multi-channel mode can be set in interactive mode. Together with an optional multi-VGA graphics card, the multi-channel mode supports up to 4 screens.
- The **Picture Tree Manager** supports the graphic configuring of the picture hierarchy. The operator can scroll in the picture hierarchy during process control.
- The **Sign-of-life Function** monitors all subordinate systems connected via the plant bus for correct functioning. A graphic plant configuration display shows the monitored bus stations with their respective operating status.

Last message

Overview with 16 areas

Working area with movable windows (video, faceplates, curves etc.)

System function keys



- The **Message Wizard** generates the I & C message pages such as new list, old list, deactivated list, operating list, I & C list and history. The system can be configured using the message wizard such that an optional signal module controls external signal sources, e.g. up to 3 different signalling units.
- The **Curve Wizard** can be used to select and display curve groups in online interactive mode.
- The operator stations can also handle the **Central Clock Synchronization** of all automation systems connected to the bus.

OS control system software highlights

- Predefined standard OS graphical user interface:
 - Top line on screen for display of last message
 - Overview area with 16 area displays
 - Working area for the plant displays
 - Bar for system function keys, e.g. selection of language, online help
 - Date, time and operator name in the display area
 - Button for printout of current screen contents
- Process display hierarchy (Picture Tree Manager) with navigation keys and navigation faceplates for direct selection of subordinate areas
- Several windows and faceplates can be opened simultaneously, and shifted as desired in the working area
- Collective displays for messages; complete displays for message/alarm lists depending on the message group
- Direct selection of loop display in event of alarms (loop-in-alarm)
- Acknowledgment in the process display
- Message wizard for user-specific adaptation of message display
- Curve wizard: online compilation of curves / selection using measuring point names
- Selection of process displays and measuring points using names
- Saving and recalling of screen arrangement
- Sign-of-life monitoring for plant components
- Online selection of system language (German, English, French), further languages can be defined by the user

OS options

The OS option packages can be used to adapt the functionality of the operator stations to individual user requirements.

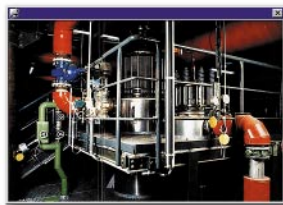
To permit long-term storage, the data recorded using the operator stations can be automatically exported using the **Storage** function. Such data include reports as well as message and measured-value archives. Automatic exporting can be carried out e.g. according to a time cycle or following a selectable filling level.

If several operation channels are required on one operator terminal, up to 4 process monitors can be configured on one terminal using **multi-VGA graphics cards**.

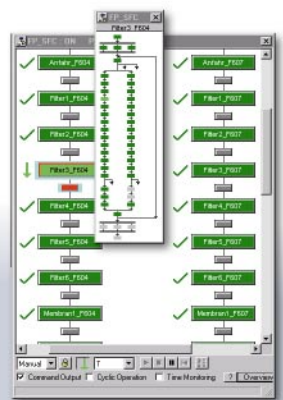
A **chipcard reader** can be used for access control on the operator stations. Different levels of access privileges can be created which are checked using the chipcard. In particularly critical plants, an additional password can be configured for extended access protection.

The option "**Guardian**" permits camera monitoring throughout a network. Different plant areas which are recorded by several video cameras can be simultaneously monitored online by on-screen display on the operator stations. Messages can be output if certain changes occur, and user-defined actions can be executed.

The images are documented, and can be saved in a video database. The Network Edition version of the Guardian can distribute the images to max. 15 OS clients.



On-screen display



SFC visualization



OS with multi-VGA card "4 screens"

The sequential controls which are configured on the engineering station using SFC can be visualized in the same form on the operator station using the **SFC visualization** option. In an overview display, you can open e.g. the step and transition displays, and display the step comments or the dynamic step conditions.

Highlights of the OS options

- Multi-screen technology (display of image on several monitors with mouse/keyboard as single operation device) permits simultaneous operation of several plant areas together with increased safety on failure of monitor
- Video monitoring with on-screen display in separate OS window
- Signal module connection for external audible signal device
- Assignment of flexible and system-wide user privileges
- Access authorization using password and chipcard
- Time synchronization
- Simple visualization of sequential function charts (SFC visualization) without special configuring

Interfacing to the IT environment

For plant owners, information technology (IT), process data management and production planning systems have become important elements for reducing costs and optimizing processes. These elements will become even more significant in the future. Efficient information technology and process data management increase reaction abilities, decision quality and process transparency.

SIMATIC PCS 7 together with the comprehensive industrial information technology permit the opening up of significant rationalization potentials in the processes.

SIMATIC PCS 7 provides the open system platform for fast and simple integration of many software packages at the plant management level. On this platform, data exchange and availability at the management and controlling levels can be implemented without problems.

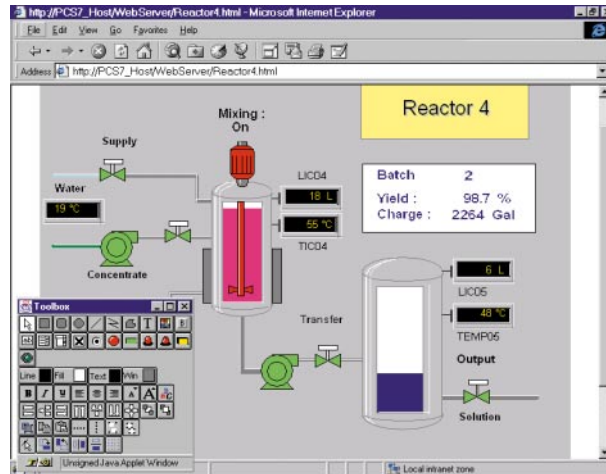
Remote access to process data

@PCS7 offers a simple, cost-effective possibility for remote access to the process data recorded using SIMATIC PCS 7.

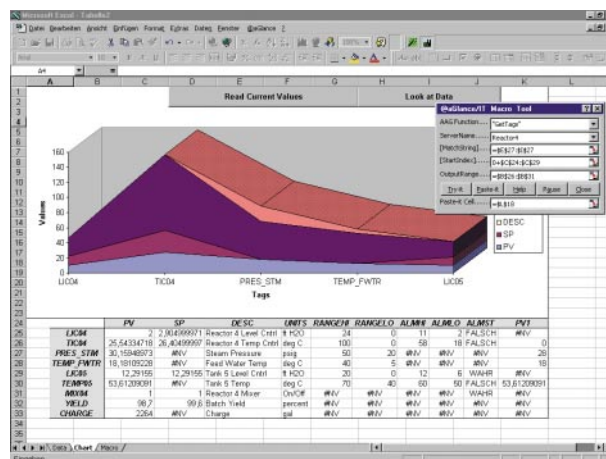
The data can be displayed and processed further on any computers with various operating systems using the standard package @aGlance – even via intranet/Internet.

An @aGlance server is already integrated in every SIMATIC PCS 7 operator station. To permit reading, the target PC only requires a Web@aGlance package and a standard Web browser. To permit writing and communication with other @aGlance servers, it is simply necessary to activate a corresponding license in the OS operator station.

Following integration of @aGlance/IT, the SIMATIC PCS 7 is able to communicate with a large number of software products for the plant management/company management level. @PCS7 provides customers with access via the @aGlance interface to the data of the PCS 7 operator station including the archives and messages.



Visualization of process data via Internet/intranet



Importing of process data for business administration evaluations

@PCS7 highlights

- @PCS7 can be used to make process data available throughout the complete company. All process data can then be visualized, analyzed and processed on any desktop.
- @PCS 7 permits access to all data of the PCS 7 operator stations, e.g. the archived data. All architectures such as distributed servers and redundancy are supported.
- All client/server applications which have an @aGlance interface can be connected to @PCS7.
- @PCS7 is based on the @aGlance technology; @aGlance has become established as the de facto standard for interface software (middleware) with Internet interfacing.
- @PCS7 is used to provide the process data at the plant management/company management level, based on client/server technology.
- @PCS7 is the communications software between the server providing the process data and the client applications, e.g. Web browser, Excel, Lotus, InfoPlus.21
- In addition, separate client/server applications can be developed based on the @aGlance product range

An intelligent log-on procedure provides the @aGlance product range with a Plug&Play character without neglecting security aspects. Access protection is achieved using a powerful administration tool.

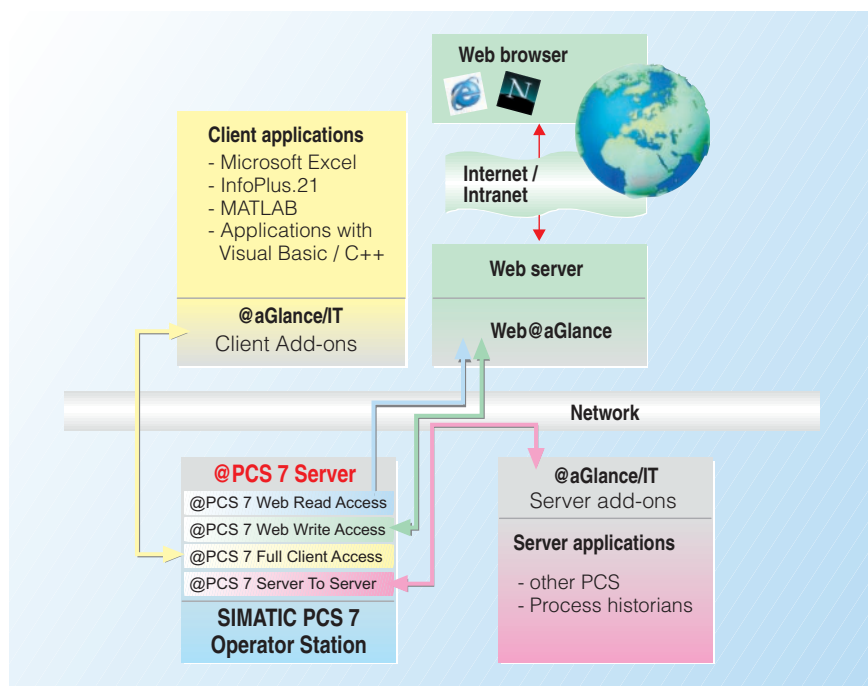
A further advantage of the open architecture of this client/server technology is free selection of the operating systems or applications on the server or at the client end of the @aGlance/IT software package. This also means that implementation of @aGlance is independent of any hardware and software architecture which may be present. This permits the greatest possible independence from systems already existing in the company or which are to be implemented. The result is that no costs arise when changing the system, and there is no dependence on systems or suppliers.

