SIEMENS

SIMATIC Ident

RFID systems
Communications module RF120C with application blocks for S7-1200 and S7-1500

Operating Instructions

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Legal information

Warning notice system

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

⚠DANGER

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

⚠WARNING

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

⚠CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

⚠WARNING

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

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Disclaimer of Liability

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

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Introduction

1

Purpose of these operating instructions

With the information in these operating instructions, you will be able to commission and operate the RF120C communications module with a SIMATIC S7-1200 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 RF120C communications module.

Note

Validity of the manual for other communications modules

You can also use the function blocks described in the section "Ident instructions (Page 30)" in the same way for the communications modules RF180C (PROFINET) and ASM 456 (PROFIBUS) if these are connected to an S7-1200 or S7-1500. The Reset function blocks required for these communications modules can be found in the appendix.

Position in the information landscape

- In addition to these operating instructions, you require the operating instructions "SIMATIC S7-1200 programmable controller (http://support.automation.siemens.com/WW/view/en/36932465)".
- The manual of the particular RFID system contains information on the readers / write/read devices to be connected.
- Special information on the expert parameters and parameter assignment of the RF620R/RF630R readers in conjunction with the RF120C communications module can be found in the "Configuration manual RF620R/RF630R (http://support.automation.siemens.com/WW/view/en/33287195)".

Recycling and disposal

- The components of the RF120C communications module have low pollutant levels which means that it 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 Area of application and features

Area of application

The RF120C is a module for the SIMATIC S7-1200 controllers. The RF120C can be used as central I/O in a SIMATIC S7-1200.

Figure 2-1 RF120C communications module

When operating the communications modules with a SIMATIC S7-1200, there is a global library with function blocks available to you.

Only one reader or one code reading device with an RS-422 interface can be operated with an RF120C communications module. RFID readers and code readers from the following product families can be operated with the RF120C:

- RF200
- RF300
- RF600
- MV400 code readers
- MOBY D
- MOBY U

Features

To operate the RF120C, you require a SIMATIC S7-1200.

With the help of the RF120C communications module, you can address the data on the transponders physically. This type of addressing is also referred to as normal addressing.

A Hardware Support Package (HSP) allows you to install the RF120C module later in the catalog of the TIA Portal. You can configure and set parameters for modules using the TIA Portal.

Other features

- A maximum of three RF120C modules can be operated at the same time with one SIMATIC S7-1200.
- There are no restrictions relating to operation with other modules from the SIMATIC S7-1200 range.
- Degree of protection IP20
- System integration with standard cables
- Standardized user interface for Ident technology with easy-to-use function blocks

2.2 Setup and configuration

This section describes the setup of a SIMATIC S7-1200 with RF120C as an example.

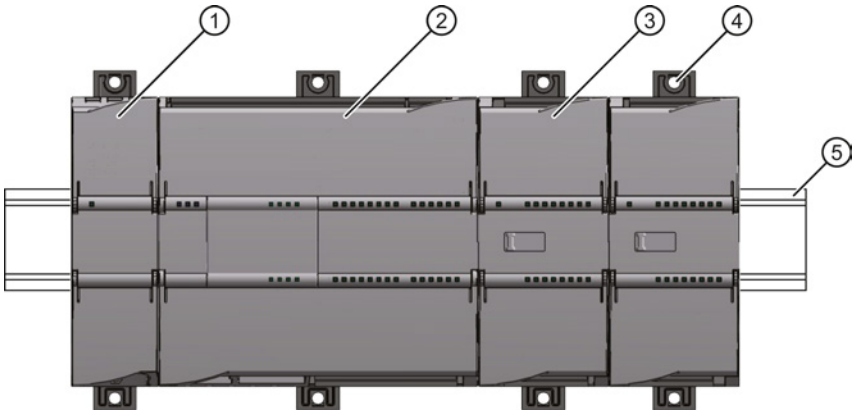
Configuration

The SIMATIC S7-1200 is designed for panel or rail mounting and consists of the following components:

- SIMATIC S7-1200
- Power supply unit
- Up to 3 communications modules (CM); e.g RF120C
- Up to 8 signal modules (SM)

You can thus set the focus of your configuration on local requirements.

The simple handling of the SIMATIC S7-1200 ensures fast commissioning and user-friendly maintenance.



① RF120C communications module
② CPU SIMATIC S7-1200
③ Signal modules
④ DIN rail mounting clip
⑤ DIN rail / panel

Figure 2-2 SIMATIC S7-1200 with RF120C

Configuration

The following figure shows the SIMATIC S7-1200 with three RF120C communications modules.

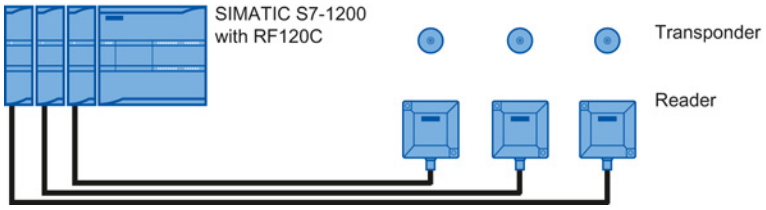


Figure 2-3 Maximum configuration of RF120C with a SIMATIC S7-1200

Extensive configurations are possible using a PROFIBUS/PROFINET setup with various SIMATIC Ident communications modules.

2.3 Integration

Integration

The figure below shows how the SIMATIC S7-1200 with SIMATIC RF120C is integrated into an automation system.

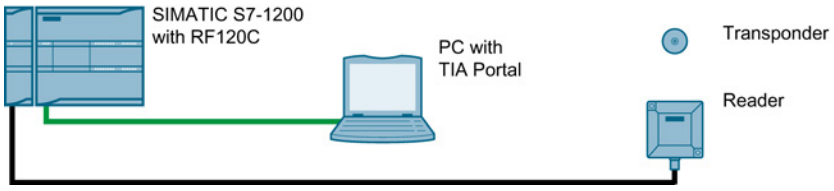


Figure 2-4 Example of integrating a SIMATIC S7-1200 with RF120C

The RF120C is integrated in the SIMATIC S7-1200 hardware configuration using an HSP. Following this, the RF120C can be configured in the TIA Portal using the device configuration. You will find the HSP on the DVD "RFID Systems, Software & Documentation" or on the Internet on the Support homepage (http://support.automation.siemens.com/WW/view/en/23183356).

Mounting, connecting up and commissioning 3

3.1 Important notes on using the device

Safety notices on the use of the device

The following safety notices must be adhered to when setting up and operating the device and during all work relating to it such as installation, connecting up, replacing devices or opening the device.

General notes

⚠ WARNING

Safety extra low voltage

The equipment is designed for operation with Safety Extra-Low Voltage (SELV) by a Limited Power Source (LPS). (This does not apply to 100 V ... 240 V devices.)

This means that only SELV / LPS complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 must be connected to the power supply terminals. The power supply unit for the equipment power supply must comply with NEC Class 2, as described by the National Electrical Code (r) (ANSI / NFPA 70).

There is an additional requirement if devices are operated with a redundant power supply:

If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.

⚠ WARNING

Opening the device

D not open the device when energized.

Overvoltage protection

NOTICE
Protection of the external 24 VDC voltage supply If the module is supplied via widespread 24 V power supply cables or networks, coupling of strong electromagnetic pulses into the power supply cables is possible, for example due to lightning or the switching of large loads. The connection of the external 24 VDC power supply is not protected against strong electromagnetic pulses. Make sure that any cables liable to lightning strikes are fitted with suitable overvoltage protection.

3.2 Installing and commissioning the RF120C

Prior to installation and commissioning

⚠ WARNING
Read the system manual "S7-1200 Programmable Controller" Prior to installation, connecting up and commissioning, read the relevant sections in the system manual "S7-1200 Programmable Controller". When installing and connecting up, keep to the procedures described in the system manual "S7-1200 Programmable Controller". Make sure that the power supply is turned off when installing/uninstalling the devices.

Parameter assignment

One requirement for the commissioning of the CP is the completeness of the STEP 7 project data. For more information, read the section "Parameter assignment and configuration (Page 21)".

Dimensions for installation

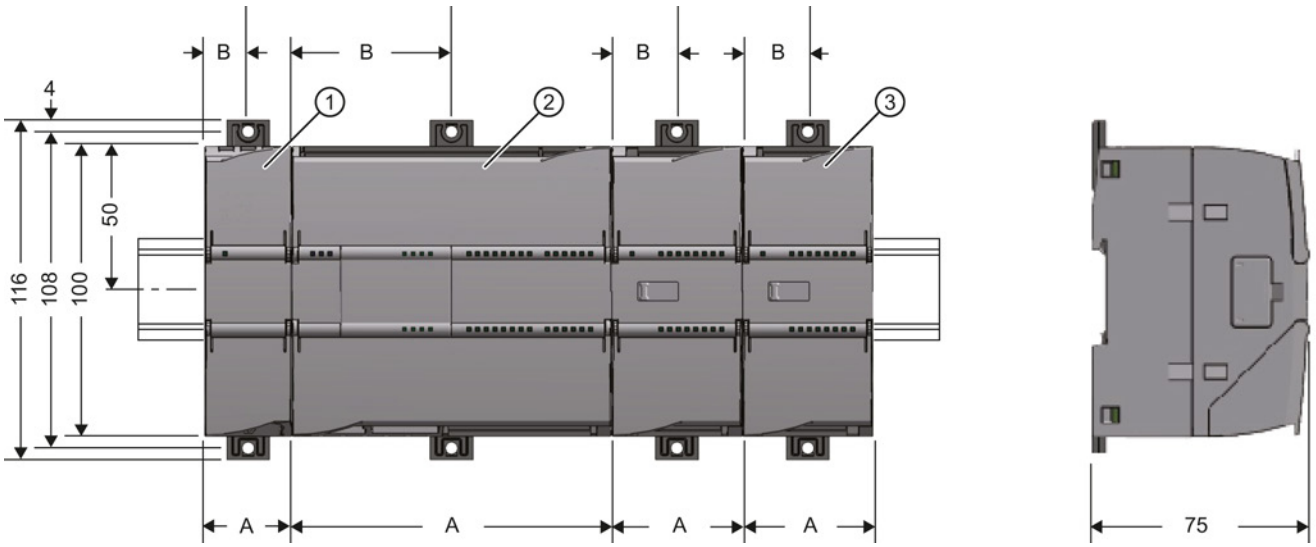


Figure 3-1 Dimensions for installation of the S7-1200

Table 3- 1 Dimensions for installation

S7-1200 devices		Width A	Width B *
CPU ②	Width depends on the CPU being used	90 mm	45 mm
		110 mm	55 mm
Signal modules ③	Width depends on the signal module being used	45 mm	22.5 mm
		70 mm	35 mm
Communications interfaces ①	e.g. RF120C	30 mm	15 mm

* Width B: The distance between the edge of the housing and the center of the hole in the DIN rail mounting clip

DIN rail mounting clips

All CPUs, SMs, CMs and CPs can be installed on the DIN rail in the cabinet. Use the pull-out DIN rail mounting clips to secure the device to the rail. These mounting clips also lock into place when they are extended to allow the device to be installed in a switching panel. The inner dimension of the hole for the DIN rail mounting clips is 4.3 mm.

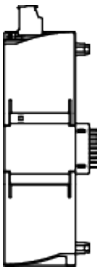
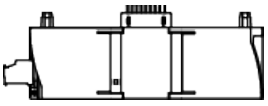
Procedure for installation and commissioning

Note

Installation location

All RF120C communications modules must be installed to the left beside the SIMATIC S7-1200. During installation, make sure that the upper and lower ventilation slits of the module are not obstructed and good ventilation is possible. Above and below the device, there must be a clearance of 25 mm to allow air to circulate and prevent overheating.

Remember that the permitted temperature ranges depend on the position of the installed device.

Device position / permitted temperature range	Installation location
Horizontal installation of the rack: 0 °C to 55 °C	
Vertical installation of the rack: 0 °C to 45 °C	

NOTICE
Connection with power off
Wire up the SIMATIC S7-1200 and modules to be connected only when the power is off.

Note

Power supply from the power outputs of the CPU

Connected modules obtain their power via the backplane bus of the SIMATIC S7-1200. Readers or code reading systems connected to the CM require an additional external power supply via the CM. Keep within the maximum load of the power outputs of the CPU.

You will find data relating to the current consumption and power loss of the CM in the section "Technical data (Page 63)".

The RF120C communications module must be grounded via the shield.

Table 3- 2 Installing and connecting up an RF120C

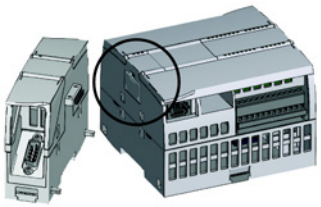
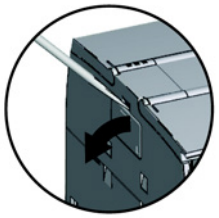
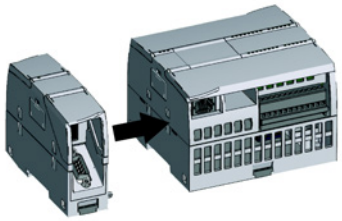
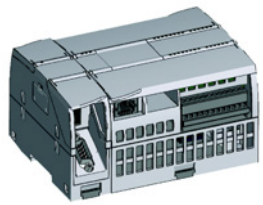
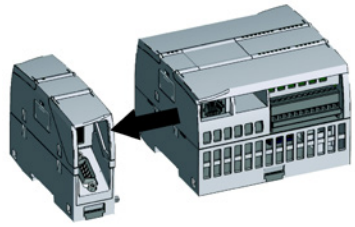
Task	Procedure
 	1. Remove the bus cover on the left of the CPU: – Insert a screwdriver into the slot above the bus cover. – Lever the cover up carefully out of its mounting. Remove the bus cover. Put the cover away for later use. 2. Connect the RF120C to the CPU: – Align the bus connector and the pins of the RF120C with the drill holes in the CPU. – Press the components together firmly until the limit stop is reached. 3. Fit the CPU with the connected modules onto the 35 mm DIN rail and secure the DIN rail. 4. Secure the power supply wires to the external power supply unit. 5. Secure the wires of the external power supply to the plug supplied with the RF120C and insert the plug in the socket on the top of the RF120C. The pinning is shown beside the socket on the top of the housing. You will also find this in the section "Pin assignment of the socket for the external power supply (Page 20)". 6. Connect the reader using the RF120C cable to the D-sub female connector of the RF120C. To do this, open the lower door in the housing. 7. Turn on the power supply. 8. Close the front covers of the module and keep them closed during operation. 9. The remaining steps in commissioning involve downloading the STEP 7 project data. The STEP 7 project data of the RF120C is transferred when you download to the station. To load the station, connect the engineering station on which the project data is located to the Ethernet interface of the CPU. You will find more detailed information on loading in the following sections of the STEP 7 online help: • "Loading project data" • "Using online and diagnostics functions"
	

Table 3- 3 Dismantling an RF120C

Task	Procedure
	1. Make sure that the CPU and all S7-1200 devices are disconnected from the electric power. 2. Remove the two plug-in connectors from the CPU and the RF120C. 3. Pull out the two DIN rail clamps on the CPU and the RF120C. 4. Remove the CPU and the RF120C from the DIN rail. 5. Hold the CPU and RF 120 firmly and pull them apart.
	

3.3 Connecting a reader to the RF120C

NOTICE
Correct usage When connecting non-specified devices to the RF120C, it is possible that the connected device may be destroyed.

A pre-assembled cable therefore permits the optimum and simple connection of the reader. The standard version of the connecting cable is available in lengths 2 m, 5 m and 10 m.

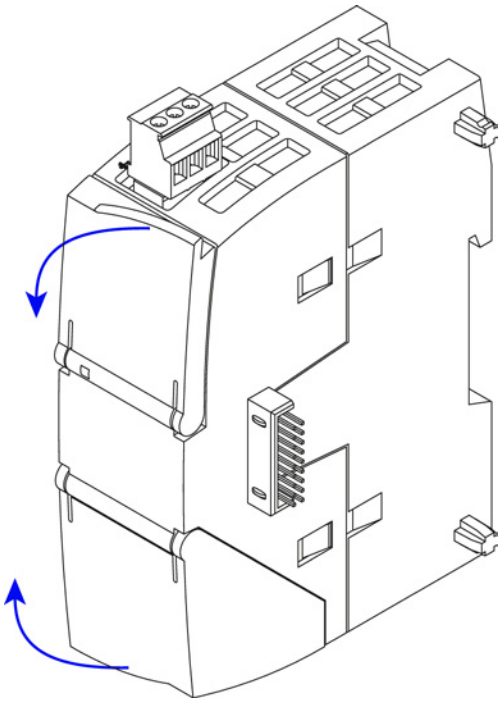


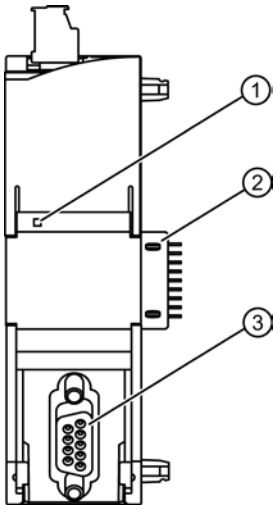
Figure 3-2 Opening the doors in the housing of the RF120C

To connect the cable, open the lower door in the housing as shown in the figure and connect the reader using the D-sub cable and the 9-pin D-sub socket of the communications module.

