

Field Automation with
PROFIBUS and SIMATIC PCS 7

Product Brief · April 2003

simatic
PCS 7

SIEMENS

PROFIBUS

Distributed automation solutions on the basis of open fieldbuses are currently the standard in many sectors of the production and process engineering industries. Only fieldbuses permit full use of the functional advantages of digital communication such as improved resolution of measured values, diagnostics facilities and remote parameterization. PROFIBUS is currently the most successful open fieldbus with a large installed basis for a wide range of applications. The IEC 61158 / EN 50170 standard guarantees future compatibility of your investments.

PROFIBUS is suitable for fast communication with distributed I/Os (PROFIBUS DP) in production automation, and for communications tasks in process automation (PROFIBUS PA). It is the first fieldbus system which covers the requirements of both sectors using identical communications services.

The transmission method of PROFIBUS PA is tailored to the requirements of the process industry. The standardized communications services guarantee interoperability between field devices from different vendors and remote modification of field device parameters during operation.

With SIMATIC PDM (Process Device Manager), an integrated and cross-vendor tool for configuring, parameterization, commissioning and diagnostics of intelligent process devices on the PROFIBUS, it is possible to configure a large number of process devices from different vendors using *one* uniform graphical user interface.

Theory of operation

PROFIBUS PA is the expansion of PROFIBUS DP with process-oriented components for direct connection of actuators and sensors. The RS 485 transmission system used for PROFIBUS DP has been replaced for PROFIBUS PA by the transmission system according to IEC 61158. This system is internationally standardized and can also be used for intrinsically-safe applications.

highlights

Advantages of distributed field automation with PROFIBUS PA:

- Totally integrated modular system from sensor up to the management level opens up new plant concepts
- Problem-free interchanging of field devices from different vendors which comply with the standard profile
- Connection of transmitters, valves, actuators etc. to the network
- Implementation of intrinsically-safe applications with use of fieldbus in potentially explosive atmospheres
- Easy installation with two-wire cable for common power supply and data transmission
- Reduced cabling costs as result of savings in material and routing
- Reduced configuring costs resulting from simple, centralized engineering of field devices (PROFIBUS PA and HART with SIMATIC PDM, also cross-vendor)
- Fast, fault-free installation
- Low servicing costs thanks to simpler cabling and plant structure, as well as comprehensive diagnostics facilities
- Greatly reduced commission costs as result of simplified loop check
- Scaling/digitization of measured values already carried out in field device; thus no conversion required in SIMATIC PCS 7.

This results in:

- Lower hardware costs
- Shorter startup time
- Problem-free maintenance
- Low-cost software engineering
- Higher operational reliability.

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 to the field devices can be transmitted on one two-wire cable.

PROFIBUS PA can be used in standard environments just as in potentially explosive atmospheres. When using in potentially explosive atmospheres, the PROFIBUS PA and all connected devices must be designed with the type of protection Ex [i].

The uniform protocol of PROFIBUS DP and PROFIBUS PA permits the connection of the networks and thus the combination of processing performance and intrinsically-safe transmission.

PROFIBUS International

The conformity and interoperability tests carried out by laboratories authorized by PROFIBUS International (PNO) together with the PNO device certification guarantee that the quality and functionality are also provided in multi-vendor installations.

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

The catalog provides a summary of a wide range of products and services associated with PROFIBUS. It represents the offers from suppliers worldwide, and is available online on the Internet at:

www.profibus.com

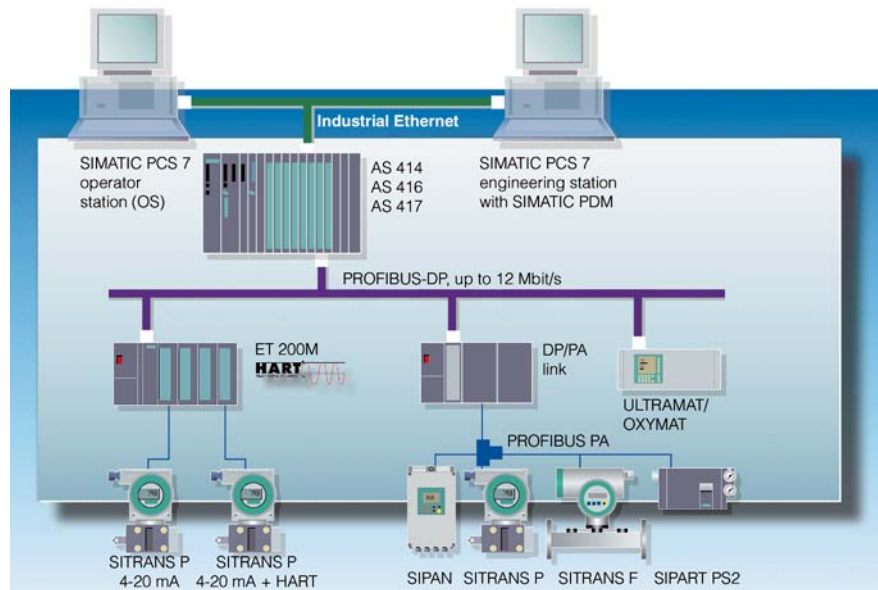
PROFIBUS PA in the SIMATIC PCS 7 environment

