SIEMENS

SIMATIC Sensors

**RFID systems
RF180C communication module**

Operating Instructions

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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.

Table of contents

Introduction

<div style="text-align:right; font-size:3em">1</div>

Purpose of these operating instructions

The information provided in these Operating Instructions enables you to operate the RF180C communication module on a PROFINET IO controller.

Basic knowledge required

These operating instructions assume general knowledge of automation engineering and identification systems.

Scope of the manual

The operating instructions apply to the RF180C communication module.

Position in the information landscape

- In addition to these operating instructions, you require the operating instructions for the controller used.
- If you are using a SIMATIC S7, you will find information for programming the module as well as a complete error description in the description for the function block *FB 45*.
- The manual of the relevant RFID family contains information on the readers/SLGs to be connected.
- Special information on parameterizing the RF620R/RF630R readers in conjunction with the RF180C communication module can be found in the "Configuration Manual RF620R/RF630R (http://support.automation.siemens.com/WW/view/en/33287195)".

Guide

These operating instructions describe the hardware of the RF180C communication module. They comprise introductory chapters and reference chapters (e.g. technical data).

The operating instructions include the following subject areas:

- Connection of the RF180C communication module
- Parameterization of the RF180C communication module
- Diagnostics information
- Display elements of the RF180C communication module
- Information on repair and maintenance (e.g. firmware update)
- Technical data as well as dimension drawings of the RF180C communication module
- Ordering data

Recycling and disposal

- Due to its non-toxic equipment, the RF180C communication module can be recycled.

- Contact a certified electronic-waste disposal company to recycle and dispose of your old equipment in an environment-friendly manner.

Description

2

2.1 Description

Area of application

The RF180C communication module is a module that can be used on any controller for operating RFID components over PROFINET IO.

RF180C communication module

With M12 connection block (7/8")   With push-pull connection block

When operating the RF180C on a SIMATIC S7, a convenient function module is made available to the user (FB 45). When using it on other controllers, please follow the appropriate instructions for parameterization and integration in the system.

The following RFID readers and code readers can be operated with the RF180C:

- RF300
- RF600 (RF620R and RF630R)
- MOBY D
- MOBY U
- MOBY E
- MOBY I
- MV400 code readers

Features

Up to two readers / SLGs can be operated on the RF180C at the same time. The user can issue a command to 2 readers / SLGs simultaneously (FB 45 when operating on a SIMATIC S7).

The tag data are accessed by means of physical addressing of the tag. In SIMATIC S7, the FB 45 is available for this purpose. The FB 45 provides the S7 user with a simple-to-use interface with powerful commands (processing one complete tag with one command; command linking; S7 data structures via UDTs).

Other features

- Degree of protection IP67
- System integration with M12, 7/8" concept or with push-pull concept
- Standardized PROFINET IO user interface for identification systems with RFID standard profile (with later firmware version)
- Firmware update
- Parameterizable device-specific diagnostics data
- Support for I&M functionality (a mechanism for reading out information via the module and saving system information such as function, installation date, installation location, and comments).

Design

The RF180C has the same enclosure as the RFID communication module ASM 456 for PROFIBUS.

For connecting to PROFINET IO, the RF180C communication module features a connection block in one of the following designs:

- M12 connection block design (7/8")
- Push-pull connection block design, RJ45

The following figure shows the basic design of the RF180C.

Basic unit

Connection block
M12, 7/8"

Connector socket for
1st reader / SLG

Status LEDs for operation
of the 1st reader / SLG

Connector socket for
2nd reader / SLG

Status LEDs for operation of
the 2nd reader / SLG

Status LEDs for interface module

Space for connection
block

Protective earth

M12 connection sockets
for PROFINET IO

Connection block

7/8" connection sockets for
voltage supply

Connection block
Push-pull

Push-pull connection sockets
for voltage supply

Connection block

Push-pull connection sockets (RJ45)
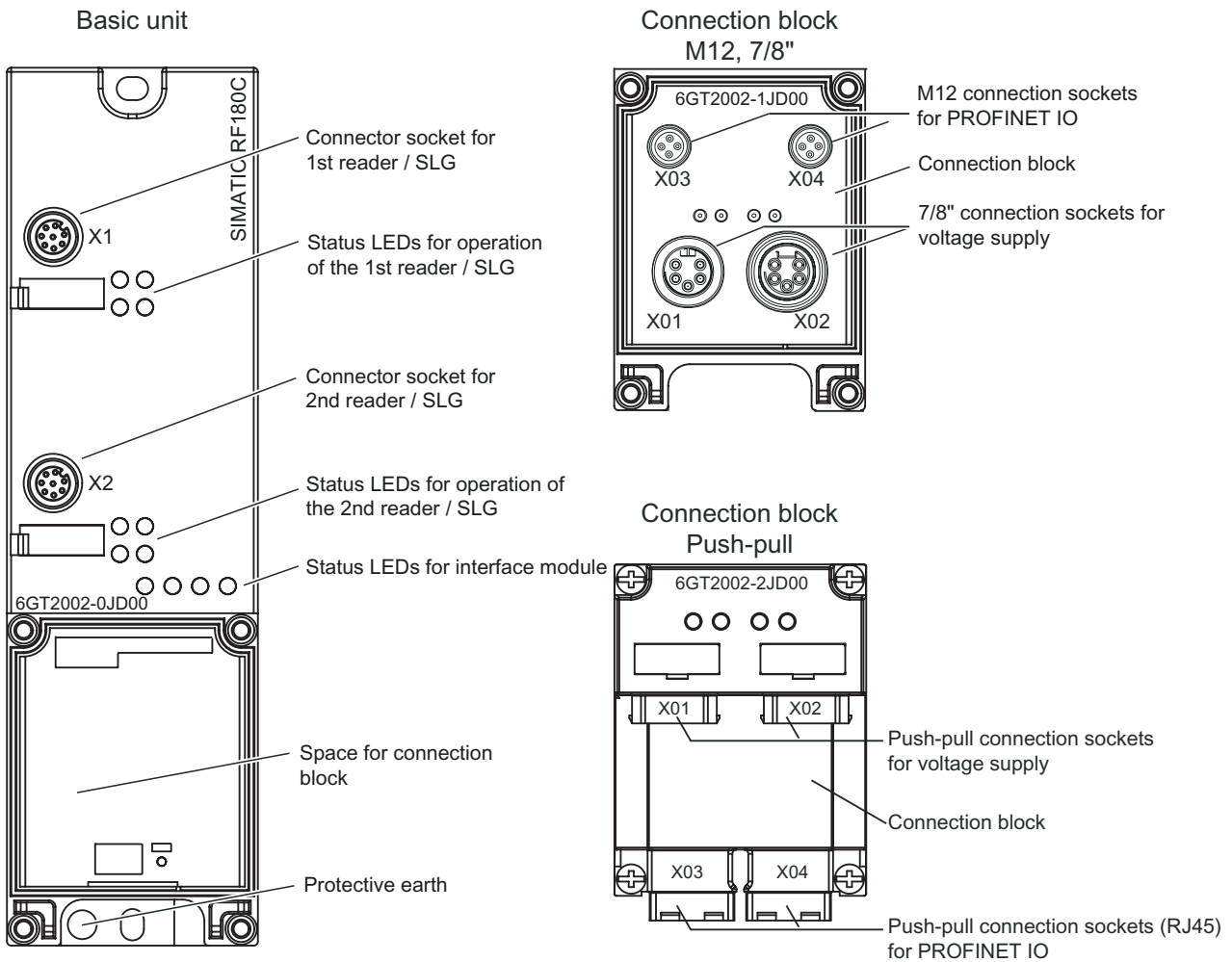for PROFINET IO

Figure 2-1   Basic design of the RF180C

Potential

Ungrounded installation of the system is possible with the RF180C. The following circuit shows the internal relationships of the reference potentials.
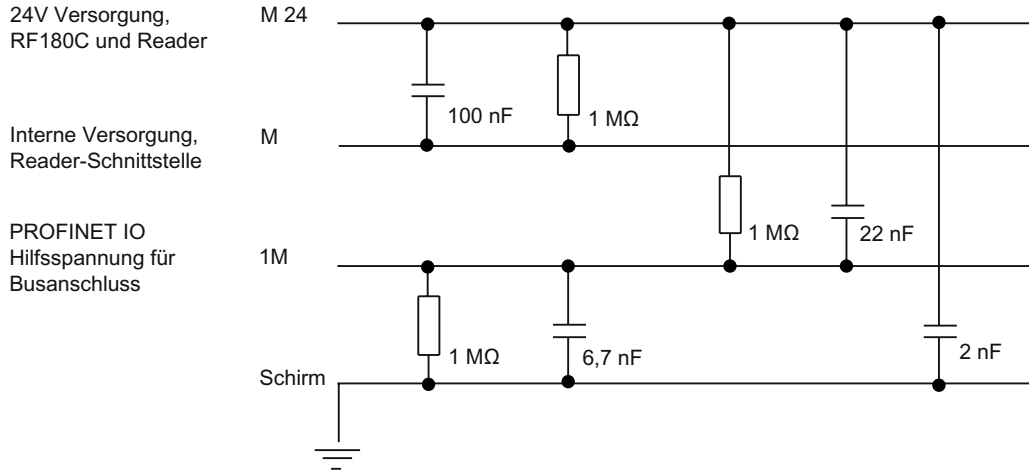

Figure 2-2   Galvanic isolation of RF180C

Integration

The following figure shows how the RF180C with M12 connection block (7/8") is integrated in an automation system. The push-pull connection block is integrated in the same manner as the M12 connection block (7/8").

