SIEMENS

SIMATIC TOP connect for S7-1500 and ET200MP

Manual

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Warning notice system

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

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠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.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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⚠WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Preface

Purpose of this documentation

This documentation provides important information on wiring the I/O modules (input and output modules) of the S7-1500 SIMATIC controller and the ET 200MP modular I/O system with SIMATIC TOP connect system cabling.

Basic knowledge required

General knowledge about automation is needed to understand this documentation.

Scope of this documentation

This documentation applies to all SIMATIC products in the S7-1500 product family with ET 200MP.

Conventions

Please also observe the notes marked as follows:

Note

A note contains important information about the product described, about handling the product or about a specific section of the documentation that requires particular attention.

Recycling and disposal

The products can be recycled as their components are low in pollutants. For the environmentally friendly recycling and disposal of your old device, please contact a certificated disposal service for electronic scrap.

Additional support

- You will find information on the technical support service in the appendix to this documentation.
- The technical documentation for the various SIMATIC products and systems is available on the Internet (http://www.siemens.com/simatic-tech-doku-portal).
- You will find the online catalog and online ordering system on the Internet (http://mall.automation.siemens.com).

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Safety notes

1

Warning

When electrical devices are operated, parts of these devices will necessarily carry dangerous voltages.

If these devices are not correctly handled/operated, this can result in death or severe injury as well as significant material damage.

Only appropriately qualified personnel may work on or in the vicinity of this device.

This device can only function correctly and safely if it is transported, stored, set up and installed correctly.

Before installation or maintenance work can begin, the system's main switch must be switched off and measures taken to prevent it being switched on again.

If this instruction is not followed, touching live parts can result in death or serious injury.

Documentation guide

2

Introduction

The documentation for the SIMATIC products is modular in structure and covers a wide range of subjects relating to your automation system.

The complete documentation for SIMATIC products in the S7-1500 product family with ET 200MP comprises the system manual, the function manuals and the product manuals.

The TIA Selection Tool will also help you to select and order the right system cabling for your SIMATIC S7-1500.

Overview of documentation for SIMATIC S71500 / ET200MP

The tables below set out the documentation for SIMATIC S7-1500 / ET 200MP with the relevant content for system cabling.

Table 2- 1 Documentation for SIMATIC S7-1500 / ET 200MP system cabling

Subject	Documentation	Key content
System description	S7-1500 Automation System system manual (http://support.automation.siemens.com/WW/view/en/59191792) ET 200MP distributed I/O device system manual (http://support.automation.siemens.com/WW/view/en/59193214)	• Connecting
Digital modules	DQ 16 x 24 V DC/0.5A ST digital output module (http://support.automation.siemens.com/WW/view/en/59193401)	• Block diagram • Connecting • Technical specifications • Dimension drawings
	DQ 32 x 24 V DC/0.5A ST digital output module (http://support.automation.siemens.com/WW/view/en/59193400)	
	DQ 8 x 24 V DC/2A HF digital output module (http://support.automation.siemens.com/WW/view/en/59193089)	
	DI 16 x 24 V DC HF digital input module (http://support.automation.siemens.com/WW/view/en/59193001)	
	DI 16 x 24 V DC SRC BA digital input module (http://support.automation.siemens.com/WW/view/en/59191844)	
	DI 32 x 24 V DC HF digital input module (http://support.automation.siemens.com/WW/view/en/59192896)	
Analog modules	AQ 4 x U/I ST analog output module (http://support.automation.siemens.com/WW/view/en/59191850)	• Block diagram • Connecting • Technical specifications • Dimension drawings
	AQ 8 x U/I HS analog output module (http://support.automation.siemens.com/WW/view/en/59193551)	
	AI 8 x U/I/RTD/TC ST analog input module (http://support.automation.siemens.com/WW/view/en/59193205)	
	AI 8 x U/I HS analog input module (http://support.automation.siemens.com/WW/view/en/59193206)	

SIMATIC manuals

The latest versions of all SIMATIC manuals are available on the Internet (http://www.siemens.com/automation/service&support) for download.

Product overview

3

3.1 What is SIMATIC TOP connect system cabling?

Introduction

SIMATIC TOP connect system cabling is an efficient way to connect the I/O modules (input and output modules) of the SIMATIC controller S7-1500 I/O and ET 200MP.
SIMATIC TOP connect uses standardized connectors and reduces the wiring work required.

There are two types of connection:

- Fully modular connection:
  for connecting sensors and actuators in the field.
- Flexible connection:
  for simple wiring inside the control cabinet.

Area of application

SIMATIC TOP connect allows you to wire actuators and sensors "locally" to one or more terminal modules. Connection to the I/O modules takes place via connecting cable.

Figure 3-1 SIMATIC TOP connect with an S7-1500

Installation

System cabling with SIMATIC TOP connect always consists of the following components:

- The front connector module with either
  - One or more 16-pin male connectors for connecting the connecting cables or
  - One 50-pin male connector for connecting the connecting cable
- One or more terminal modules
- One or more connecting cables with plug connectors at the ends

Fully modular connection

The fully modular connection for the system cabling comprises the following components:

- A front connector module ① for connection to the SIMATIC S7-1500 or ET200MP I/O modules
- Connecting cables ②, pre-assembled or by the meter
- Terminal modules ③, for connection to sensors and actuators in the field ④

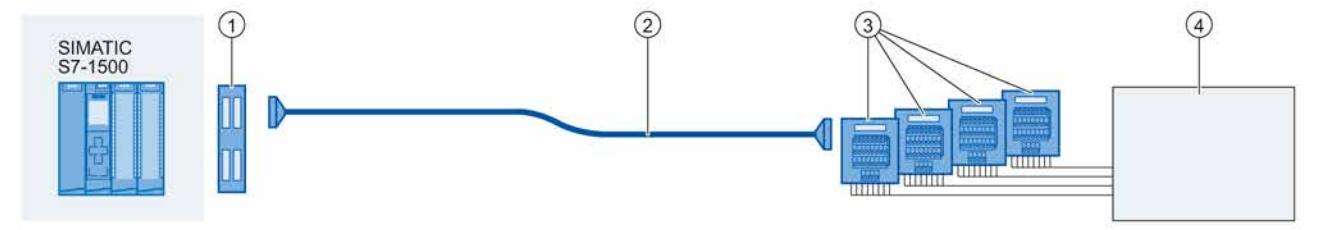


Figure 3-2 Fully modular connection

The components can be combined to suit the application and connected with simple plug-in connections. The terminal modules are used instead of conventional terminal blocks and act as the interface to the sensors and actuators.

In addition to the terminal module versions with screw-type terminals or push-in systems, there are also versions with LED signaling and signal conditioning, for example, from 230 V AC to 24 V DC.

Flexible connection

The flexible connection for the system cabling comprises a front connector module ① for connection to the SIMATIC S7-1500 or ET200MP digital I/O modules. The front connector is already wired with 20 or 40 single wires ② which connect the SIMATIC S7-1500 or ET200MP digital I/O modules directly to the sensors and actuators in the control cabinet.

Figure 3-3 Flexible connection

The single wires (cross-section: 0.5 mm²) are available in different lengths and in the following designs:

- H05V-K cable (PVC insulation)
- H05Z-K (halogen-free insulation)
- UL/CSA approval

3.2 Components

This section gives you an overview of the components of the SIMATIC TOP connect system cabling.

Components for fully modular connection

The table below lists the components for fully modular connection of the SIMATIC TOP connect system cabling.

Table 3- 1 Components for fully modular connection of SIMATIC TOP connect

Component	Function	Figure
Front connector module	Front connector modules are modified front connectors and are plugged into the I/O module to be wired. The front connector module has IDC female connectors for connecting the connecting cables. Front connector modules are available in the following designs: • For DI/DO digital modules (power supply with push-in or screw-type terminals) • For 2A digital output 1 x 8 DO (power supply with push-in or screw-type terminals) • For analog modules	

Component	Function	Figure
Connecting cable	Connecting cables connect the front connector module with the terminal modules. Connecting cables are available in the following versions: • 16-pin and 50-pin round cable (shielded or unshielded), pre-assembled[1] Max. length 10 m • 16-pin round-sheath ribbon cable (shielded or unshielded), for assembly by the user[2] Max. length 30 m • 2 x 16-pin round-sheath ribbon cable (unshielded), for assembly by the user[2] Max. length 30 m [1]Pre-assembled: One IDC connector (insulation displacement connector) (flat socket) at each end. [2]For assembly by the user. See "Assembling round-sheath ribbon cables".	
Terminal module	Digital and analog terminal modules in S7-1500 design are available for connecting the I/O signals. These are attached to the standard mounting rail. The terminal modules are available in the following connecting systems: • Push-in system • Screw-type terminals All digital terminal modules also have LED for channel display.	

Accessories for fully modular connection

The following components can be ordered separately or as spare part:

Table 3- 2 Accessories for fully modular connection of SIMATIC TOP connect

Accessories	Function
Labels	Labels (20 x 7 mm, pale turquoise) in the S7-1500 design are available for labeling the terminal modules.
Shield plate	The shield plate can be fitted onto the terminal module for analog signals. The terminal module with the fitted shield plate is fastened to the standard mounting rail.
Shield connection clamps for the shield plate	The shield connection clamps provide contact plating for cable shields on the shield plate.
IDC connector (insulation displacement connector), 16-pin	**Round-sheath ribbon cables only:** The IDC connector (insulation displacement connector) is crimped onto the pre-assembled round-sheath ribbon cable.
Crimping pliers for IDC connectors (insulation displacement connectors)	The IDC connectors (insulation displacement connectors) are crimped onto the pre-assembled round-sheath ribbon cable using the crimping pliers.

Components for flexible connection

The table below lists the components for flexible connection of the SIMATIC TOP connect system cabling.

Table 3- 3 Components for flexible connection of SIMATIC TOP connect

Component	Function	Figure
Front connector with single wires	Up to 16 or 32 digital input and output channels can be connected directly to the I/O with a front connector with single wires. The single wires are fitted with screw-type contacts in the front connector and are cut off straight at the other end. The wires can be easily identified as they are marked at regular intervals in accordance with the pin designations on the front connector. The front connectors are available in the following designs: • For 16 DI/DO modules • For 32 DI/DO modules	

3.3 Connectable I/O modules

The tables below list all input and output modules of the SIMATIC controller S7-1500 and ET 200MP that can be connected with the SIMATIC TOP connect fully modular connection.

Table 3- 4 Connectable I/O modules, for terminal modules with 16-pin connecting cables

I/O module (digital, analog)	Article number
DI 16x24 VDC, 0.05 ms … 20 ms, type 3	6ES7 521-1BH00-0AB0
DI 16x24 VDC, 3 ms type 1; sourcing	6ES7 521-1BH50-0AB0
DI 32x24 VDC, 0.05 ms … 20 ms, type 3	6ES7 521-1BL00-0AB0
DO 16x24 VDC, 0.5 A, substitute values	6ES7 522-1BH00-0AB0
DQ 8x24 VDC, 2 amperes	6ES7 522-1BF00-0AB0
DO 32x24 VDC, 0.5 A, substitute values	6ES7 522-1BL00-0AB0
AO 4xU, I, 16-bit, 0.3 %	6ES7 532-5HD00-0AB0
AQ 8xU, I, HS correct	6ES7 532-5HF00-0AB0
AI 8xU, I, 14-bit, 0.3 %	6ES7 531-7NF10-0AB0
AI 8xU, I, R, RTD, TC, 16-bit, 0.3 %	6ES7 531-7KF00-0AB0

Table 3- 5 Connectable I/O modules, for terminal modules with 50-pin connecting cables

I/O module (digital, analog)	Article number
DI 16x24 VDC, 0.05 ms … 20 ms, type 3	6ES7 521-1BH00-0AB0
DI 16x24 VDC, 3 ms type 1; sourcing	6ES7 521-1BH50-0AB0
DI 32x24 VDC, 0.05 ms … 20 ms, type 3	6ES7 521-1BL00-0AB0
DO 16x24 VDC, 0.5 A, substitute values	6ES7 522-1BH00-0AB0
DO 32x24 VDC, 0.5 A, substitute values	6ES7 522-1BL00-0AB0
AO 4xU, I, 16-bit, 0.3 %	6ES7 532-5HD00-0AB0
AQ 8xU, I, HS correct	6ES7 532-5HF00-0AB0
AI 8xU, I, 14-bit, 0.3 %	6ES7 531-7NF10-0AB0
AI 8xU, I, R, RTD, TC, 16-bit, 0.3 %	6ES7 531-7KF00-0AB0

Connecting

4

4.1 Safety regulations

Introduction

When used in plants or systems, SIMATIC TOP connect system cabling is subject to special rules and regulations in line with the area of application.

This section provides an overview of the most important rules for connecting SIMATIC TOP connect.

Rules and regulations governing the integration of the S7-1500 into a plant or system can also be found under "Rules and regulations" in the S7-1500 system manual (http://support.automation.siemens.com/WW/view/en/59191792).

Specific application

Please observe the safety and accident prevention regulations that apply to specific applications, for example, the machinery directives.

Supply voltage

Please note the following points about line voltage:

- For stationary plants and systems without an all-pole line disconnector, there must be a disconnector unit (all-pole) fitted in the building installation.
- Any fluctuation/deviation in the line voltage from the rated value must be within the permitted tolerance for all S7-1500 electric circuits.

24 V DC supply

Please note the following points for 24 V DC supply:

- Power supplies for 24 V DC must have secure electrical isolation in accordance with IEC 60364-4-41.
- Surge arrestors must be fitted to protect against lighting and overvoltage.

You will find components for lightning and overvoltage protection in the "Designing interference-free controllers" function manual (http://support.automation.siemens.com/WW/view/en/59193566).

Protection from electric shock

The S7-1500 automation system mounting rail must be connected (conductive connection) to the protective conductor to prevent electric shock.

Protection from external electrical interference

The following section details the points to note to prevent electrical interference and faults:

- You must make sure that each plant or system fitted with an S7-1500 is connected to a protective conductor with a sufficient cross-section to deal with electromagnetic interference.
- For supply, signal and bus cables, you must make sure that the cables are correctly routed and installed.
- For signal and bus cables, you must make sure that an open circuit or crossover will not result in undefined plant or system states.

Reference

Further information is available in the "Designing interference-free controllers" function manual.

4.2 Wiring rules

The table below sets out the wiring rules for connecting the I/O module supply voltage to the terminal module or front connector module.

For information on push-in connections, please see Connecting the connecting cable and supply voltage to the front connector module (Page 27).

Table 4- 1 Wiring rules

Wiring rules for ...	Terminal module		Front connector module	
	Push-in system	Screw-type terminal	Push-in system	Screw-type terminal
Connectable cable cross-sections				
Solid cables	No			
Flexible cables				
... Without end sleeve	0.2 to 2.5 mm²		0.5 to 1.5 mm²	0.5 to 2.5 mm²
... With end sleeve In accordance with DIN 46228/1	0.2 to 2.5 mm²	0.5 to 2.5 mm² (2.5 mm² with crimp in accordance with EN 60947-1)	0.25 to 1.5 mm²	0.25 to 1.5 mm²
... With end sleeve In accordance with DIN 46228/4 with plastic collar	0.2 to 2.5 mm²		0.25 to 0.75 mm²	0.25 to 1.5 mm²
Number of cables per connection	Combination of 1 or 2 conductors to make up the cross-sections specified above (in total) in one end sleeve.			
Max. diameter of insulation			3.1 mm	3.1 mm
Stripped length of the cables				
... Without insulating collar			8 + 1 mm	10 mm
... With insulating collar			8 + 1 mm	10 mm
Blade of the screwdriver	0.6 x 3.5	0.6 x 3.5	SD 0.6 x 3.5 DIN 5264	SD 0.6 x 3.5 DIN 5264
Tightening torque for connecting the cables		0.4 Nm		0.4 Nm

See also

Connecting the connecting cable and supply voltage to the front connector module (Page 27)

4.3 Connecting components

Introduction

WARNING

Risk of electrocution

Touching live parts can result in death or serious injury.

Before you connect a module, make sure that it is disconnected from the power supply.

The procedure for connecting the front connector modules is basically the same as for the standard front connectors. The connection of standard front connectors is described in detail in the S7-1500 system manual under "Connecting" (http://support.automation.siemens.com/WW/view/en/59191792).

Before connecting the front connector modules, read the following sections of the S7-1500 system manual:

- Wiring front connectors for I/O modules without shield connection element
- Preparing and wiring front connectors for I/O modules without shield connection element
- Wiring front connectors for I/O modules with shield connection element
- Preparing front connectors for I/O modules with shield connection element
- Bringing the front connector into final position

Abbreviations used

The meanings of the abbreviations in the figures below are as follows:

AI	Analog input module
BR	Potential bridges
M	Connection for ground
L+	Connection for supply voltage
Mn	Measuring input, channel n
ICn+/ICn-	Current output power supply, thermal resistance (RTD), channel n
Un+/Un-	Voltage input, channel n
In+/In-	Current input, channel n
COMP+/COMP-	Compensation input
IComp+/IComp-	Current output power supply, compensation
UV	Feed voltage at channel for 2-wire transducer
UCM	Potential difference between reference points of the measuring inputs / the analog ground MANA
UISO	Potential difference between reference points of the measuring inputs and the central grounding point
MANA	Reference point of the analog ground

Wiring sequence

Step	Action		See section
1	Prepare the connecting cable	Assembling the round-sheath ribbon cable	Assembling the round-sheath ribbon cable (Page 24)
		Round-sheath ribbon cable already assembled	–
2	Wiring the front connector module		Wiring the front connector module (Page 26)
3	Connecting the connecting cable to the terminal module		Connecting the connecting cable and supply voltage to the front connector module (Page 27)
4	Wire the terminal module inputs and outputs		Connecting the connecting cable to the terminal module (Page 31)

See also

Assembling the round-sheath ribbon cable (Page 24)

Wiring the front connector module (Page 26)

Connecting the connecting cable and supply voltage to the front connector module (Page 27)

Connecting the connecting cable to the terminal module (Page 31)

4.3.1 Assembling the round-sheath ribbon cable

Note

Connecting cable assembly is only required for round-sheath ribbon cables (16-pin and 2 x 16-pin).

Round cables are already assembled.

Maximum cable length

The length of the connecting cable (round-sheath ribbon cable) between the SIMATIC controller and the terminal modules must not exceed 30 m.

Connecting the round-sheath ribbon cable to connectors

Note

Each connecting end of the round-sheath ribbon cable needs to be fitted with connectors for connecting to the front connector module and the terminal module.

Follow the steps below for each of the ends.

1. Cut the round-sheath ribbon cable to the required length.

   The maximum length is 30 m.

2. Remove part of the cable sheath at each end of the round-sheath ribbon cable.

   The table below sets out the length of sheathing to be removed.

Connection end	1 x 16 wires shielded/unshielded	2 x 16 wires, unshielded	
		Outer flat ribbon cable	Inner flat ribbon cable
Top connector, front connector module	Approx. 130 mm	Approx. 130 mm	
Bottom connector, front connector module	Approx. 80 mm		Approx. 80 mm
Terminal module connector	Approx. 40 mm	100 mm	100 mm

3. Thread the round-sheath ribbon cable into the 16-pin connector at the "terminal module connector" connection side.

NOTICE
Incorrectly connecting the round-sheath ribbon cable will cause malfunctions.
There is a mark on the connector to prevent incorrect connection.
When you insert the cable, make sure that the triangular mark ① is pointing to the wire marked ②, as shown in the figure below.

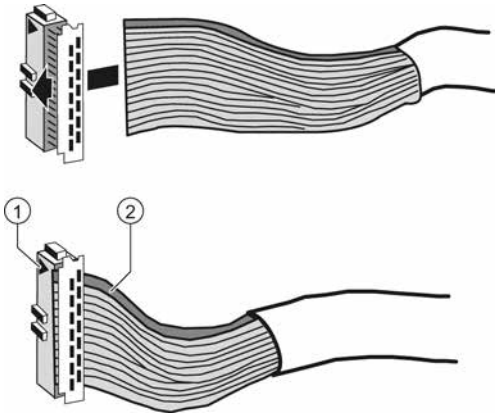


Figure 4-1 Wire marked to prevent incorrect connection

4. Use the crimping pliers to crimp the end of the cable into the connector.
5. Run the round-sheath ribbon cable back over the top of the connector.