SIMATIC PCS 7 is the process control system in the Siemens automation network "Totally Integrated Automation" (TIA). It uses standard hardware and software components from the TIA family such as controllers, PCs, communications functions and distributed I/Os. The uniform data management, communication and configuration capabilities of TIA offer an open platform for advanced, future-oriented and economical automation solutions in all sectors of the process industry, manufacturing industry and hybrid industries. The use of worldwide standards means that the system is open and flexible in many respects. At the field level, a wide range of standardized field devices (PROFIBUS DP/PA, HART) can be integrated.

The adjacent Fig. shows the integration of PROFIBUS PA in SIMATIC PCS 7. The most important features of the configuration are the optimized communication throughout all hierarchical levels and central engineering for all components.

Communication between the automation system and field devices on PROFIBUS PA takes place via representative blocks in the CPU. There are five representative blocks (analog input/output, digital input/output, totalizer) with which all field devices are covered. The inputs and outputs of these blocks "represent" the field devices in the CPU to facilitate access to the operator system via the plant bus. The blocks are configured in the central engineering system. The configuration data are also generated there and loaded during commissioning into the DP/PA link and the field devices.

The SIMATIC PDM parameterization software is used for commissioning and diagnostics of the field devices. It is executed in the engineering system and can communicate directly with field devices via the communication levels.



Up to 10 DP lines can be used per CPU for access to the field level. Since all field components are connected together on the PROFIBUS DP, it is easy to adapt the field instrumentation to the physical characteristics of the plant, e.g. one DP line per subsystem.

Safe communication with PROFIBUS DP (PROFISafe)



Now that PROFIBUS DP has extended the total integration of distributed automation to the process environment by means of the PROFIBUS PA version (IEC 1158-2), the

PROFISafe profile expands the PROFIBUS DP communication between CPU and process I/O by safety-related functions for the protection of persons, plants and the environment.

PROFISafe permits coverage of the extremely fast response times in the production sector on the one hand and the extremely low-power instrument mode in the process sector on the other by one totally integrated solution.

A safety bus implemented with PROFISafe is one of the open systems. The defined interfaces and procedures permit use of a permanently increasing number of safety devices (F hosts and F slaves) and systems with a flexible constellation. Both standard and safety-oriented communication are carried out

on one single cable, which not only results in enormous saving of cabling requirements and stocking of parts, but also provides the advantage of retrofitting. Both standard and safety-oriented communication can also be distributed on different PROFIBUS lines if required.

The safety measures are encapsulated in the communication stations. This encapsulation means that the useful load of standard PROFIBUS telegrams is extended by a few bytes of information which guarantee safe communication.

The PROFISafe profile supports fail-safe communication for applications up to safety class SIL 3 according to IEC 61508, up to requirement class AK 6 according to DIN V 19250/DIN V VDE 0801, and up to category 4 according to EN 954-1.

Availability is an important factor with safety systems, and can be increased using a redundant design of the complete system. This was taken into consideration right from the beginning of the PROFISafe development.

SIMATIC PDM

SIMATIC PDM (Process Device Manager) is a totally integrated and cross-vendor tool for configuring, parameterization, commissioning and diagnostics of intelligent field devices and components. SIMATIC PDM enables the configuring of a large number of process devices from different vendors using one software and one uniform user interface. This results in surety and significantly saves costs for investments, training and follow-up costs.

SIMATIC PDM can be used in two manners:

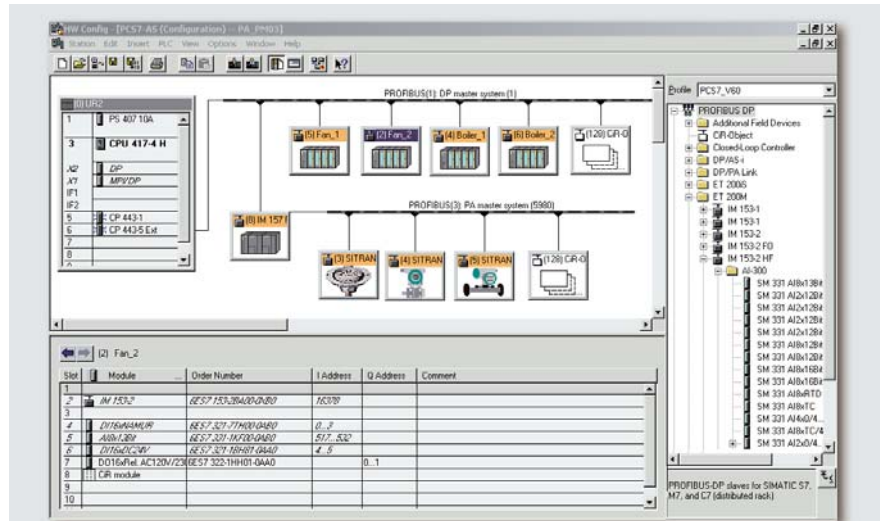
- As an integral tool in STEP 7, and thus as an integral component of the SIMATIC PCS 7 engineering system.
- Independent of system suppliers on a PC/programming device with Windows 95/98/ME and Windows NT/2000/XP.

