Product overview

2

2.1 Properties

Article number

6ES7155-6AU01-0BN0 (IM 155-6 PN ST interface module and server module)

6ES7155-6AA01-0BN0 (IM 155-6 PN ST interface module with BusAdapter BA 2×RJ45 and server module)

View of the module

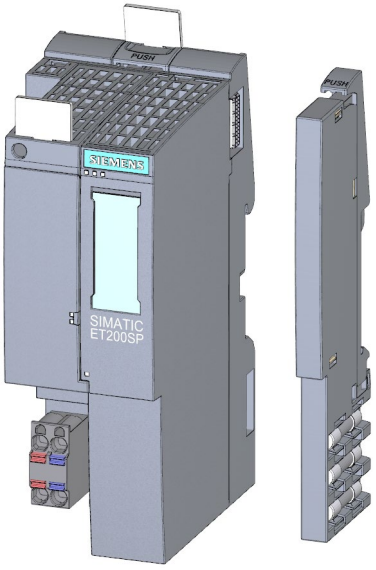


Figure 2-1 View of the IM 155-6 PN ST interface module and the server module

Properties

The module has the following technical properties:

- Connects the ET 200SP distributed I/O system with PROFINET IO
- Power supply 1 L+ 24 V DC (SELV/PELV). The connection plug is included in the scope of delivery of the interface module.
- PROFINET IO connection via selectable BusAdapter for RJ45 bus connector (BA 2×RJ45), for standard M12 connector or push-pull connector (BA 2xM12) or for direct connection of the bus cable (BA 2×FC)
- Use of fail-safe modules
- As of firmware version V 3.0, you can plug a light or a dark BaseUnit into slot 1.

The module supports the following functions (Page 12):

Maximum configuration

- 32 I/O modules
- 512 bytes I/O data
- 1 m backplane bus (without interface module)

Accessories

The following accessories can be ordered separately:

- BA 2xRJ45 BusAdapter
- BA 2xFC BusAdapter
- BusAdapter BA 2xM12
- 24 V DC connector
- Labeling strips
- Reference identification label

Note

The interface module is also available as a bundle with the BusAdapter BA 2xRJ45 (and the server module). The article number is 6ES7155-6AA01-0BN0.

A detailed list of the available accessories can be found in the system manual ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293).

Server module

The server module is included in the scope of delivery of the interface module and available separately as an accessory.

The server module has the following properties:

- Terminates the backplane bus of the ET 200SP distributed I/O system
- Features a support for 3 spare fuses (5 × 20 mm)
- Identification data I&M 0 to 3

Note

You need to configure and assign parameters to the server module in the configuration software.

To do this, place the server module in the last configuration slot and enable the parameter Group diagnostics: missing supply voltage L+. When there are 32 I/O modules, the server module is inserted in slot 33.

You can find more information in the Server module (http://support.automation.siemens.com/WW/view/en/63257531) manual.

First BaseUnit of an ET 200SP in the configuration (as of V3.0)

Note

First BaseUnit of an ET 200SP in the configuration

When an AC I/O module or AI Energy Meter ST is plugged, the first BaseUnit in an ET 200SP station may be a dark one. Please note the information on limiting the overvoltage and power rating in the AC I/O module manuals.

In order to route the 24 V DC supply voltage via a fuse, a light BaseUnit must be plugged into the slot of the first 24 V DC I/O module.

Pay attention to the type of the BaseUnits during the configuration.

As of firmware V3.x, the interface modules support plugging dark BaseUnits in slot 1. This means that modules without a connection to the integrated voltage buses P1 and P2 can now also be configured starting with slot 1. Currently, this applies to the following modules:

- DI 4x120..230VAC ST (6ES7131-6FD00-0BB1)
- DQ 4x24..230VAC/2A ST (6ES7132-6FD00-0BB1)

Requirement for configuration of these modules in slot 1:

- Configuration via GSD or GSDML
- Configuration as of STEP 7 V5.5 SP4 with
  - HSP0241 V2.0 for IM155-6 PN ST
- Configuration as of STEP 7 V13 SP1

2.2 Functions

Introduction

The interface module supports the following PROFINET IO functions:

- Integrated switch with 2 ports
- Supported Ethernet services: ping, arp, SNMP, LLDP
- Port diagnostics
- Disabling ports
- Isochronous real-time communication
- Minimum update time 1 ms
- Prioritized startup
- Media redundancy (MRP)
- Shared device
- Support of submodules on suitable I/O modules
- Module-internal Shared Input/Shared Output (MSI/MSO)
- Device replacement without PG and without topological configuration
- Reset to factory settings via PROFINET IO
- Firmware update via PROFINET IO
- Station extension via ET-Connection
- The BusAdapter provides the connection system for PROFINET IO. The following versions are available for the IM 155-6 PN ST interface module:
  - For standard RJ45 connector: BA 2×RJ45
  - For direct connection of the bus cable: BA 2×FC
  - For standard M12 connector or push-pull connector BA 2xM12

The interface module supports additional functions:

- Identification data I&M 0 to 3
- PROFIenergy
- Use of fail-safe modules
- Configuration control (option handling)
- Value status (quality information, QI) of I/O modules

Note
Docking system

Do **not** use the IM155-6 PN ST interface module as a docking station. The use as a docking unit (function: IO devices changing during operation) in a docking system is supported.

Requirements

The table below shows the software requirements for a configuration with the IM 155-6 PN ST interface module:

Table 2- 1 Version dependencies of other module functions

Function	Product version of the module as of	Firmware version of the module as of	Configuration software		
			Configuration with GSD file (http://support.automation.siemens.com/WW/view/en/19698639/130000)/software from a third-party manufacturer [1]	STEP 7 as of V5.5 SP3 with HSP241	STEP 7 (TIA Portal), as of V11 SP2
Real-time communication	1	V1.0.0	X	X	X
Isochronous real-time communication	1	V1.0.0	X	X	X
Prioritized startup	1	V1.0.0	X	X	X
Device replacement without programming device	1	V1.0.0	X	X	X
Media redundancy (MRP)	1	V1.0.0	X	X	X
Shared device	1	V1.0.0	X	X	X (as of V13 SP1)
PROFIenergy	1	V1.0.0	---	X	X
Use of fail-safe modules	1	V1.0.1	X	X	X (as of V13 SP1)
Module-internal Shared Input/Shared Output (MSI/MSO)	1	V3.1.0	X	X	X (as of V13 SP1)
Station extension via ET-Connection	5	V3.1.0	X	X	X (as of V13 SP1)
User data 512 bytes	1	V3.1.0	X	X	X (as of V13 SP1)
Distribution of module channels to multiple submodules	1	V3.3.0	X	X (as of V5.5 SP4, HSP0241 V3)	X (as of V13 SP1, Update 6)
Interface module; article number: 6ES7155-6AU01-0BN0	1	V4.1	X	X (as of V5.5 SP4 HSP241 V4)	X (as of V14 HSP205)
BusAdapter BA 2xMA12	1	V4.2	X	-	X (as of V16 Update 1)

[1] Systems of third-party manufacturers: Depending on the range of functions of the third-party system

Note

BusAdapter BA 2xMA12 and firmware 4.1

When using a BA 2xMA12 BusAdapter and firmware 4.1, note that an update to version V4.2 via another BusAdapter must first be performed to make the IM executable.

Cabling with fixed connection setting

If you set a fixed connection setting of the port in STEP 7, you must also disable "Autonegotiation/Autocrossover".

You can find more information on this topic in the STEP 7 online help and:

- As of STEP 7 V12 in the PROFINET with STEP 7 V13 (http://support.automation.siemens.com/WW/view/en/49948856) function manual
- As of STEP 7 V5.5 in the PROFINET System Description (http://support.automation.siemens.com/WW/view/en/19292127) system manual

Isochronous real-time communication

Synchronized transmission method for cyclic exchange of IRT data between PROFINET devices. A reserved bandwidth within the send clock is available for IRT data. The reserved bandwidth ensures that the IRT data is also transmitted in time-synchronized intervals, unaffected by other high network loading (e.g. TCP/IP communication or additional real time communication).

A topological configuration is required for IRT.

Note

IO controller as sync master with IRT communication

We recommend operating the IO controller also as a sync master when configuring the IRT communication.

Otherwise, IRT- and RT-configured IO devices may fail if the sync master fails.