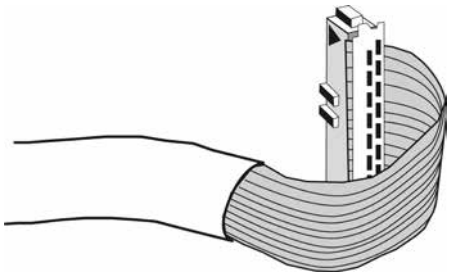


Figure 4-2 Running round-sheath ribbon cable back over top of connector

6. Lay the round-sheath ribbon cable up against the connector.

7. Latch the cable grip ③ on the connector into place.

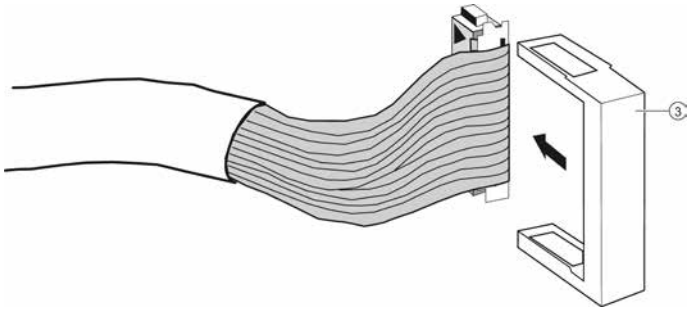


Figure 4-3 Fitting the strain relief

8. Repeat steps 3 – 5 to connect the round-sheath cable connector to the "lower connector, front connector module" and the "upper connector, front connector module" connection ends.

4.3.2 Wiring the front connector module

Introduction

This section explains how to wire the front connector modules.

Note

Please also read Wiring SIMATIC TOP connect to the I/O modules (Page 33) for special connection examples and the criteria for selecting front connector modules.

Functions of the front connector module

The front connector module is used to connect the connecting cable to the I/O module. The supply voltage cables for the modules can also be connected to the front connector module.

See also

Wiring SIMATIC TOP connect to the I/O modules (Page 33)

4.3.3 Connecting the connecting cable and supply voltage to the front connector module

Requirements

- Supply voltages are switched off
- Cables have been prepared in line with the terminal system used; see the wiring rules under Wiring rules (Page 21).

Connecting the connecting cable to the front connector module

⚠ WARNING

Risk of electrocution

Touching live parts can result in death or serious injury.

Before you connect a module, make sure that it is disconnected from the power supply.

Note

The example here shows the connection of a 16-pin connecting cable to the front connector module.

Follow the same procedure as applicable for 50-pin connecting cables.

1. Switch off the load current supply.
2. Lift up the front flap of the I/O module until it snaps into place.

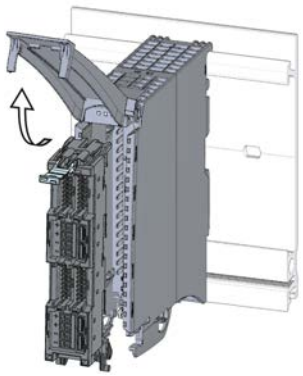


Figure 4-4 Front flap of the I/O module open (example)

3. Place the front connector in the pre-wiring position. This is done by fitting the bottom of the front connector into the I/O module and swiveling up the front connector until it latches into place.

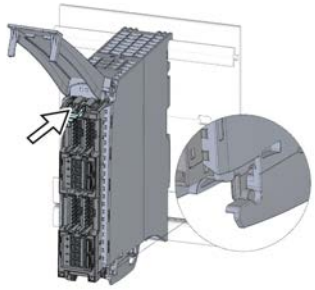


Figure 4-5 Front connector module in the pre-wiring position (example)

Note

In this position, the front connector module is still protruding from the I/O module (see figure above). The front connector module and I/O module are not yet electrically connected.
The pre-wiring position makes it easy to wire the front connector module.

4. If required, connect the cables for the I/O module supply voltage to the front connector module.
5. Connect the connecting cables to the front connector module.

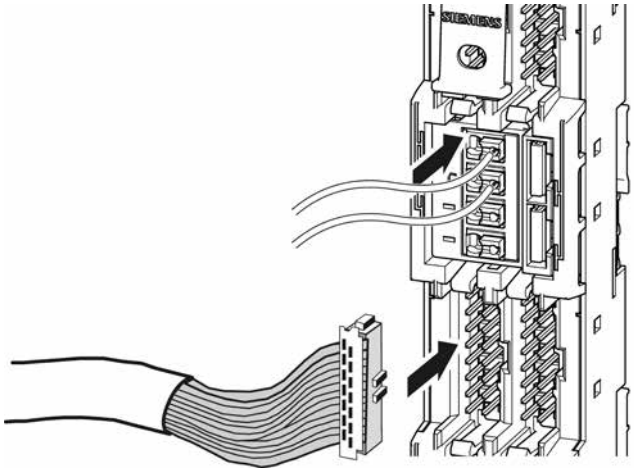


Figure 4-6 Connecting the supply voltage cables and connecting cables to the front connector module (example)

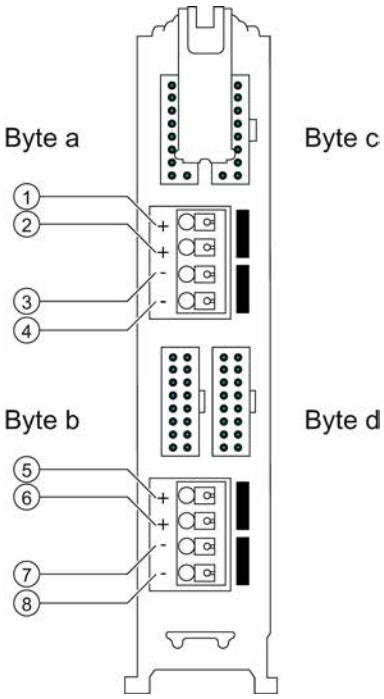
Note

Make sure that you follow the correct assignment when connecting the supply voltage cables for the I/O module and connecting cables to the front connector module:

-The assignment of supply voltage cables to connecting cable connections

-The assignment of connecting cable connections to the address bytes of the module

The correct assignment is set out in the diagram and key below.



Number	Connection to	Assigned byte
①	Supply voltage +	a
②	Supply voltage +	c
③	Supply voltage -	a
④	Supply voltage -	c
⑤	Supply voltage +	b
⑥	Supply voltage +	d
⑦	Supply voltage -	b
⑧	Supply voltage -	d

6. With push-in terminal: Insert the wire fitted with end sleeve into the duct.
7. When using a round-sheath ribbon cable:
   Twist down each connecting cable by 90° and give it one turn.
8. Insert the strain relief (cable tie) provided for the cabling into the front connector module. The strain relief holds the cabling (supply voltage cables and connecting cables) in the cable storage space of the I/O module.

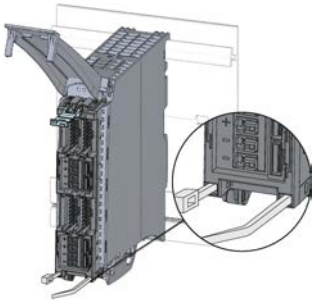


Figure 4-7 Fitted strain relief (example)

9. Run the connecting cables and the cables for the I/O module supply voltage down and out of the I/O module.

See also

Wiring rules (Page 21)

4.3.4 Connecting the connecting cable to the terminal module

Introduction

This section details how to wire the terminal modules.

Note

Please also follow the instructions in the section Wiring SIMATIC TOP connect to the I/O modules (Page 33). These include the selection criteria for the terminal modules and information on wiring.

Terminal module function

The terminal module is the interface between the connection cables from the field and the SIMATIC S7-1500 or ET200MP. The supply voltage cables for the I/O modules can also be connected to the terminal module.

Fitting the terminal module and connecting cable

1. Fasten the terminal module to a 35 mm standard mounting rail (DIN EN 60715).
2. Connect the connecting cable to the terminal module as shown in the figure below.

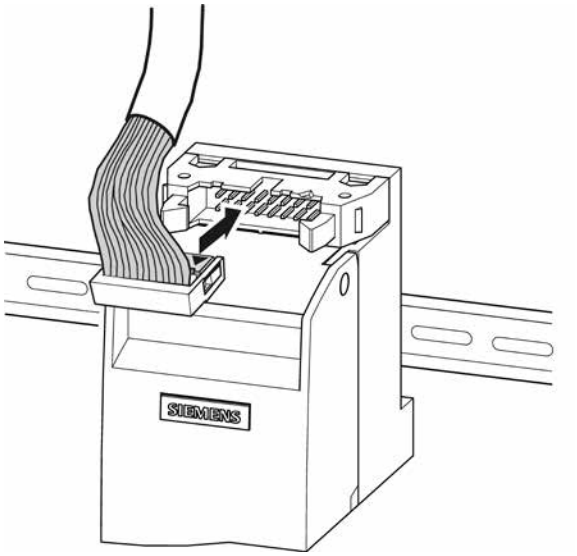


Figure 4-8 Connecting the connecting cable to the terminal module

See also

Wiring SIMATIC TOP connect to the I/O modules (Page 33)

4.3.5 Connecting the actuators/sensors to the terminal module

The connecting cables of the actuators/sensors are connected to the terminals of the terminal module. Terminal modules are available with the following types of terminal:

- Screw-type terminal
- Push-in system

4.4 Labeling terminal modules

Introduction

The terminal modules are identified using labels. The labels are perforated and are attached to the front flap of the terminal module.

The following types of labels are available:

- For terminal modules in S7-1500 design

Preparing and attaching labels

1. Tear out the completed label.
2. Insert the label into the holder ① on the outside of the front flap.

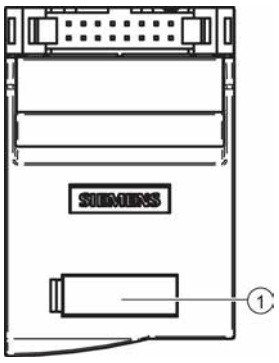


Figure 4-9 Label holder with labels (example)

Wiring SIMATIC TOP connect to the I/O modules 5

Introduction

You can use SIMATIC TOP connect system cabling to wire I/O modules with actuators/sensors. The SIMATIC TOP connect components used depend on the following factors:

- The I/O module to be wired and
- The connection system (screw-type terminal / push-in system, 1-wire, 3-wire, 2 A connection, relay or optocoupler).

5.1 SIMATIC TOP connect components and selection guide

Components for 16-pin connecting cable

The table below lists the SIMATIC TOP connect system cabling components for a 16-pin connecting cable.

Components of SIMATIC TOP connect system cabling				
Front connector modules	...for digital I/O modules		Voltage supply with - Screw-type terminals - Push-in system	 6ES7921-5AB20-0AA0 6ES7921-5AH20-0AA0
	…for 2 A output module		Voltage supply with - Screw-type terminals - Push-in system	 6ES7921-5AD00-0AA0 6ES7921-5AJ00-0AA0
	...for analog modules			6ES7921-5AK20-0AA0
Terminal modules	TP1	…digital, for 1-wire connection, without LED	- Screw-type terminals - Push-in system	6ES7924-0AA20-0AA0 6ES7924-0AA20-0AC0
		…digital, for 1-wire connection, with LED	- Screw-type terminals - Push-in system	6ES7924-0AA20-0BA0 6ES7924-0AA20-0BC0
	TP2	…digital, for 2-ampere modules, without LED, digital	- Screw-type terminals - Push-in system	6ES7924-0BB20-0AA0 6ES7924-0BB20-0AC0
	TP3	…digital, for 3-wire connection, without LED	- Screw-type terminals - Push-in system	6ES7924-0CA20-0AA0 6ES7924-0CA20-0AC0
		…digital, for 3-wire connection, with LED	- Screw-type terminals - Push-in system	6ES7924-0CA20-0BA0 6ES7924-0CA20-0BC0
	TPF	…for 3-wire connection, with LED, digital and fuse in the signal path	- Screw-type terminals - Push-in terminals	6ES7924-0CL20-0BA0 6ES7924-0CL20-0BC0

Components of SIMATIC TOP connect system cabling				
	TPS	…for 3-wire connection with LED, digital and switch in the signal path	- Screw-type terminal - Push-in system	6ES7924-0CH20-0BA0 6ES7924-0CH20-0BC0
	TPA	...for analog modules, without LED	- Screw-type terminals - Push-in system	6ES7924-0CC20-0AA0 6ES7924-0CC20-0AC0
	TPRi 230 V	Digital, with LED	- Screw-type terminals - Push-in system	6ES7924-0BE20-0BA0 6ES7924-0BE20-0BC0
	TPRi 110 V	Digital, without LED	- Screw-type terminals - Push-in system	6ES7924-0BG20-0BA0 6ES7924-0BG20-0BC0
	TPRo	Digital, with LED	- Screw-type terminals - Push-in system	6ES7924-0BD20-0BA0 6ES7924-0BD20-0BC0
	TPOo	Digital, with LED	- Screw-type terminals - Push-in system	6ES7924-0BF20-0BA0 6ES7924-0BF20-0BC0

Pre-assembled round cable	Length	Unshielded	Shielded
	0.5 m	6ES7923-0BA50-0CB0	...not available
	1.0 m	6ES7923-0BB00-0CB0	6ES7923-0BB00-0DB0
	1.5 m	6ES7923-0BB50-0CB0	...not available
	2.0 m	6ES7923-0BC00-0CB0	6ES7923-0BC00-0DB0
	2.5 m	6ES7923-0BC50-0CB0	6ES7923-0BC50-0DB0
	3.0 m	6ES7923-0BD00-0CB0	6ES7923-0BD00-0DB0
	4.0 m	6ES7923-0BE00-0CB0	6ES7923-0BE00-0DB0
	5.0 m	6ES7923-0BF00-0CB0	6ES7923-0BF00-0DB0
	6.5 m	6ES7923-0BG50-0CB0	6ES7923-0BG50-0DB0
	8.0 m	6ES7923-0BJ00-0CB0	6ES7923-0BJ00-0DB0
	10.0 m	6ES7923-0CB00-0CB0	6ES7923-0CB00-0DB0
Round-sheath ribbon cable 1 x 16-pin, 0.14 mm²	Length	Unshielded	Shielded
	30 m	6ES7923-0CD00-0AA0	6ES7923-0CD00-0BA0
	60 m	6ES7923-0CG00-0AA0	6ES7923-0CG00-0BA0
Round-sheath ribbon cable 2 x 16-pin, 0.14 mm²	30 m	6ES7923-2CD00-0AA0	...not available
	60 m	6ES7923-2CG00-0AA0	...not available

Accessories	16-pin IDC connectors for the round-sheath ribbon cable (x 8)	6ES7921-3BE10-0AA0
	Crimping pliers for fitting the 16-pin IDC connectors	6ES7928-0AA00-0AA0
	20 x 7 mm label, pale turquoise, for fitting to terminal modules (x 340)	3RT1900-1SB20

Selection guide for 16-pin connecting cable

The tables below list the SIMATIC TOP connect system cabling components which you can use to wire the I/O modules of the automation system.

Front connector module for ...	...I/O modules, connectable with...	TP1		TP2	TP3		TPF	TPS	TPA	TPRi 230 V	TPRi 110 V	TPRo	TPOo
		Without LED	With LED	Without LED	Without LED	With LED	LED fuse	LED switch	Without LED	With LED	With LED	With LED	With LED
Front connector module 6ES7921-5AB20-0AA0 6ES7921-5AH20-0AA0	DI 16 x 24 VDC HF 6ES7521-1BH00-0AB0	X	X		X	X	X	X		X	X		
	DI 16 x 24 VDC SRC BA 6ES7521-1BH50-0AB0	X			X								
	DI 32 x 24 VDC HF 6ES7521-1BL00-0AB0	X	X		X	X	X	X		X	X		
	DQ 16 x 24 VDC/0.5A ST 6ES7522-1BH00-0AB0	X	X		X	X	X	X				X	X
	DQ 32 x 24 VDC/0.5A ST 6ES7522-1BL00-0AB0	X	X		X	X	X	X				X	X

Front connector module for ...	...I/O modules, connectable with...	TP1		TP2	TP3		TPF	TPS	TPA	TPRi 230 V	TPRi 110 V	TPRo	TPOo
		Without LED	With LED	Without LED	Without LED	With LED	LED fuse	LED switch	Without LED	With LED	With LED	With LED	With LED
Front connector module 6ES7921-5AD00-0AA0 6ES7921-5AJ00-0AA0	DQ 8 x 24 VDC/2A HF 6ES7522-1BF00-0AB0			X									
Front connector module 6ES7921-5AK20-0AA0	AI 8 x U/I/RTD/TC ST 6ES7531-7KF00-0AB0								X				
	AI 8 x U/I HS 6ES7531-7NF10-0AB0								X				
	AQ 4 x U/I ST 6ES7532-5HD00-0AB0								X				
	AQ 8 x U/I ST 6ES7532-5HF00-0AB0								X				

Components for 50-pin connecting cable

The table below lists the SIMATIC TOP connect system cabling components for a 50-pin connecting cable.

Components of SIMATIC TOP connect system cabling				
Front connector modules	...for digital I/O modules		Voltage supply with - Screw-type terminals - Push-in system	 6ES7921-5CB20-0AA0 6ES7921-5CH20-0AA0
	...for analog modules			6ES7921-5CK20-0AA0
Terminal modules	TP1	…digital, for 1-wire connection, without LED	- Screw-type terminals - Push-in system	6ES7924-2AA20-0AA0 6ES7924-2AA20-0AC0
		…digital, for 1-wire connection, with LED	- Screw-type terminals - Push-in system	6ES7924-2AA20-0BA0 6ES7924-2AA20-0BC0
	TP3	…digital, for 3-wire connection, without LED	- Screw-type terminals - Push-in system	6ES7924-2CA20-0AA0 6ES7924-2CA20-0AC0
		…digital, for 3-wire connection, with LED	- Screw-type terminals - Push-in system	6ES7924-2CA20-0BA0 6ES7924-2CA20-0BC0
	TPA	...for analog modules, without LED	- Screw-type terminals - Push-in system	6ES7924-2CC20-0AA0 6ES7924-2CC20-0AC0

Pre-assembled round cable with IDC connectors	Length	Unshielded	Shielded
	0.5 m	6ES7923-5BA50-0CB0	...not available
	1.0 m	6ES7923-5BB00-0CB0	6ES7923-5BB00-0DB0
	1.5 m	6ES7923-5BB50-0CB0	...not available
	2.0 m	6ES7923-5BC00-0CB0	6ES7923-5BC00-0DB0
	2.5 m	6ES7923-5BC50-0CB0	6ES7923-5BC50-0DB0
	3.0 m	6ES7923-5BD00-0CB0	6ES7923-5BD00-0DB0
	4.0 m	6ES7923-5BE00-0CB0	6ES7923-5BE00-0DB0
	5.0 m	6ES7923-5BF00-0CB0	6ES7923-5BF00-0DB0
	6.5 m	6ES7923-5BG50-0CB0	6ES7923-5BG50-0DB0
	8.0 m	6ES7923-5BJ00-0CB0	6ES7923-5BJ00-0DB0
	10.0 m	6ES7923-5CB00-0CB0	6ES7923-5CB00-0DB0

Accessories	20 x 7 mm label, pale turquoise, for fitting to terminal modules (x 340)	3RT1900-1SB20

Selection guide for 50-pin connecting cable

The tables below list the SIMATIC TOP connect system cabling components which you can use to wire the I/O modules of the automation system.

Front connector module for ...	…I/O modules, connectable with…	TP1		TP3		TPA
		Without LED	With LED	Without LED	With LED	Without LED
Front connector module 6ES7921-5CB20-0AA0 6ES7921-5CH20-0AA0	DI 16 x 24 VDC HF 6ES7521-1BH00-0AB0	X	X	X	X	
	DI 16 x 24 VDC SRC BA 6ES7521-1BH50-0AB0	X		X		
	DI 32 x 24 VDC HF 6ES7521-1BL00-0AB0	X	X	X	X	
	DQ 16 x 24 VDC/0.5A ST 6ES7522-1BH00-0AB0	X	X	X	X	
	DQ 32 x 24 VDC/0.5A ST 6ES7522-1BL00-0AB0	X	X	X	X	
Front connector module 6ES7921-5CK20-0AA0	AI 8 x U/I/RTD/TC ST 6ES7531-7KF00-0AB0					X
	AI 8 x U/I HS 6ES7531-7NF10-0AB0					X
	AQ 4 x U/I ST 6ES7532-5HD00-0AB0					X
	AQ 8 x U/I ST 6ES7532-5HF00-0AB0					X

1-wire or 3-wire connection

With a 1-wire or 3-wire connection, you can connect the supply voltage for the I/O modules either at the front connector module or at the terminal module.

5.2 Note on connecting digital I/O modules

Introduction

This section contains information on connecting digital I/O modules with SIMATIC TOP connect.