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

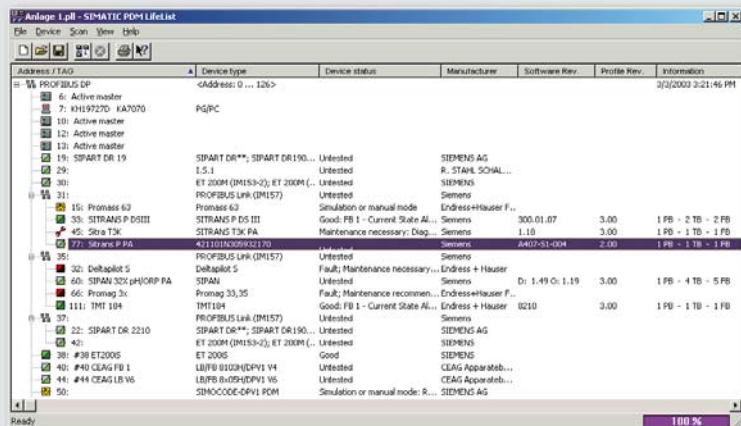
The core functions of SIMATIC PDM include

- the setting and modifications of device parameters,
- comparison of correct and actual parameter settings,
- testing for plausibility of inputs,
- simulation,
- diagnostics,
- administration, and
- commissioning functions, e.g. testing of the signal loops of process device data.

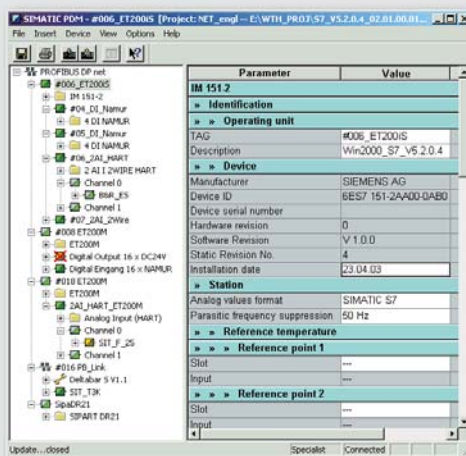
In addition, SIMATIC PDM enables online monitoring of process values, alarms and status signals of the device.



