Customized Monitoring – S7 Controller Interfaces

ibaPDA Connectivity

SIMATIC®
LOGO!, S7-200, S7-300, S7-400, S7-400H, S7-1200, S7-1500, WinAC

PROFIBUS
PROFINET
Ethernet
MPI
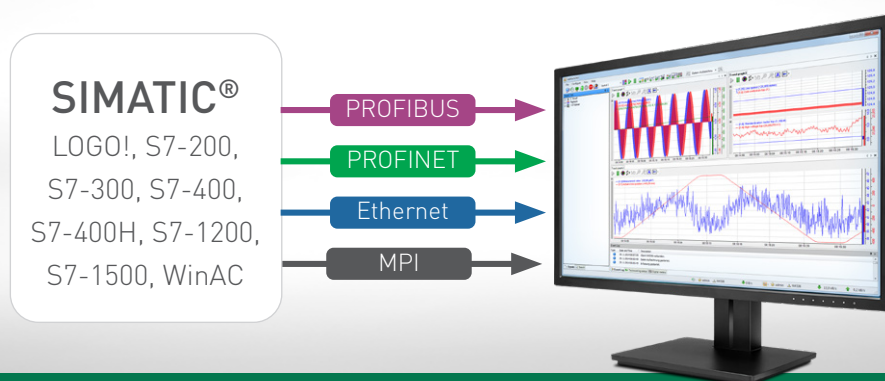
ibaBM-DP
Acquire data via PROFIBUS

ibaBM-PN
Acquire data via PROFINET

ibaPDA-Interface-S7-TCP/UDP
Acquire data via Ethernet

**ibaPDA-Interface-S7-Xplorer**
Connection via Xplorer interface

SIMATIC S7-200®, S7-300®, S7-400®, S7-400H®, S7-1200®, S7-1500® and
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S7 Connectivity

One of the most widely used industrial controllers is the SIMATIC S7 product family. The iba system offers several ways to acquire data from the S7 controllers – the right solution for different requirements.
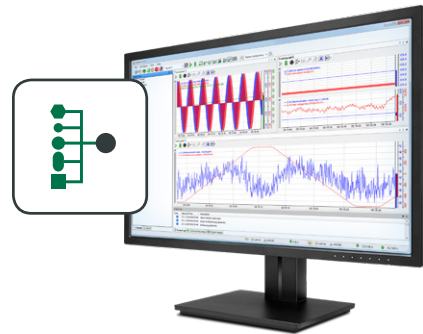
Different connections

An ibaPDA system can be connected to S7 controllers via various methods: via PROFIBUS, PROFINET, Ethernet or MPI. Which method is best depends on, amongst other things, how quickly the data needs to be acquired, whether scan-cycle-synchronous data transmission is required and which hardware is available.

If there is also the demand for free variable selection, the Request method and the Xplorer interface offer the option of selecting the operands and symbols without any programming effort using symbolic identifiers.

Direct interface

If data needs to be acquired quickly and precisely with each scan cycle, the S7 system should be connected via PROFIBUS or PROFINET with the appropriate ibaBM-PN or ibaBM-DP bus monitors. The bus monitors are configured as an active device; the output is programmed directly in the program.

When connected via Ethernet, the communication depends on the communication performance of the controller and the network load. Therefore, acquisition via Ethernet is not 100% scan-cycle-precise. The advantage, however, is that the standard network

At a glance

› Connection to SIMATIC S7 controllers via various interfaces: ibaBM-DP, ibaBM-PN, S7-TCP/UDP, S7-Xplorer
› Free selection of variables with Request method or Xplorer interface
› Scan-cycle-precise acquisition via PROFIBUS and PROFINET with ibaBM-DP and ibaBM-PN bus monitors
› Connection without additional hardware with S7-TCP/UDP and S7-Xplorer software interface
› Simple, cost-effective connection via Xplorer interface

connection of the controller can be used; in ibaPDA, only a software interface is required.

Regardless of whether the connection is via PROFIBUS/PROFINET or Ethernet, the operands to be recorded must be programmed in the controller and be sent by the controller program. Each change of operands requires a program change.

Operand selection without programming

Using special iba solutions, programming effort can be avoided: With the Xplorer interface or Request method, measurement variables can be changed without intervention in the programming while the controller is running. In addition, the measurement variables can be freely selected by importing the address book.

