

Configuration

Note

In the figures below, the ET 200pro with the CM IM DP Direct connection module represents an example for the interface module.

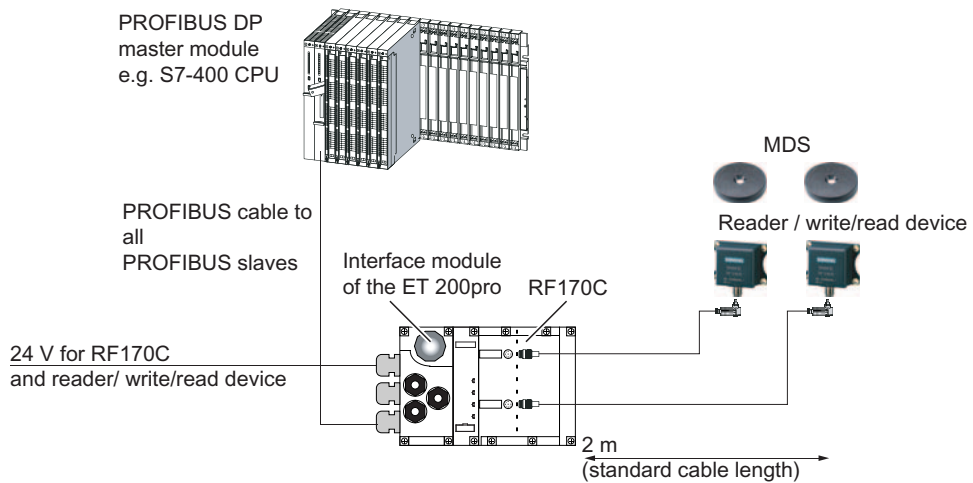


Figure 7-38 Configurator for an RF170C

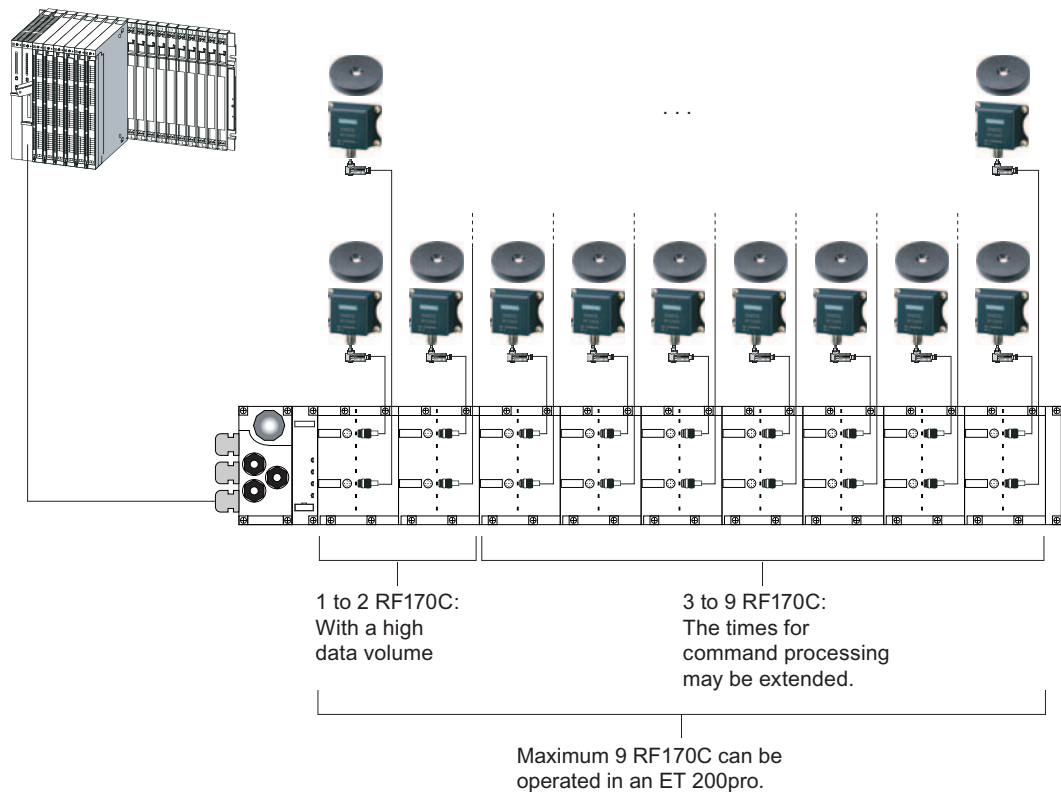


Figure 7-39 Maximum configuration of RF170C on an ET 200pro

7.7.2 Connect the RF170C with the connection module

Introduction

On the RF170C connection module, you connect the cable to the readers / write/read devices using 8-pin round sockets. Use an 8-pin M12 connector and a corresponding cable if you prefer to produce a customized cable. In doing so, please comply with the cable configurator in the system manuals of the RFID families.

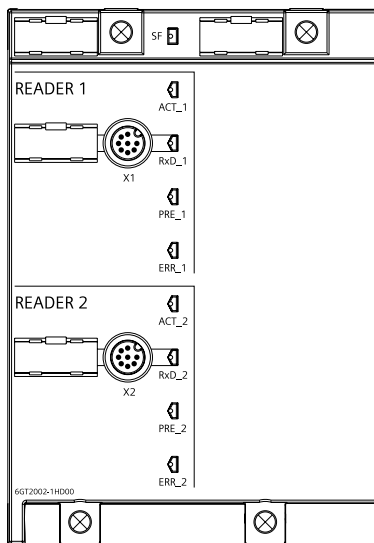


Figure 7-40 Sockets and LEDs of the RF170C connection module

Requirements

Before you start to wire the RF170C connection module, switch off the supply voltage, or de-install the connection module.

Note

It is easier to wire the RF170C connection module after you have removed it from the communication module.

Accessories required for the RF170C

- Patch cable with 8-pin M12 connector
- Alternatively: Shielded 7-core Cu cable, flexible, conductor cross-section $\leq 0.75 \text{ mm}^2$ and 8-pin M12 connector

Connecting M12 connectors

1. Plug the connector into the relevant socket of the RF170C connection module. Make sure the connector and socket are properly interlocked (groove and spring).
2. Tighten the knurled screws of the connector (torque = 1.5 Nm.)

Connect RF170C connection module

1. Insert the RF170C connection module into the communication module.
2. Screw the connection module onto the rack (4 cross-head screws on the front: top and bottom, tightening torque 1.5 Nm)

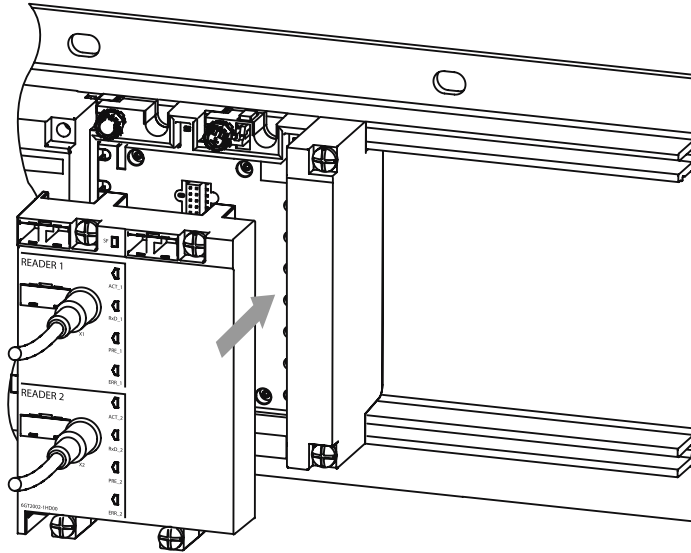


Figure 7-41 Connect RF170C connection module

Sealing unused sockets

Always close all unused sockets using M12 caps in order to achieve the degree of protection IP65, IP66 or IP67.