Hardware view in HW Config

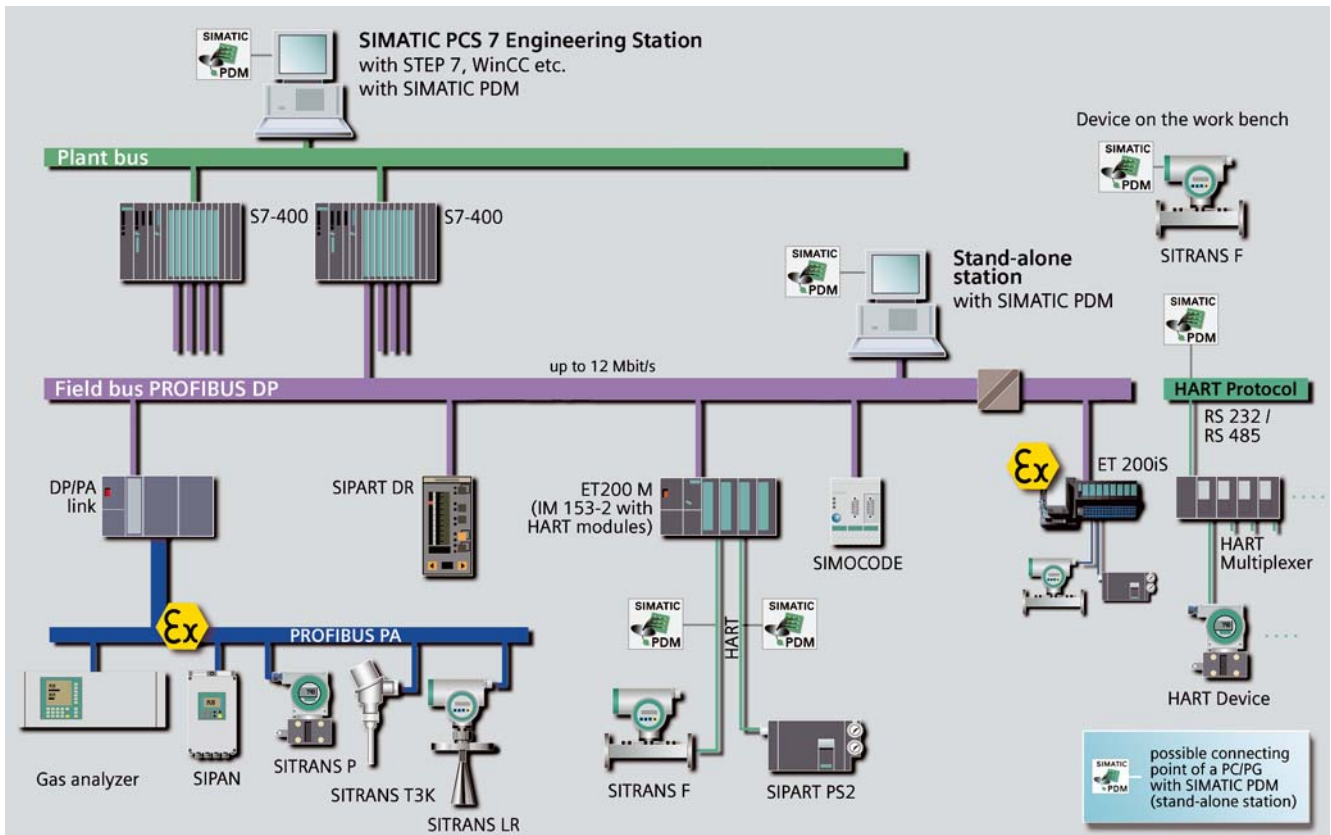


Lifelist with detailed and diagnostics information on the field devices



Parameter view

Configuring of process devices: user interface of SIMATIC PDM



User interface

The graphical user interface of SIMATIC PDM complies with the VDI/VDE GMA 2187 and IEC 65/349/CD regulations. Even devices with several hundred parameters can be processed clearly and rapidly. SIMATIC PDM can be used for extremely simple navigation in highly complex stations such as remote I/Os up to the connected field devices. Several views are available to operators:

- Hardware project view (integrated in SIMATIC PCS 7)
Process devices are configured within STEP 7 / SIMATIC PCS 7 using HWConfig and displayed graphically or in tabular form.
- Process device plant view – a tag-based view that includes display of diagnostics information
The devices configured in HWConfig or in the process device network view are also automatically created in the process device plant view.

- Parameter view for parameterization of process devices
The parameters of a selected process device can be displayed, modified and saved here. Communication to the device is also established here. This parameter display is started following double clicking on a process device in one of the other views.
- Lifelist view for identification/diagnostics as well as for online parameterization of the process devices
- Process device network view (for stand-alone application)
The hierarchical structure of networks, communications components up to process devices can be configured here. When integrating in STEP 7 / PCS 7, these data can be imported, thus avoiding double inputs.

Central device operation

The overview display shows the possible connection points of SIMATIC PDM in a system.

The engineering stations on which SIMATIC PDM is installed are connected on the plant bus. Working on one project database using different stations is possible via the LAN.

Devices can be connected in different manners in the field: PROFIBUS PA devices to DP/PA couplers and links, or HART devices to the HART analog input/output modules of the ET 200M or ET 200iS. HART devices can also be connected to conventional analog input/output modules.

A HART multiplexer is shown on the right via which all connected HART devices can be accessed.

SIMATIC PDM

The SIPART DR controllers and the SIMOCODE are representatives of PROFIBUS DP devices in the Fig. on page 5.

The PROFIBUS DP is connected here to a SIMATIC S7-400 automation system. The S7-400 permits connection of several DP segments.

Routing

Routing allows access from a central location – commonly from the engineering station – to device parameters and to the status of any process device that is part of an installation. Reconnection of the DP interface of the PC to the correct DP segment in each case is superfluous, thus eliminating a possible source of faults.

It is then possible to:

- Read diagnostics information from the field devices
- Modify device settings
- Calibrate and adjust field devices
- Monitor process values
- Generate simulation values in the field device
- Modify the field device parameters.

Communication

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

■ Devices with PROFIBUS DP interface

These are connected directly on the PROFIBUS DP. An example is the SIPART DR20 process controller.

■ Devices with PROFIBUS PA interface

e.g. the SITRANS P transmitter

■ Remote I/O stations, e.g. ET 200M

The PROFIBUS PA devices supported by SIMATIC PDM are connected to the PROFIBUS DP segment via a DP/PA link or DP/PA coupler.

The fully integrated PROFIBUS devices can be parameterized, as well as almost all PROFIBUS devices with the following PA profiles of versions 2.0 and 3.0:

- Pressure and temperature
- Level and flow
- Actuators
- Discrete I/Os
- Analyzers (only PA profile version 3.0)

■ Devices with HART interface

These devices can be connected in different manners:

- Via the SIMATIC ET 200M distributed I/O station with the HART modules
- Via the ET 200iS distributed I/O station with HART on PROFIBUS according to PNO
- Via a HART modem with which a point-to-point connection is established between a PC or engineering station and the HART device
- Via HART multiplexers present in the HART server of the HCF (HART Communication Foundation).