Request method

The Request method allows users to record variables from the controller by free variable selection. The variables can be selected from the address book of the project and simply accessed via their symbolic names. A PLC-code block ("Request block") must be integrated into the S7 system program once. After the request, the S7 system sends the measured operands cyclically to the ibaPDA system. Licenses for the Request method are available for connections via PROFIBUS, PROFINET, or Ethernet UDP. The operands can be easily selected in ibaPDA using a symbol browser with the click of a mouse and changed at any time during operation.
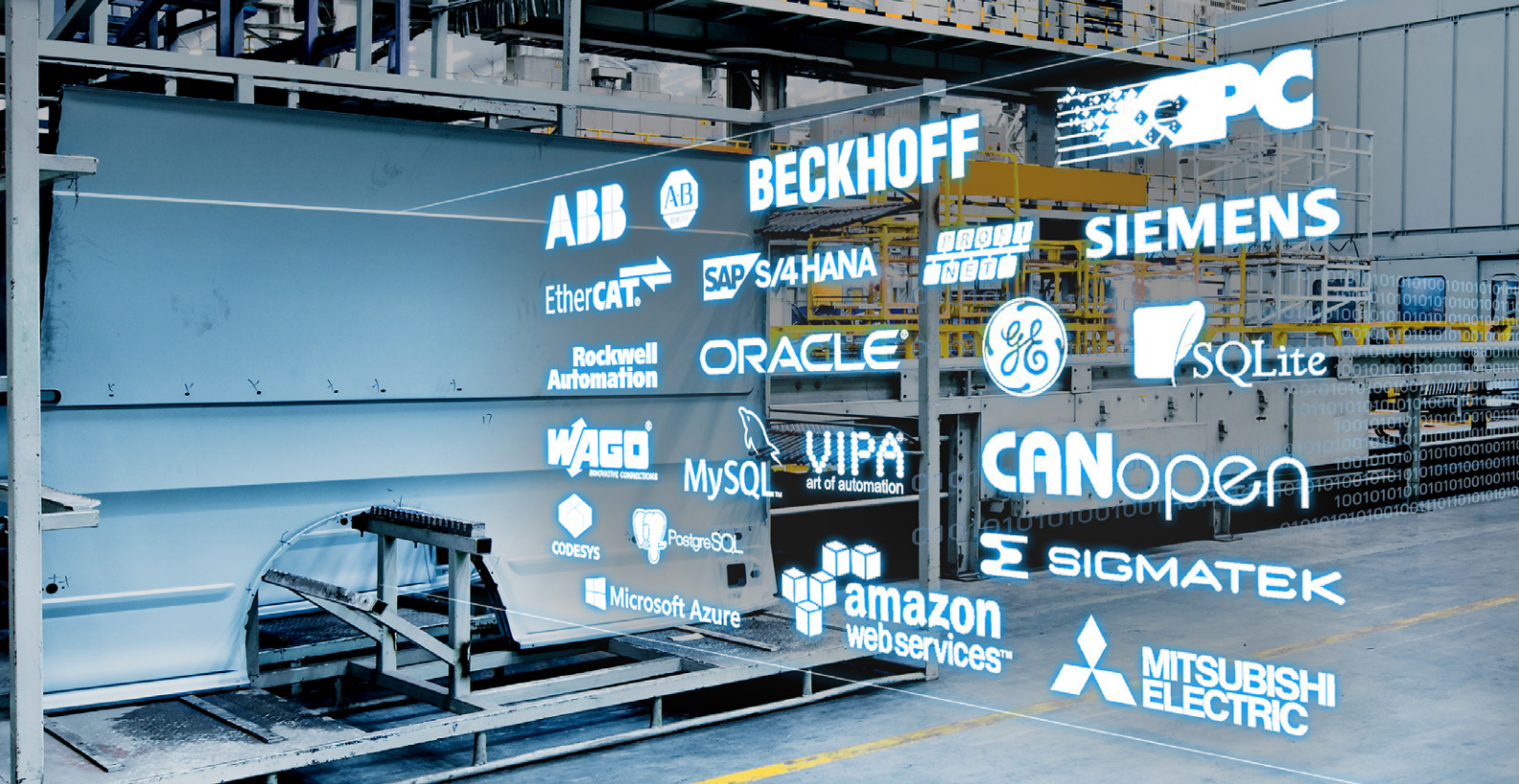
How does the Xplorer interface work?