SIMATIC PCS 7 offers a number of @PCS 7 versions (see Fig. on right) with the following functions:

- Reading of OS data (process data, messages, archive data) via Internet/intranet
- Writing of OS data
- Communication with @aGlance/IT client applications, e.g. the InfoPlus.21 information management system
- Communication with server applications of the @aGlance/IT server add-ons

The option packages can be upgraded using powerpacks.

The @PCS 7 server has its own user management for data access.



Web@aGlance

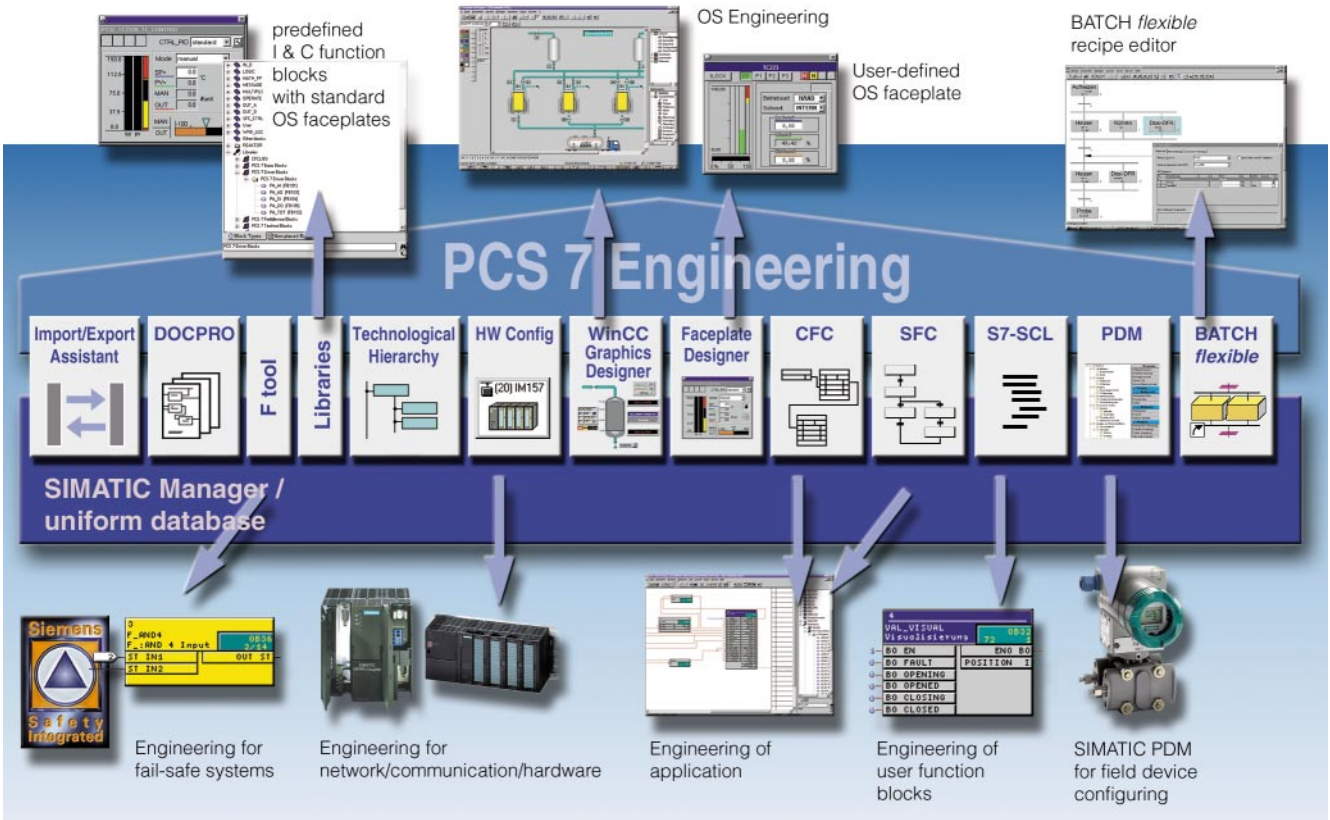
Web@aGlance is an @aGlance/IT client and permits remote monitoring of a process (in real-time); with a browser-based display, the process can be monitored from any computer which has a browser (no installation/updates necessary on the client).

Every user can now create his own Internet sites simply and rapidly using an editor. No knowledge of programming languages is necessary, the animation editor provides assistance when creating animated graphics, and the wizard for FrontPage automatically delivers flowcharts. Intuitive assistants (wizards) have been integrated into the Web tool Microsoft FrontPage, and display any process values in Web sites as tables, flowcharts etc. within a few seconds. Operation and monitoring via intranet/Internet has become child's play thanks to the Plug&Play access to @aGlance servers. For example, @aGlance users can save development, operating and updating costs by using state-of-the-art Internet technology for industrial communication.

InfoPlus.21 information management system

The @PCS 7 server can also be used to link higher-level information systems possessing an @aGlance interface to SIMATIC PCS 7. An example is InfoPlus.21. This is the information management system for real-time production processes and information can be recorded. This combination of process control systems and process data management systems offers a high degree of integration and performance for real-time continuous or batch applications.

Engineering



The central engineering system of SIMATIC PCS 7 contains tools which are optimally tuned to one another:

- For configuration of the hardware
- For configuration of the communication networks
- For configuration of continuous and sequential process operations
- For design of operation and monitoring strategies
- For generation of recipes for batch processes.

The open engineering system means that project data can be imported from CAD/CAE tools.

The use of predefined blocks together with a configuring tool tailored to the requirements of technologists permits technologists, process engineers and production engineers to carry out planning and configuring in the environment with which they are acquainted.

Typical automation components such as motors, valves and PID controllers are available as software objects and need only be connected together according to the process operations. These connections are carried out in full-graphics mode in SIMATIC PCS 7 and are therefore simple, rapid and clear. These operations can easily be carried out by technologists without programming knowledge.

A uniform database for the engineering system ensures that data which have been entered once are available to all tools throughout the system. For example, display and message information is already prepared when configuring the process sequences, and can be simply used when designing the operator station without any additional requirements.

The component-independent, plant-wide configuring offers the best prerequisites for saving engineering time and costs:

- The compatible tools largely prevent multiple inputs and possible errors.
- Configuring using the technological hierarchy means that the plant can be configured according to functional aspects.
- Users only handle selected objects which correspond to the process task.
- Use of plant data from CAE tools means that previously configured data are used automatically.

ES software Engineering Toolset

A complete Engineering Toolset is provided for configuring SIMATIC PCS 7:

The **SIMATIC Manager** of STEP 7 is the standard SIMATIC configuring platform from which the complete PCS 7 engineering is carried out. The PCS 7 project is managed, archived and documented here. The SIMATIC Manager provides a selection of required hardware from an electronic catalog as well as tools for configuration of the automation systems, I/O components and network components.

A project can be displayed in a technological view in the **technological hierarchy** (TH). The resources of a project are grouped according to the plant structure, and the existing information is thus displayed in a practice-oriented manner. The technologist then has a clear overview of the complete project resources.

The TH created during configuring can be used to automatically derive the display hierarchy in the plant display structure, and thus saves double engineering. The TH is also used for plant-oriented identification of process objects.

Continuous Function Chart (CFC) is the tool for graphic configuring of continuous automation functions according to IEC 1131. Predefined blocks are positioned, parameterized and connected on CFCs – supported by powerful autorouting and an integral message configuring function. CFC additionally offers – just like other PCS 7 software components – comprehensive test and commissioning functions.

Sequential Function Chart (SFC) is used for graphic configuring of batch processes. Sequential controls (sequencer configurations) can be graphically displayed in a simple manner. Single actions such as "Drag & drop" and "Fill in the blanks" are used to set the desired CFC block connections and connect them to the steps or transitions of the sequencers. Support is also provided here by powerful test and commissioning functions as well as convenient editing functions.

Engineering system highlights

- Uniform, central engineering drastically reduces engineering costs and times as result of:
 - Fully-graphic configuring with user-friendly desktop with Windows look and feel
 - Import/export assistant for bulk engineering
 - Integral configuring of field devices
- Universal engineering tool for classical systems as well as fault-tolerant and fail-safe systems
- Fast engineering as result of:
 - Ready-made charts
 - Comprehensive library of tested, ready-to-use standard blocks
 - Numerous configuring steps automatically controlled by the system (auto-engineering)
- Process-based configuring without special programming knowledge:
 - Functional structure with hierarchy arranged according to systems, sub-systems, technical equipment
 - No configuring of communication, just selection and setting of parameters
 - Engineering independent of hardware: subsequent selection of I/O modules is possible
 - No differences in configuring of redundant or non-redundant applications
 - Configuring of fail-safe applications with the same tool
 - Simple, customer-specific adaptation of function blocks
 - Can be expanded by branch add-ons via standard data interchange interfaces

Powerful creation of charts

- Convenient graphic configuring
 - For hardware configuration
 - For charts (continuous processes and sequential controls)
 - For batch recipes and batch planning
- Autorouting: good readability of charts, even following subsequent repositioning of blocks, all connections are automatically redrawn (fast generation of new connections)
- Detailed view of blocks by clicking with mouse directly in the chart
- Simple chart-independent connection of blocks
- Simple navigation between charts using margins, naming of source and targets for connections

Structured Control Language (S7-SCL) is a high-level language similar to Pascal for programming user function blocks according to IEC 61131-3. The user blocks are homogeneously integrated into the system, i.e. they can be edited like standard function blocks in the CFC.

The **Import/Export Assistant** is an important tool for fast bulk engineering. It significantly shortens the configuring time: plant data which have already been configured, such as measuring-point lists or CAD/CAE charts, can be imported into the engineering system and used automatically to a large extent to generate application software. Existing PCS 7 projects can be exported and also re-imported as example solutions. Further configuring operations can then be based on these data.

