Communication and Software

9

Communication and Software
Communication

HART protocol

Overview

HART is a widely used communication standard for field devices. Specification of HART devices takes place through the HCF (HART Communication Foundation).

The HART standard expands the analog 4 to 20 mA signal for modulated, industry-proven, digital signal transmission.

Benefits

- Service-proven analog measured value transmission
- Simultaneous digital communication with bidirectional data transmission
- Possibility of transmitting several measured variables from one field device (e.g. diagnosis, maintenance and process data)
- Connection to higher-level systems such as PROFIBUS DP
- Easy installation and startup

Use in conjunction with SIMATIC PDM

- Cross-vendor operation of all HART devices by means of standardized parameter records
- HART field devices that are described by HART DD are integrated in SIMATIC PDM through the HCF catalog. HART DD (Device Description) is standardized in SIMATIC PDM, multivendor and very widely used. Other HART field devices are integrated in SIMATIC PDM through EDD (Electronic Device Description)
- Easy operation and startup of field devices, also in hard-to-reach locations
- Expanded diagnosis, evaluation and logging functions

Application

These devices can be connected in different ways:

- Using the distributed I/O system
  - SIMATIC ET 200M with the HART modules
  - SIMATIC ET 200iSP with the HART modules
  or with analog modules 4 to 20 mA and a HART handheld communicator
- Using a HART modem, with which a point-to-point connection is established between the PC or engineering station and the HART device
- Using HART multiplexers, which are contained in the HART server of the HCF

Integration

Siemens field devices for process automation which are listed in this catalog and can be controlled using HART:

Measuring instruments for pressure
SITRANS P DS III
SITRANS P P300

Measuring instruments for temperature
SITRANS TF
SITRANS TH300
SITRANS TR300
SITRANS TW

Flowmeters
SITRANS F M MAG 5000 HART
SITRANS F M MAG 6000 19" / IP67 / I / I Ex d
SITRANS F M Transmag 2
SITRANS F C MASS 6000 19" / IP67 / Ex d
SITRANS FUS060

Measuring instruments for level
Pointek CLS 500
SITRANS Probe LR
SITRANS Probe LU
SITRANS LR200
SITRANS LR250
SITRANS LR260
SITRANS LR300
SITRANS LR400
SITRANS LR460
SITRANS LC 500

Positioners
SIPART PS2
SITRANS VP300

Power supply units and isolation amplifiers
SITRANS I

Selection and Ordering data

		Order No.
HART modem		
• With RS 232 connection	► D)	**7MF4997-1DA**
• With USB connection	► D)	**7MF4997-1DB**

► Available ex stock

D) Subject to export regulations AL:N, ECCN: EAR99H

Overview

WirelessHART is the first international industry standard for wireless communication at field level in the area of process automation. Hence this is the first time users are provided with a standard for wireless communication at field level which ensures the interoperability of instruments and components from different manufacturers.

Benefits

WirelessHART enables access to the following:

- Measuring and control values
- Parameters

of field devices with HART interface. These usually include pressure, temperature, level or flow transmitters or actuators.

WirelessHART allows for the following:

- wireless transmission of measured values and their status
- wireless parameterization and diagnosis of field devices

The WirelessHART adapter can be used to enable field devices with HART interfaces (that are designed for wired communication) for wireless communication. This allows users to continue using their proven devices while benefiting from and participate in addition in advantages offered by wireless communication.

Application

Looking at the large number of possible applications and configurations, we generally differentiate between two application types.

Background for the first type is the fact that according to estimates forwarded by the HART Communication Foundation (HCF), approximately 85 % of the over 30 million HART devices in operation are used in an environment where only the 4 to 20 mA interface rather than the HART interface of the device is used on a system level. Generally, data on the device can only be read on site. This is of particular disadvantage with devices that contain self-diagnostic functions - that's what we call "stranded diagnosis".

In these cases, a WirelessHART adapter can offer assistance. Connected to the 4 to 20 mA loop, it allows central access to the device based on wireless communication. It does not affect process control systems which continue to receive the measured value using the 4 to 20 mA loop.

Central access is enabled through a diagnostic station with SIMATIC PDM and SITRANS MDS software.

Main advantages:

- Increases the availability of the plant
- Increases plant transparency
- Reduces costs due to employing a predictive rather than preventative maintenance concept
- Reduces travel time in larger systems based on central access to field instrumentation

In the second application the 4 to 20 mA loop is omitted, all data including measured process values and diagnostic information are transmitted wirelessly to a process control system, for example.

Main advantages are:

- No planning and installation of data cables, resulting in significant cost reductions
- Higher system transparency due to additional and hitherto unfeasible installation of measuring points
- Process optimization due to flexible, temporary and cost-effective measuring points via wireless communication
- Utilization of proven devices by using adapters
- The WirelessHART meshed network also makes it possible to bridge longer distances

Design

This section introduces the application types described in the previous section in greater detail.

The figure below shows a typical situation for the first application type.
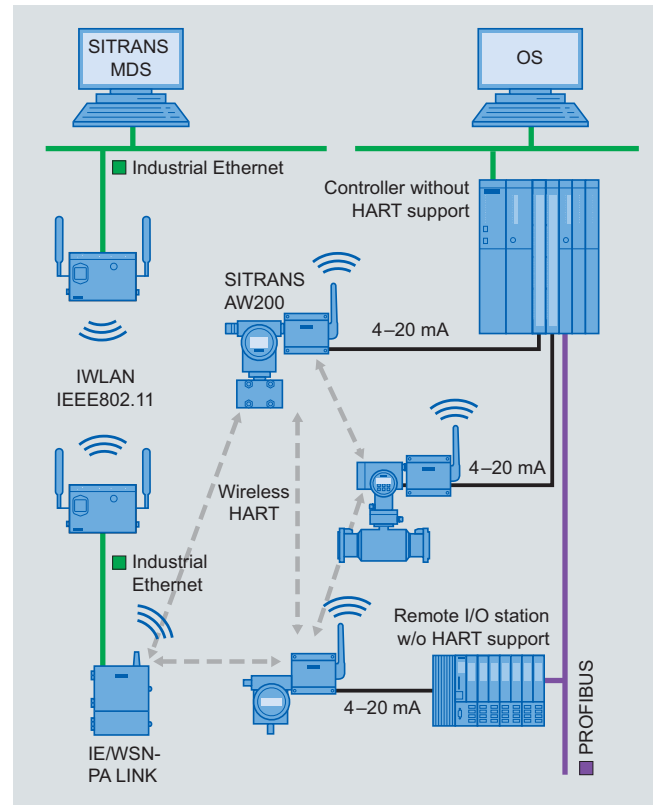
The adapter is connected to the 4 to 20 mA loop, which is used to transmit the measured value to the control system, or transmit the setpoint to an actuator. The existing control system is not affected by the WirelessHART adapter.