With the S7-Xplorer interface, it is possible to easily and cost-effectively connect to S7 systems. Like the Request method, the Xplorer interface allows free access to the internal data of a controller. The standard connections for each controller are used; additional hardware is not required when connecting via Ethernet. However, the variables are cyclically requested and sent by the controller in a „polling" procedure. Data acquisition is not scan-cycle-precise since the data is only sent by the controller when the request can be processed.
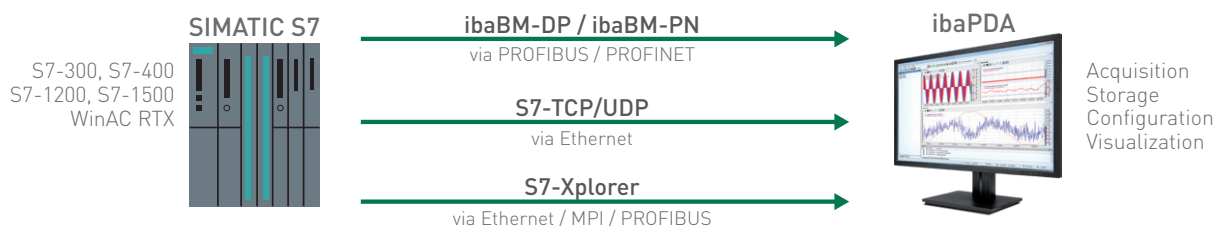
The variables can be easily selected in ibaPDA with a mouse click using the symbol. The selection of measurement variables can be changed at any time without interruption to the controller running operation. Up to 16 connections to S7 systems can be used with the basic license.

Different Xplorer interfaces

An Xplorer interface is available not only for S7 controllers but also for Allen-Bradley controllers (PLC5, SLC500, ControlLogix), for Beckhoff TwinCAT 2 and TwinCAT 3, B&R systems, Bachmann M1 systems, CODESYS V2 and V3 based systems, Mitsubishi

MELSEC controllers, as well as SIGMATEK controllers. All available Xplorer interfaces are provided as a bundle for ibaPDA. A cost-effective entry-level solution is also available: ibaPDA-PLC-Xplorer offers the full ibaPDA functionality with all available Xplorer interfaces for up to 64 signals. This is ideal for applications, such as troubleshooting or commissioning.

› Detailed information on the Xplorer licenses can be found under order information on page 12.

SIMATIC S7 (S7-300, S7-400, S7-1200, S7-1500, WinAC RTX) → ibaBM-DP / ibaBM-PN via PROFIBUS / PROFINET; S7-TCP/UDP via Ethernet; S7-Xplorer via Ethernet / MPI / PROFIBUS → ibaPDA (Acquisition, Storage, Configuration, Visualization)

The best connection for your needs

The following table shows which interface is available for which controller, the communication method and which SIMATIC development environment is supported. A description of the individual connections can be found on the following pages.

SIMATIC development environment			PCS7 [A]						
			SIMATIC Manager						
				TIA-Portal					
Interface + module			S7-400H	S7-300	S7-400	WinAC	S7-1200	S7-1500	Connection
S7-Xplorer	TCP/IP [A]		✓ [A]	✓ [A]	✓ [A]	✓ [A]	✓[1] [A]	✓[1] [A]	LAN
	PC/CP [A]		✓ [A]	✓ [A]	✓ [A]	✓ [A]			Adapter
	TCP/IP S7-1x00 [A]						✓ [A]	✓ [A]	LAN
PROFIBUS	Direct interface		✓	✓	✓	✓	✓	✓	ibaBM-DP + ibaFOB
	Sniffer		✓	✓	✓	✓	✓	✓	
	Request-S7 [A]		✓ [A]	✓[2] [A]	✓ [A]	✓ [A]		✓[1] [A]	
PROFINET	Direct interface		✓	✓	✓	✓	✓	✓	ibaBM-PN + ibaFOB
	Sniffer		✓	✓	✓	✓	✓	✓	
	Request-S7 [A]		✓	✓ [A]	✓ [A]	✓ [A]		✓[1] [A]	
S7-TCP/UDP	Direct interface		✓	✓	✓	✓	✓	✓	LAN
	Request-S7 [3] [A]			✓ [A]	✓ [A]	✓ [A]		✓[1] [A]	

[1] not optimized data blocks
[2] not possible with CP342-5
[3] only via UDP

✓ configuration possible
[A] address book supported

[A] Address book

An address books contains all available S7 symbols of an S7 project and a reference to the S7 operands. An S7 symbol selected in ibaPDA is „translated" into an S7 operand.