Engineering

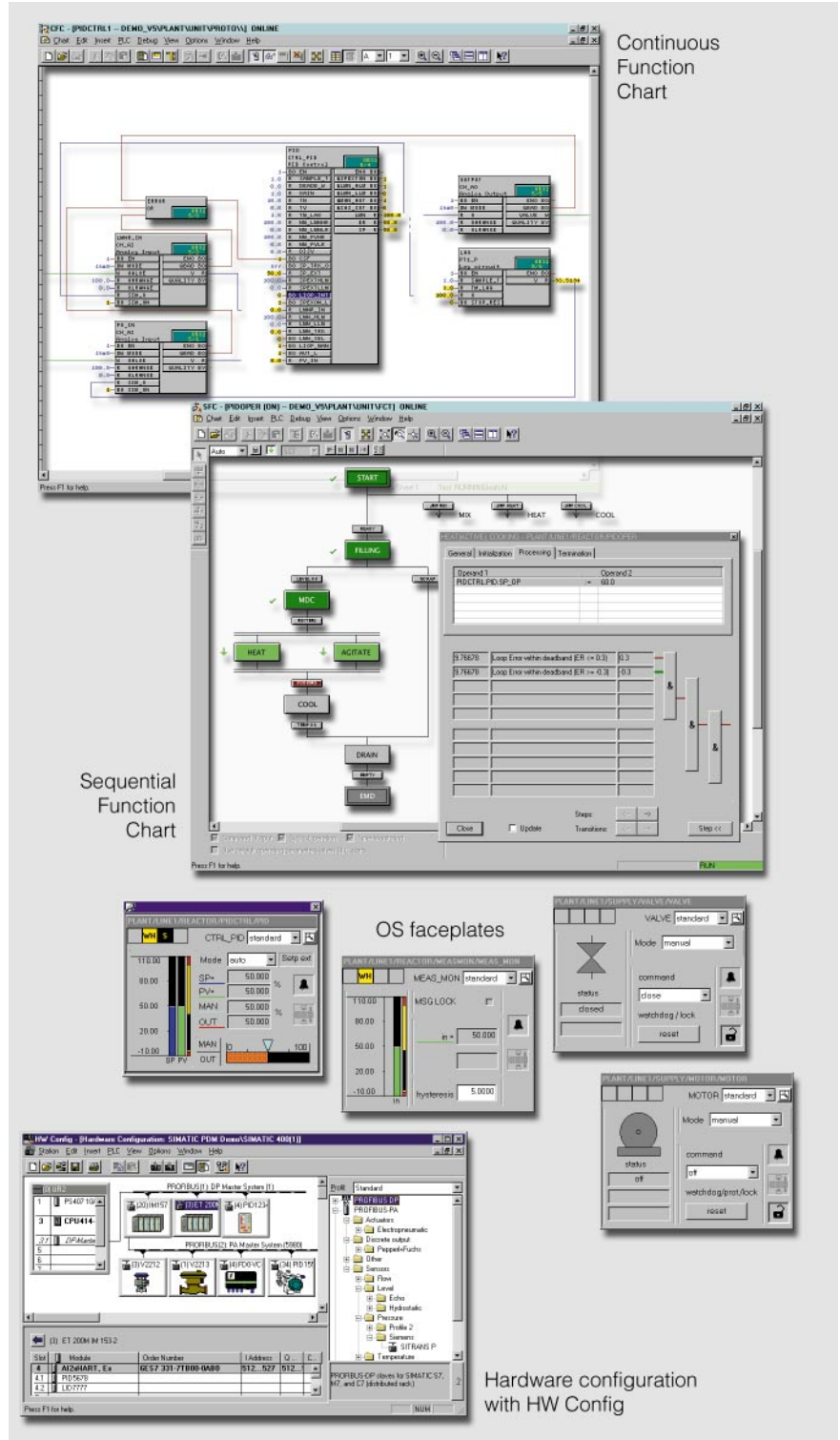
Standardized I & C libraries containing ready-made, tested function blocks permit effective implementation of automation solutions in conjunction with powerful graphic configuring tools, and significantly reduce the engineering requirements, and subsequently also the project costs. The comprehensive range of over 200 blocks includes simple logic and driver blocks, technological blocks with integral operation and alarm functions such as PID controllers, motors or valves (with preconfigured faceplates), up to blocks for integration of PROFIBUS-compatible field devices.

OS engineering for the PCS 7 operator stations is completely integrated into the configuring. The project data are organized by the SIMATIC Manager. All measuring-point data relevant to operation and monitoring, e.g. messages and variables, are already generated when defining the automation function. The proven WinCC graphics editors can be used for the graphic generation of plant displays. The views of the standard user interface and messages specific to the process control system are handled by PCS 7 wizards (assistants) which significantly simplify configuring.

The PCS 7 Faceplate Designer is used for rapid, simple creation of OS faceplates. It is then possible to use customer-specific faceplates in addition to the standard OS faceplates for operation and monitoring of measuring points or plant components, e.g. motors, valves, controllers, measured values.

The Faceplate Designer does not require any programming knowledge. Creation is carried out using the OS Graphic Designer and is based on standard faceplates which can be edited as well as a set of objects with predefined process symbols and operating symbols.

DOCPRO enables you to save a lot of time when generating your plant documentation. In PCS 7 projects, DOCPRO generates plant documentation in accordance with standards, as well as a circuit manual in which you can also enter your special requirements. The generation can be defined as a print order, and then started.



Examples of views of PCS 7 engineering editors and OS control elements

When configuring fail-safe systems, the CFCs defined by the user are automatically supplemented by the functions required for fault detection and response using the **F tool**. The F tool additionally provides support functions, e.g. for comparison or acceptance of F programs (see page 23).

SIMATIC PDM

SIMATIC PDM (Process Device Manager) is a uniform, cross-vendor tool for configuring, parameterization, commissioning and diagnostics of intelligent process devices. SIMATIC PDM enables you to configure a large number of process devices using a uniform desktop. This results in certainty and low costs for investments, staff training, and other follow-up expenditure. SIMATIC PDM can be used in two manners:

- Independent of the system supplier on a personal computer or programmer with Windows 95/98 or Windows NT
- As an integral tool in STEP 7, and thus also as an integral component of the SIMATIC PCS 7 engineering system.

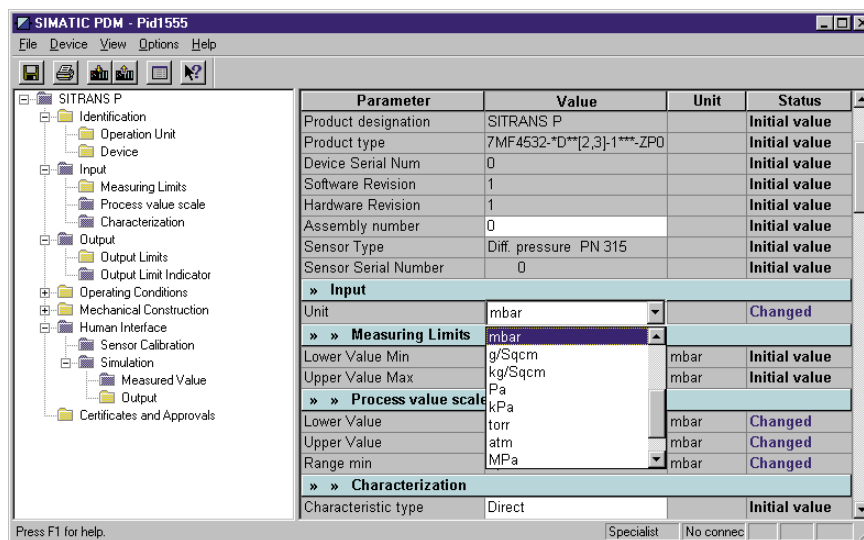
The display of the device parameters and functions is uniform for all supported process devices, and independent of their communications interface, e.g. via PROFIBUS-DP/PA or the HART protocol.

Core functions of SIMATIC PDM are the adjustment, modification, plausibility testing, management and simulation of process device data.

In addition, SIMATIC PDM also permits online monitoring of selected values, alarms and status signals of the device.

Graphical user interface

As with all PCS 7 engineering tools, the SIMATIC PDM graphical user interface is designed according to the Microsoft Windows standard guidelines. Menu structures and toolbars are present, as is an Explorer view which simplifies navigation between parameter groups. Even complex devices with several hundred parameters can then be processed clearly and rapidly.



The graphical user interface supports several views:

- The hardware project view
- The process device network view for the stand-alone application
- The process device plant view as a tag-based view
- The parameter view for parameterization of the field devices (Fig. above)

Communication

SIMATIC PDM supports several communications protocols and components for communication with the following devices:

- Devices with PROFIBUS-DP interface
- Devices with PROFIBUS-PA interface
- Devices with HART interface

Routing

Every field device which can be parameterized can be reached with SIMATIC PDM from the engineering station. Using SIMATIC PDM it is then possible from a central position to read diagnostics information from the field devices, to modify device settings, to generate simulated values in the field device, or to modify the field device parameters.

Device integration

SIMATIC PDM supports all field devices according to the profile descriptions of the PROFIBUS user organization (PNO). In addition, current process devices from Siemens as well as devices from other vendors are integrated in SIMATIC PDM. The Device Description Language (HART-DDL) is available for parameterization of HART devices. This language is a guideline of the HCF (Hart Communication Foundation); it is standardized, multi-vendor, and very widely used. The PROFIBUS devices are described by the Electronic Device Description Language (EDDL). SIMATIC PDM automatically generates its graphical user interface using these descriptions.

Diagnostics

Devices with a PROFIBUS-DP, PROFIBUS-PA or HART interface permit automatic diagnostics. A differentiation is made between standard diagnostics, diagnostics specific to the device type, and freely-formulated diagnostics. The interval between two tests is variable. Diagnostics results are displayed in a window in the SIMATIC Manager.

Batch processes

BATCH flexible

The SIMATIC PCS 7 process control system always offers the appropriate solution for low-cost, effective implementation of batch processes.

Automation of simple batch processes with parameterizable sequential controls is carried out using the SFC and CFC tools included in the engineering system.

BATCH *flexible* is the convenient solution for more complex tasks with recipe-controlled operation. This permits simple, flexible processing of complex tasks with changing control sequences. It supports recipe controls in small to large applications, and can be optimally adapted to the respective demands as a result of its modular design.

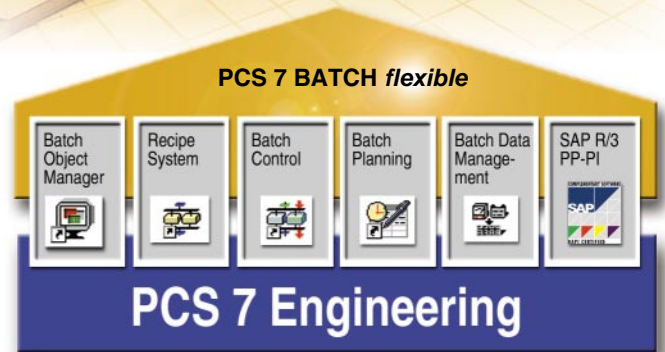
BATCH *flexible* consists of four integral components which are all executed on one operator station:

- The recipe system is responsible for simple graphic creation and management of any number of recipes.
- The batch control can also process and visualize several batches in parallel.
- The batch data management acquires, saves, logs and exports batch data.
- The batch planning is responsible for the planning of batches and production orders in list form.

