

## SIMATIC S7-1500 Advanced Controllers

I/O modules

Connection system

### System cabling for SIMATIC S7-1500 and ET 200MP > Fully modular connection

#### Overview



The fully modular connection for connecting to the digital I/O modules of the SIMATIC S7-1500 or ET 200MP consists of modified front connectors, called front connector modules, pre-assembled connecting cables of various lengths, and connection modules. Suitable components can be selected for the application in question and joined by means of simple plugs. The connection modules are used instead of conventional terminal blocks and act as the interface to the sensors and actuators.

#### Benefits

- Easy plugging in of front connector module, connecting cable and connection module
- Fast and low-cost wiring
- In the case of digital signals, the supply voltage can be connected to the front connector module or the connection module
- Reduction in wiring errors, clear control cabinet wiring
- Byte-by-byte, or four-byte distribution of the signals in the case of digital signals
- Each component can be replaced individually
- Every cable length can be configured without cutting, or pre-assembled cables can be used

#### Design

##### Front connector module

Modified front connectors, called front connector modules, are available for connecting to the I/O modules. These are plugged into the I/O module to be wired instead of the front connector. The front connector modules are available in many different versions for digital I/O modules, analog I/O modules and for the 24 V, 2-ampère module. The connecting cables are plugged into these front connector modules.

##### Connecting cable

The connecting cable is available in two different versions.

As a pre-assembled 16-pole or 50-pole round cable (shielded or unshielded) up to a length of 10 m, or as a 16-pole round-sheath ribbon cable (with or without shield), which can be easily assembled by the user; or as 2 x 16-pole round-sheath ribbon cables (without shield).

When assembled, there are one or two insulation displacement connectors (female ribbon connectors) at both ends of the cable.

The round-sheath ribbon cable is assembled by the user with the aid of pliers (can be ordered separately). The cable transmits 8 or 2 x 8 channels over a distance of up to 30 m.

The connecting cable connects the front connector module with the connection module.

##### Connection module

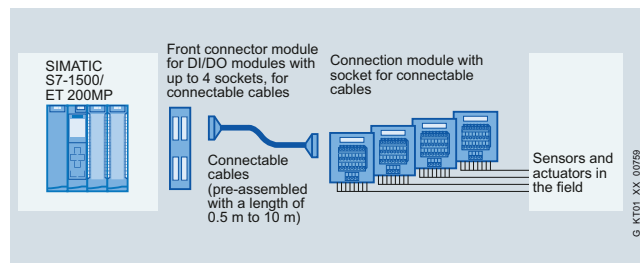
The system has digital and analog connection modules for connecting the I/O signals. These are snapped onto the standard mounting rail. The connection modules with basic or signal functionality are available in 1-byte or 4-byte versions.

Connection modules are available for two different connection methods: with push-in or screw-type terminals. The potential can be fed in at the connection module or at the front connector module.

If other voltage or power levels are required in the field, the connection module for TPRo or TPOo output signals is used. For the TPRo connection module, relays are used for the implementation. For the TPOo connection module, optocouplers are used for the implementation. This converts the 24 V DC output signal simply and reliably to another voltage or power level. If 230 V AC or 110 V AC input signals have to be transmitted to the controller in the field, a connection module with relay TPRi is available that simply converts the 230/110 V AC signal to 24 V DC. This means that there is always the same voltage level on the module side.

##### Use with optocouplers for the TPRo relay modules

If higher switching frequencies of the relay connection module are required for the output signals, the relay can simply be replaced with an optocoupler (note technical specifications) in order to increase the switching frequency here.