Reference

ET 200pro Distributed I/O device operating instructions, Section Electrical configuration of ET 200pro

7.7.3 LED displays on the RF170C communication module

LED display

The figure below shows the position and layout of the LED display on the the RF170C connection module.

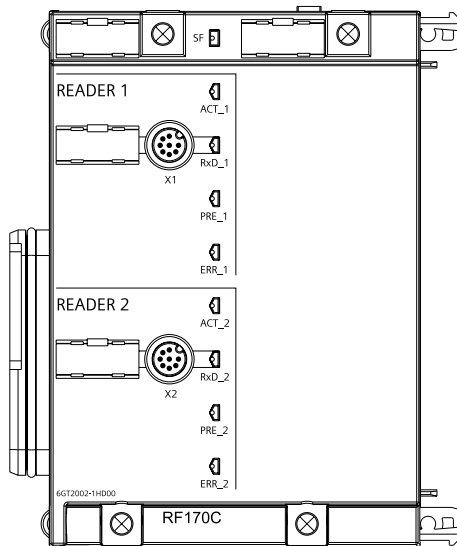


Figure 7-42 LED display on the RF170C communication module

Status and error LEDs on the RF170C connection module

Table 7-21 Status and error LEDs for RF170C

LEDs	Meaning*
SF	Group errors
ACT_1, ACT_2	The corresponding reader / (write/read device) is active in processing a user command. (MOBY I only)
ERR_1, ERR_2 *	A flashing pattern indicates the last error to occur.
PRE_1, PRE_2 **	Indicates the presence of a transponder/MDS.
RxD_1, RxD_2	Indicates live communication with the reader / write/read device. May also indicate malfunctions on the reader / write/read device.
<p>* The meaning of the individual flashing pattern is described in the relevant FB and FC documentation. That documentation also includes the associated error descriptions.</p> <p>** In the case of multitag operation, this LED uses a flashing interval to indicate the number of data carriers currently within the range of the reader / write/read device.</p>	

After start-up or updating the firmware, the LEDs SF, PRE, ERR and ACT indicate the operating status or faults of the RF170C:

SF	PRE_1	ERR_1	ACT_1	PRE_2	ERR_2	ACT_2	Description
Off	Off	Off	On	Off	Off	Off	Start-up active
On	Off	On	Off	Off	Off	Off	Checksum error at start-up *
On	Off	Off	Off	Off	On	Off	Firmware invalid *
On	On	On	On	On	On	On	LED test for approximately 4 seconds; otherwise firmware fault *
On	Off	On	On	Off	On	On	Checksum error at start-up *
On	On	On	On	Off	On	On	Checksum error of the firmware *
On	Off	On	On	On	On	On	External RAM defective *
On	On	Off	On	On	On	On	ESSA3 defective *
On	Off	On	On	On	Off	On	ID error firmware *
–	Off	1 x flash every 3 s	Off	Off	1 x flash every 3 s	Off	RF170C successfully started up, waiting for reset command
–	–	n x flash every 3 s	–	–	m x flash every 3 s	–	The number of flashes (n, m) indicates the last reported error on a given channel.
–	–	Flashing	Rapid flashing	–	Flashing	Rapid flashing	Firmware update; alternate flashing of the error LEDs at approximately 1 Hz
– = not relevant							
* If this fault recurs, the module is defective and must be replaced.							

7.7.4 Technical specifications

Table 7-22 Technical specifications for RF170C

	Normal addressing	Filehandler
Serial interface to the user	PROFIBUS DP-V1/PROFINET IO	
Interface to the ET 200pro	ET 200pro backplane bus	
Connection method	See <i>ET 200pro</i> operating instructions	
Transmission rate	See <i>ET 200pro</i> operating instructions	
Max. block length	2 words cyclic/240 bytes acyclic (per channel)	
Serial interface to the reader/ write/read device		
Connector	2 x M12 coupler plug	
Max. cable length	1000 m, dependent on reader / write/read device (2 m = standard length; for other standard cables and self-assembled cables, refer to Section <i>Connecting cables</i>)	
Connectable readers / write/read devices	2x reader / write/read devices	
Software functions		
Programming	Depending on the PROFIBUS DP master	Depending on the PROFIBUS DP master
SIMATIC S7 function blocks	FB 45 / FC 45 (normal addressing without multitag) FC 55 (normal addressing with multitag)	FB 56 / FC 56 (filehandler, with and without multitag)
MDS addressing	Direct access via addresses	Access via DOS-like file system
Commands	Initialize MDS, read data from MDS, write data to MDS, etc.	Format MDS, read file, write file, etc
MOBY I dialog:		
Normal station/VMDS	Yes/Yes	No/No
Memory size VMDS	16KB	-
Power supply ¹		
• Rated value	24 V DC	
• Permissible range	20 V to 30 V DC	
Current consumption ²	Max. 1 A; typ. 130 mA (without reader / write/read device)	
Current taken from reader outputs	max. 800 mA (for one or 2 readers / write/read devices)	
Galvanic isolation	Yes	
Ambient temperature		
• During operation	-25 to +55°C	
• During transport and storage	-40 to +70°C	

	Normal addressing	Filehandler
Dimensions (W x H x D) in mm		
• RF170C (electronic and bus module)	90 x 130 x 35	
• RF170C with connection module	90 x 130 x 60	
Weight		
• RF170C communication module	Approx. 270 g	
• RF170C connection module	Approx. 500 g	
Degree of protection	IP67	
MTBF (at 40°C)	129 years	
Approvals	cULus (file E116536)	
<p>1) All supply and signal voltages must be low level protective voltage (SELV/PELV acc. to EN 60950) 24 V DC supply: Safety (electrical) isolation of low voltage (SELV / PELV acc. to EN 60950)</p> <p>2) The current supply must provide the current required (max. 1 A) for intermittent periods of failed voltage \leq 20 ms.</p>		

7.7.5 Dimensional drawings

RF170C with connection module

The dimension drawing for an RF170C communication module with plugged-in connection module is shown below.

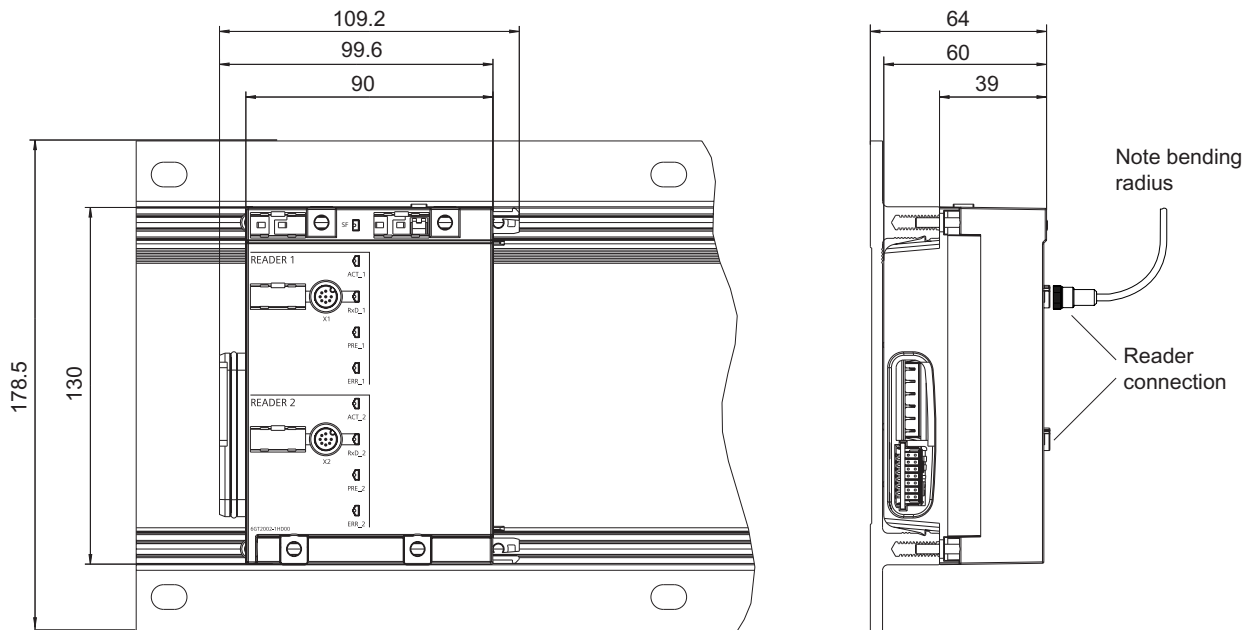


Figure 7-43 Dimension drawing for RF170C communication module with connection module on mounting rack, narrow

