

SIEMENS



Manual

SIMATIC

ET 200SP/ET 200AL

Mixed configuration

Edition

11/2020

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SIMATIC

ET 200SP/ET 200AL Mixed configuration




Equipment Manual

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Legal information

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This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

 DANGER
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 WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
 CAUTION
indicates that minor personal injury can result if proper precautions are not taken.
NOTICE
indicates that property damage can result if proper precautions are not taken.


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Preface

Purpose of the documentation

This manual supplements the system manuals ET 200SP distributed I/O system and ET 200AL distributed I/O system.

Functions that generally relate to the system are described in these system manuals.

The information provided in this manual and in the system/function manuals supports you in commissioning the system.

Conventions

CPU: When the term "CPU" is used in the following, it applies to the CPUs of the S7-1500 automation system as well as to the CPUs/interface modules of the ET 200SP and ET 200AL distributed I/O systems.

STEP 7: In this documentation, "STEP 7" is used as a synonym for all versions of the configuration and programming software "STEP 7 (TIA Portal)".

Also observe notes marked as follows:

Note

A note contains important information on the product described in the documentation, on the handling of the product and on the section of the documentation to which particular attention should be paid.

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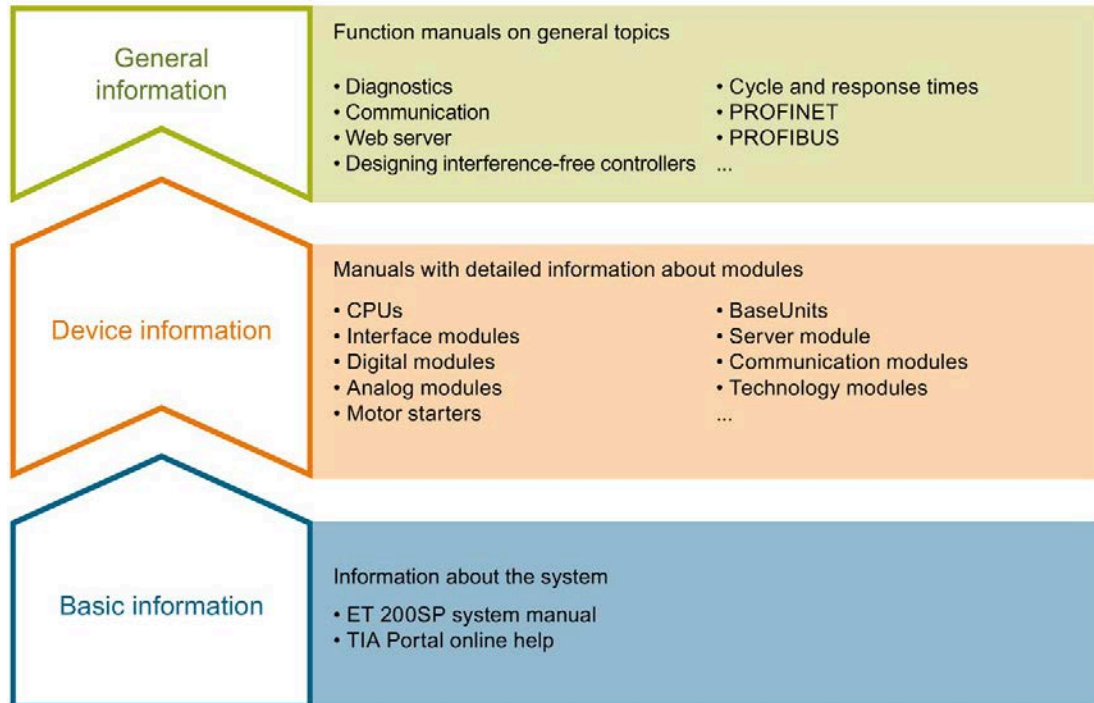
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To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed visit (<https://www.siemens.com/industrialsecurity>).

Documentation guide

The documentation for the SIMATIC ET 200SP distributed I/O system is arranged into three areas.

This arrangement enables you to access the specific content you require.



Basic information

The System Manual and Getting Started describe in detail the configuration, installation, wiring and commissioning of the SIMATIC ET 200SP distributed I/O system. The STEP 7 online help supports you in the configuration and programming.

Device information

Product manuals contain a compact description of the module-specific information, such as properties, wiring diagrams, characteristics and technical specifications.

General information

The function manuals contain detailed descriptions on general topics regarding the SIMATIC ET 200SP distributed I/O system, e.g. diagnostics, communication, Web server, motion control and OPC UA.

You can download the documentation free of charge from the Internet (<http://w3.siemens.com/mcms/industrial-automation-systems-simatic/en/manual-overview/tech-doc-et200/Pages/Default.aspx>).

Changes and supplements to the manuals are documented in a Product Information.

You can download the product information free of charge from the Internet (<https://support.industry.siemens.com/cs/us/en/view/73021864>).