Note

The information provided here does not apply to the 2 A output module.

For connecting the 2 A output module, please see Note on connecting the 2 A output module (Page 41).

Using potential bridges

If you want to supply load groups with the same potential (non-isolated), use the potential bridges provided with the front connector module. This saves you having to wire a terminal point with two wires.

The detailed application can be found in the manual for the I/O module to be wired, described for the front connector. You can find an overview of this documentation under "Documentation guide (Page 9)". The procedure described in the front connector documentation can also be followed for the front connector modules.

The potential bridges can be wired either to the front connector module or to the terminal module.

NOTICE
High continuous current damages components. The current must not exceed the maximum current carrying capacity of 8 A per potential bridge. Make sure when you wire the potential bridges that no continuous current of over 8 A per potential bridge can occur.

Note

The potential bridges are usually inserted in the front connector module.

Terminal module assignment for 1-wire connection

Front view of terminal module, 1-wire connection	Terminal assignment
	Top row, terminals for: • 2 x M for ground potential ④ • Bit 0; 2; 4; 6 ① Bottom row, terminals for: • 2 x L+ for positive potential ③ • Bit 1; 3; 5; 7 ②

Terminal module assignment for 3-wire connection

Front view of terminal module, 3-wire connection	Terminal assignment
	Top row, terminals for: • Bits 0 to 7 ① Middle row, terminals for: • M potential (all bridged internally) ② Bottom row, terminals for: • L+ potential (all bridged internally) ③

See also

Note on connecting the 2 A output module (Page 41)
Documentation guide (Page 9)

5.3 Note on connecting the 2 A output module

Introduction

This section contains information on connecting the 2 A output module (2 amperes) with SIMATIC TOP connect.

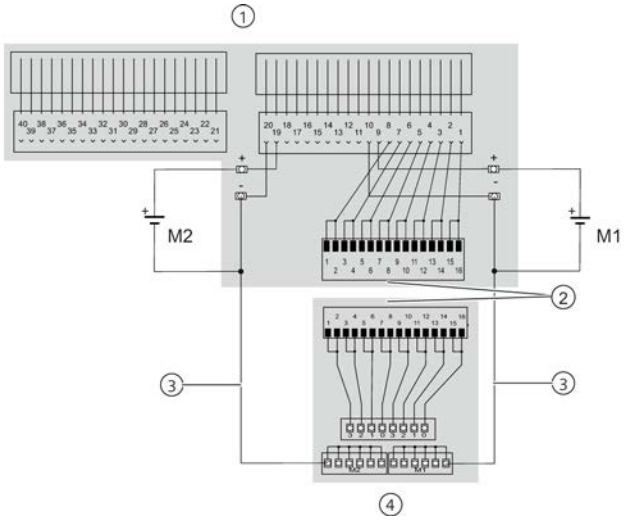
Connecting the supply voltage

Note

Before starting work, make sure you have read the wiring rules in Wiring rules (Page 21).

The potential supply must be at the front connector module, and a supplementary ground connection to the terminal module is required for this purpose. To create this ground connection, follow these steps.

1. Connect the supply voltage to each of the two potential clamps on the front connector module using separate cables.
2. In addition to the connecting cable, connect one cable for M1 or M2 to each terminal module.
3. Connect M1 / M2 with a separate cable to the front connector module and terminal module.
   The potential of M1 and M2 can be bridged.



① 2-ampere front connector module
② Standard connecting cable between front connector module and terminal module
③ Additional connecting cable for M1 and M2
④ 2 A output module

Terminal module assignment for 2 A connection

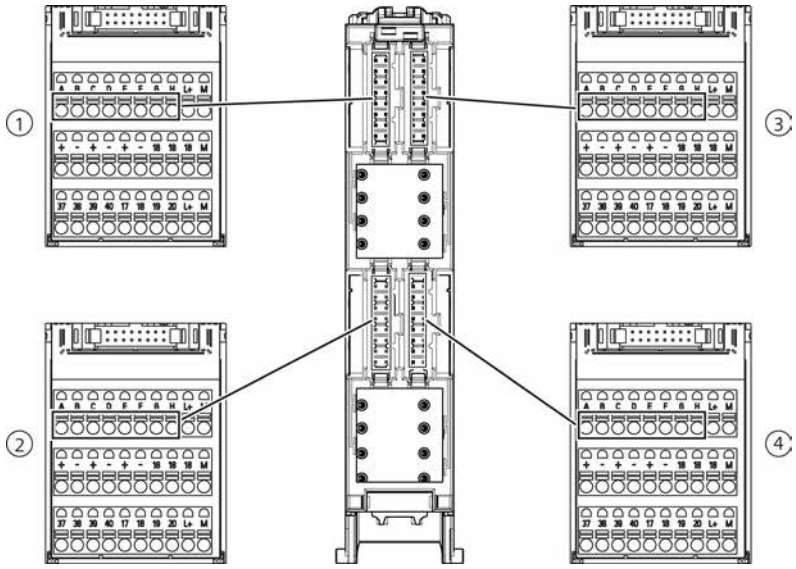
Front view of 2 A terminal module	Terminal assignment, left	Terminal assignment, right
	**Top row** Terminals 0 to 3 ⑥: CH0 to CH3 **Middle row** M1 potential ⑤ (all "M1" terminal points bridged internally) **Bottom row** M1 potential ④ (all "M1" terminal points bridged internally)	**Top row** Terminals 0 to 3 ①: CH4 to CH7 **Middle row** M2 potential ② (all "M2" terminal points bridged internally) **Bottom row** M2 potential ③ (all "M2" terminal points bridged internally)

See also

Wiring rules (Page 21)

5.4 Note on connecting analog I/O modules

Up to four analog terminal modules can be connected to the 40 clamping points of an analog I/O module. Two terminal modules can be connected to each side of the I/O module.



The alphabetically labeled clamping points of the analog terminal module are connected to the numbered clamping points of the I/O module as shown in the table below.

Clamping points					
Terminal module ①	**Terminal module ②**	**I/O module, left**	**I/O module, right**	**Terminal module ③**	**Terminal module ④**
A		1	21	A	
B		2	22	B	
C		3	23	C	
D		4	24	D	
E		5	25	E	
F		6	26	F	
G		7	27	G	
H		8	28	H	
	A	9	29		A
	B	10	30		B
	C	11	31		C
	D	12	32		D
	E	13	33		E
	F	14	34		F
	G	15	35		G
	H	16	36		H
		17	37		
		18	38		
		19	39		
		20	40		

Notes

Clamping points 17 to 20 and 37 to 40 of the I/O module are also labeled 17 to 20 and 37 to 40 on the analog terminal module.

Clamping points L+; M; +; -; of the analog terminal module are auxiliary terminals and are not connected to the I/O module.

There is an electrical connection between all clamping points with the same designation (labeling) on the analog terminal module (multiplication terminal).

5.5 Shield connection of the signal cables

Shield connection options

There are two options for grounding the signal cable shield:

- At the I/O module with the shield connection element of the front connector/front connector module; see S7-1500 function manual, Connections, Front connectors (http://support.automation.siemens.com/WW/view/en/59191792) for the I/O modules.
- At the terminal module directly with a shield plate; see the description below.

Attaching the shield plate to the terminal module

The shield plate is used to connect the shield.

1. Position the shield plate on the back of the terminal module with the gaps in the shield plate fitted over the corresponding parts on the terminal module.

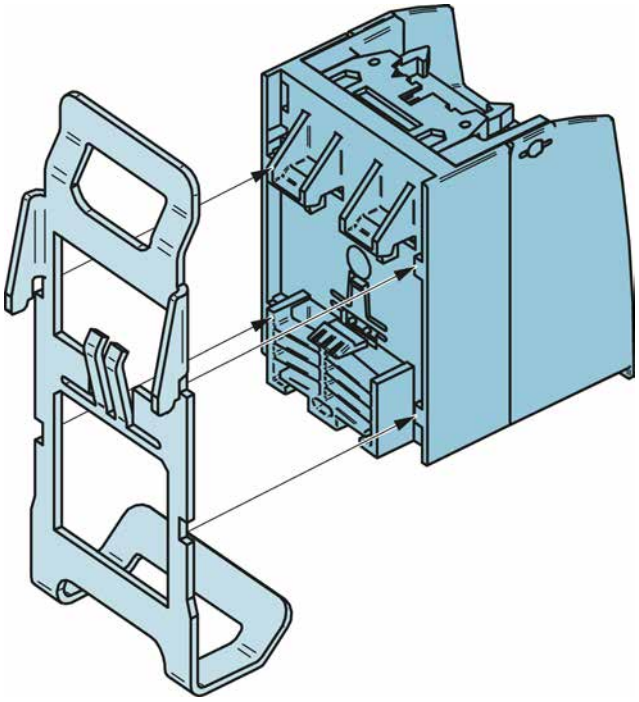


Figure 5-1 Fit the shield plate over the back of the terminal module (example)

2. Push the shield plate up against the terminal module and up.

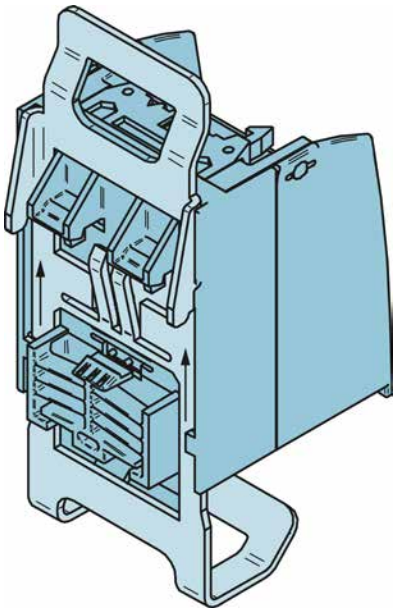


Figure 5-2 Position shield plate and push up

3. Check that the latch ① has fully engaged.
   The latch holds the shield plate in the correct position.

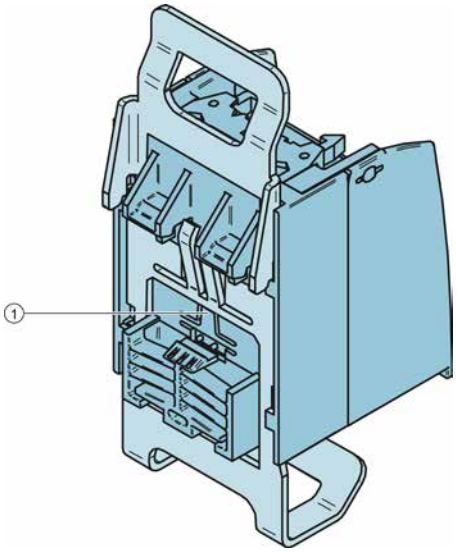


Figure 5-3 Shield plate with latch engaged

4. Mount the terminal module with attached shield plate on the standard mounting rail.
   The shield plate connects the terminal module to the grounded mounting rail.
5. Position the shield of the signal cables with the shield connection terminals on the shield plate.

Connecting the connecting cable to the shield at the front connector module

The connecting cables have two pre-prepared points for shield connection. These points are protected by a protective sheath (shrink-on sheath) on delivery, which will need to be removed at the required place.

Which shield connection point you need depends on the location of the connection in the front connector module. For connection in the upper position, use the shield connection point shown in ①. For connection in the upper position, use the shield connection point shown in ②.

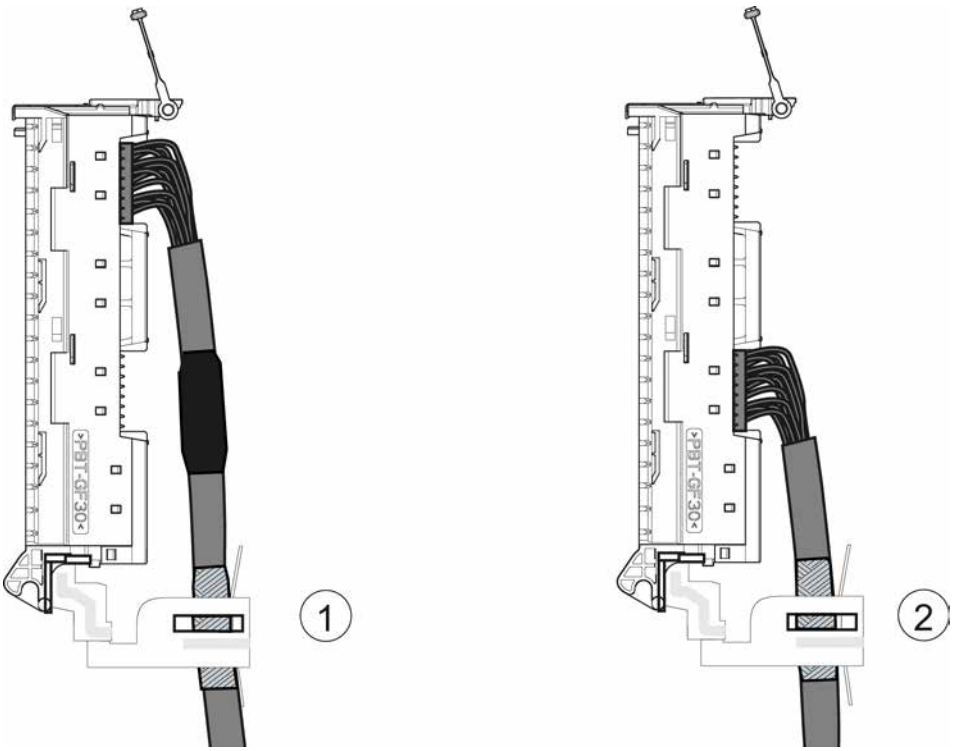


Figure 5-4 Shield connection in different connection positions

Procedure

1. Uncover the cable sheath by removing the protective sheath (shrink-on sheath) at the required place.
2. Push the shield clamp over the connecting cable shield.
3. Connect the connecting cable to the front connector module.
4. Push the shield clamp up over the shield clip to connect the cable shield

   .

Technical specifications

6

Introduction

The technical specifications contain:

- The standards and test values satisfied by the terminal modules of the SIMATIC TOP connect system cabling.
- The technical specifications for the components of the SIMATIC TOP connect system cabling.

Technical specifications of the I/O modules

The technical specifications of the I/O modules are also available in the product manuals for the relevant modules. Please see the overview of documentation on SIMATIC TOP connect system cabling under Documentation guide (Page 9).

If the information in this document differs from that in the product manuals, the product manuals take priority.

See also

Documentation guide (Page 9)

6.1 Standards and approvals

Introduction

This section sets out the standards and test values satisfied by the terminal modules of the SIMATIC TOP connect system cabling.

Note

Components of the SIMATIC TOP connect system cabling

The valid marks and approvals are printed on the components of the SIMATIC TOP connect system cabling.

Reference

The corresponding certificates for the marks and approvals can be found on the Internet under Service & Support (http://www.siemens.com/automation/service&support).

CE marking

The SIMATIC TOP connect cabling system satisfies the requirements and objectives of the following EC directives and satisfies the Harmonized European Standards (EN) for Programmable Logic Controllers which were published in the official journals of the European Community:

- 2006/95/EC "Electrical Equipment Designed for Use within Certain Voltage Limits" (Low-Voltage Directive)
- 2004/108/EC "Electromagnetic Compatibility" (EMC Directive)

The EC declarations of conformity are held for the competent authorities by:
Siemens Aktiengesellschaft
Industry Sector
I IA AS FA WF AMB
Postfach 1963
D-92209 Amberg

These files are also available for download from the Customer Support pages, under "Declaration of Conformity".

cULus approval

Underwriters Laboratories Inc., to

- UL 508 (Industrial Control Equipment)
- C22.2 No. 142 (Process Control Equipment)

IEC 61131

The SIMATIC TOP connect system cabling meets the requirements and criteria of the IEC 61131-2 standard (Programmable Logic Controllers, Part 2: Equipment Requirements and Tests).

Industrial applications

SIMATIC products are designed for industrial applications.

Field of application	Noise emission requirements	Noise immunity requirements
Industry	EN 61000-6-4: 2007	EN 61000-6-2: 2005

Use in residential areas

Note

SIMATIC TOP connect system cabling and the S7-1500 automation system are designed for use in industrial areas; their use in residential areas could interfere with radio and TV reception.

To operate SIMATIC TOP connect system cabling and S7-1500 automation systems in a residential area, the RF emission must comply with Limit Value Class B to EN 55011. Suitable measures for achieving RF interference Limit Class B include, for example:

- Fitting the cabling system and automation system in grounded control cabinets/control boxes
- Use of noise filters in the supply lines

6.2 Electromagnetic compatibility

Definition

Electromagnetic compatibility (EMC) is the capacity of an electrical installation to function satisfactorily in its electromagnetic environment without affecting that environment. SIMATIC TOP connect system cabling also satisfies, among others, the requirements of EMC legislation for the European internal market. A prerequisite is S7-1500 system compliance with specifications and directives for electrical design.

6.3 Shipping and storage conditions

Introduction

SIMATIC TOP connect system cabling meets IEC 61131-2 requirements for shipping and storage conditions. The specifications below apply to modules that are shipped or stored in their original packaging.

Shipping and storage conditions for modules

Type of condition	Permissible range
Drop test (in transport package)	≤1 m
Temperature	From -40 °C to +70 °C
Air pressure	From 1080 to 660 hPa (corresponds to an altitude of -1000 to 3500 m)
Relative humidity	5% to 95%, without condensation
Sinusoidal vibrations in accordance with IEC 60068-2-6	5 to 9 Hz: 3.5 mm 9 to 500 Hz: 9.8 m/s²
Shock conforming to IEC 60068-2-27	250 m/s², 6 ms, 1000 shocks

6.4 Mechanical and climatic ambient conditions

Operating conditions

SIMATIC TOP connect system cabling is designed for stationary use in weather-proof locations. The conditions of use meet the requirements of DIN IEC 60721-3-3:

- Class 3M3 (mechanical requirements)
- Class 3K3 (climatic requirements)

Testing mechanical ambient conditions

Testing for...	Test standard	Remarks
Vibration	Vibration test complying with IEC 60068-2-6 (sine)	Vibration type: Frequency cycles with a rate of change of 1 octave/minute. 5 Hz ≤ f ≤ 8.4 Hz, constant amplitude 7 mm 8.4 Hz ≤ f ≤ 150 Hz, constant acceleration 2 g Vibration duration: 10 frequency cycles per axis in each of the 3 axes which are perpendicular to each other
Shock	Shock, tested to IEC 60068-2-27	Type of shock: Half-sine Shock intensity: 15 g peak value, 11 ms duration Direction of shock: 3 shocks each in +/– direction in each of the three perpendicular axes
Continuous shock	Shock, tested to IEC 60068-2-27	Type of shock: Half-sine shock intensity: 250 m/s2 peak value, 6 ms duration Direction of shock: 1000 shocks each in +/– direction in each of the three perpendicular axes

Reduction of vibrations

If your SIMATIC TOP connect system cabling is exposed to severe shocks or vibration, take appropriate measures to reduce the acceleration or amplitude. We recommend fitting the SIMATIC TOP connect cabling system to shock-absorbent material (for example, metal shock absorbers).

Ambient climatic conditions

SIMATIC TOP connect system cabling components may only be used in the ambient climatic conditions specified in the technical specifications.

Please see the following sections.