Steuerung
z. B. S7-400 CPU

RF180C

X1

X2

PROFINET IO-Leitung

24 V für RF180C und Reader / SLG

zu weiteren
PROFINET IO-Teilnehmern

2. Reader

1. Reader
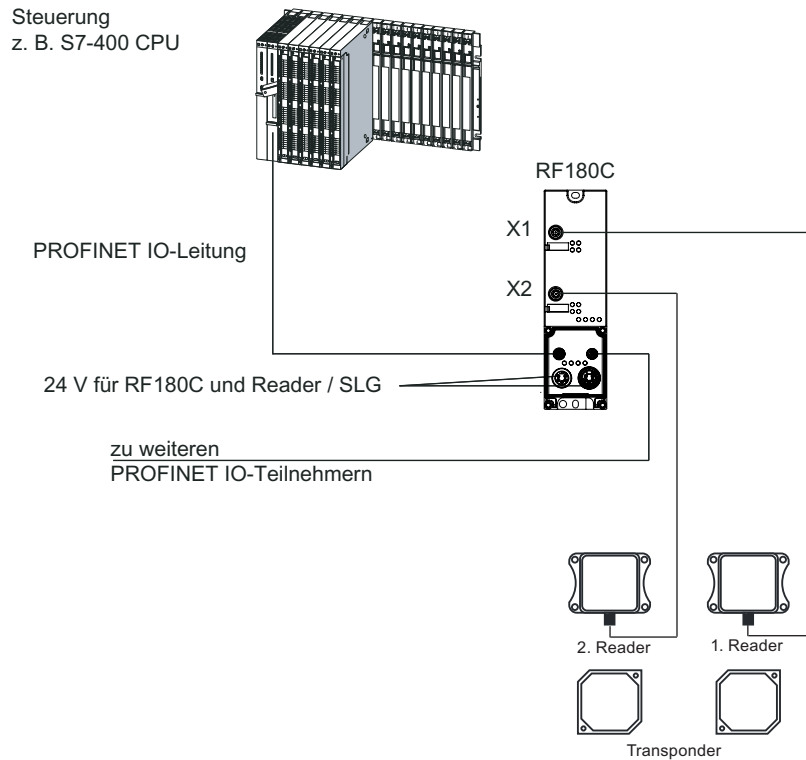
Transponder

Figure 2-3   RF180C configurator with M12 connection block (7/8")

The RF180C is integrated into the hardware configuration by means of a GSDML file. The RF180C can then be configured using HW Config of the SIMATIC manager or another PROFINET tool. The GSDML file can be found on the *RFID Systems Software & Documentation* CD or on the Internet (see Section *Service & Support*).

Installation

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The RF180C communication module is designed for easy assembly.

3.1 Mounting position, mounting dimensions

Mounting position

There are no restrictions regarding the mounting position for the RF180C.

Mounting dimensions and spacing

Table 3- 1   Mounting dimensions of basic module with M12 connection block (7/8", without connector)

Designation	Dimensions
Mounting width	60 mm
Mounting height	210 mm
Mounting depth	54 mm

Table 3- 2   Mounting dimensions of basic module with push-pull connection block (without connector)

Designation	Dimensions
Mounting width	60 mm
Mounting height	216 mm
Mounting depth	100 mm

3.2 Mounting the I/O module

Features

- The base unit is mounted on a stable surface

Note

Functional ground (PE)

If a grounded metal mounting surface is used, the bottom mounting screw of the RF180C module already establishes a reliable grounding connection. This eliminates the need for a separate grounding cable. If you use the fixing screw as grounding connection, the thread of the fixing screw or the contact facing of the fastening nut on the base must be unpainted. This ensures a low-resistance connection.

Requirements

Screws:

Screw type	Description
M5 cylindrical head screw to ISO 1207/ISO 1580 (DIN 84/DIN 85)	The screw should be at least 20 mm long. You will also need washers according to DIN 125.
Cylindrical head screw with M5 hexagonal recessed hole according to DIN 912	

Required tools

Medium-sized cross-head screwdriver or 8 mm socket wrench.

Procedure

Fix the base unit onto a level surface using the screws. The base unit must be screwed to the surface (3 Nm tightening torque) at both fixing points (front, top and bottom).
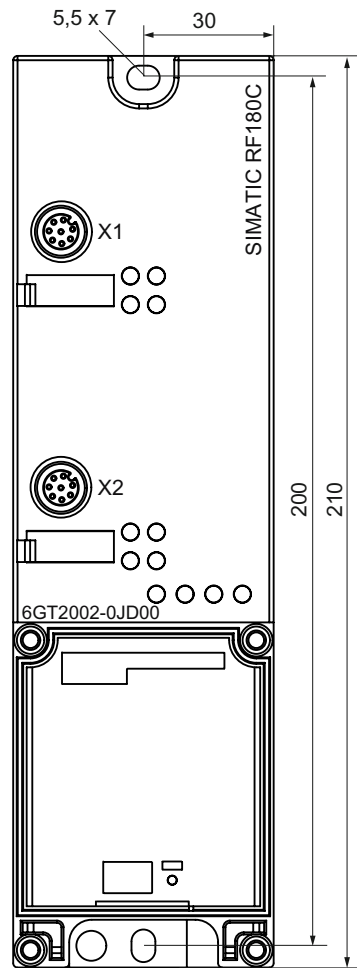

Figure 3-1   Mounting the I/O module

3.3 Mounting the connection block

Features

The connection block connects the RF180C with the PROFINET IO and supplies the base unit with voltage.

Requirements

The base unit is already mounted

Required tools

Cross-head screwdriver, medium.

Mounting the connection block

1. Plug the connection block into the base unit

2. Screw the connection block onto the base unit (torque 1 to 1.3 Nm) Tighten the screws evenly, working in cross-wise passes. 4 screws are already located in the connection block (see Figure).
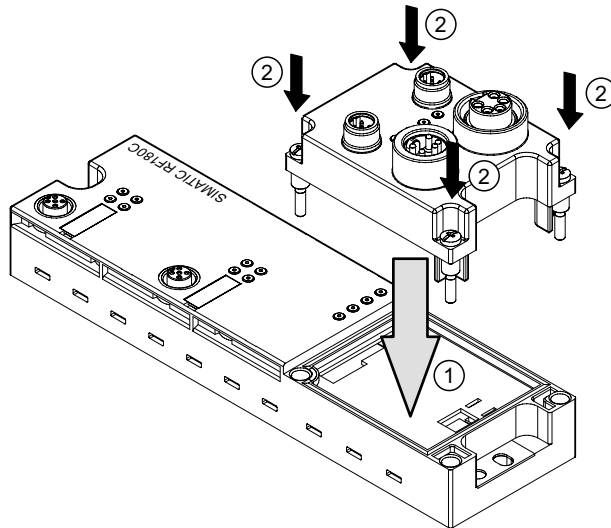

Figure 3-2   Plug the M12 connection block (7/8''') onto the base unit and screw it on
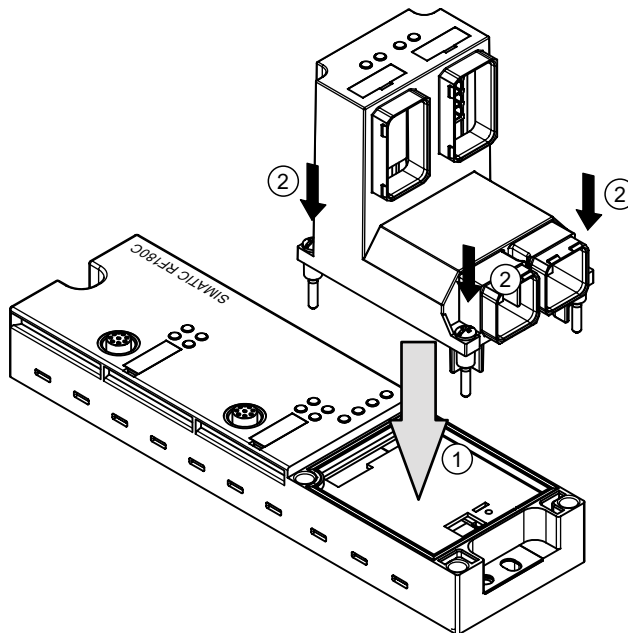

Figure 3-3   Plug the push-pull connection block onto the base unit and screw it on

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Note

IP65, IP66 or IP67 degree of protection only exists when the connection block is screwed to the base unit.

3.4 Replacing labels

Features

You can use the labels to mark every channel on the base unit and the connection block. The labeling strips are supplied with clipped on label.

- 2 labels on the base module
- 1 label on M12 connection block (7/8")
- 2 labels on push-pull connection block

Requirements

If you want to replace the labels, you can reorder them. You will find the order number in the Section *Ordering Data*.

Required tools

Screwdriver, size 2.5 mm to 4 mm.

Replacing labels

1. Push the screwdriver into the small opening of the label, and then lever it out.
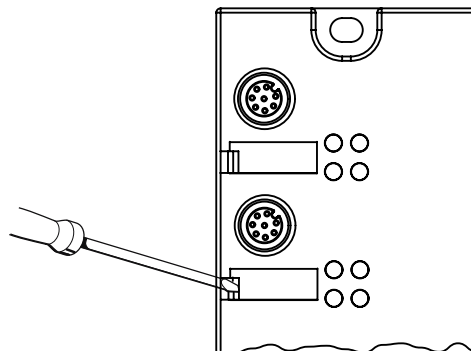
Figure 3-4   Removing labels

2. With your finger push the new label into the holder of the module.

3.5 Disassembling the RF180C

Procedure

The RF180C is wired up and operating.

1. Switch off the supply voltage for the RF180C.

2. Disconnect the wiring on the connection block.

3. Remove the 4 fixing screws from the connection block and pull the connection block off the base unit.

4. Disconnect the wiring on the base unit.

5. Remove the fixing screws from the base unit.

Note

Please note the information in the Section *Loop-through connection of PROFINET IO and supply voltage*.