Manual Collection ET 200SP

The Manual Collection contains the complete documentation on the SIMATIC ET 200SP distributed I/O system gathered together in one file.

You can find the Manual Collection on the Internet (<http://support.automation.siemens.com/WW/view/en/84133942>).

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In "mySupport", you can save filters, favorites and tags, request CAx data and compile your personal library in the Documentation area. In addition, your data is already filled out in support requests and you can get an overview of your current requests at any time.

You must register once to use the full functionality of "mySupport".

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"mySupport" - CAx data

In the CAx data area of "mySupport", you can access the latest product data for your CAx or CAe system.

You configure your own download package with a few clicks.

In doing so you can select:

- Product images, 2D dimension drawings, 3D models, internal circuit diagrams, EPLAN macro files
- Manuals, characteristics, operating manuals, certificates
- Product master data

You can find "mySupport" - CAx data on the Internet (<http://support.industry.siemens.com/my/ww/en/CAxOnline>).

Application examples

The application examples support you with various tools and examples for solving your automation tasks. Solutions are shown in interplay with multiple components in the system - separated from the focus on individual products.

You will find the application examples on the Internet (<https://support.industry.siemens.com/sc/ww/en/sc/2054>).

TIA Selection Tool

With the TIA Selection Tool, you can select, configure and order devices for Totally Integrated Automation (TIA).

This tool is the successor of the SIMATIC Selection Tool and combines the known configurators for automation technology into one tool.

With the TIA Selection Tool, you can generate a complete order list from your product selection or product configuration.

You can find the TIA Selection Tool on the Internet (<http://w3.siemens.com/mcmts/topics/en/simatic/tia-selection-tool>).

SIMATIC Automation Tool

You can use the SIMATIC Automation Tool to perform commissioning and maintenance activities simultaneously on various SIMATIC S7 stations as a bulk operation independent of TIA Portal.

The SIMATIC Automation Tool provides a multitude of functions:

- Scanning of a PROFINET/Ethernet system network and identification of all connected CPUs
- Address assignment (IP, subnet, gateway) and station name (PROFINET device) to a CPU
- Transfer of the date and the programming device/PC time converted to UTC time to the module
- Program download to CPU
- RUN/STOP mode switchover
- CPU localization by means of LED flashing
- Reading out of CPU error information
- Reading of the CPU diagnostics buffer
- Reset to factory settings
- Firmware update of the CPU and connected modules

You can find the SIMATIC Automation Tool on the Internet.

PRONETA

SIEMENS PRONETA (PROFINET network analysis) allows you to analyze the plant network during commissioning. PRONETA features two core functions:

- The topology overview automatically scans the PROFINET and all connected components.
- The IO check is a fast test of the wiring and the module configuration of a plant.

You can find SIEMENS PRONETA on the Internet.

SINETPLAN

SINETPLAN, the Siemens Network Planner, supports you in planning automation systems and networks based on PROFINET. The tool facilitates professional and predictive dimensioning of your PROFINET installation as early as in the planning stage. In addition, SINETPLAN supports you during network optimization and helps you to exploit network resources optimally and to plan reserves. This helps to prevent problems in commissioning or failures during productive operation even in advance of a planned operation. This increases the availability of the production plant and helps improve operational safety.

The advantages at a glance

- Network optimization thanks to port-specific calculation of the network load
- Increased production availability thanks to online scan and verification of existing systems
- Transparency before commissioning through importing and simulation of existing STEP 7 projects
- Efficiency through securing existing investments in the long term and the optimal use of resources

You can find SINETPLAN on the Internet.

See also

My Documentation Manager
(<http://support.industry.siemens.com/My/ww/en/documentation>)