SIMATIC TOP connect for S7-1500/ ET200 MP, fully modular connection

Ordering data	Article No.	Article No.	
<b>Connection modules</b>			
<b>Connection module TP1</b> For 1-wire connection, for 16-pin connecting cables <ul style="list-style-type: none"> <li>• Push-in terminals without LEDs</li> <li>• Screw-type terminals without LEDs</li> <li>• Push-in terminals with LEDs</li> <li>• Screw-type terminals with LEDs</li> </ul> For 1-wire connection, for 50-pin connecting cables <ul style="list-style-type: none"> <li>• Push-in terminals without LEDs</li> <li>• Push-in terminals with LEDs</li> <li>• Screw-type terminals without LEDs</li> <li>• Screw-type terminals with LEDs</li> </ul>	6ES7924-0AA20-0AC0 6ES7924-0AA20-0AA0  6ES7924-0AA20-0BC0 6ES7924-0AA20-0BA0  6ES7924-2AA20-0AC0 6ES7924-2AA20-0BC0 6ES7924-2AA20-0AA0 6ES7924-2AA20-0BA0	<b>Connection module for digital output modules 2 A</b> Connection module TP2 <ul style="list-style-type: none"> <li>• Push-in terminals without LEDs</li> <li>• Screw-type terminals without LEDs</li> </ul>	6ES7924-0BB20-0AC0 6ES7924-0BB20-0AA0
<b>Connection module TP3</b> For 3-wire connection, for 16-pin connecting cables <ul style="list-style-type: none"> <li>• Push-in terminals without LEDs</li> <li>• Screw-type terminals without LEDs</li> <li>• Push-in terminals with LEDs</li> <li>• Screw-type terminals with LEDs</li> <li>• Push-in terminals with LEDs and one isolating terminal per channel</li> <li>• Screw-type terminals with LEDs and one isolating terminal per channel</li> <li>• Push-in terminals with LED and fuse per channel</li> <li>• Screw-type terminals with LED and fuse per channel</li> </ul> For 3-wire connection, for 50-pin connecting cables <ul style="list-style-type: none"> <li>• Push-in terminals without LEDs</li> <li>• Screw-type terminals without LEDs</li> <li>• Push-in terminals with LEDs</li> <li>• Screw-type terminals with LEDs</li> </ul>	6ES7924-0CA20-0AC0 6ES7924-0CA20-0AA0  6ES7924-0CA20-0BC0 6ES7924-0CA20-0BA0 6ES7924-0CH20-0BC0 6ES7924-0CH20-0BA0  6ES7924-0CL20-0BC0 6ES7924-0CL20-0BA0  6ES7924-2CA20-0AC0 6ES7924-2CA20-0AA0  6ES7924-2CA20-0BC0 6ES7924-2CA20-0BA0	<b>Connection module for analog modules (for S7-1500 only)</b> Connection module TPA, 16-pin <ul style="list-style-type: none"> <li>• Push-in terminals without LEDs</li> <li>• Screw-type terminals without LEDs</li> </ul> Connection module TPA, 50-pin <ul style="list-style-type: none"> <li>• Push-in terminals without LEDs</li> <li>• Screw-type terminals without LEDs</li> </ul>	6ES7924-0CC20-0AC0 6ES7924-0CC20-0AA0  6ES7924-2CC20-0AC0 6ES7924-2CC20-0AA0
<b>Accessories</b>			
<b>ID labels for connection modules in S7-1500 design</b>			
ID labels, insertable PU = 340 units		3RT1900-1SB20	
<b>Shield plate for analog connection module</b>			
PU = 4 units (for connection of 16-pin connecting cable)		6ES7928-1AA20-4AA0	
PU = 4 units (for connection of 16-pin connecting cable) (for S7-1500 only)		6ES7928-1BA20-4AA0	
<b>Shield connection clamp</b>			
For shield plate at SIMATIC end, PU = 10 units		6ES7590-5BA00-0AA0	
For shield plate at field end, 2 x 2 ... 6 mm		6ES7390-5AB00-0AA0	
For shield plate at field end, 3 ... 8 mm		6ES7390-5BA00-0AA0	
For shield plate at field end, 4 ... 13 mm		6ES7390-5CA00-0AA0	
<b>Connection module TPRo</b> Relay module for 8 outputs, relay as normally open contact <ul style="list-style-type: none"> <li>• Push-in terminals with LEDs</li> <li>• Screw-type terminals with LEDs</li> </ul>	6ES7924-0BD20-0BC0 6ES7924-0BD20-0BA0		
<b>Connection module TPRI</b> Relay module for 8 outputs (110 V AC), relay as normally open contact <ul style="list-style-type: none"> <li>• Push-in terminals with LEDs</li> <li>• Screw-type terminals with LEDs</li> </ul>	6ES7924-0BG20-0BC0 6ES7924-0BG20-0BA0		
<b>Connection module TPRI</b> Relay module for 8 outputs (230 V AC), relay as normally open contact <ul style="list-style-type: none"> <li>• Push-in terminals with LEDs</li> <li>• Screw-type terminals with LEDs</li> </ul>	6ES7924-0BE20-0BC0 6ES7924-0BE20-0BA0		
<b>Connection module TPOo</b> Optocoupler module for 8 outputs (max. 24 V DC/4 A) <ul style="list-style-type: none"> <li>• Push-in terminals with LEDs</li> <li>• Screw-type terminals with LEDs</li> </ul>	6ES7924-0BF20-0BC0 6ES7924-0BF20-0BA0		