6.5 Technical specifications for front connector modules

Table 6- 1 Technical specifications front connector module for digital input and output modules

For digital input and output modules, for 16-pin connecting cable: 6ES7921-5AB20-0AA0 and 6ES7921-5AH20-0AA0	
Type of supply voltage	DC
Rated value	24 V
Lower limit of admissible range (DC)	20.4 V
Upper limit of admissible range (DC)	28.8 V
Max. permissible continuous current	
Per connector pin	1 A
Max. permissible total current per group	
At 40 °C (mounted horizontally)	3 A
At 60 °C (mounted horizontally)	2 A
At 40 °C (mounted vertically)	2 A
Permissible ambient temperature	0 to 60 °C

Table 6- 2 Technical specifications front connector module for digital output modules (2-ampere)

For digital output modules, for 16-pin connecting cable: 6ES7921-5AD00-0AA0 and 6ES7921-5AJ00-0AA0	
Type of supply voltage	DC
Rated value	24 V
Lower limit of admissible range (DC)	20.4 V
Upper limit of admissible range (DC)	28.8 V
Max. permissible continuous current	
Per connector pin	1 A
Max. permissible total current per group	
At 40 °C (mounted horizontally)	6 A
At 60 °C (mounted horizontally)	3 A
At 25 °C (mounted vertically)	6 A
At 40 °C (mounted vertically)	2.5 A
Permissible ambient temperature	0 to 60 °C

Table 6- 3 Technical specifications front connector module for analog input and output modules

For analog input and output modules, for 16-pin connecting cable: 6ES7921-5AK20-0AA0	
Type of supply voltage	DC
Rated value	24 V
Lower limit of admissible range (DC)	20.4 V
Upper limit of admissible range (DC)	28.8 V
Max. permissible continuous current	
Per connector pin	0.5 A
Permissible ambient temperature	0 to 60 °C

Table 6- 4 Technical specifications front connector module for digital input and output modules

For digital input and output modules, for 50-pin connecting cable: 6ES7921-5CB20-0AA0 and 6ES7921-5CH20-0AA0	
Type of supply voltage	DC
Rated value	24 V
Lower limit of admissible range (DC)	20.4 V
Upper limit of admissible range (DC)	28.8 V
Max. permissible continuous current	
Per connector pin	1 A
Max. permissible total current per group	
At 40 °C (mounted horizontally)	2 A
At 60 °C (mounted horizontally)	2 A
At 40 °C (mounted vertically)	2 A
Permissible ambient temperature	0 to 60 °C

Table 6- 5 Technical specifications front connector module for analog input and output modules

For analog input and output modules, for 50-pin connecting cable: 6ES7921-5CK20-0AA0	
Type of supply voltage	DC
Rated value	24 V
Lower limit of admissible range (DC)	20.4 V
Upper limit of admissible range (DC)	28.8 V
Max. permissible continuous current	
Per connector pin	0.5 A
Permissible ambient temperature	0 to 60 °C

6.6 Technical specifications for connecting cables

Table 6- 6 Connecting cables

For 6ES7923 - * connecting cables	
Type of supply voltage	DC
Operating voltage	max. 60 V
Max. permissible continuous current	
Per signal line	1 A
Permissible total current per group	
16-pin	4 A / byte
50-pin	2 A / byte
External diameter of pre-fabricated round cable	
Unshielded	16-pin: Approx. 6.5 mm
	50-pin: Approx. 10.5 mm
Shielded	16-pin: Approx. 7 mm
	50-pin: Approx. 11 mm
External diameter of round-sheath ribbon cable to be assembled	
1 x 16-pin, unshielded	Approx. 9.5 mm
1 x 16-pin, shielded	Approx. 10.5 mm
2 x 16-pin, unshielded	Approx. 11.5 mm
Permissible ambient temperature	0 to 60 °C

6.7 Technical specifications for terminal modules

Note

The "x" in the article numbers is a placeholder for the terminal module version with push-in or screw-type terminals.

In place of the "x", there is either an "A" for the version with screw-type terminals or a "C" for the version with a push-in system.

Terminal modules for 16-pin connecting cable

Table 6- 7 Technical specifications for terminal modules TP1 and TP3 without LED

Terminal modules TP1 and TP3, 16-pin **1-wire connection without LED 6ES7924-0AA20-0Ax0** **3-wire initiators without LED 6ES7924-0CA20-0Ax0**	
Type of supply voltage	DC
Operating voltage	max. 50 V
Max. permissible continuous current per signal	1 A
Max. permissible total current (power supply)	4 A / byte
Connection to SIMATIC fitted for	16-pin IDC connector with fitted strain relief
Operating temperature	0 to + 60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, Overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
1-wire connection 6ES7924-0AA20-0Ax0	Approx. 40 x 58 x 50
For 3-wire initiators 6ES7924-0CA20-0Ax0	Approx. 57 x 76 x 60

Table 6- 8 Technical specifications for terminal modules TP1 and TP3 with LED

Terminal modules TP1 and TP3, 16-pin **1-wire connection with LED 6ES7924-0AA20-0Bx0** **3-wire initiators with LED 6ES7924-0CA20-0Bx0**	
Type of supply voltage	DC
Operating voltage	max. 24 V
Max. permissible continuous current per signal	1 A
Max. permissible total current (power supply)	4 A / byte
Connection to SIMATIC fitted for	16-pin IDC connector with fitted strain relief
Operating temperature	0 to + 60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
1-wire connection 6ES7924-0AA20-0Bx0	Approx. 40 x 58 x 50
For 3-wire initiators 6ES7924-0CA20-0Bx0	Approx. 57 x 76 x 60

Table 6- 9 Technical specifications for terminal module TPA

Terminal modules TPA, 16-pin, for analog modules in S7-1500 or ET200MP **6ES7924-0CC20-0Ax0 series**	
Type of supply voltage	DC
Operating voltage	max. 50 V
Max. permissible continuous current per signal line	1 A
Connection to SIMATIC fitted for	16-pin IDC connector with fitted strain relief
Operating temperature	0 to + 60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
6ES7924-0CC20-0Ax0	Approx. 57 x 76 x 60

Table 6- 10 Technical specifications for terminal module TPF with LED

Terminal modules TPF (use), 3-wire initiators with LED, incl. fuse in the signal path 6ES7924-0CL20-0Bx0	
Type of supply voltage	DC
Operating voltage	max. 24 V
Max. permissible continuous current per signal	1 A (limited with 0.6 A microfuse)
Max. permissible total current (power supply)	4 A / byte
Fuse	
Factory fittings	5 mm x 20 mm microfuse 0.6 A / 250 V quick-response
General data	
Connection to SIMATIC fitted for	16-pin IDC connector with fitted strain relief
Operating temperature	0 to + 60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160,0 overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
For 3-wire initiators with fuse 6ES7924-0CL20-0Bx0	Approx. 57 x 76 x 60

Table 6- 11 Technical specifications for terminal module TPS with LED

Terminal modules TPS (witch), 3-wire initiators with LED, incl. switch in the signal path 6ES7924-0CH20-0Bx0	
Type of supply voltage	DC
Operating voltage	max. 24 V
Max. permissible continuous current per signal	1 A
Max. permissible total current (power supply)	4 A / byte
Switch	
Type	DIP slide switch
Activation during operation	Activation during operation permitted, Max. switching capacity 10VA, ON = "top" position, set to "ON"
General data	
Connection to SIMATIC fitted for	16-pin IDC connector with fitted strain relief
Operating temperature	0 to + 60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, Overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
For 3-wire initiators with disconnector 6ES7924-0CH20-0Bx0	Approx. 57 x 76 x 60

Table 6- 12 Technical specifications for terminal module TP2 without LED

Terminal modules TP2, 2 A modules without LED 6ES7924-0BB20-0Ax0	
Type of supply voltage	DC
Operating voltage	max. 50 V
Max. permissible continuous current per signal	2 A
Connection to SIMATIC fitted for	16-pin IDC connector with fitted strain relief
Operating temperature	0 to + 60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, Overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
For 2 A modules 6ES7924-0BB20-0Ax0	Approx. 57 x 76 x 60

Table 6- 13 Technical specifications for terminal module TPRi 230 V

Terminal module TPRi 230 V with relay for inputs 6ES7924-0BE20-0Bx0	
Energizing side	
Operating voltage for coil	230 V AC / from 207 – 264 V AC
Input circuit	Suppressor diode
Contact side	
Number of relay outputs	8 NO contacts
Contact design	Single contact, 1 NO contact
Switching capacity (resistive load)	max. 50 mA / 24 V DC
	max. 50 mA / 48 V DC
	max. 50 mA / 60 V DC
	Recommended minimum load ≥ 5mA
Switching frequency	500 cycles/minute
Service life	
Mechanical	10 x 10^6 switching cycles
Electrical	3 x 10^6 switching cycles at 230 V AC/50 mA/ cos φ = 1
Connection to SIMATIC fitted for	16-pin IDC connector with fitted strain relief
Operating temperature	0 … +60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
6ES7924-0BE20-0Bx0	Approx. 130 x 76 x 60

Table 6- 14 Technical specifications for terminal module TPRi 110 V

Terminal module TPRi 110 V with relay for inputs 6ES7924-0BG20-0Bx0	
Energizing side	
Operating voltage for coil	115 V AC / from 103 – 132 V AC
Input circuit	Suppressor diode
Contact side	
Number of relay outputs	8 NO contacts
Contact design	Single contact, 1 NO contact
Switching capacity (resistive load)	max. 50 mA / 24 V DC
	max. 50 mA / 48 V DC
	max. 50 mA / 60 V DC
	Recommended minimum load ≥ 5mA
Switching frequency	500 cycles/minute
Service life	
Mechanical	10 x 10^6 switching cycles
Electrical	3 x 10^6 switching cycles at 230 V AC/50 mA/ cos φ = 1
Connection to SIMATIC fitted for	16-pin IDC connector with fitted strain relief
Operating temperate	0 … +60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
6ES7924-0BG20-0Bx0	Approx. 130 x 76 x 60

Table 6- 15 Technical specifications for terminal module TPRo

Terminal module TPRo with relays for outputs 6ES7924-0BD20-0Bx0	
Energizing side	
Operating voltage for coil	24 V DC 19 - 28.8 V
Input circuit	Reverse polarity protection and freewheeling diodes
Contact side	
Number of relay outputs	8 NO contacts
Contact design	Single contact, 1 NO contact
Switching capacity (resistive load)	max. 4 A / 250 V AC
	max. 3 A / 30 V DC
	max. 0.6 A / 48 V DC
	max. 0.4 A / 60 V DC
	Recommended minimum load ≥ 1 mA
Switching frequency	6 cycles/minute
Service life	
Mechanical	3 x 10^6 switching cycles
Electrical	5 x 10^4 switching cycles at 230 V AC/4 A/ cos φ = 1, 6 x per minute
Inductive loads	To protect the relay contacts, inductive loads must be dampened externally with an effective protective circuit. No measures are provided for this in the TPR.
Connection to SIMATIC fitted for	16-pin IDC connector with fitted strain relief
Operating temperate	0 … +60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
6ES7924-0BG20-0Bx0	Approx. 100 x 76 x 60

Table 6- 16 Technical specifications for terminal module TPOo

Terminal module TPOo optocoupler for outputs 6ES7924-0BF20-0Bx0	
Input data for supply voltage	
Potential connection (L1/M1)	24 V DC (20.4 ... 28.8 V DC)
Status display "L1"	Green LED
Input data for switching inputs	
Number of switching inputs	8 channels (channel 0 ... 7) With reverse polarity protection
Input voltage "off"	0 V DC (0 ... 5 V DC)
Input voltage "on"	24 V DC (15 ... 28.8 V DC)
Input current	min. 5 mA with 20 V DC, per channel
Status display "on"	Green LED per channel
Output data for supply voltage	
Operating voltage V_{op} (L2/M2, L3/M3)	24 V DC (20 ... 30 V DC), one per group of 4
V_{op} with conditional reverse polarity protection	Up to 30 V DC (Protected against reverse polarity if the ground potential of the output load is directly connected to the 0 V supply of the power supply unit.)
Current consumption	Approx. 10 mA at 24 V DC + output currents
Total current	max. 16 A per group of 4
Switching outputs	
Number	8 channels (channel 0 ... 7)
Short-circuit protection	When Vop < 24 V DC or 20 … 30 V DC/max. 20 A No continuous short-circuit protection, max. duration approx. 60 min.
Output voltage	Typ. V_{op} – 0.5 V (for input "on")
Output current	Max. 4 A per channel
Lamp load	max. 40 W at 24 V per channel
Short-circuit response	Clocked output signal (approx. 2 ... 20 ms)
On/Off-delay	Typ. 100 µs / 250 µs with resistive load
Switching frequency	max. 500 Hz with 4 A resistive load (square wave voltage, pulse/pause 1:1)
"Overload" fault display	Red LED per channel, in the event of wire break or short-circuit
Wire break display active	When output "off" and R_{load} > 2 MOhm
Recommended conductor cross-section for cable	1.5 mm ^{2}
Group fault messages SF1, SF2	
Monitored channels	SF1: Channels 0 … 3, SF2: Channels 4 … 7

Terminal module TPOo optocoupler for outputs 6ES7924-0BF20-0Bx0	
Voltage V_{SF1}, V_{SF2}	
No error at the switching output	Typ. Vop – 2 V
Wire break at the switching output	Approx. 0 V
Short-circuit at the switching output	0 V to V_{op}, clocked
Current I_{SF1}, I_{SF2}	min. 4 mA/max. 200 mA
General data	
Connection to SIMATIC fitted for	16-pin IDC connector with fitted strain relief
Degree of protection	IP20
Operating temperature	0 … 60 °C
Mounting position	Any, except overhead
Connecting terminals	Screw-type terminal or push-in system
Stripped length	9 mm
Conductor cross-section	
Finely stranded without end sleeve	0.5 … 2.5 mm^2
With end sleeve for screw-type terminals	0.5 ... 2.5 mm^2 in accordance with DIN 46222-1
With end sleeve, push-in system	0.2 … 2.5 mm^2
Screwdriver	According to DIN 5264 B 0.6 x 3.5 mm
Tightening torque of screw-type terminals	0.4 … 0.7 Nm
Weight	
Screw model	0.29 kg
Push-in model	0.25 kg
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
6ES7924-0BF20-0Bx0	Approx. 130 x 76 x 60

Terminal modules for 50-pin connecting cable

Table 6- 17 Technical specifications for terminal modules TP1 and TP3 without LED

Terminal modules TP1 and TP3, 50-pin **1-wire connection without LED 6ES7924-2AA20-0Ax0** **3-wire initiators without LED 6ES7924-2CA20-0Ax0**	
Type of supply voltage	DC
Operating voltage	max. 50 V
Max. permissible continuous current per signal	1 A
Max. permissible total current (power supply)	2 A / byte
Connection to SIMATIC fitted for	50-pin IDC connector with fitted strain relief
Operating temperature	0 to + 60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, Overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
1-wire connection 6ES7924-2AA20-0Ax0	Approx. 100 x 76 x 60
For 3-wire initiators 6ES7924-2CA20-0Ax0	Approx. 175 x 76 x 60

Table 6- 18 Technical specifications for terminal modules TP1 and TP3 with LED

Terminal modules TP1 and TP3, 50-pin **1-wire connection with LED 6ES7924-2AA20-0Bx0** **3-wire initiators with LED 6ES7924-2CA20-0Bx0**	
Type of supply voltage	DC
Operating voltage	max. 24 V
Max. permissible continuous current per signal	1 A
Max. permissible total current (power supply)	2 A / byte
Connection to SIMATIC fitted for	50-pin IDC connector with fitted strain relief
Operating temperature	0 to + 60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
1-wire connection 6ES7924-2AA20-0Bx0	Approx. 100 x 76 x 60
For 3-wire initiators 6ES7924-2CA20-0Bx0	Approx. 175 x 76 x 60

Table 6- 19 Technical specifications for terminal module TPA

Terminal modules TPA, 50-pin, for analog modules in S7-1500 or ET200MP 6ES7924-2CC20-0Ax0 series	
Type of supply voltage	DC
Operating voltage	max. 50 V
Max. permissible continuous current per signal line	1 A
Connection to SIMATIC fitted for	50-pin IDC connector with fitted strain relief
Operating temperature	0 to + 60° C
Mounting position	Any
Clearances and creepage distances	IEC 60664-1, IEC61131-2, CSA C22.2 No 142 UL 508, VDE 0160, overvoltage category II, pollution degree 2
Dimensions (W x H x D) in mm	
For analog modules 6ES7924-2CC20-0Ax0	Approx. 130 x 76 x 60

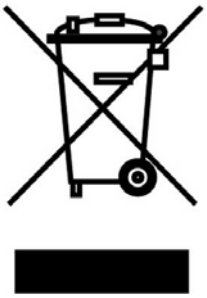
Environment

7

The device conforms to the RoHS Directive.

No materials used release silicone.

Disposal provisions



The packaging and packing products are recyclable and should be recycled. The product itself must not be disposed of in the household waste.

Dimension drawings

A

A.1 Front connector modules

Views

All views in the dimension drawings below are numbered.

The following applies:

Number	View
①	Front view
②	View from left

Note

All dimensions in millimeters (mm).