Further HART devices can be parameterized in addition to the fully-integrated, HART-compatible devices.

■ Controllers with serial SIPART DR communication via RS 232 / RS 485

Controllers from the SIPART range can be parameterized via the so-called SIPART DR network.



Device Description Language

SIMATIC PDM supports field devices conforming to the PROFIBUS PA profile descriptions provided by PROFIBUS International (PNO), as well as field devices which are supported by an Electronic Device Description (EDD) and HART Device Description (HART-DD).

The design and functions of the field devices are described by the Electronic Device Description Language EDDL specified by the PNO. SIMATIC PDM automatically creates its GUI with the corresponding field device information using these descriptions. The HART field devices described by HART-DDL are integrated into SIMATIC PDM using the HCF catalog (Hart Communication Foundation). HART-DDL is a widely accepted standard and is strongly supported by device vendors.

Additional field devices from Siemens as well as devices from other vendors can be simply integrated into SIMATIC PDM by importing their device descriptions (EDD, GSD).

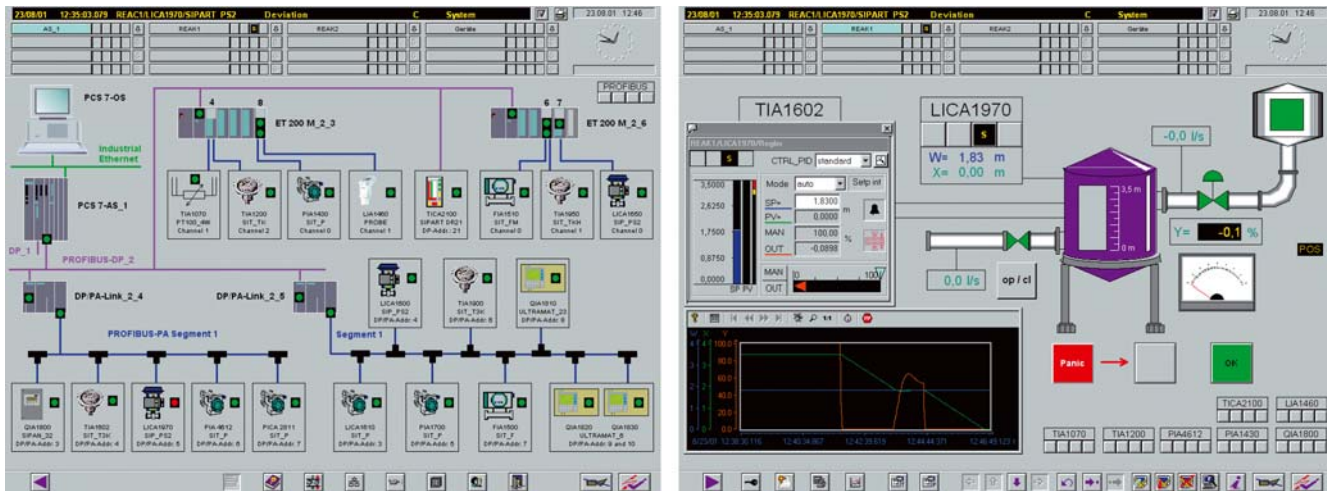
Access protection

SIMATIC PDM supports two different groups of users: specialists and maintenance engineers. The maintenance engineer can modify the operating data, the specialist can access all parameters and functions.

A password can be assigned as required as access protection for specialists.

Diagnostics with PROFIBUS PA and SIMATIC PCS 7

23/08/01 12:35:03.079 REAC1/LICA1970/SIPART PS2 Deviation



Diagnostics display (left) on the operator station with plant topology. One field device is faulty (red symbol) on the PROFIBUS PA line. The associated message "Deviation" is displayed in the message line. Clicking the faulty field device displays a process view (right) in which an operator can recognize that the inlet valve has been closed and can no longer be opened. SIMATIC PDM can be used if required to read further detailed information from the field device.

Status information from PROFIBUS PA devices

Each PROFIBUS PA device delivers a status together with each measured value. This status contains a variety of diagnostics information on the measured value delivered by the device, in accordance with the profile definition of PROFIBUS International (PNO).

The standard diagnostics information delivered by the PROFIBUS PA devices includes e.g.:

- Device faults,
- Maintenance requests,
- Operating mode (automatic or local operation) of a positioner,
- Configuration fault etc.

Compression of information using standard SIMATIC PCS 7 function blocks

The status information can be interpreted, compressed or output as alphanumeric messages in SIMATIC PCS 7 using standard CFC blocks, always based on the PNO profile definition.

Practice-oriented PCS 7 diagnostics blocks for Siemens field devices

In addition to this, practice-oriented diagnostics blocks are available which are specially tuned to Siemens field devices and are ready to use.

These blocks provide precise message texts optimally matched to the respective device which are more comprehensive than those of the standard defined in the profile. Examples include:

- "Deviation fault" (SIPART PS2), e.g. resulting from compressed air failure (also see Fig. above)
- "Function check" (ULTRAMAT/OXYMAT).