The complete program package is incorporated into the SIMATIC PCS 7 system environment, and additional hardware is not required.

A convenient graphic recipe editor can be used to create and update equipment-specific and standard quantity "Equipment recipes" according to ISA S88.01.

In order to connect the automation function into the production control level, it is possible to link BATCH *flexible* to SAP R/3 PP-PI. SAP sends production orders via a certified interface to BATCH *flexible* which in turn is able to return BATCH-relevant data to SAP, e.g. for material/maintenance planning.



Validation

An increasing number of plants have to be validated with respect to compliance with quality standards and as a result of marketing and statutory requirements. The process control system and the system manufacturer play an important role in the validation process.

SIMATIC PCS 7 supports you with the well-structured BATCH *flexible* packages, as well as the ISA S88.01 conformity of these components.

Furthermore, Siemens as a manufacturer of process control systems has many years of experience in quality management, in the validation of plants, and has specially trained personnel.

Recipe system

The BATCH *flexible* recipes are built up from any automation functions (from individual control drive up to unit) in any order. The recipes are created as SFCs in accordance with IEC 1131-3/EN 61131-3.

BATCH *flexible* offers the facility for specifying instructions for the operator which are visualized while the batch is being processed, e.g. before an automation function is started. The operator can then monitor the actual values in a dialog window, and enter setpoints.

The created recipes are stored in a relational database which permits various types of evaluation or scanning of all recipes. A version management function supports the modification of recipes.

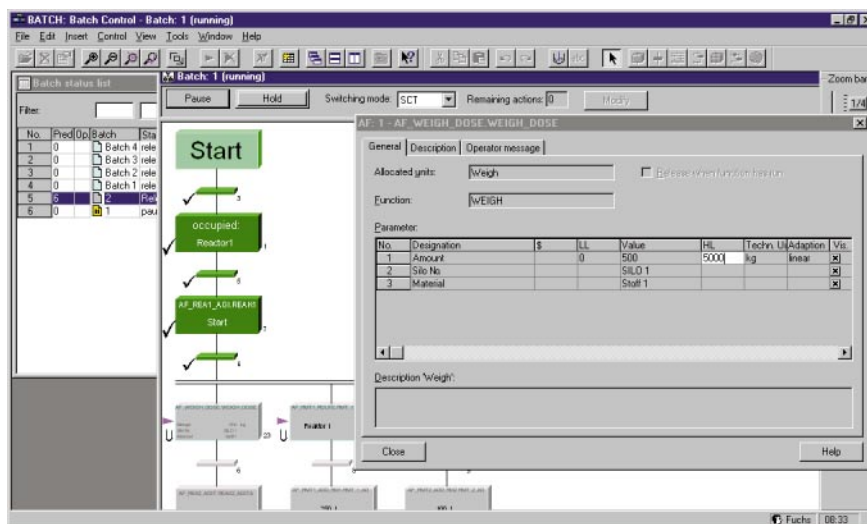
Plant-specific and standard quantity recipes are created and updated using the graphical recipe editor.

A batch-specific control recipe is generated from a standard quantity recipe by specifying a concrete quantity, a unique batch identification and, if necessary, a start time. A control recipe can only be generated from a released recipe. A plausibility check is always performed before a recipe is released.

Both numeric values (e.g. settings) and texts (e.g. names or batch IDs) can be used for data transfer with the automation system via the AF interface.

Batch control

Batch control is responsible for the processing, visualization and operation of batches released for production and the associated control recipes.



Batch control, shown here with operator dialog

In "Automatic" start mode, the batches are started:

- in the sequence defined by chaining (specification of previous batch), or
- in the sequence in which they were released, taking into account the equipment allocation.

In "Manual" start mode, they can be explicitly started by the operator.

Apart from starting and aborting recipe processing, various processing modes can be selected:

- Automatic progression
- Progression with additional operator acknowledgment
- Progression as result of operator acknowledgment
- Operator-controlled selection of the next step(s) to be processed.

The control recipes and their processing in the plant are visualized in the same manner as used for creating the recipes. The operator has the same possibilities for manipulating the recipes (modifying parameters and structures) as were available for recipe creation, providing the user has the appropriate authorization.

Batch planning

Batches can be derived from production orders or entered directly. The production orders are either loaded into the batch planning via a production planning and control system (e.g. PP-PI from SAP) or entered directly using the editor.

The processing sequence for the scheduled batches depends on the sequences in which they were released, and the equipment allocation. A batch processing sequence can be defined by chaining the batches. The result of the planning process is displayed in the form of batch scheduling and equipment allocation lists.

Batch data management

The batch data management processes the alarms and measured values collected by the operator station, stores them in a relational database, and logs and exports the batch data if necessary. The database permits any queries or evaluations concerning the archived batch data.

The batch data contain all information required for reproduction of the batch process, quality certification, and compliance with regulations.

Communication

Industrial Ethernet plant bus

Communication with SIMATIC NET

Communication within SIMATIC PCS 7 is based on SIMATIC NET network components. Based on proven worldwide standards, a communication concept is offered which guarantees reliable data transfer between all levels and components of a plant.

All SIMATIC NET products have been specially developed for industrial applications, and can therefore be optimally used in all sectors and plants.

The network components satisfy highest requirements, in particular in areas where the components are subject to external influences, e.g. interfering electromagnetic fields, corrosive liquids and atmospheres, explosion hazards, high degree of contamination or mechanical loads.

The buses of the SIMATIC NET range permit uniform, trouble-free communication between all system components: engineering stations, operator stations, automation systems, I/Os and field components.

Industrial Ethernet is primarily used as the plant bus. The Basic Communication Ethernet integrated as standard is available for small systems and permits use of Ethernet without a communications processor.

State-of-the-art Fast Ethernet technology is used with SIMATIC PCS 7 for high demands in medium-sized and large plants, and provides all the advantages of a high communication speed of 100 Mbit/s, switching technology, and the reliability of redundant optical rings.

PROFIBUS-DP/PA is used for the I/O and field device connections, and complies with the international standard IEC 61158. In the PA version, or with series-connected isolating transformer, this permits the connection of bus-based field devices in hazardous areas.

Communication highlights

Plant bus

- Ethernet IEEE 802.3 (with ISO and TCP/IP protocols)
 - Industrial Ethernet 10 Mbit/s
 - Fast Ethernet, redundant, 100 Mbit/s, with switch technology
 - Starter version "Basic Communication Ethernet" on basis of LAN connection (3COM card on OS/ES) without communications processor

I/O bus for intelligent and bus-based field devices

- PROFIBUS IEC 61158 / EN 50170
 - PROFIBUS-DP (up to 12 Mbit/s) for fast distributed I/Os, with series-connected isolating transformer in hazardous areas
 - PROFIBUS-PA (31.25 kbit/s) for PA field devices, can be used in hazardous areas
 - ProfiSafe for fail-safe applications
- Selection from more than 1600 products for PROFIBUS-DP and more than 150 products for PROFIBUS-PA
- Interoperability of field devices from different vendors
- 100% application for all processes: core processes, upstream and downstream processes, secondary plants
- Protection of investment by using existing devices, e.g. HART
- Central technology for all field devices with direct access to HART and PROFIBUS-PA field devices
- Redundant I/O bus to guarantee high availability

Cost savings with PROFIBUS throughout the complete life cycle of the plant

- Design with simplified hardware technology
- Assembly with less complex cabling
- Central software for engineering and operation (saves local operation)
- Efficient diagnostics and fast troubleshooting during commissioning, e.g. commissioning of more than 100 PA field devices in one day
- Fast troubleshooting in the production phase using diagnostics and preventive maintenance

PROFIBUS-PA complies with the **FISCO model** (Fieldbus Intrinsically Safe Concept)

- Permits true "Plug&Play" of the field devices in hazardous areas
- Simple certification of the intrinsically-safe PROFIBUS-PA line
- When using additional field devices, it is not necessary to recalculate and certify the intrinsically-safe PROFIBUS-PA line
- Simple documentation
- Easy connection of new field devices, and simple replacement

HART communication, AS-Interface, *instabus* EIB

- HART modules permit HART-compatible field devices to be connected to the ET 200 distributed I/O system (also in hazardous areas)
- AS-Interface EN 50295 for connection of simple sensors and actuators
- *instabus* EIB as subordinate bus, connected to PROFIBUS-DP, permits integration of building services in the system



SIMATIC PCS 7 therefore permits all production sectors to be equipped with absolutely uniform, matched communication from all automation levels, via the actual process, up to supplementary automation systems, from the field up to the operational management level.

Fast Ethernet technology

The industrial high-speed network for the future: Fast Ethernet – compatible with the existing 10-Mbit/s Ethernet, open for data terminals from different vendors, and already the most frequently used 100-Mbit/s network.

The optical switch module OSM® from the SIMATIC NET range enables step-by-step implementation of the 100 Mbit/s technology.

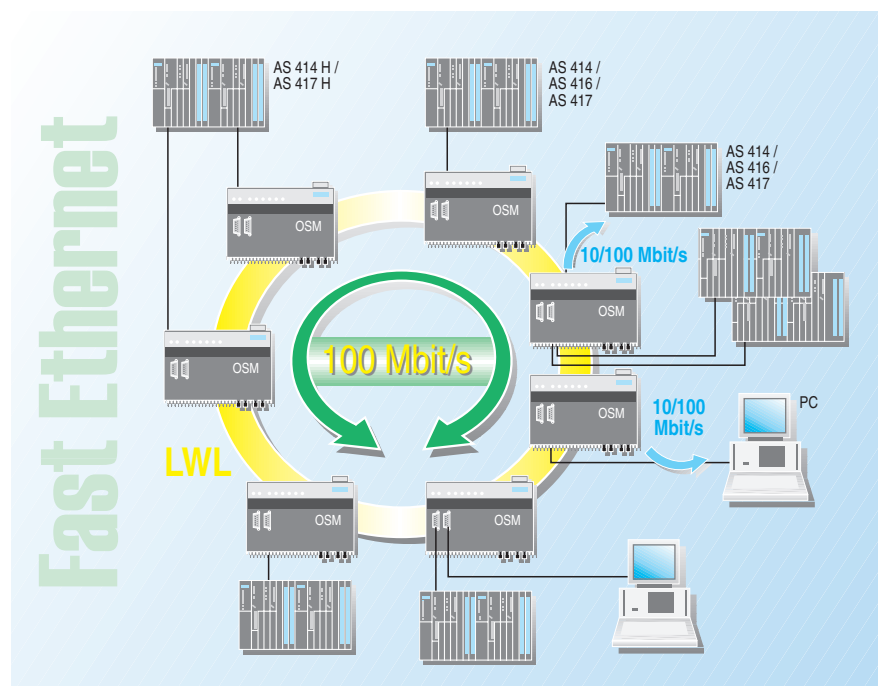
The main reason for the wide and growing acceptance of Fast Ethernet (100 Mbit/s) is its great similarity with the existing Ethernet. The data format and access procedures are the same. Industrial twisted pair (ITP) and fiber-optic (FO) cables as well as the existing technological know-how can therefore still be used, thus significantly reducing the costs when implementing Fast Ethernet as well as additional work and acquaintance problems.