Front connector module 6ES7921-5AB20-0AA0

8-bit, for digital modules

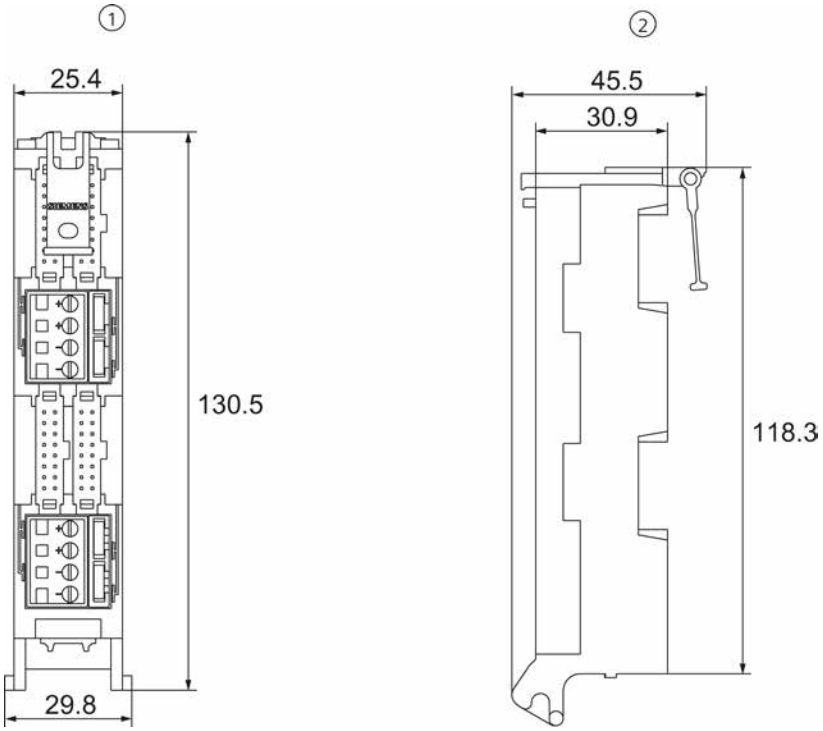


Figure A-1 6ES79215AB20-0AA0

Front connector module 6ES7921-5AH20-0AA0

8-bit, for digital modules

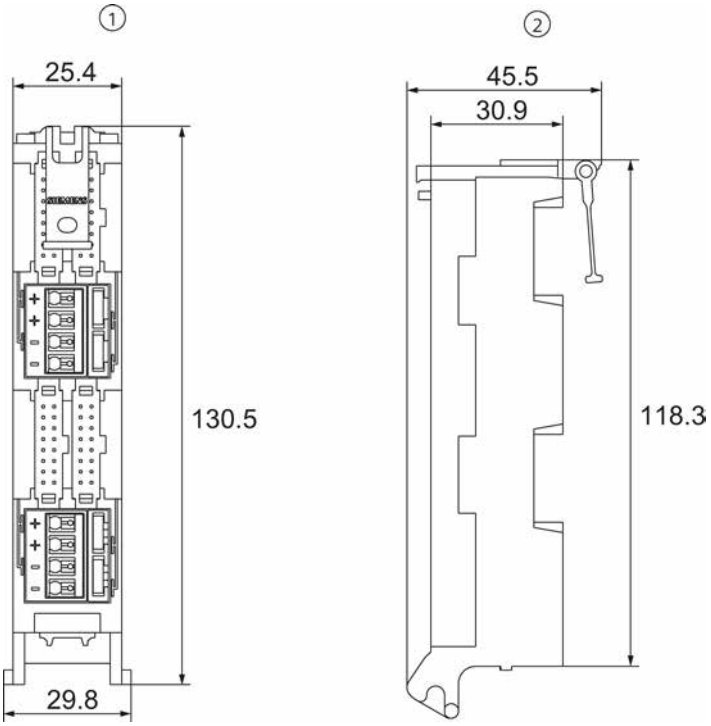


Figure A-2 6ES7921-5AH20-0AA0

Front connector module 6ES7921-5AK20-0AA0

8-bit, for analog modules

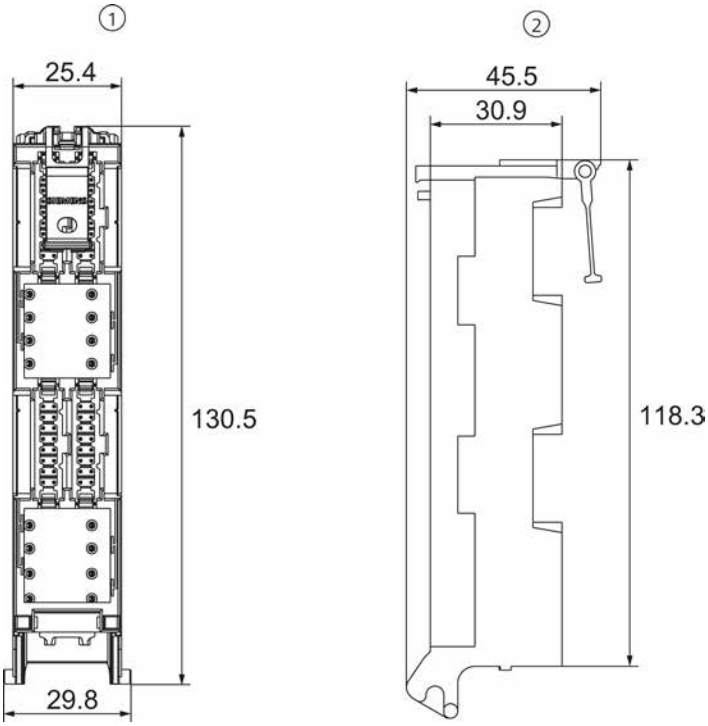


Figure A-3 6ES7921-5AK20-0AA0

Front connector module 6ES7921-5AD00-0AA0

8-bit, for 2 A modules

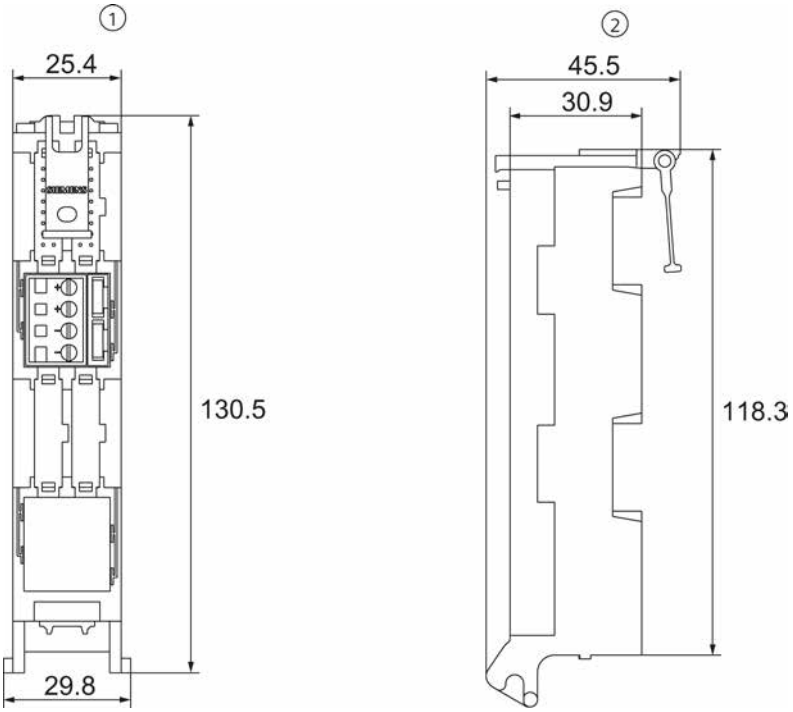


Figure A-4 6ES7921-5AD00-0AA0

Front connector module 6ES7921-5AJ00-0AA0

8-bit, for 2 A modules

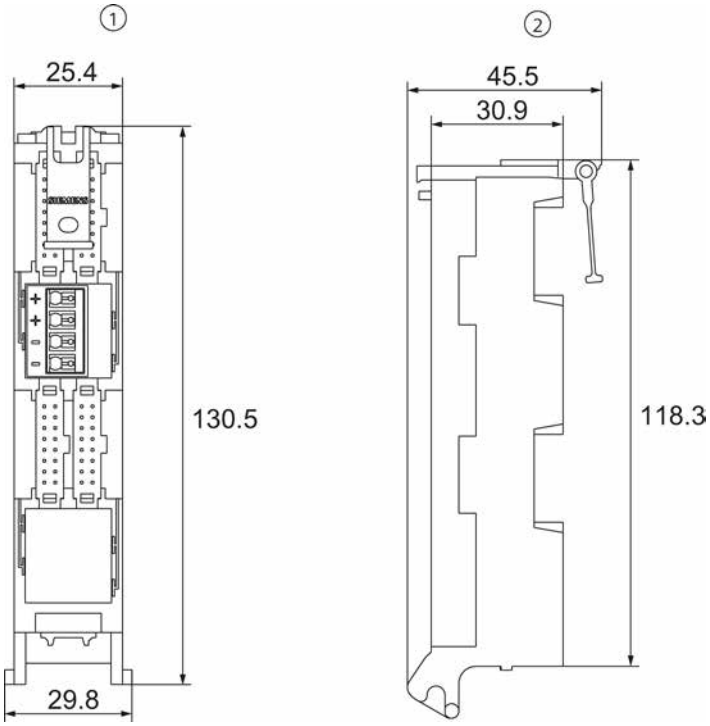


Figure A-5 6ES7921-5AJ00-0AA0

Front connector module 6ES7921-5CB20-0AA0

32-bit, for digital modules

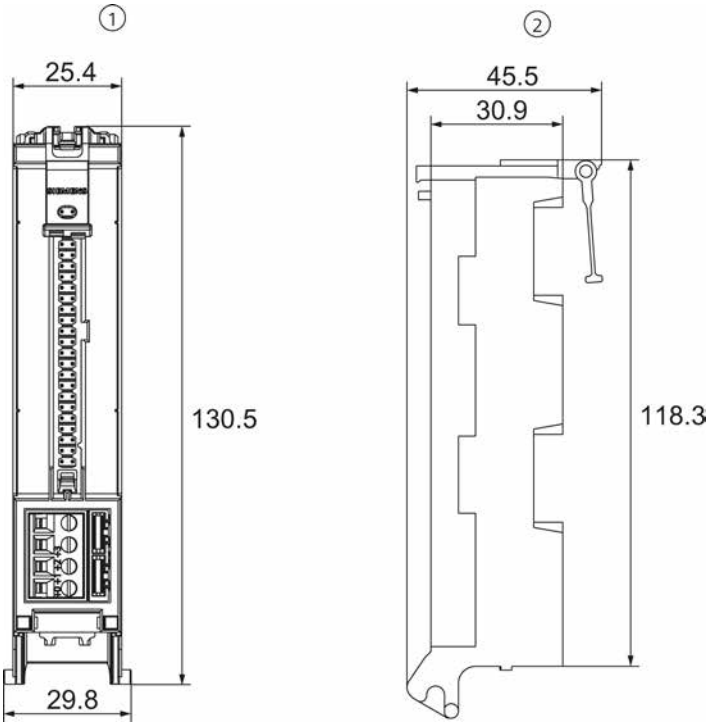


Figure A-6 6ES7921-5CB20-0AA0

Front connector module 6ES7921-5CH20-0AA0

32-bit, for digital modules

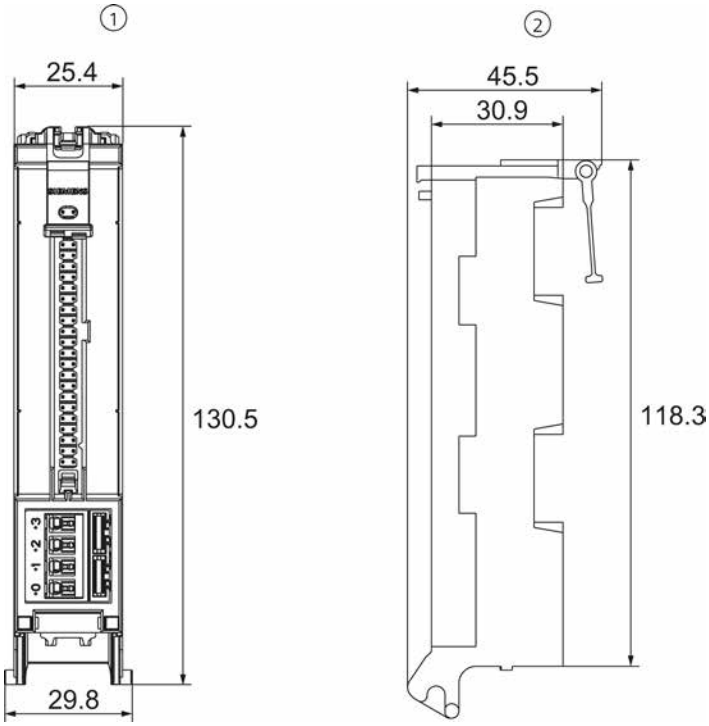


Figure A-7 6ES7921-5CH20-0AA0

Front connector module 6ES7921-5CK20-0AA0

32-bit, for analog modules

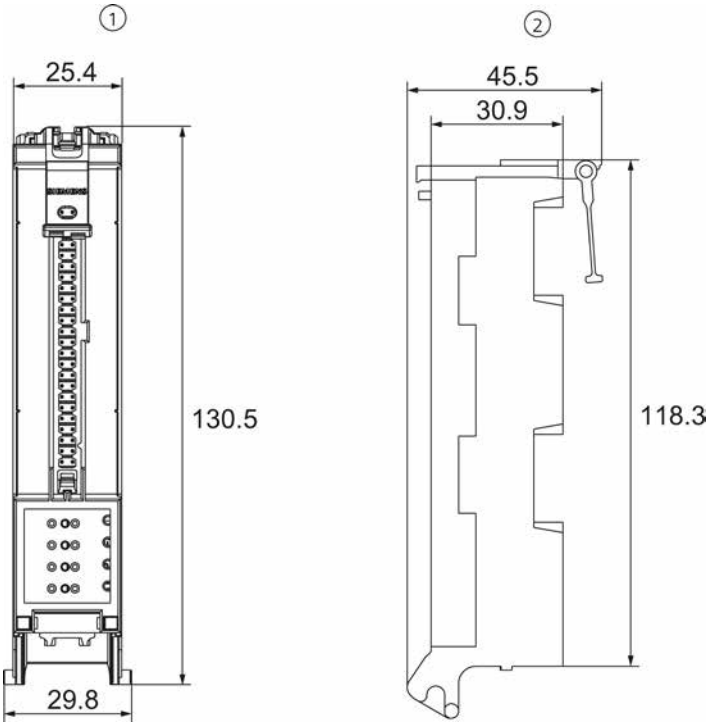


Figure A-8 6ES7921-5CK20-0AA0

A.2 Terminal modules for 16-pin connecting cable

Views

All views in the dimension drawings below are numbered.

The following applies:

Number	View
①	Front view
②	Front view with front flap closed
③	Left view with front flap closed

Note

All dimensions in millimeters (mm).

Note

The dimensions for terminal modules with screw-type terminals are the same as for those with the push-in system.