At the top right behind the upper door in the housing of the module the version is printed as a placeholder "X". You require the version if you have questions for Support. In the example "X 2 3 4", the "X" is a placeholder for the version "1".

Note

Pulling and plugging the D-sub is allowed when the power is on. After connecting a new reader, the "Reset_Reader" block must be called.



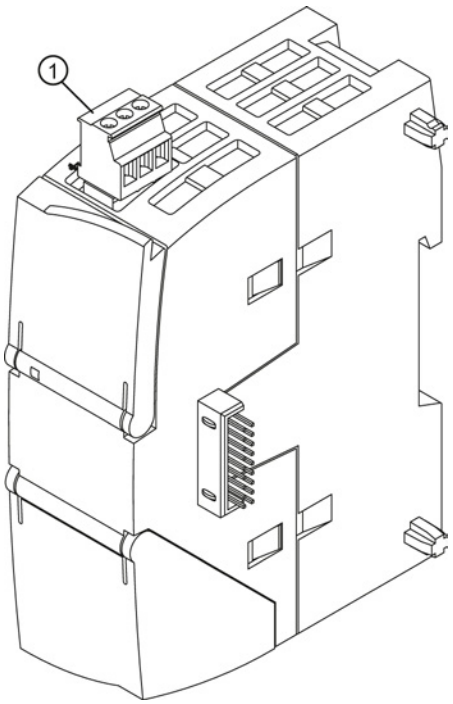
① Diagnostics LEDs
② Bus connector for connection to the controller
③ D-sub socket for connecting the reader

Figure 3-3 Sockets and LEDs of the RF120C communications module

3.4 External power supply

Power supply

The 3-pin socket for the external 24 VDC power supply is located on the top of the module. The reader is supplied with voltage via this power supply. The matching plug with screw terminals ships with the product. If there is overload, the RF120C turns off the power supply to the reader and signals this to the CPU.



① Mounted terminal block for the 24 VDC power supply of the reader

Figure 3-4 Terminal block for the 24 VDC power supply

The RF120C is supplied with power via the backplane bus and can also be addressed and commissioned without an external power supply from the SIMATIC S7-1200.

3.5 Pin assignment of the socket for the external power supply

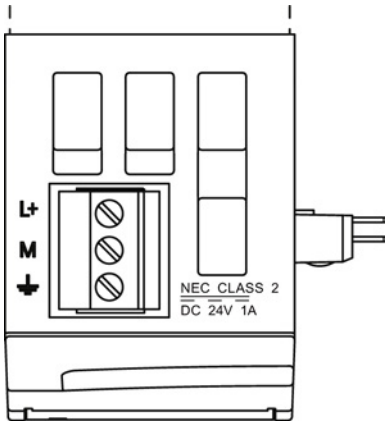


Figure 3-5 Socket for the external 24 VDC power supply (view from above)

Table 3- 4 Pin assignment of the socket for the external power supply

Pin	Labeling	Function
1	L+	+ 24 VDC (max. 1 A)
2	M	Ground reference for + 24 VDC
3	⏚	Ground connector

3.6 Pinout of the D-sub socket

RS-422 interface

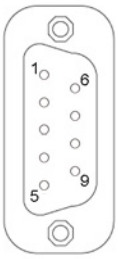


Table 3- 5 Pinout of the D-sub socket

Pin	Description	Pin	Description
1	24 VDC	6	-RxD
2	- not used -	7	+RxD
3	- not used -	8	-TxD
4	+TxD	9	- not used -
5	GND	Housing	Ground connector

Parameter assignment and configuration

4

4.1 Hardware configuration

The RF120C is integrated in the hardware configuration of STEP 7 (as of V12) using an HSP. You will find the HSP on the DVD "RFID Systems, Software & Documentation" (6GT2080-2AA20) or on the Internet on Support homepage (http://www.siemens.com/automation/service&support).

After installation, you can locate the RF120C module on the following path in the device configuration:
"SIMATIC S7-1200 > Communications modules > Ident Systems > RF120C > 6GT2002-0LA00"

4.2 Configuration

Configuration with the TIA portal

You configure the RF120C is using the TIA Portal. To do this, drag the RF120C to the device configuration from the hardware catalog.

You can connect and configure a maximum of three RF120C modules per station.

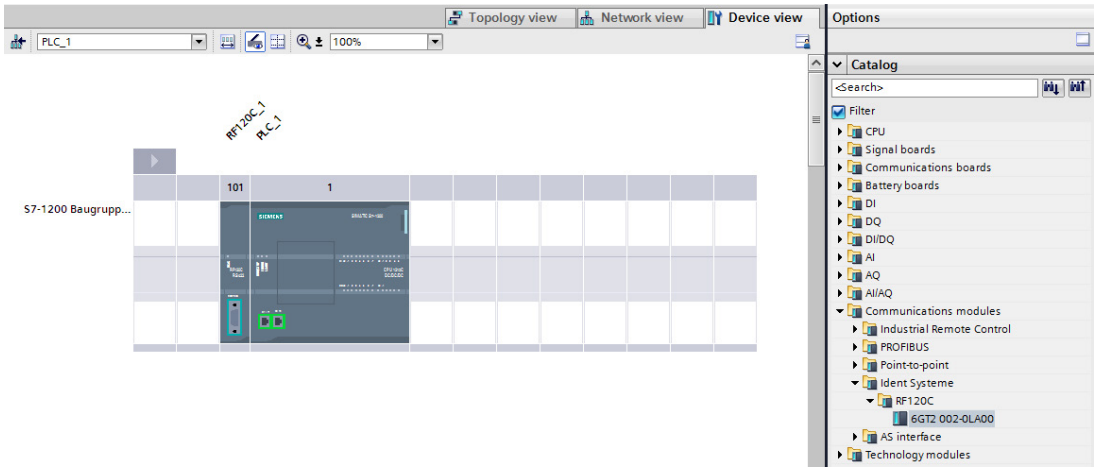


Figure 4-1 Adding the RF120C in the device configuration

4.3 Parameter assignment with the device configuration

You can set the parameters for the reader connected to the RF120C in the properties window of the RF120C. Using the "Parameter" menu item, you can set all reader-specific parameters. When using the RF180C and ASM 456 you also need to specify these parameters in the Reset block of the application (see Appendix B). This means that no further parameter assignment in the program is required for the RFID readers when working with the RF120C. For reasons of compatibility with the communications modules RF180C and ASM 456 you also have the alternative of setting parameters for the RF120C using special Reset blocks (see Appendix B).

The "Parameter" main menu item is divided into the following two menus:

- Reader
- Reader System
- Reader type (RF600 only)

4.3.1 Menu: Reader

The "Reader" menu contains the following submenus:

- Diagnostics: Setting to decide whether or not hardware diagnostics messages are reported.
- Reader System: Selection of the connected RFID system. Depending on the selection you make, the "Reader System" submenu is adapted.

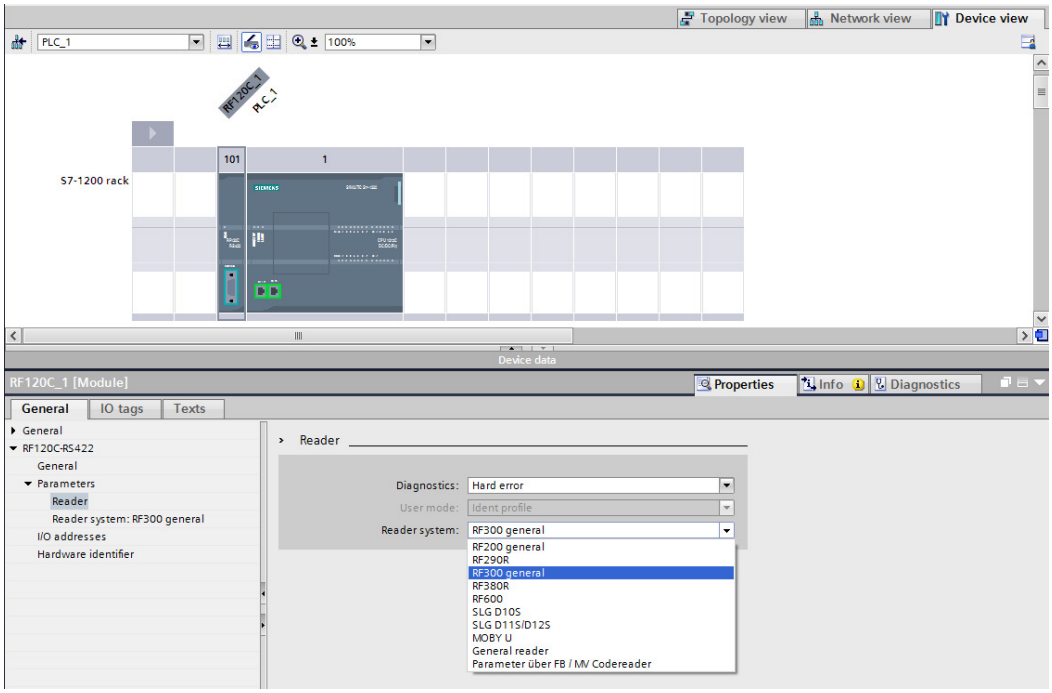


Figure 4-2 Selecting the reader system for parameter assignment

Submenu: Diagnostics

Parameter assignment options:

- None

  Apart from standard diagnostics, no other alarms are generated.

- Hard errors

  Extended alarms are generated if the following events occur.

  – Hardware fault (memory test)
  – Firmware error (checksum)
  – Connection to reader lost
  – Short-circuit fault/interruption if supported by the hardware

You will find more detailed information on diagnostics in the section "Diagnostics (Page 49)".

4.3.2 Menu: Reader System

Menu: Reader System

In this menu you can set all specific parameters for the selected RFID system.

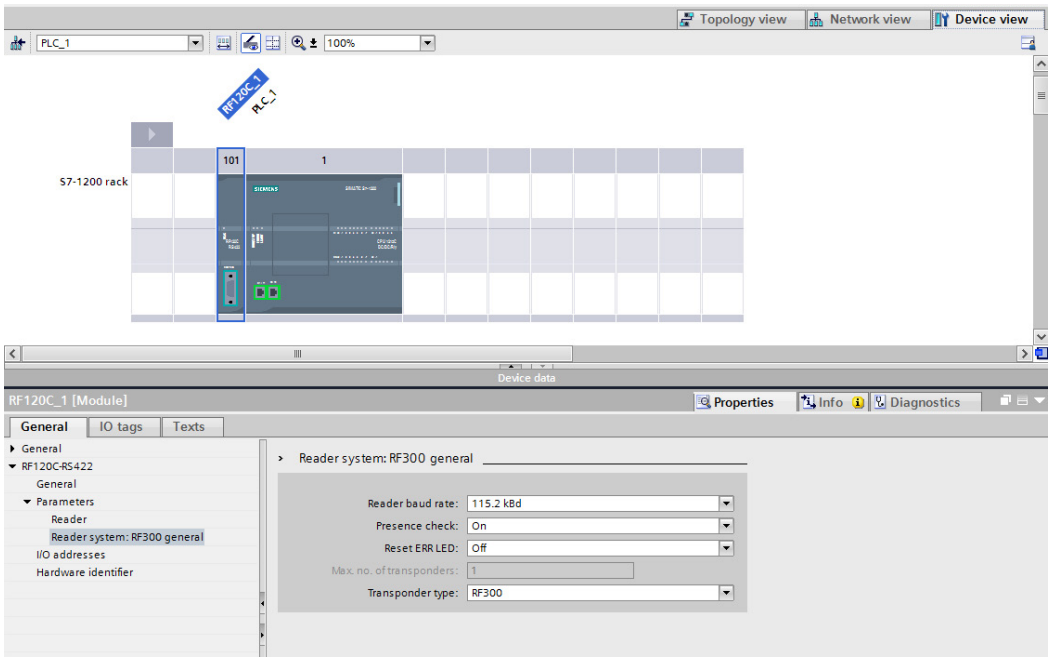


Figure 4-3 General parameter assignment options of the RF300 reader system

The following parameters exist with all Ident systems (RFID and code reading systems):

Table 4- 1 Standard parameters for all Ident systems

Parameter	Parameter value	Default value	Description
Baudrate Reader	19.2 kBd 57.6 kBd 115.2 kBd	115.2 kBd	After changing the baud rate, the reader must be turned off and on again.
Presence Check	On Off (RF field off) Off (RF field on)	On	On = presence is reported as soon as there is a transponder in the antenna field of the reader Off (RF field on) = the presence check in the FB is suppressed. The antenna on the reader is nevertheless turned on as long as it has not been turned off by a command. Off (RF field off) = the antenna is turned on only when a command is sent and it then turns itself off again (RF300 only)
Reset ERR-LED	On Off	Off	On = the flashing of the error LED on the RF120C is reset by each FB reset. Off = the error LED always indicates the last error. The display can only be reset by turning off the RF120C.

The following parameters are system specific according to the selection you made in the "Reader" menu.

4.3.2.1 RF200

Table 4- 2 RF200 general

Parameter	Parameter value	Default value	Description
-	-	-	No further settings are necessary.

Table 4- 3 RF290R

Parameter	Parameter value	Default value	Description
RF power	0.50 - 5.00 W	1.00 W	Setting for the output power of the reader.

4.3.2.2 RF300

Table 4- 4 RF300 general

Parameter	Parameter value	Default value	Description
Transponder type	RF300 ISO 15693	RF300	Selection of the transponders used.

Table 4- 5 RF380R

Parameter	Parameter value	Default value	Description
RF power	0.50 - 2.00 W	1.25 W	Setting for the output power of the reader.
Transponder type	RF300 ISO 15693	RF300	Selection of the transponders used.

4.3.2.3 RF600

Table 4- 6 RF600 general

Parameter	Parameter value	Default value	Description
Max. no. of transponders	1 - 80	1	Number of transponders expected in the antenna field. Permitted values: • 1 - 40 for RF620R • 1 - 80 for RF630R with 2 antennas • 1 - 40 for RF630R with 1 antenna The value stored in "multitag" defines the expected number of transponders to be read (EPC-ID) in the inventory. The value does not restrict the number of transponders to be processed in the antenna field. To ensure an efficient inventory of transponders in the antenna field, make sure that the values specified here do not deviate by more than approximately 10% from the maximum number of transponders to be expected in the antenna field.
Reader type	RF620R ETSI RF620R FCC RF620R CMIIT RF630R ETSI RF630R FCC RF630R CMIIT	RF620R ETSI	Selection of the reader used. By selecting a reader, you open the "Reader type" menu. This menu is described in the following section.

Menu: Reader type (RF600 only)

In the Reader type menu, further specific parameters are set for the reader type selected in Reader System.

Table 4- 7 RF600 menu: Reader type

Parameter	Parameter value	Default value	Description
Wireless profile	-	-	Selection of the relevant wireless profile for ETSI, FCC or CMIIT.
Multitag mode	UID = EPC-ID (8 bytes) UID = Handle ID (4 bytes)	UID = EPC-ID (8 bytes)	UID = EPC-ID (8 bytes) = 8 byte UID of the bytes 5-12 of the 12 byte long EPC-ID UID = handle ID (4 bytes) = 4 byte UID as handle ID for access to transponders with EPC-ID of any length
Intelligent Single Tag Mode (ISTM)	On Off	Off	Enable/disable the "Intelligent Single Tag Mode ISTM" algorithm [1]
Black list	On Off	Off	Enable/disable the "Black list" [1]
Radiated power internal antenna (RF620R)	0 - B	4	Setting the radiated power for the internal antenna [1] [2] With the RF620R, either only the internal or only the external antenna can be set.
Transmit power (external antenna RF620R; both antennas RF630R)	0 - 9	4	Setting the transmit power for the external antenna [1] [2]
Communication speed	Reliable detection Fast detection	Reliable detection	[1]
Tag hold	On Off	Off	Enable/disable "Tag hold" [1]
Scanning mode	On Off	Off	Enable/disable the "Scanning mode" [1]
Channel assignment (only with wireless profile ETSI)	-	-	Selection of the wireless channels to be used [1]

[1] You will find further information in the "Configuration manual RF620R_RF630R".

[2] The values for the transmit/radiated power of the antennas can be found in the following table.