Product overview

3.1 BaseUnit BU-Send

3.1.1 Product overview

Article number

6ES7193-6BN00-0NE0

View

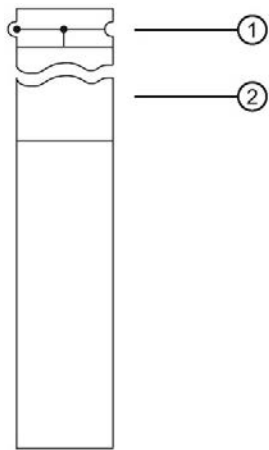


Figure 3-1 BaseUnit BU-Send

Properties

BaseUnit suitable for BusAdapter BA-Send 1xFC

Schematic circuit diagram



- ① Backplane bus
- ② BA-Send 1xFC expansion module

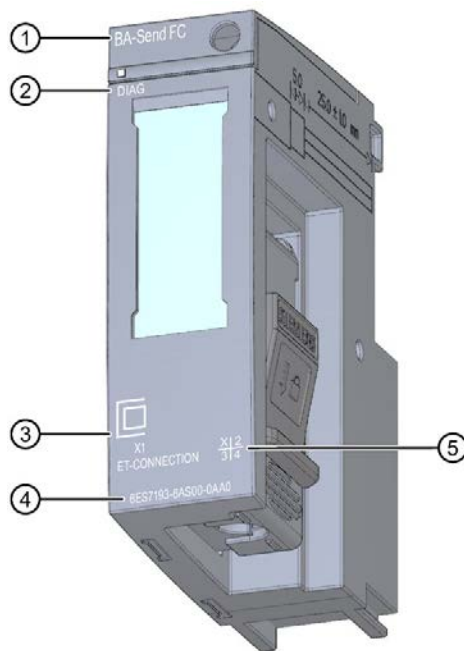
3.2 BusAdapter BA-Send 1xFC

3.2.1 Properties

Article number

6ES7193-6AS00-0AA0

View of the module



- ① Module type and name
- ② LED for diagnostics
- ③ Connection for ET-Connection
- ④ Article number
- ⑤ Functional version

Figure 3-2 View of the BusAdapter BA-Send 1xFC

Properties

The module has the following technical properties:

- BusAdapter for the direct connection of ET-Connection
- Connects the interface module via ET-Connection with the ET 200AL I/O modules
- Supports all ET 200AL I/O modules

The module supports the following functions:

- Identification data I&M 0 to 3. See system manual ET 200SP Distributed I/O System (<https://support.industry.siemens.com/cs/ww/en/view/58649293>).

Maximum configuration

- 16 ET 200AL I/O modules
- 15 m bus cable between BusAdapter BA Send and the first ET 200AL I/O module and between two ET 200AL I/O modules.
- Supported functions:

Function	Mixed configuration		
	ET 200SP		ET 200AL I/O modules on ET-Connection
	IM	CPU	
Isochronous mode	⑥	--	--
Configuration control	⑥	⑥	⑥
Shared device	⑥	⑥	⑥
PROFenergy	⑥	--	⑥
System redundancy S2	● ¹	--	● ¹

¹⁾ With IM 155-6 PN/3 HF and IM 155-6 PN/2 HF V4.2 or higher

Accessories

The following components must be ordered separately:

- Labeling strips
- Reference identification label
- Stripping tool for ET-Connection
- Bus cables for ET-Connection

See also

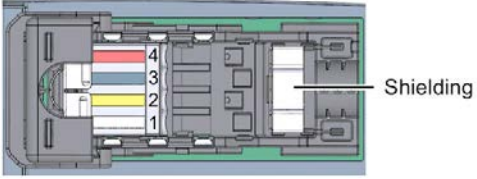
You will find additional information on accessories and the other components in the system manuals ET 200AL Distributed I/O System (<http://support.automation.siemens.com/WW/view/en/89254965>) and the Accessories/Spare parts section of the ET 200SP Distributed I/O System (<https://support.industry.siemens.com/cs/ww/en/view/58649293>) system manual.

3.2.2 Wiring and schematic circuit diagram

ET-Connection with BusAdapter BA-Send 1xFC

The following table shows the signal names and the designations for the pin assignment of the BusAdapter BA-Send 1xFC.

Table 3- 1 ET-Connection pin assignment with BusAdapter BA-Send 1xFC

View	Signal name	Description	
 <p>PROFINET IO with BusAdapter BA1xFC</p>	1	TD	Transmit data +
	2	RD	Receive data +
	3	TD_N	Transmit data –
	4	RD_N	Receive data -

Schematic circuit diagram

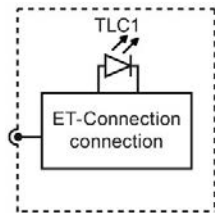


Figure 3-3 Circuit diagram BA-Send 1xFC

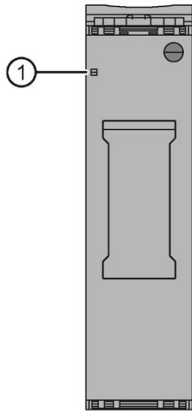
Additional information

You can find additional information on connecting the interface module and accessories in the *ET 200SP Distributed I/O System* system manual.

3.2.3 Diagnostics by means of LED display

LED display

The figure below shows the LED display (status and fault display) of the BusAdapter BA-Send 1xFC.



① DIAG (green/red)

Figure 3-4 LED display

Meaning of the LED display

The table below explains the meaning of the status and fault display.

DIAG LED

Table 3- 2 Status and fault display DIAG

DIAG LED	Meaning	Remedy
□ Off	There is no connection between the ET-Connection interface of the BusAdapter BA-Send 1xFC and the ET 200AL.	Check whether the bus cable is interrupted.
	The CPU/interface module does not support the BA-Send 1xFC.	Run a firmware update.
■ On	There is a connection between the ET-Connection interface of the BusAdapter BA-Send 1xFC and the ET 200AL.	---
☀ Flashes	There is (at least) one diagnostics alarm of an ET-Connection device. Group error for all ET-Connection bus nodes.	Check the ET-Connection device.
	Set configuration does not match the actual configuration on the ET-Connection.	Check the configuration of the ET-Connection to see whether a module is missing or defective, or whether a non-configured module is wired.