Furthermore, the diagnostics blocks provide evaluation of the status with respect to time, e.g. by the message "Continuous overload".

For specific field devices, the diagnostics blocks also have an interface for user functions which would otherwise have to be configured in addition, e.g. autocalibration for gas analyzers.

This increased degree of convenience is offered for the following PROFIBUS PA field devices from Siemens, e.g. SITRANS P, SITRANS T, SITRANS F US, SITRANS LR, SIPART PS2, ULTRAMAT, OXYMAT or SIPAN.

The diagnostics messages permit operators to react more rapidly, and to inform the maintenance personnel more exactly. Operators know, for example, that a device has to be replaced in the near future, or that a device is currently being configured or calibrated and thus cannot carry out any measurements.

These messages are displayed on the operator station (OS), and are saved in the OS message archive together with a time stamp and the tag number.

Specific maintenance information using SIMATIC PDM

Detailed information which is exceptionally appropriate as a decision basis for further actions can be called from field devices using SIMATIC PDM, e.g. whether the device is positioned in an unsuitable location resulting in an excessively high temperature for the measuring electronics, or whether it has to be tested and repaired by a maintenance engineer. Thus service measures can be planned before a device fails.

Integration in MES systems

If required, the diagnostics messages can also be evaluated by host computers via the standard interfaces of SIMATIC PCS 7, e.g. via the OPC interface.

DP/PA coupler and DP/PA link

PROFIBUS-DP/PA transition

To guarantee a problem-free transition between PROFIBUS DP and PROFIBUS PA with their different transmission systems, the SIMATIC range provides the DP/PA coupler and DP/PA link as gateways. Their respective application depends on the plant size, the required performance, and the automation system used:

- The DP/PA coupler is used for small quantity breakdowns (signal quantities) 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 that links PROFIBUS DP and PROFIBUS PA together in a manner whereby data transmission decoupling is retained. PROFIBUS DP and PROFIBUS PA can thus be combined without influencing the processing performance of PROFIBUS DP.

The DP/PA link permits the design of large systems with extensive address volumes and demanding requirements with respect to cycle time. It can be operated on standard PROFIBUS DP masters.

Mode of operation

The DP/PA link functions as a slave on the PROFIBUS DP and as a master on the 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 lower-level PROFIBUS PA system. The field devices are addressed indirectly via the DP/PA link.

Thanks to data transmission decoupling, the maximum transmission rate of up to 12 Mbits/s can be utilized on the PROFIBUS DP side.

The addressing capacity of the system is considerably increased due to the fact that up to 31 field devices can be connected to a DP/PA link, but the DP/PA link only reserves one PROFIBUS DP address.



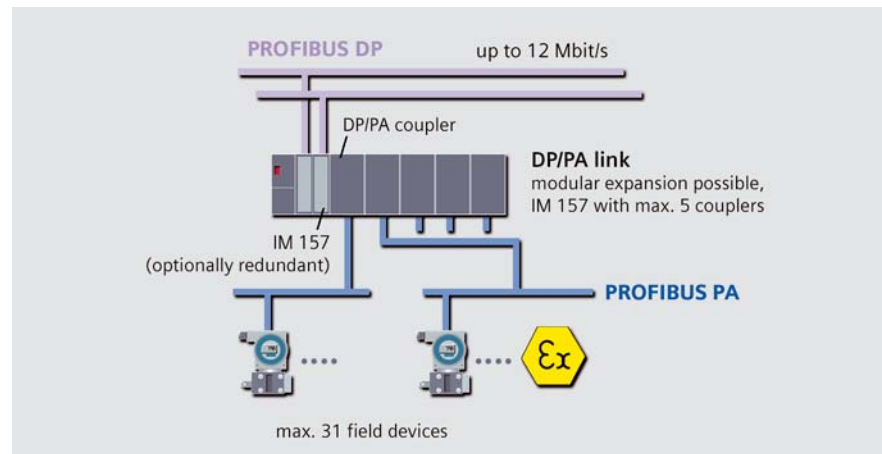
Design

The DP/PA link is of modular design according to the S7-300 format. It comprises the IM 157 interface module and one or more DP/PA couplers in the versions either for hazardous or non-hazardous applications.

Use of active bus modules as the backplane bus permits the hot swapping of individual modules during operation as well as a redundant design for the PROFIBUS DP interface. High-availability applications are therefore possible together with the AS 414H/AS 417H automation systems.

Versions of the DP/PA link for hazardous or non-hazardous applications are also configurable by combination of the IM 157 with hazardous or non-hazardous versions of the DP/PA coupler.


This modular system can be extended to up to 5 PROFIBUS PA lines per DP connection. These lines are physically isolated as far as the power supply is concerned, but constitute one bus system for communications aspects.