Table 4- 8 Transmit / radiated power of the antennas

Hex value	RF630R transmit power	RF620R radiated power (internal antenna)			RF620R transmit power
		ETSI	FCC	CMIIT	
	dBm / (mW)	dBm / (mW) ERP	dBm / (mW) EIRP	dBm / (mW) ERP	dBm / (mW)
0	18 / (63)	18 / (63)	20 / (100)	18 / (65)	18 / (63)
1	19 / (79)	19 / (79)	21 / (126)	19 / (79)	19 / (79)
...	...	...	...	...	...
4	22 / (158)	22 / (158)	24 / (251)	22 / (158)	22 / (158)
...	...	...	...	...	...
9	27 / (501)	27 / (501)	29 / (794)	27 / (501)	27 / (501)
A	27 / (501)	28 / (631)	30 / (1000)	28 / (631)	27 / (501)
B (...F)	27 / (501)	29 / (794)	31 / (1259)	29 / (794)	27 / (501)

4.3.2.4 SLG D10S

Table 4- 9 SLG D10S

Parameter	Parameter value	Default value	Description
RF power	0.50 - 10.00 W	1.00 W	Setting for the output power of the reader.
Transponder type	ISO I-Code (e.g. MDS D139)	ISO	Selection of the transponders used.

4.3.2.5 SLG D11S/D12S

Table 4- 10 SLG D11S/D12S

Parameter	Parameter value	Default value	Description
Transponder type	ISO I-Code (e.g. MDS D139)	ISO	Selection of the transponders used.

4.3.2.6 MOBY U

Table 4- 11 MOBY U

Parameter	Parameter value	Default value	Description
Standby time	0 - 1400 ms	0 ms	"Scanning_time" describes the standby time for the transponder. If the transponder receives a further command before "scanning_time" has expired, this command can be executed immediately. If the transponder receives a command after "scanning_time" has expired, command execution is delayed by the "sleep_time" of the transponder.
Range limitation	0.2 m 0.5 m 1.0 m 1.5 m 2.0 m 2.5 m 3.0 m 3.5 m	1.5 m	-
Max. no. of transponders	1 - 12	1	Maximum number of transponders that can be processed at the same time in the antenna field.
BERO mode	Without BEROs 1 or 2 BEROs 1st BERO on, 2nd BERO off Synchronization by cable connection	Without BEROs	Without BEROs = no reader synchronization 1 or 2 BEROs = the BEROs are logically ORed. The antenna field is turned on during the actuation of a BERO. 1st BERO on, 2nd BERO off = The 1st BERO turns on the antenna field and the 2nd BERO turns the antenna field off. If there are two BEROs present and "BERO time in s" is set, the antenna field is turned off automatically if the 2nd BERO does not switch within this BERO time. If no "BERO time in s" is set, the antenna field remains turned on until the 2nd BERO is activated. Synchronization via cable connection = activate reader synchronization via cable connection (see manual on configuration, installation and service for MOBY U).
BERO time in s	0 - 255 s	0 s	Can only be set if the BERO mode is set to "1st BERO on, 2nd BERO off". 0 = timeout monitoring is deactivated. The 2nd BERO is required to turn the field off. 1 … 255 s = switch on time for the reader field

4.3.2.7 General Reader

Table 4- 12 General Reader

Parameter	Parameter value	Default value	Description
Input box for byte sequence (hexadecimal notation)	00000000	00000000	Expert mode With this function, you can specify the reset parameters directly in hexadecimal notation. This setting may only be selected if you have previously received the hex string for the setting from a member of the SIEMENS staff.

4.3.2.8 Parameters via FB / MV code reader

Table 4- 13 Parameters via FB / MV code reader

Parameter	Parameter value	Default value	Description
MOBY mode	RF200, RF300, RF600, MOBY D/U, MV	RF200, RF300, RF600, MOBY D/U, MV	Currently, only the parameter "RF200, RF300, RF600, MOBY D/U, MV" can be selected. Note the Reset function blocks in Appendix B.

4.4 Ident instructions

To be able to operate the RF120C with various Ident systems, the TIA Portal provides you with a global library. This library contains various Ident instructions.

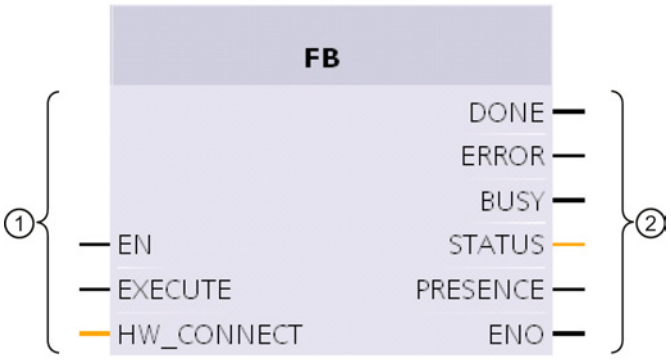
The following table lists all the Ident instructions and program elements of the library.

Table 4- 14 Overview of the Ident instructions

Position		Type	Symbolic name	Description
Ident instructions (global library)	Ident application blocks	Function block	Reset_Reader	These Ident instructions are available so that the communication with the Ident systems can be programmed as simply as possible.
			Read	
			Write	
			Read_EPC-ID	
			Write_EPC-ID	
			Set_Ant	
		PLC data type	HW_CONNECT_VAR	Separate data type for all Ident application blocks for physical addressing of communications modules and readers and for synchronizing the function blocks used for each reader.
		Function block	AdvancedCmd	Advanced command set. With the Ident application block "AdvancedCmd" it is possible to access other commands from the Ident command set.
	Ident profile	Function block	Ident profile	One instruction, full flexibility. This block is available for experts to be able to include complex command structures in their own program sequence.
		PLC data type	PIB_COMMAND	Data type for the Ident profile for setting the command parameters.
		PLC tags	PIB constants	Constants of the Ident profile

Example of a function block (FB)

The following graphic shows an example of an FB with input and output parameters as they exist in the same way in all function blocks.



① Input parameters
② Output parameters
Data type: Bit
Data type: Byte, Word, DWORD, INT

Figure 4-4 Example of an FB

Input parameters

- EN

  Enabling Input

- EXECUTE

  There must be a positive edge at this input before the block will execute the command.

- HW_CONNECT

  Global variable to address the reader/channel and to synchronize the application blocks. This variable needs to be created and addressed once for each connected RF120C. HW_CONNECT must always be transferred to the function blocks to address the relevant RF120C.

Note

Using HW_CONNECT with other communications modules

When using the function blocks with the communications modules RF180C or ASM 456, you need to create HW_CONNECT for each channel/reader.

Output parameters

- DONE (Bool)

  The job was executed. If the result is positive, this parameter is set.
- ERROR (Bool)

  The job was ended with an error. The error code is indicated in Status.
- BUSY (Bool)

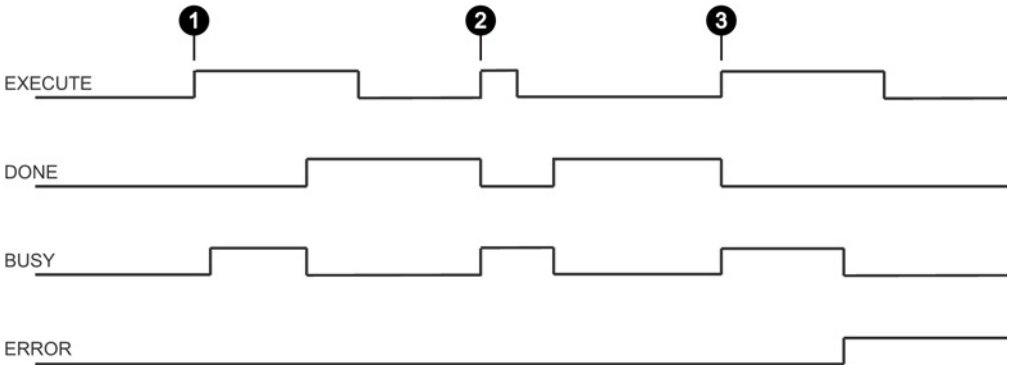
  The job is being executed.
- STATUS (DWORD)

  Display of the error message if the ERROR bit was set.
- PRESENCE (Bool)

  This bit indicates the presence of a transponder. The displayed value is updated each time the block is called.
- ENO

  Enable output

General sequence when calling function blocks



Case ① By setting EXECUTE (EXECUTE = 1) the function/instruction is started. If the job was completed successfully (DONE = 1), you need to reset EXECUTE.

Case ② EXECUTE is set for only one cycle. As soon as BUSY is set (and DONE is reset), you can reset EXECUTE again.

Case ③ Handling as in Case 1, however with error output. As soon as ERROR is set, the precise error code is available in the STATUS output.

Figure 4-5 General sequence when calling function blocks

Configuring the "HW_CONNECT" variable

Follow the steps below to configure an "HW_CONNECT" variable:

1. Create an "HW_CONNECT_VAR" variable in a data block. The "HW_CONNECT_VAR" data type is supplied with the function blocks.

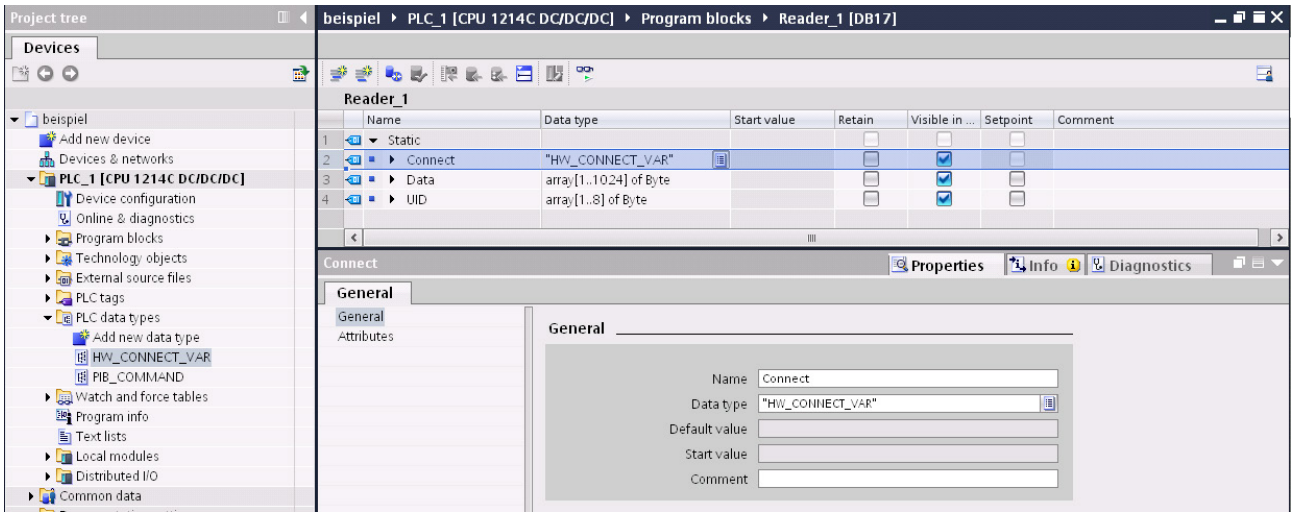


Figure 4-6 Creating the "HW_CONNECT_VAR" variable

2. Click on the triangle in front of the "Connect" entry to open the structure it contains.
3. With the help of the parameters in the "Address" structure, you can set the addresses for the RF120C to be used.
   - HW_ID: Hardware identifier of the module
   - CM_CHANNEL: Channel of the interface module. With the RF120C, the value is always 1 because the CM only has one channel.

     With RF180C or ASM 456 you need to enter "CM_CHANNEL = 2" for the second reader.
   - LADDR: I/O address of the module

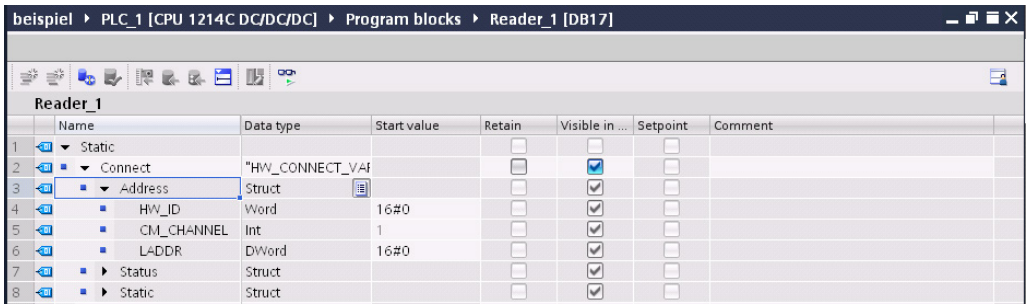


Figure 4-7 Address parameters

You will find the "HW_ID" and "LADDR" parameters in the device configuration in the properties of the RF120C.

To get the "HW_ID" and "LADDR" parameters, follow the steps below:

1. Open the device configuration.
2. Open the properties window of the RF120C by double-clicking on the RF120C in the device view.
3. In the "General" > "RF120C-RS422" > "I/O- addresses" tab you will find the I/O address that corresponds to "LADDR".
   Remember that the input and output address must have the same value.
4. On the "General" > "RF120C-RS422" > "Hardware identifier" tab you will find the hardware identifier that corresponds to the "HW_ID".

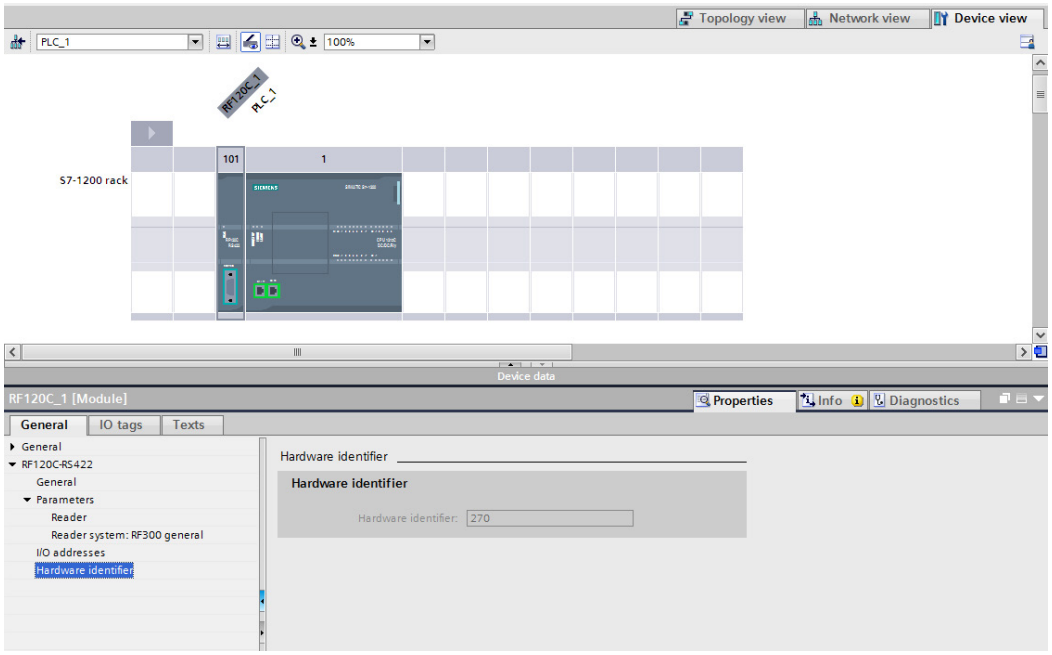


Figure 4-8 The "Hardware identifier" parameter

How the FBs work:

You can only ever send one command to an RF120C. You can, however, call and start two or more blocks at the same time. The FBs execute in the order in which they are called.

This does not apply to the Reset function blocks. If a Reset command is executed, the command active at this time is aborted.

Inserting the FBs in the program

The following elements must exist in the project to allow the function blocks to be compiled:

- PLC data types
- PLC tags
- PIB_1200_UID_001KB

First copy this element from the library and insert it in your own program before you start to select and program the function blocks.

4.4.1 Reset_Reader

With the "Reset_Reader" FB, all SIEMENS RFID reader types can be reset. All the readers are reset to the settings stored in the device configuration of the RF120C. The "Reset_Reader" FB has no specific parameters. The execution of the FB is started by the "EXECUTE" parameter.

You will find descriptions of other Reset blocks for operation with the communications modules RF180C and ASM 456 in the appendix of the operating instructions.

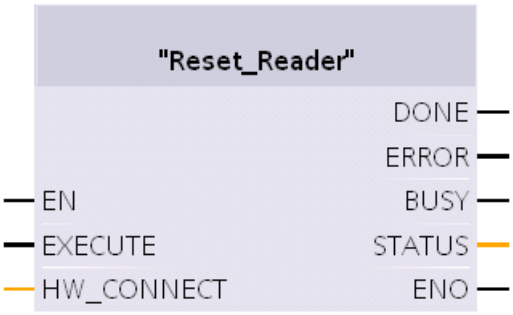


Figure 4-9 "Reset_Reader" function block

4.4.2 Read

The "Read" block reads the data from the transponder once and enters this in the "IDENT_DATA" buffer. The physical address and the length of the data are transferred using the "ADR_TAG" and "LEN_DATA" parameters. Up to 1024 bytes can read with one job.