**SIMATIC S7-300 Advanced Controllers**

I/O modules

Connection system

**System cabling for SIMATIC S7-300/400 and ET 200M > Fully modular connection****Ordering data****Connection modules****Connection module TP1**

For 1-wire connection, for 16-pin connecting cables

- Push-in terminals without LEDs
- Screw-type terminals without LEDs
- Push-in terminals with LEDs
- Screw-type terminals with LEDs

**6ES7924-0AA20-0AC0**  
**6ES7924-0AA20-0AA0**

**6ES7924-0AA20-0BC0**  
**6ES7924-0AA20-0BA0**

For 1-wire connection, for 50-pin connecting cables

- Push-in terminals without LEDs
- Screw-type terminals without LEDs
- Push-in terminals with LEDs
- Screw-type terminals with LEDs

**6ES7924-2AA20-0AC0**  
**6ES7924-2AA20-0AA0**

**6ES7924-2AA20-0BC0**  
**6ES7924-2AA20-0BA0**

**Connection module TP3**

For 3-wire connection, for 16-pin connecting cables

- Push-in terminals without LEDs
- Screw-type terminals without LEDs
- Push-in terminals with LEDs
- Screw-type terminals with LEDs
- Push-in terminals with LEDs and one isolating terminal per channel
- Screw-type terminals with LEDs and one isolating terminal per channel
- Push-in terminals with LED and fuse per channel
- Push-in terminals with LED and fuse per channel

**6ES7924-0CA20-0AC0**  
**6ES7924-0CA20-0AA0**

**6ES7924-0CA20-0BC0**  
**6ES7924-0CA20-0BA0**

**6ES7924-0CH20-0BC0**

**6ES7924-0CH20-0BA0**

**6ES7924-0CL20-0BC0**

**6ES7924-0CL20-0BA0**

For 3-wire connection, for 50-pin connecting cables

- Push-in terminals without LEDs
- Screw-type terminals without LEDs
- Push-in terminals with LEDs
- Screw-type terminals with LEDs

**6ES7924-2CA20-0AC0**  
**6ES7924-2CA20-0AA0**

**6ES7924-2CA20-0BC0**  
**6ES7924-2CA20-0BA0**

**Connection module TPRo**

Relay module for 8 outputs, relay as normally open contact

- Push-in terminals with LEDs
- Screw-type terminals with LEDs

**6ES7924-0BD20-0BC0**  
**6ES7924-0BD20-0BA0**

**Connection module TPRI**

Relay module for 8 outputs (110 V AC), relay as normally open contact

- Push-in terminals with LEDs
- Screw-type terminals with LEDs

**6ES7924-0BG20-0BC0**  
**6ES7924-0BG20-0BA0**

**Connection module TPRI**

Relay module for 8 outputs (230 V AC), relay as normally open contact

- Push-in terminals with LEDs
- Screw-type terminals with LEDs

**6ES7924-0BE20-0BC0**  
**6ES7924-0BE20-0BA0**

**Article No.****Connection module TPOo**

Optocoupler module for 8 outputs (max. 24 V DC/4 A)

- Push-in terminals with LEDs
- Screw-type terminals with LEDs

**6ES7924-0BF20-0BC0**  
**6ES7924-0BF20-0BA0**

**Connection module for digital output modules 2 A**

Connection module TP2

- Push-in terminals without LEDs
- Screw-type terminals without LEDs

**6ES7924-0BB20-0AC0**  
**6ES7924-0BB20-0AA0**

**Connection module for analog modules (for S7-300 only)**

Connection module TPA

- Push-in terminals without LEDs
- Screw-type terminals without LEDs

**6ES7924-0CC21-0AC0**  
**6ES7924-0CC21-0AA0**

**Accessories****ID labels for connection modules in S7-1500 design**

ID labels, insertable  
PU = 340 units

**3RT1900-1SB20**

**Shield for analog connection module**

PU = 4 units (for connection of 16-pin connecting cable)

**6ES7928-1AA20-4AA0**

PU = 4 units (for connection of 16-pin connecting cable) (for S7-1500 only)

**6ES7928-1BA20-4AA0**

**Shield connection clamp**

for shield plate at SIMATIC end, PU = 10 units

**6ES7590-5BA00-0AA0**

for shield plate at field end, 2 x 2 ... 6 mm

**6ES7390-5AB00-0AA0**

for shield plate at field end, 3 ... 8 mm

**6ES7390-5BA00-0AA0**

for shield plate at field end, 4 ... 13 mm

**6ES7390-5CA00-0AA0**