Your Global Automation Partner

TURCK

BL ident® RFID System
Commissioning with Modbus TCP

User Manual

Contents

1 About this manual

This manual describes the setup, the functions and use of the system and helps you to commission the system with MODBUS TCP.
Read this manual carefully before using the system. This will prevent the risk of personal injury or damage to property or equipment. Keep this manual safe during the service life of the system. If the system is passed on, hand over this manual as well.

1.1 Target groups

This manual is designed for use by suitably qualified and trained personnel and must be read and followed by anyone entrusted with any of the following tasks:
- Unpacking and mounting
- Commissioning
- Setting
- Testing and maintenance
- Troubleshooting
- Disassembly and disposal

1.2 Explanation of symbols

Warnings related to actions are placed in front of potentially dangerous operating steps and are indicated with graphical symbols. Each warning is introduced with a warning symbol and a keyword expressing the severity of the danger. The instructions must be observed in all cases:

DANGER
DANGER indicates an immediate hazardous situation, which, if not avoided, will result in death or serious injury.

WARNING
WARNING indicates a possible hazardous situation with the risk of death or serious injury if it is not prevented.

NOTICE
NOTICE indicates a situation that may cause possible damage to property if it is not prevented.

NOTE
NOTE indicates tips, recommendations and important information. The notes simplify work, contain information on particular operating steps and help to avoid additional work resulting from incorrect procedures.

➤ **MANDATORY ACTION**
This symbol denotes actions that the user must carry out.

➥ **RESULT OF ACTION**
This symbol denotes the relevant results of actions and procedures.

1.3 Other documents

Besides this document the following material can be found in the Turck product database at www.turck.com:

- Engineering manual
- Startup manuals
- Product specific data sheets
- Device approvals

The free Turck BL ident® simulator for optimizing and simulating an application is available at http://www.turck.com.

1.4 Naming convention

Common synonyms for "tags" are "data carriers", "transponders" and "mobile data memory". Read/write heads are also called "transceivers".

1.5 Feedback about these instructions

We make every effort to ensure that these instructions are as informative and as clear as possible. If you have any suggestions for improving the design or if some information is missing in the document, please send your suggestions to techdoc@turck.com.

2 About the system

BL ident® is a modular RFID system for use in industrial environments. The system allows HF technology (13.56 MHz) and UHF technology (865…928 MHz) to be run in parallel. The system consists of several components and levels that can be flexibly combined:

- Interfaces
  The interfaces consist of a gateway for connecting to a network and RFID I/O modules for connecting the read/write heads. The BL67 (field mounting) and BL20 (control cabinet mounting) modular I/O systems and the BL compact fieldbus modules (field mounting) provide the basic system.
- Read/write heads for the HF and UHF range
- Tags for the HF and UHF range
- Connection cables
- Handhelds for the mobile writing and reading of data (optional)

2.1 System identification

2.1.1 BL ident® interface – type code

Modular interface sets in IP20 and IP67

Type code – example

T	I	–	BL67	–	PG	–	DP	–	S	–	2

Type code – explanation

T	I	Interface set	–	BL67	Modular I/O system	–	PG	Programmable gateway	–

T I Interface set

Device Type
I Interface set: gateway and RFID modules

TURCK RFID system *BL ident*®

BL67 Modular I/O system
BL20 cabinet mounting (IP20)
BL20-E cabinet mounting (IP20) ECONOMY version
BL67 field application (IP67)

PG Programmable gateway
Programmable gateway
PG Programmable gateway

DP	Fieldbus	–	S	Communication	–	2	Number of channels

Fieldbus

CO	CANopen
DN	DeviceNet™
DP/DPV1	PROFIBUS-DP
EC	EtherCAT®
EN	Modbus TCP[1]
EN-IP	EtherNet/IP™
PN-AC	PROFINET IO + AIDA

Communication

blank	data transfer via function block (PIB) in the control unit or programmable Gateway
S	data transfer via I/O communication

Number of channels

2	2 channels for 2 read/write heads
4	4 channels for 4 read/write heads
6	6 channels for 6 read/write heads
8	8 channels for 8 read/write heads

[1] TI-BL67-EN-S-x and TI-BL20-EN-S-x with multiprotocol: Modbus TCP, EtherNet/IP™ and PROFINET