Application planning

Mixed configuration ET 200SP and ET 200AL with ET-Connection

You have the option of integrating the I/O modules of the ET 200AL distributed I/O system (IP65/IP67) in a configuration of the ET 200SP distributed I/O system (IP20).

The figure below shows a combination of the modules of the ET 200AL and ET 200SP distributed I/O system.

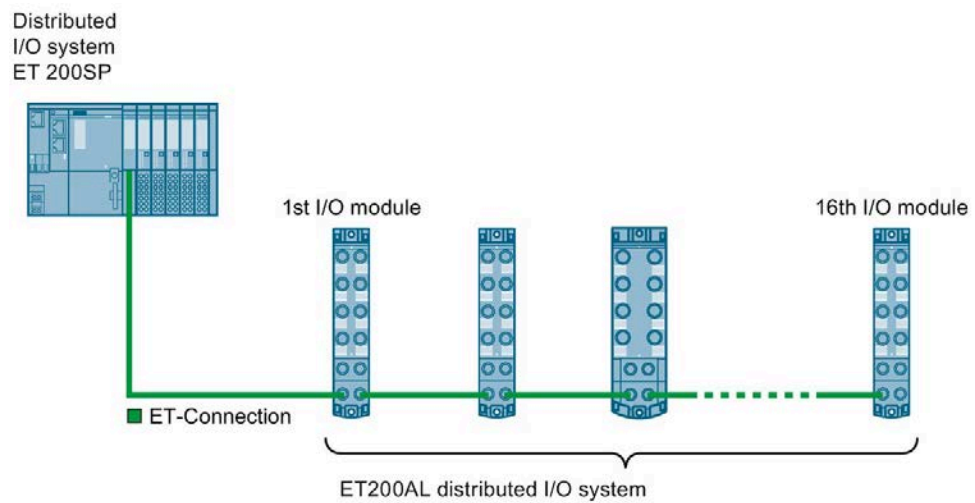


Figure 4-1 Mixed configuration ET 200SP and ET 200AL with ET-Connection

Requirement

The following components support mixed configuration:

- Interface module
 - IM 155-6 PN HF (V3.0 or higher)
 - IM 155-6 PN/2 HF
 - IM 155-6 PN/3 HF
 - IM 155-6 PN ST (V3.1 or higher)
 - IM 155-6 DP HF (V3.0 or higher)
 - IM 155-6 MF HF
- CPU
 - CPU 1510SP-1 PN (V2.0 or higher)
 - CPU 1510SP F-1 PN (V2.0 or higher)
 - CPU 1512SP-1 PN (V2.0 or higher)
 - CPU 1512SP F-1 PN (V2.0 or higher)
 - CPU 1515SP PC
 - CPU 1515SP PC F
 - CPU 1515SP PC T
 - CPU 1515SP PC2
 - CPU 1515SP PC2 F
 - CPU 1515SP PC2 T
 - CPU 1515SP PC2 TF
- BaseUnit BU-Send with BusAdapter BA-Send 1xFC
- ET-Connection cable
- Power cable

Rules

You must observe the following rules when assembling a mixed configuration:

- The bus length of the ET 200SP distributed I/O system must not exceed 1 m (without interface module, including BU-Send/BA-Send 1xFC and server module)
- A maximum of 16 ET 200AL I/O modules can be connected to ET-Connection
- The maximum length of the bus cable for ET-Connection between BA-Send and the first module or between two modules is 15 m

The following table shows which firmware versions of your IM or CPU support which maximum bus cable length.

IM/CPU	Up to 10 m	Up to 15 m
IM 155-6 PN HF	V3.0 or higher	V3.3 or higher
IM 155-6 PN ST	V3.1 or higher	V3.3 or higher
IM 155-6 DP HF	V3.0 or higher	--
CPU 1510SP-1 PN	V2.0 or higher	
CPU 1510SP F-1 PN		
CPU 1512SP-1 PN		
CPU 1512SP F-1 PN		

Procedure

To assemble a multi-tier configuration, follow these steps:

1. Switch off the supply voltage for the ET 200SP distributed I/O system.
2. Install the BaseUnit BU-Send to the immediate right of the ET 200SP CPU/interface module. When the BaseUnit BU-Send is used next to the ET 200SP CPU, a CM DP and an Ethernet CP or a maximum of two Ethernet CPs can be inserted between the CPU and BU-Send.
3. Then mount the additional BaseUnits / I/O modules for the ET 200SP distributed I/O system and the server module.
4. Connect the bus cable for ET-Connection to the BusAdapter BA-Send 1xFC and install it on the BaseUnit BU-Send.
5. Fasten the BusAdapter BA-Send 1xFC with the BaseUnit BU-Send (1 screw with tightening torque of 0.2 Nm). To do this, use a screwdriver with a 3 to 3.5 mm blade.
6. Connect the other end of the bus cable for ET-Connection (with M8 connector) to the first ET 200AL I/O module (X30 socket ET-Connection IN).
7. Connect the supply voltage (24 V DC) to the ET 200AL I/O modules (X80 connector).