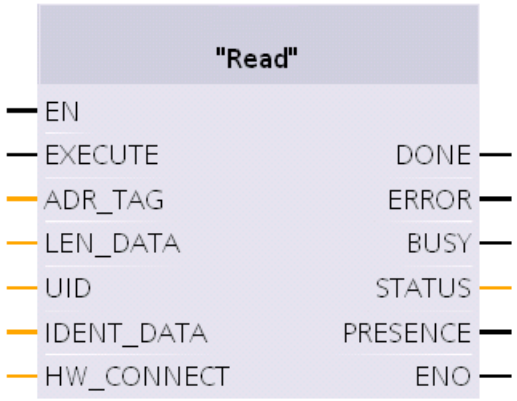


Figure 4-10 "Read" function block

Table 4- 15 Explanation of the "Read" function block

Parameter	Data type	Description
ADR_TAG	WORD	Physical address on the transponder where the read starts. You will find more detailed information on addressing in the section "Transponder addressing (Page 40)".
LEN_DATA	INT	Length of the data to be read (1 ... 1024 bytes)
UID	Array [1...8] of Byte	Unique Identifier of the transponder In single tag mode, this parameter is not used (UID = 0). In multi-tag mode you obtain the UID of the transponder using the Inventory command ("AdvancedCmd" function block).
IDENT_DATA	Array [1...1024] of Byte	Data buffer in which the read data is stored.

4.4.3 Write

The "Write" block writes the data from the "IDENT_DATA" buffer to the transponder once. The physical address and the length of the data are transferred using the "ADR_TAG" and "LEN_DATA" parameters. Up to 1024 bytes can written with one job.

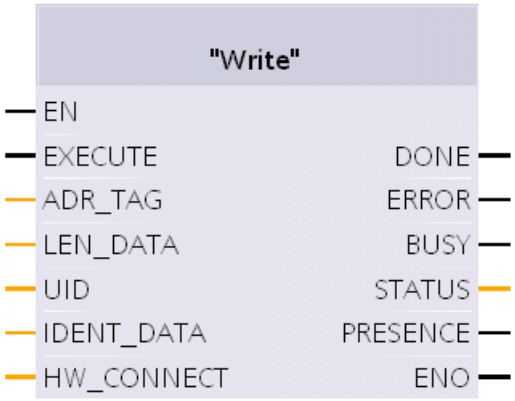


Figure 4-11 "Write" function block

Table 4- 16 Explanation of the "Write" function block

Parameter	Data type	Description
ADR_TAG	WORD	Physical address on the transponder where the write starts. You will find more detailed information on addressing in the section "Transponder addressing (Page 40)".
LEN_DATA	INT	Length of the data to be written (1 ... 1024 bytes)
UID	Array [1...8] of Byte	Unique Identifier of the transponder In single tag mode, this parameter is not used (UID = 0). In multi-tag mode you obtain the UID of the transponder using the Inventory command ("AdvancedCmd" function block).
IDENT_DATA	Array [1...1024] of Byte	Data buffer with the data to be written.

4.4.4 Read_EPC-ID

The "Read_EPC-ID" block reads the EPC-ID of the RF600 transponder. The length of the EPC-ID to be read out is specified by the "LEN_DATA" parameter. The block is intended only for single tag mode.

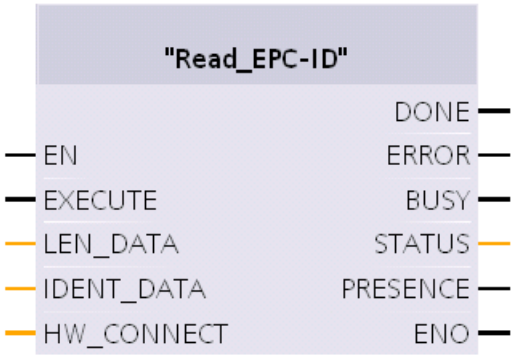


Figure 4-12 "Read_EPC-ID" function block

Table 4- 17 Explanation of the "Read_EPC-ID" function block

Parameter	Data type	Description
LEN_DATA	INT	Length of the EPC-ID to be read out (1 ... 62 bytes)
IDENT_DATA	Array [1...1024] of Byte	Data buffer in which the read EPC-ID is stored.

4.4.5 Write_EPC-ID

The "Write_EPC-ID" block overwrites the EPC-ID of the RF600 transponder. The length of the EPC-ID to be written is specified by the "LEN_DATA" parameter. The block is intended only for single tag mode.

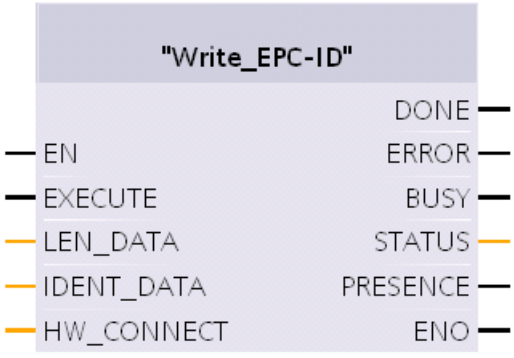


Figure 4-13 "Write_EPC-ID" function block

Table 4- 18 Explanation of the "Write_EPC-ID" function block

Parameter	Data type	Description
LEN_DATA	INT	Length of the EPC-ID to be written (1 ... 62 bytes)
IDENT_DATA	Array [1...1024] of Byte	Data buffer with the EPC-ID to be written.

4.4.6 Set_Ant

With the "Set_Ant" block, antennas can be turned on or off. There are different function blocks for RF300 and RF600. The "Set_Ant_RF300" block can also be used for RF200 and MOBY U.

Set_Ant_RF300

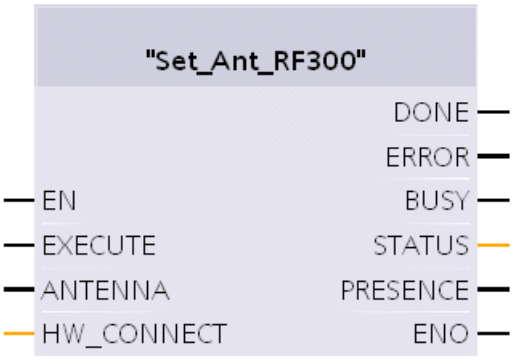


Figure 4-14 "Set_Ant_RF300" function block

Table 4- 19 Explanation of the "Set_Ant_RF300" function block

Parameter	Data type	Description
ANTENNA	Bool	0 = turn antenna off 1 = turn antenna on

Set_Ant_RF600

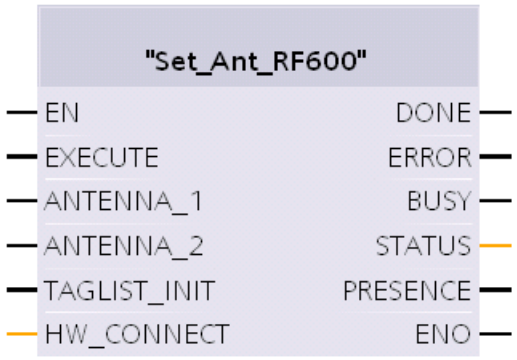


Figure 4-15 "Set_Ant_RF600" function block

Table 4- 20 Explanation of the "Set_Ant_RF600" function block

Parameter	Data type	Description
ANTENNA_1	Bool	0 = turn antenna 1 off 1 = turn antenna 1 on
ANTENNA_2	Bool	0 = turn antenna 2 off 1 = turn antenna 2 on
TAGLIST_INIT	Bool	0 = TagList is reset 1 = the existing TagList continues to be used

4.5 Transponder addressing

Addressing

The data memories are addressed linearly from address 0000 (or the specified start address) to the end address. The CM or reader automatically recognizes the size of the memory on the transponder. If the end address on the transponder is exceeded, the user receives an error message.

The next table shows the address space of the individual tag versions. The ADR_TAG and LEN-DATA variables must be assigned parameters according to this address space.

Address space of the transponder/MDS variants according to ISO 15693 for RF200, RF300 and MOBY D

System	Addressing	16-bit hexadecimal number	Integer
RF200, RF300, MOBY D	**MDS D139 (I-Code 1; 44 bytes)**		
	Start address	0000	+0
	End address	002B	+43
	ID no.: (fixed-coded; can only be read as a whole)		
	Start address	FFF0	-16
	Length	0008	+8
	ISO-MDS (I-Code SLI; 112 bytes)		
	Start address	0000	+0
	End address	006F	+111
	ID no.: (fixed-coded; can only be read as a whole)		
	Start address	FFF0	-16
	Length	0008	+8
	ISO MDS (Tag-it HF-I; 256 bytes)		
	Start address	0000	+0
	End address	00FF	+255
	ID no.: (fixed-coded; can only be read as a whole)		
	Start address	FFF0	-16
	Length	0008	+8
	ISO MDS (my-d SRF55V10P; 992 bytes)		
	Start address	0000	+0
	End address	03DF	+991
	ID no.: (fixed-coded; can only be read as a whole)		
	Start address	FFF0	-16
	Length	0008	+8
	ISO-MDS (MB 89R118B, 2000 bytes)		
	Start address	0000	+0
	End address	07CF	+1999
	ID no.: (fixed-coded; can only be read as a whole)		
	Start address	FFF0	-16
	Length	0008	+8

Address space of the transponder versions for RF300

System	Addressing	16-bit hexadecimal number	Integer
RF300	**20 bytes of data memory (EEPROM)**		
	R/W or OTP memory (EEPROM) (The EEPROM user memory for RF300 can be used either as R/W memory or as an OTP memory (see RF300 system manual))		
	Start address End address	FF00 FF13	-256 -237
	ID no.: (fixed-coded; can only be output as a whole)		
	Start address Length	FFF0 0008	-16 +8
	8 KB data memory (FRAM/EEPROM)		
	R/W or OTP memory (EEPROM) (The EEPROM user memory for RF300 can be used either as R/W memory or as an OTP memory (see RF300 system manual))		
	Start address End address	FF00 FF13	-256 -237
	R/W memory (FRAM)		
	Start address End address	0000 1FFC	+0 +8188
	ID no.: (fixed-coded, can only be read as a whole)		
	Start address Length	FFF0 0008	-16 +8
	32 KB data memory (FRAM/EEPROM)		
	R/W or OTP memory (EEPROM) (The EEPROM user memory for RF300 can be used either as R/W memory or as an OTP memory (see RF300 system manual))		
	Start address End address	FF00 FF13	-256 -237
	R/W memory (FRAM)		
	Start address End address	0000 7FFC	+0 +32764
	ID no.: (fixed-coded; can only be output as a whole)		
	Start address Length	FFF0 0008	-16 +8
	64 KB data memory (FRAM/EEPROM)		
	R/W or OTP memory (EEPROM) (The EEPROM user memory for RF300 can be used either as R/W memory or as an OTP memory (see RF300 system manual))		
	Start address End address	FF00 FF13	-256 -237
	R/W memory (FRAM)		

System	Addressing	16-bit hexadecimal number	Integer
	Start address End address	0000 FEFC	+0 –
	ID no.: (fixed-coded; can only be output as a whole)		
	Start address Length	FFF0 0008	-16 +8

RF300: General notes on the meaning of the OTP memory

RF300 tags and ISO tags have a memory area that can be protected against overwriting. This memory area is called OTP. Five block addresses are available for activating the OTP function:

- FF80, FF84, FF88, FF8C and FF90

A write command to this block address with a valid length (4, 8, 12, 16, 20 depending on the block address) protects the written data from subsequent overwriting.

Note

OTP writing/locking should only be used in static operation.

Note

Use of the OTP area is not reversible

If you use the OPT area, you cannot undo it, because the OPT area can only be written to once.

RF300: Address mapping of OTP memory on the RF300 transponder

R/W EEPROM memory and OTP memory is only available once on the transponder.

The following table shows the mapping of addresses on the transponder.

Data can be read via the R/W address or the OTP address.

R/W EEPROM		Write RF300 OTP once	
Address	Length	Address	Length
FF00	1 .. 20	FF80	4,8,12,16,20
FF01	1 .. 19		
FF02	1 .. 18		
FF03	1 .. 17		
FF04	1 .. 16	FF84	4,8,12,16
FF05	1 .. 15		
FF06	1 .. 14		
FF07	1 .. 13		
FF08	1 .. 12	FF88	4,8,12
FF09	1 .. 11		
FF0A	1 .. 10		
FF0B	1 .. 9		
FF0C	1 .. 8	FF8C	4,8
FF0D	1 .. 7		
FF0E	1 .. 6		
FF0F	1 .. 5		
FF10	1 .. 4	FF90	4
FF11	1 .. 3		
FF12	1 .. 2		
FF13	1		

Note

Write access to addresses starting at FF80 to FF93 activates the write protection (OTP function) on the EEPROM user memory. This operation is not reversible. Switching on write protection must always take place in ascending order without gaps, starting at address FF80.

Address space of the transponder versions for RF600

Tag	Chip type	User [hex]	EPC		TID	RESERVED (passwords)	Special	
			Range (preset length)	Access			KILL-PW	Lock function
RF630L (-2AB00, -2AB01)	Impinj Monza 2	-	FF00-FF0B (96 bits = FF00-FF0B)	read/ write	FFC0-FFC7	FF80-FF87	yes	yes
RF630L (-2AB02)	Impinj Monza 4QT [1)]	00 - 3F	FF00-FF0F (96 bits = FF00-FF0B)	read/ write	FFC0-FFC9	FF80-FF87	yes	yes
RF630L (-2AB03)	NXP G2XM	00 - 3F	FF00-FF1D (96 bits = FF00-FF0B)	read/ write	FFC0-FFC7	FF80-FF87	yes	yes
RF680L	NXP G2XM	00 - 3F	FF00-FF1D (96 bits = FF00-FF0B)	read/ write	FFC0-FFC7	FF80-FF87	yes	yes
RF610T	NXP G2XM	00 - 3F	FF00-FF1D (96 bits = FF00-FF0B)	read/ write	FFC0-FFC7	FF80-FF87	LOCKED	yes
RF610T ATEX	NXP G2XM	00 - 3F	FF00-FF1D (96 bits = FF00-FF0B)	read/ write	FFC0-FFC7	FF80-FF87	LOCKED	yes
RF620T	Impinj Monza 4QT [1)]	00 - 3F	FF00-FF0F (96 bits = FF00-FF0B)	read/ write	FFC0-FFC9	FF80-FF87	LOCKED	yes
RF625T	Impinj Monza 4QT [1)]	00 - 3F	FF00-FF0F (96 bits = FF00-FF0B)	read/ write	FFC0-FFC9	FF80-FF87	LOCKED	yes
RF630T	NXP G2XM	00 - 3F	FF00-FF1D (96 bits = FF00-FF0B)	read/ write	FFC0-FFC7	FF80-FF87	LOCKED	yes
RF640T	NXP G2XM	00 - 3F	FF00-FF1D (96 bits = FF00-FF0B)	read/ write	FFC0-FFC7	FF80-FF87	LOCKED	yes
RF680T	NXP G2XM	00 - 3F	FF00-FF1D (96 bits = FF00-FF0B)	read/ write	FFC0-FFC7	FF80-FF87	LOCKED	yes

[1)] Uses User Memory Indicator (UMI)

Address space of the transponder/MDS variants for MOBY U

System	Addressing	16-bit hexadecimal number	Integer
MOBY U	**2 KB data memory**		
	Start address	0000	+0
	End address	07FF	+2047
	Read OTP memory (write access only possible once. The OTP memory of MOBY U can only be processed completely, i.e. the start address must always be specified with value FFF0 hex and the length with value 10 hex.)		
	Start address	FFF0	-16
	Length	10	+16
	ID no.: (4 fixed-coded bytes; can only be read with the MDS status command)		
	32 KB data memory		
	Start address	0000	+0
	End address	7FFF	+32767
	Read OTP memory (write access only possible once)*		
	Start address	FFF0	-16
	Length	10	+16
	ID no.: (4 fixed-coded bytes; can only be read with the MDS status command)		

Service and maintenance

5

5.1 LED status display on the RF120C

Position of the display elements and the electrical connectors

The LEDs for detailed display of the module statuses are located behind the upper door in the housing. Open the upper door in the housing by pulling it down. To allow this, the doors in the housing are extended to form a handle.

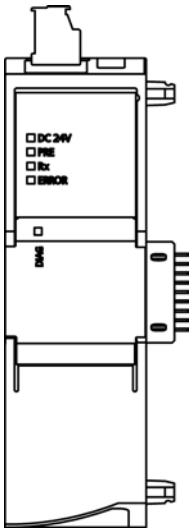


Figure 5-1 The LEDs of the RF120C

LED display of the module

The module has various LEDs for displaying the status:

- LED on the front panel

  The "DIAG" LED that is always visible shows the basic statuses of the module.