An address book is created once in ibaPDA and is generally available, not only in individual modules. The associated address book must be updated if the S7 project has been changed. An address book can be used with the S7-Xplorer interface and the Request method.

Direct interface

Sending a pre-programmed signal selection without free variable selection.
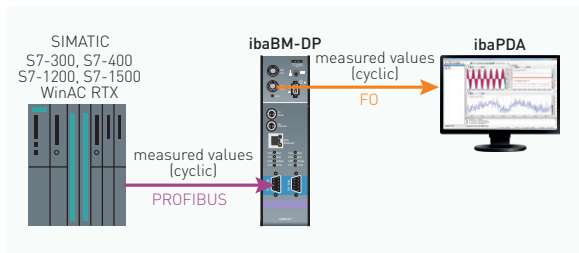
Sniffer

In sniffer mode, the values communicated on the bus are read and recorded as signals. Changes in the configuration of the respective bus system are not necessary.

Acquire data via PROFIBUS

The connection via PROFIBUS is done with the ibaBM-DP bus monitor. A fast and (bus) scan-cycle-precise acquisition of measured values is possible via PROFIBUS.
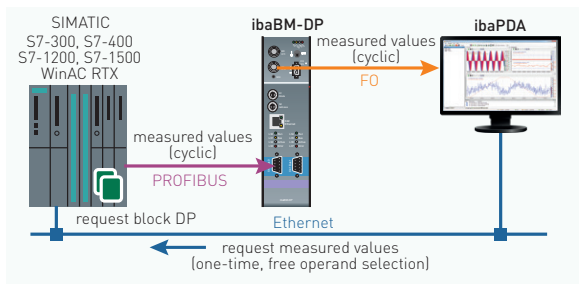
ibaBM-DP - Active slave

› (Bus) scan-cycle-precise transmission of measured values
› Low additional load of the CPU
› PLC program must be changed for selecting the variables to be measured

iba software	iba hardware
ibaPDA	ibaBM-DP
	ibaFOB-D card (in the PC)

ibaPDA-Request-S7-DP/PN

› (Bus) scan-cycle-precise transmission of measured values
› A PLC code block needs to be integrated once
› No PLC program changes needed for selecting the variables (free selection)
› Possible to change the variable selection during operation

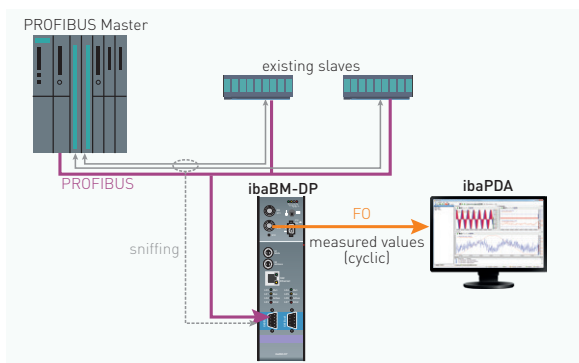| iba software	iba hardware
ibaPDA	ibaBM-DP
ibaPDA-Request-S7-DP/PN	ibaFOB-D card (in the PC)

ibaPDA-Request-FM458/TDC

› (Bus) scan-cycle-precise transmission of measured values directly from the FM458/TDC module
› A FM458/TDC code block needs to be integrated once
› No PLC program changes needed for selecting the variables (free selection)
› Possible to change the variable selection during operation

iba software	iba hardware
ibaPDA	ibaBM-DP
ibaPDA-Request-FM458/TDC	ibaFOB-D card (in the PC)

ibaBM-DP - Sniffer

› (Bus) scan-cycle-precise transmission of measured values
› No programming and therefore no additional load of the CPU
› Only existing data exchange between master/slave can be detected
› Analog values are transmitted as a raw value; variable selection may be difficult

iba software	iba hardware
ibaPDA	ibaBM-DP
	ibaFOB-D card (in the PC)

ibaBM-DP

Acquire data on redundant PROFIBUS

With the additional license for the option „Redundancy mode" data can
be captured on redundant PROFIBUS lines on S7-400H systems. The bus
switchover takes place in the bus monitor based on the DP telegrams.