Note

Firmware update of an ET 200AL I/O module

When you run a firmware update of an ET 200AL I/O module, ET-Connection is briefly interrupted by the restart of the module. All downstream ET 200AL I/O modules report a pull/plug interrupt.

Note

Insertion of theBusAdapter BA-Send 1xFC during operation leads to a restart of the interface module.

Mounting

Introduction

For the connection of the ET 200AL I/O module via ET-Connection to the ET 200SP, you require the BaseUnit BU-Send with the BusAdapter BA-Send 1xFC.

Requirement

- The mounting rail is mounted.
- The interface module is mounted.

Required tools

3 to 3.5 mm screwdriver (only for dismantling the BusAdapter)

Mounting BaseUnit BU-Send

To mount the BaseUnit BU-Send, follow these steps:

1. Mount the BaseUnit BU-Send to the right of the CPU/interface module.
2. Swivel the BaseUnit back until you hear the mounting rail release latch into place.
3. Move the BaseUnit to the left until you hear it latch into place on the CPU/interface module.

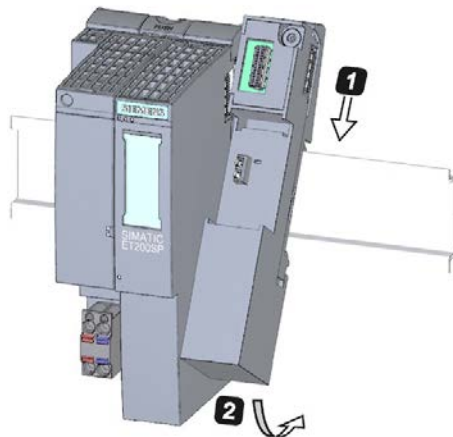


Figure 5-1 Mounting BU-Send

4. Mount the BusAdapter BA-Send 1xFC only after you have connected the bus cable for ET-Connection (see section Connecting).

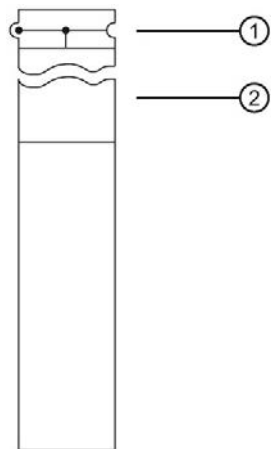
Connecting

6.1 Connecting BaseUnit BU-Send

Pin assignment

The BaseUnit BU-Send only has one slot for an expansion module. No other connections are available.

Schematic circuit diagram

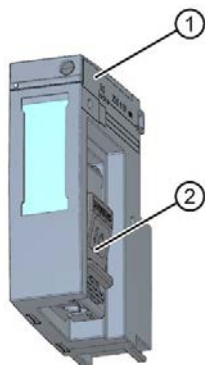


- ① Backplane bus
- ② BA-Send 1xFC expansion module

Figure 6-1 Schematic circuit diagram BU-Send

Introduction

You connect the ET 200AL I/O modules via the BusAdapter BA-Send 1xFC via ET-Connection.



- ① BusAdapter BA-Send 1xFC
- ② Connection element for ET-Connection bus cable

Figure 6-2 BusAdapter BA-Send 1xFC

Required tools

Screwdriver with 3 to 3.5 mm blade

Required accessories

Use the bus cable for ET-Connection as connecting cable between the BusAdapter BA-Send 1xFC and the ET 200AL I/O modules.

We recommend using the Stripping Tool for ET-Connection (6ES7194-2KA00-0AA0) with blade cassette green (6GK1901-1B...). This guarantees fast and safe stripping.

The bus cable is available in the following versions:

Bus cable for ET-Connection M8, prefabricated on one side with 1x M8 connector, 4-pole, shielded

- Length 2 m: 6ES7194-2LH20-0ACO
- Length 5 m: 6ES7194-2LH50-0ACO
- Length 10 m: 6ES7194-2LN10-0ACO
- Length 15 m: 6ES7194-2LN15-0ACO

Bus cable for ET-Connection M8, PUR cable, prefabricated on one side with 1x M8 connector, 4-pole, shielded

- Length 2 m: 6ES7194-2MH20-0ACO
- Length 5 m: 6ES7194-2MH50-0ACO
- Length 10 m: 6ES7194-2MN10-0ACO
- Length 15 m: 6ES7194-2MN15-0ACO

Procedure

To connect the BusAdapter BA-Send 1xFC , follow these steps:

1. Strip the sheath of the bus cable at the open end as follows:

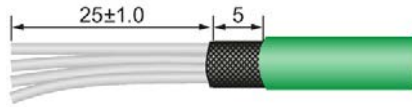
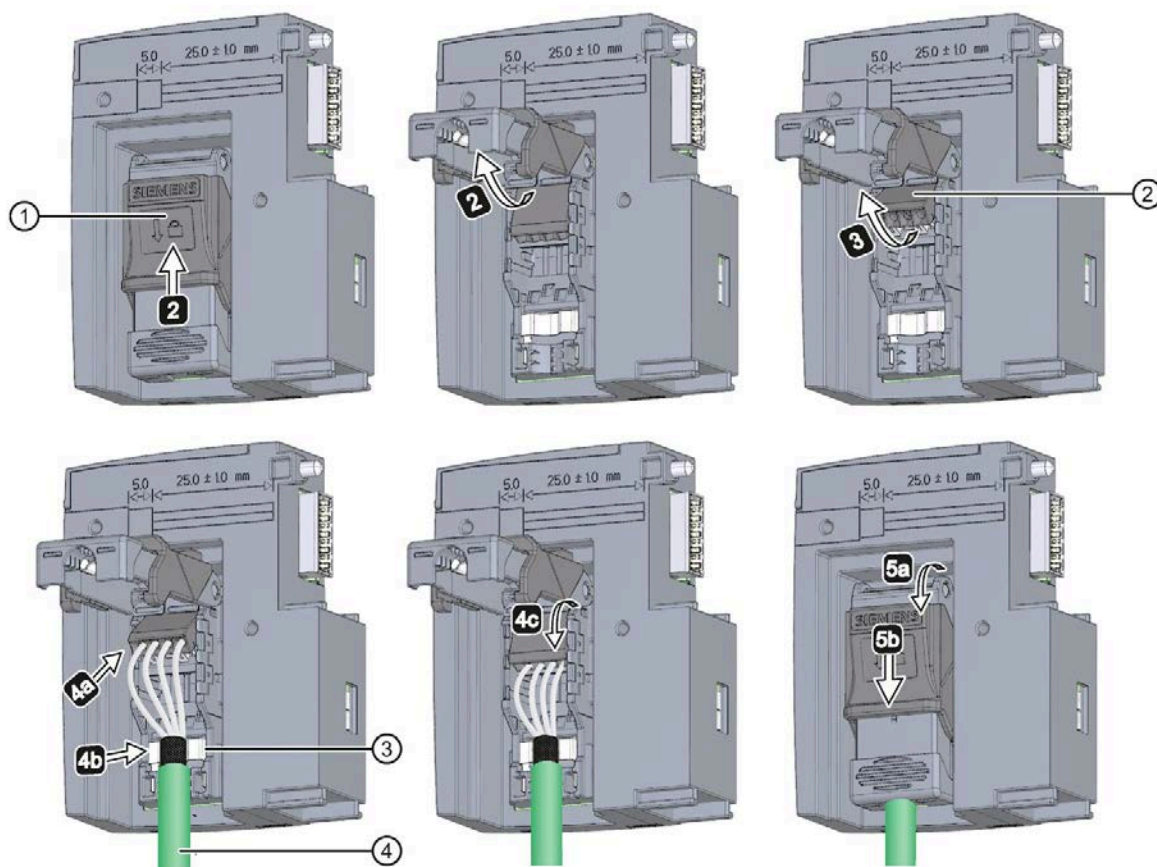


Figure 6-3 Connecting cable

Use the Stripping Tool for ET-Connection to do this. The relevant settings are shown on the tool.

2. Pull back the locking slide of the BusAdapter BA-Send 1xFC and open the cover of the connection element.
3. Lift the cable routing up as far as it will go.
4. Insert the unstripped single cores of the bus cable (according to the imprinted color coding) into the cable routing as far as they will go and press the cable routing down as far as it will go.
5. Close the cover of the connection element and push the locking slide forward.

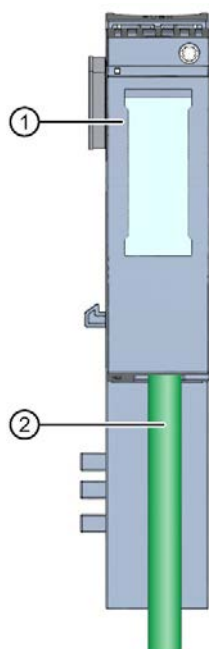
6. Insert and fasten the BusAdapter BA-Send 1xFC with the BaseUnit BU-Send (1 screw with tightening torque of 0.2 Nm). To do this, use a screwdriver with a 3 to 3.5 mm blade.
7. Connect the M8 connector of the bus cable to the first ET 200AL I/O module (socket X30 ET-Connection IN). For more information about wiring the ET 200AL I/O modules, refer to the system manual of the ET 200AL distributed I/O system.