You can find more information on the configuration of synchronized PROFINET devices in sync domains in the STEP 7 online help and:

- As of STEP 7 V12 in the PROFINET with STEP 7 V13 (http://support.automation.siemens.com/WW/view/en/49948856) function manual
- As of STEP 7 V5.5 in the PROFINET System Description (http://support.automation.siemens.com/WW/view/en/19292127) system manual

Prioritized startup

Prioritized startup is a PROFINET IO function in a PROFINET IO system with IRT and RT communication. It reduces the time needed for correspondingly configured IO devices to return to cyclic user data exchange.

This function accelerates the startup of IO devices in the following cases:

- After recovery of supply voltage
- After station recovery
- After activation of IO devices

Note

Dependency of the startup time

The interface module permits startup times from 0.9 s.

The startup time depends on the number and type of modules.

You can find more information on this topic in the STEP 7 online help and:

- As of STEP 7 V12, in the function manual PROFINET with STEP 7 V13 (http://support.automation.siemens.com/WW/view/en/49948856)
- As of STEP 7 V5.5 in the PROFINET System Description (http://support.automation.siemens.com/WW/view/en/19292127) system manual

Device replacement

Device replacement without topological configuration

The device name is also stored on the BusAdapter in addition to the interface module. A device name saved on the BusAdapter is the requirement for device replacement without topological configuration.

When the interface module is replaced, there is range of scenarios in which the device name is used.

Table 2- 2 Scenarios for using the device name

	Interface module empty	**Interface module with device name**
BusAdapter empty	No device name available	The device name from the interface module is used and copied to the BusAdapter.
BusAdapter with device name	The device name from the BusAdapter is used and copied to the interface module.	The device name from the BusAdapter is used and copied to the interface module if this has a different device name.

Be aware of the following constraints:

- Resetting to factory settings deletes the device name in both the interface module and the BusAdapter. To prevent the device name from being deleted in the BusAdapter, you can remove the BusAdapter from the interface module before resetting to factory settings.
- When a BusAdapter is replaced, a device name stored in the BusAdapter is applied to the interface module after a POWER ON.
- Do not pull/plug the BusAdapter while under voltage. If you pull/plug the BusAdapter while under voltage, the interface module restarts.

Device replacement with topological configuration

IO devices with this function can be replaced in a simple manner:

- The device name does not have to be assigned with the programming device.

The replacement IO device is assigned the device name by the IO controller and not by the programming device. The IO controller uses the configured topology and the neighboring relationships determined by the IO devices for this purpose. All involved devices must support the LLDP protocol (Link Layer Discovery Protocol). The configured target topology must match the actual topology.

If the IO devices were already used in another configuration, reset them to factory settings before reusing them. You can find information on this in the ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293) system manual.

You can find more information on this topic in the STEP 7 online help and:

- As of STEP 7 V12 in the PROFINET with STEP 7 V13 (http://support.automation.siemens.com/WW/view/en/49948856) function manual
- As of STEP 7 V5.5 in the PROFINET System Description (http://support.automation.siemens.com/WW/view/en/19292127) system manual

Replacement of an IM 155-6 PN ST

In a replacement scenario, you reset an IO device that is already in operation to the as-delivered state using "Reset to factory settings". You can find more information in the ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293) system manual.

Media redundancy (MRP)

Function for safeguarding communication and plant availability. A ring topology ensures that an alternative communication path is made available if a transmission route fails.

You can find more information on this topic in the STEP 7 online help and:

- As of STEP 7 V12, in the function manual PROFINET with STEP 7 V13 (http://support.automation.siemens.com/WW/view/en/49948856)
- As of STEP 7 V5.5 in the PROFINET System Description (http://support.automation.siemens.com/WW/view/en/19292127) system manual

Shared device

IO device which makes its data available to multiple IO controllers.

The interface module supports shared device at submodule level.

If **there is no validity check of the shared device projects by the Engineering System**, note the following:

- Make sure the configurations are consistent. Assign each module or submodule to only one IO controller. Multiple assignment causes errors because the module or submodule is only available in the first controller.
- If you reconfigure the shared device configurations without the validity check mentioned above, you must commission ET 200SP again. This means you must download the projects of all involved IO controllers to the respective CPU again after reconfiguration. If necessary, perform a POWER OFF/POWER ON of the interface module.