ibaBM-DP - Active slave redundant
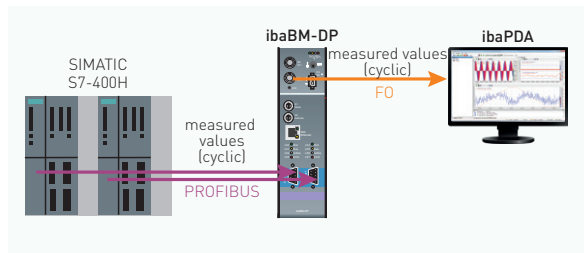
› (Bus) scan-cycle-precise transmission of measured values
› Low additional load of the CPU
› PLC program must be changed for selecting the variables to be measured

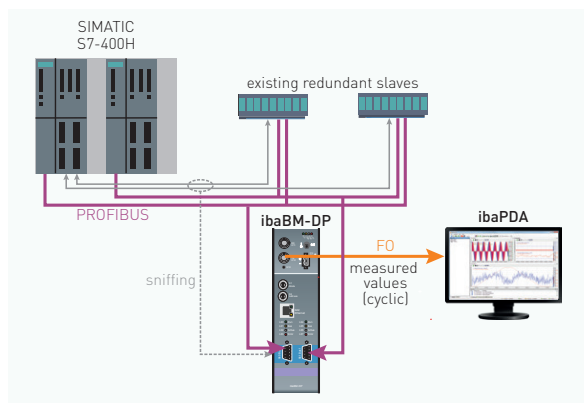| iba software	iba hardware
ibaPDA	ibaBM-DP + additional license „Redundancy mode" ibaFOB-D card (in the PC)

ibaPDA-Request-S7-DP redundant
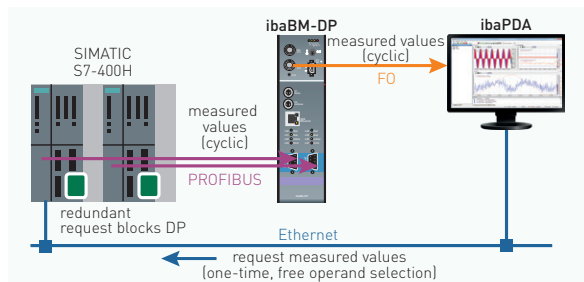
› (Bus) scan-cycle-precise transmission of measured values
› A PLC code block needs to be integrated once
› No PLC program changes needed for selecting the variables (free selection)
› Possible to change the variable selection during operation

iba software	iba hardware
ibaPDA ibaPDA-Request-S7-DP/PN	ibaBM-DP + additional license „Redundancy mode" ibaFOB-D card (in the PC)

ibaBM-DP - Sniffer redundant
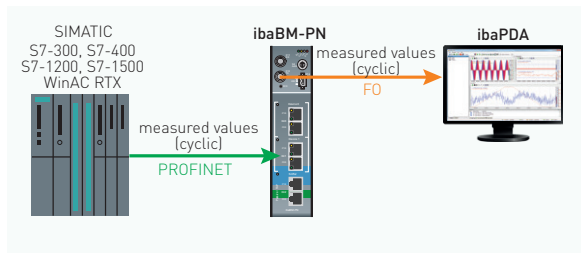

› (Bus) scan-cycle-precise transmission of measured values
› No programming and therefore no additional load of the CPU
› Only existing data exchange between master/slave can be detected
› Analog values are transmitted as a raw value; variable selection may be difficult

iba software	iba hardware
ibaPDA	ibaBM-DP + additional license „Redundancy mode" ibaFOB-D card (in the PC)

Acquire data via PROFINET

The connection via PROFINET is done with the ibaBM-PN bus monitor. A fast and (bus) scan-cycle-precise acquisition of measured values is possible via PROFINET.
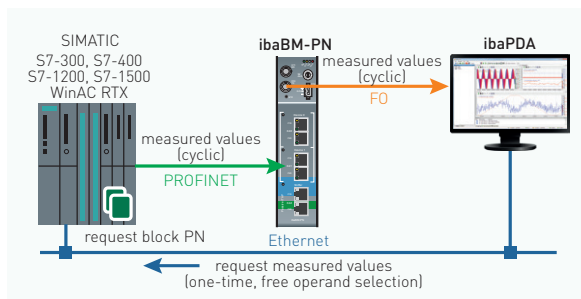
ibaBM-PN - Active device

› (Bus) scan-cycle-precise transmission of measured values
› Low additional load of the CPU
› PLC program change needed for selecting the variables to be measured