- | | | | |
|---|---------------|---|-----------------------------|
| ① | Locking slide | ③ | Shield contact |
| ② | Cable routing | ④ | Bus cable for ET-Connection |

Figure 6-4 Connection of the BusAdapter BA-Send 1xFC

BusAdapter BA-Send 1xFC mounted



- ① BusAdapter BA-Send 1xFC
- ② Bus cable for ET-Connection

Figure 6-5 BusAdapter BA-Send 1xFC mounted

Configuring

Introduction

The mixed configuration allows the connection of up to 16 ET 200AL I/O modules to the ET 200SP via ET-Connection. The figure below shows the configuration of the ET-Connection and the assignment of the slots.

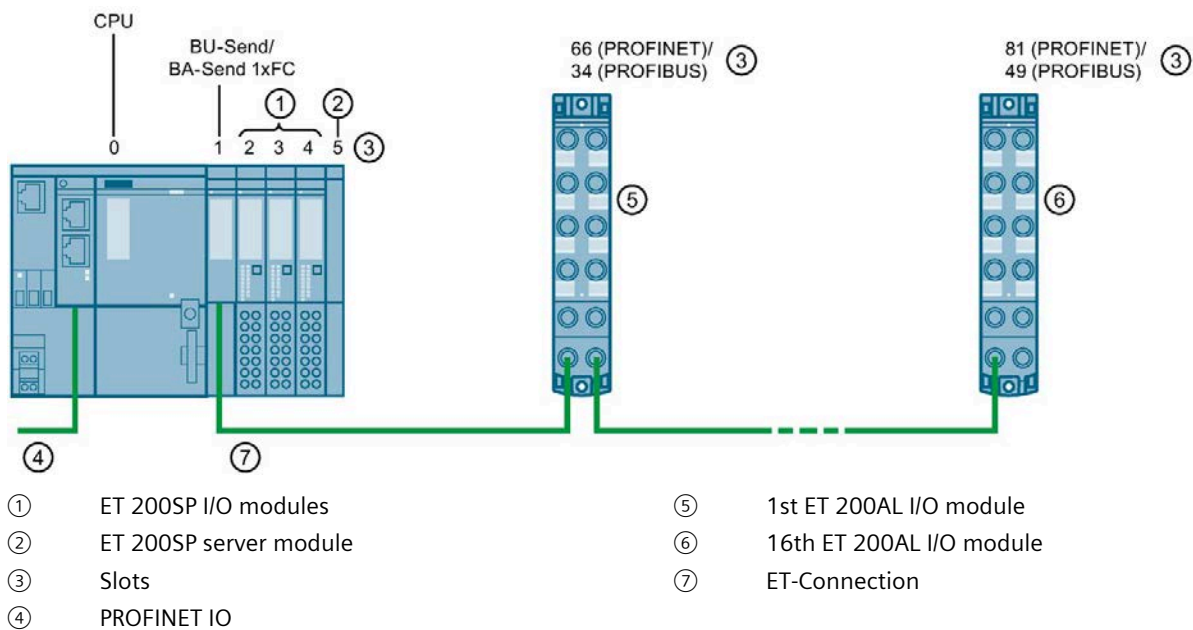


Figure 7-1 Mixed configuration

For more information about connecting ET-Connection, supply voltages, actuators and sensors, refer to the ET 200AL system manual.

Configuration with a CPU

In a configuration with a CPU, a maximum of 2 slots can be used immediately to the right of the CPU with CM DP module or Ethernet CP. Combinations are also possible, i.e. CM DP module and one Ethernet CP or two Ethernet CPs.

BU-Send and BA-Send should always be inserted to the immediate right of the CM/CP.

Rules

Observe the following rules when configuring:

- With mixed configurations, the following maximum configuration is possible:
 - 31 slots for ET 200SP modules (IM 155-6 DP HF and IM 155-6 PN ST)
 - 63 slots for ET 200SP modules (IM 155-6 PN HF and CPUs)
 - 16 slots for ET 200AL I/O modules
 - 1 slot for BU-Send/BA-Send 1xFC
 - 1 slot for server module.
- The mixed configuration may contain a maximum of 31 (IM 155-6 DP HF and IM 155-6 PN ST)/63 (IM 155-6 PN HF and CPUs) ET 200SP I/O modules.
- The server module can also be mounted right next to the BU-Send/BA-Send 1xFC.
- Supported functions:

Function	Mixed configuration		
	ET 200SP		ET 200AL I/O modules on ET-Connection
	IM	CPU	
Isochronous mode	●	--	--
Configuration control	●	●	●
Shared device	●	●	●
PROFenergy	●	--	●
System redundancy S2	● ¹	--	● ¹

¹⁾ With IM 155-6 PN/3 HF and IM 155-6 PN/2 HF V4.2 or higher

Configuring

Observe the following points when configuring:

- BU-Send/BA-Send 1xFC and server module must be configured. There are no parameters for BU-Send/BA-Send 1xFC.
- Arrangement of the modules in the configuration:
 - Configure the BU-Send/BA-Send 1xFC modules downstream from the interface module in slot 1. Position the ET 200SP modules behind it.
 - Configure the ET 200AL I/O modules from slot 66 (PROFINET)/67 (CPU)/34 (PROFIBUS).
- The layout of the modules represents a preset configuration and is independent of the configuration control.
- The system redundancy S2 function is not available in a mixed configuration.