- LEDs below the upper cover of the housing

  Open the upper housing cover. The LEDs here provide more detailed information on the module status.

Table 5- 1 LEDs below the upper cover of the housing

LED / colors	Name	Meaning
green	DC 24 V	Indicates that voltage is being applied via the external 24 V power supply.
green	PRE	Indicates the presence of a transponder.
yellow	Rx	Indicates live communication with the reader.
flashing red	ERROR	A flashing pattern indicates the last error to occur. The meaning of the flashing patterns is explained in the section "Error messages (Page 52)".

Note

LED colors when the module starts up

When the module starts up, all its LEDs are lit for a short time. Multicolored LEDs display a color mixture. At this point in time, the color of the LEDs is not clear.

Display of the operating and communication status

The LEDs indicate the operating and communications status of the module according to the following scheme:

Table 5- 2 Display of the basic states of the module by the "DIAG" LED

DIAG (red / green)	Meaning	Comment
Off	Power OFF	-
green	Module configured	Configuration was completed successfully and no error occurred.
flashing green	• Startup • Module not configured • Firmware update	-
flashing red	• Defect • Error • Alarm message	Check the ERROR LED and the 24 VDC LED for more detailed error diagnostics.
red	Module defective	Replace the module.

5.2 Diagnostics

NOTICE
The diagnostics options are limited Error messages that the RF120C communications module forwards automatically to the SIMATIC controller are not evaluated by S7-1200 controllers with firmware version 4.0. For this reason error messages from the communications module are displayed neither on the controller nor in the TIA Portal. This error eliminated by an update of the SIMATIC controller. The error display using the function block is not affected by this restriction in diagnostics.

You have the following diagnostics options available for the module:

- The LEDs of the module

  For information on the LED displays, refer to the section "LED status display on the RF120C (Page 47)".
- STEP 7 Basic / Professional using the TIA Portal: Diagnostics functions in the "Online & diagnostics" menu

  Here, you can obtain static information on the selected module:
  - General information on the module
  - Diagnostics status
- Evaluation with the standard GET_DIAG instruction
- Evaluation based on the ERROR and STATUS output parameters

  You will find more detailed information on the parameters in the sections "Ident instructions (Page 30)" and Error messages (Page 52)".

Diagnostics with the TIA Portal (STEP 7 Basic / Professional)

Follow the steps below to read out the diagnostics status of the RF120C:

1. Start the TIA Portal in the project view.
2. Open the "Local modules" folder in the project tree.
3. Right-click on the required RF120C and select the "Online & diagnostics" entry in the shortcut menu.
4. Select the "Diagnostics" option.

   The identifier and the firmware version of the RF120C is displayed below the "General" entry.

   Under the "Diagnostic status" entry, you can see the current status of the RF120C.

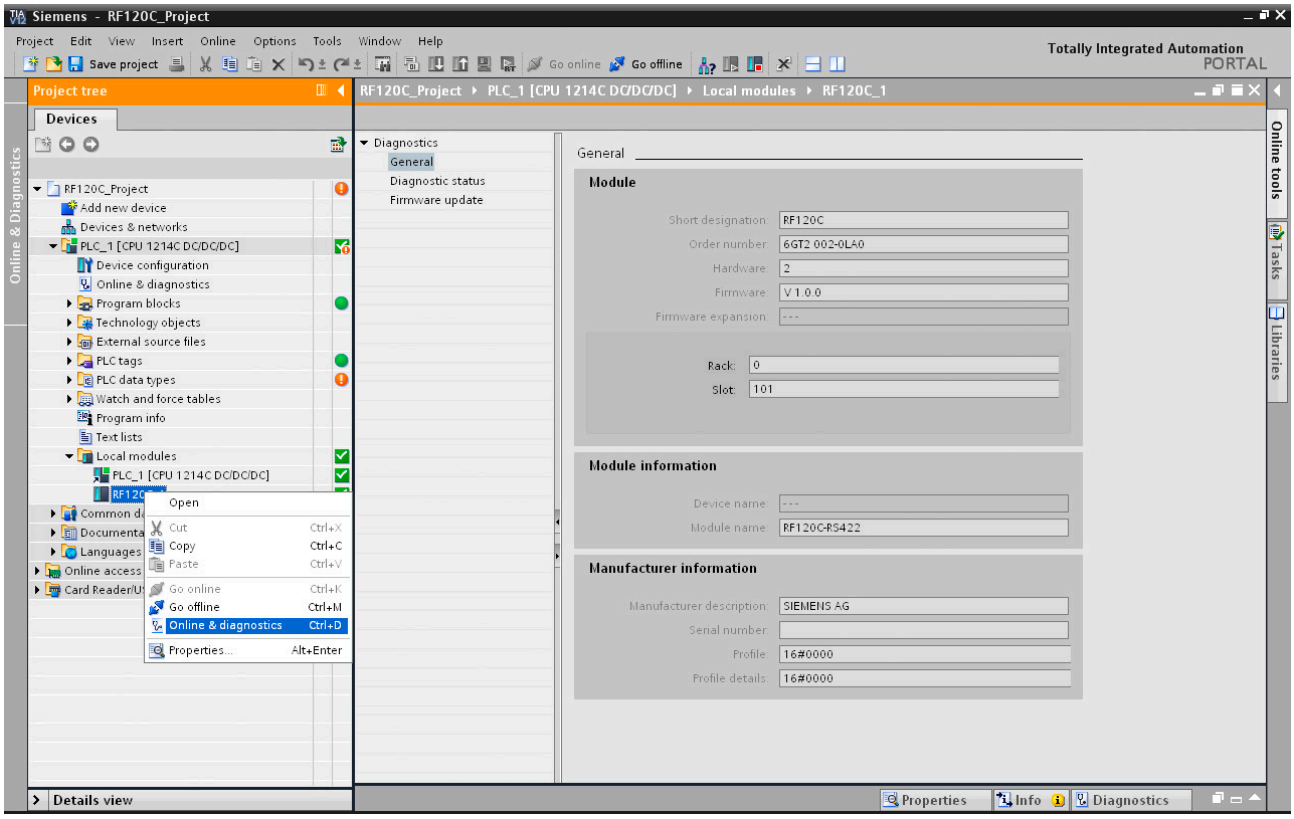


Figure 5-2 Diagnostics view in the TIA Portal; "General" entry

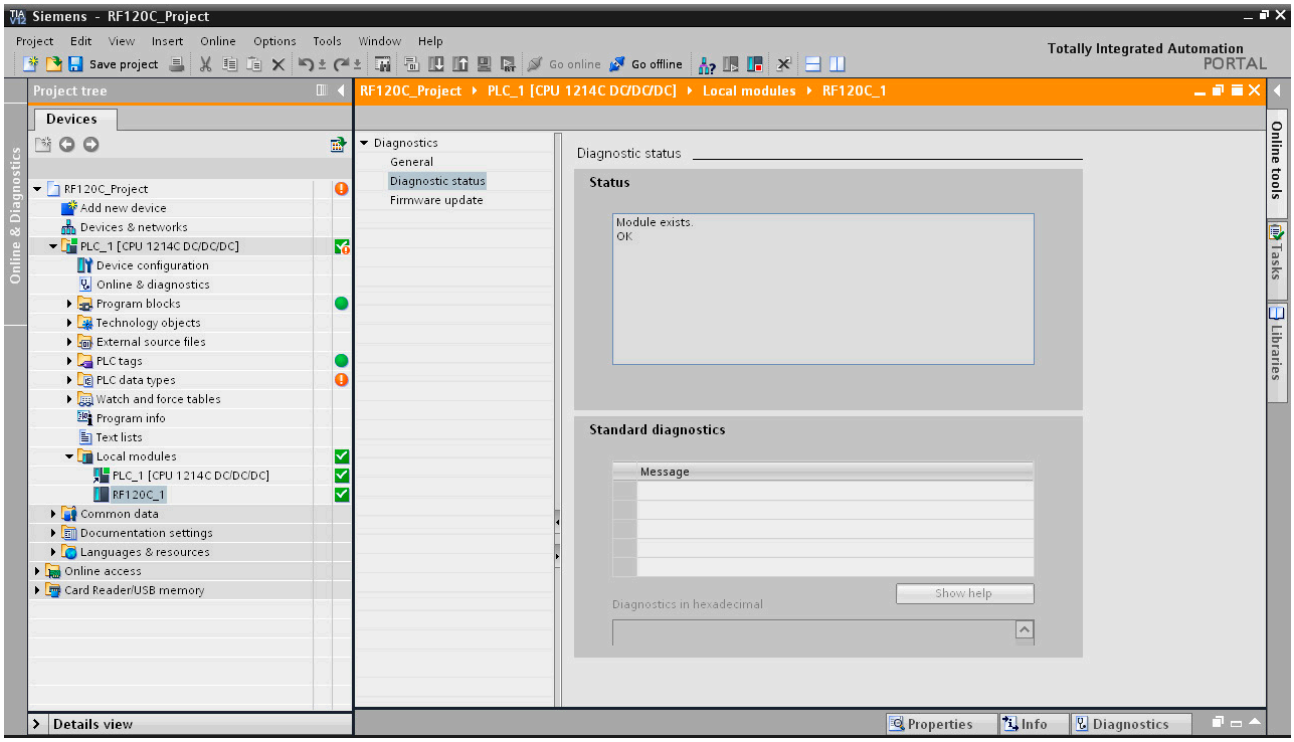


Figure 5-3 Diagnostics view in the TIA Portal; "Diagnostic status" entry

5.3 FB error messages

5.3.1 Structure of the status output parameter

There is always an error status in the Ident profile function if the output parameter ERROR = TRUE. The error can be analyzed (decoded) using the STATUS output parameter.

The STATUS output parameter is made up of 4 bytes:

Byte	Meaning
Byte 0	Function numbers • Cx - error in bus communication (backplane bus, PROFINET, PROFIBUS) • E1 - transponder-related error • E2 - error on the air interface • E4 - reader hardware fault • E5 - error in the communication between reader and FB • E6 - error in the user command • E7 - error message generated by the FB
Byte 1	Error numbers This byte defines the meaning of the error code and the warnings. The error numbers have the followinig meaning: • 0x00 - no error, no warning • 0x80 - error message from the backplane bus or from PROFIBUS DP-V1 or PROFINET (in accordance with IEC 61158-6) • 0x81 … 0x8F - the controller reports an error according to the parameter "x" (0x8x). • 0xFE - error from the Ident profile or communications module/reader
Byte 2	Error code
Byte 3	Warnings In this byte, each bit has a separate meaning.

5.3.2 Error messages

Errors from the communications module/reader

The causes of these errors can, for example, be as follows:

- Errors have occurred in communication between the CM and the reader or between the reader and the transponder.
- The communications module is unable to process the command.

Byte 3 of the STATUS is not relevant for the error messages.

With certain error messages of the communications module, the ERR-LED also flashes (see the two tables below).

Table 5- 3 Evaluation of the ERR LED

Flashing of ERR LED	Error in STATUS	Errors that have occurred
1x	E4 FE 07	No error Communications module has started up and is waiting for an "init_run"
3x	E4 FE 03	Error in the connection to the reader; the reader is not answering
5x	E6 FE 01	unknown command (all product families); incorrect parameter assignment (RF600 only)
17x	E4 FE 01	Short-circuit or overload
18x	E4 FE 8D	Internal communication error of the communications module
19x	E4 FE 04	The reader does not have enough buffer on the communications module to store the command temporarily.
20x	E4 FE 8D	Internal monitoring error of the communications module
21x	E4 FE 15	Incorrect parameter assignment of the communications module
23x	E4 FE 8C E5 FE 01 E5 FE 04	Communication error between Ident profile and communications module. Handshake error.
25x	E5 FE 08	An error has occurrerd that makes a WRITE-CONFIG with Config = 3 necessary.
30x	E5 FE 06 E6 FE 02 E6 FE 03	Error when processing the command

Table 5- 4 Error messages from communications module/reader or from the Ident profile via the STATUS output parameter

Byte			Description
0	1	2	
E1h	FEh	01h	Memory of the transponder cannot be written to • Transponder memory is defective • Transponder EEPROM was written too frequently and has reached the end of its service life • RF600 transponder is write protected (Memory Lock)
E1h	FEh	02h	Presence error: The transponder has moved out of the transmission window of the reader. The command was executed only partially. Read command: IDENT_DATA has no valid data. Write command: The transponder that has just left the antenna field contains an incomplete data record. • Operating distance from reader to transponder is not being maintained • Configuration error: The data record to be processed is too large (in dynamic mode) • With timeout: No transponder in the antenna field
E1h	FEh	03h	Address error The address area of the transponder has been exceeded. • Starting address of the command start has been incorrectly issued • Transponder is not the correct type • Attempted write access to write-protected areas
E1h	FEh	04h	Only during initialization: Transponder is unable to execute the initialization command • Transponder is defective
E1h	FEh	06h	Error in transponder memory The transponder has never been written to or has lost the content of its memory due to battery failure. • Replace transponder (if battery bit is set) • Re-initialize transponder
E1h	FEh	07h	Password error, wrong password (RF600)
E1h	FEh	08h	The transponder in the antenna field does not have the expected UID or has no UID.

Byte			Description
0	1	2	
E2h	FEh	01h	• Field interference on the reader The reader is receiving interference from its environment. – External interference field; the field of interference can be verified with the "inductive field indicator" of the STG – The distance between two readers is too short and does not correspond to the configuration guidelines – The connecting cable to the reader is disrupted, too long or does not comply with the specification – MOBY U: Transponder has left the antenna field during communication. – MOBY U: Communication between reader and transponder was aborted due to a disruption (e.g. person/foreign body moving between reader and transponder). • Too many transmission errors The transponder could not receive the command or the write data correctly from the communications module even after several attempts. – The transponder is positioned exactly in the limit area of the transmission window – Data transmission to the transponder is being affected by external interference • CRC sending error – The transponder reports CRC error frequently (transponder is positioned in the limit area of the reader; transponder and/or reader has a hardware defect) • Only during initialization: CRC error on receipt of acknowledgement from transponder (cause as for field interference on the reader) • When formatting, the transponder must be in the transmission window of the reader, otherwise a timeout error will occur, in other words: – The transponder is located exactly in the limit area of the transmission window – The transponder is using too much current (defect) – Bad FORMAT parameter setting for transponder EEPROM • RF600: – No free ETSI channel – Wrong communications standard selected in the "init_run" command – Bad expert parameter – Power check of the ETSI wireless profile is incorrect
E2h	FEh	02h	• More transponders are located in the transmission window than can be processed at the same time by the reader. • RF600: Transponder power supply close to limit. Increase the antenna power or reduce the distance to the transponder.

Byte			Description
0	1	2	
E4h	FEh	01h	Short circuit or overload of the 24 V outputs • The reader is using too much current. • The reader cable is causing a short-circuit. Possible consequences: • The affected output is turned off • All outputs are turned off when total overload occurs • A reset can only be performed by turning the 24 V voltage off and on again • and then starting "Reset_Reader"
E4h	FEh	03h	• Error in the connection to the reader; the reader is not answering. – The cable between the communications module and reader is wired incorrectly or there is a cable break – The 24 V supply voltage is not connected or is not on or has failed briefly – Automatic fuse on the communications module has blown – Hardware defect – There is another reader in the vicinity and is this is active – Execute init_run after error correction • The antenna of the reader is turned off. A tag command to the communications module was started in this status. – Turn on the antenna with the command "antenna on/off." – The antenna is turned on (off) and has received an additional turn-on (turn-off) command • The mode is unknown in the SET_ANT command • The antenna on the reader is turned off or the antenna cable is defective
E4h	FEh	04h	The reader does not have enough buffer on the communications module or reader to store the command temporarily.
E4h	FEh	07h	Start-up message from communications module. The communications module was off and has not yet received a Reset_Reader (WRITE-CONFIG) command. • Execute an init_run • The same physical address in the HW_CONNECT parameter is being used more than once. Check your HW_CONNECT parameter assignments.