7.7.6 Ordering data

Communication module and connection module

Table 7-23 Communication module and connection module order numbers

Name	Order number
RF170C communication module, 1 unit	6GT2002-0HD00
RF170C connection module, 1 unit	6GT2002-1HD00

RF170C connection module accessories

Table 7-24 Order numbers for RF170C connection module accessories

Name		Order number
Write/read device cable MOBY I / E / U	2.0 m	6GT2091-0FH20
	5.0 m	6GT2091-0FH50
Write/read device cable MOBY D	2.0 m	6GT2691-0FH20
Reader cable RF300, extension cable RF300/MOBY I/E/U/D	2.0 m	6GT2891-0FH20
	5.0 m	6GT2891-0FH50
	10.0 m	6GT2891-0FN10
	20.0 m	6GT2891-0FN20
	50.0 m	6GT2891-0FN50

7.8 RF180C

7.8.1 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.



Figure 7-44 RF180C communication module

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 families can be operated with the RF180C:

- RF300
- MOBY D
- MOBY U (normal addressing)
- MOBY E (available soon)
- MOBY I (available soon)

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
- 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).

Layout

The RF180C has the same housing as the distributed I/O system ET 200eco.

For connecting to PROFINET IO, the RF180C communication module has a connection block of the M12, 7/8" type.

The following figure shows the basic design of the RF180C.

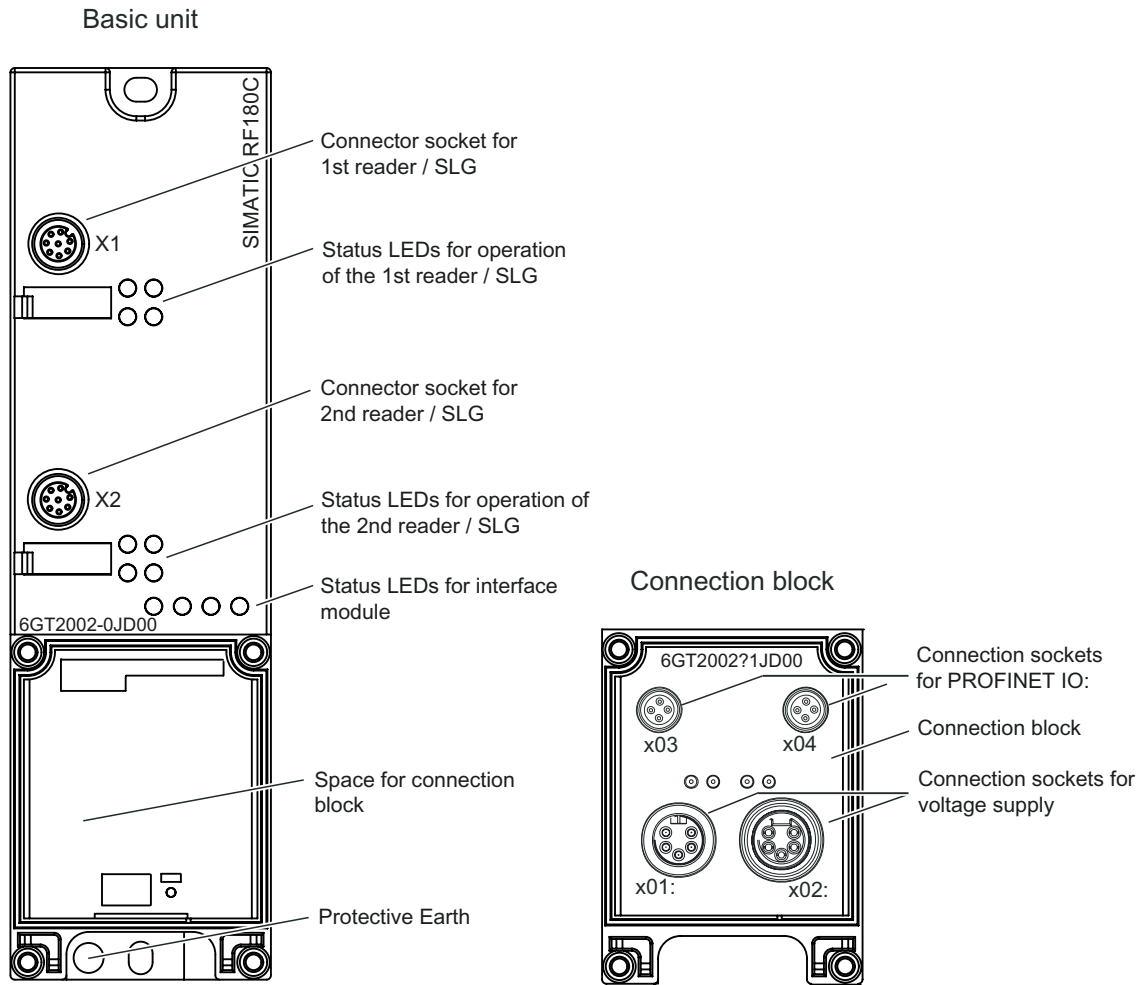


Figure 7-45 Basic design of the RF180C

Potential

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

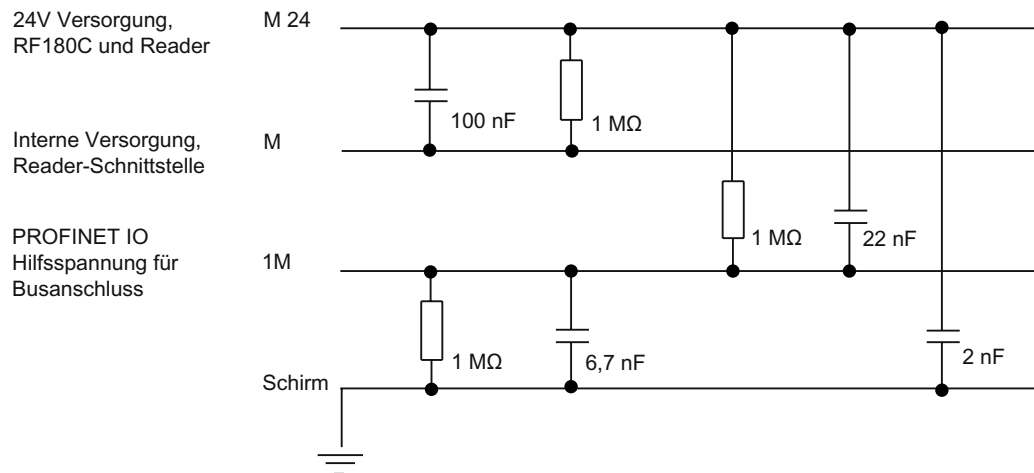


Figure 7-46 Electrical isolation of RF180C

Integration

The following figure shows how the RF180C is integrated in an automation system.