Terminal module 6ES7924-0AA20-0AA0

TP1 without LED

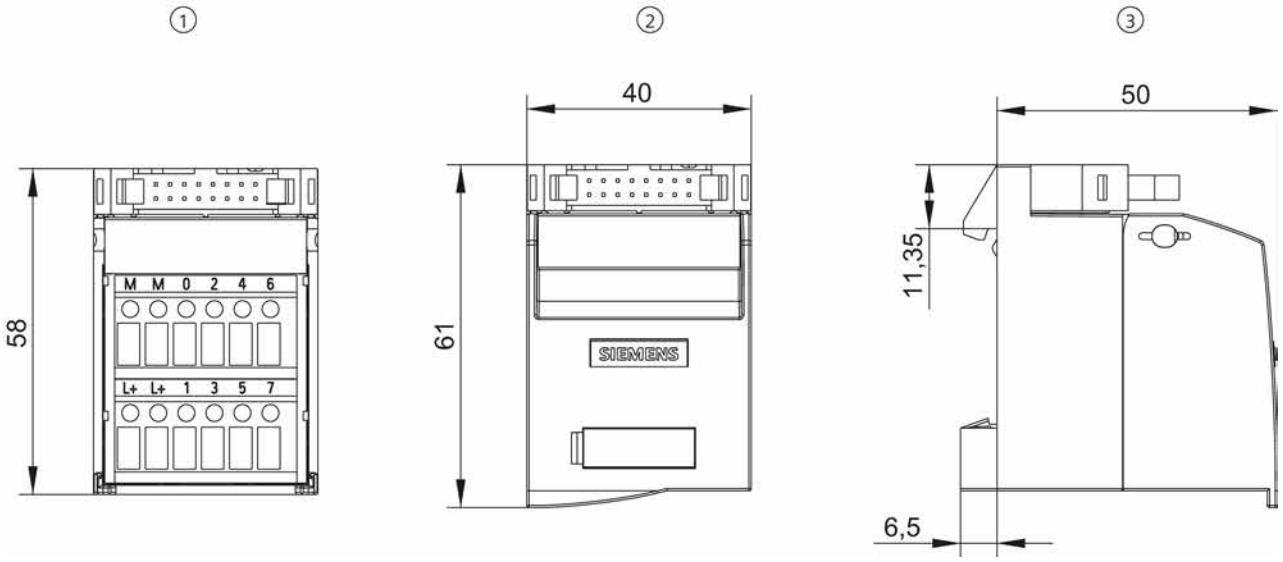


Figure A-9 6ES7924-0AA20-0AA0

Terminal module 6ES7924-0AA20-0BA0

TP1 with LED

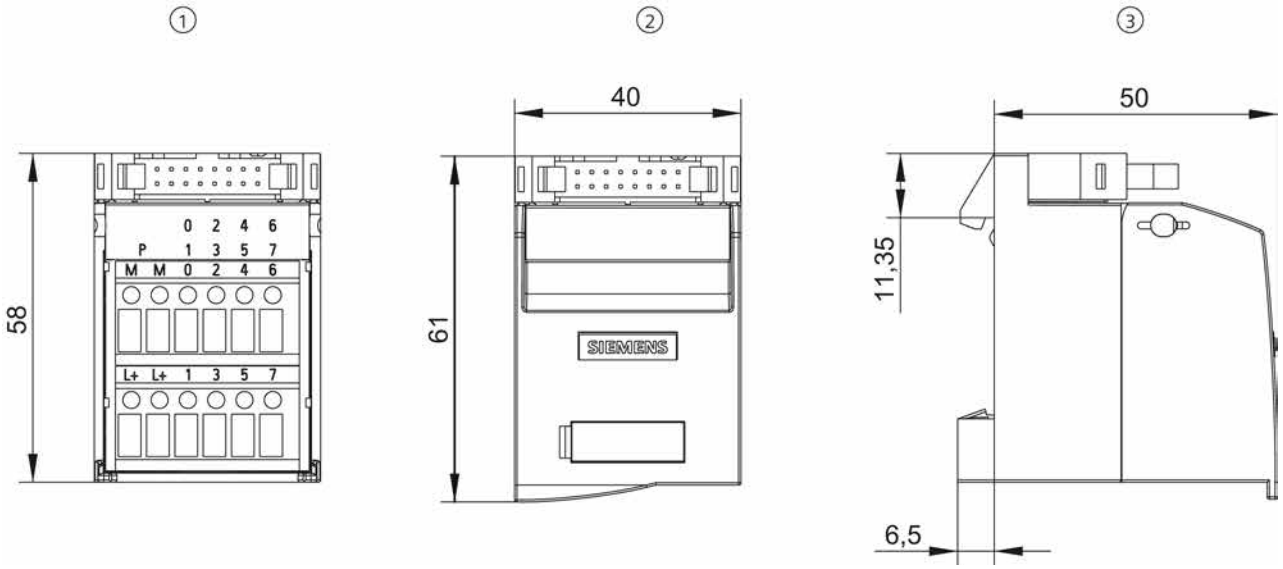


Figure A-10 6ES7924-0AA20-0BA0

Terminal module 6ES7924-0BB20-0AA0

TP2 without LED

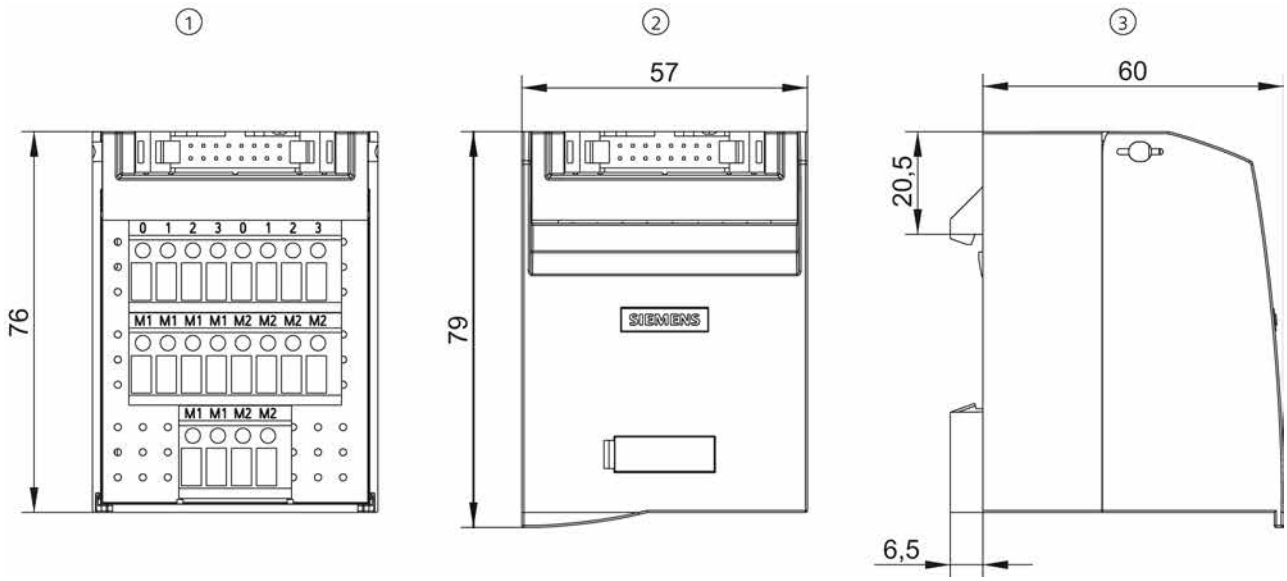


Figure A-11 6ES7924-0BB20-0AA0

Terminal module 6ES7924-0CA20-0AA0

TP3 without LED

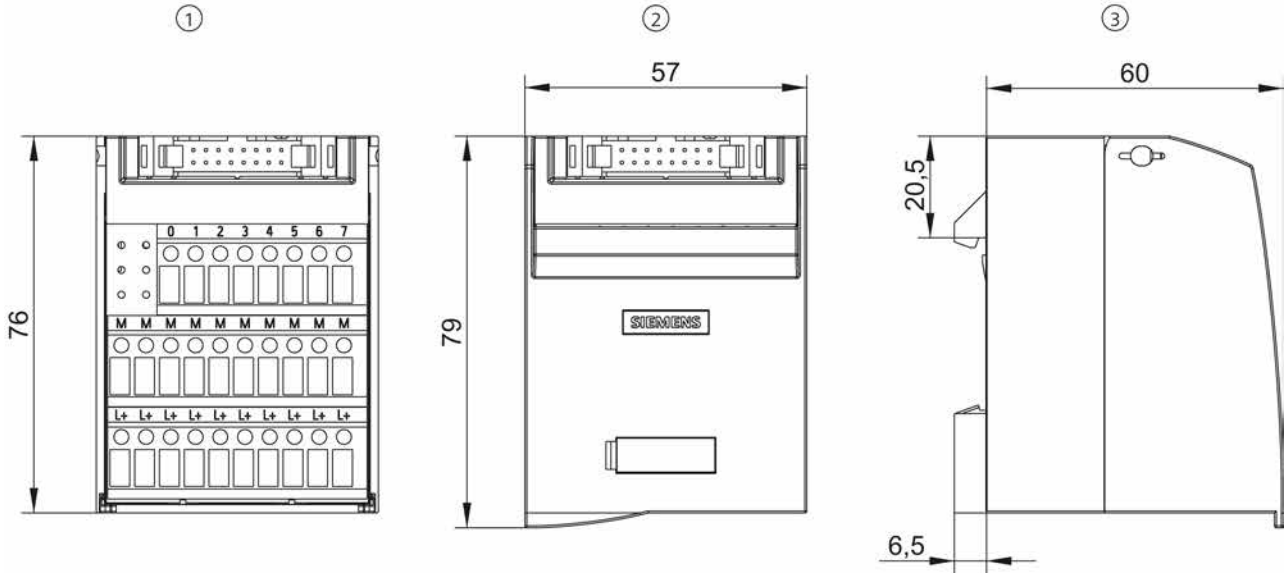


Figure A-12 6ES7924-0CA20-0AA0

Terminal module 6ES7924-0CA20-0BA0

TP3 with LED

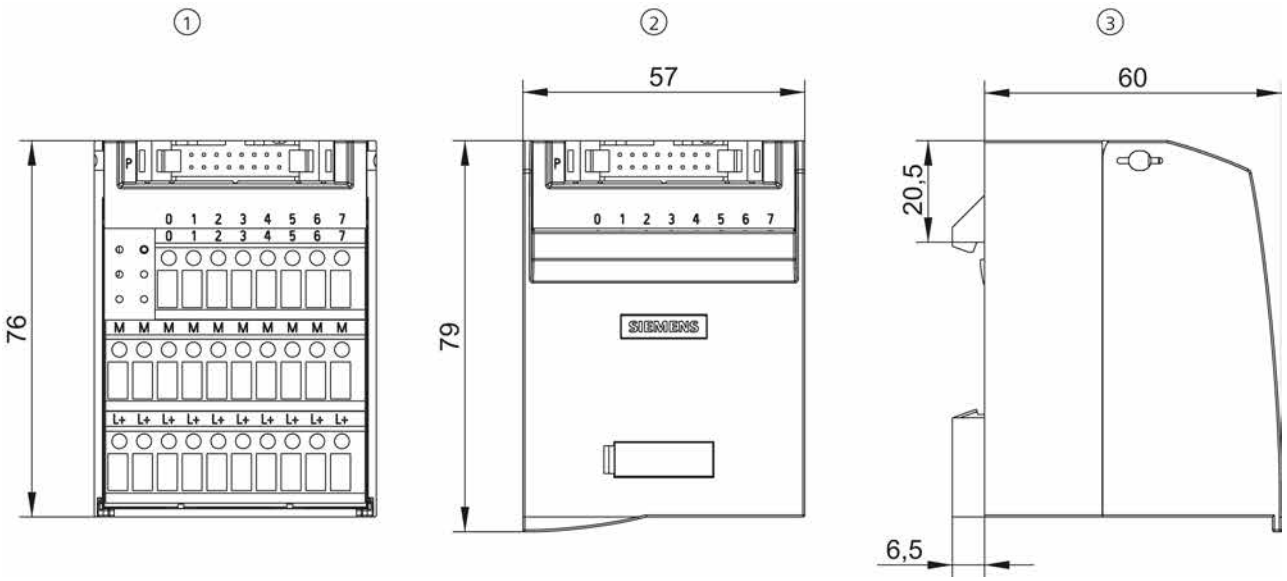


Figure A-13 6ES7924-0CA20-0BA0

Terminal module 6ES7924-0CC20-0AA0

TPA without LED

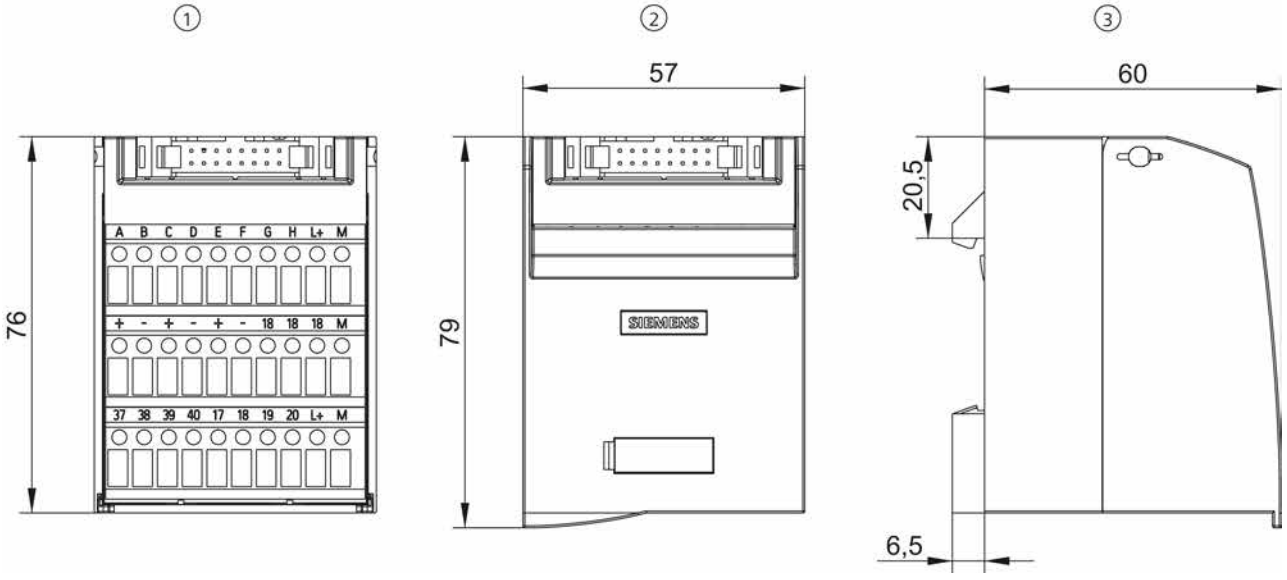


Figure A-14 6ES7924-0CC20-0AA0

Terminal module 6ES7924-0BE20-0BA0

TPRi 230 V with LED

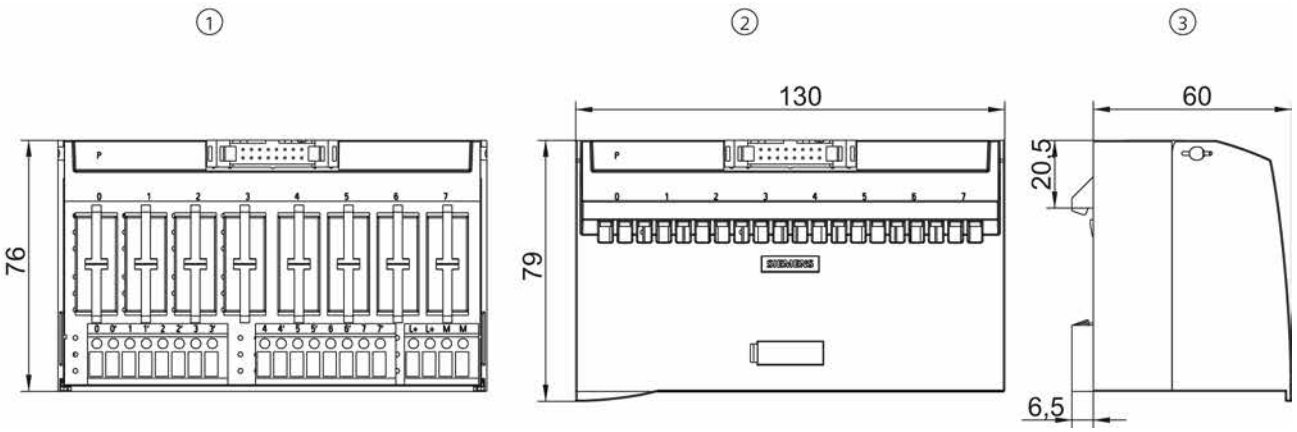


Figure A-15 6ES7924-0BE20-0BA0

Terminal module 6ES7924-0BG20-0BA0

TPRi 110 V with LED

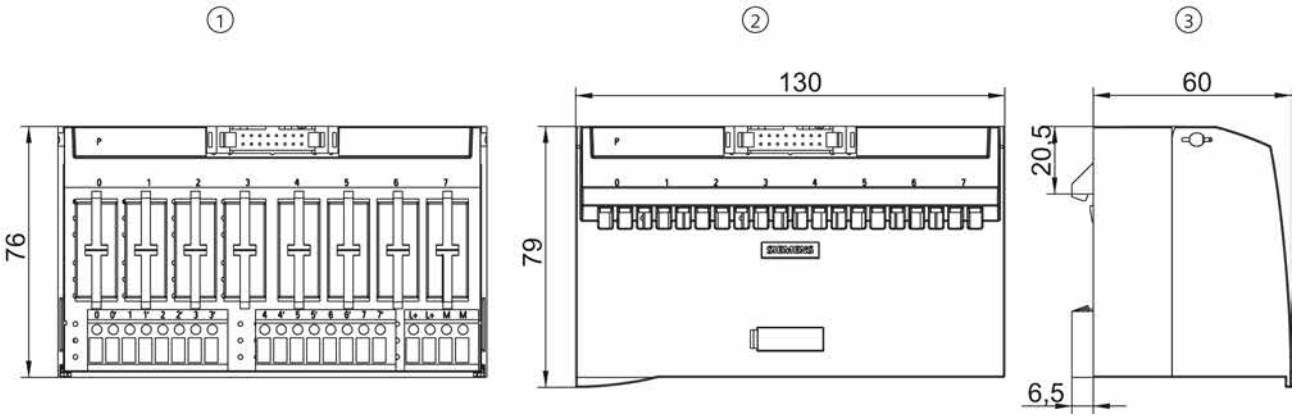


Figure A-16 6ES7924-0BG20-0BA0

Terminal module 6ES7924-0BD20-0BA0

TPRo with LED

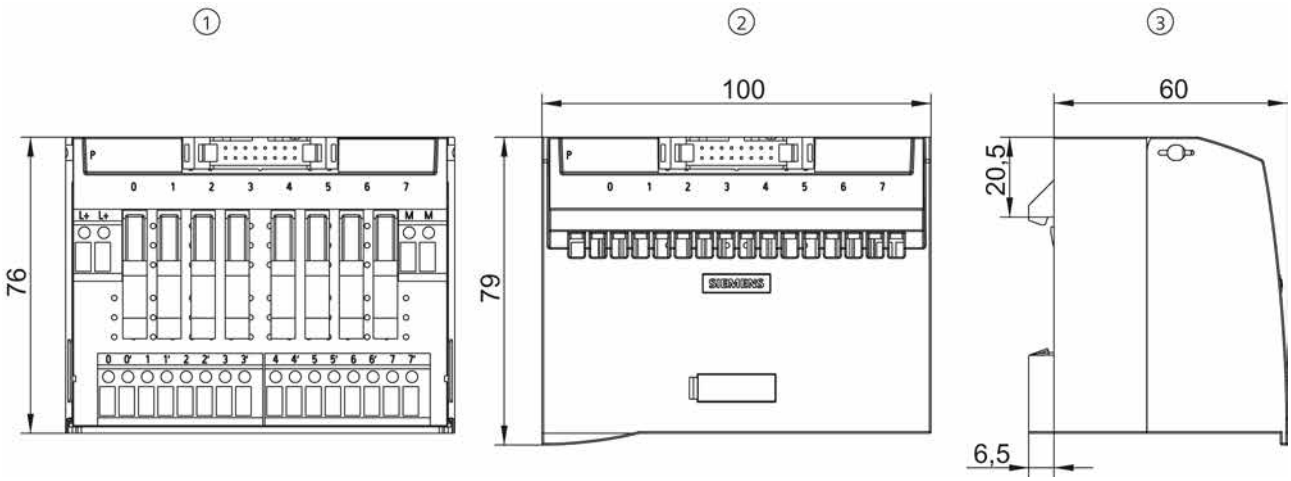


Figure A-17 6ES7924-0BD20-0BA0

Terminal module 6ES7924-0BF20-0BA0

TPOo with LED

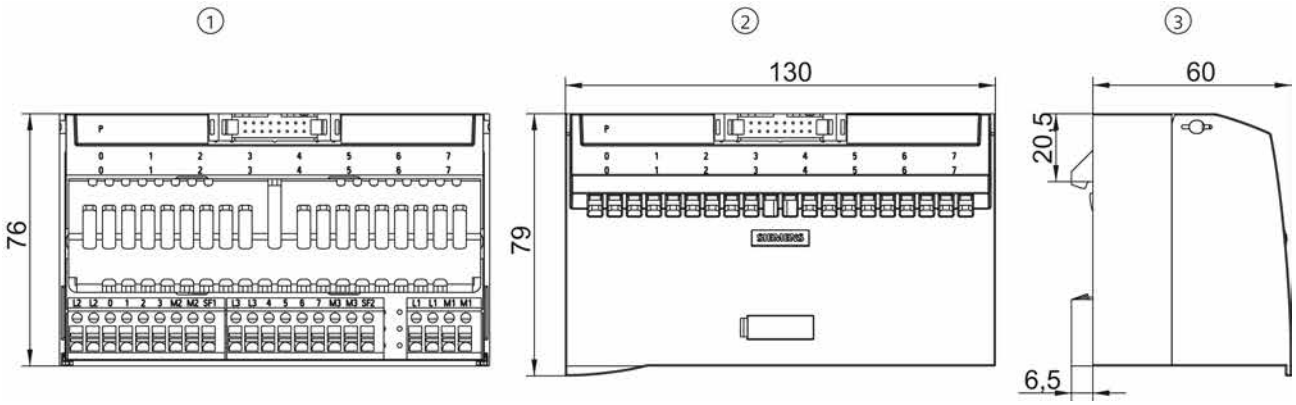


Figure A-18 6ES7924-0BF20-0BA0

A.3 Terminal modules for 50-pin connecting cable

All views in the dimension drawings below are numbered.

The following applies:

Number	View
①	Front view
②	Front view with front flap closed
③	Left view with front flap closed

Note

All dimensions in millimeters (mm).

Note

The dimensions for terminal modules with screw-type terminals are the same as for those with the push-in system.