Connecting 4

Proper use

When connecting non-specified devices to the RF180C, it is possible that the connected device may be destroyed.

PROFINET IO connection system

Detailed information about connecting the RF180C to PROFINET IO can be found in the *PROFINET System Manual*.

You will find the system manual on the Internet at the following address:

`http://www.siemens.com/automation/service&support`

Search for the entry with the ID number 19292127.

⚠ CAUTION

PROFINET

Modules with PROFINET interfaces may only be operated in LANs (Local Area Networks) in which all connected nodes are equipped with SELV/PELV power supplies or protection systems of equal quality.

A data transfer terminal (modem, for example) is required to access the WAN (Wide Area Network) in order to ensure compliance with this safety standard.

The power supply must provide the current required (max. 1.5 A) during brief power failures of ≤ 20 ms.

All supply and signal voltages must be safety extra low voltage (SELV/PELV according to EN 60950).

24 V DC power supply: safe (electrical) isolation of extra-low voltage (SELV/PELV according to EN 60950).

NOTICE

The device must **not** be connected to the public telephone network without a HUB / Switch because the voltage intervals are designed for 500 V.

PROFINET IO installation techniques

PROFINET IO communication can be established in BUS or STAR topology. Please note the information in the Section *Loop-through connection of PROFINET IO and supply voltage*.
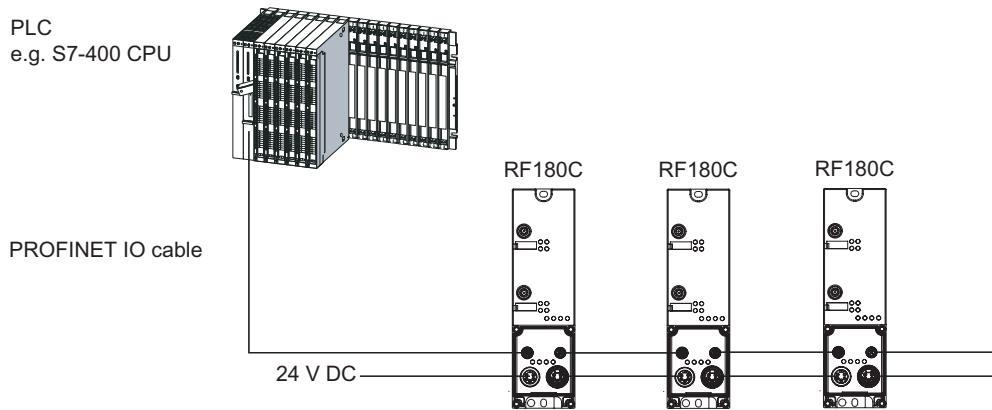

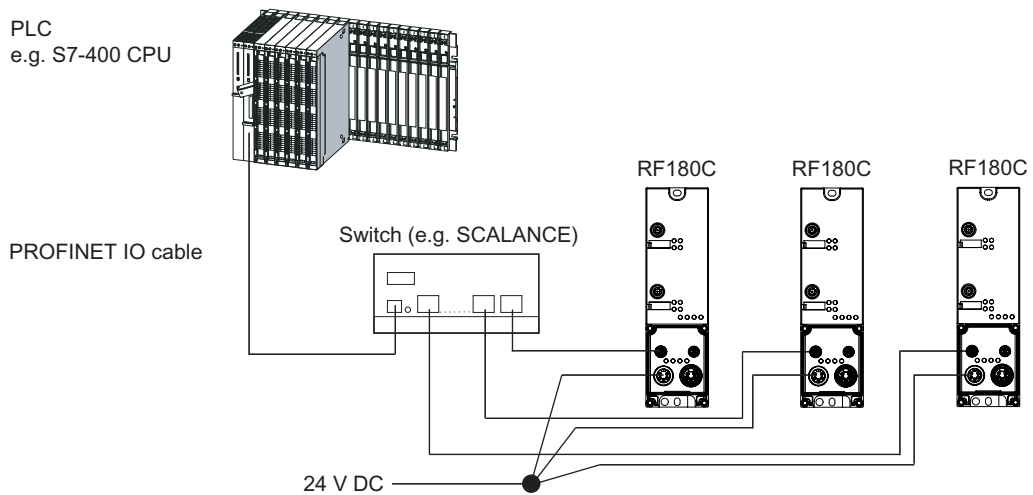Figure 4-1   RF180C with BUS topology

Figure 4-2   RF180C with STAR topology

Reader/SLG connection system

One reader/SLG always occupies one M12 connection socket on the RF180C. A preassembled cable therefore provides the optimum easy connection for the reader/SLG. The connection cable is 2 m long in the standard version.
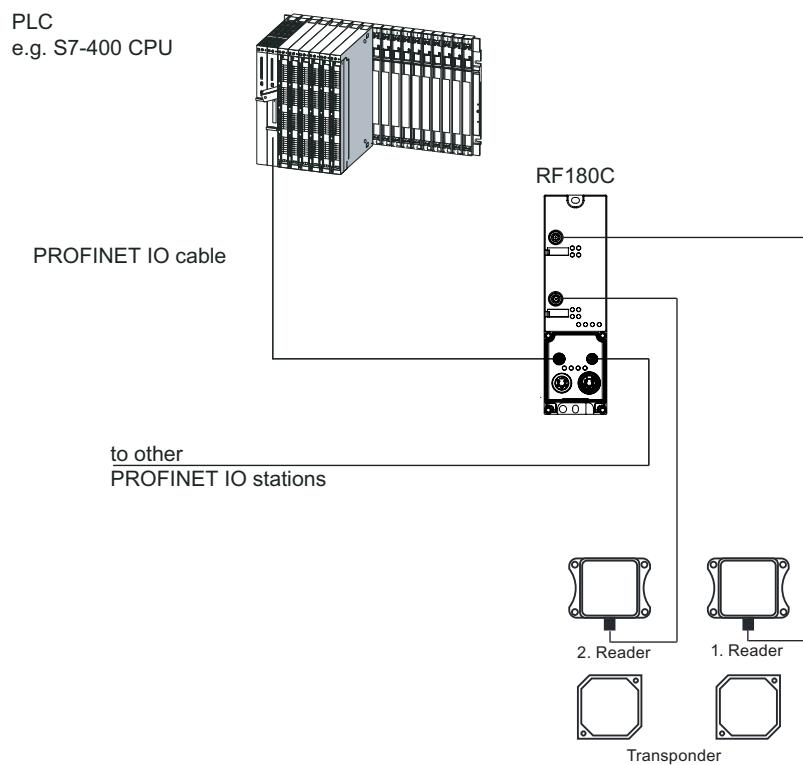

Figure 4-3   Overview of wiring

4.1 Wiring connection block M12, 7/8"

Features

- Connect the supply voltages and PROFINET IO to connection block M12, 7/8":
  - M12 connection in D coding: PROFINET IO
  - 7/8" connection: Supply voltages
- You can loop the supply voltages and PROFINET IO through via the second M12 or 7/8" round socket.

Requirements

- Wire connection block M12, 7/8" when the supply voltage is switched off.

Required tools

Stripping tool, screwdriver for wiring the M12 and/or 7/8" connector if you are not using a pre-assembled cable.

Accessories required

- Pre-assembled cable with connector
- If you are not using a pre-assembled cable:
  - M12: 4-core Ethernet cable (Twisted Pair), shielded and M12 connector, 4-pole, D coding (see Table *Pin assignments of M12 connector, 4-pole, D coding (PROFINET IO)*)
  - 7/8": 5-core cable and 7/8" connector (see Table *Pin assignment for 7/8" connector (supply voltages)*)
- For order numbers, refer to Section *Ordering data*.

Wiring M12, 7/8" connector

The tables below contain the pin assignment for the M12 and 7/8" connectors:

Table 4- 1   Pin assignment for M12 connector, 4-pole, D coding (PROFINET IO)

Pin	Assignment	View of M12 connector, 4-pole, D coding (wiring side)
1	Data line TxP	Einspeisen und Weiterschleifen PROFINET IO X3, X4
2	Data line RxP	
3	Data line TxN	Ethernet-Kabel (Twisted Pair)
4	Data line RxN	
		Any connector can be used for infeed and looping through

Table 4- 2   Pin assignment for 7/8" connector (supply voltages)

Pin	Assignment	View of 7/8" connector (wiring side)
1	Load voltage ground (2M)	
2	Ground for electronic / encoder supply (1M)	
3	Functional ground (PE)	
4	Electronics / encoder supply (1L+) (voltage supply for RF180C and reader/SLG)	
5	Load voltage supply (2L+) (unused on RF180C)	

Note

When connecting up the supply voltage, we recommend the cable specified in the Section *Ordering data* (cable 5 x 1.5 mm^2 pre-assembled with 7/8" connectors).

If you want to assemble the cable yourself, then the conductor cross-section should be 1.5 mm^2.

Connecting M12, 7/8" connectors

1. Press the connector (M12 or 7/8") into the relevant round socket on the connection block. Ensure that the correct stop is provided between the connector and bush (groove and spring).