The OSM has two 100-Mbit/s fiber-optic connections and six 10/100-Mbit/s ITP connections. The fiber-optic ports are used to design the 100-Mbit/s backbone. Data terminals or existing network components, such as from the range of optical link modules (OLM®), are connected to the ITP ports.

The SIMATIC NET switches in optical rings additionally provide redundancy which can be configured rapidly and flexibly. Where a switch in redundancy is necessary, the full transmission capacity is already available again after 0.3 s.

Fast Ethernet enables cost-efficient migration from 10 Mbit/s to 100 Mbit/s. You can continue to use existing components without limitation.

Process or field communication	PROFIBUS-DP	PROFIBUS-PA
Number of slaves	Typ. 20 to 30, max. 125	Max. 31 field devices per DP/PA link
Network size	Electrical up to 9.6 km, optical up to 90 km	Max. 1.9 km
Topology	Linear, tree, redundant ring, star	Linear, tree
Plant bus	Industrial Ethernet	
Number of stations	Typ. 2 to 100, max.: more than 1000	
Network size	Electrical up to 1.5 km, optical up to 150 km Worldwide with TCP/IP	
Topology	Linear, tree, redundant ring, star	



Communication

PROFIBUS-DP/PA fieldbus



Simple assembly using FastConnect system for PROFIBUS

Distributed automation solutions based on open fieldbuses are the current standard in many sectors of the manufacturing industry, and more recently also for process engineering. Only fieldbuses permit full utilization of the functional advantages of digital communication such as improved resolution of measured values, diagnostics facilities and remote parameterization.

PROFIBUS is currently the most widely used fieldbus system. More than 1,000 companies support PROFIBUS, more than 1,600 different products are available with a PROFIBUS interface, and approx. 3,500,000 PROFIBUS devices are currently in field use.

PROFIBUS is part of the international standard IEC 61158, thus guaranteeing openness and protection of the user's investment. PROFIBUS is suitable for fast communication to distributed I/Os (PROFIBUS-DP) for production automation/process engineering. Series-connected isolating transformers which limit the ignition energy also permit it to be used in hazardous areas.

PROFIBUS-PA is used for networking field devices in the process environment. It is the first fieldbus system which covers the requirements of both applications with identical communications services. The transmission system for PROFIBUS-PA is tailored to the requirements of the process industry, and offers features such as a power supply to the field devices via the bus or the facility for simple handling of field devices in hazardous areas. Interoperability between field devices from different vendors as well as remote reparameterization during operation are guaranteed by the standardized communications services.

PROFIBUS user organization

You can find further information on PROFIBUS in the PNO (PROFIBUS user organization) product catalog. The PNO supports the further technical development, standardization and worldwide marketing of PROFIBUS.

The catalog provides a summary of more than 1,600 products and services associated with PROFIBUS from global suppliers. It is available online on the Internet at:

www.profibus.com

PROFIBUS-PA permits the advantages of fieldbus technology with distributed concepts to be also used in the chemical industry, in process engineering and in power plant automation:

- Uniform, modular system from sensors up to the control level permit new plant concepts
- Any combination of powerful, cost-effective standard components from process and production engineering
- Problem-free replacement of field devices which corresponding to the standard profile, also from different vendors
- Networking of transmitters, valves, actuators etc.
- Implementation of intrinsically-safe applications by using the fieldbus in hazardous areas
- Simple installation using two-wire cable for both power supply and data transmission
- Cost advantages since isolating power supply, terminal block and separate power supplies etc. are omitted
- Drastically reduced cabling costs by saving of material and installation
- Reduced configuring costs by central, simple engineering of the field devices (PROFIBUS-PA and HART with SIMATIC PDM, also cross-vendor)
- Fast, fault-free assembly
- Low servicing costs thanks to simpler wiring and plant structure as well as facilities for comprehensive diagnostics
- Greatly reduced commissioning costs resulting from simplified loop check
- Scaling/digitalization of measured values already in the field device; no rescaling necessary in SIMATIC PCS 7
- Simple integration of existing field devices in PCS 7 systems

Resulting effects:

- Reduced hardware requirements
- Shorter commissioning time
- Problem-free repair
- Cost-effective engineering
- Increased operational reliability

Principle of operation

The RS 485 transmission technology used in the PROFIBUS-DP has been replaced in the PROFIBUS-PA by the transmission technology according to IEC 1158-2. This technology is internationally standardized, and can also be used for intrinsically-safe applications. PROFIBUS-PA uses the same communications protocol as PROFIBUS-DP; the communications services and telegrams are identical.

With PROFIBUS-PA, information and the power supply are transmitted on a two-wire cable. When using in hazardous areas, the PA bus and all connected devices must be designed with the type of protection "Intrinsically-safe i". Up to 31 field devices can be connected per DP/PA link.

The uniform protocol of PROFIBUS-DP and PROFIBUS-PA permits simple combination of the two networks, and thus the combination of time performance and intrinsically-safe transmission. This has permitted the implementation of large plants. PROFIBUS is the first fieldbus system which satisfies the requirements of the production industry and process engineering with one single communications protocol.

Migration of existing interfaces to PROFIBUS

Devices with conventional digital and analog interfaces in the chemical and process industries are connected to PROFIBUS-DP via the signal modules of the ET 200 I/O system. This permits the migration of existing field device interfaces to PROFIBUS. PROFIBUS means: investment in the future with simultaneous protection of existing investments.

PROFIBUS-DP/PA transition

To achieve a trouble-free transition between PROFIBUS-DP and PROFIBUS-PA with their different transmission technologies, the SIMATIC range offers two gateways: DP/PA coupler and DP/PA link.

Their respective application depends on the plant size, the required performance, and the used automation system:

- The DP/PA coupler is used for small quantity breakdowns and low timing requirements,
- The DP/PA link is used for large quantity breakdowns and high timing requirements.

DP/PA link

Application

The DP/PA link is a very simple gateway which connects the PROFIBUS-DP and PROFIBUS-PA bus systems together but which decouples the transmission rates.

This means that PROFIBUS-DP and PROFIBUS-PA can be combined together without influencing the time performance of PROFIBUS-DP.

The DP/PA link permits the design of large plants with comprehensive addressing volumes and high cycle time requirements. The DP/PA link can be operated on PROFIBUS-DP standard masters.



Principle of operation

The DP/PA-Link functions as a slave on PROFIBUS-DP and as a master on PROFIBUS-PA.

From the viewpoint of the automation system or process control system, the DP/PA link is a modular slave. The individual modules of this slave are the field devices connected to the subordinate PROFIBUS-PA system. The field devices are addressed indirectly via the DP/PA link.

Decoupling of the transmission rates means that the maximum transmission rate of up to 12 Mbit/s can be used at the PROFIBUS-DP end.

Since up to 31 field devices can be connected per DP/PA link, and the link itself only requires one PROFIBUS-DP address, the addressing volume of the system is considerably increased.

The DP/PA link is configured using the SIMATIC Manager.

Design

The DP/PA link is designed using the modular S7-300 packaging system. It consists of the IM 157 interface module and one or more DP/PA couplers of Ex or non-Ex design.

The use of active bus modules as the backplane bus permits hot swapping of individual modules as well as a redundant design of the interface to PROFIBUS-DP. Thus fault-tolerant applications are possible together with the redundant AS 414 H / AS 417 H automation systems.

Combination of the IM 157 with Ex or non-Ex versions of the DP/PA coupler means that Ex or non-Ex versions of the DP/PA link are also possible.

This modular system can be expanded up to five PROFIBUS-PA lines per DP connection. The PROFIBUS-PA lines are physically isolated as far as the power supply is concerned, but constitute one bus system as far as communication is concerned.

Automation systems

Automation systems

The automation systems of the SIMATIC PCS 7 process control system are selected SIMATIC S7-400 components. The following SIMATIC S7-400 properties make it extremely suitable as the automation system for SIMATIC PCS 7: modular, fan-free and robust design, high degree of expansion, redundant or non-redundant design, comprehensive communications facilities, integral system functions, simple connection of central or distributed I/Os.

Various automation systems are available with a price/performance ratio which can be flexibly scaled to different requirements. All automation systems are equipped as standard with a PROFIBUS-DP fieldbus connection. They can therefore be used in small systems without an additional CP communications processor.

The automation systems are usually connected to the Industrial Ethernet plant bus. Fast Ethernet (100 Mbit/s) with redundant optical rings and switching technology is available for plants with high data transfer rates and high communication reliability requirements.

Central SIMATIC S7-400 I/O modules can be inserted into the automation system if required.



Automation system highlights

- Wide range of automation systems with different CPUs in all performance classes
- Complete ordering units for automation systems with CPU, memory card, sub-rack, power supply and PROFIBUS-DP interface; the systems are delivered completely assembled and tested
- Complete redundancy of the AS 414 H / AS 417 H automation systems:
 - Redundant CPU and power supply module
 - Identical application program in both CPUs; is processed by both CPUs simultaneously (in synchronism)
 - Data updating between master and standby CPUs
- Identical application program for single or redundant applications
- Fail-safe automation systems with ProfiSafe communication

Typical quantity breakdowns

Automation systems	AS 414-3	AS 416-3	AS 417-4
Motors	30	100	140
Valves	40	150	200
Fixed setpoint controls	40	60	80
Analog-value measurements	70	120	150
Binary inputs	180	650	880
Binary outputs	130	450	620
Analog inputs	115	200	255
Analog outputs	40	60	80
Sequencers with 9 steps each	10	40	50
Dosing	5	20	25

ET 200M components as distributed I/Os are connected via the PROFIBUS-DP to modules from the SIMATIC S7-300 range.

SIMATIC PCS 7 additionally supports the incorporation of intelligent field devices with HART protocol or bus-based devices via PROFIBUS-DP/PA.

To permit safety-relevant applications, connection is possible to the fail-safe SIMATIC S5-95F automation system in addition to the new S7-400F systems (see overleaf).