The data, in particular diagnostic data from the devices is transmitted to the IE/WSN-PA LINK via the connected adapter and the WirelessHART network. The link provides this data to a diagnostic and maintenance station with installed SITRANS MDS software and SIMATIC PDM via an industrial Ethernet. Industrial wireless LAN can be used to save on the installation costs required for Ethernet wiring. An extensive product portfolio of Scalance W components is available for this purpose.
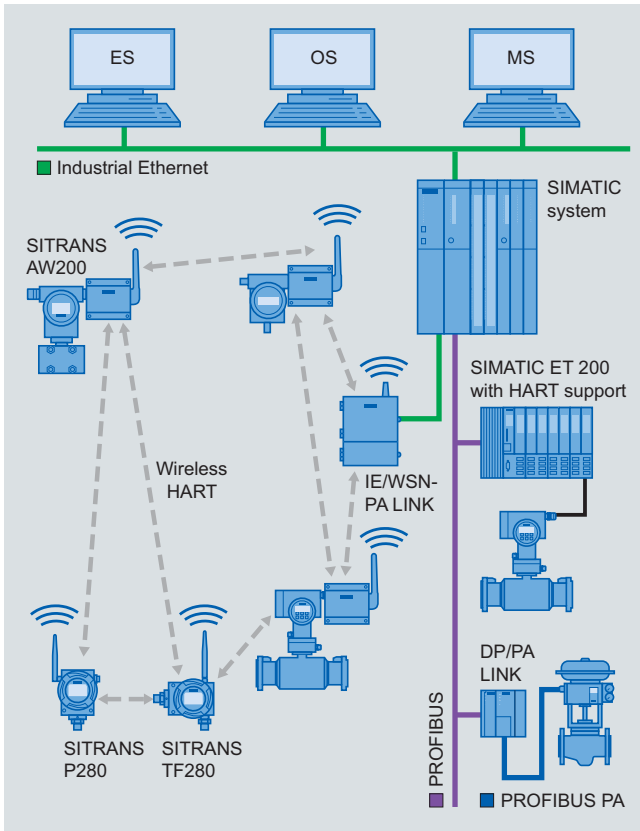
The functionality of related to the SITRANS MDS is described in great detail on page 9/9 of this catalog.

Communication and Software
Communication

WirelessHART

The figure below shows a typical situation for the second application type.

WirelessHART is integrated into SIMATIC systems parallel to the wire-connected devices with HART or PROFIBUS interfaces. In this case, the 4 to 20 mA line to the control system is not required: all data, i.e. process values, parameters, diagnostic information and functions, is supplied to the automation system on a wireless basis. This is mainly useful for replacement and expansion measures related to existing systems, and of course also new systems, but also for temporary and mobile measurements.

The field devices are standard instruments with connected adapters, or those with integrated wireless communication.

In principle, a differentiation needs to be made between wireless communication and the power supply for the devices.

When installing a field device, the planning and installation of the data cable to the control system is usually considered a significant cost driver. This factor is greatly reduced when using wireless communication.

When using 4 to 20 mA/HART field devices with adapters, the question of powering up always arises - in contrast to battery-powered field devices with integrated wireless modules.

It is important to distinguish between two and four-wire devices here. Under certain circumstances, the SITRANS AW200 adapter can take over the supply of a connected two-wire device. The power consumption of the field device plays an important role here. If it is too high, an additional power supply becomes necessary. If more than one device is connected to the SITRANS AW200 adapter, an additional power supply is required.

Four-wire devices always require an additional power supply.

Function

The properties of WirelessHART can be summarized as follows:
- Simplicity in handling and engineering
- Secure communication
- Availability in network

Simplicity in handling and engineering
- Utilize current tools, same workflow
  The description of devices and adapter is carried out using proven EDDL technology. SIMATIC PDM continues to be used as a tool.
- Multiple power supply options
  Devices can be operated externally with 24 V DC, external or integrated battery packs as well as solar cells. The option of using energy from the process or the environment has been researched at universities and industry for some time. It is expected that results and products will be available in the medium term.
- Reduced installation costs
  Depending on use, installation costs for data cables or power supply cables are not required.
- Coexists with other wireless networks
  WirelessHART only uses the ISM band in the 2.4 GHz area, since it is available across the globe. However, it is also used by Industrial Wireless LAN (IWLAN), for example. For this reason, a requirement to allow WirelessHART to co-exist with Wireless LAN networks was an absolute requirement when this technology was defined. This coexistence has been achieved by constantly changing the channels and hence frequencies. This is also called "channel hopping".
  Moreover, individual channels can be completely disabled through so-called "blacklisting", for example if they are locally used by IWLAN.
- Support of star-shaped and meshed network topologies
  Networks can be built in both a star-shaped as well as meshed structure. The advantage of star-shaped networks with a gateway as the centre is that it allows for fast update cycles. However, the range of the network is limited to a maximum of approx. 200 m without obstacles between the gateway and the devices.
  The advantage of meshed networks is their greater range, since each participant in the network is also a repeater and forwards the data of remote participants towards the gateway. The disadvantage: increased transmission times for data between the field device and the gateway.
- Faster commissioning
  Once the device is installed, it can usually be commissioned right away, since the usual waiting time for completing the installation of the cables does not apply in this case.
- Self-organizing and self-healing networks
  WirelessHART networks are automatically organized, built and administered by the Network Manager. Engineering is usually not required.
  The Network Manager is implemented in the IE/WSN-PA LINK, the WirelessHART gateway from Siemens.
  It calculates the optimal connection routes between the network participants and defines an alternative path that can be used in the case of disruptions in advance. In that sense, the network can be considered self-healing.
  In addition, the Network manager also defines the channels or frequencies to be used for all communication.
  Statistics regarding communication are compiled automatically and are available to users.
- Security - always active
  All designated mechanisms with regard to security are available automatically, and do not require any engineering.
- Make changes in the network without the need for configuration. The Network Manager automatically adds and withdraws participants to/from the network.

9

Secure communication

- Encryption - All information is automatically encrypted with 128 bit AES prior to transmission
- Specific keys for each data packet
- Data integrity - Each data packet is checked for changes or damage during transport.
- Device authentication
  Each device must know the network identification number as well as the join key. Otherwise the Network Manager does not include it in the network.
- Channel Hopping
  The channel which is used will be changed according to the Network manager's specifications after each telegram. This provides an added level of security against spying activities.
- Failed authentification report
  Each unsuccessful attempt by a participant to join the network will be recorded and made available to the user.

Availability in network

- Communication based on IEEE 802.15.4-2006
  Wireless communication takes place on the basis of a proven industry standard. It allows for very minimal power consumption.
- Utilization of ISM band (2.4 GHz)
  This band can be used worldwide without incurring additional costs.
- Channel hopping overcomes disruptions
  Disruptions are usually limited to a small frequency range. By constantly changing the channel, it is possible to overcome the effects of such disruptions and hence increase the network's reliability.
- Channel Black Listing permanently blocks disrupted channels.
  When operating another network at the same location, the channels occupied by that network can be blocked in the WirelessHART network.
- Self-healing network
  This aspect has already been discussed
- Redundant communication paths
  The Network manager automatically calculates redundant communication paths. This significantly increases the level of availability.