2. Use the knurled locking ring to secure the connector.
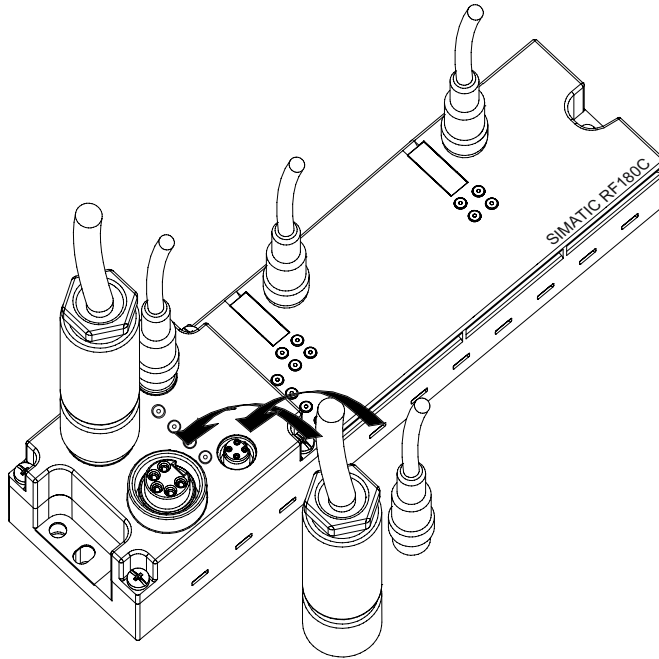

Figure 4-4   Connecting M12, 7/8" connectors

Sealing unused sockets

Always close all unused sockets using M12 or 7/8" seal caps in order to achieve the degree of protection IP65, IP66 or IP67. For order numbers, refer to Section *Ordering data*.

4.2 Wiring of the push-pull connection block

Features

- Connect the power supplies and PROFINET IO to the push-pull connection block:
  – Push-pull connection (RJ45), D-coded: PROFINET IO
  – Push-pull connection: Supply voltages
- You can loop through the supply voltages and the PROFINET IO via the second push-pull connection.

Requirements

- Wire the push-pull connection block with the supply voltage switched off.

Required tools

- Screwdriver
- Stripping tool for wiring the push-pull cable connector if you assemble your own cables.

Accessories required

- Pre-fabricated cables with push-pull cable connector for 1L+/2L+ and RJ45. The cables are available in various lengths from appropriate manufacturers.
- If you assemble your own cables:
  – 5-core cable and push-pull cable connector for 1L+/2L+
  – 4-core, shielded cable (bus cable) and push-pull cable connector for RJ45

> **Note**
>
> Refer to the manufacturer's documentation if you assemble the cables with the push-pull cable connectors.

Wiring of push-pull connectors

The tables below contain the pin assignment for the push-pull connectors:

Table 4- 3   Pin assignment of push-pull cable connectors (RJ45)

View of push-pull cable connectors (RJ45)	Terminal	Assignment
	X03 PN1 for feeding of PROFINET	
	X04 PN2 for looping through of PROFINET	
	1	Receive Data+ RD
	2	Receive Data- RD_N
	3	Transmit Data+ TD
	4	Ground GND (RJ45)
	5	Ground GND (RJ45)
	6	Transmit Data- TD_N
	7	Ground GND (RJ45)
	8	Ground GND (RJ45)

Table 4- 4   Pin assignment of push-pull cable connectors (1L+ and 2L+ supply voltages)

| View of push-pull cable connectors (1L+ and 2L+ supply voltages)	Terminal	Assignment
	X01 DC 24 V for infeed	
	X02 24 V DC for looping through	
	1	Electronic/encoder supply 1L+ground
	2	Ground for electronic/encoder supply 1M
	3	2L+ load voltage supply
	4	Ground for load voltage supply 2M
	5	Functional ground (PE)

Note

When connecting the power supply, we recommend the cable specified in the Chapter *Ordering data* (cable 5 x 1.5 mm^2 pre-assembled with push-pull connectors).

If you want to assemble the cable yourself, then the conductor cross-section should be 1.5 mm^2.

A cable cross-section of 2.5 mm² is mandatory for an amperage > 8 A.

Connecting push-pull cable connectors

Plug the push-pull cable connectors for 1L+/2L+ and RJ45 into the associated sockets (see figure below). Ensure that the locking mechanism between the connector and socket is properly applied. The connectors must engage.
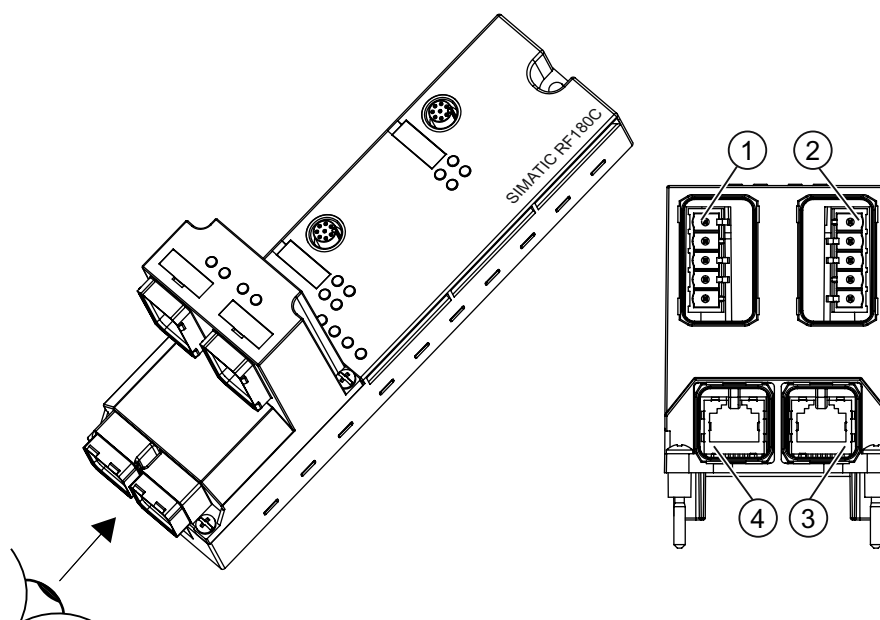
①	X01 24 V DC	Push-pull socket (with socket insert) for infeed of the 1L+ electronic/encoder supply and the 2L+ load voltage supply
②	X02 24 V DC	Push-pull socket (with socket insert) for looping through of the 1L+ electronic/encoder supply and the 2L+ load voltage supply
④	X03 PN1	Push-pull socket for RJ45 for feeding of PROFINET IO
③	X04 PN2	Push-pull socket for RJ45 for looping through of PROFINET IO

Figure 4-5   Connecting push-pull cable connectors

Sealing unused sockets

Cover all unused push-pull sockets with caps in order to achieve degree of protection IP65, IP66, or IP67. For order numbers, refer to section *Ordering data*.

4.3 Loop-through connection of PROFINET IO and supply voltage

Features

The connection block features one connector for the incoming supply and one socket for loop-through connection of the supply voltage. The connector and the socket for the supply are linked with one another internally.

Two sockets are available for the incoming PROFINET IO and for loop-through connection. The sockets are not connected to each other in the connection block. The switch in the base unit creates the logical connection.

Note

If you disassemble the connection block during operation, only the power supply will be looped through. Data communication to subsequent devices will be interrupted from this module onwards.
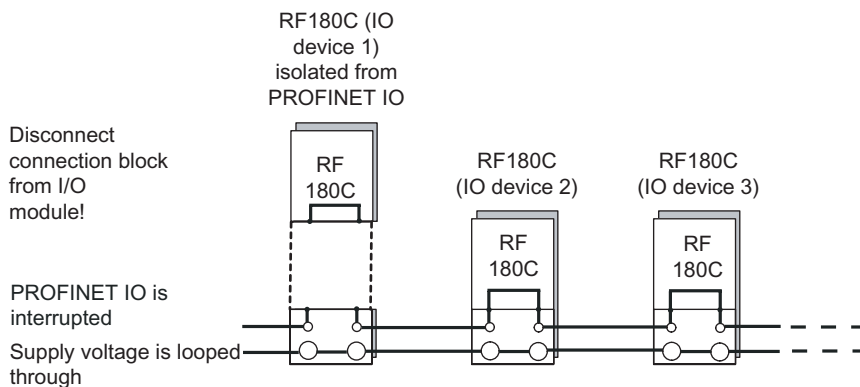

Figure 4-6   Loop-through connection of PROFINET IO and supply voltage

CAUTION
The IP65, IP66 or IP67 degree of protection is no longer guaranteed when the connection block is dismounted.

Notes for wiring

- If you are wiring your structure, then you must take into account the impact of cable length on supply voltage to the RF180C.

  Example:

  When using a 10 m long cable with a diameter of 1.5 mm^2, the voltage drop is 2.5 V with a loading of 10 A. This corresponds to 0.25 V at a 1 A load.

- The maximum infeed current for connection block M12, 7/8" is 6 A at 1L+ and 8 A at 2L+. These values must not be exceeded.

- The maximum infeed current of the push-pull connection block is 12 A for 1L+ and 2L+ at up to 40 °C and 8 A for 1L+ and 2L+ at up to 60 °C. These values must not be exceeded.

- Adhere to the current carrying capacity of the connected cables, which depends on the conductor material, the conductor cross-section and the ambient temperature.

CAUTION
If you do not observe the maximum infeed current and the cable cross-section required, this may result in the cable isolation and contacts overheating and to the device being damaged.

CAUTION
Damage
A cable cross-section of 2.5 mm² is mandatory for an amperage > 8 A!

4.4 Wiring an RF180C to a controller with RJ45 connector

A connection can be easily implemented from an RJ45 connector to an M12 connector.

Self-assembly of an RJ45-to-M12 cable

- You will need a preassembled PROFINET cable with M12 connectors at both ends twice the required length. You will also need two RJ45 connectors for self-assembly. Cut the M12 cable in the center and connect one RJ45 connector to each free cable end. This will result in two RJ45-to-M12 cables.

- You will need the following individual parts: RJ45 and M12 plug-in cables and PROFINET standard cable (unassembled). The parts can be found in the ordering data. You can make up a cable to your own length requirements using these parts.