Components

The automation systems are delivered as completely preassembled and tested systems and comprise:

- Subracks with 9 or 18 slots, also separate in the case of redundant systems
- CPU 414-3, 416-2, 416-3 or 417-4 as well as the redundant CPU 414-4H and 417-4H
- DC 24 V or AC 120/230 V power supply
- Main memory from 768 to 20 Mbyte
- Memory card with 1 to 8 Mbyte RAM
- Runtime license for the driver blocks and technological blocks libraries
- Optional connection to Industrial Ethernet

Fault-tolerant and fail-safe systems

Fault-tolerant automation systems

Economical production which saves resources and protects the environment is achieved in all industrial sectors by applying a high degree of automation. At the same time, fault-tolerant automation systems are required with as much distribution as possible.

The objective for using fault-tolerant automation systems is the reduction in the risk of production failures. The higher the costs resulting from a production standstill, the more applicable the use of a fault-tolerant system. The higher investment is far smaller than the costs resulting from production failures.

AS 414 H and AS 417 H are fault-tolerant automation systems, so-called 1-out-of-2 systems which reduce the probability of production failures by switching over to an internal standby system.

The automation system has an internal redundant design to ensure that it always remains available. This means that all major components such as CPU, power supply and hardware for coupling the two CPUs are present twice. You can decide which further components are to be present twice in your automated process, thus having a higher availability.

A redundant automation system can be installed in one or two subracks. Automation systems on two subracks are used e.g. if both partial AS systems have to be installed separated from one another by a fire-resistant wall. Appropriate complete units are available for every type of application.

The S7-REDCONNECT software package is connected to the operator station via the fault-tolerant automation system. Mixed operation with redundant and single systems is also possible.



Fail-safe automation systems

A fail-safe system carries out a permanent self-test for correct operation, and sets the process to a safe status in the event of a fault. The AS 414 F/FH and AS 417 F/FH automation systems are such fail-safe systems. They can also have a redundant design if necessary, thus increasing the availability in addition to the fail-safe feature.

In addition to the CPU, the F package includes the F signal modules SM 326 F and SM 336 F (see page 25) for ET 200M, a corresponding F program tool and a runtime license. The new **ProfiSafe profile** is used for the safety-oriented communication between CPU and I/Os via PROFIBUS-DP, where an additional security protocol guarantees fail-safe transmission parallel to standard communication.

The F programming tool is integrated in the SIMATIC Manager and permits both parameterization of the CPU and F signal modules as well as the generation of fail-safe applications in the CFC. Ready-to-use blocks approved by the TÜV (Technical Inspectorate) are available for this purpose. Functions such as a checksum for the F program generated by the user, strict isolation of F and S functions, and access privileges using passwords guarantee simple yet safe operation.

The F signal modules (digital input/output, analog input) comply with the requirements of SIL 3 (IEC 61508) or AK 6 (VDE 0801), can diagnose internal and external faults, and have a completely redundant design because of the safety requirements.

Highlights

- Flexibility with different availability and safety aspects: standard systems (S), fault-tolerant systems (H), fail-safe systems (F), fail-safe and fault-tolerant systems (FH)
- Safety stage SIL 3, AK 6 can be achieved with only one CPU
- S and F functions can be mixed in the same automation system
- S and F I/Os can be operated on one PROFIBUS-DP line
- Configuring of S and F functions using CFCs
- Support for TÜV (Technical Inspectorate) acceptance:
 - Isolation of S and F functions
 - Checksum for F functions
 - Comparison function
 - Access protection to F functions via password

Distributed I/Os

The distributed SIMATIC ET 200 I/Os are used for the field connections to SIMATIC PCS 7. The I/Os are connected to the automation system via the PROFIBUS-DP fieldbus. This results in high flexibility when designing the I/Os, either in central electronics rooms, in remote switchrooms, or directly on site.

There are various possibilities depending on the application and environment:

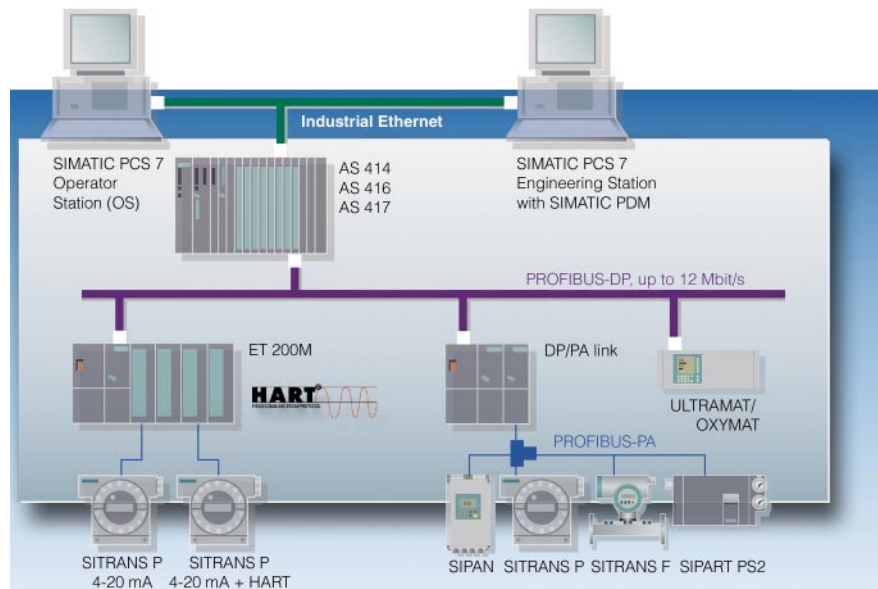
- SIMATIC ET 200M is installed in the safe area. The actuators/sensors can be located in the hazardous area if appropriate modules are used.
 - Connection via PROFIBUS-DP
 - Transmission rate up to 12 Mbit/s
 - Redundancy possible
- SIMATIC ET 200iS (available soon) can be directly installed in a hazardous area since it has an intrinsically-safe design. Connection via PROFIBUS-DP with series-connected isolating transformer in the safe area. Transmission rate up to 1.5 Mbit/s.
- The two devices permit hot swapping of individual modules (design with active bus modules for ET 200M; swapping without fire certificate for ET 200iS).

Further I/O modules can be used in addition to the SIMATIC components selected for SIMATIC PCS 7, but with restricted diagnostics functions.

SIMATIC ET 200M

The ET 200M distributed I/O stations exclusively use modules from the SIMATIC S7-300 range. The following types of module can be used:

- Standard S7-300 signal modules
- I & C I/O modules with increased diagnostics capability
- Ex input/output modules
- Controller and counter modules
- HART modules
- F modules for fail-safe applications



Example of an I/O configuration in SIMATIC PCS 7

An associated block is positioned in the chart for each module using the engineering tool CFC. The diagnostics data as well as the corresponding drivers are automatically incorporated into the fault signalling function of the control system.

The functions of the I & C I/O modules with diagnostics capability include channel-related fault display, internal module monitoring, diagnostics alarms, storage of last value or connection of a default value on failure of the CPU or load power supply. The modules can detect open-circuits, short-circuits, load voltage faults and module-internal faults, and automatically signal these events to the operator station. Without the diagnostics functions, it is possible to use the new channel-selective and hardware-independent input/output drivers to operate all central S7-400 modules as well as all SM modules of the ET 200® ranges with SIMATIC PCS 7.

Incorporation of intelligent field devices

In addition to the central and distributed I/O modules, SIMATIC PCS 7 also supports the incorporation of intelligent field devices, both field devices with HART protocol and bus-based devices via PROFIBUS-DP/PA. This permits a drastic reduction in installation costs together with the retention of previous investments in that the existing field

instrumentation can be simply incorporated into the SIMATIC PCS 7 plant.

The SIMATIC PDM software package is used, *inter alia*, to parameterize the field devices online or offline, to configure them, and to start them up.

The PROFIBUS-DP/PA permits data exchange between automation systems, distributed I/Os and intelligent field devices – with extremely low installation requirements. The SIMATIC signal modules and function modules are either connected via the ET 200M or inserted centrally, i.e. directly into the automation system.

The field devices include the SIMOVERT variable-speed drives, SIWAREX M/U weighing systems, SIMOCODE motor protection and control devices, SIPART DR19 and DR21 compact controllers, and all other PROFIBUS-compatible field devices (see also page 28).

AS-Interface (AS-I) and *EIB instabus* can be connected as subordinate bus systems to PROFIBUS-DP using appropriate links. Thus SIMATIC PCS 7 can integrate further subordinate I/O levels in a project. In this manner, simple sensors and actuators (via AS-Interface) or building system components (via *EIB instabus*) can be connected to SIMATIC PCS 7.

I/Os in hazardous area

Summary of modules

I/Os in hazardous area (Fig. on right)

The S7-300 Ex input/output modules are available for the automation of chemical plants. They isolate the intrinsically-safe circuits in the hazardous area from the non-intrinsically-safe circuits of the automation system.

The PROFIBUS-PA is also available for use inside hazardous areas. DP/PA link and DP/PA coupler permit the combined use of PROFIBUS-PA and PROFIBUS-DP.

SIMATIC ET 200iS

The ET 200iS distributed I/O system for hazardous areas will be available soon. The I/O system can be installed directly in zone 1 or 2 (Ex de ib [ia/ib] IIC T4), the sensors/actuators can also be installed in zone 0 if required.

ET 200iS is intrinsically-safe and has a bit-modular design, and can thus be optimally matched to the application. It consists of a flameproof power supply, interface module for PROFIBUS-DP, and up to 32 electronics modules. HART capability and hot swapping of modules during operation without fire certificate are standard features.