Intelligent PROFIBUS-compatible field devices

Siemens offers a complete range of intelligent field devices for use with the SIMATIC PCS 7 process control system that allow automation and control at the field level:

- Process devices
- Analyzers
- Weighing systems
- Panel instruments
- Drives

 The field devices identified by this symbol can be parameterized using SIMATIC PDM.

Process devices

The process devices are available as either PROFIBUS or HART compliant versions.

Further technical data and ordering information on these process devices are available at:

www.siemens.com/fielddevices

Transmitters for pressure measurements

The SITRANS P transmitters are suitable for flow, pressure and level measurements 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. With a completely welded measuring cell, the SITRANS P is vacuum-tight, has an exceptional over-pressure tolerance capability, resulting in a long service life with unmatched operating performance. These transmitters are designed for absolute and differential pressures from 1 mbar to 400 bar.



Flow measurements

The SITRANS F US ultrasonic flowmeter with the patented helical passage of sound is used to measure 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.

The SITRANS F M electromagnetic flowmeter measures the flow of electrically conductive media above $0.008 \mu\text{S}/\text{cm}$. Homogeneous liquids can be measured, including flowing media with solid particles such as slurries, pastes and sludges. Flow velocities up to 12 m/s are permissible.

Nominal diameters from DN 2 to DN 2000 are available, together with flanges according to DIN, ANSI and further standards. Liners are available with soft and hard rubber, with NOVOLAK for corrosive media up to 130 °C, and with PTFE for temperatures up to 180 °C.

Temperature measurements

SITRANS T is used to measure temperatures. Its universal input stage provides flexibility such that all common temperature sensors and DC voltage sources can be connected:

- Pt 100 resistance thermometers,
- Thermocouples,
- Resistance-based sensors/potentiometers from 24Ω to 6000Ω and
- DC voltage sources with spans 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.

Intelligent PROFIBUS-compatible field devices

Level measurements PDM

SITRANS LR 400 is a high-frequency radar level meter for the process industry, featuring high accuracy and wide measuring ranges.

SITRANS LR 300 is a level meter that operates per the Siemens patented microwave pulse technology, and provides exceptional measurement reliability even under difficult operating conditions. The device can be used on pressurized vessels, in explosive or non-explosive media, in applications where large amounts of steam or dust are present, and in high temperature applications.

Besides these two level instruments, Siemens portfolio also includes various ultrasonic level meters for a variety of applications. These include compact devices for measuring liquid, solid or sludge levels, and a system for monitoring and controlling pump stations.

Meters for capacitive level measurements

SITRANS LC 500 is an ideal capacitive level meter for use under extreme temperature and pressure conditions. The Siemens patented active shield technology protects it from dirt, deposits, steam and condensation.

The SITRANS LS level switches are used to determine predefined levels of bulk materials, sludges or interfaces. The measurement is based on the non-contact ultrasonic principle or using highly-sensitive capacitive electrodes. A wide range of different versions is available, including those for use at high pressures and temperatures or sanitary versions for the food and drink industry or the pharmaceutical industry.



Intelligent positioner for pneumatic control valves PDM

The SIPART® PS2 electro-pneumatic positioner is used with linear or quarter-turn control valves and air-operated dampers. The positioner ensures that the control valve performs as commanded by the control system and also provides feedback to the control system regarding the actual valve position at all times. The SIPART PS2 positioner is available in PROFIBUS and HART compliant versions. The user is able to configure many advanced functionalities such as a min-stop position, a fail-safe position, etc. via a comprehensive choice of configurable parameters in the positioner.

SIPART PS2 is also available for use in hazardous areas.

Analyzers

Liquid analysis PDM

Siemens liquid analyzers under the brand SIPAN® are available for measurement of pH, conductivity and dissolved oxygen. These analyzers are PROFIBUS PA compliant and are powered over the bus. Intrinsically-safe versions are available for applications in electrically hazardous areas.

Gas analyzers PDM

ULTRAMAT® 6 operates on the dual beam NDIR principle, and continuously and selectively measures IR-active gases such as CO/NO/SO₂, CO₂, N₂O and CH₄.

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

CALOMAT® 6 measures the specific thermal conductivity to determine the concentration of hydrogen and noble gases.

FIDAMAT® gas analyzers have a flame ionization detector to measure hydrocarbons. The measurement is component-specific, and not just class-specific. As a first approximation, the result is proportional to the number of C atoms in the respective molecule.

Weighing systems

Weighing modules

Net weight and proportioning scales for industrial processes can be configured quickly and efficiently using predefined scales blocks.

For SIMATIC PCS 7, Siemens offers configuration packages with blocks for the SIWAREX M and SIWAREX U weighing modules as add-on products. These blocks permit simple linking of the weighing modules into the engineering system, and also easy operation of the scales from the operator system. The scale's faceplate in the operator system also provides important diagnostics information for the operating personnel.

Integral message response and maintenance functions such as the reading or writing of all weighing parameters provide a high level of system availability, and thus short down times.