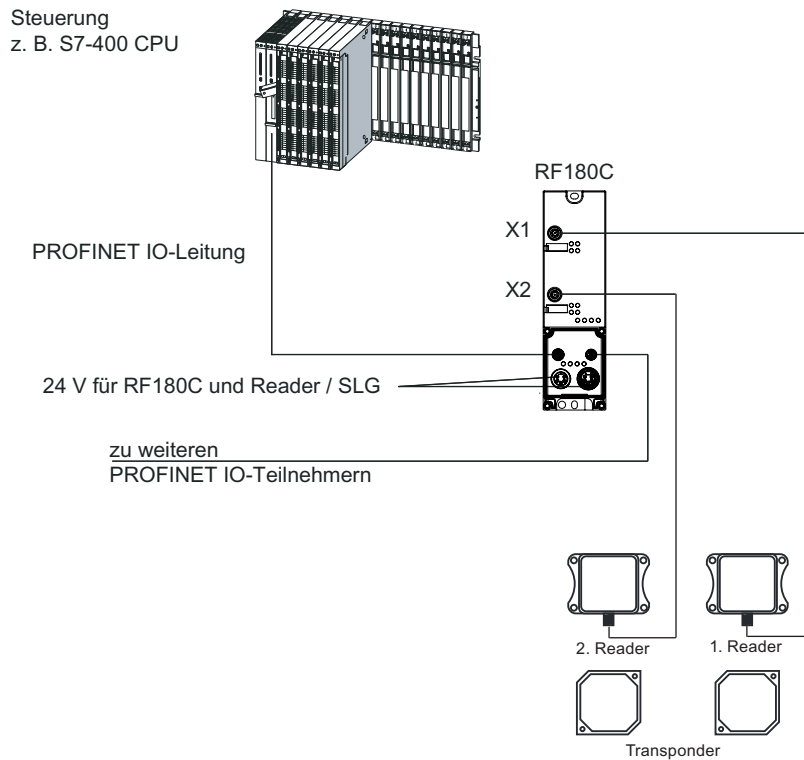


Figure 7-47 Configurator for RF180C

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*).

7.8.2 Connection

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.

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*.

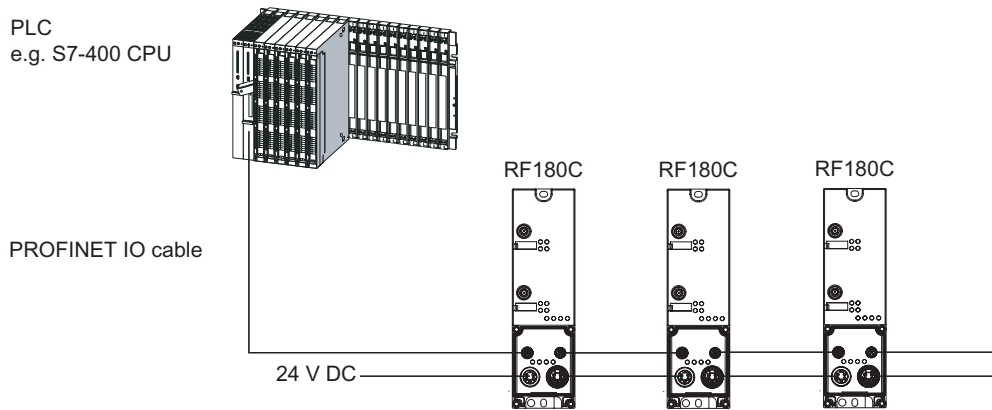


Figure 7-48 RF180C with BUS topology

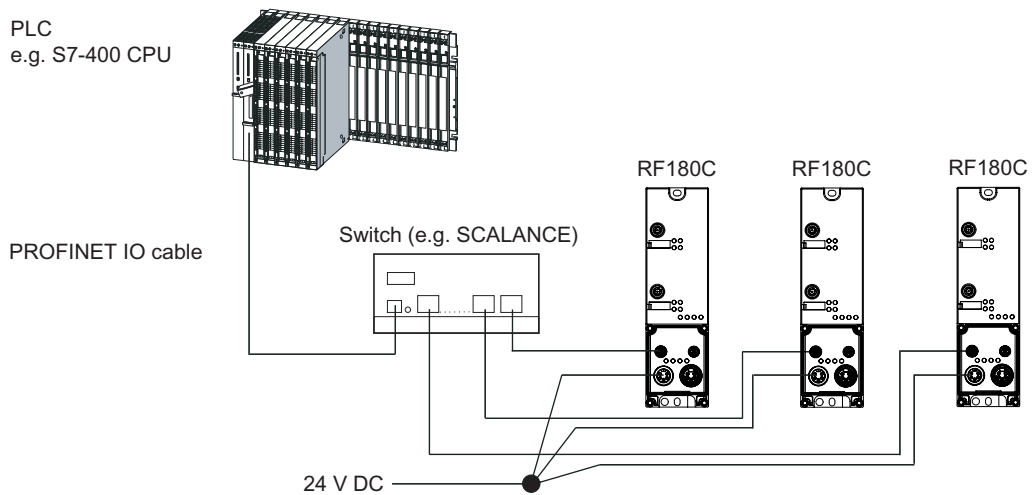


Figure 7-49 RF180C with STAR topology

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.

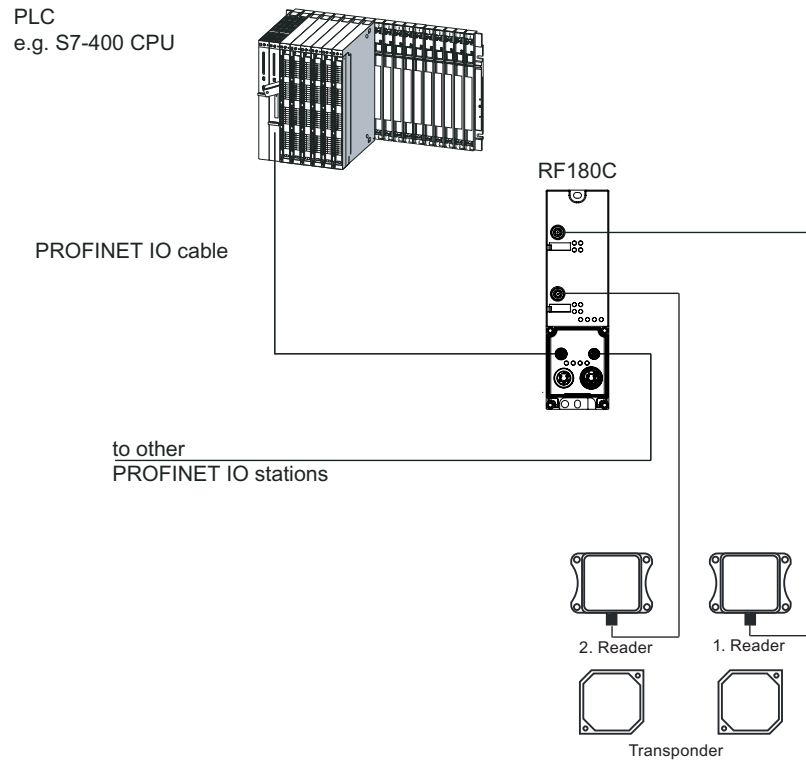


Figure 7-50 Overview of wiring

7.8.2.1 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: Power 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 7-25 Pin assignment for M12 connector, 4-pole, D coding (PROFINET IO)

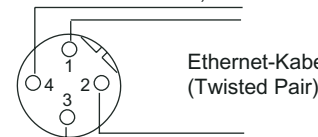
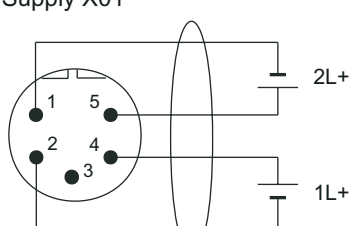
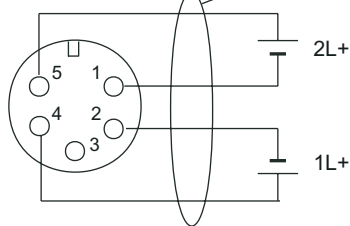
Pin	Assignment	View of M12 connector, 4-pole, D coding (wiring side)
1	Data line TxP	<p>Einspeisen und Weiterschleifen PROFINET IO X3, X4</p>  <p>Ethernet-Kabel (Twisted Pair)</p> <p>Any connector can be used for infeed and looping through</p>
2	Data line RxP	
3	Data line TxN	
4	Data line RxN	

Table 7-26 Pin assignment for 7/8" connector (supply voltages)

Pin	Assignment	View of 7/8" connector (wiring side)
1	Load voltage ground (2M)	<p>Supply X01</p>  <p>2L+</p> <p>1L+</p> <p>Loop-through connection X02</p>  <p>2L+</p> <p>1L+</p> <p>5-core cab</p>
2	Ground for electronic / encoder supply (1M)	
3	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 mm² pre-assembled with 7/8" connectors).