Byte			Description
0	1	2	
E4h	FEh	8Ch	• Communication error between Ident profile and communications module. Handshake error. – UDT of this communications module is overwritten by other program sections – Check parameter settings of communications modules in the UDT – Check the Ident profile command that caused this error – Start init_run command after error correction • Backplane bus/PROFIBUS DP/PROFINET error occurred This error is only indicated when access monitoring has been enabled in the PROFIBUS configuration. – Backplane bus/PROFIBUS DP/PROFINET bus connection was interrupted (wire break on the bus; bus connector on the communications module was briefly unplugged) – Backplane bus/PROFIBUS DP/PROFINET master no longer addressing communications module – Execute an init_run – The communications module has detected a frame interruption on the bus. The backplane bus, PROFIBUS or PROFINET may have been reconfigured (e.g. with HW Config)
E4h	FEh	8Dh	• Internal communication error of the communications module – Connector contact problem on the communications module – Hardware of the communications module has a defect; → Send in communications module for repair – Start init_run command after error correction • Internal monitoring error of the communications module – Program execution error on the communications module – Cycle power to the communications module – Start init_run command after error correction – MOBY U: Watchdog errror on the reader
E4h	FEh	8Eh	Running command canceled by WRITE-CONFIG (init_run or cancel) or bus connector removed • Communication with the transponder was aborted by init_run • This error can only be reported on init_run or cancel
E5h	FEh	01h	Incorrect sequence number order (SN) on the communications module
E5h	FEh	02h	Incorrect sequence number order (SN) in the Ident profile
E5h	FEh	04h	Invalid data block number (DBN) on the communications module
E5h	FEh	05h	Invalid data block number (DBN) in the Ident profile
E5h	FEh	06h	Invalid data block length (DBL) on the communications module
E5h	FEh	07h	Invalid data block length (DBL) in the Ident profile

Byte			Description
0	1	2	
E5h	FEh	08h	Previous command is active or buffer overflow The user sent a new command to the communications module although the last command was still active. • Active command can only be terminated with an init_run • Before a new command can be started, the DONE bit must be 1; exception: init_run • Two Ident profile calls were had the same parameter settings ("ASM_address" and "ASM_channel") • Two Ident profile calls are using the same pointer • Start init_run command after error correction • When working with command repetition (e.g., fixed code transponder), no data is fetched from the transponder. The data buffer on the communications module has overflowed. Transponder data has been lost.
E5h	FEh	09h	The communications module executes a hardware reset (INIT_ACTIVE set to "1"). INIT is expected from the Ident profile (bit 15 in the cyclic control word).
E5h	FEh	0Ah	The "CMD" command code and the relevant acknowledgement do not match. This can be a software error or synchronization error that cannot occur in normal operation.
E5h	FEh	0Bh	Incorrect sequence of acknowledgement message frames (TDB / DBN)
E5h	FEh	0Ch	Synchronization error (incorrect increment of AC_H / AC_L and CC_H / CC_L in the cyclic control word). INIT had to be executed
E6h	FEh	01h	Unknown command Ident profile transfers an uninterpretable command to the communications module. • The AdvancedCmd block was supplied with an incorrect CMD. • The CMD input of the AdvancedCmd block was overwritten by the user. • The transponder has signaled an address error.
E6h	FEh	02h	Invalid command index CI
E6h	FEh	03h	• Bad parameter assignment of the communications module or reader – Check INPUT parameter in FB 101 – Check parameters in HW Config – WRITE-CONFIG command has been incorrectly parameterized – After a startup, the communications module has still not received an init_run • The command cannot be executed with the parameter assignment of the communications module on PROFIBUS/PROFINET. – Length of the input/output areas too small for the cyclic I/O word. Did you use the correct GSD file? – Command (e.g. READ) issued with too much user data • Error when processing the command – The data in the AdvancedCmd or PIB_COMMAND contain errors (e.g. WRITE command with length = 0); check AdvancedCmd or PIB_COMMAND and execute init_run – Communications module hardware defective: Communications module receives wrong data during init_run – AB byte does not comply with the user data length • Wrong reset function block was selected – Regardless of the selected reader system, use the "Reset_Reader" function block

Byte			Description
0	1	2	
E6h	FEh	04h	• Presence error: A transponder has passed by a reader without being processed by a command. • This error message is not reported immediately. Instead, the communications module is waiting for the next command (read, write). This command is immediately replied to with this error. This means that a read or write command is not processed. The next command is executed normally again by the communications module. • An init_run from the Ident profile also resets this error status. • Bit 2 is set in the OPT1 parameter and there is no transponder in the transmission window.
E6h	FEh	05h	An error has occurred that makes a Reset_Reader (WRITE-CONFIG with Config = 3) necessary. • Error(s) in the WRITE-CONFIG command • Start init_run command after error correction • Check the HW_CONNECT parameter.
E6h	FEh	06h	The timer for "Reset_Reader" has elapsed
E7h	FEh	01h	In this state, only the "Reset_Reader" command is permitted.
E7h	FEh	02h	The CMD command code is not permissible.
E7h	FEh	03h	The length parameter of the command is too long. It does not match the global data reserved in the send data buffer (TXBUF).
E7h	FEh	04h	Overflow of the receive data buffer (RXBUF) More data was received than memory available in the RXBUF
E7h	FEh	05h	This error tells the user that only an INIT command is permissible as the next command. All other commands are rejected.
E7h	FEh	06h	Wrong index (outside range of 101 to 108)
E7h	FEh	07h	Communications module does not respond to INIT (INIT_ACTIVE is expected in the cyclic status message).
E7h	FEh	08h	Time exceeded during INIT (60 seconds according to TC3WG9)
E7h	FEh	09h	Command repetition is not supported.
Fxh	FEh	xxh	An FxFExxh error is identical to the corresponding ExFExxh error (see ExFExxh). Byte 3 contains additional warning information.

Errors from backplane bus

The transport layer of the bus system being used (backplane bus, PROFIBUS, PROFINET) is signaling an error. For precise troubleshooting and analysis, a PROFIBUS tracer can be useful. For PROFINET, the open source software "Wireshark" can be used. The PROFIBUS or PROFINET system diagnostics can provide further information about the cause of the error.

Table 5- 5 Error messages from the backplane bus using the STATUS output parameter

Byte			Description
0	1	2	
Cxh	80h	0Ah	Communications module is not ready (temporary message) • This message is received by a who is not using the Ident profile and is polling the communications module acyclically and at short intervals.
Cxh	8xh	7Fh	Internal error on parameter x. Cannot be remedied by the user.
Cxh	8xh	22h	Area length error when reading a parameter. This error code indicates that parameter x is partially or completely outside the operand range or the length of a bit array for an ANY parameter is not divisible by 8.
Cxh	8xh	23h	Area length error when writing a parameter. This error code indicates that parameter x is partially or completely outside the operand range or the length of a bit array for an ANY parameter is not divisible by 8.
Cxh	8xh	24h	Area error when reading a parameter. This error code indicates that parameter x is in a range that not allowed for the system function.
Cxh	8xh	25h	Area error when writing a parameter. This error code indicates that parameter x is in a range that is not allowed for the system function.
Cxh	8xh	26h	Parameter contains a time cell number which is too high.
Cxh	8xh	27h	Parameter contains a counter cell number which is too high.
Cxh	8xh	28h	Alignment error when reading a parameter. The reference to parameter x is an operand whose bit address is not equal to 0.
Cxh	8xh	29h	Alignment error when writing a parameter. The reference to parameter x is an operand whose bit address is not equal to 0.
Cxh	8xh	30h	Parameter is in write-protected global DB.
Cxh	8xh	31h	Parameter is in write-protected instance DB.
Cxh	8xh	32h	Parameter contains DB number which is too high.
Cxh	8xh	34h	Parameter contains FC number which is too high.
Cxh	8xh	35h	Parameter contains FB number which is too high.
Cxh	8xh	3Ah	Parameter contains the number of a DB that is not loaded.
Cxh	8xh	3Ch	Parameter contains the number of an FC that is not loaded.
Cxh	8xh	3Eh	Parameter contains the number of an FB that is not loaded.
Cxh	8xh	42h	An access error has occurred while the system wanted to read out a parameter from the I/O area of the inputs.
Cxh	8xh	43h	An access error has occurred while the system wanted to write a parameter to the I/O area of the outputs.
Cxh	8xh	44h	Error on n-th (n > 1) read access after occurrence of an error.
Cxh	8xh	45h	Error on n-th (n > 1) write access after occurrence of an error.
Cxh	80h	90h	Specified logical base address is invalid: No assignment in SDB1/SDB2x exists, or it is not a base address.

Byte			Description
0	1	2	
Cxh	80h	92h	A type other than BYTE has been specified in an ANY reference.
Cxh	80h	93h	The area identifier contained in the configuration (SDB1, SDB2x) of the logical address is not permitted for these SFCs. Permitted: • 0 = S7-400 • 1 = S7-300 • 2, 7 = DP modules and backplane bus
Cxh	80h	A0h	Negative acknowledgment when reading from module; Ident profile fetches acknowledgment although no acknowledgment is ready A user who is not using the Ident profile wants to fetch DS 101 (or DS 102 to DS 104) although no acknowledgment is available. • Perform an init_run to resynchronize communications module and application
Cxh	80h	A1h	Negative acknowledgment when writing to the module; Ident profile sends command although a communications module cannot receive a command
Cxh	80h	A2h	DP protocol error in layer 2 could be a hardware defect
Cxh	80h	A3h	DP protocol error in Direct-Data-Link-Mapper or User-Interface/User could be a hardware defect
Cxh	80h	B0h	• SFC not possible for module type. • Data record unknown to module. • Data record number ≥ 241 is not allowed. • Data records 0 and 1 are not permitted for SFC 58 "WR_REC".
Cxh	80h	B1h	The length specified in the RECORD parameter is wrong.
Cxh	80h	B2h	The configured slot is not occupied.
Cxh	80h	B3h	Actual module type is not the module type specified in SDB1
Cxh	80h	C0h	• RDREC: The module has the data record, but there is not yet any data to be read. • WRREC: Communications module is not ready to receive new data – Wait until the cyclic counter has been incremented
Cxh	80h	C1h	The data of the preceding write job on the module for the same data record have not yet been processed by the module.
Cxh	80h	C2h	The module is currently processing the maximum possible number of jobs for a CPU.
Cxh	80h	C3h	Required resources (memory, etc.) are currently in use. This error is not reported by the Ident profile. If this error occurs, the Ident profile waits until the system is able to provide resources again.
Cxh	80h	C4h	Communication Errors • Parity error • SW ready not set • Error in block length management • Checksum error on CPU side Checksum error on module side
Cxh	80h	C5h	Distributed I/O not available.
Dxh	8xh	xxh	A Dx8xxxh error is identical to the corresponding Cx8xxxh error (see Cx8xxxh). Byte 3 contains additional warning information.

5.3.3 Warnings

Byte 3 of the STATUS output parameter indicates warnings if byte 0 of the STATUS (function numbers) has the value "Fxh" or "Dxh".

No warnings are indicated with the RF120C.

5.4 Module replacement

The configuration data of the RF120C is stored on the local CPU. When necessary, this allows simple replacement of this communications module without needing to re-load the project data on the module.

When the CM starts up again, the CPU automatically transfers the stored data to the CM.

You will find information on installing/removing a CM in the section "Installing and commissioning the RF120C (Page 12)".

Technical data

6

Table 6- 1 Technical specifications of the RF120C

	6GT2002-0LA00
Product type designation	RF120C
Transmission rate	
maximum transmission rate on point-to-point connections (serial)	115.2 Kbps
Interfaces	
Design of the interface for point-to-point connection	RS-422
Max. cable length	1000 m, reader-dependent
Number of connectable readers	1
Electrical connection version	
• of the backplane bus	• S7-1200 backplane bus
• For supply voltage	• Screw terminals
Version of the interface (to the reader)	9-pin D-sub female
Max. block length	1 word cyclic / 240 bytes acyclic
Mechanical specifications	
Material	Xantar MX 1094
Color	Ti-Grey 24L01
Maximum tightening torque of the screw for securing the equipment	0.45 Nm
Electrical data	
Supply voltage[1)]	
• Rated value	• 24 V DC
• Permissible range	• 20 to 30 VDC
Current consumption	
• via backplane bus	• typically 110 mA; max. 250 mA
• from ext. power supply, without devices connected	• typically 30 mA
• from ext. power supply, including connected devices [2)]	• max. 1 A
Galvanic isolation	Yes

	6GT2002-0LA00
Permitted ambient conditions	
Ambient temperature	
• during operation (horizontal installation)	• 0 ... +55 °C
• during operation (vertical installation)	• 0 ... +45 °C
• During transport and storage	• -40 ... +70 °C
Degree of protection	IP20
Shock resistance	to IEC 61131-2
Shock acceleration	300 m/s²
Vibration acceleration	100 m/s²
Design, dimensions, and weight	
Dimensions (W°x H°x°D)	30 x 100 x 75 mm
Weight	0.15 kg
Type of mounting	S7-1200 rack
Product functions	
LED display	4 LEDs for reader connection, 1 LED for device status
Function blocks SIMATIC S7-1200 and S7-1500	Library with function blocks: Read, Write, Read_EPC-ID, Write_EPC-ID, Set_Ant, Reset_Reader, AdvancedCmd
Transponder addressing	Direct access via addresses
Communications protocol	S7 communication
Commands	Initialize transponder, Read data from transponder, Write data to transponder, etc.
Standards, specifications, approvals	
Approvals	CE, FCC, cULus (File E85972), KCC, C-Tick
MTBF (at 40°C)	196 years

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 required current of max. 1 A during brief power outages of ≤ 20 ms.

Dimension drawings

7

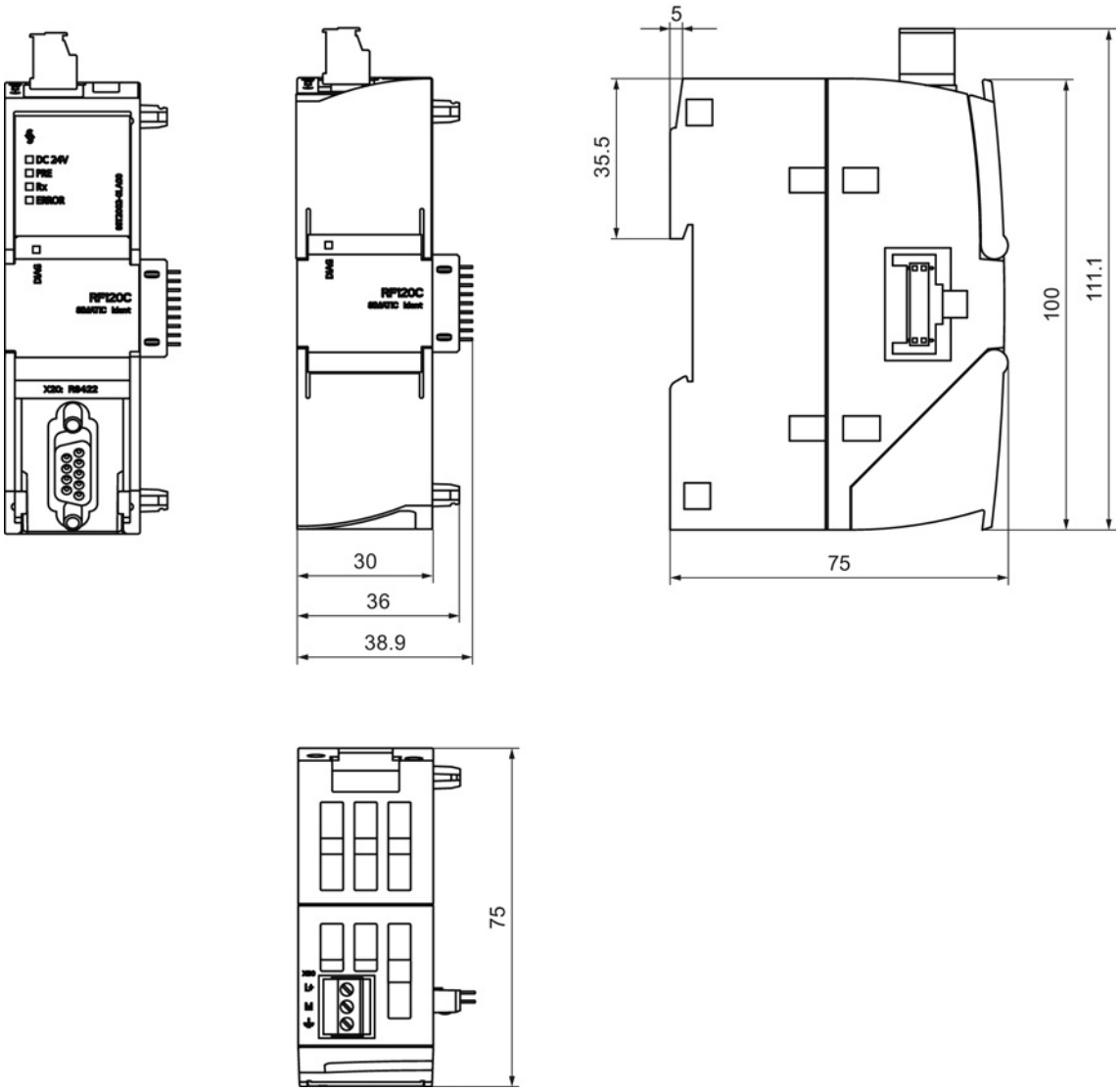


Figure 7-1 Dimension drawing RF120C communications module (dimensions in mm)

Appendix A

A.1 Approvals and standards

A.1.1 Approvals

Note

Granted approvals on the type plate of the device

The specified approvals apply only when the corresponding mark is printed on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate.

Current approvals

SIMATIC NET products are regularly submitted to the authorities and approval centers for approvals relating to certain markets and applications.