Software Overview

Applications 1 and 2 will require the following software products

	Component	Products	Order No.
Application type 1	Maintenance Diagnostic Station	SITRANS MDS	[1]
		SIMATIC PDM and Options	
		SIMATIC PDM Basic (4 Tags)	**6ES7 658-3AX06-0YA5**
		Extend Basic to 128 Tags	**6ES7 658-3XA06-2YB5**
		Extend Basic to up to 512 Tags	**6ES7 658-3XB06-2YB5**
		Extend Basic to up to 1,024 Tags	**6ES7 658-3XC06-2YB5**
		Extend Basic to up to 2,048 Tags	**6ES7 658-3XD06-2YB5**
		SIMATIC PDM service (128 Tags)	**6ES7 658-3JX06-0YA5**
		SIMATIC PDM Option HART Mux	**6ES7 658-3EX06-0YB5**
		HART OPC Server V3.0	**Included in SIMATIC PDM[1]**
	WirelessHART gateway	IE/WSN-PA LINK with integrated non-removable antenna	**6GK1 411-6CA40-0AA0**
	WirelessHART adapter	SITRANS AW200[2]	**7MP3112-1AA00-0AA0**
Application type 2	Process control system	SIMATIC PCS 7	
		SIMATIC S7/SIMATIC PCS 7 function blocks for communicating with WirelessHART devices using the IE/WSN-PA LINK	**9AE4110-3AA00**
	WirelessHART gateway	IE/WSN-PA LINK with integrated non-removable aerial[2]	**6GK1 411-6CA40-0AA0**
	Field devices	SITRANS AW200[2]	**7MP3112-1AA00-0AA0**
		SITRANS P280[2]	**7MP1120-...**
		SITRANS TF280[2]	**MP1110-...**

[1] You can also contact your Siemens contact person.
[2] Other versions and accessories can be found in the product descriptions of this catalog.

More information

More detailed information on the required WirelessHART software and hardware components can be found in the FI 01 catalog or at www.siemens.com/wirelesshart.

9

Communication and Software
Communication

PROFIBUS

■ Overview

Today, distributed automation solutions based on open field buses are state-of-the-art in large areas of the manufacturing industry and process engineering. It is only with field buses that the functional benefits of digital communication can be put to full use, e.g. better resolution of measured values, diagnosis options and remote parameterization.

PROFIBUS is today's most successful open field bus with a large installed base for a wide range of application. Standardization to IEC 61158 / EN 50170 provides you with future protection for your investment.

■ Benefits

- A uniform modular system from the sensor into the control level enables new plant concepts
- Problem-free exchangeability of field devices, including from different manufacturers, that comply with the standard profile
- Networking of transmitters, valves, actuators etc.
- Implementation of intrinsically safe applications through use of the field bus in hazardous areas
- Easy installation of 2-wire lines for joint energy supply and data transmission
- Reduced cabling costs through savings of material and installation time
- Reduced configuration costs through central, simple engineering of the field devices (PROFIBUS PA and HART with SIMATIC PDM, also cross-vendor)
- Fast and error-free installation
- Lower service costs thanks to simpler wiring and plant structure plus extensive diagnosis options
- Greatly reduced commissioning costs through simplified loop check
- Scaling/digitizing of the measured values in the field device already, hence no rescaling necessary in SIMATIC PCS 7

■ Application

PROFIBUS is suitable for fast communication with distributed I/Os (PROFIBUS DP) in production automation as well as for communication tasks in process automation (PROFIBUS PA). It is the first field bus system that meets the demands of both areas with identical communication services.

The transmission technique of the PROFIBUS PA is tailored to the needs of the process industry. Interoperability between field devices from different manufacturers and remote parameterization of the field devices during operation are guaranteed by the standardized communication services.

Using SIMATIC PDM (Process Device Manager), a uniform and cross-vendor tool for configuring, parameterizing, commissioning and diagnosis of intelligent process devices on the PROFIBUS, it is possible to configure a wide variety of process devices from different manufacturers using one uniform graphical user interface.

PROFIBUS PA can just as readily used in standard environments as well as hazardous areas. For use in hazardous areas, PROFIBUS PA and all connected devices have to be designed with type of explosion protection Ex [i].

The uniform protocol of PROFIBUS DP and PROFIBUS PA enables the two networks to be interlinked, thus combining time-based performance with intrinsically safe transmission.

■ Function

PROFIBUS PA expands PROFIBUS DP with near-process components for the direct connection of actuators and sensors.

For PROFIBUS PA the RS 485 transmission technique was replaced by a different technique optimized for intrinsically safe application. Both techniques are internationally standardized in IEC 61158.

PROFIBUS PA uses the same communication protocol as PROFIBUS DP; the communication services and telegrams are identical.

For PROFIBUS PA the data and energy supply for the field devices can be directed through a 2-wire line.

■ Integration

Siemens field devices for process automation which are listed in this catalog and can be controlled using PROFIBUS:

PROFIBUS PA

Measuring instruments for pressure
SITRANS P DS III PA
SITRANS P300

Measuring instruments for temperature
SITRANS TH400

Flowmeters
SITRANS F M MAG 6000 19" / IP67 / I / I Ex d
SITRANS F M Transmag 2
SITRANS F C MASS 6000 19" / IP67 /Ex d
SITRANS F C MASS 6000 19" / IP67 / Ex d
SITRANS FUS060

Measuring instruments for level
Pointek CLS 200
Pointek CLS 300
SITRANS Probe LU
SITRANS LR200
SITRANS LR250
SITRANS LR260
SITRANS LR300
SITRANS LR400
SITRANS LR460

Electropneumatic positioners
SIPART PS2

Acoustic sensor for pump monitoring
SITRANS DA400

PROFIBUS DP

Flowmeters
SITRANS F M MAG 6000 19" / IP67 / I
SITRANS F C MASS 6000 19" / IP67
SIFLOW FC070

Measuring instruments for level
SITRANS LUC500
HydroRanger 200
MultiRanger 100/200
SITRANS Probe LU 01, LU 02, LU 10

Acoustic sensor for pump monitoring
SITRANS DA400

9

Overview

Today, distributed automation solutions based on open field buses are state-of-the-art in large areas of the process engineering industry. It is only with field buses that the functional benefits of digital communication can be put to full use, e.g. better resolution of measured values, diagnosis options and remote parameterization.

Like PROFIBUS PA, the FF bus (FOUNDATION Fieldbus) is an open field bus with a large installed base for a wide range of application. Standardization to IEC 61158 / EN 50170 provides you with future protection for your investment.

Benefits

- A uniform modular system from the sensor to the connection to the control level enables new plant concepts
- Problem-free exchangeability of field devices, including from different manufacturers, that comply with the standard profile
- Networking of transmitters, valves, actuators etc.
- Implementation of intrinsically safe applications through use of the field bus in hazardous areas
- Easy installation of 2-wire cables for joint energy supply and data transfer
- Reduced cabling costs through savings of material and installation time.
- Reduced configuration costs through central, simple engineering of the field devices, also cross-vendor
- Fast and error-free installation
- Lower service costs thanks to simpler wiring and plant structure plus extensive diagnosis options
- Greatly reduced commissioning costs through simplified loop check
- Scaling/digitizing of the measured values in the field device already, hence no rescaling necessary in SIMATIC PCS 7

Application

The transfer technology of the FOUNDATION Fieldbus is tailored to the needs of the process industry. Interoperability between field devices from different manufacturers and remote parameterization of the field devices during operation are guaranteed by the standardized communication services.

FOUNDATION Fieldbus can just as readily be used in standard environments as in hazardous areas. For use in hazardous areas, FOUNDATION Fieldbus and all connected devices have to be designed with type of explosion protection Ex [i].