If you want to assemble the cable yourself, then the conductor cross-section should be 1.5 mm².

Connecting up M12, 7/8" connector

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.

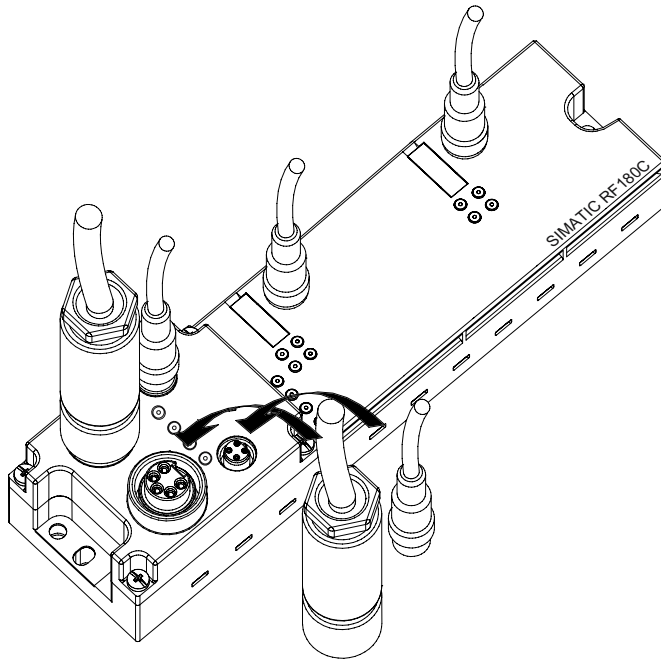


Figure 7-51 Connecting up M12, 7/8" connector

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*.

7.8.3 Parameter assignment

7.8.3.1 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 yyyyymmdd".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 IO controller.

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

7.8.3.2 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 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> flashing stops again.

7.8.3.3 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 7-27 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	With later firmware version
	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 write/read 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 <i>Diagnostics</i> 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 write/read device D11S/D12S		

7.8.3.4 Input parameters for RF180C

Input parameters for RF180C with FB 45

Allocation is undertaken in UDT 10.

Table 7-28 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 control unit
+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)
+10.0	MOBY_mode	B#16#1, 4, 5, 6, 7, 8, 9, A, B	Special features of the MOBY I dialog (8): <ul style="list-style-type: none"> • 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	The 00 value is only of any use if the parameters for MOBY_mode have been set accordingly.
+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
+14.0	multitag	B#16#1	MOBY U / D
+15.0	field_ON_control	MOBY U: B#16#0, 1, 2, 3 MOBY D: B#16#0	MOBY U / D
+16.0	field_ON_time	MOBY U: B#16#00 ... FF MOBY D: B#16#00, 01	MOBY U / D

7.8.3.5 Command table of the RF180C

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

Allocation is undertaken in UDT 20 using the "command" variable.

Table 7-29 Commands for RF180C with standard addressing

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

7.8.4 PROFINET diagnostics

7.8.4.1 Diagnosis using LEDs

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

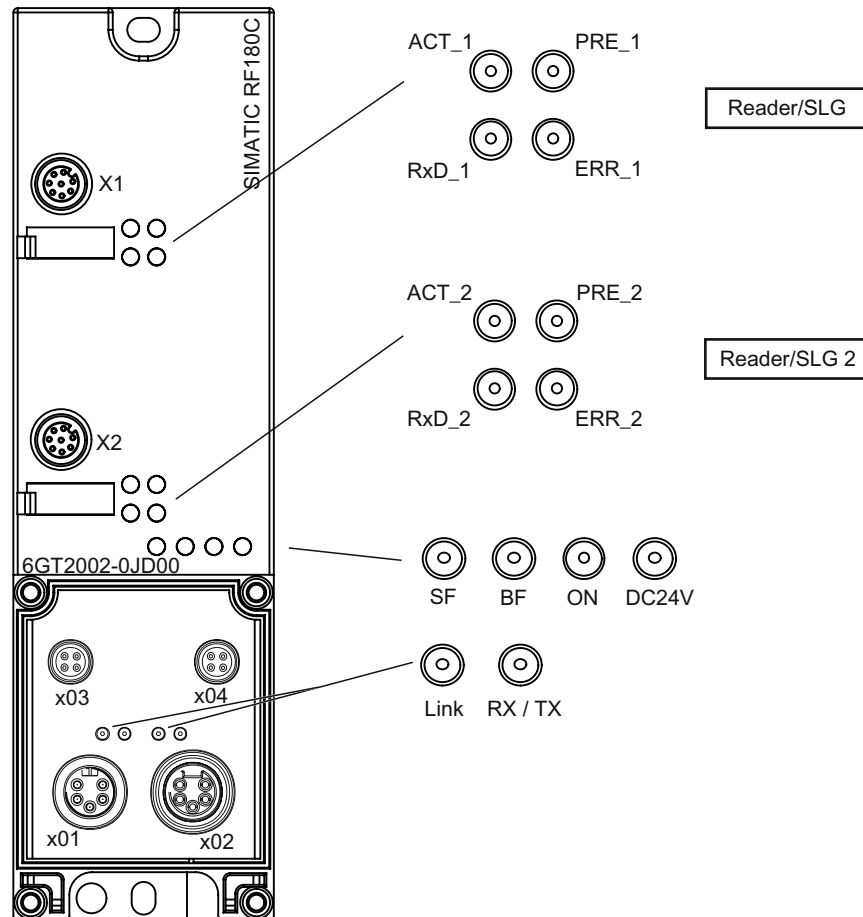


Figure 7-52 LEDs of the RF180C

7.8 RF180C

Table 7-30 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 7-31 LED display for PROFINET diagnostics

BF	SF	Cause of error	Error handling
On	–	<ul style="list-style-type: none"> 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	-	<ul style="list-style-type: none"> There is no connection to the IO controller. 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> A PROFINET diagnostic signal exists. 	<ul style="list-style-type: none"> Analyze the diagnostic data.
Off	Off	<ul style="list-style-type: none"> Normal mode 	–
– = Status not relevant			

Table 7-32 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 7-33 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 flashin g	Off	Off	Slow flashin g	Off	Firmware update (flashes with every described area)

7.8.4.2 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.

7.8.4.3 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

7.8.5 Technical data

Table 7-34 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
Autonegotiation	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 plug
Max. cable length	1000 m, dependent on Reader/SLG (2 m = standard length; for other standard cables and self-assembled cables, refer to Section <i>Connection cables</i>)
Connectable readers/SLGs	2x readers / SLGs of the RFID families RF300, MOBY D or MOBY U
Software functions	
Programming	Depending on the 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 voltage¹⁾	
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
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
Weight	
Base unit	Approx. 210 g
M12, 7/8" connection block	Approx. 230 g
Mechanical Environmental Conditions	
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 low level protective voltage (SELV/PELV acc. to EN 60950)
24 V DC supply: Safety (electrical) isolation of low voltage (SELV / PELV acc. to EN 60950)
- 2) The current supply must provide the current required (max. 500 mA) for intermittent periods of failed voltage ≤ 20 ms.