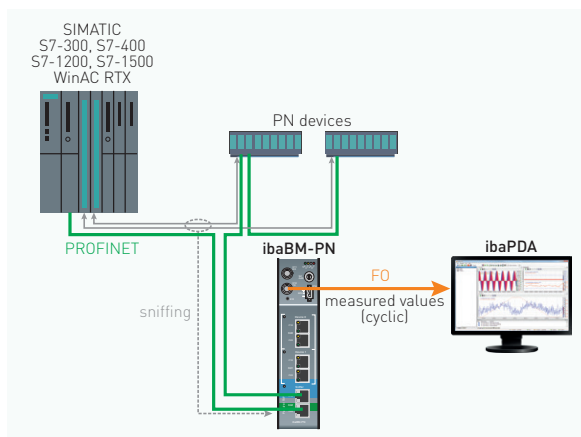| iba software	iba hardware
ibaPDA	ibaBM-PN
	ibaFOB-D card (in the PC)

ibaPDA-Request-S7-DP/PN

› (Bus) scan-cycle-precise transmission of measured values
› A PLC code block needs to be integrated once
› No PLC program changes needed for selecting the variables (free selection)
› Possible to change the variable selection during operation

iba software	iba hardware
ibaPDA	ibaBM-PN
ibaPDA-Request-S7-DP/PN	ibaFOB-D card (in the PC)

ibaBM-PN - Sniffer

› (Bus) scan-cycle-precise transmission of measured values
› No programming and therefore no additional load of the CPU
› Only existing data exchange between controller/device via TAP interface can be detected
› Analog values are transmitted as a raw value; variable selection may be difficult

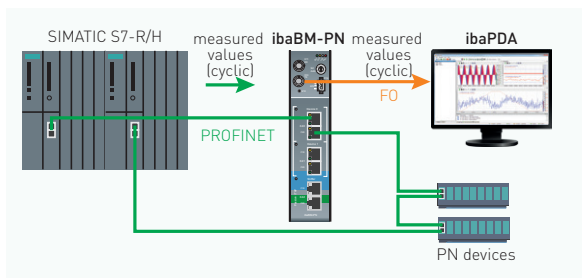| iba software	iba hardware
ibaPDA	ibaBM-PN
	ibaFOB-D card (in the PC)

Acquire data on redundant PROFINET

With the additional license for the option „Redundancy mode" data
can be captured on redundant PROFINET lines on S7-R/H
systems. ibaBM-PN only supports „S2" configurations.

ibaBM-PN - Active device redundant

› (Bus) scan-cycle-precise transmission of measured values
› Low additional load of the CPU
› PLC program must be changed for selecting the variables to be measured

iba software	iba hardware
ibaPDA	ibaBM-PN + additional license „Redundancy mode S2" ibaFOB-D card (im PC)

ibaPDA-Request-S7-DP/PN redundant
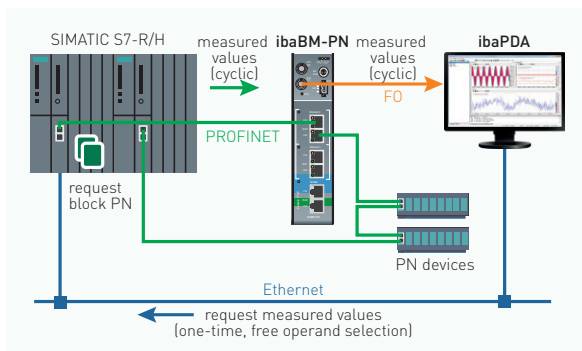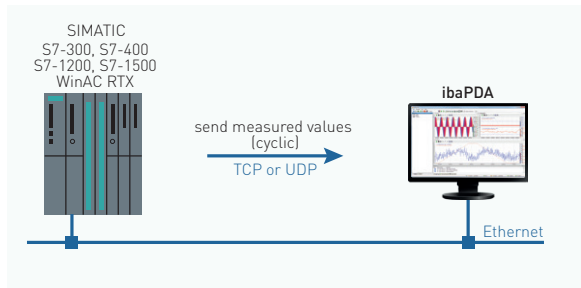

› (Bus) scan-cycle-precise transmission of measured values
› A PLC code block needs to be integrated once
› No PLC program changes needed for selecting the variables (free selection)
› Possible to change the variable selection during operation

iba software	iba hardware
ibaPDA ibaPDA-Request-S7-DP/PN	ibaBM-PN + additional license „Redundancy mode S2" ibaFOB-D card (im PC)