You can find more information on this topic in the STEP 7 online help and:

- As of STEP 7 V12, in the function manual PROFINET with STEP 7 V13 (http://support.automation.siemens.com/WW/view/en/49948856)
- As of STEP 7 V5.5 in the PROFINET System Description (http://support.automation.siemens.com/WW/view/en/19292127) system manual

Note

In the case of a shared device application, make sure that all controllers work with the same send clock. If the controller does not have the same send clock, this results in communication relationships not being set up.

If you set up all controllers in one project, the same send clock is ensured. Set the same send clock for engineering in separate projects.

Submodules

The IM 155-6 PN ST interface module supports the division of I/O modules into up to 4 submodules. This allows parts of an I/O module to be separately configured and parameterized.

You can assign each of these submodules to different IO controllers.

The following functions are only executed if you have configured submodule 1 during configuration:

- Firmware update
- Write I&M data
- Calibration
- PROFIenergy

Module-internal Shared Input/Shared Output (MSI/MSO)

The Module-internal Shared Input function allows an input module to make its input data available to up to two IO controllers (for ET 200SP PN ST). Each controller has read access to the same channels.

The Module-internal Shared Output function allows an output module to make its output data available to up to two IO controllers. One IO controller has write access. A second IO controller can have read access to the same channels.

You can find more information on this topic in the STEP 7 online help and:

● As of STEP 7 V12 in the PROFINET with STEP 7 V13 (http://support.automation.siemens.com/WW/view/en/49948856) function manual

Value status

The IM 155-6 PN ST interface module supports I/O modules with value status.

Additional information on the value status can be found in the manuals for the I/O modules.

GSD file

An additional GSD file based on the schema version V2.25 is available for the previous PROFINET GSD files. This is only to be used when the engineering tool used does not support GSD files of the current schema version.

These limitations must be taken into account when using the GSD file with the schema version V2.25 compared to the GSD file of the current schema version:

- Only IM 155-6 PN ST with the firmware version V4.2 can be configured with GSD V2.25. Only the IM 155-6 PN ST with firmware V4.2 and compatible successors can be used.
- Functionally, there are the following differences:
  - No support for S2 system redundancy
  - No support of fail-safe modules
  - No assignment of hardware interrupts to organization blocks (OB)
  - IRT including PerformanceUpgrade is not supported
  - PROFIenergy is not supported on module level (can only still be used on IM)
  - No support for MRPD, MRT
  - No hierarchical display in the parameter masks
  - No configuration check with automatic device naming with topological configuration
  - StartupMode: No AdvancedStartup, only the Legacy Mode is supported.

2.2.1 PROFIenergy

Properties

PROFIenergy (for PROFINET) reduces the energy consumption by using PROFIenergy commands during production-free periods.

Reference

You can find more information on PROFIenergy in the:

- Product manual I/O modules (http://support.automation.siemens.com/WW/view/en/55679691/133300)
- PROFINET with STEP 7 V13 (http://support.automation.siemens.com/WW/view/en/49948856) function manual.
- System manual PROFINET system description (http://support.automation.siemens.com/WW/view/en/19292127)
- PROFIenergy (http://support.automation.siemens.com/WW/view/en/66928686) product information.
- Internet (http://www.profibus.com) under Common Application Profile PROFIenergy; Technical Specification for PROFINET; Version 1.0; January 2010; Order No: 3.802.

2.2.2 Use of fail-safe modules

Properties

The IM 155-6 PN ST interface module as of firmware V1.0.1 supports the use of fail-safe modules.

Reference

You can find more information in the ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293) system manual.

2.2.3 Use of technology modules

Technology modules

As of firmware version V3.1, the interface module IM 155-6 PN ST supports the "Position input for Motion Control" mode of the technology modules TM Count 1x24V (6ES7138-6AA00-0BA0) and TM PosInput 1 (6ES7138-6BA00-0BA0).

2.2.4 Configuration control (option handling)

Properties

Configuration control allows you to prepare your distributed I/O system for future extensions or changes. Configuration control means that you can configure the planned maximum configuration of your distributed I/O system in advance and vary it later in a flexible manner by means of the user program.

Reference

You can find more information on configuration control

- in the ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293) system manual
- on the Internet under the following link: Application collection (http://support.automation.siemens.com/WW/view/en/29430270)
- in the STEP 7 online help.