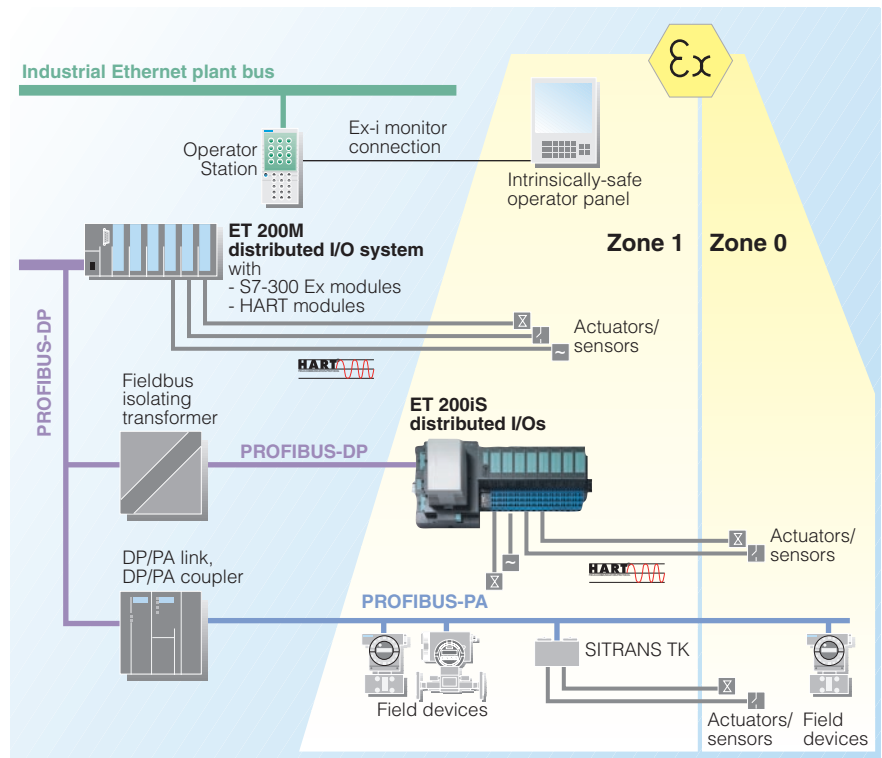
Incorporation into SIMATIC PCS 7 is provided with system diagnostics, time stamping and CFC driver blocks.

The ET 200iS can be started up simply and conveniently; configuring of the electronics modules and parameterization of the field devices are carried out directly on the engineering station using SIMATIC PDM. The HART devices are parameterized in the same manner as for PROFIBUS-DP/PA devices.

The range of electronics modules covers NAMUR digital input, valve modules with digital input/output, analog input/output with/without HART, and RTD and TC analog inputs.

Intrinsically-safe operator panel

An intrinsically-safe operator panel is available for use in hazardous areas if required. The operator panel is connected to an operator station at a distance of up to 500 m.



Summary of modules (selection)

Central S7-400 modules

SM 421 Digital input	<ul style="list-style-type: none"> 16 inputs, DC 24 V, with process/diagnostics alarm 32 inputs, DC 24 V or AC/DC 120 V 16 inputs, AC/DC 120/230 V or AC 120 V or AC/DC 24 to 60 V with process/diagnostics alarm
SM 422 Digital output	<ul style="list-style-type: none"> 8 outputs, AC 120/230 V, 5 A 16 outputs, DC 24 V, 2 A with diagnostics alarm 16 outputs, AC 120/230 V, 2 A 16 outputs, AC 230 V/DC 60 V with relay contracts 32 outputs, DC 24 V, 0.5 A, with and without diagnostics alarm
SM 431 Analog input	<ul style="list-style-type: none"> 16 inputs, non-floating, 13 bits 8 inputs, floating, 13 bits or 14 bits with linearization 16 inputs, floating, 16 bits, process alarm capability 8 inputs, floating, 16 bits, process alarm capability, for thermocouples or thermal resistors
SM 432 Analog output	<ul style="list-style-type: none"> 8 outputs, floating, 13 bits, for ± 10 V, 0 to 10 V, 1 to 5 V, ± 20 mA, 0 to 20 mA, 4 to 20 mA

Distributed S7-300 modules

SM 321 Digital input	<ul style="list-style-type: none"> 16 inputs, DC 24 V 32 inputs, DC 24 V or AC 120 V 16 inputs, AC 120 V or DC 48 to 125 V 8 inputs, AC 120/230 V 4 or 16 NAMUR inputs Ex module with 4 NAMUR inputs
SM 322 Digital output	<ul style="list-style-type: none"> 8/16/32 outputs, DC 24 V, 0.5 A 16 outputs, AC 120 V, 0.5 A 32 outputs, AC 120 V, 1 A 8 outputs, DC 24 V, 2 A 8 outputs, DC 48 to 120 V 8 outputs, AC 120/230 V, 1 A 8/16 outputs, relay contacts Ex modules with 4 outputs, DC 15 V, 20 mA or DC 24 V, 10 mA
SM 331 Analog input	<ul style="list-style-type: none"> 2 or 8 inputs Ex modules with 4 inputs, 0/4 to 20 mA, 15 bits or 8/4 inputs, for thermocouples and Pt 100, Pt 200, Ni 100 2 inputs 0/4 to 20 mA, for HART communication
SM 332 Analog output	<ul style="list-style-type: none"> 2 or 4 outputs Ex module with 4 outputs, 0/4 to 20 mA 2 outputs 0/4 to 20 mA, for HART communication

Fail-safe modules

SM 326F	<ul style="list-style-type: none"> 24 digital inputs, DC 24 V 8 digital NAMUR inputs, Ex(i) 10 digital outputs, DC 24 V, 2 A
SM 336F	<ul style="list-style-type: none"> 6 analog inputs, 13 bits

HART functions and HART modules

Application

HART (Highway Addressable Remote Transducer) is a serial transmission procedure with which parameter data such as measuring ranges, damping etc. can be additionally transmitted to the field device via a 4 to 20 mA current loop.

HART modules permit use of HART in the ET 200M distributed I/O system (with the IM 153-2 interface module) or ET 200iS in the SIMATIC S5/S7 automation systems and the SIMATIC PCS 7 process control system.

All field devices which are certified for digital communication using the HART protocol can be connected to the modules. Conventional field devices with 0/4 to 20 mA technology without HART protocol can also be connected.

Principle of operation

HART orders can be initiated in remote mode for each channel via PROFIBUS-DP. This is usually carried out from a central engineering station which can be connected as desired to the PROFIBUS-DP or is part of the SIMATIC PCS 7 process control system. It is then possible to modify the field device settings from the central engineering system using HART communication.



Features

The HART modules are characterized by the following features:

- ET 200M: connection compatible with analog modules
- Communication additionally possible via the current loop
- As a result of their low power requirements, the modules are suitable for connection of HART devices in the hazardous area. The ET 200M I/O system is located in the safe area, ET 200iS can be installed directly in zone 1 or 2.
- Remote parameterization of
 - conversion time,
 - resolution,
 - limits,
 - alarms, etc.
- Each channel is a primary master of the HART protocol.
- With the ET 200M, all channels of the modules can be addressed by several clients simultaneously and independent of one another.
- 2 analog channels per module
- Electrically isolated channels (ET 200M)
- Current signal selectable per channel:
 - 0 to 20 mA (without HART function)
 - 4 to 20 mA (with/without HART)
- Online monitoring of HART devices is carried out by the module automatically.
- Parameterization of the HART devices by a secondary master (e.g. handheld) is tolerated by the module.

Field devices

Siemens offers a complete range of intelligent field devices for process automation. These can be optimally linked into the environment of the SIMATIC PCS 7 process control system.

The field devices presented here are available as versions with PROFIBUS-DP/PA interface and for communication using the HART protocol.

You can also find further information, technical data and ordering data on these field devices on the Internet: www.fielddevices.com

SITRANS P – transmitters for pressure measurements

The SITRANS P transmitters are suitable for measuring the pressure, absolute pressure, differential pressure, flow and level of corrosive and non-corrosive gases, vapors and liquids. Various measuring cells are used for the different requirements and permit optimum accuracy for the respective task. The measuring cell of the SITRANS P is completely welded, guaranteeing that the transmitters are completely vacuum-tight, provide a high ability to withstand overloads and have an optimum service life. The spans cover the range from 1 mbar up to 400 bar.

SITRANS F US – ultrasonic flowmeters

The SITRANS F US ultrasonic flowmeters with the patented helical passage of sound is used to measure the flow of conductive and non-conductive liquids, e.g. solvents, organic liquids and condensates.

In addition to the signal for the flow, the device delivers additional data from which information can also be derived on the product quality.

The main advantages are the high measuring accuracy, the flow without pressure losses, the wide dynamic range, the multi-sensor properties, and the low maintenance costs since no moving parts are present.



SITRANS F M – electromagnetic flowmeters

SITRANS F M is used to measure the flow of electrically conductive media above $0.008 \mu\text{S}/\text{cm}$. Homogeneous liquids can be measured, also with solid particles, slurries, pastes and sludges. Flow velocities are permissible up to 12 m/s. Nominal diameters from DN2 to DN2000 are available, together with flanges according to DIN, ANSI and further standards. Liners are available with soft and hard rubber, NOVOLAK for corrosive media up to 130°C , and PTFE for temperatures up to 180°C .

SITRANS T – transmitters for temperature measurements

SITRANS T is used in conjunction with a sensor to measure temperatures. Its universal input stage means that all common temperature sensors and DC voltage sources can be connected, e.g. Pt 100 resistance thermometers, thermocouples, resistance-based sensors/potentiometers from 24Ω to 6000Ω , and DC voltage sources with a span from 17 mV to 1120 mV.

The complete standardized temperature range can be measured for the various sensors. The characteristics of all sensors are linearized.

SITRANS LR and IQ Radar 160 – meters for radar level measurements

SITRANS LR is the high-frequency radar level meter for high accuracy and wide measuring ranges in the process industry.

The IQ Radar 160¹⁾ operates according to the patented microwave pulse technology, and provides long-term reliability even under difficult operating conditions. The device can be used on vessels subject to pressure, with explosive or non-explosive media, where large amounts of steam or dust are produced, and at high temperatures.

Meters for ultrasonic level measurements

A comprehensive range of ultrasonic level measuring systems is available for reliable and exact measurements:

- The Probe¹⁾: compact solution for smaller ranges with liquids and sludges.
- MiniRanger Plus¹⁾: low-cost solution for standard applications for small and medium ranges.

1) PROFIBUS-PA/HART protocol available soon

Field devices

- HydroRanger Plus¹⁾: standard device for reliable, multi-function level measurements for the water/ sewage industry.
- AiRanger¹⁾: for level measurements for solids and liquids and medium or large measuring ranges. Versions with 1, 2 or 10 channels.
- EnviroRanger ERS500¹⁾: system for monitoring and control of pump stations. Wide range of use resulting from medium-independent level measurement.

SIPART PS2 – positioner for pneumatic control valves

The SIPART PS2 electropneumatic positioner controls the valve or damper position on pneumatic linear or part-turn actuators. The setpoint for the valve position is defined by the control system, and the actual value is returned from the SIPART PS2 to the control system. A binary input can be used to block the current valve position or to drive the valve into a safety position.

SIPART PS2 is also available for use in hazardous areas.

Additionally presented here are a number of further field devices which can be connected to PROFIBUS-DP:

SIPOS 5 electric actuators

SIMATIC PCS 7 function blocks are available for SIPOS 5 ECOTRON and SIPOS 5 PROFITRON. They are used to link SIPOS 5 actuators with PROFIBUS-DP interface to SIMATIC PCS 7.