Compact interfaces – BL compact for BL ident®

Type code – example

BLCDP	–	2	M12	S	T	–	2RFID-A	–	8DI-PD

Type code – explanation

BLCDP	Compact I/O system	–	2	M12	S	T	Housing	–	2RFID-A	RFID communication	–

BLCDP – Compact I/O system

BLC – compact I/O system for field application (IP67),fieldbus type:

BLCDN	DeviceNet™
BLCDP	PROFIBUS-DP
BLCCO	CANopen

2 – Number of connectors

1	1 connector
2	2 connnectors
4	4 connnectors
6	6 connnectors
8	8 connnectors
16	16 connnectors

M12 – Connector type

M8	connector M8 x 1
M12	connector M12 x 1
M16	connector M16 x 0.75

S – Housing size

S	small housing 93 x 71 x 32.5
M	middle housing 113 x 71 x 32.5
L	large housing 168 x 71 x 32.5

T – Connector for power supply

T	separate M12 connector
blank	no separate connector

2RFID-A – RFID communication

2RFID-A	data transmission via function block (PIB)
2RFID-S	data transmission via I/O communication

8DI-PD	Inputs/Outputs

8DI-PD – Inputs/Outputs

8XSG-PD	8 digital inputs/ outputs, configurable, PNP, diagnostics
8DI-PD	8 digital inputs, PNP, diagnostics

2.1.2 BL ident® read/write heads – type code

Type – Example:

T	N	LR	...	–	Q80	–	H1147	–	Ex

Type – Description:

T	N	LR	...	Read/write head	–	Q80	Housing	–	H1147	Connector type	/

Working frequency

blank	13.56 MHz
865	865…868 MHz
866	866…868 MHz
902	902…928 MHz
840/920	840.5…844.5 MHz & 920.5…924.5 MHz
902/915	902…907,5 MHz & 915…928 MHz
917	917…920.8 MHz

Special range

LR	long range
SLR	super long range

Read/write heads, **mounting condition**

B	flush mountable
N	non-flush mountable

TURCK RFID-System BL ident®

Housing

CK40	rectangular 40 x 40 x 65 mm, variable orientation of active face
EM18WD	thread M18, stainless steel, wash down (IP69K)
EM30WD	thread M30, stainless steel, wash down (IP69K)
M18	thread M18
M30	thread M30
Q08	rectangular, 32 x 20 x 8 mm
Q14	rectangular 55.5 x 30 x 14 mm
Q42TWD	rectangular, 68 x 42,5 x 42,5 mm, active face on top, wash down (IP69K)
Q80	rectangular, 114 x 80 x 40 mm
Q80L400	rectangular, 400 x 80 x 25 mm
Q80WD	rectangular, 83 x 102 x 40 mm, wash down (IP69K)
Q120L130	rectangular, 120 x 130 x 60 mm
Q175L200	rectangular, 175 x 200 x 60 mm
Q175	rectangular, 175 x 200 x 60 mm
Q350	rectangular, 370 x 350 x 20 mm
S32XL	ring shaped, 180 x 120 x 32 mm

Connector

0.15-RS4.47T	pigtail (150 mm) with male connector M12
H1147	connector M12 x 1
H1147L	connector M12 x 1, lateral

Ex	Approvals

Approvals

Ex approval for Ex-Area

2.1.3 BL ident® tags – type code

Type – Example:

T	W	...	–	Q51	–	M	–	HT	–	B128	–	Ex

Type – Description:

T	W	...	Data carrier	–	Q51	Housing	–	M	Features	–

Working frequency

blank	13.56 MHz
865-868	865…868 MHz
865-928	865…928 MHz
860-960	860…960 MHz
902-928	902…928 MHz

Data carrier,memory access

W	read/write
R	read only

TURCK RFID-System *BL ident*®

Housing

BD10X1.5-19	screw housing, plastic, M10 x 1.5, wrench size 19 mm
BS10X1.5-19	screw housing, metal/ plastic, M10 x 1.5, wrench size 19 mm
BV10X1.5-19	screw housing, stainless steel/ plastic, M10 x 1.5, wrench size 19 mm
I...	inlay & dimensions
L...	label & dimensions
Q...L...	rectangular & diameter
Q51	rectangular & lateral lenght: 51 mm
R...	round & diameter

Features

C	cheque card format
F	foil data carrier
M	for direct mounting on metal
MF	for direct mounting on metal, foil shielded
P	paper data carrier

HT	High temperature (optional)	–	B128	Memory capacity total	–	Ex	Approvals

High temperature

HT High temperature

Memory capacity total (size)