7.8.6 Dimension drawing for RF180C with fixing holes

The following figure shows the dimension drawing of an RF180C with bus connection block M12, 7/8" PN.

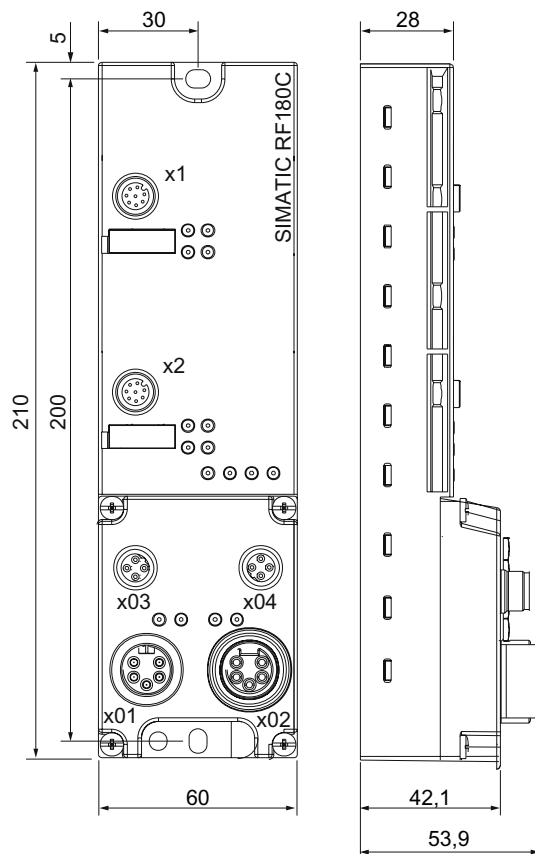


Figure 7-53 Dimension drawing for RF180C

7.8.7 Connecting cable to the reader/SLG

7.8.7.1 Routing of standard cables

Available cables

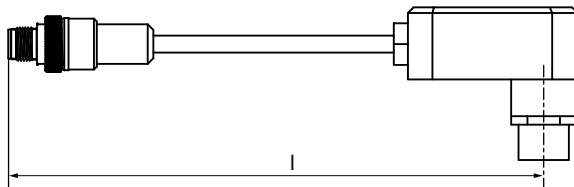


Figure 7-54 Connecting cable M12 ↔ Reader / SLG; l = 2 m, 5 m (MOBY I / E / U)

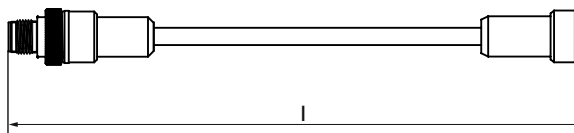


Figure 7-55 Connecting cable/extension cable M12 ↔ M12; l = 2 m, 5 m, 10 m, 20 m, 50 m

- RF300 connecting cable
- Extension cable for all RFID systems

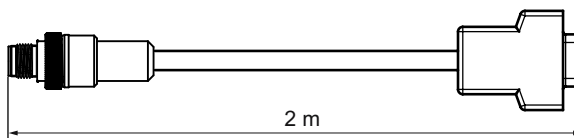


Figure 7-56 Connecting cable M12 ↔ sub-D (MOBY D)

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/SLG 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 7-35 Connecting cable M12 ↔ Reader / SLG

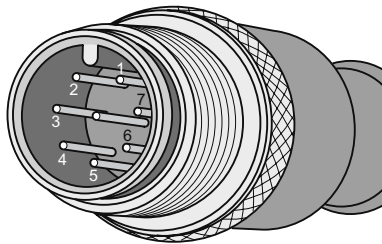
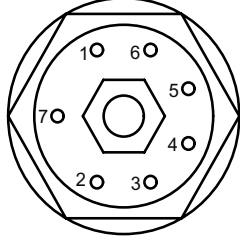
M12 connector (male)		Reader/SLG connector (female)
	1	2
	2	5
	3	3
	4	4
	5	6
	6	1
	7	–
	8	7
		

Table 7-36 Connecting cable / extension cable M12 ↔ M12

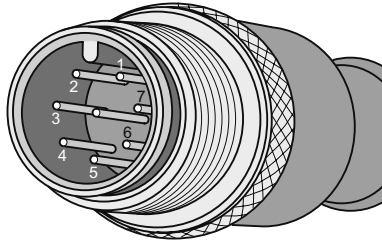
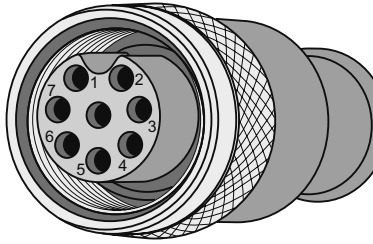
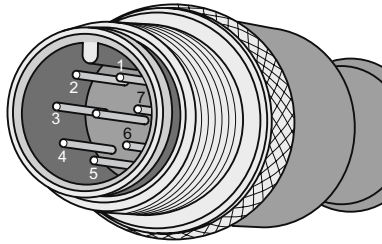
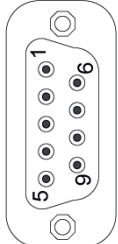
	1	1	
	2	2	
	3	3	
	4	4	
	5	5	
	6	6	
	7	7	
	8	8	

Table 7-37 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
		
<p>Note: Reader/SLG with Sub-D connector must be supplied over an additional connector with 24 V DC.</p>		

7.8.7.2 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

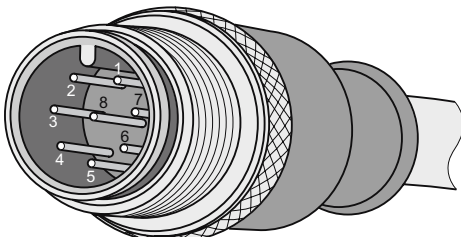
Connectors

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 7-38 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	PE / shield	

System diagnostics

8.1 Error codes

Error codes of the RF300 readers

Flashing of red LED on reader	Error code (hexadecimal)	Description
00	00	no error
01	0F	Boot message
02	01	Presence error, possible causes: <ul style="list-style-type: none"> • The active command was not carried out completely • The tag has left the field while the command is being processed • Communication fault between reader and tag
05	05	Parameterization error, possible causes: <ul style="list-style-type: none"> • Unknown command • Incorrect parameter • Function not allowed
06	06	Air interface faulty
12	0C	The tag memory cannot be written, possible causes: <ul style="list-style-type: none"> • Hardware fault (memory faulty) • Memory write-protected (corresponding OTP area has already been written)
13	0D	Error in the specified memory address (access attempted to non-existent or non-accessible memory areas).
19	13	Buffer overflow: Insufficient buffer available in the reader for saving the command
20	14	Major system fault (hardware fault)
21	15	Parameter assignment error: faulty parameter in RESET command
25	19	Previous command is still active
28	1C	Antenna is already switched off/Antenna is already switched on, mode in SET-ANT command not recognized.
30	1E	Incorrect number of characters in frame
31	1F	Running command cancelled by "RESET" command

8.2 Diagnostics functions

8.2.1 Overview

Extended diagnostic functions with SIMATIC RF300

With SIMATIC RF300, extended diagnostic functions are available which simplify start-up and maintenance.

These diagnostic data are accessed using the FC 45 function with the SLG STATUS and MDS STATUS commands. These two commands can each be called in various modes (subcommands) for which corresponding data structures (UDTs) are defined.