Function

FOUNDATION Fieldbus enables the direct connection of actuators and sensors.

FOUNDATION Fieldbus is based on a transfer optimized for intrinsically safe application. The transfer technology is internationally standardized in IEC 61158.

For FOUNDATION Fieldbus the data and energy supply for the field devices can be directed through a 2-wire cable.

FOUNDATION Fieldbus enables device-to-device communication ("control in the field").

Integration

Siemens field devices for process automation which are listed in this catalog and can be controlled using Foundation Fieldbus:

Measuring instruments for pressure
SITRANS P300 FF
SITRANS P DS III FF

Measuring instruments for temperature
SITRANS TH400 FF

Electropneumatic positioners
SIPART PS2 FF

Flowmeters
SITRANS F M MAG 6000
SITRANS F C MASS 6000

Level meters
SITRANS LR250

9

Communication and Software
WirelessHART Communication

Communication blocks

Overview

Communication block
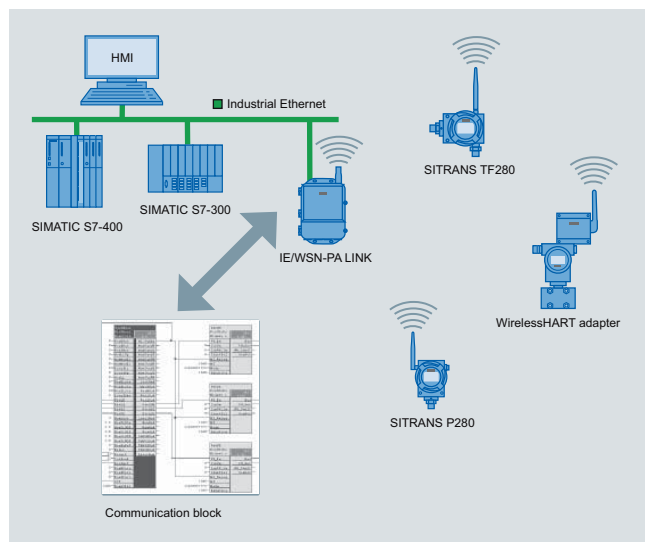
The WirelessHART communication blocks implement the communication between S7/PCS 7 automation systems and WirelessHART field devices. They communicate via the IE/WSN-PA LINK using the Modbus TCP/IP protocol. Preconfigured communication blocks simplify the engineering process. Symbols and face plates are included in the delivery for use with SIMATIC PCS 7 OS or SIMATIC WinCC.

Benefits

A library, which can be installed, offers pre-fabricated blocks and hence an easy way to integrate WirelessHART devices into the SIMATIC automation world.

Simple configuration thanks to:

- Prefabricated function blocks for IE/WSN-PA LINK and WirelessHART devices
- SIMATIC PCS 7 OS or SIMATIC WinCC symbols and face plates are included
- Configuring help for IE/WSN-PA LINK in line with function blocks
- Output of quality codes for respective process values
- Analysis of IE/WSN-PA LINK diagnostic information

Application

WirelessHART communication blocks are used where SIMATIC automation systems communicate with WirelessHART devices via the IE/WSN-PA LINK gateway.

Function

The function blocks cyclically communicate with the IE/WSN-PA LINK via Modbus TCP/IP. Process values of WirelessHART devices as well as their status are read and made available at the function block outputs. Furthermore, selected status information of the IE/WSN-PA LINK is also made available at another building block. This information includes connection status, condition of the wireless network and other diagnostics. Precondition of the usage of these communication blocks is a TCP/IP connection, engineered in NetPro in the Engineering Station of Simatic PCS 7. Currently this requires a CP343 or a CP443-1.

Configuration

The standard S7 or PCS 7 engineering tools CFC, KOP, FUP can be used for the communication block engineering. Connection planning is done in NetPro. A configuration example for configuring the IE/WSN-PA LINK makes it easy to assign the WirelessHART devices to the communication blocks which need to be engineered.

More information

You can obtain function blocks and technical support for integrating the IE/WSN-PA LINK in PCS 7 at the following address:

Siemens AG
Industry Sector
Industry Solutions Division
Industrial Technologies
Roland Heid
Siemensallee 84
76187 Karlsruhe
Germany
Tel: +49 721 595-6380
E-Mail: function.blocks.industry@siemens.com
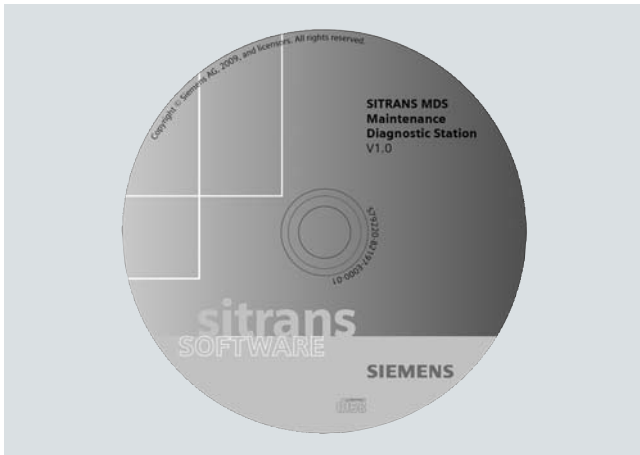
Selection and ordering Data

	Order No.
S7/PCS 7 function blocks for communicating with WirelessHART devices using the IE/WSN-PA LINK S7-300 or S7-400, including face plate	**9AE4110-3AA00**

Overview

Maintenance Diagnostic Station

SITRANS MDS for flexible and automated diagnostic processing:

- Central display of diagnostic information from HART devices, which was only readable on site until now.
- Adjustable updating period for each device
- Clear visualization of diagnostic status of all devices
- Simply transfer of SIMATIC PDM configuring data
- Windows-based application

Benefits

SITRANS MDS in cooperation with SIMATIC PDM increases significantly the transparency of a plant.

The main advantages of SIMATIC MDS are as follows:

- Increase transparency of the plant by reading diagnostic information from accessible devices and providing a well-organized representation of this information
- Representation of diagnostic status of a device as in SIMATIC PCS 7 or NAMUR NE 107 (switchable)
- Ease of use through use of SIMATIC PDM project data
- The update cycle for the diagnostic status can be uniformly set as the default value for all devices ...
- ... as well as for each device individually

Application

SITRANS MDS increases the transparency of a plant by centrally collecting diagnostic information, directly from the accessible field devices. In principle, all devices that are integrated in SIMATIC PDM can be included in the collecting process.

SITRANS MDS can be used where the installed automation system does not support an integrated acyclic communication of parameters and diagnostic information with the devices. In the case of HART devices, this applies to 85% of all installed devices.

The modern SIMATIC PCS 7 process control system allows for this type of continuous communication from the engineering system up to the devices. It also features a decidedly higher performance asset management system. The use of SIMATIC MDS therefore does not make sense in a SIMATIC PCS 7 environment and is hence not approved for that purpose.