Siemens-Milltronics weighing systems

The range comprises:

- Precision and torque scales for reliable and continuous weighing of bulk materials
- High-performance conveyor scales for measuring ranges from 45 kg/h up to 725 t/h
- Low-maintenance bulk flow meter with high reliability and repeatability (even for difficult mixing and batch functions)

Panel instruments

Process controllers PDM

The SIPART DR19 and DR21 process controllers designed for general process control provide a single-loop control solution at an affordable price. These offer a wide range of preconfigured functions for process control which can be deployed by users without any programming knowledge or engineering effort. The built-in self-tuning algorithms in the SIPART DR19 and DR21 makes the task of commissioning these controllers even easier.

These two process controllers are connected to the SIMATIC PCS 7 automa-



tion systems via PROFIBUS DP. The SIPART DR19/21 function blocks are available as add-on products for SIMATIC PCS 7. Each function block has its associated OS faceplate which shows the control and display elements of the corresponding process controller.

Drives

Motor management PDM

The SIMOCODE-DP motor protection and control device is primarily used in the motor control centers (MCC) of process industry plants. It offers the following functions:

- Comprehensive motor protection and motor feeder monitoring
- Integral, software-based control programs for all typical, switched motor applications
- Detailed motor and plant diagnostics
- Integral PROFIBUS DP interface

In particular for applications in the chemical industry, SIMOCODE-DP provides safe isolation and complies with the NAMUR regulations.

SIMOCODE-DP can be integrated simply into the SIMATIC PCS 7 process control system using the PCS 7 function block SIMOCODE-DP offered as an add-on product, and visualized in the operator

station using the associated OS faceplate.

Variable Frequency Drives

The MASTERDRIVES range is universal and modular. The power range extends from 0.55 up to 2300 kW. All common international power supplies from 200 to 690 V are covered.

The MICROMASTER drive is a standard frequency converter in the power range from 0.12 up to 90 kW, and can be used for numerous drive applications with variable speeds. The converter is particularly suitable for applications with pumps, fans and conveying equipment. The add-on product "Drive ES PCS 7" can be used to control, operate and monitor the drives using the SIMATIC PCS 7 process control system. Parameterization, commissioning and diagnostics of the drives can be carried out with the add-on product "Drive ES Basic" which can be integrated in the SIMATIC Manager.

Technical specifications

Technical specification	DP/PA coupler	IM 157 (for DP/PA link)	HART modules
Function	Bus coupling of – PROFIBUS DP (45.45 kbits/s) and – PROFIBUS PA (31.25 kbits/s)	Bus coupling of PROFIBUS DP (9.6 kbits/s to 12 Mbits/s, slave functions) and PROFIBUS PA Implementation of the DP/PA link function together with one or more DP/PA couplers	For coupling HART devices to PROFIBUS DP
Power supply • Supply • Mains backup • Mechanical design	24 V DC 20 ms 4-pole screw terminal		24 V DC
Current consumption	max. 400 mA (Ex version) max. 750 mA (Non-Ex version)	max. 100 mA (in DP/PA link) max. 200 mA (in Y-link)	
Power loss	approx. 7 W (Ex- and Non-Ex version)	approx. 2 W (in DP/PA link) approx. 4 W (in Y-link)	
PROFIBUS DP connection	9-pin Sub-D plug, electrically isolated and floating		Via IM 153-2 interface module (ET 200M)
PROFIBUS-PA connection • Intrinsically-safe version • Non-intrinsically-safe ver- sion	2-pole screw terminal, perman- ently integrated terminating resistor, [Ex ia]: output current max. 110 mA 4-pole screw terminal, selectable terminating resistor, output current max. 400 mA	–	–
Transmitter connection	–	–	2-wire connection (HART, 4...20 mA) 4-wire connection (0...20 mA)
Displays	DP bus active (yellow) PA bus active (yellow) 24 V DC(green)	System fault (red) DP bus fault (red) PA bus fault (red) 24 V DC(green)	Common fault LED (red) Channel-specific fault (red) HART status (green)
Parameterizable resolution (bits+sign)	–	–	Input 10+sign/13+sign/15+sign Output 12+sign
Load impedance			Output up to 650 Ω
Temperature range	[Ex ia]: 0...+60 °C [Ex ib]: -25...+60 °C Non-Ex: -25...+60 °C	-25...+60 °C	0...+60 °C
Packaging system	S7-300 format, double-width module (80 mm), mounting on S7-300 rail	S7-300 format, single-width module (40 mm), mounting on S7-300 rail	
Type of protection	Ex version [Ex ia] II C	–	Ex version [Ex ib] II C
Dimensions (W x H x D) in mm	80 x 125 x 130	40 x 125 x 130	40 x 125 x 120

products. An obligation to provide the respective characteristics shall only exist if expressly agreed in the terms of contract. Availability and technical specifications are subject to change without notice.

The information provided in this brochure contains merely general descriptions or characteristics of performance which in case of actual use do not always apply as described or which may change as a result of further development of the