B...	... Byte
K...	... kByte

Approvals

Ex Approval for Ex-Area

2.1.4 BL ident® connection technology – type code

Type code – example

...	–	RK4.5T	–	5	/	S2500

Type code – explanation

...	Usage	–	RK4.5T	Connector type	–	5	Cable length	/

Usage

FB–	Food & Beverage type; resistant to all common acid and alkaline detergents and disinfectants; IP67 and IP69K

Connector type

RK4.5T	female straight; 5-pin
WK4.5T	female angled; 5-pin
RS4.5T	male straight; 5-pin

Cable length

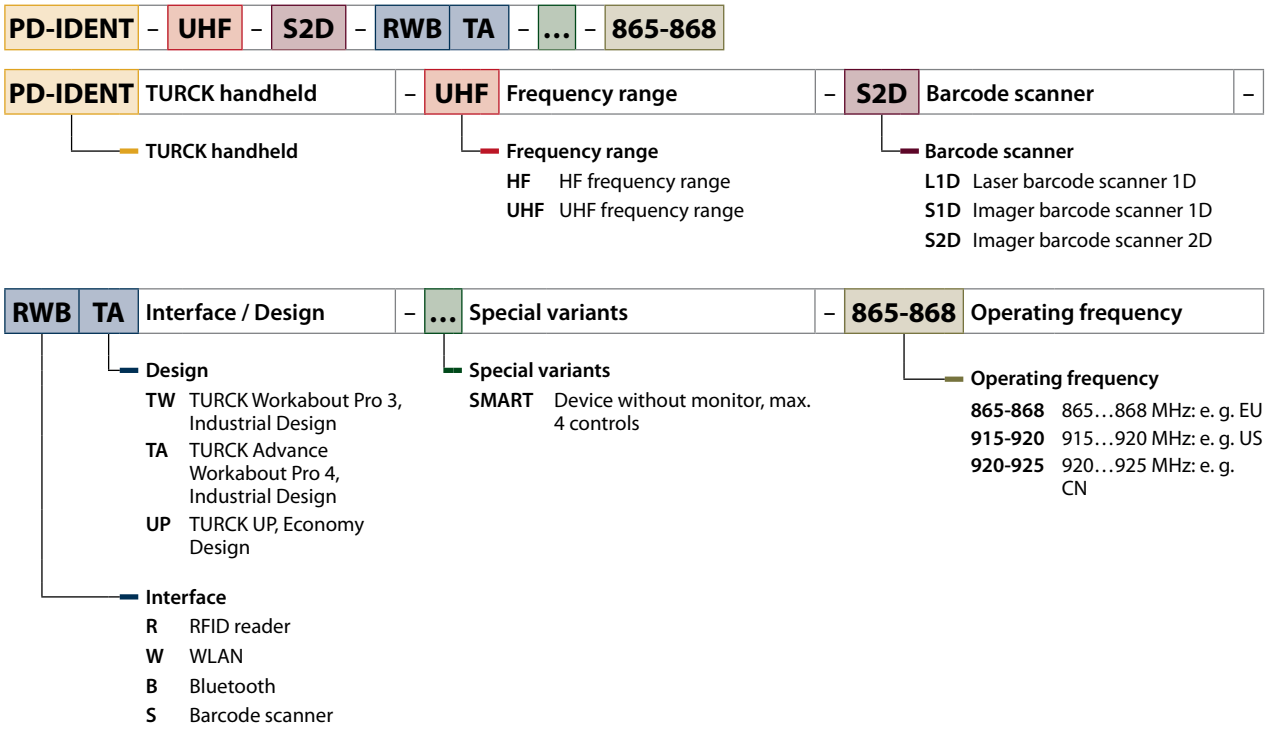
0.3	0.3 m
2	2 m
5	5 m
10	10 m
25	25 m
50	50 m

S2500	Connector quality

Connector quality

S2500	standard version: cable: UL 20963; cable jacket: PUR, yellow, qualified for drag chain use, oil-resistant, highly flexible
S2503	economic version: cable: UL 20549; cable jacket: PUR, black; qualified for drag chain use, oil-resistant, flexible

2.1.5 BL ident® handhelds – type code



2.2 Legal requirements

The following EU guidelines are relevant for the system:
- 2004/108/EC (EMC Directive)
- 2006/95/EC (Low-Voltage Directive)
- 94/9/EC (ATEX Directive)
- 1999/5/EC (R&TTE Directive)

The system consists of different components which do not all comply with the same directives and which are also developed and manufactured according to different standards. Refer to the relevant EC declarations of conformity to find the relevant directives and standards for individual components. The EC declarations of conformity are available online for download from the Turck product database at **www.turck.com**.