Design

SITRANS MDS uses SIMATIC PDM project data to read and display diagnostic data from accessible devices.
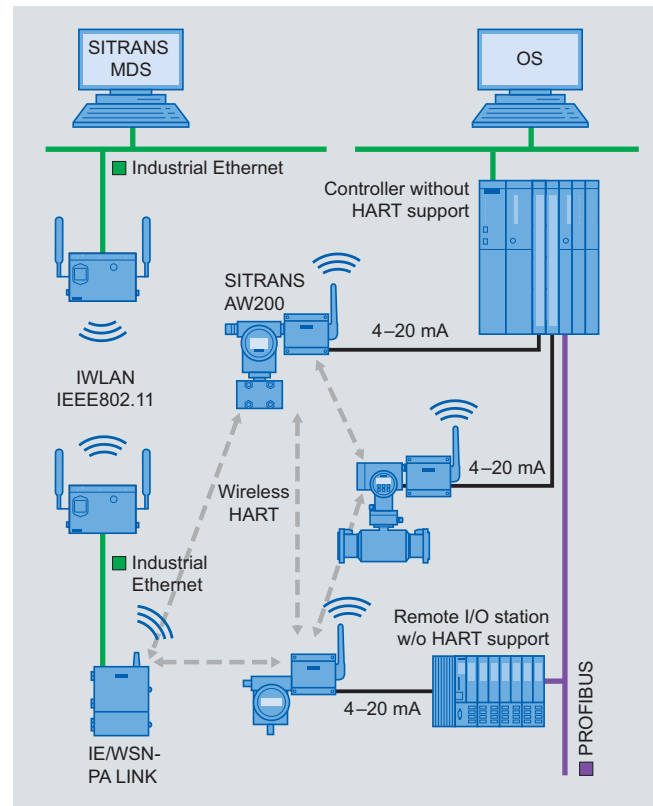
Integration

SITRANS MDS is installed on a PC together with SIMATIC PDM. Only the stand-alone version is used in this case.

Configuration

Configuration required for SITRANS MDS is adopted from SIMATIC PDM. Only the project name must be entered.

Very few other entries are required, such as the definition of update periods.

Technical specifications

SITRANS MDS Maintenance Diagnostic Station	
Operating system	Microsoft Windows XP professional SP2/SP3
Additionally required software	
SIMATIC PDM as of V 6.05 and options	
• SIMATIC PDM Basic (4 Tags)	6ES7 658-3AX06-0YA5
• SIMATIC PDM service (128 Tags)	6ES7 658-3JX06-0YA5
• SIMATIC PDM Option HART Mux	6ES7 658-3EX06-0YB5
	Additional options to increase number of measuring points

9

Communication and Software
WirelessHART Communication

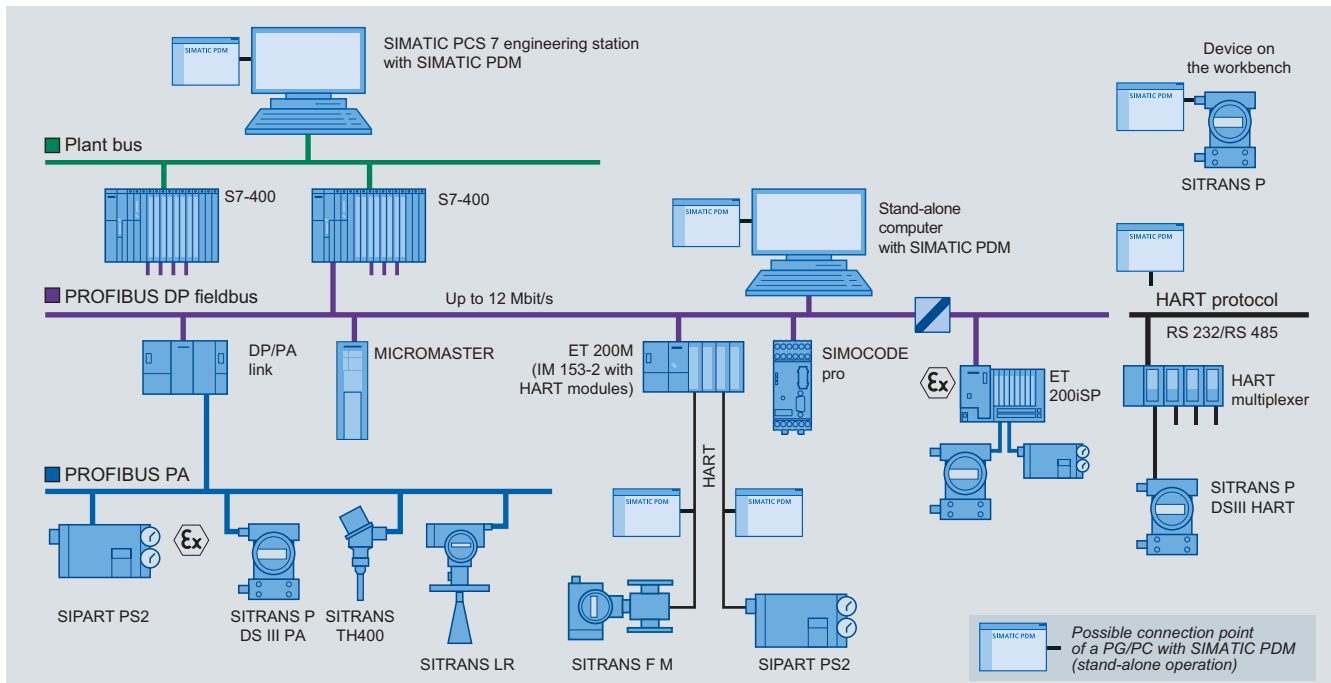### SITRANS MDS - Maintenance Diagnostic Station

PC hardware

600 MHz
256 MB *)
XGA 1024 x 768
16 Bit color depth

*) main memory of at least
512 MB is recommended

Up-to-date information can be
found in the description for
SIMATIC PDM

Selection and Ordering data

SITRANS MDS is a software package which is delivered together
with the IE/WSN-PA LINK for Version 1.0.

9

Overview

Configuration options with SIMATIC PDM

SIMATIC PDM (Process Device Manager) is a universal, vendor-independent tool for the configuration, parameterization, commissioning, diagnostics and servicing of intelligent field devices (sensors and actuators) and field components (remote I/Os, multiplexers, control-room devices, compact controllers), which in the following sections will be referred to simply as devices.

Using *one* software, SIMATIC PDM enables the processing of more than 1 300 devices from Siemens and over 120 vendors worldwide on *one* homogeneous user interface. Parameters and functions for all supported devices are displayed in a consistent and uniform fashion independent of their communications interface.

From the viewpoint of device integration, SIMATIC PDM is the most powerful open device manager available in the world. Devices which previously were not supported can be easily integrated in SIMATIC PDM at any time by importing their device descriptions (EDD). This provides security for your investment and saves you investment costs, training expenses and consequential costs.

SIMATIC PDM is integrated in the asset management of SIMATIC PCS 7. The Process Device Manager provides wider information for all devices described by the Electronic Device Description (EDD), e.g. detailed diagnostics information (vendor information, information on fault diagnostics and troubleshooting, further documentation), modification logbook (audit trial), parameter information. It is possible to change directly to SIMATIC PDM from the diagnostics faceplates in the maintenance station.