Terminal module 6ES7924-2AA20-0AA0

TP1 without LED

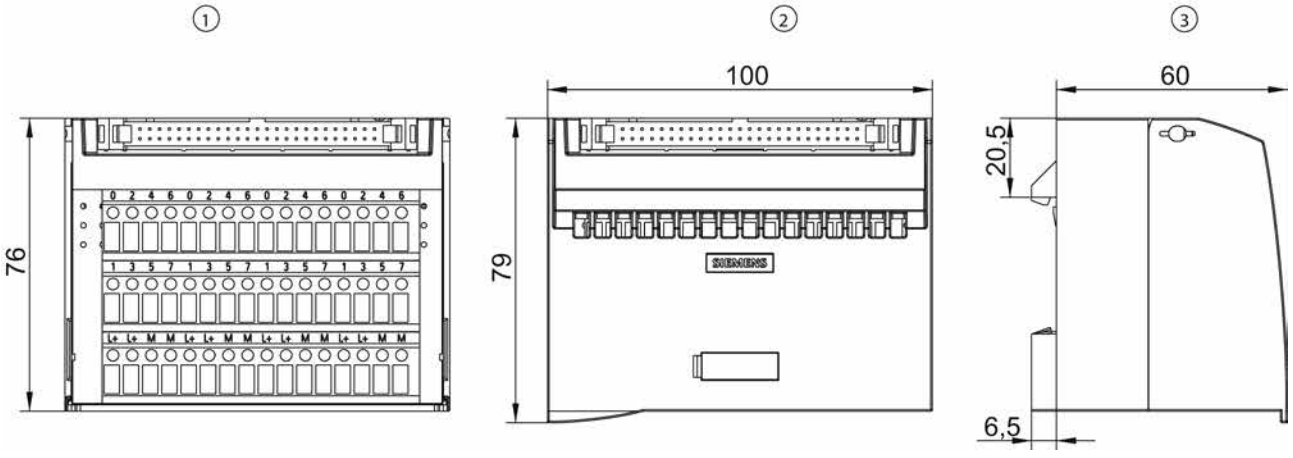


Figure A-19 6ES7924-2AA20-0AA0

Terminal module 6ES7924-2AA20-0BA0

TP1 with LED

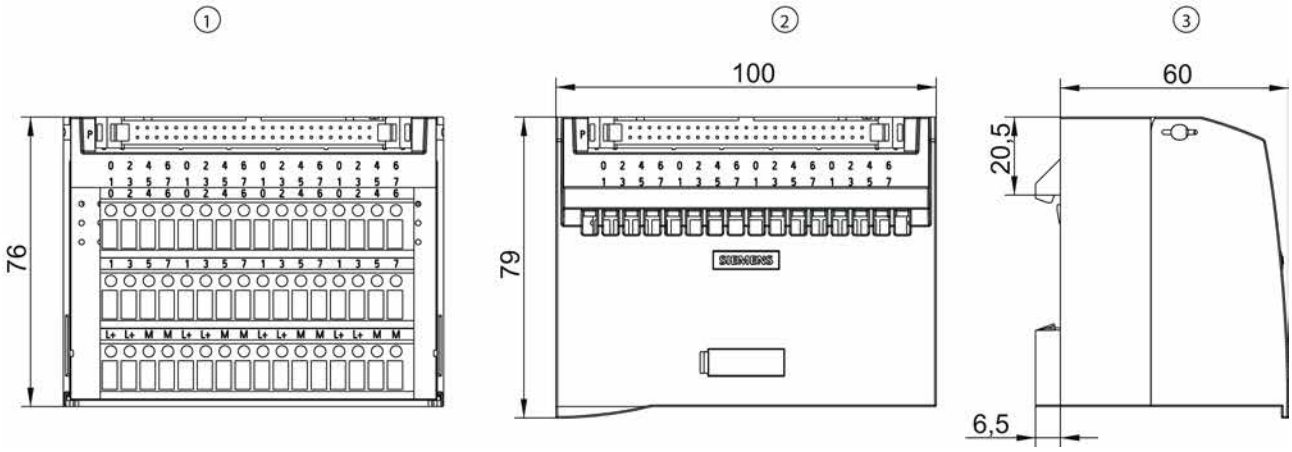


Figure A-20 6ES7924-2AA20-0BA0

Terminal module 6ES7924-2CA20-0AA0

TP3 without LED

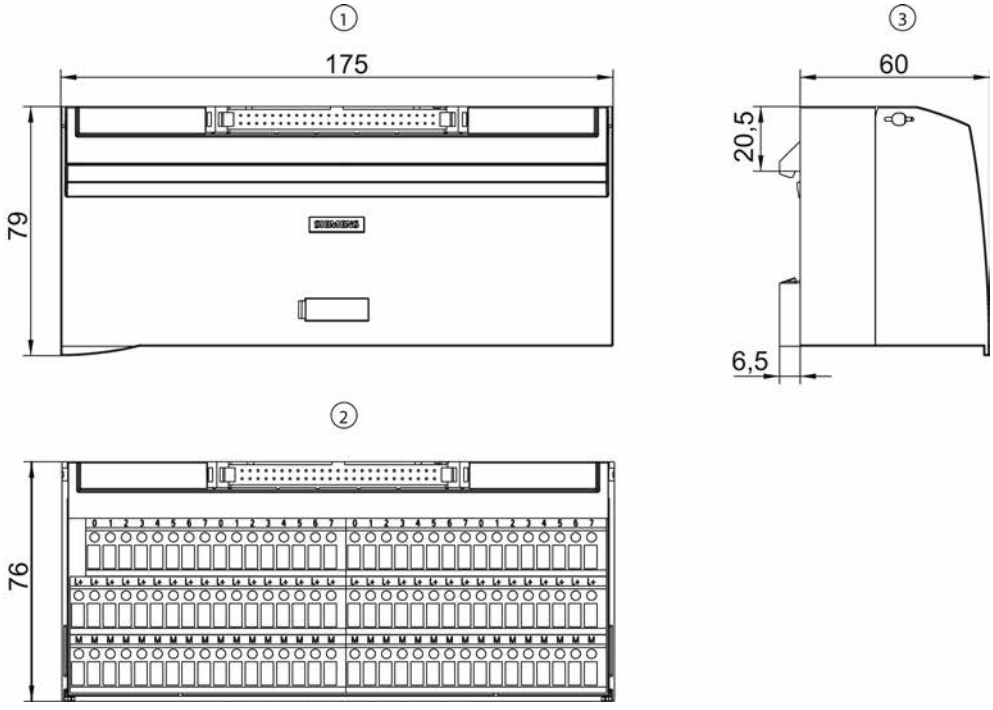


Figure A-21 6ES7924-2CA20-0AA0

Terminal module 6ES7924-2CA20-0BA0

TP3 with LED

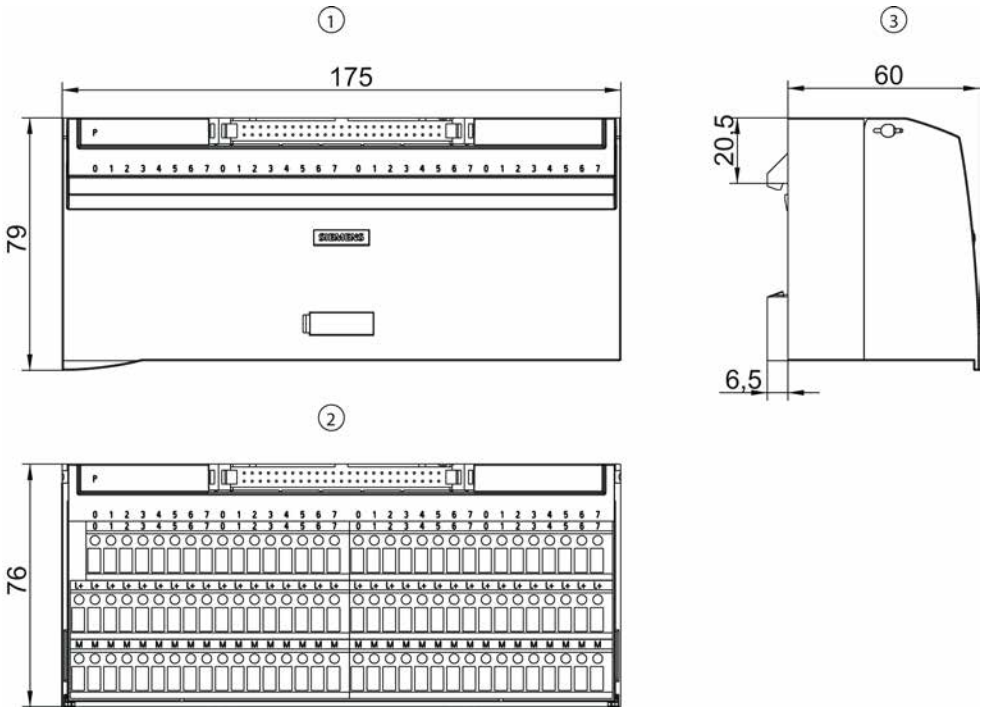


Figure A-22 6ES7924-2CA20-0BA0

Terminal module 6ES7924-2CC20-0AA0

TPA without LED

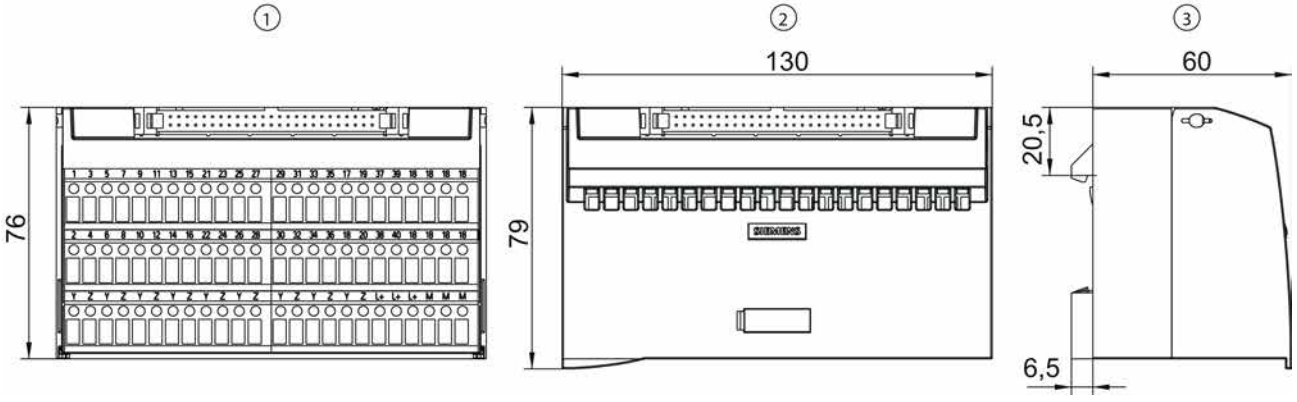


Figure A-23 6ES7924-2CC20-0AA0

Circuit diagrams

B

B.1 Circuit diagrams for front connector modules

Front connector modules 6ES7921-5AB20-0AA0 and 6ES7921-5AH20-0AA0

For digital I/O modules

Front connector module with potential supply

Connecting terminals in

Screw-type system: 6ES7921-5AB20-0AA0

Push-in system: 6ES7921-5AH20-0AA0

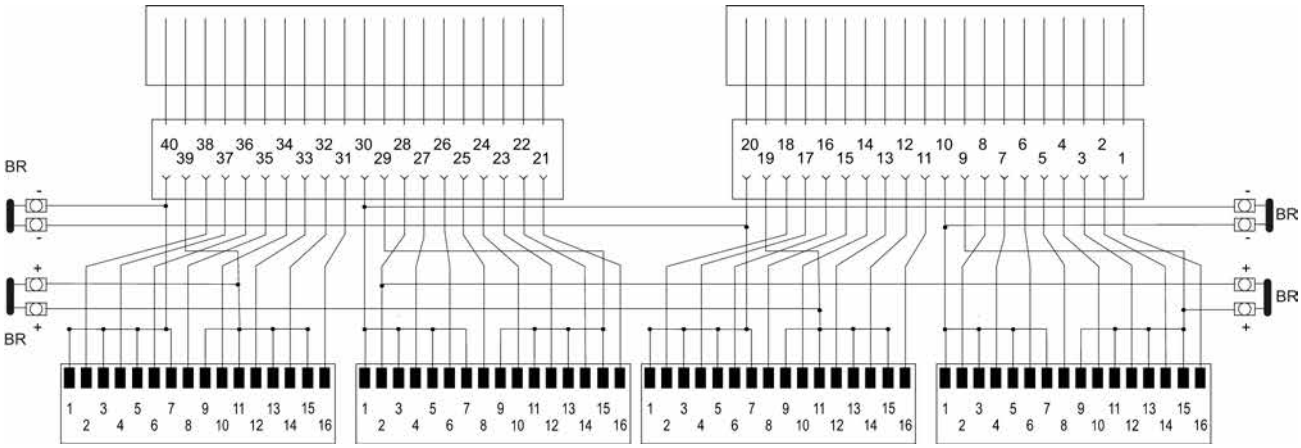


Figure B-1 6ES7921-5AB20-0AA0 and 6ES7921-5AH20-0AA0

Front connector module 6ES7921-5AD00-0AA0 and 6ES7921-5AJ00-0AA0

For 2-ampere digital output modules

Front connector module with potential supply

Connecting terminals in

Screw-type system: 6ES7921-5AD00-0AA0

Push-in system: 6ES7921-5AJ00-0AA0

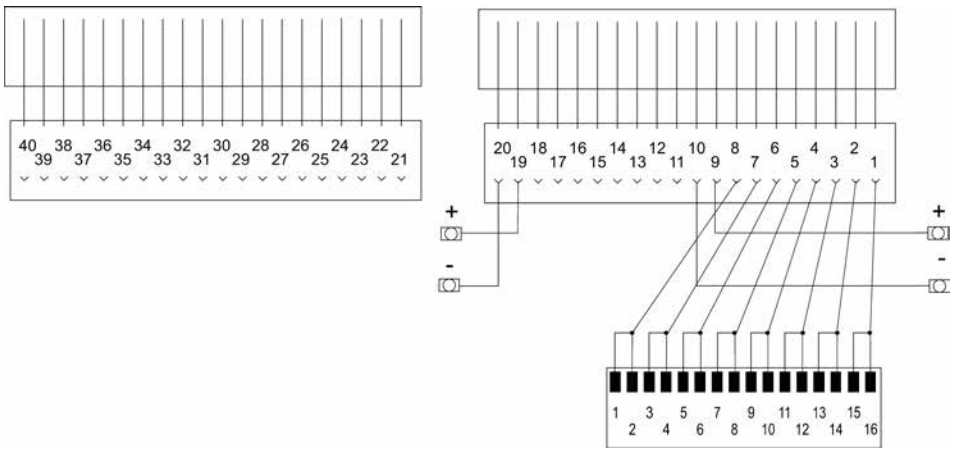


Figure B-2 6ES7921-5AD00-0AA0 and 6ES7921-5AJ00-0AA0

Front connector module 6ES7921-5AK20-0AA0

For analog I/O modules

Front connector module for connecting 4 x 16-pin connecting cables

Article number

6ES7921-5AK20-0AA0

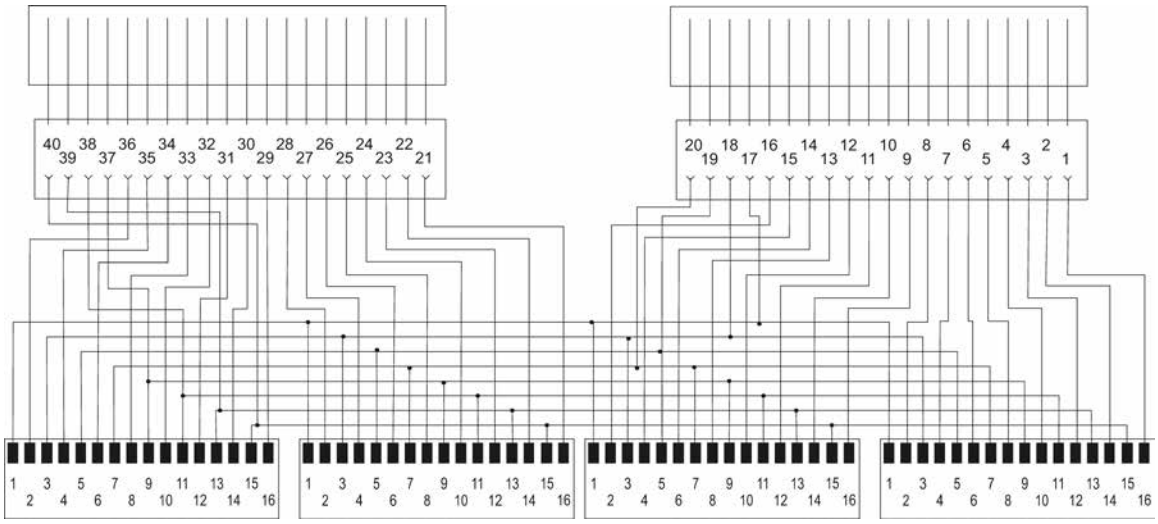


Figure B-3 6ES7921-5AK20-0AA0

Front connector modules 6ES7921-5CB20-0AA0 and 6ES7921-5CH20-0AA0

For digital I/O modules

Front connector module with potential supply

Connecting terminals in

Screw-type system: 6ES7921-5CB20-0AA0

Push-in system: 6ES7921-5CH20-0AA0

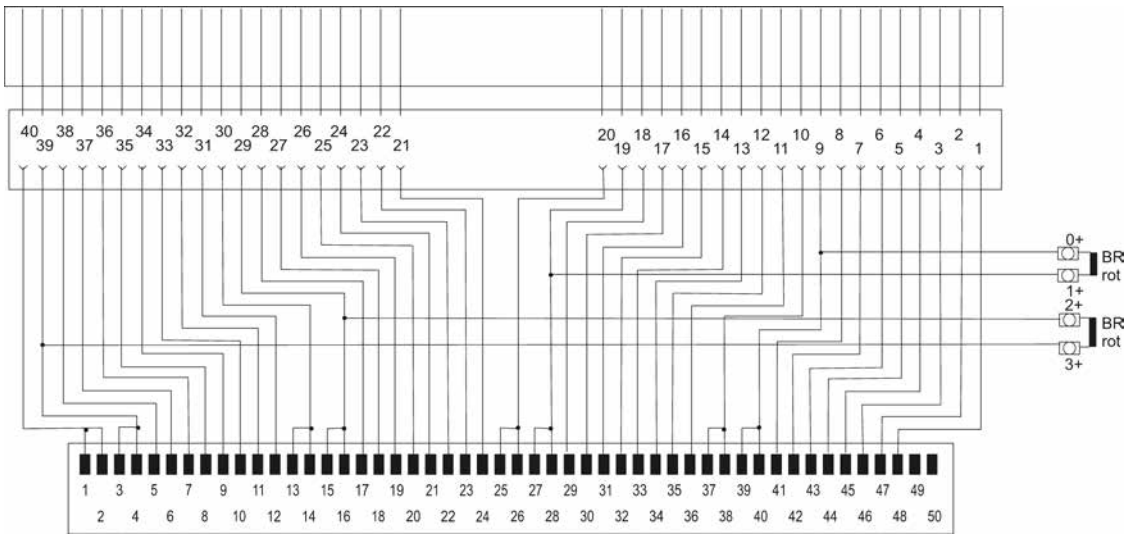


Figure B-4 6ES7921-5CB20-0AA0 and 6ES7921-5CH20-0AA0

Front connector module 6ES7921-5CK20-0AA0

For analog I/O modules

Front connector module for connecting 50-pin connecting cable

Article number

6ES7921-5CK20-0AA0

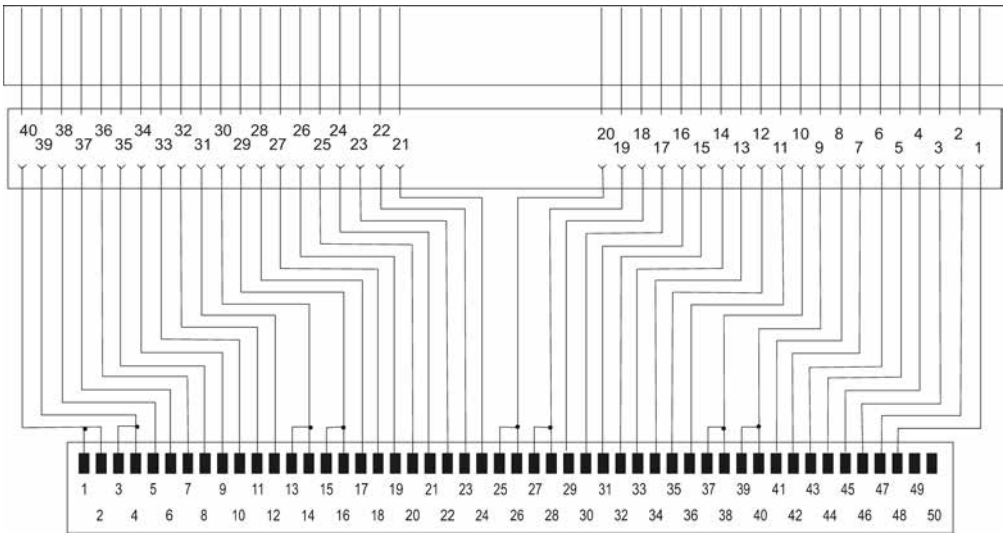


Figure B-5 6ES7921-5CK20-0AA0

B.2 Circuit diagrams, terminal modules for 16-pin connecting cable

Terminal module 6ES7924-0AA20-0Ax0

Terminal module TP1

For S7-300 / ET200M / S7-1500 / ET200MP, for 8 I/O (16-pin connecting cables)

Connecting terminals in

Screw-type system: 6ES7924-0AA20-0AA0

Push-in system: 6ES7924-0AA20-0AC0

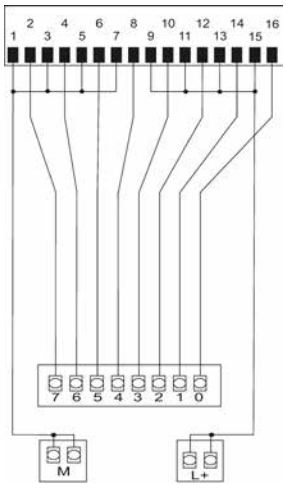


Figure B-6 6ES7924-0AA20-0Ax0

Terminal module 6ES7924-0AA20-0Bx0

Terminal module Tp1 with LED

For S7-300 / ET200M / S7-1500 / ET200MP, for 8 I/O (16-pin connecting cables)

Connecting terminals in

Screw-type system: 6ES7924-0AA20-0BA0

Push-in system: 6ES7924-0AA20-0BC0

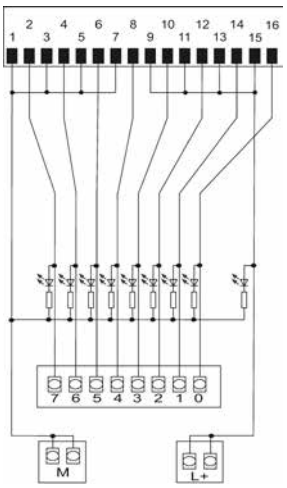


Figure B-7 6ES7924-0AA20-0Bx0

Terminal module 6ES7924-0BB20-0Ax0

Terminal module TP2

For S7-300 / ET200M / S7-1500 / ET200MP, for 8-ampere output module

Connecting terminals in

Screw-type system 6ES7924-0BB20-0AA0

Push-in system 6ES7924-0BB20-0AC0

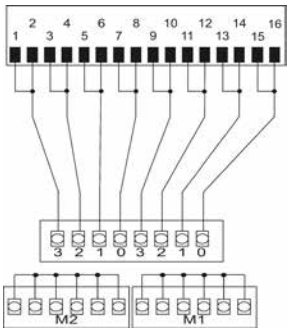


Figure B-8 6ES7924-0BB20-0Ax0

Terminal module 6ES7924-0BD20-0Ax0

Terminal module TPRo

For S7-300 / ET200M / S7-1500 / ET200MP

Connecting terminals in

Screw-type system: 6ES7924-0BD20-0AA0

Push-in system: 6ES7924-0BD20-0AC0

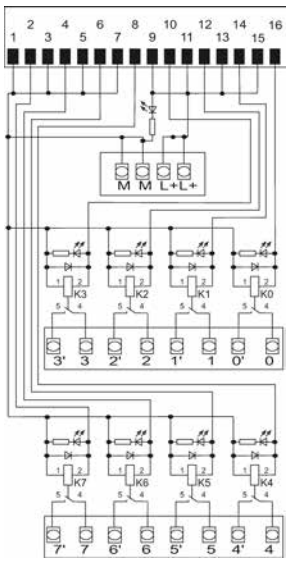


Figure B-9 6ES7924-0BD20-0Ax0

Terminal module 6ES7924-0BE20-0Ax0

Terminal module TPRi 230 V

For S7-300 / ET200M / S7-1500 / ET200MP

Connecting terminals in

Screw-type system: 6ES7924-0BE20-0AA0

Push-in system: 6ES7924-0BE20-0AC0

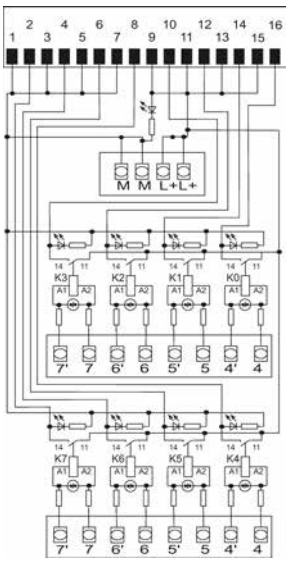


Figure B-10 6ES7924-0BE20-0Ax0

Terminal module 6ES7924-0BF20-0Ax0

Terminal module TPOo

For S7-300 / ET200M / S7-1500 / ET200MP

Connecting terminals in

Screw-type system: 6ES7924-0BF20-0AA0

Push-in system: 6ES7924-0BF20-0AC0

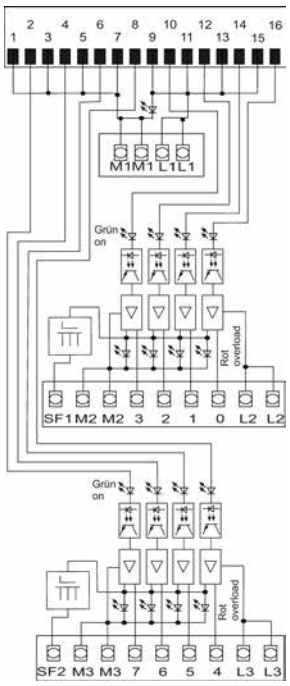


Figure B-11 6ES7924-0BF20-0Ax0

Terminal module 6ES7924-0BG20-0Ax0

Terminal module TPRi 110 V

For S7-300 / ET200M / S7-1500 / ET200MP

Connecting terminals in

Screw-type system: 6ES7924-0BG20-0AA0

Push-in system:6ES7924-0BG20-0AC0

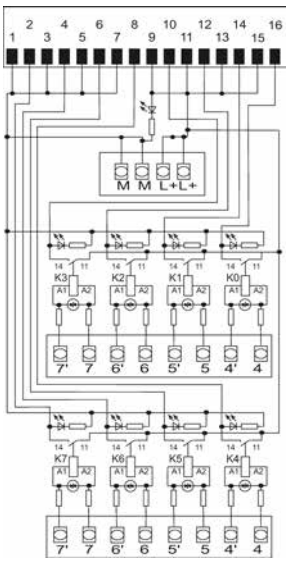


Figure B-12 6ES7924-0BG20-0Ax0

Terminal module 6ES7924-0CA20-0Ax0

Terminal module TP3 without LED

For S7-300 / ET200M / S7-1500 / ET200MP, for 8 I/O (16-pin connecting cables)