Acquire data via Ethernet

A software interface in ibaPDA is required for collecting data via Ethernet (TCP or UDP), additional hardware is not necessary. The transmission performance depends on the network.
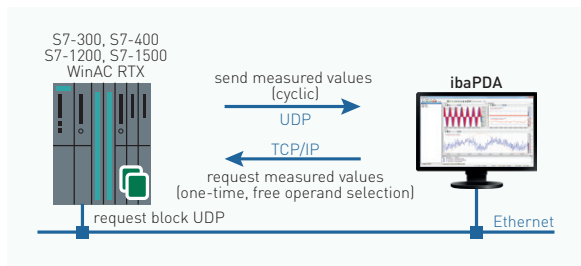
ibaPDA-Interface-S7-TCP/UDP

› Cyclical transmission of measured values
› Low additional load of the CPU
› TCP and UDP supported
› PLC program must be changed for selecting the variables to be measured
› Transmission performance and quality depend on the network

iba software	iba hardware
ibaPDA ibaPDA-Interface-S7-TCP/UDP	–

ibaPDA-Request-S7-UDP

› Cyclical transmission of measured values
› PLC code blocks need to be integrated once
› No PLC program changes needed for selecting the variables (free selection)
› Possible to change the variable selection during operation
› UDP supported (not TCP)
› Transmission performance and quality depend on the network

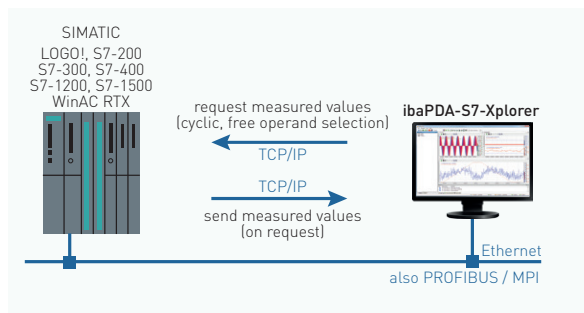| iba software	iba hardware
ibaPDA ibaPDA-Interface-S7-TCP/UDP ibaPDA-Request-S7-UDP	–

Acquire data via Xplorer interface

With the S7-Xplorer interface, measured variables can be requested in a polling procedure of ibaPDA and sent by the S7 controller. The Xplorer interface allows free access to the controller's internal data.
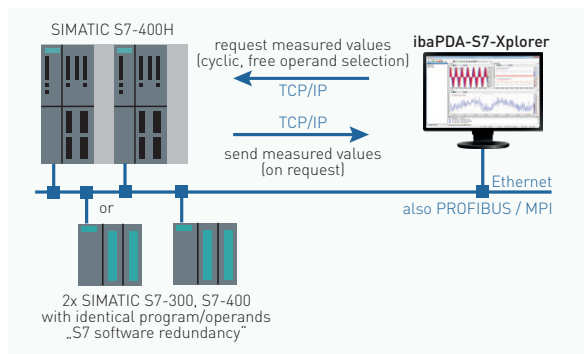
S7-Xplorer

> Simple configuration
> No PLC program changes needed for selecting the variables (free selection)
> Possible to change the variable selection during operation
> Access possible via TCP/IP, PROFIBUS and MPI
> Measured variables are requested individually (polling, not scan-cycle-precise)

iba software	iba hardware
ibaPDA + ibaPDA-Interface-S7-Xplorer or ibaPDA-PLC-Xplorer (max. 64 signals)	-

S7-Xplorer redundant
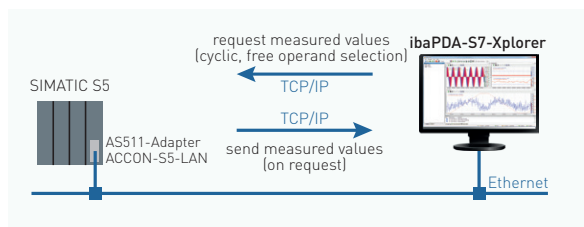

The above features and more:

> Data is always read from exactly one CPU
> CPU / connection switchover is done by ibaPDA based on CPU status and timeout monitoring
> No gapless switchover

iba software	iba hardware
ibaPDA + ibaPDA-Interface-S7-Xplorer or ibaPDA-PLC-Xplorer (max. 64 signals)	-