9

SIMATIC PDM
Process Device Manager

Application

SIMATIC PDM product structure	SIMATIC PDM stand-alone			SIMATIC PDM system-integrated	
	Minimum configuration	Components for individual configuration	Predefined product configurations		
Product name	SIMATIC PDM Single Point	SIMATIC PDM Basic	SIMATIC PDM Service	SIMATIC PDM S7	SIMATIC PDM PCS 7
Components/TAGs included in scope of delivery	1	4	SIMATIC PDM Basic/ 128	SIMATIC PDM Basic/ 128	SIMATIC PDM Basic/ 128
TAG expansions	Not expandable	TAG options - 128 TAGs - 512 TAGs - 1 024 TAGs - 2 048 TAGs and/or PowerPacks	PowerPacks - From 128 to 512 TAGs - From 512 to 1 024 TAGs - From 1 024 to 2 048 TAGs - From 2 048 to unlimited TAGs		
Option "Integration in STEP 7/PCS 7"		○	○	●	●
Option "Routing through S7-400"		○	○	○	●
Option "Communication through standard HART multiplexer"		○	○	○	○

● Components included in delivery of individual PDM configurations
○ Can be ordered as options

Table with SIMATIC PDM product structure
Note: For definition of TAG, see under TAG options/PowerPacks

Customer-oriented product structure

The SIMATIC PDM Process Device Manager can be used in a versatile manner in the context of Totally Integrated Automation (TIA). Use in the engineering system of SIMATIC PCS 7 is one possible application.

The customer-oriented products structure of SIMATIC PDM supports you in adaptation of the scope of functions and performance to your individual requirements. You can select the minimum configuration SIMATIC PDM Single Point, one of the application-specific, predefined product configurations SIMATIC PDM Service, SIMATIC PDM PCS 7 or SIMATIC PDM S7, or produce your desired configuration from the individual components offered (see table).

The selection depends on the application range and environment of use:

- System-integrated in a SIMATIC PCS 7/S7 configuration environment:
  - SIMATIC PDM PCS 7 (for integration in an engineering system for SIMATIC PCS 7)
  - SIMATIC PDM S7 (for integration in a SIMATIC S7 configuration environment)
- SIMATIC PDM stand-alone as service tool for operation on a mobile computer on the PROFIBUS or with direct connection to the device:
  - SIMATIC PDM Single Point (for processing of a single field device via a point-to-point coupling)
  - SIMATIC PDM Service (for enhanced servicing, including modification logbook and lifelist detailed diagnostics)

Design

Minimum configuration SIMATIC PDM Single Point

This low-cost minimum configuration with handheld functionality is tailored to processing exactly *one* field device via a point-to-point coupling. All device functions are supported as defined in the device description. These functions include:

- Unlimited selection of devices / management of device catalog
- Communication via PROFIBUS DP/PA or HART modem
- Parameterization and diagnostics in accordance with the device description
- Exporting and importing of parameter data
- Device identification
- Lifelist

The following system functions of SIMATIC PDM Basic are not available with SIMATIC PDM Single Point:

- EDD-based diagnostics in the lifelist
- Project editing
- Storage function (only exporting and importing of parameter data)
- Recording functions
- Routing
- Communication with HART field devices via remote I/Os

The functions of SIMATIC PDM Single Point cannot be extended (e.g. to SIMATIC PDM Basic or with the routing option through S7-400), nor can it be expanded with TAG options or Power-Packs.

9

Predefined product configurations

SIMATIC PDM Service

This is a predefined product configuration especially for mobile use in servicing for projects with up to 128 TAGs. It offers service engineers all functions of SIMATIC PDM Basic, including change log, calibration report and detailed diagnostics in the lifelist.

The following program components are part of SIMATIC PDM Service:

- SIMATIC PDM Basic
- Option: 128 TAGs

SIMATIC PDM Service can be expanded by the functional options "Integration in STEP 7/PCS 7", "Routing through S7-400" and "Communication via standard HART multiplexer" as well as by SIMATIC PDM PowerPacks (see under TAG options/ PowerPacks, page 3/16).

SIMATIC PDM PCS 7

SIMATIC PDM PCS 7 is a predefined product configuration for integration into the engineering system (engineering tool set) and the maintenance station of SIMATIC PCS 7. The product version designed for projects with up to 128 TAGs allows the use of all functions of SIMATIC PDM Basic (including change log, calibration report and detailed diagnostics in the lifelist). In addition, it contains the functionality for integration of the SIMATIC PDM into HW-Config as well as the routing from the central engineering system to the field devices.

The following program components are part of SIMATIC PDM PCS 7:

- SIMATIC PDM Basic
- Option: 128 TAGs
- Option: Integration in STEP 7/SIMATIC PCS 7
- Option: Routing through S7-400

SIMATIC PDM PCS 7 can be expanded by the option "Communication via standard HART multiplexer" and by SIMATIC PDM PowerPacks (see under TAG options/PowerPacks, page 3/16).

SIMATIC PDM S7

SIMATIC PDM S7 is a predefined product configuration tailored to the use of SIMATIC PDM in a SIMATIC S7 configuration environment. It offers all functions of SIMATIC PDM Basic (including change log, calibration report and detailed diagnostics in the lifelist) as well as the functionality for integration of PDM in HW-Config.

The following program components are part of SIMATIC PDM S7:

- SIMATIC PDM Basic
- Option: 128 TAGs
- Option: Integration in STEP 7/SIMATIC PCS 7

SIMATIC PDM S7 can be expanded by the functional options "Routing through S7-400" and "Communication via standard HART multiplexer" as well as by SIMATIC PDM PowerPacks (see under TAG options/PowerPacks, page 3/16).

Components for individual configuration

SIMATIC PDM Basic

SIMATIC PDM Basic is the basic component for production of individual SIMATIC PDM configurations from single components. It contains all functions required for operation and parameterization of the devices, as well as enabling for the following communication modes:

- PROFIBUS DP/PA
- HART communication (modem, RS 232 and PROFIBUS)
- MODBUS
- SIREC bus
- SIPART DR

SIMATIC PDM Basic without TAG expansion can manage projects with as many as 4 TAGs and, provided the system requirements are met, can be used for stand-alone operation on any computers (PCs/notebooks) with local connection to bus segments or with direct connection to the device.

SIMATIC PDM Basic can be expanded by functional options and TAG options/PowerPacks. Use of the following functions requires at least 128 TAGs:

- Change log
- Calibration report
- Detailed diagnostics in the lifelist

SIMATIC PDM Basic is also available in the form of a rental license for 50 operating hours for low-cost processing of short-term projects.

SIMATIC PDM option: Integration in STEP 7/PCS 7

This option is required for use of SIMATIC PDM within a SIMATIC S7 or SIMATIC PCS 7 project with a local connection to the PROFIBUS. SIMATIC PDM can then be started directly from the hardware project (HW-Config).

SIMATIC PDM option: Routing through S7-400

This option is required additive to the option "Integration in STEP7/PCS 7" if SIMATIC PDM is to be used in a engineering system for SIMATIC PCS 7/S7 with Ethernet bus connection to the automation systems for plant-wide configuration, parameterization, commissioning and diagnostics of field devices.

SIMATIC PDM option: Communication via standard HART multiplexer

This option permits SIMATIC PDM to use the HART OPC server for communication with HART field devices via HART multiplexers.

TAG options/PowerPacks

A TAG corresponds to a SIMATIC PDM object, which represents individual field devices or components within a project, e.g. measuring instruments, positioners, switching devices or remote I/Os. TAGs are also relevant for diagnostics with the lifelist of SIMATIC PDM. In this case, TAGs are considered to be all recognized devices with diagnostics capability, whose detailed diagnostics is effected through the device description (EDD).