Technical specifications

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Technical specifications of the IM 155-6 PN ST

Article number	6ES7155-6AU01-0BN0
General information	
Product type designation	IM 155-6 PN ST
HW functional status	From FS03
Product function	
• I&M data	Yes; I&M0 to I&M3
• Module swapping during operation (hot swapping)	Yes; Single hot swapping
• Isochronous mode	No
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	V14
• STEP 7 configurable/integrated from version	V5.5 SP4 and higher
• PROFINET from GSD version/GSD revision	V2.3 / -
Configuration control	
via dataset	Yes
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Short-circuit protection	Yes
Mains buffering	
• Mains/voltage failure stored energy time	10 ms
Input current	
Current consumption (rated value)	450 mA
Current consumption, max.	550 mA
Inrush current, max.	3.7 A
I^2t	0.09 $A^2 \cdot s$
Power	
Infeed power to the backplane bus	4.5 W
Power loss	
Power loss, typ.	1.9 W
Address area	
Address space per module	

Article number	6ES7155-6AU01-0BN0
• Address space per module, max.	256 byte; per input / output
Address space per station	
• Address space per station, max.	512 byte; Dependent on configuration
Hardware configuration	
Rack	
• Quantity of operable ET 200SP modules, max.	32
• Quantity of operable ET 200AL modules, max.	16
Submodules	
• Number of submodules per station, max.	256
Interfaces	
Number of PROFINET interfaces	1; 2 ports (switch)
1. Interface	
Interface types	
• Number of ports	2
• integrated switch	Yes
• BusAdapter (PROFINET)	Yes; compatible BusAdapters: BA 2x RJ45, BA 2x FC, BA 2x M12
Protocols	
• PROFINET IO Device	Yes
• Open IE communication	Yes
• Media redundancy	Yes; PROFINET MRP
Interface types	
RJ 45 (Ethernet)	
• Transmission procedure	PROFINET with 100 Mbit/s full duplex (100BASE-TX)
• 10 Mbps	Yes; for Ethernet services
• 100 Mbps	Yes; PROFINET with 100 Mbit/s full duplex (100BASE-TX)
• Autonegotiation	Yes
• Autocrossing	Yes
Protocols	
PROFINET IO Device	
Services	
– IRT	Yes; with send cycles of between 250 µs and 4 ms in increments of 125 µs
– PROFIenergy	Yes
– Prioritized startup	Yes
– Shared device	Yes
– Number of IO Controllers with shared device, max.	2

Article number	6ES7155-6AU01-0BN0
Redundancy mode	
• PROFINET system redundancy (S2)	No
Media redundancy	
– MRP	Yes
– MRPD	No
Open IE communication	
• TCP/IP	Yes
• SNMP	Yes
• LLDP	Yes
Interrupts/diagnostics/status information	
Status indicator	Yes
Alarms	Yes
Diagnostics function	Yes
Diagnostics indication LED	
• RUN LED	Yes; green LED
• ERROR LED	Yes; red LED
• MAINT LED	Yes; Yellow LED
• Monitoring of the supply voltage (PWR-LED)	Yes; green PWR LED
• Connection display LINK TX/RX	Yes; 2x green link LEDs on BusAdapter
Potential separation	
between backplane bus and electronics	No
between PROFINET and all other circuits	Yes; 1 500 V AC
between supply and all other circuits	No
Permissible potential difference	
between different circuits	Safety extra low voltage SELV
Isolation	
Isolation tested with	707 V DC (type test)
Standards, approvals, certificates	
Network loading class	2
Security level	According to Security Level 1 Test Cases V1.1.1
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	0 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	0 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m
Connection method	
ET-Connection	
• via BU/BA Send	Yes; + 16 ET 200AL modules

Article number	**6ES7155-6AU01-0BN0**
Dimensions	
Width	50 mm
Height	117 mm
Depth	74 mm
Weights	
Weight, approx.	147 g; without BusAdapter

Dimension drawing

A

This appendix contains a dimension drawing of the module installed on a mounting rail. Always observe the specified dimensions for installation in cabinets, control rooms, etc.



Figure A-1 Dimension drawing of the IM 155-6 PN ST interface module (front and side view)