Connecting terminals in

Screw-type system: 6ES7924-0CA20-0AA0

Push-in system: 6ES7924-0CA20-0AC0

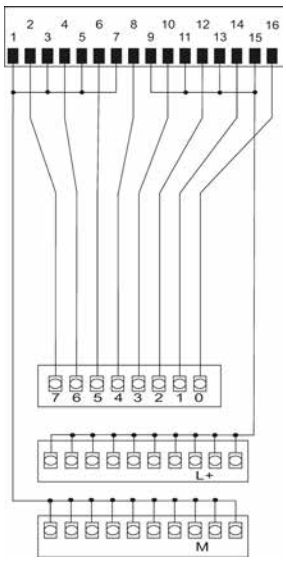


Figure B-13 6ES7924-0CA20-0Ax0

Terminal module 6ES7924-0CA20-0Bx0

Terminal module TP3 with LED

For S7-300 / ET200M / S7-1500 / ET200MP, for 8 I/O (16-pin connecting cables)

Connecting terminals in

Screw-type system:6ES7924-0CA20-0BA0

Push-in system: 6ES7924-0CA20-0BC0

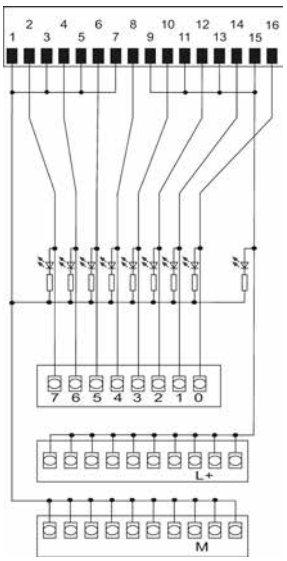


Figure B-14 6ES7924-0CA20-0Bx0

Terminal module 6ES7924-0CC20-0Ax0

Terminal module TPA (S7-1500)

For S7-1500 / ET200MP

Connecting terminals in

Screw-type system: 6ES7924-0CC20-0AA0

Push-in system: 6ES7924-0CC20-0AC0

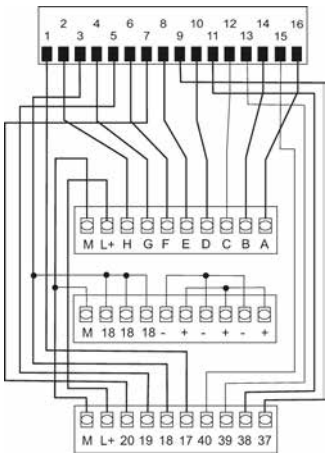


Figure B-15 6ES7924-0CC20-0Ax0

Terminal module 6ES7924-0CH20-0Bx0

Terminal module TPS, with LED switch

For S7-300 / ET200M / S7-1500 / ET200MP, for 8 I/O (16-pin connecting cables)

Connecting terminals in

Screw-type system: 6ES7924-0CH20-0BA0

Push-in system: 6ES7924-0CH20-0BC0

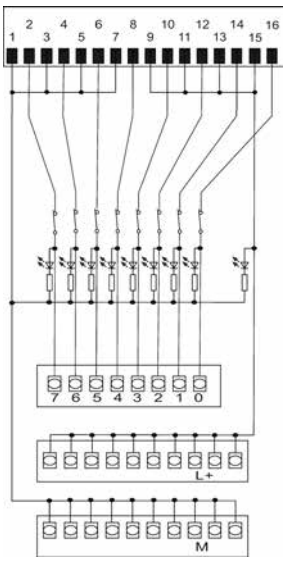


Figure B-16 6ES7924-0CH20-0Bx0

Terminal module 6ES7924-0CL20-0Bx0

Terminal module TPF with LED fuse

For S7-300 / ET200M / S7-1500 / ET200MP, for 8 I/O (16-pin connecting cables)

Connecting terminals in

Screw-type system: 6ES7924-0CL20-0BA0

Push-in system: 6ES7924-0CL20-0BC0

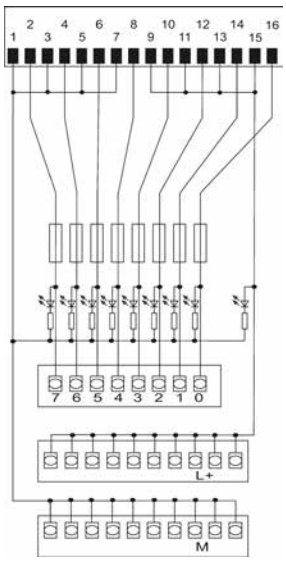


Figure B-17 6ES7924-0CL20-0Bx0

B.3 Circuit diagrams, terminal modules for 50-pin connecting cable

Note

All terminal modules for 50-pin connecting cables are for use with S7-1500 and ET200MP only.

Terminal module 6ES7924-2AA20-0Ax0

Terminal module TP1 without LED

For S7-1500 / ET200MP 32 I/O (50-pin connecting cables)

Connecting terminals in

Screw-type system: 6ES7924-2AA20-0AA0

Push-in system: 6ES7924-2AA20-0AC0

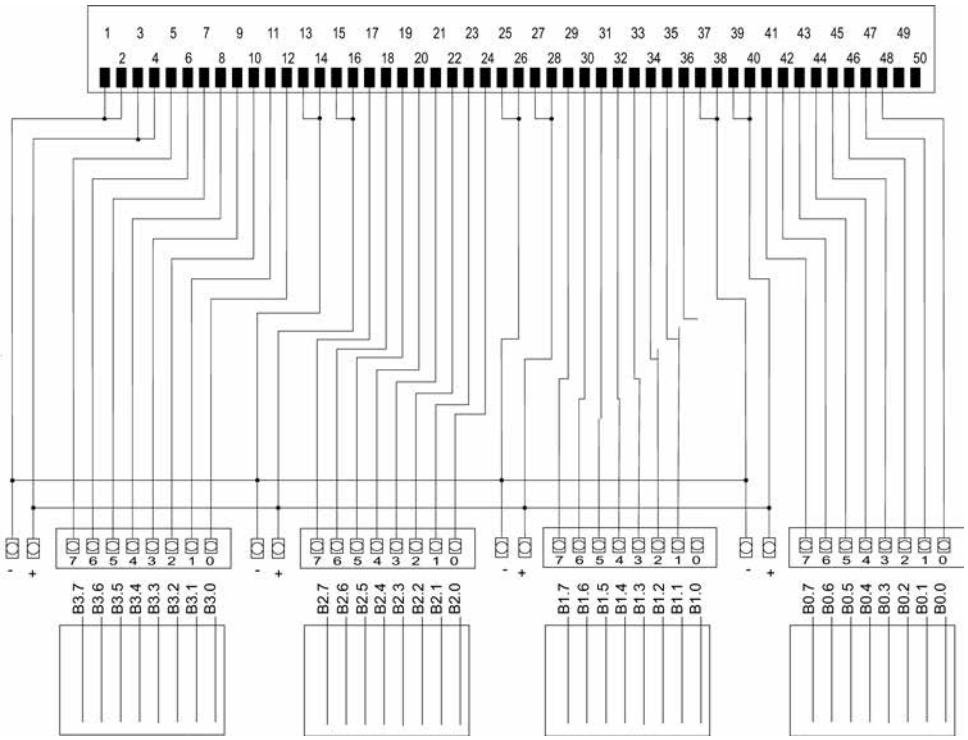


Figure B-18 6ES7924-2AA20-0Ax0

Terminal module 6ES7924-2AA20-0Bx0

Terminal module TP1 with LED

For S7-1500 / ET200MP 32 I/O (50-pin connecting cables)

Connecting terminals in

Screw-type system: 6ES7924-2AA20-0BA0

Push-in system: 6ES7924-2AA20-0BC0

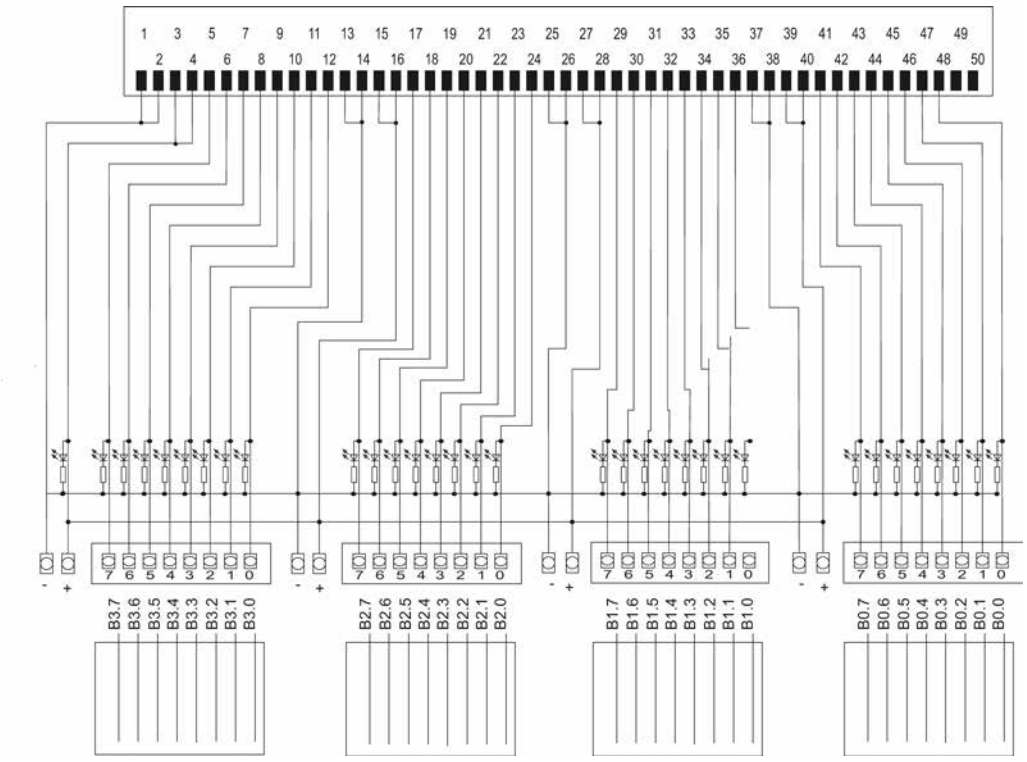


Figure B-19 6ES7924-2AA20-0Bx0

Terminal module 6ES7924-2CA20-0Ax0

Terminal module TP3

For S7-1500 / ET200MP 32 I/O (50-pin connecting cables)

Connecting terminals in

Screw-type system: 6ES7924-2CA20-0AA0

Push-in system: 6ES7924-2CA20-0AC0

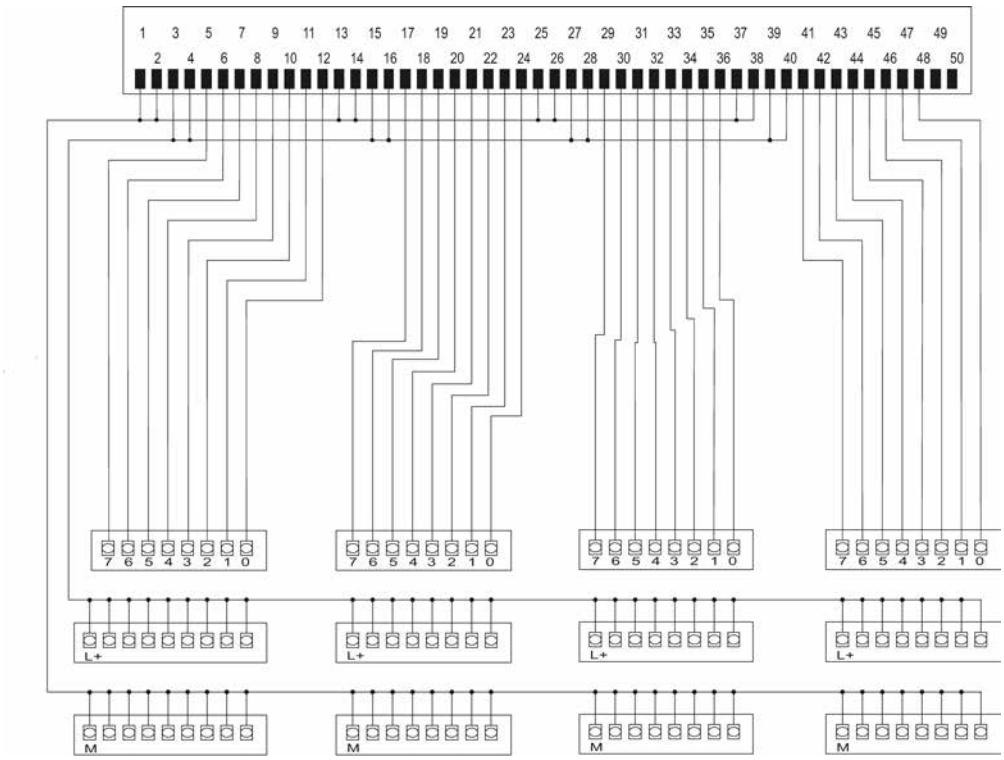


Figure B-20 6ES7924-2CA20-0Ax0

Terminal module 6ES7924-2CA20-0Bx0

Terminal module TP3 with LED

For S7-1500 / ET200MP 32 I/O (50-pin connecting cables)

Connecting terminals in

Screw-type system: 6ES7924-2CA20-0BA0

Push-in system: 6ES7924-2CA20-0BC0

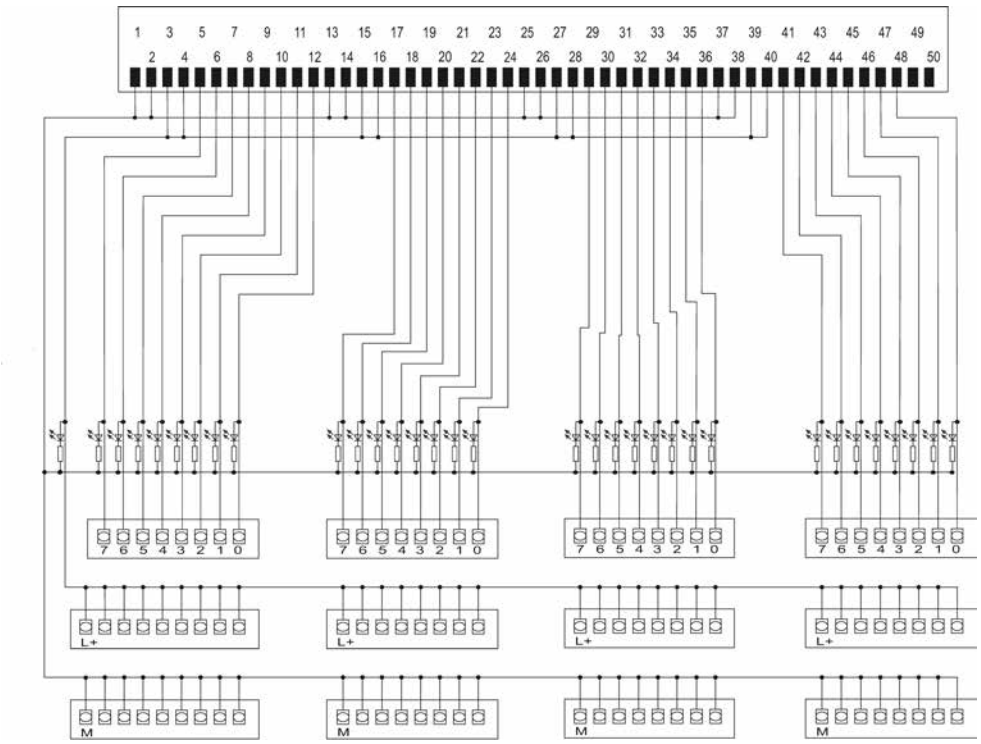


Figure B-21 6ES7924-2CA20-0Bx0

Terminal module 6ES7924-2CC20-0Ax0

Terminal module TPA for S7-1500 / ET200MP analog modules

Connecting terminals in

Screw-type system: 6ES7924-2CC20-0AA0

Push-in system: 6ES7924-2CC20-0AC0

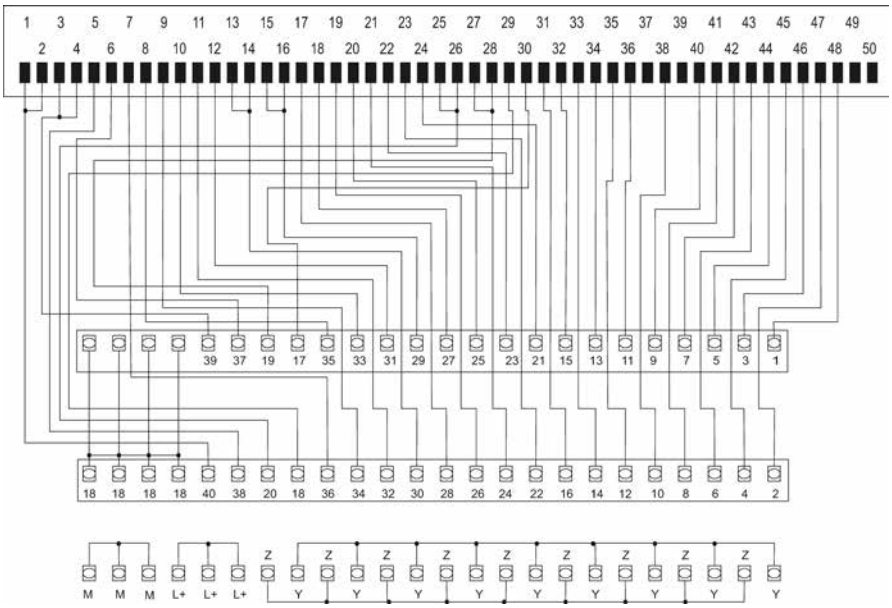


Figure B-22 6ES7924-2CC20-0Ax0

Spare parts / Accessories

C

C.1 Accessories

Accessories for SIMATIC TOP connect system cabling

Designation	Order number
Labels for fitting to terminal modules in the S7-1500 design, pack of 340, plug-in	3RT1900-1SB20
IDC connector (insulation displacement connector), set of 8 with 8 strain reliefs	6ES7921-3BE10-0AA0
Pliers for IDC connectors (insulation displacement connectors) for assembling the round-sheath ribbon cable	6ES7928-0AA00-0AA0
Shield plate TPA for 8 bits, set of 4	6ES7928-1AA20-4AA0
Shield plate TPA for 32 bits, set of 4	6ES7928-1BA20-4AA0
Shield connection clamps for shield plate SIMATIC end, set of 10	6ES7590-5BA00-0AA0
Shield connection clamps for shield plate field end φ 2x 2…6 mm, set of 2	6ES7390-5AB00-0AA0
Shield connection clamps for shield plate field end φ 3…8 mm, set of 2	6ES7390-5BA00-0AA0
Shield connection clamps for shield plate field end φ 4…13 mm, set of 2	6ES7390-5CA00-0AA0
Relay for TPRo 24 V DC, set of 4	6ES7928-3AA20-4AA0
Relay for TPRi 230 V AC, set of 4	6ES7928-3BA20-4AA0
Relay for TPRo 230 V AC, set of 4	6ES7928-3CA20-4AA0
Relay for TPRo 60 V DC, set of 4	6ES7928-3DA20-4AA0
Relay for TPRi 110 V AC, set of 4	6ES7928-3EA20-4AA0
0.6 A fuses, set of 10	6ES7928-6AA20-0AA0
Enclosure cover for terminal module TP1 8-bit, set of 4	6ES7928-5AA20-4AA0
Enclosure cover for terminal module TP2 / TP3 / TPA 8-bit, set of 4	6ES7928-5BA20-4AA0
Enclosure cover for terminal module TP3 32-bit, set of 4	6ES7928-5CA20-4AA0
Enclosure cover for terminal module TPS / TPRo 8-bit and TP1 32-bit, set of 4	6ES7928-5DA20-4AA0
Enclosure cover for terminal module TPF / TPRi / TPOo 8-bit and TPA 32-bit, set of 4	6ES7928-5EA20-4AA0
Round-sheath ribbon cable with 16 wires, 30 m long, unshielded	6ES7923-0CD00-0AA0
Round-sheath ribbon cable with 16 wires, 30 m long, shielded	6ES7923-0CD00-0BA0
Round-sheath ribbon cable with 16 wires, 60 m long, unshielded	6ES7923-0CG00-0AA0
Round-sheath ribbon cable with 16 wires, 60 m long, shielded	6ES7923-0CG00-0BA0
Round-sheath ribbon cable with 2 x 16 wires, 30 m long, unshielded	6ES7923-2CD00-0AA0
Round-sheath ribbon cable with 2 x 16 wires, 60 m long, unshielded	6ES7923-2CG00-0AA0

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