In contrast to PowerPacks, TAG options are only suitable for product configurations on the basis of individual components. Using the SIMATIC PDM TAG options, the basic software SIMATIC PDM Basic can be expanded from 4 TAGs to 128, 512, 1 024 or 2 048 TAGs, and with the help of an additive PowerPack also to unlimited TAGs.

The number of available TAGs can be subsequently increased for all SIMATIC PDM product configurations by means of the SIMATIC PDM PowerPacks. PowerPacks are available for expansion to 512, 1 024, 2 048 and unlimited TAGs.
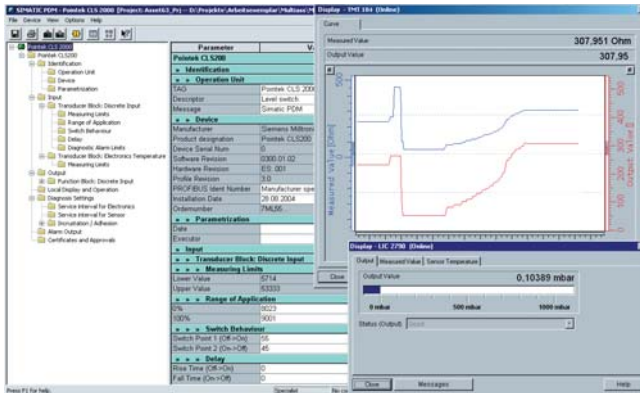
Demonstration software

A demonstration version of SIMATIC PDM is also available. Online communication and storage functions are not available with this version.

9

Communication and Software

Software

SIMATIC PDM
Process Device Manager

■ Function

Parameter view of SIMATIC PDM with trend curve and online display

Core functions

- Adjustment and modification of device parameters
- Comparing (e.g. project and device data)
- Plausibility testing of data input
- Device identification and testing
- Device status indication with operating modes, alarms and states
- Simulation
- Diagnostics (standard, detailed)
- Management (e.g. networks and PCs)
- Export/import (parameter data, reports)
- Commissioning functions, e.g. measuring circuit tests of device data
- Device replacement (lifecycle management)
- Global and device-specific modification logbook for user operations (audit trail)
- Device-specific calibration reports
- Graphic presentations of echo envelope curves, trend displays, valve diagnosis results etc.
- Presentation of incorporated manuals
- Document manager for integration of up to 10 multimedia files

Support of system management

SIMATIC PDM supports the operative system management in particular through:

- Uniform presentation and operation of devices
- Indicators for preventive maintenance and servicing
- Detection of changes in the project and device
- Increasing the operational reliability
- Reducing the investment, operating and maintenance costs
- Graded user privileges including password protection

PDM lifelist with status and diagnostics display

Graphical user interface

The GUI of SIMATIC PDM satisfies the requirements of the directives VDI/VDE GMA 2187 and IEC 65/349/CD. Even complex devices with several hundred parameters can thus be represented clearly and processed quickly. Using SIMATIC PDM it is very easy to navigate in highly complex stations such as remote I/Os and even connected field devices.

Several views are available to users to help them with their tasks:

- Hardware project view
- Process device network view (preferably for stand-alone application)
- Process device plant view as TAG-related view, also with display of diagnostics information
- Parameter view for parameterizing the field devices
- Lifelist view for commissioning and service

Communication

SIMATIC PDM supports several communication protocols and components for communicating with devices that have the following interfaces:

- PROFIBUS DP/PA interface
- HART interface
- Modbus interface
- Special interface from Siemens

Further communication protocols on request.

Routing

From the central engineering system of the SIMATIC PCS 7 process control system, you can navigate with SIMATIC PDM through the various bus systems and remote I/Os down to the connected devices. Throughout the plant, every device which can be parameterized per EDD can be processed using this routing functionality. The following processing functions are available:

- Read diagnostics information from the device
- Modify device settings
- Adjust and calibrate devices
- Monitor process values
- Generate simulation values
- Reparameterize devices

9

Integration

Device Integration

SIMATIC PDM supports all devices described by EDD (Electronic Device Description). EDD is standardized to EN 50391 and IEC 61804. Internationally it is the most widely used standardized technology for device integration. At the same time it is the directive of the established organizations for PROFIBUS (PNO: PROFIBUS International) and HART (HCF: HART Communication Foundation).

The devices are directly integrated in SIMATIC PDM through their EDD or the current HCF catalog. In the EDD the device is described in terms of its functions and construction using the Electronic Device Description Language (EDDL) specified by PNO. Using this description, SIMATIC PDM automatically creates its user interface with the specific device data.

The current device catalog of SIMATIC PDM covers more than 1 300 devices from more than 120 manufacturers world-wide. In addition, devices from all manufacturers can be integrated in SIMATIC PDM by simply importing their EDDs. It is thus possible to keep the device range up to date at all times and to add to the number of manufacturers and devices supported by SIMATIC PDM. To permit improved transparency, SIMATIC PDM also allows the creation of project-specific device catalogs. If devices are to be used which cannot be found in the SIMATIC PDM device catalog, we will be glad to help you integrate them.

Contact addresses

Siemens AG, Automation and Drives,
Technical Support

Europe

Phone: +49 180 50 50 222
Fax: +49 180 50 50 223
E-mail: FPlease fill in a Support Request on the Internet
(see below for address)

Asia/Pacific

Phone: +86 1064 719 990
Fax: +86 1064 747 474
E-mail: adsupport.asia@siemens.com

America

Phone: +1 423 262 2522
Fax: +1 423 262 2200
E-mail: techsupport.sea@siemens.com

Support Request

You can also obtain corresponding support over the Internet per Support Request:

www.siemens.com/automation/support-request

Technical specifications

Hardware minimum requirements	• PG/PC/notebook with processor corresponding to operating system requirements
	• Main memory 256 MB
	• Vacant hard disk 370 MB
Operating systems (alternative)	• Microsoft Windows 2000 Professional SP3/SP4
	• Microsoft Windows XP Professional SP2/SP3
	• Microsoft Windows Server 2003 SP2 (only for operation with a SIMATIC PCS 7 Engineering Station)

Further software components

• SIMATIC PDM option "Integration in STEP 7/PCS 7"	STEP 7 V5.2 + SP1
	STEP 7 V5.3 + SP3
	STEP 7 V5.4 + SP4
	SIMATIC PCS 7 V6.1 + SP2/SP3
	SIMATIC PCS 7 V7.0 + SP2
	SIMATIC PCS 7 V7.1

9

Communication and Software

Software

SIMATIC PDM
Process Device Manager

Selection and ordering Data

SIMATIC PDM belongs to the SIMATIC products which can be used both in the context of SIMATIC PCS 7 and in the extended context of Totally Integrated Automation (TIA). Depending on the field of application, SIMATIC PDM is used in various product versions with different functionalities, ordering data and type of delivery. To provide a better overview and to avoid faulty ordering, the special selection and ordering data for SIMATIC PCS 7 are listed separately.