The interface can have one or two (redundant) channels. With the redundant version, the block supports the PROFIBUS-DP protocol for one of the two SIPOS 5 communications channels.

The function block for SIPOS 5 constitutes the interface between SIPOS 5 and the blocks of the PCS 7 libraries. It can also be linked to other SIMATIC S7 blocks. It can only be used on a SIMATIC S7 PROFIBUS-DP master. Together with these function blocks, SIPOS 5 PROFITRON offers homogeneous integration of the actuators into the control technology, including

¹⁾ PROFIBUS-PA/HART protocol available soon



SIPART PS2



SIPOS 5



SIPAN



OXYMAT 6

access to parameters and visualization using an OS faceplate.

Liquid analysis with SIPAN

SIPAN means liquid analysis for pH, conductivity and dissolved oxygen with maximum convenience. The transmitters are powered via the PROFIBUS-PA, and can also be of intrinsically-safe design for use in hazardous areas.

Together with a wide range of sensors and fittings, one single analyzer can cover the complete spectrum of applications and measuring ranges over nine powers of ten.

The self-explanatory input panel according to NAMUR guarantees unambiguous configuring, and the display outputs messages either in alphanumeric text or using clear symbols.

SIPAN satisfies maximum safety requirements. The analyzers are completely immune to interferences even in the vicinity of radio sets or turbines, and comply with the EMC guidelines according to CE and NAMUR NE21.

The self-diagnostics system monitors all analyzer and sensor procedures and sequences. Two sensor inputs permit redundant pH measurements with an increased accuracy resulting from averaging. The integral logbook

records all faults and calibration procedures with date and time.

ULTRAMAT / OXYMAT 6 gas analyzers

The ULTRAMAT 6 and OXYMAT 6 gas analyzers are powerful units for measuring IR-sensitive components and oxygen.

ULTRAMAT 6 operates according to the NDIR two-beam alternating light principle, and measures gases highly selectively whose absorption bands are in the infrared wavelength range from 2 to 9 µm, such as e.g. CO, CO₂, NO, SO₂, NH₃, H₂O, CH₄ and other hydrocarbons.

OXYMAT 6 operates according to the paramagnetic alternating pressure principle, and is used to measure oxygen in gases.

SIWAREX M/U weighing modules

Net weight and dosing scales can be configured rapidly and efficiently for process engineering applications using predefined function blocks for weighing applications. Libraries are available for SIMATIC PCS 7 with function blocks for the SIWAREX U and SIWAREX M weighing modules.

This permits simple and rational linking into the engineering system, and also convenient operation of the scales from the operator stations using scale faceplates.

The two function modules SIWAREX U and SIWAREX M can be directly integrated into the automation system as a module, and thus permit uniform automation solutions which can be adapted to the respective task.

In addition to visualization and operation of the scales, the faceplates also provide important diagnostics information for the plant operators. Integral message processing and maintenance functions such as the reading and writing of all scale parameters result in high plant availability and thus short standstill times.

Motor management with SIMOCODE-DP

The SIMOCODE-DP motor protection and control device is primarily used in motor control centers in the process industry.

It offers the following functions:

- Comprehensive motor protection and motor circuit monitoring
- Integral control software for all typical, switched motor applications (e.g. direct-online starters, reversing drives, star-delta starters) replace complex hardware control circuits
- Detailed motor and plant diagnostics
- Integral PROFIBUS-DP interface

In particular for applications in the chemical industry, SIMOCODE-DP provides safe isolation and satisfies the NAMUR requirements.



Simple integration into the SIMATIC PCS 7 process control system is guaranteed using the SIMOCODE-DP function block. Visualization in the operator station is using the associated faceplate.

Furthermore, SIMOCODE-DP supports the uniform parameterization and diagnostics of field devices using SIMATIC PDM.

SIPART DR19 and SIPART DR21

The SIPART DR19 and SIPART DR21 compact controllers are designed for general process engineering. They offer a wide range of prepared functions in the input software which can be simply called.

The devices can be used as continuous or step controllers. Additional analog inputs, binary inputs/outputs and the PROFIBUS-DP interface can be retrofitted using plug-in options.

The controllers are integrated in SIMATIC PDM, and can be parameterized and configured via PROFIBUS-DP.

MASTERDRIVES / MICROMASTER 420

The MASTERDRIVES converter range has a uniform and modular design. The power range extends from 2.2 up to 2300 kW. All common international voltages from 200 to 690 V are covered. Three housing designs are available depending on the application and the required power: compact device, flush-mounting device and cabinet device. The range is also suitable for complex technological and dynamic applications.

The MICROMASTER 420 converter is a standard frequency converter for the power range from 0.12 up to 11 kW, and can be used for numerous variable-speed drive applications. It is particularly suitable for applications with pumps, fans, and in conveying technology. The large power supply range permits worldwide use.

"Drive ES SIMATIC" permits control of the drives using SIMATIC PCS 7, and operation and monitoring in the operator station. Parameterization, commissioning and diagnostics of the drive are carried out with the "Drive ES Basic" which can be integrated in the SIMATIC Manager.

Migration of the TELEPERM M process control system

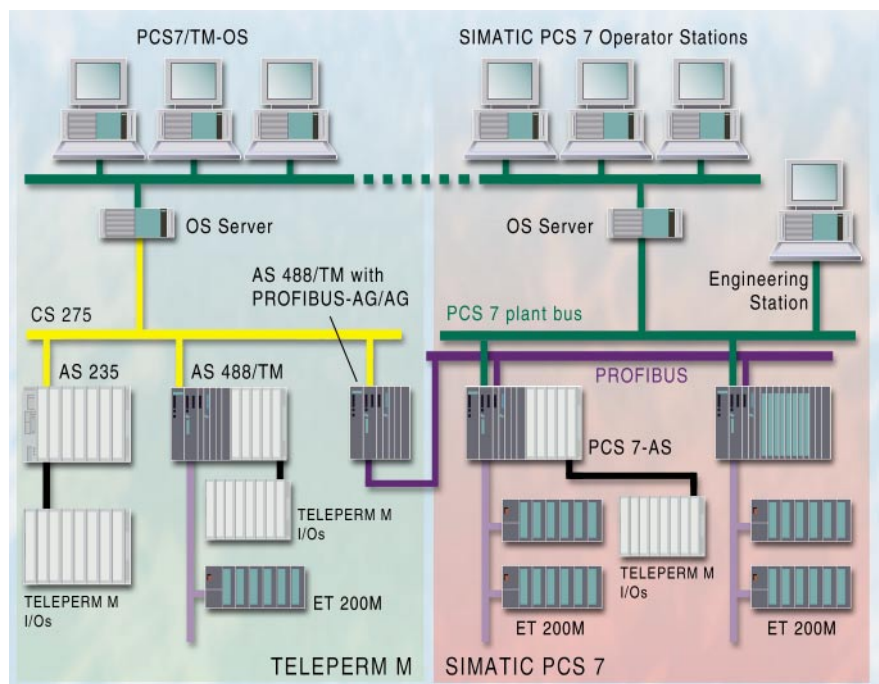


Approximately 15,000 TELEPERM M process control systems have been delivered since the first installation in 1980. When converting to the new SIMATIC PCS 7 process control system, appropriate measures must be made to ensure that users can change to the new system while retaining as much as possible of the previous investments and without having to replace the old system completely. These demands are satisfied for TELEPERM M using a three-stage migration strategy and the resulting migration products (see table at top right):

- New AS 488/TM automation systems based on SIMATIC S7/M7 components whose system and application software is compatible with the previous AS 235 system, providing the plant a secure future.
- Implementation of uniform operation in plants automated using both TELEPERM M and SIMATIC PCS 7. A PCS7/TM-OS operator system is used for this purpose which is a version of the SIMATIC PCS 7 operator station which can communicate with the TELEPERM M automation systems.
- The migration subrack (see Fig. above) permits incorporation of TELEPERM M I/Os into SIMATIC PCS 7.

You can find further information on the Internet at the address www.ad.siemens.de/teleperm

Stage	Highlight	Benefits
Stage 1	New hardware platform: AS 488/TM	<ul style="list-style-type: none"> • Graded increase in performance of automation system • Updating and maintenance of the systems is guaranteed for a longer period • Larger range and performance of interfaces • Cost-effective lump-sum quotations for upgrading
	Software compatibility	<ul style="list-style-type: none"> • Application software can be imported and used further • No retraining of personnel necessary • Fast, low-risk conversion
Stage 2	Common operation and monitoring for TELEPERM M and SIMATIC PCS 7	<ul style="list-style-type: none"> • Uniform configuring of operator systems for TELEPERM M and SIMATIC PCS 7 plant components • Uniform look and feel for the plant operator • Low-price, low-risk 1:1 conversion of application software
Stage 3	Incorporation of TELEPERM M I/Os into SIMATIC PCS 7	<ul style="list-style-type: none"> • "Pure" SIMATIC PCS 7 system for automation, operation and monitoring with uniform configuring • High-cost replacement of the I/O level is avoided • Step-by-step transfer to SIMATIC PCS 7 I/Os when expansions become necessary



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- 24 hours a day according to the "Follow the sun" principle – technical support free-of-charge via Free Contact
- or by Fast Contact – the fast way to obtain technical support with guaranteed return call within the next two hours on workdays 24 hours a day.

A&D in the World Wide Web

When planning and configuring automated plants, it is essential to have detailed knowledge on the available product range and services. It is also clear that this information must always be up-to-date.

The Siemens Automation and Drives Group (A&D) therefore provides comprehensive information on the World Wide Web which can be accessed conveniently and without problem.

At the address www.ad.siemens.de you can find everything you need to know on products, systems and services.

You can directly access SIMATIC PCS 7 at

www.ad.siemens.de/simatic-pcs7

There you will find the current product catalog and a wide variety of further information on SIMATIC PCS 7.

Selection of products using the interactive catalogs

The interactive Catalogs CA 01 and ET 01 with more than 80,000 products provide a comprehensive summary of what is available from Siemens Automation & Drives. Here you can find everything you require to solve tasks associated with automation, switchgear, installation engineering and drives.

You can find information on the interactive catalogs on the Internet at

www.ad.siemens.de/ca01

www.ad.siemens.de/et01

Easy shopping with the Siemens Mall

The Siemens Mall is a virtual shopping center on the Internet. You can access an enormous range of products which are presented informatively and clearly in electronic catalogs. You can find the Siemens Mall on the Internet at:

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