S7-Xplorer with SIMATIC S5

> Simple configuration
> No PLC program changes needed for selecting the variables (free selection)
> Possible to change the variable selection during operation
> Measured variables are requested individually (polling, not cyclic precise)
> Additional hardware (adapter) required
> AS511 adapter limited to 9600 baud

iba software	iba hardware
ibaPDA + ibaPDA-Interface-S7-Xplorer or ibaPDA-PLC-Xplorer (max. 64 signals)	Adapter ACCON-S5-LAN

Order information

Software

Order no.	Name	Description
30.770256	ibaPDA-V7-256[1]	Basic package for 256 signals, 2 clients, 2 data stores
30.681502	ibaPDA-V7-PLC-Xplorer	ibaPDA system for 64 signals, 2 clients, 2 data stores + S7-Xplorer (interface for SIMATIC S7) + AB-Xplorer (interface for Allen-Bradley) + B&R-Xplorer (interface for B&R systems) + Bachmann-Xplorer (interface for Bachmann M1 systems) + Codesys-Xplorer (interface for CODESYS-based systems) + Logix-Xplorer (interface for ControlLogix systems) + MELSEC-Xplorer (interface for Mitsubishi MELSEC systems) + Sigmatek-Xplorer (interface to SIGMATEK systems) + TwinCAT-Xplorer (interface to Beckhoff systems) (up to 16 connections per interface)
30.770009	Upgrade-PLC-Xplorer to PDA-V7-64	Upgrade to ibaPDA-V7 with 64 signals and PLC-Xplorer interfaces
31.001042	ibaPDA-Interface-PLC-Xplorer	License bundle of all current PLC-Xplorer interfaces (S7, AB, B&R, Codesys, Logix, MELSEC, Sigmatek, TwinCAT-Xplorer) for an ibaPDA system (up to 16 connections per interface)
31.000001	ibaPDA-Interface-S7-Xplorer	License extension for ibaPDA system for S7-Xplorer interface (up to 16 connections)
31.100001	one-step-up-Interface-S7-Xplorer	License extension for 16 more S7-Xplorer connections
31.001040	ibaPDA-Interface-S7-TCP/UDP	License extension for ibaPDA system for a TCP/IP & UDP/IP interface (64 connections)
31.101040	one-step-up-Interface-S7-TCP/UDP	License extension for existing ibaPDA-Interface-S7-TCP/UDP interface for 64 more S7-TCP/UDP connections (maximum 3)
31.001310	ibaPDA-Request-S7-DP/PN	License extension for ibaPDA system for the usage of Request-S7 with ibaBM-PN, ibaBM-DP, ibaBM-DPM-S or ibaCom-L2B
31.001311	ibaPDA-Request-S7-UDP	License extension for ibaPDA system for Request-functionality with ibaPDA-Interface-S7-TCP/UDP, number of connections: 2
31.101311	one-step-up-Request-S7-UDP	License extension for existing ibaPDA-Request-S7-UDP interface for 2 more Request-S7-UDP connections (maximum 127)
31.001360	ibaPDA-Request-FM458/TDC	License extension for ibaPDA system for the usage of Request-FM458/TDC via PROFIBUS

[1] Other licenses are available for ibaPDA for a larger number of signals, clients and data storages.

Hardware

Order no.	Name	Description
13.121001	ibaBM-DP	Bus monitor for PROFIBUS
13.321001	ibaBM-DP-Upgrade-with-8DPS	ibaBM-DP function extension, upgrade for 8 more active slaves
13.321021	ibaBM-DP-Upgrade Redundancy Mode	Redundancy mode function extension
13.120000	ibaBM-PN	Bus monitor for PROFINET
13.120001	ibaBM-PN-Upgrade-Redundancy-S2	Redundancy mode function extension
11.118030	ibaFOB-2i-Dexp	FO card, PCI Express, 2 inputs
11.118020	ibaFOB-io-Dexp	FO card, PCI Express, 1 input, 1 output
11.118010	ibaFOB-2io-Dexp	FO card, PCI Express, 2 inputs, 2 outputs
11.118000	ibaFOB-4i-Dexp	FO card, PCI Express, 4 inputs
11.116200	ibaFOB-4o-D rackline-slot	FO card, 4 outputs, short design for ibaRackline
11.117010	ibaFOB-io-USB	FO adapter with USB interface, 1 input, 1 output
19.000020	Connection Adaptor ACCON-S5-LAN	Adapter for S5 controllers via Ethernet with TCP/IP
19.000021	Connection Adaptor ACCON-NetLink-PRO compact	Adapter between PC and S7 controllers

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