Using an RJ45-to-M12 cabinet feedthrough

This connection variant must always be used when the controller electronics is installed in a cabinet. The following figure shows the connection layout.
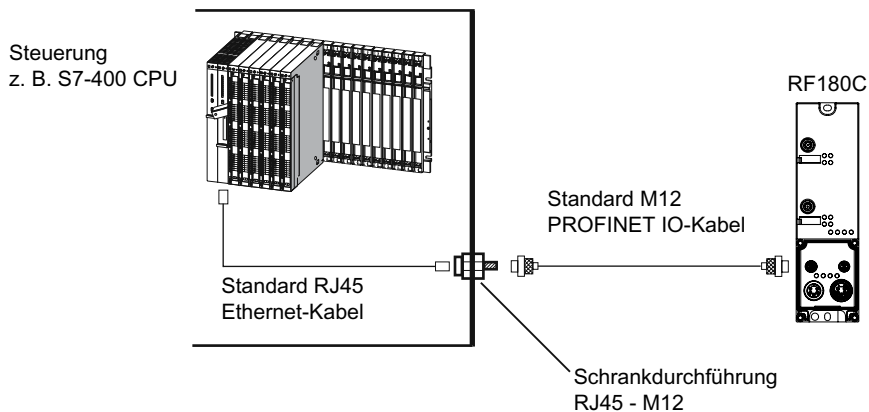

Figure 4-7   Cabinet feedthrough

4.5   Connecting the RF180C to functional ground (PE)

Features

- You have to connect the RF180C to the functional ground (PE). For this purpose, a grounding screw for one grounding cable is provided on the communication module.

- If a grounded metal mounting surface is used, the bottom mounting screw of the RF180C module already establishes a reliable grounding connection. This eliminates the need for a separate grounding cable.

- The connection to functional ground (PE) is also required to deflect the interference currents and for electromagnetic compatibility.

Requirements

- Always make sure there is a low-resistance connection to the functional ground (PE).

- If you use the fixing screw as grounding connection, the thread of the fixing screw or the contact facing of the fastening nut on the base must be unpainted. This ensures a low-resistance connection.
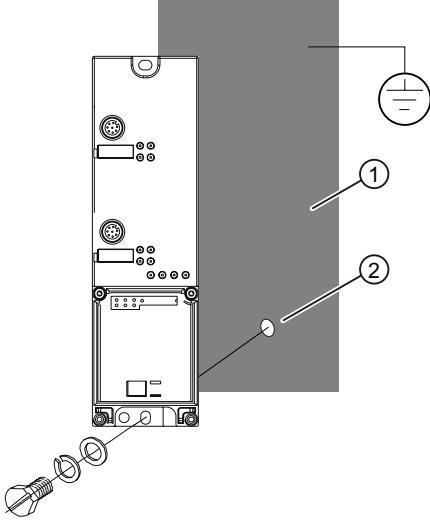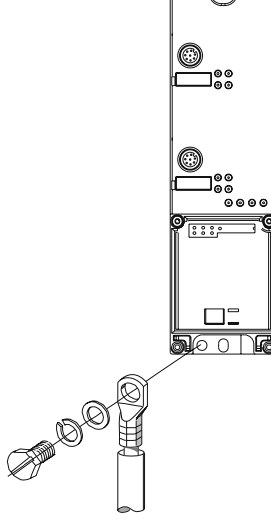
Required tools (only if grounding via the grounding cable is required).

- Screwdriver
- Stripping tool
- Crimp tool

Required accessories (only if grounding via the grounding cable is required).

- M5 x 10 grounding screw and washers
- Grounding cable (copper braided cable) with minimum cross-section of 4 mm^2
- Cable lug

Connecting the RF180C to functional ground (PE)

Standard grounding via the fixing screw	Optional grounding via a grounding cable
1. Mount the module on the grounded, metallic base as described in section *Mounting the I/O module.* ① Grounded, metallic base ② Unpainted thread or nut base	1. Isolate the grounding cable and secure the cable lug. 2. Screw the cable lug on to the communication module (M5 grounding screw). The tightening torque is 3 Nm.

Parameterization

5

5.1 PROFINET IO configuration

Introduction

The GSDML file allows you to configure RF180C in STEP 7 V5.3 + SP 2 or higher. The GSDML file must have been installed beforehand in the configuration software.

Requirements

- A GSDML file is required to integrate the RF180C into the hardware configuration of the SIMATIC Manager:
  GSDML-V1.0-SIEMENS-RF180C-"Datum im Format yyyymmdd".xml
  You will find the file on the CD *RFID Systems Software & Documentation* in the directory *Daten\PROFI_GSD\RF180C*.

- The RF180C must have a valid IO device name. The default device name is RF180C

Configuring the RF180C on PROFINET IO with STEP 7

1. Start STEP 7, then select **Options > Install New GSD File** in HW Config.

2. Select the GSDML file to install from the next dialog box, then confirm with OK.
   Result: The RF180C is displayed in the HW catalog under Profinet IO > Ident Systems > SIMATIC RFID.

3. Create a new project.

4. Configure the RF180C in HW Config.

5. Parameterize the RF180C.

6. Save the configuration, or download it to the PROFINET IO controller.

Further information can be found in the Sections *Assigning device names to the IO device* and *Configuration parameters of the RF180C*.

5.2 Assigning device names to the I/O device

Introduction

Each PROFINET IO device is assigned a unique device ID by the manufacturer (MAC address).

Each RF180C IO device is addressed by its device name in the configuration and user program.

For detailed information on addressing in PROFINET IO, refer to the *PROFINET System Description*.

Requirements

- RF180C communication module
- The PG must be online on PROFINET to the IO device to let you assign a device name to the communication module.
- There must be no connection to the CPU.

Transferring the device name to the communication module

1. In HW Config select **PLC > Ethernet > Edit Ethernet Node**.
2. Click the <Search> button for modules that can be accessed online. This will display all accessible PROFINET IO controllers and IO Devices complete with MAC address, IP address (where applicable), device name and device type.
3. Select the required RF180C and click <OK>.
4. Assign a device name and click the button <Assign name>.
   The device name must be unique within the plant and must comply with the HW Config configuration.

Result

The device name is saved in connection block and base unit of the RF180C communication module.

Forwarding the device name when the communication module is replaced

The device name of the IO device is saved in the connection block.

To transfer the device name when the RF180C communication module is replaced, remove the connection block from the "old" RF180C and plug it into the "new" RF180C. The station can be addressed again and will operate as before the replacement.

Station flash test

If you use more than one IO device, the dialog also displays more than one IO device. In this case, you should compare the MAC address of the device with the indicated MAC address and select the proper IO device.

The identification of IO devices in a system is facilitated by a node flash test. The flash test is activated as follows:

1. In the **Edit Ethernet Node** dialog, select one of the indicated IO devices.

2. Press the button **<Flashing>**.
   On the selected IO device both "Link" and "RX/TX" LEDs flash on the connection block.

3. With <Stop Flashing> fliashing stops again.

5.3 Configuration parameters of the RF180C

The GSDML file contains four parameters relevant to RFID that must be set. They are set by selecting the "Object properties" for slot 0 of the RF180C in HW Config

The parameters are described in the function manual *FB 45*. The table below shows the possible settings:

Table 5- 1   Setting of RFID-relevant parameters

Parameter name	Value	Note
USER_Mode	FB 45	Default
	FB 55	With later firmware version
	FB 56	With later firmware version
	RFID standard profile	With later firmware version
MOBY_Mode	MOBY I / E standard addressing	
	MOBY I file handler	With later firmware version
	MOBY U / D / RF300 standard addressing	Default
	MOBY U file handler	With later firmware version
Baud rate for read/write device RF300 / MOBY U/D	19.2 k baud	
	57.6 k baud	[1]
	115.2 k baud	Default [1]
Diagnostics with diagnostics messages (see *Diagnostics* chapter)	none	Standard diagnostics only
	Hard errors	Hardware-related messages only
	Hard/soft errors low priority	All messages
	Hard/soft errors high priority	All messages high-priority
[1] Not permitted with MOBY D with SLG D11S/D12S		

5.4 Input parameters for RF180C

Input parameters for RF180C with FB 45

Assignment is made in UDT 10.

Table 5- 2   Input parameters for RF180C with FB 45

Address	Name	Permissible values	Comment
+0.0	ASM_address	256, 260, 264, 268, ...	Each RF180C occupies four bytes of I/O in the I/O area of the controller
+2.0	ASM_channel	1, 2	
+8.0	MDS_control	B#16#0, 1	0 = no presence check 1 = presence check
+9.0	ECC_mode	TRUE, FALSE	
+9.1	RESET_long	TRUE, FALSE	TRUE, if MOBY_mode = 5 (MOBY U/D; RF300)
+10.0	MOBY_mode	B#16#1, 4, 5, 6, 7, 8, 9, A, B	Special features of the MOBY I dialog (8): • Write/read device must be type SLG4x. • The VMDS memory size is 16KB. The INIT command for the VMDS must be specified using 4000 hex.
+11.0	scanning_time	MOBY I: B#16#00 ... FF MOBY U: B#16#00 ... C8	A value not equal to 00 is only practical if MOBY mode has been parameterized accordingly. MOBY D, RF300 reserved (00)
+12.0	option_1	B#16#00, 02, 04	
+13.0	distance_limiting	MOBY U (normal output power): B#16#05, 0A, 0F, 14, 19, 1E, 23 MOBY U (reduced output power): B#16#85, 8A, 8F, 94, 99, 9E, A3 MOBY D: B#16#02 ... 28	MOBY U/D RF300 reserved (00)
+14.0	multitag	B#16#1	MOBY U/D, RF300
+15.0	field_ON_control	MOBY U: B#16#0, 1, 2, 3 MOBY D, RF300: B#16#0	MOBY U/D, RF300
+16.0	field_ON_time	MOBY U: B#16#00 ... FF MOBY D: B#16#00, 01	MOBY U/D RF300 reserved (00)

You will find special information on the input parameters for RF180C with FB45 in combination with the RF620R/RF630R readers in the section "Parameterizing > Parameterizing RF620R/RF630R with FB 45 > Input parameters" in the "Configuration Manual RF620R/RF630R".