Selection and ordering data
for SIMATIC PCS 7 applications

Selection and Ordering data	Order No.
SIMATIC PDM PCS 7 V6.0 Complete package for integration into the engineering toolset of the SIMATIC PCS 7 engineering system 6 languages (German, English, French, Italian, Spanish, Chinese), software class A, executes with Windows XP Professional Floating license for 1 user, with • SIMATIC PDM Basic • Integration in STEP 7 / PCS 7 • Routing via S7-400 • 128 TAGs Type of delivery: License Key Disk, Certificate of License incl. Terms and Conditions; CDs with SIMATIC PDM V6.0 and device library	**6ES7 658-3LX06-0YA5**

PowerPacks

SIMATIC PDM PowerPack
for expanding the TAGs of SIMATIC PDM PCS 7 V6.0

6 languages (German, English, French, Italian, Spanish, Chinese),software class A, executes with Windows XP Professional

Floating license for 1 user

Type of delivery:
License Key Disk, Certificate of License incl. Terms and Conditions

• From 128 TAGs to 512 TAGs	**6ES7 658-3XB06-2YD5**
• From 512 TAGs to 1 024 TAGs	**6ES7 658-3XC06-2YD5**
• From 1 024 TAGs to 2 048 TAGs	**6ES7 658-3XD06-2YD5**
• From 2 048 TAGs to unlimited TAGs	**6ES7 658-3XH06-2YD5**

Demonstration software

SIMATIC PDM Demo V6.0 without online communication and storage functionality 6 languages (German, English, French, Italian, Spanish, Chinese), software class A, executes with Windows XP Professional Type of delivery: CDs with SIMATIC PDM V6.0 and device library	**6ES7 658-3GX06-0YC8**

Selection and ordering data for TIA applications

Selection and Ordering data	Order No.
Minimum configuration SIMATIC PDM Single Point	
SIMATIC PDM Single Point V6.0 for operation and parameterization of one field device; communication via PROFIBUS DP/PA or HART modem, including 1 TAG cannot be expanded with respect to functions or with TAG option/PowerPack 6 languages (German, English, French, Spanish, Italian, Chinese), software class A, executes with Windows 2000 Professional or Windows XP Professional Floating license for 1 user Type of delivery: License Key Disk, Certificate of License incl. Terms and Conditions; CDs with SIMATIC PDM V6.0 and device library	**6ES7 658-3HX06-0YA5**

Predefined SIMATIC PDM V6.0 product configurations
for special applications

SIMATIC PDM Service V6.0 Complete package for standalone users for servicing, with • SIMATIC PDM Basic V6.0 • 128 TAGs 6 languages (German, English, French, Italian, Spanish, Chinese), software class A, executes with Windows 2000 Professional or Windows XP Professional, floating license for 1 user Type of delivery: License Key Disk, Certificate of License incl. Terms and Conditions; CDs with SIMATIC PDM V6.0 and device library	**6ES7 658-3JX06-0YA5**
SIMATIC PDM S7 V6.0 Complete package for use in a SIMATIC S7 configuration environment, with • SIMATIC PDM Basic V6.0 • Integration in STEP 7 / PCS 7 • 128 TAGs 6 languages (German, English, French, Italian, Spanish, Chinese), software class A, executes with Windows 2000 Professional or Windows XP Professional, floating license for 1 user Type of delivery: License Key Disk, Certificate of License incl. Terms and Conditions; CDs with SIMATIC PDM V6.0 and device library	**6ES7 658-3KX06-0YA5**

9

Communication and Software
Software

Selection and Ordering data	Order No.

Components for individual configuration

SIMATIC PDM Basic V6.0
for operation and parameterization of field devices and components, communication via PROFIBUS DP/PA, HART (modem, RS 232, PROFIBUS) and Modbus, including 4 TAGs

6 languages (German, English, French, Spanish, Italian, Chinese), software class A, executes with Windows 2000 Professional or Windows XP Professional

Type of delivery:
License Key Disk, Certificate of License incl. Terms and Conditions; CDs with SIMATIC PDM V6.0 and device library

• Floating license for 1 user	**6ES7 658-3AX06-0YA5**
• Rental license for 50 hours	**6ES7 658-3AX06-0YA6**

Integration in STEP 7 / SIMATIC PCS 7
Only required if integration of SIMATIC PDM into HW-Config is to be used

6 languages (German, English, French, Spanish, Italian, Chinese), software class A, executes with Windows 2000 Professional or Windows XP Professional

Type of delivery:
License Key Disk, Certificate of License incl. Terms and Conditions

• Floating license for 1 user	**6ES7 658-3BX06-2YB5**

Routing via S7-400
6 languages (German, English, French, Spanish, Italian, Chinese), software class A, executes with Windows 2000 Professional or Windows XP Professional

Type of delivery:
License Key Disk, Certificate of License incl. Terms and Conditions

• Floating license for 1 user	**6ES7 658-3CX06-2YB5**

Communication via standard HART multiplexer
6 languages (German, English, French, Spanish, Italian, Chinese), software class A, executes with Windows 2000 Professional or Windows XP Professional

Type of delivery:
License Key Disk, Certificate of License incl. Terms and Conditions

• Floating license for 1 user	**6ES7 658-3EX06-2YB5**

Selection and Ordering data	Order No.

TAG options / PowerPacks

SIMATIC PDM TAG option
for TAG expansion, additive to SIMATIC PDM Basic V6.0

6 languages (German, English, French, Spanish, Italian, Chinese), software class A, executes with Windows 2000 Professional or Windows XP Professional

Floating license for 1 user

Type of delivery:
License Key Disk, Certificate of License incl. Terms and Conditions

• Up to 128 TAGs	**6ES7 658-3XA06-2YB5**
• Up to 512 TAGs	**6ES7 658-3XB06-2YB5**
• Up to 1 024 TAGs	**6ES7 658-3XC06-2YB5**
• Up to 2 048 TAGs	**6ES7 658-3XD06-2YB5**

SIMATIC PDM PowerPack
for subsequent TAG expansion of all SIMATIC PDM V6.0 product configurations

6 languages (German, English, French, Spanish, Italian, Chinese), software class A, executes with Windows 2000 Professional or Windows XP Professional

Floating license for 1 user

Type of delivery:
License Key Disk, Certificate of License incl. Terms and Conditions

• From 128 TAGs to 512 TAGs	**6ES7 658-3XB06-2YD5**
• From 512 TAGs to 1 024 TAGs	**6ES7 658-3XC06-2YD5**
• From 1 024 TAGs to 2 048 TAGs	**6ES7 658-3XD06-2YD5**
• From 2 048 TAGs to unlimited TAGs	**6ES7 658-3XH06-2YD5**

Demonstration software

SIMATIC PDM Demo V6.0	**6ES7 658-3GX06-0YC8**

without online communication and storage functionality

6 languages (German, English, French, Spanish, Italian, Chinese), software class A, executes with Windows 2000 Professional or Windows XP Professional

Type of delivery:
CDs with SIMATIC PDM V6.0 and device library

More information

Update/Upgrade

All SIMATIC PDM product variants and combinations with Version 5.x can be upgraded to Version 6.0 per SIMATIC PDM Upgrade. In addition, a Software Update Service in the form of a subscription is offered for SIMATIC PDM.

For further information, see Sections "Updates/upgrades asynchronous to the PCS 7 version", page 17/19, and "Software Update Service", page 17/2.

9

9