Contact your Siemens representative if you would like a list of the current approvals or check the Internet pages of Siemens Automation Customer Support:

Current approvals (http://support.automation.siemens.com/WW/view/en/44632196)

Go to the relevant product there and select the "Certificates" entry type from the "Entry list" tab.

Approvals for SIMATIC NET products

You will find an overview of the approvals granted for SIMATIC NET products including approvals for shipbuilding on the Internet pages of the Siemens Automation Customer Support:

Overview of the approvals granted (http://support.automation.siemens.com/WW/view/en/57337426)

Overview of the approvals and standards

The CM RF120C has the following approvals and meets the following standards:

- cULus LISTED IND. CONT. EQ.
- C-TICK

- EC directives and standards
  - EC directive 2004/108/EC "Electromagnetic Compatibility" (EMC directive) according to the following standards:

    EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-11, EN 61000-6-2, EN 61000-6-4
  - EU Directive 2011/65/EU (RoHS)
  - Use in an industrial environment according to the following standards:

    EN 61000-6-2:2005, EN 61000-6-4:2007
- FCC
- KCC-REM-S49-SIMATICRF

EC Declaration of Conformity

CE

The RF120C communications module meets the general and safety-related requirements of the following EC directives and conforms to the harmonized European standards (EN) for programmable controllers published in the official gazettes of the European Union:

- EC directive 2006/95/EC "Electrical Equipment Designed for Use within Certain Voltage Limits" (low voltage directive)
  - EN 61131-2:2007 Programmable logic controllers – equipment requirements and tests
- EC directive 2004/108/EC "Electromagnetic Compatibility Directive" (EMC directive)
  - Emission

    EN 61000-6-4 + A1:2007/2011: Industrial area
  - Immunity

    EN 61000-6-2:2005: Industrial area
- Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

The CE Declaration of Conformity is available for the responsible authorities at the following address:

Siemens Aktiengesellschaft
Industry Automation
Industrielle Kommunikation SIMATIC NET
Postfach 4848
D-90327 Nürnberg
Germany

You will find the CE Declaration of Conformity for this product on the Internet at the following address:

CE declaration of conformity
(http://support.automation.siemens.com/WW/view/en/10805817)

cULus certification

Underwriters Laboratories Inc. in accordance with

- UL 508 (Industrial Control Equipment)

C-Tick approval

The product meets the requirements of the standards according to AS/NZS 61000.6.4:2007 (Class A).

Additional information is available in the Operating Instructions "S7-1200 Programmable Controller".

FCC approval

FCC Code of Federal Regulations
CFR 47, Part 15,
Sections 15.107 and 15.109 (Class A)

Industry Canada Interference -Causing-Equipment Standard ICES-003 Issue 4, Sections 5.2 and 5.4 (Digital Apparatus)

KCC approval

KCC-REM-S49-SIMATICRF

A.1.2 Standards and test regulations

Industrial environments

The product was developed for use in industrial environments.

Application	Requirements for emissions	Requirements for immunity
Industry	EN 61000-6-4 + A1:2007/2011	EN 61000-6-2:2005

Electromagnetic compatibility (EMC)

The electromagnetic compatibility (EMC) of an electrical device is its capability of functioning as intended in an electromagnetic environment without emitting electromagnetic interference that could impair the operation of other electrical devices in the vicinity.

Electromagnetic compatibility - immunity	
EN 61000-4-2 Electrostatic discharge	8 kV air discharge to all surfaces 4 kV contact discharge to exposed conductive surfaces
EN 61000-4-3 Radiated electromagnetic field	80 ... 1 000 MHz, 10 V/m, 80 % AM at 1 kHz 1.4 ... 2.0 GHz, 3 V/m, 80 % AM at 1 kHz 2.0 ... 2.7 GHz, 1 V/m, 80 % AM at 1 kHz
EN 61000-4-4 Fast transient bursts	2 kV, 5 kHz with coupling network to AC and DC system power 1 kV, 5 kHz with coupling clamp to inputs/outputs
EN 61000-4-5 Surge immunity	DC systems - 2 kV common mode, 1 kV push-pull For DC systems (I/O signals, DC power supplies), external protection is necessary.
EN 61000-4-6 Conducted disturbances	150 kHz to 80 MHz, 10 V RMS, 80 % AM at 1 kHz
Electromagnetic compatibility - emission	
Conducted emissions EN 61000-6-4, class A 0.15 MHz to 5 MHz 5 MHz to 30 MHz	 < 79 dB (µV) quasi peak; <66 dB (µV) average < 73 dB (µV) quasi peak; <60 dB (µV) average
Radiated emissions EN 61000-6-4, class A 30 MHz to 230 MHz 230 MHz to 1 GHz	 < 40 dB (µV/m) quasi peak; measured at 10 m < 47 dB (µV/m) quasi peak; measured at a distance of 10 m

Environmental conditions

Environmental conditions - transportation and storage	
EN 60068-2-2, Test Bb, dry heat and EN 60068-2-1 Test Ab, cold	-40 ℃ ... +70 ℃
EN 60068-2-30, Test Db, damp heat	25 ℃ to 55 ℃, 95% humidity
EN 60068-2-14, Test Na, temperature shock	-40 ℃ to +70 ℃, dwell time 3 hours, 2 cycles
EN 60068-2-32 Free fall	0.3 m, five times, in product packaging
Atmospheric pressure	1 080 ... 660 hPa (corresponding to an altitude of -1 000 to 3 500 m)
Environmental conditions - operation	
Ambient temperatures / air humidity (inlet air 25 mm below device)	0 °C to 55 °C for horizontal installation of the rack 0 °C to 45 °C for vertical installation of the rack 95% relative humidity, non-condensing
Atmospheric pressure	1080 ... 795 hPa (corresponding to an altitude of -1000 to 2,000 m)
EN 60068-2-14, Test Nb, temperature change	5 ℃ to 55 ℃, 3 °C / minute
EN 60068-2-27 Mechanical shock	15 g, 11 ms pulse, 3 positive and 3 negative shocks in each of the 3 axes (half sine)
EN 60068-2-6 Sinusoidal vibration (DIN rail mount)	3.5 mm at 5 ... 8.4 Hz; 9.8 m/s^2 at 8.4 ... 150 Hz; 10 sweep cycles per axis, 1 Octave/minute

Protection class

- Protection class III according to EN 61131-2 (protective conductor not required)

Degree of protection

- Mechanical protection to EN 60529: IP20

  Protects against finger contact with high voltage as tested using a standard probe. External protection required for dust, dirt, water and foreign objects of < 12.5 mm in diameter.

A.2 Connecting cable

A.2.1 Routing of standard cables

Connecting cable for RF120C

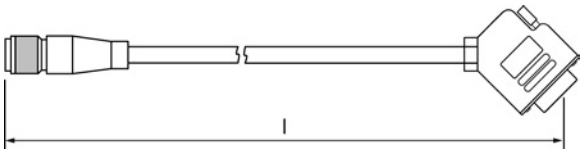


Figure A-1 Connecting cable M12 ↔ D-sub

- Connecting cable betw. RF120C ↔ RF200/RF300/RF600, MV400
- Length: 2 m, 5 m, 10 m

Extension cable

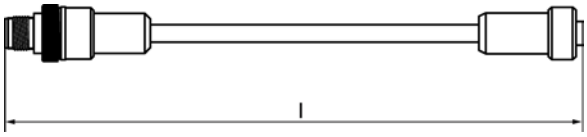


Figure A-2 Extension cable M12 ↔ M12

- Extension cable for all readers
- Length: 2 m, 5 m, 10 m, 20 m, 50 m

Connecting cable MOBY U

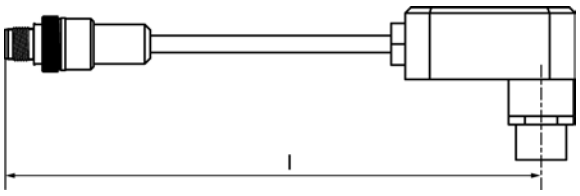


Figure A-3 M12 connecting cable ↔ reader

- Can only be used in conjunction with a connecting cable 6GT2091-4Lxxx.
- Length: 2 m, 5 m

Connecting cable MOBY D

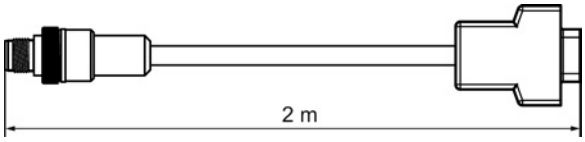


Figure A-4 Connecting cable M12 ↔ D-sub

- Can only be used in conjunction with a connecting cable 6GT2091-4Lxxx.
- Length: 2 m

Maximum cable length

The RF120C can be operated with every reader configuration with the maximum cable length of 50 m. In some situations, longer connecting cables up to 1000 m are possible. The current consumption of the connected reader must, however, be taken into account. You will find further information in the relevant system manuals.

Do not connect more than 2 pieces of cable (3 pieces for MOBY U/D) together to form a longer cable since this produces additional contact resistance.

Pin assignment

Table A- 1 Connecting cable D-sub ↔ M12

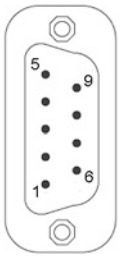
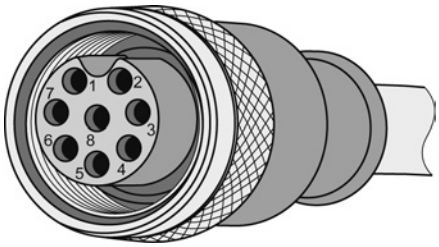
D-sub connector (male)		M12 connector (female)	
	1	1	
	6	2	
	5	3	
	7	4	
	4	5	
	8	6	
	-	7	
	9	8	
	2	-	
	3	-	

Table A- 2 M12 connecting cable ↔ reader

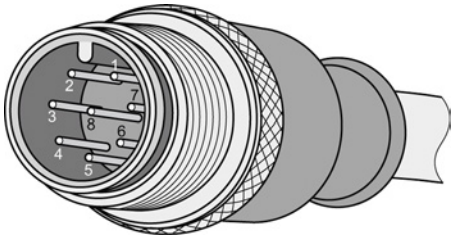
M12 connector (male)		Reader connector (female)	
	1	2	
	2	5	
	3	3	
	4	4	
	5	6	
	6	1	
	7	–	
	8	7	

Table A- 3 Connecting cable/extension cable M12 ↔ M12

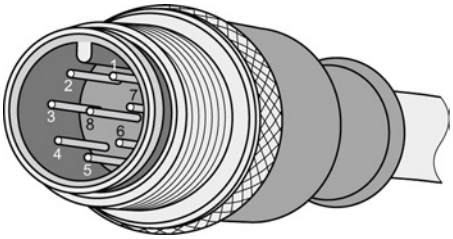
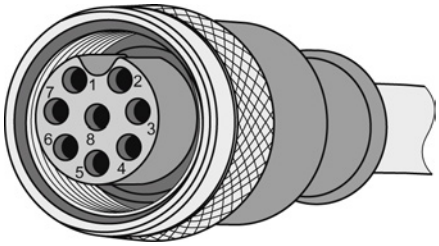
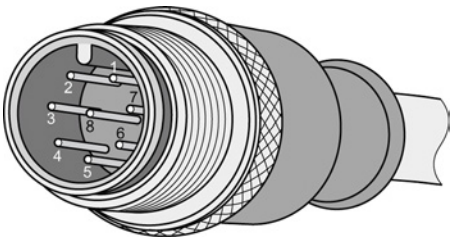
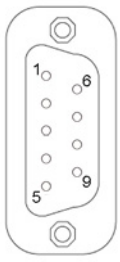
M12 connector (male)		M12 connector (female)	
	1	1	
	2	2	
	3	3	
	4	4	
	5	5	
	6	6	
	7	7	
	8	8	

Table A- 4 Connecting cable M12 ↔ D-sub 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 with a D-sub connector must be supplied over an additional connector with 24 VDC.			

A.2.2 Self-assembled cables

A reader connector plug with screw terminals is available for users who want to individually assemble their own cables (refer to the relevant system manual). Cables and reader connectors can be ordered from the catalog "ID 10 Industrial Identification Systems".

Cable structure

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

- 7 x 0.25 mm^2
- LiYC11Y 7 x 0.25

Connectors

D-sub and M12 connectors can be obtained from specialist dealers (e.g. Binder).

Pin assignment

You will find the pinout in the section "Pinout of the D-sub socket (Page 20)".

A.3 Ordering data

A.3.1 Ordering data for RF120C

RF120C communications module

Table A- 5 Communications module

Name	Order number
RF120C communications module	6GT2002-0LA00

RF120C communications module accessories

Table A- 6 RF120C communications module accessories

Name		Order number
Connecting cable RF120C; RF120C ↔ RF200/RF300/RF600, MV400	2.0 m	6GT2091-4LH20
	5.0 m	6GT2091-4LH50
	10.0 m	6GT2091-4LN10
Extension cable for all readers; straight connector	2.0 m	6GT2091-4FH20
	5.0 m	6GT2091-4FH50
	10.0 m	6GT2091-4FN10
	20.0 m	6GT2891-4FN20
	50.0 m	6GT2891-4FN50
Extension cable for all readers; connector angled on reader	2.0 m	6GT2891-4JH20
MOBY D connecting cable; only in conjunction with the RF120C connecting cable	2.0 m	6GT2691-4FH20
MOBY U connecting cable; only in conjunction with the RF120C connecting cable	2.0 m	6GT2091-4FH20
	5.0 m	6GT2091-4FH50

A.3.2 Ordering data for SIMATIC S7-1200 accessories

You will find the complete ordering overview for the SIMATIC S7-1200

- in the Operating Instructions "S7-1200 Programmable Controller" or
- in the catalog "ST 70, Totally Integrated Automation and Micro Automation".

A.3.3 Further ordering data

Table A- 7 SIMATIC manual collection

Name	Order number	Content
SIMATIC manual collection	6ES7998-8XC01-8YE0	Contains all SIMATIC manuals in electronic format

Table A- 8 RFID accessories

Name	Order number	Content
DVD "RFID Systems Software & Documentation"	6GT2080-2AA20	• FBs/FCs for SIMATIC • 3964R driver for DOS/Windows 95/NT/2000/XP • C libraries • PC demo program • RFID documentation • Throughput calculation tool

Reset function blocks

B

The Reset function blocks described in this section are required when you want to operate the communications modules RF180C, ASM 456 with a SIMATIC S7-1200/S7-1500 controller. As an alternative you can also use these blocks for the RF120C if you have selected the appropriate setting in the HSP.

In the system, these Reset function blocks have the same function as the "Reset_Reader" block described earlier. However, with the blocks described here, you need to set reader-dependent parameters.

Remember that the default value will be used automatically if you do not select a value manually.

Reset_RF200

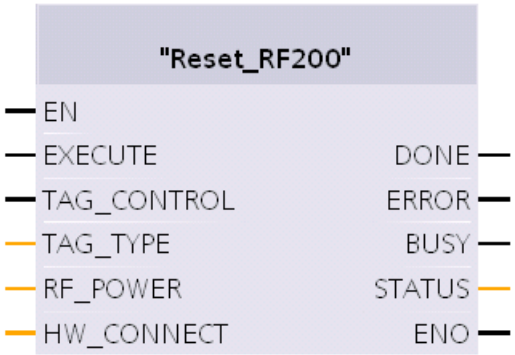


Figure B-1 "Reset_RF200" function block

Table B- 1 Explanation of the "Reset_RF200" function block

Parameter	Data type	Default value	Description
TAG_CONTROL	Bool	True	Presence check
TAG_TYPE	Byte	1	Tag type: 1 = every ISO transponder 3 = MDS D3xx optimization
RF_POWER	Byte	0	Output power; only relevant for RF290R RF power from 0.5 W to 5 W in increments of 0.25 W (range of values: 0x02 - 0x14). Default value 0 ≙ 0 W.

Reset_RF300

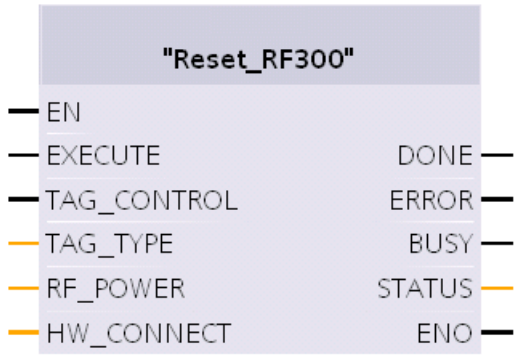


Figure B-2 "Reset_RF300" function block

Table B- 2 Explanation of the "Reset_RF300" function block

Parameter	Data type	Default value	Description
TAG_CONTROL	Bool	True	Presence check
TAG_TYPE	Byte	0	Tag type: 1 = every ISO transponder 0 = RF300 transponder
RF_POWER	Byte	0	Output power; only relevant for RF380R RF power from 0.5 W to 5 W in increments of 0.25 W (range of values: 0x02 - 0x14). Default value 0 ≙ 1.25 W.