Configuration example

An example of a mixed configuration is shown below:

Hardware configuration

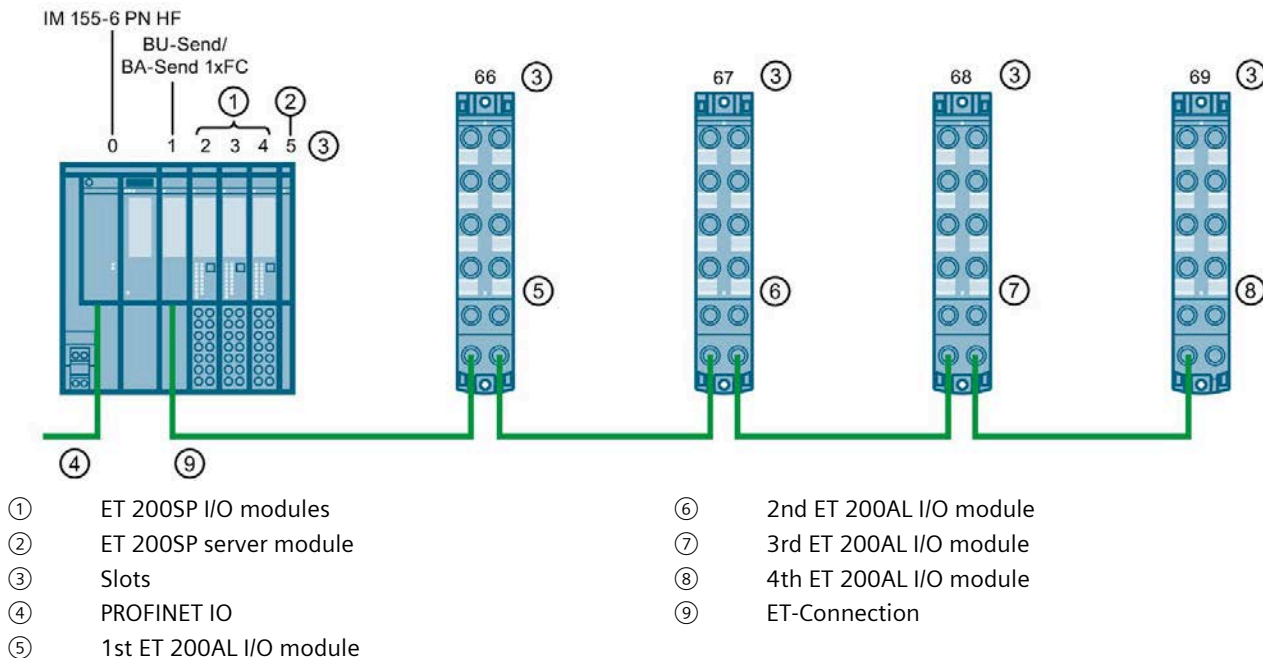


Figure 7-2 Mixed configuration

Configuring configuration example

Table 7-1 Overview

Mixed configuration	Module	Slot
ET 200SP	IM 155-6 PN HF	0
	BA-Send 1xFC	1
	DI 16x24VDC ST	2
	DI 16x24VDC ST	3
	DI 16x24VDC ST	4
	Server module	5
ET 200AL	DI 8x24VDC 8xM8	66
	DIQ 4+DQ 4x24VDC/0.5A 8xM8	67
	AI 4xU//RTD 4xM12	68
	CM 4xIO-Link 4xM12	69

Note

Configuration using PROFIBUS GSD file

When you use the PROFIBUS GSD file for the configuration, you must configure the gaps between the server module and the first ET 200AL I/O module with BU cover.

Technical specifications

8.1 Technical specifications BaseUnit BU-Send

Technical specifications of the BaseUnit BU-Send

Article number	6ES7193-6BN00-0NE0
General information	
HW functional status	from FS04
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-30 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
Dimensions	
Width	20 mm
Height	117 mm
Depth	35 mm
Weights	
Weight, approx.	30 g

8.2 Technical specifications BusAdapter BA-Send 1xFC

Technical specifications of the BusAdapter BA-Send 1xFC

Article number	6ES7193-6AS00-0AA0
General information	
Product type designation	BA-Send 1xFC
HW functional status	From FS05
Interfaces	
Supports protocol for PROFINET IO	
Cable length	
– Cu conductors	15 m; from IM firmware V3.3: between BA-send and the first ET-CONNECTION bus node and between all other bus nodes
ET-Connection	
• Number of interfaces ET connection	1
• FC (FastConnect)	Yes
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-30 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	2 000 m; On request: Installation altitudes greater than 2 000 m
Dimensions	
Width	20 mm
Weights	
Weight, approx.	44 g