5.5   Command table of the RF180C

Table of commands of the RF180C for standard addressing (FB 45)

Assignment is made in the UDT 20 by means of the "command" variable.

Table 5- 3   Commands for RF180C with standard addressing

Command code		Description	Available in the RFID system
normal	chained*		
01	41	Write MDS	all
02	42	Read MDS; read fixed code	all
03	43	Initialize MDS	all
04	44	SLG status	RF300 / RF600 / MOBY U / D
08	48	Switch off MDS	MOBY U
0A	4A	Turn antenna on/off	RF300 / RF600 / MOBY U / D
0B	4B	MDS status	RF300 / RF600 / MOBY U
*) Chained commmands are not supported by all readers / write/read devices. Please note the relevant information in the RFID system manuals.			

Maintenance and service

6

6.1 Replacing the RF180C communication module

Initial situation

- The RF180C communication module is already mounted. A new RF180C communication module of the same type should be installed.
- The RF180C is wired up and operating.

Procedure

1. Remove the 4 fixing screws from the connection block and pull the connection block off the communication module.

   Note

   If you disassemble the connection block during operation, only the power supply will be looped through. PROFINET IO communication will be interrupted during module replacement from this node onwards. You will find further information in the Section *Loop-through connection of PROFINET IO and supply voltage*.

2. Disconnect the wiring on the communication module.
3. Remove the fixing screws from the communication module and remove it.
4. Locate the new communication module and screw it down firmly.
5. Place the connection block on the new communication module and tighten the 4 fixing screws.

Result

The device name for the IO Device remains saved in the connection block, so the new RF180C communication module is included in the data communication by the PROFINET IO controller.

Note

If the connection block is replaced in addition to the base unit, the RF180C may not start up automatically. In this case, proceed as follows:

What should I do if the RF180C no longer starts up

Under certain conditions, if the connection block is replaced in addition to the base unit, the RF180C may not start up automatically. This is indicated by a permanently lit BF LED.

In this case, check whether the bus configuration in the S7 CPU (created with HW Config) is consistent with the data saved in the RF180C. If necessary, correct the data in the RF180C. Further information can be found in the Sections *Configuration of PROFINET IO* and *Assigning device names to the IO device*.

6.2 Firmware update

A download of the firmware for the RF180C communication module through the SIMATIC Manager will be available soon.

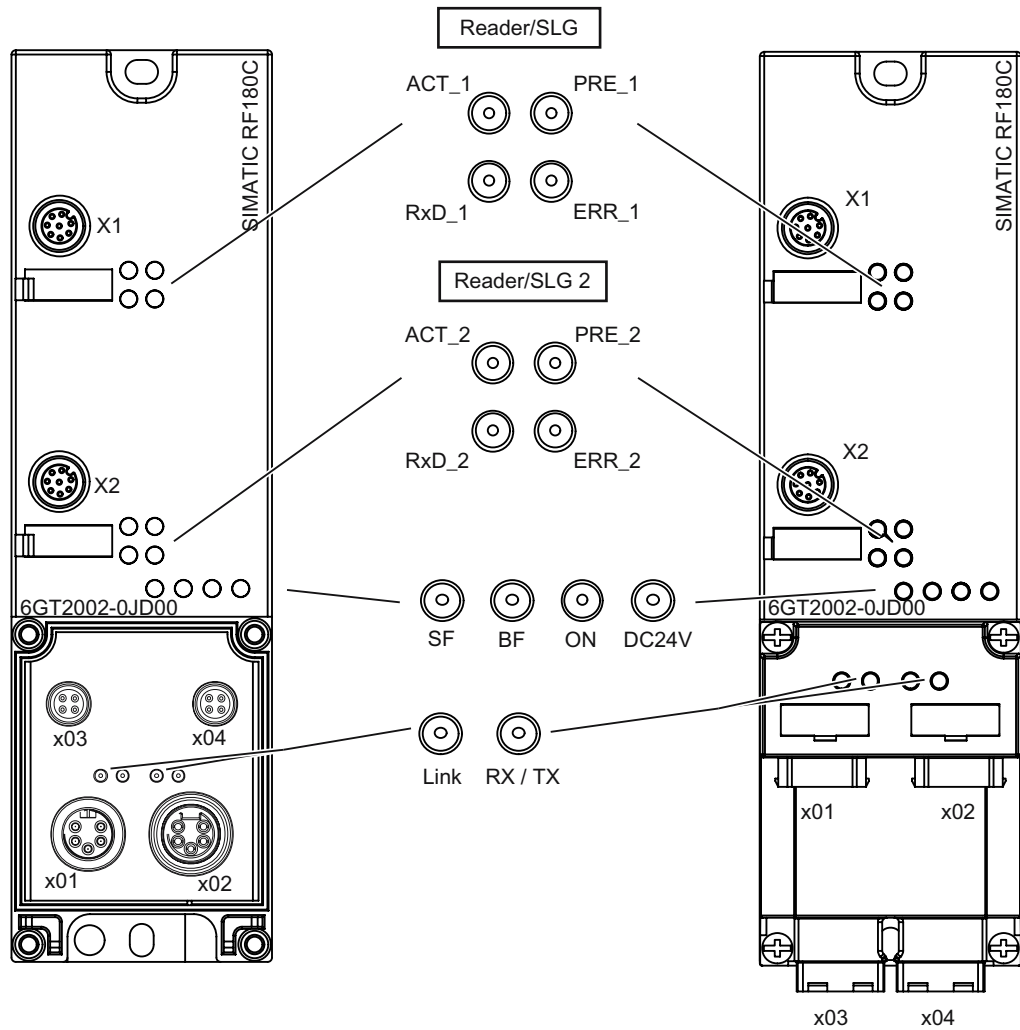When you require an update for your RF180C, please contact your local Siemens representative.

Diagnostics

7

7.1 Diagnosis using LEDs

The following figure shows details of the LEDs of the RF180C.

With M12 connection block (7/8")

With push-pull connection block

Table 7- 1   Status LEDs for the RF180C

LEDs	Meaning*
ON	Lights up when the RF180C has completed start-up without errors.
24 VDC	Lights up when the 24 V supply voltage is connected to the RF180C.
ACT_1, ACT_2	The corresponding reader/SLG is active in processing a user command.
ERR_1, ERR_2 *	A flashing pattern indicates the last error to occur.
PRE_1, PRE_2 **	Indicates the presence of a tag/MDS.
RxD_1, RxD_2	Indicates live communication with the reader / SLG. May also indicate malfunctions on the reader / SLG.
*) The meaning of the individual flash patterns and the associated fault descriptions can be found in the relevant FB documentation. **) In multitag mode, this LED uses a flash interval to indicate the number of data media currently within the range of influence of the reader/SLG.	

Table 7- 2   LED display for PROFINET diagnostics

BF	SF	Cause of error	Error handling
On	–	• Communication module is in start-up mode. • No cable inserted	When the bus is configured correctly, this state ends a few seconds after switching the module on.
Flashes	-	• There is no connection to the PROFINET IO controller.	• Check the PROFINET IO connection. • Check your PROFINET IO configuration (device name, GSDML file). • Reload the configuration into the RF180C (see the Section "Configuration parameters of the RF180C")
Off	On	• A PROFINET diagnostic signal exists.	• Analyze the diagnostic data.
Off	Off	• Normal mode	–
– = Status not relevant			

Table 7- 3   LEDs on connection block

Link (green)	Tx / Tx (yellow)	Meaning
Off	Off	No physical connection over PROFINET IO
On	Off	Physical connection over PROFINET IO, no data communication
On	Flashes	Physical connection over PROFINET IO, with data communication
Off	On	Temporary state following switch-on
The table is applicable to both left and right PROFINET IO connection.		

Other communication module operating modes are indicated by the PRE, ERR, ACT, SF and ON LEDs:

Table 7- 4   LED display for operating states

ON	BF	SF	PRE_1	ERR_1	ACT_1	PRE_2	ERR_2	ACT_2	Description
Off	Off	Off	Off	Off	Off	Off	Off	Off	Start-up active
On	On	On	On	On	On	On	On	On	LED test on start-up (start PROFINET IO)
Off	Off	On	On	On	Off	On	On	Off	Internal fault
Off	Off	On	On	Off	On	On	Off	On	Checksum error of the firmware
Off	Off	On	Off	Slow flashing	Off	Off	Slow flashing	Off	Firmware update (flashes with every described area)

7.2 Parameterization of the diagnostics

- Faults are reported by PROFINET IO through the generation of alarms. Alarms are output using OB82. The alarm data can be accessed through *SFB 54*.

Parameterizing possibilities

See also Section *Configuration parameters of RF180C*.

- **None**

  An alarm will not be issued in the event of an error.

- **Hard errors**

  Alarms are generated in the case of the following events:

  – Hardware fault (memory test)

  – Firmware fault (checksum)

  – Interrupted connection to the reader/SLG

  An alarm is generated and the SF LED on the S7 CPU is activated.

- **Hard/soft errors low priority**

  In contrast to hard errors, in this case, errors are also reported that arise during command processing
  An alarm is generated. However the SF LED on the S7 CPU is activated.

- **Hard/soft errors high priority**

  As under hard/soft errors low priority

An alarm is generated when an event occurs as well as when the event ceases.