Command	Mode (subcommand)	Meaning
SLG STATUS	01	Hardware and firmware configuration, parameterization status
	06	Communication error counter, current command status
MDS STATUS	01	Serial number of the tag (UID), memory configuration EEPROM write-protection status
	02	Serial number of the tag (UID), HF field strength value, communication error counter, presence counter (duration)

Overview of the diagnostic functions

8.2.2 Reader diagnostics with SLG STATUS

The SLG STATUS command can be used to scan the status and diagnostics data of the reader.

SLG STATUS (mode 01), UDT110

HW	ASCII	Type of hardware (31 to 38 hex)	
HW-V	Binary value	HW version 0 to FF hex 0 to FF hex	= Version (high byte): Unused = Version (low byte)
Url-V	Binary value	Version of loader 0 to FF hex 0 to FF hex	= Version (high byte) = Version (low byte)
FW	ASCII format	Type of firmware	
FW-V	Binary value	Firmware version 0 to FF hex 0 to FF hex	= Version (high byte) = Version (low byte)
TR	Binary value	Type of driver	"1" = 3964R
TR-V	Binary value	Version of driver 0 to FF hex 0 to FF hex	= Version (high byte) = Version (low byte)
SS	Binary value	RS232 / RS422 01 hex	= RS422
Baud	Binary value	Baud rate 01 hex 02 hex 05 hex	= 19.2 Kbaud = 57.6 Kbaud = 115,2 Kbaud
mtag	Binary value	Number of MDSEs (Multitag/Bulk) that can be processed in the antenna field	= 1 with single-tag mode (param = 0x05, 0x25)
ANT	Binary value	Status of antenna 01 hex 02 hex	= Antenna On = Antenna Off
ANW	Binary value	Presence mode 0 01 hex	= Operation without presence = Operation with presence (see ANW-MELD signal)

SLG STATUS (mode 06), UDT280

FZP	Binary value	0 ... 255	= Error counter, passive (errors during idle time)
ABZ	Binary value	0 ... 255	= Abort counter
CFZ	Binary value	0 ... 255	= Code error counter
SFZ	Binary value	0 ... 255	= Signature error counter
CRCFZ	Binary value	0 ... 255	= CRC error counter
BSTAT	Binary value	0 ... 255	= Current command status
ASMFZ	Binary value	0 ... 255	= Interface problems to host (ASM/PC) parity, BCC, frame error

Note

All counter values are reset after reading (= SLG STATUS command executed).

Explanations:

- "FZP": Counts interference pulses when communication is not taking place with a transponder. (e.g. EMC interference caused by contactors, motors, etc.). Counter values can also be generated when a tag is located at the edge of the field even when there is no external interference.
- "ABZ", "CFZ", "SFZ" and "CRCFZ" are protocol error counters that can be generated during reader/tag communication. This can be caused by unsuitable reader/tag positioning (e.g. tag on field boundary, several data carriers in the field) or external electromagnetic interference.

To ensure clear diagnosis of the quality of communication, it is recommended that an SLG STATUS command (mode 06) is executed following receipt of the presence command to reset the error counter.

The protocol error counters are not mutually independent. If a code error (CFZ) occurs, this will cause a secondary signature (SFZ) or CRC (CRCFZ) error.

- "BSTAT" is the status for the most recently executed command. A value other than 0 means that the previous command was repeated by the reader due to faults (see above).
- "ASMFZ" signals line-conducted communication interference between the communication module (ASM) and the reader. Faults of this type can be caused by contact problems on the connector or the cable connection.

8.2.3 Transponder diagnostics with MDS STATUS

The MDS STATUS command can be used to scan the status and diagnostics data of the transponder that is located within the antenna field.

MDS STATUS (mode 01), UDT260

UID	Binary value	0 ... $2^{64} - 1$	= b0-31: 4 byte TAG ID, b32-63: 0
MDS type	Binary value	0x01	= Transponder without FRAM
		0x02	= Transponder with FRAM 8 KB
		0x03	= Transponder with FRAM 32 KB
Lock status	Binary value	0 ... 255	= Content of lock-bit register (EEPROM addr. 0xFF18)

MDS STATUS (mode 02), UDT270

LFD	Binary value	0 ... 255	= Value for field strength
FZP	Binary value	0 ... 255	= Error counter (passive) → errors during idle time
FZA	Binary value	0 ... 255	= Error counter (active)
ANWZ	Binary value	0 ... 255	= Presence counter

Note

All counter values are reset when the tag exits the field or when the antenna is switched off.

Notes:

- "LFD" is a value for the field strength that is determined in the transponder. The lower the value, the higher the field strength. A setpoint of < 28 hex signals reliable data transfer.
- "FZP" counts fault pulses when communication with a transponder is not taking place (e.g. electromagnetic interference caused by contactors, motors, etc.). Counter values can also be generated when a transponder is located at the edge of the field even when there is no external interference.
- "FZA" counts errors that can occur during reader-to-transponder communication. This can be caused by unsuitable reader/transponder positioning (e.g. transponder on field boundary, several data carriers in the field) or external electromagnetic interference.
- "ANWZ" is the value for the time that the transponder remains in the field before the MDS STATUS command (mode 02) is executed. A time step is 10 ms. The maximum time that can be recorded is therefore 2.5 s.

Accessories

9.1 RFID Systems Software & Documentation

Version 3.0 and higher of the "RFID Systems Software & Documentation" product is supplied on CD. All the required function blocks and drivers as well as the documentation for the RFID systems are included.

- FC 35: S7 function for the 8xIQ-Sense module
- FB 240: Function block for ASM 450; MOBY on PROFIBUS DP via SIMATIC S5 (including device data file for PROFIBUS DP)
- FB 250: Function block for ASM 400
- FB 41 contains a function block for the ASM 410. The call interface of the FB is virtually identical to FB 250. Please refer to the description of FB 250 for programming instructions.
- FC 44 can be used to operate the ASM 450 in a SIMATIC S7 environment. It is essential to read the instructions in the "Readme" file in the FC 44 directory. The "FC 44 for ASM 450" description is available for operation of the ASM 450.
- FC 45: S7 function for the ASM 754
- Function FC 47 for ASM 470
- FB 47 contains a function block for SIMATIC S5 115U - 155U. It can be used to operate the ASM 470 in a SIMATIC S5 environment via an ET 200M.
- Load program for ES 030 and device data file for connection of the ES 030 to PROFIBUS DP
- Test and demo programs for demonstrating the "read from MDS" and "write to MDS" functions etc. on a PC (Windows). The ASM 424/724 MOBY modules and SIM are connected to the PC (COM 1 or COM 2) by cable (with serial interface).
- 3964R driver for DOS, Windows 95 and Windows NT
- C library for CCT32 for Windows 95/NT 4.0
- C library for MOBY API for Windows 98/NT 4.0
- Latest edition of MOBY documentation in PDF format
- Tools: You will find utility programs for RFID system configuration here.

The "RFID Systems Software & Documentation" CD has a user-friendly interface based on HTML. After Start.exe has been called, a window for selecting the RFID system appears:

- RF300
- RF600
- RF-MANAGER
- MOBY
- CM/ASM

After selecting the RFID system, you can navigate to the required information.

Note

Notes on "RFID system software" and licensing

When purchasing a communication module or an interface module, no software or documentation is supplied. The "RFID Systems Software & Documentation" CD-ROM contains all available FBs/FCs for the SIMATIC, C libraries, demo programs, etc. and needs to be ordered separately. In addition, the CD-ROM contains the complete RFID documentation (German, English and French) in PDF format.

The purchase of a communication module or an interface module includes a payment for the use of the software, including documentation, on the "RFID Systems Software & Documentation" CD-ROM and the purchaser acquires the right to make copies (copy license) insofar as they are required as part of the customer-specific application or development for the plant.

The enclosed contract pertaining to the use of software products against a one-off payment shall apply in addition.