Reset_RF600

Figure B-3 "Reset_RF600" function block

Table B- 3 Explanation of the "Reset_RF600" function block

Parameter	Data type	Default value	Description
TAG_CONTROL	Bool	True	Presence check
RADIO_PROFILE	Byte	1	Scanning time: Wireless profile according to EPC Global (range of values: 0x01 - 0x09 depending on the reader variant)
POWER_ANT1	Byte	0	Transmit power for antenna 1 or internal antenna (range of values: 0x00 - 0x0F)
POWER_ANT2	Byte	0	Transmit power for antenna 2 or external antenna (range of values: 0x00 - 0x0F)
UID_HANDLE	Bool	False	Meaning of the UID in the command: True = Handle ID, only the least significant 4 bytes of the UID are evaluated; False = UID/EPC-ID with a length of 8 bytes
BLACK_LIST	Bool	False	True = activate Black List
TAG_HOLD	Bool	False	True = activate Tag Hold
PARAM_SET	Byte	0	Field_ON_Control (0 = fast; range of values: 0x00, 0x02)

Parameter	Data type	Default value	Description
CHANNEL_PLAN	Byte	0F	Field_ON_Time (range of values: 0x00 - 0x0F; ETSI only)
MULTITAG	Byte	1	Maximum number of transponders that can be processed at the same time in the antenna field. (Range of values: 0x01 - 0x50)
ISTM	Bool	False	True = activate intelligent single tag mode
SCANNING_MODE	Bool	False	True = activate scanning mode

Reset_MOBY_D

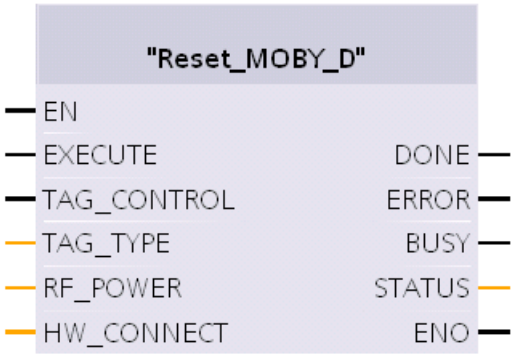


Figure B-4 "Reset_MOBY_D" function block

Table B- 4 Explanation of the "Reset_MOBY" function block

Parameter	Data type	Default value	Description
TAG_CONTROL	Bool	True	Presence check
TAG_TYPE	Byte	1	Tag type: 1 = every ISO transponder
RF_POWER	Byte	0	Output power RF power from 0.5 W to 10 W in increments of 0.25 W (range of values: 0x02 - 0x28)

Reset_MOBY_U

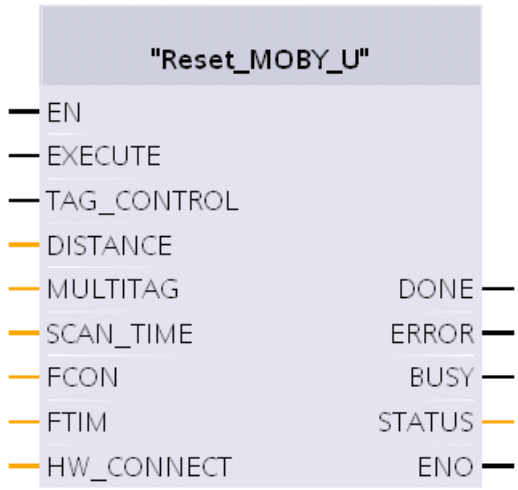


Figure B-5 "Reset_MOBY_U" function block

Table B- 5 Explanation of the "Reset_MOBY_U" function block

Parameter	Data type	Default value	Description
TAG_CONTROL	Bool	True	Presence check
DISTANCE	Byte	23h	Range limitation (range of values: 0x02 - 0x23 or 0x82 - 0xA3 for reduced transmit power)
MULTITAG	Byte	1	Maximum number of transponders that can be processed at the same time in the antenna field. (Range of values: 0x01 - 0x12)
SCAN_TIME	Byte	0	Scanning time: Standby time of the transponder (range of values: 0x00 - 0xC8)
FCON	Byte	0	field_ON_control: BERO mode (range of values: 0x00 - 0x03)
FTIM	Byte	0	field_ON_time: Time for BERO mode (range of values: 0x00 - 0xFF)

Reset_MV

The "Reset_MV" function block has no specific input parameters. To reset MV products, simply call the FB and activate the "EXECUTE" parameter.

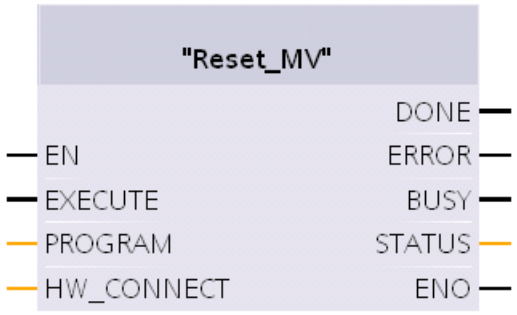


Figure B-6 "Reset_MV" function block

Table B- 6 Explanation of the "Reset_MV" function block

Parameter	Data type	Description
PROGRAM	Byte	Program selection B#16#0: Reset without without program selection or in the case of diagnostics, the error code for "IN_OP = 0" is fetched. B#16#1 ... B#16#15: Number of the program to be started ⇒ Reset with program selection (as of firmware V5.1 of the MV4x0)

Reset_Univ

The "Reset_Univ" function block is a universal reset block with which all systems can be reset. Use this FB only after consulting Support.

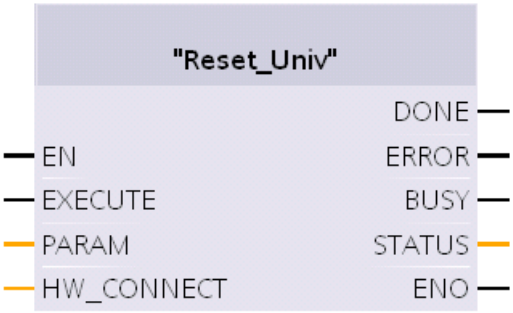


Figure B-7 "Reset_Univ" function block

Table B- 7 Explanation of the "Reset_Univ" function block

Parameter	Data type	Description
PARAM	Array [1...16] of Byte	Data for Reset frame The data to be set here can be made available by Support when necessary for special settings.

AdvancedCmd and Ident profile

C

C.1 AdvancedCmd

With the "AdvancedCmd" function block, every command can be executed including commands not represented by other function blocks. This general FB can be used for all commands and is intended only for experienced users.

The entire command structure must be specified in the "CMD" input parameter. You need to create the structure for the "CMD" parameter in a data block or as a data type.

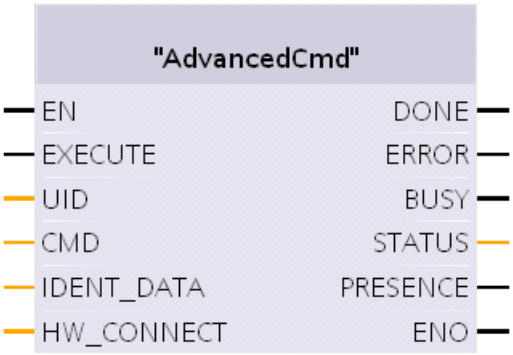


Figure C-1 "AdvancedCmd" function block

Table C- 1 Explanation of the "AdvancedCmd" function block

Parameter	Data type		Description
UID	Array [1...8] of Byte		Unique Identifier of the transponder
CMD	Struct{		-
	CMD_ID	Byte	ID of the command
	LEN_DATA	INT	Length of the data
	ADR_TAG	WORD	Physical address on the transponder
	ATTR	Byte}	Attribute/subcommand
IDENT_DATA	Array [1...1024] of Byte		Data buffer from which the data to be written will be read or into which the read data will be entered.

Table C- 2 Permitted settings for the "CMD" parameter

	Parameter			
Command	**CMD_ID**	**LEN_DATA**	**ADR_TAG**	**ATTR**
Write	71h	Length of the data to be written	Address on the transponder	-
Read	70h	Length of the data to be read	Address on the transponder	-
MEM-Status	73h	-	-	RF200: 83h RF300: 82h, 83h RF600: 84h, 85h MOBY D: 83h
DEV-Status	74h	-	-	RF200: 81h RF300: 81h, 86h RF600: 87h, 88h, A0h, A1h [1] MOBY U: 81h, 84h MOBY D: 81h
Inventory	69h	-	-	RF600: 82h, 83h, 85h, 90h, 91h, 92h, A0h, A1h [1]
Format	66h	Value: 15 The memory size and the initialization value must be stored in the data buffer [2]	-	-

[1] Details: See Function manual for RF620R/RF630R. There, the DEV status corresponds to the "SLG-Status" command and Inventory corresponds to the "GET" command.
The attributes must be compiled as follows: 81h → 01h, 82h → 02h, 83h → 03h, 85h → 05h, 87h → 07h, 90h → 10h, 91h → 11h, 92h → 12h, A0h → 20, A01 → 21

[2] Details: refer to the Function manual for the RFID standard profile

As an alternative, the settings possible with the "AdvancedCmd" function block can also be made with the Ident profile (see section "The "Ident profile" block (Page 88)").

C.2 The "Ident profile" block

Note

Parallel operation using the FB and Ident profile is not possible

The RF120C communications module must not be operated using the function blocks and the Ident profile at the same time.

Input and output parameters of the Ident profile (FB 101 / PIB_1200_UID_001KB)

The function blocks described in the section"Ident instructions (Page 30) represent a simplified interface of the Ident profile. If the functionality available with the function blocks is not adequate for your application, you can use the Ident profile as an alternative. Using FB 101, you can set complex command structures. The following graphic shows the Ident profile including the commands that can be implemented with it.

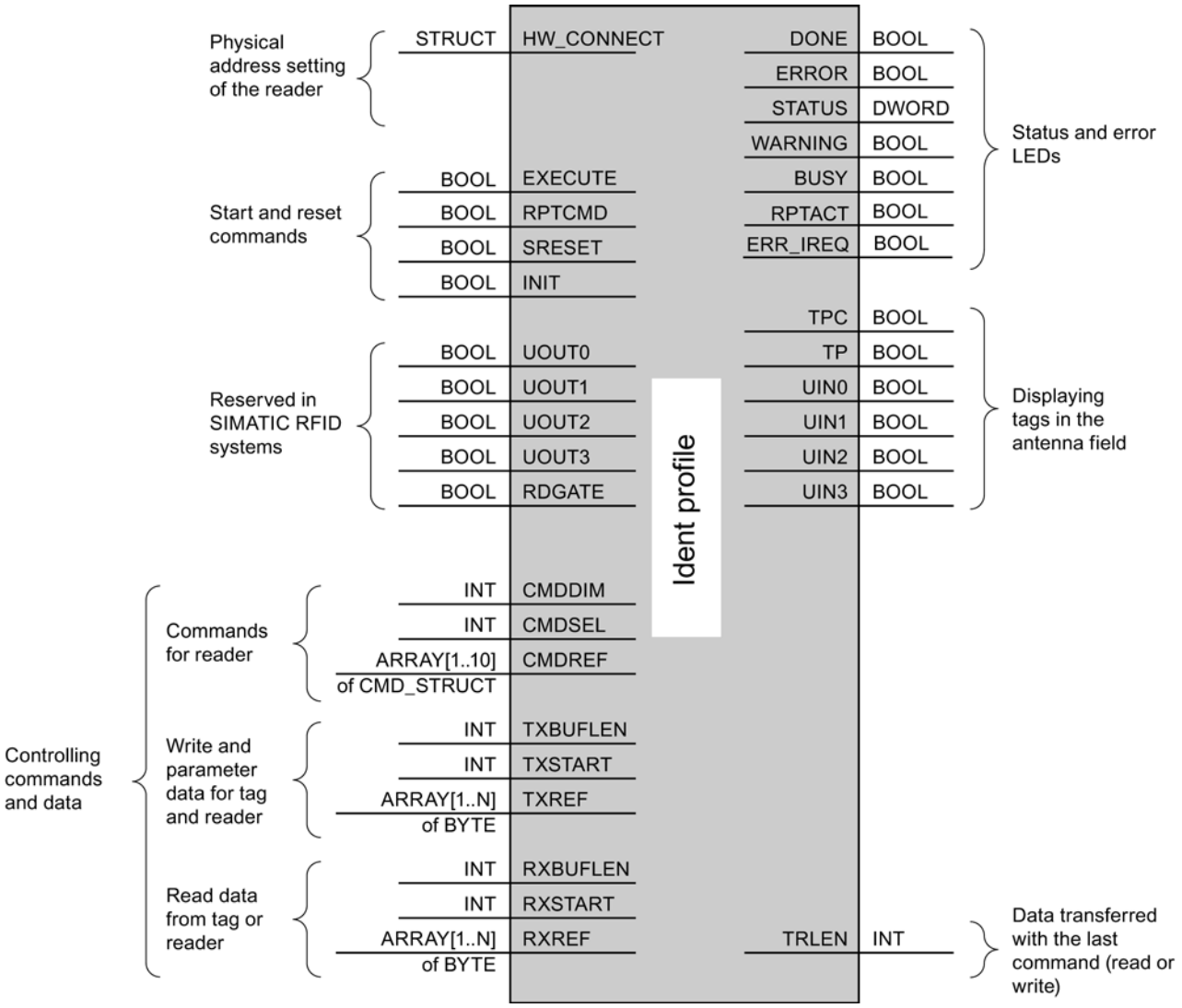


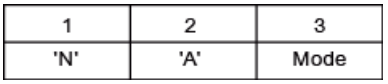
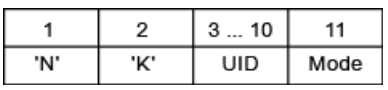
Figure C-2 Input parameters for RF120C with FB 101 (Ident profile)

You will find more detailed information on Ident profile in the manual "Ident profile; standard functions for Ident systems (http://support.automation.siemens.com/WW/view/en/45902535)".

RF120C command table with Ident profile (FB 101 / PIB_1200_UID_001KB)

The assignment is made in UDT 1 using the "command" variable.

Table C- 3 RF120C commands with Ident profile

<table>
<tr><th rowspan="2">Command</th><th colspan="2">Command code</th><th rowspan="2">Parameters used</th><th rowspan="2">Description</th></tr>
<tr><th>HEX</th><th>ASCII</th></tr>
<tr><td>DEV-STATUS</td><td>74</td><td>'t'</td><td>Attributes</td><td>Reads out the status of a communications module</td></tr>
<tr><td>FORMAT</td><td>66</td><td>'f'</td><td>UID, Length</td><td>Initializes the transponder</td></tr>
<tr><td>INVENTORY</td><td>69</td><td>'i'</td><td>Attributes</td><td>Requests a list of all currently accessible transponders within the antenna range</td></tr>
<tr><td>MEM-STATUS</td><td>73</td><td>'s'</td><td>UID, Attributes</td><td>Reads out the status of a transponder</td></tr>
<tr><td>PHYSICAL-READ</td><td>70</td><td>'p'</td><td>UID, Length, StartAddress</td><td>Reads data from a transponder by specifying the physical start address and length</td></tr>
<tr><td>PHYSICAL-WRITE</td><td>71</td><td>'q'</td><td>UID, Length, StartAddress</td><td>Writes data to a transponder by specifying the physical start address and length</td></tr>
<tr><td rowspan="10">PUT</td><td rowspan="10">65</td><td rowspan="10">'e'</td><td rowspan="10">Length</td><td>Transfers further commands not specified in the standard profile. To this end, a corresponding data structure is defined in the send data buffer for each command:</td></tr>
<tr><td>Put_SET_ANT
Switches the antenna of the reader off and on.
 
</td></tr>
<tr><td>Mode: RF200/RF300, MOBY U/D:
1 = antenna off
2 = antenna on
RF600:
Bit 0 = ANT 1 / internal antenna (1 = on)
Bit 1 = ANT 2 / external antenna (1 = on)
Bit 4 = TagList (0 = initialize, 1 = continue working with existing list)</td></tr>
<tr><td>Length: 3</td></tr>
<tr><td>Put_END
Terminates communication with a transponder (MOBY U only).
 
</td></tr>
<tr><td>UID: UID of the transponder</td></tr>
<tr><td>Mode: 0 = finish processing of the transponder
1 = pause in transponder processing</td></tr>
<tr><td>Length: 11</td></tr>
<tr><td>READ-CONFIG</td><td>61</td><td>'a'</td><td>-</td><td>Reads the parameters from the communications module</td></tr>
<tr><td>WRITE-CONFIG</td><td>78</td><td>'x'</td><td>Length, Config</td><td>Sends new parameters to the communications module</td></tr>
</table>

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D

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