Incoming alarm
An event occurs and triggers an alarm. The SF LED of the S7 CPU is set as parameterized.

Outgoing alarm
An event no longer exists, an alarm is triggered and the SF LED of the S7 CPU is reset.

For events that only exist momentarily, the reset is delayed by 3 seconds.

Further information

Detailed information about PROFINET IO diagnostics is included in the following documents:

- System manual *PROFINET, System Description*
  (Article No. 19292127)

- Programming manual *PROFINET IO, from PROFIBUS DP to PROFINET IO*
  (Article No. 19289930)

- Product information *PROFINET IO, Structure of the Diagnostic Data Records*
  (Article No. 19327300)

You will find the documents on the Internet at:

http://www.siemens.com/automation/service&support

Search for the specified article numbers here.

7.3 Structure of the diagnostic data

The header of a diagnostic data record comprises 20 bytes of PROFINET IO-specific data. The manufacturer-specific diagnostic data start from Byte 21.

For the RF180C, the diagnostic data are structured in accordance with the PROFIBUS Profile Guideline (PROFIBUS Proxy Guideline, Identification Systems Proxy Ident Function Block) for identification systems with MOBY-specific additional information.

Byte	Name	Contents	
PROFIBUS Profile Guideline for Identification Systems			
20	channel_num	Bit 7..0	1d: Relating to Reader 1
			2d: Relating to Reader 2
21	function_num	Reserved for a future expansion stage	
22	error_decode	Reserved for a future expansion stage	
23	error_code_1	Reserved for a future expansion stage	
24	error_code_2	Reserved for a future expansion stage	
RFID-specific additional information			
25	moby_code_1	Reserved for a future expansion stage	
26	moby_code_2	Reserved for a future expansion stage	
27	moby_code_3	Reserved for a future expansion stage	
28	moby_code_4	Error code To be taken from the corresponding FC/FBs.	
29	meldecode	Error code To be taken from the corresponding FC/FBs.	
30	counter_high	Continuous event counter high-order byte	
31	counter_low	Continuous event counter low-order byte	
32	fw_version_high	Firmware version high-order byte	
33	fw_version_low	Firmware version low-order byte	

Technical data

<div style="text-align: right; font-size: 2em;">8</div>

Table 8- 1   General technical data

Ethernet interface to the user	
Principle	PROFINET IO
Physical medium	Ethernet over 4-core cable
Duty type	100BaseX full duplex
Transmission rate	100 Mbit/s
Plug-in connection	M12, 4-pin, D coding
Maximum cable length	100 m
Cable type	STP Cat 5
Autonegotation	Yes
Autocrossing	Yes
Switch function	Yes, internal
IRT	No
RT	Yes
Manufacturer ID (vendor ID)	002AH
Device ID (DeviceID)	0C01H
Serial interface to the reader/SLG	
Connector	2 x M12 coupler plugs, 8-pin
Max. cable length	1000 m, dependent on Reader/SLG (2 m = standard length; for other standard cables and self-assembled cables, refer to Section *Connection cables*)
Connectable readers/SLGs	2 x readers/SLGs of the RFID families RF300, MOBY D/I/E/U
Software functions	
Programming	Depends on the PROFINET IO controller
SIMATIC S7 function blocks	FB 45 (normal addressing without multitag)
Tag/MDS addressing	Direct access via addresses
Commands	Initialize tag, read data from tag, write data to tag, etc.
Supply voltage[1)]	
Rated value	24 V DC
Permissible range	20 V to 30 V DC
Current consumption without reader / SLG [2)]	max. 500 mA; typ. 100 mA
Current consumption through reader connection	Each 500 mA
Maximum infeed current in the M12 connection block (7/8")	L1 = 6 A L2 = 8 A

Maximum infeed current in the push-pull connection block	Up to 40 °C: L1 = 12 A [3] L2 = 12 A	Up to 60 °C: L1 = 8 A L2 = 8 A
Galvanic isolation	Yes	
Ambient temperature		
During operation	0 to +60 °C	
Transport and storage	–40 to +70 °C	
Dimensions (W x H x D) in mm		
Base unit only	60 x 210 x 30	
Base unit with M12, 7/8" connection block	60 x 210 x 54	
Basic unit with push-pull connection block	60 x 216 x 100	
Weight		
Base unit	Approx. 210 g	
M12, 7/8" connection block	Approx. 230 g	
Push-pull connection block	Approx. 120 g	
Mechanical Environmental Conditions		
Mounting position	All mounting positions are possible	
Vibration during operation	According to IEC 61131-2: 0.75 mm (10Hz to 58 Hz) 10 g (58 Hz to 150 Hz)	
Shock resistance, shock during operation	Acc. to IEC 61131-2: 30 g	
Degree of protection	IP67	
MTBF (Mean Time Between Failures) in years		
Base unit	121	
Connection block	1100	
Approvals	cULus (file E116536)	
	FCC Code of Federal Regulations, CFR 47, Part 15, Sections 15.107 and 15.109 (Class A)	

[1] All supply and signal voltages must be safety extra low voltage (SELV/PELV according to EN 60950)
24 V DC supply: Safety (electrical) isolation of low voltage (SELV / PELV acc. to EN 60950)

[2] The power supply must provide the current required (max. 500 mA) during brief power failures of ≤ 20 ms.

[3] **A cable cross-section of 2.5 mm² is mandatory for an amperage > 8 A.**

Dimension drawings

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9.1 Dimension drawing for RF180C with fixing holes

Dimension drawing of an RF180C with M12 bus connection block (7/8" PN)
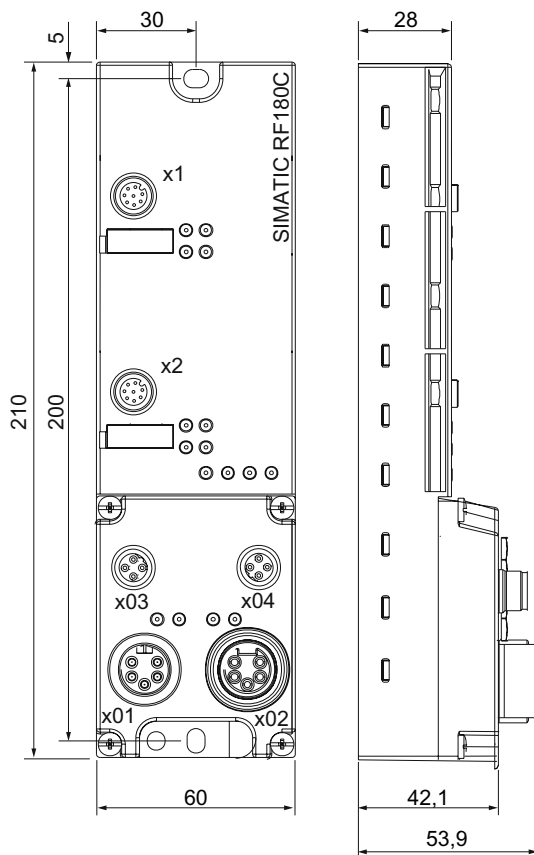

Figure 9-1   Dimension drawing of an RF180C with M12 bus connection block (7/8" PN)

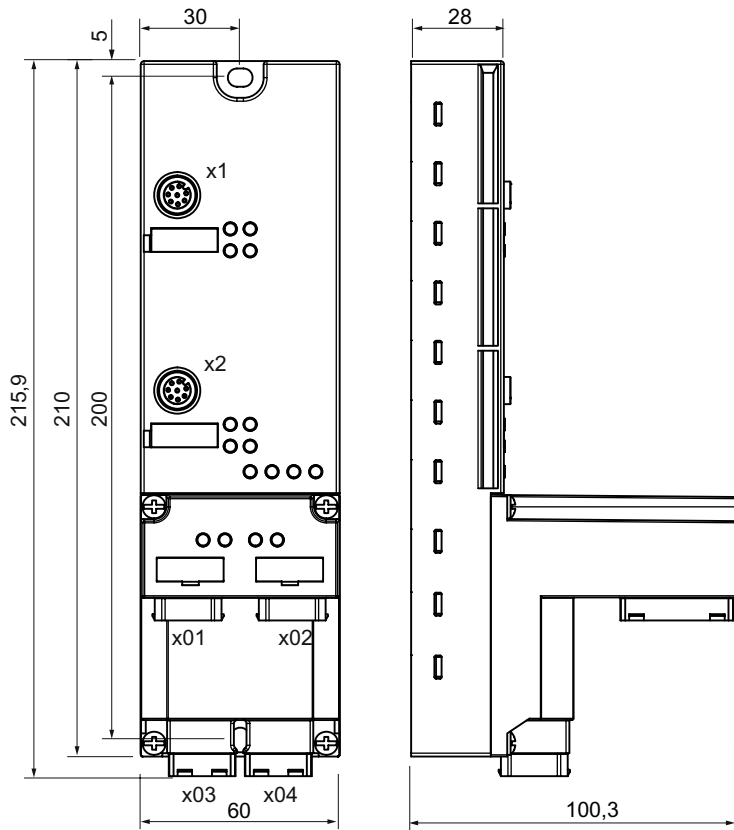**Dimension drawing of an RF180C with push-pull bus connection block**

Figure 9-2   Dimension drawing of an RF180C with push-pull bus connection block

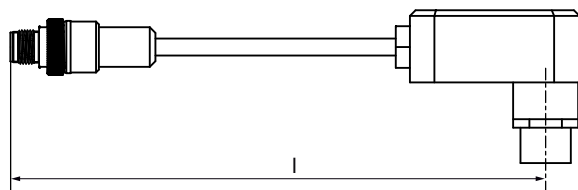# Connecting cable to the reader/SLG

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10.1 Routing of standard cables

Available cables

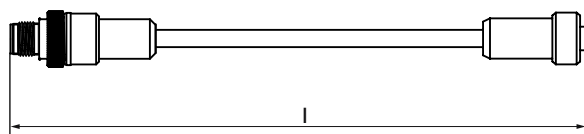Figure 10-1   Connecting cable M12 ↔ Reader / SLG; l = 2 m, 5 m (MOBY I / E / U)

Figure 10-2   Connecting cable/extension cable M12 ↔ M12; l = 2 m, 5 m, 10 m, 20 m, 50 m

- RF300, RF600 connecting cable
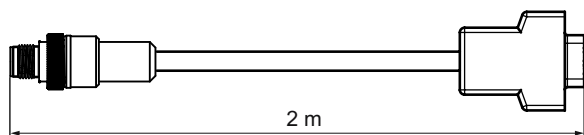- Extension cable for all RFID systems

Figure 10-3   Connecting cable M12 ↔ sub-D (MOBY D)

Maximum cable length

The RF180C can be operated with any reader/SLG configuration with a maximum cable length of 50 m.
Longer connecting cables of up to 1000 m are possible in some instances. The current consumption of the connected reader / write/read device must however be taken into account. You will find information in the relevant system manuals.
Sequential arrangement of more than two sub-sections to form a long section of cable should be avoided due to the additional contact resistances.