A

Appendix

A.1 Certificates and Approvals

DIN ISO 9001 certificate







The quality assurance system for the entire product process (development, production, and marketing) at Siemens fulfills the requirements of ISO 9001 (corresponds to EN29001: 1987).

This has been certified by DQS (the German society for the certification of quality management systems).

EQ-Net certificate no.: 1323-01

Certifications for the United States, Canada, and Australia


Safety

One of the following markings on a device is indicative of the corresponding approval:	
	Underwriters Laboratories (UL) per UL 60950 (I.T.E) or per UL 508 (IND.CONT.EQ)
	Underwriters Laboratories (UL) according to Canadian standard C22.2 No. 60950 (I.T.E) or C22.2 No. 142 (IND.CONT.EQ)
	Underwriters Laboratories (UL) according to standard UL 60950, Report E11 5352 and Canadian standard C22.2 No. 60950 (I.T.E) or UL508 and C22.2 No. 142 (IND.CONT.EQ)
	UL recognition mark
	Canadian Standard Association (CSA) per Standard C22.2. No. 60950 (LR 81690) or per C22.2 No. 142 (LR 63533)
	Canadian Standard Association (CSA) per American Standard UL 60950 (LR 81690) or per UL 508 (LR 63533)

EMC

USA	
Federal Communications Commission Radio Frequency Interference Statement	This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.
Shielded Cables	Shielded cables must be used with this equipment to maintain compliance with FCC regulations.
Modifications	Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.
Conditions of Operations	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CANADA	
Canadian Notice	This Class B digital apparatus complies with Canadian ICES-003.
Avis Canadien	Cet appareil numérique de la classe b est conforme à la norme NMB-003 du Canada.

AUSTRALIA	
	This product meets the requirements of the AS/NZS 3548 Norm.

A.2 Service & Support

Technical Support

You can reach the technical support team for all A&D projects at

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

Internet

- You can contact us via the Internet at:
<http://www.siemens.com/automation/service&support>
- We will gladly respond to any support queries at:
<http://www.siemens.com/automation/support-request>
- You can find the latest general information about our identification systems on the Internet at:
<http://www.siemens.com/simatic-sensors/rf>
- You will find the online catalog and the online ordering system at:
<http://www.siemens.com/automation/mall>

A.3 Contacts

If you have any further questions on the use of our products, please contact one of our representatives at your local Siemens office.

The addresses are found on the following pages:

- On the Internet at: <http://www.siemens.com/automation/partner>
- In catalog CA 01
- In Catalog FS 10 specially for factory automation sensors

A.4 Training

Training center

We offer appropriate courses to get you started. Please contact your local Training Center or the Central Training Center in

D-90327 Nuremberg.

Telephone: +49 (911) 895-3200

<http://www.siemens.com/sitrain>

Glossary

Active surface

Area with minimum field strength containing the transmission window, as well as the areas in which the field strength is no longer sufficient for data exchange.

Automation system (AS)

A programmable logical controller (PLC) of the SIMATIC S7 system, comprising a central controller, a CPU and various I/O modules.

Battery-free data storage unit

Mobile data storage units which operate without batteries. Power is supplied to the data storage unit across an electromagnetic alternating field.

Byte

A group of eight bits forms a byte

CE marking

Communauté Européenne (product mark of the European Union)

Communication modules

Communication modules are used to integrate the MOBY identification systems in SIMATIC or SINUMERIK systems, or to connect them to PROFIBUS, PC or any other system. Once supplied with the corresponding parameters and data, they handle data communication. They then make the corresponding results and data available. Suitable software blocks (FB/FC for SIMATIC; C libraries for PCs with Windows) ensure easy and fast integration in the application.

Data transmission rate

Unit of measurement for the volume of data transmitted within a unit of time, e.g. bytes/s

Dwell time

The dwell time is the time in which the transponder dwells within the transmission window of a read/write device. The read/write device can exchange data with the transponder during this time.

Dynamic mode

In dynamic mode, the data carrier moves past the read/write device at a traversing rate which depends on the configuration. Various checking mechanisms (listen-in check, CRC, ECC, etc.) ensure error-free data transfer even under extreme environmental conditions. A serial connection (up to 1000 m) is used to connect the read/write device directly to an interface module, PC, or any other system.

Electromagnetic compatibility

Electromagnetic compatibility is the ability of an electrical or electronic device to operate satisfactorily in an electromagnetic environment without affecting or interfering with the environment over and above certain limits.

EMC Directive

Guidelines for electromagnetic compatibility This guideline relates to any electrical or electronic equipment, plant or system containing electric or electronic components.

Equipotential bonding

Potential differences between different parts of a plant can arise due to the different design of the plant components and different voltage levels. It is necessary to compensate for these differences by equipotential bonding: this is done by combining the equipotential bonding conductors of power components and non-power components on a centralized equalizing conductor.

ESD Directive

Directive for handling ESDs.

Frequency hopping

Frequency hopping technique Automatic search for free channels.

In frequency hopping, data packets are transferred between the communication partners on constantly changing carrier frequencies. This makes it possible to react to interference from devices transmitting signals in the same frequency range. If an attempt to send a data packet is unsuccessful, the packet can be transmitted again on a different carrier frequency.

Interface modules (ASM)

See communication modules

IQ-Sense interface

Simple interface on the IQ-Sense module, using a standard design for all types of sensors, enabling integrated data exchange between the sensor and control system.

Limit distance

The limit distance is the maximum clear distance between the upper surface of the read/write device and the transponder, at which the transmission can still function under normal conditions.

M

Centerpoint of a field of a transmission window

Metal-free area

Distance/area which must be maintained between the transponder and metal in order to prevent interference during data transfer between the transponder and read/write device.

Mobile data storage units (MDS)

See transponder

Multi-tag capability

Multi-tag capability means the ability to use several read/write devices which communicate simultaneously with different data carriers.

Programmable logic controller (PLC)

The programmable logical controllers (PLCs) of the SIMATIC S5 systems consist of a central controller, one or more CPUs, and various other modules (e.g. I/O modules).

Read/write devices (SLG)

See readers

Read/write distance

See transmission distance

Readers

Readers ensure fast, secure data transfer between mobile data storage units and higher-level systems (PLCs, PCs, etc.). The data, energy included, are transmitted inductively across an electromagnetic alternating field or by radio. This principle enables contact-free data transmission, ensures high industrial compatibility and works reliably in the presence of contamination or through non-metallic materials.

RFID systems

SIMATIC RF identification systems control and optimize material flow and production sequences. They identify reliably, quickly and economically, use non-contact data communication technology, and store data directly on the product. They are also resistant to contamination.

Secondary fields

The strength of the secondary fields, which exist in addition to the transmission window, is usually lower than that of the transmission window and depends on the metallic environment. Secondary fields should not be used in configuring.

Static mode

In static mode the transponder is positioned at a fixed distance (maximum: limit distance) exactly above the read/write device.

Tag

See transponder

Telegram cycles

The transfer of a read or write command takes place in three cycles, known as message frame cycles. 1 or 2 bytes of user data can be transferred with each command. The acknowledgement transfer (status or read data) takes place in 3 further cycles.

Transmission distance

Distance between communication module (read/write device) and transponder (mobile data storage unit)

Transmission window

Area in which reliable data exchange between transponder and read/write device is possible due to a particular minimum field strength.

Transponder

An invented word from transmitter and responder. Transponders are used on the product, the product carrier, the object, or its transport or packaging unit, and contain production and manufacturing data, i.e. all application-specific data. They follow the product through assembly lines, transfer and production lines and are used to control material flow.

Because of their wireless design, transponders can be used, if necessary, at individual work locations or manufacturing stations, where their data can be read and updated.

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Siemens AG

Automation and Drives
Factory Automation Sensors
Postfach 4848
90327 NÜRNBERG
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