Pin assignment

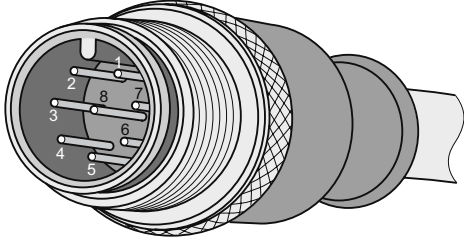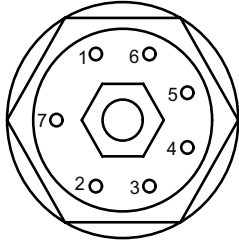Table 10- 1   Connecting cable M12 ↔ Reader / SLG

M12 connector (male)			Reader/SLG connector (female)
	1	2	
	2	5	
	3	3	
	4	4	
	5	6	
	6	1	
	7	–	
	8	7	

Table 10- 2   Connecting cable / extension cable M12 <-> M12
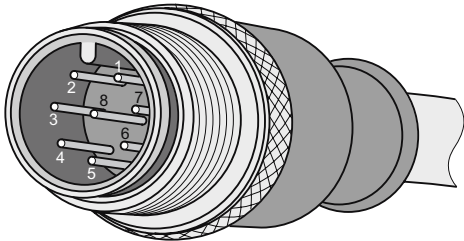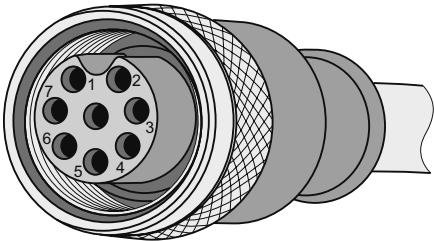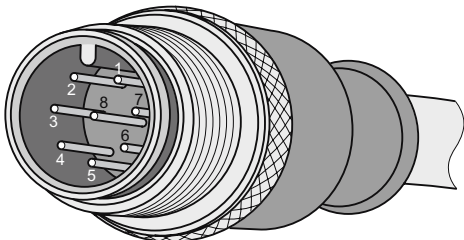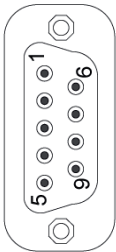
	1	1	
	2	2	
	3	3	
	4	4	
	5	5	
	6	6	
	7	7	
	8	8	

Table 10- 3   Connecting cable M12 ↔ sub-D 9-pin

M12 connector (male)			Sub-D connector (female)
	1	–	
	2	5	
	3	7	
	4	3	
	5	2	
	6	6	
	7	–	
	8	1, 8	
Note: Reader/SLG with Sub-D connector must be supplied over an additional connector with 24 V DC.			

10.2 Self-assembled cable

A reader/SLG connector plug with screw terminals is provided for users who want to individually pre-assemble their own cables (refer to the relevant system manual). Cables and reader/SLG connector plugs can be ordered from the Catalog *FS 10 Sensors for Production Automation*.

Cable structure

You will need cables of the following specifications for self-assembled cables:

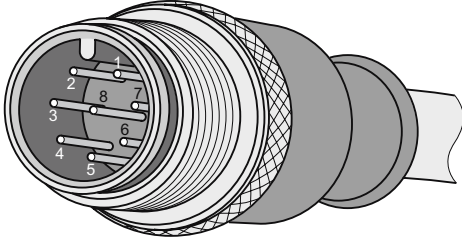7 x 0.25 mm²

LiYC11Y 7 x 0.25

Connectors

M12 connectors can be obtained from the relevant specialist dealers (e.g. Binder).

Pin assignment

The pin assignment is listed in the following table.

Table 10- 4   Pin assignment

M12 connector (male)	Pin	Signal	Core color
	1	1L+ (+ 24 V)	Note data sheet provided by cable manufacturer
	2	−RxD	
	3	0 V	
	4	RxD	
	5	TxD	
	6	−TxD	
	7	Free	
	8	Functional ground (PE)/shield	

Ordering data

<div align="right" style="font-size:3em">11</div>

11.1 Ordering data

Table 11- 1   RF180C ordering data and accessories

RF180C	
RF180C communication module max. 2 SLGs or readers can be connected	6GT2002-0JD00
Connection block M12, 7/8" PN	6GT2002-1JD00
Push-pull connection block, RJ45	6GT2002-2JD00
Labels 20 x 7 mm (1 pack = 340 items)	3RT1900-1SB20
Accessories for connection block M12, 7/8" PN	
IE plug-in cable for PROFINET (pre-assembled trailing cable with two M12 connectors, 4-pin, code D)	6XV1870-8Axxx *
7/8"-plug-in cable for supply voltage (5 x 1.5 mm^2) (pre-assembled trailing power cable with two 5-pin 7/8" connectors)	6XV1822-5Bxxx *
Trailing power cable (5 x 1.5 mm^2) (not preassembled; length min. 20 m, length max. 1000 m)	6XV1830-8AH10
Connector plug 7/8" for supply voltage; (1 pack = 5 items) • with pin insert • with socket insert	6GK1905-0FA00 6GK1905-0FB00
RJ45 plug-in cable with metal casing and FC connection system, 180° cable outlet;(1 pack = 1 item)	6GK1901-1BB10-2AA0
Control cabinet feedthrough for conversion from M12 connection method (D coded, IP65) to RJ45 connection method (IP20) ;(1 pack = 5 items)	6GK1901-0DM20-2AA5
M12 plug-in cable with metal casing and fast connection system, 180° cable outlet (D coded) ; (1 pack = 1 item)	6GK1901-0DB10-6AA0
M12 covering caps	3RX9802-0AA00
Covering caps 7/8" (1 pack = 10 items)	6ES7194-3JA00-0AA0
PROFINET standard cable 2x2, Type A, unassembled; minimum order quantity 20 m	6XV1840-2AH10
Accessories for push-pull connection block	
Trailing power cable (5 x 1.5 mm^2) (not preassembled; length min. 20 m, length max. 1000 m)	6XV1830-8AH10
Push-pull cable connector for 1L+/2L+, not preassembled	6GK1907-0AB10-6AA0
Push-pull cable connector for RJ45, not preassembled	6GK1901-1BB10-6AA0
Caps for push-pull sockets (1L+/2L+), 5 items per package, 1 item	6ES7194-4JA50-0AA0
Caps for push-pull sockets RJ45, 5 items per package, 1 item	6ES7194-4JD50-0AA0
PROFINET standard cable 2x2, Type A, unassembled; minimum order quantity 20 m	6XV1840-2AH10
Accessories for RFID	

SLG cable MOBY I / E / U; 2 m	6GT2091-0FH20
SLG cable MOBY I / E / U; 5 m	6GT2091-0FH50
SLG cable MOBY D; 2 m	6GT2691-0FH20
Reader cable RF300, RF600 extension cable RF300 / RF600 / MOBY I / E / U / D; 2 m	6GT2891-0FH20
Reader cable RF300, RF600 extension cable RF300 / RF600 / MOBY I / E / U / D; 5 m	6GT2891-0FH50
Reader cable RF300, RF600 extension cable RF300 / RF600 / MOBY I / E / U / D; 10 m	6GT2891-0FN10
Reader cable RF300, RF600 extension cable RF300 / RF600 / MOBY I / E / U / D; 20 m	6GT2891-0FN20
Reader cable RF300, RF600 extension cable RF300 / RF600 / MOBY I / E / U / D; 50 m	6GT2891-0FN50
Reader cable for RF300; connector on the reader is angled; 2 m	6GT2891-0JH20
MOBY software with FB 45, GSDML file and descriptions of the blocks and RFID systems	6GT2080-2AA10
*) These cables are available in different lengths. See Catalog IK PI for more details	

Service & Support

<div align="right">

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</div>

Technical support

The technical support specialists advise and assist customers by responding to their queries on the functions of our RFID products and how to work with them.

You can reach us worldwide Mon. to Fri. during office hours: 8 a.m. - 5 p.m. CET:

Telephone:	++49 (0) 180 5050-222
Fax:	++49 (0) 180 5050-223

Internet

Visit our site on the Internet at:

`http://www.siemens.com/automation/service&support`

You can send a support query to:

`http://www.siemens.com/automation/support-request`

General information on new features of the RF180C communication module and an overview of our other identification systems can be found on the Internet at:

`http://www.siemens.com/simatic-sensors/rfid`