2.3 Manufacturer and service

Turck supports you in your projects – from the initial analysis right through to the commissioning of your application. The Turck product database offers you several software tools for programming, configuring or commissioning, as well as data sheets and CAD files in many export formats. You can access the Product Database directly via the following address:
www.turck.de/products
For further inquiries in Germany contact the Sales and Service Team on:
Sales: +49 208 4952-380
Technical: +49 208 4952-390
For overseas inquiries contact your national Turck representative.

Hans Turck GmbH & Co. KG
Witzlebenstraße 7
45472 Mülheim an der Ruhr
Germany

3 For your safety

The system is designed according to the latest state-of-the-art technology. Residual hazards, however, still exist.
Observe the following safety instructions in order to avoid hazards.
Turck accepts no liability for damage caused by failure to observe these safety instructions.

3.1 Intended use

The Turck BL ident® system is used for the contactless exchange of data between a tag and a read/write head for identifying objects in industrial environments.
Any other use is not in accordance with the intended use and may cause injury to persons and possible damage. Turck is not liable for damage arising from improper use of the system.

3.2 Obvious misuse

The system is not suitable for the protection of persons and property and must not be used in safety-related applications.

3.3 General safety instructions

Any incorrect use of the system may cause accidents.
- The system must only be fitted, installed, operated and maintained by trained and qualified personnel. When using the system in the Ex area, the user must also have additional knowledge of explosion protection (EN 60079-14 etc.).
- Only use the system in compliance with the applicable national and international regulations, standards and laws.

Faulty repairs may cause device failure and accidents.
- Do not intervene in system components or convert them.
- Send the devices to Turck for repair.

Any extended stay within the area of radiation of the UHF read/write heads may be harmful to health.
- Observe minimum distances from the actively radiating surface of the UHF read/write head:

Region	max. permissible total radiant output power	Safety distance
Europe	2 W ERP (according to ETSI)	0.24 m
USA/Canada	4 W EIRP	> 0.30 m

The radiation of the UHF read/write heads may have an adverse effect on the operation of electrically controlled medical equipment.
- Observe an additional distance from read/write heads up to the maximum transmission distance.

3.4 Notes on Ex protection

If explosion protection measures are not implemented, there is a direct risk of explosion.
- Observe national and international regulations for explosion protection.
- Only use the device within the stated operating and ambient conditions (see device operating instructions and Ex approval specifications).

4 System components

4.1 BL ident® interfaces

The BL20 (IP20) and BL67 (IP67) modular interfaces as well as the BL compact (IP67) interfaces are available for the BL ident®system.
The modular interface sets consist of a gateway and one or several RFID modules, which can also be expanded at a later time. Depending on the type of fieldbus up to 16 channels can be fitted. One RFID module each with an electronic module and a base module are required for every two channels.

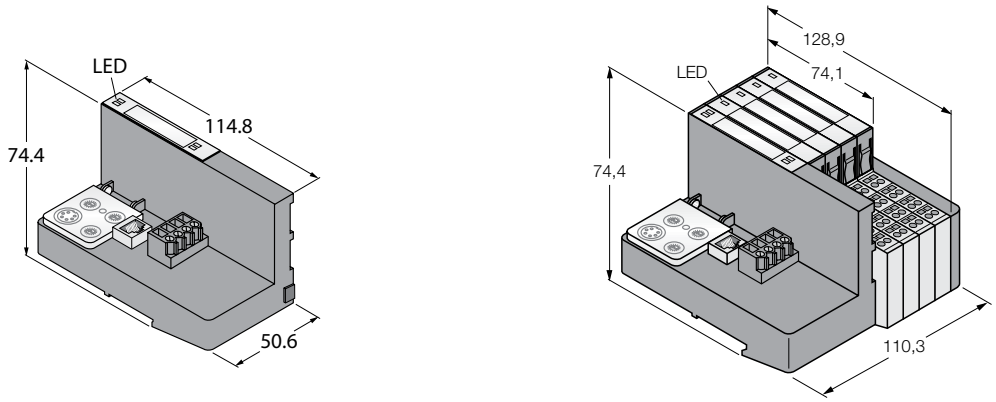


Fig. 1: BL20 standard gateway for Modbus TCP and
BL ident® interface set with BL20 standard gateway and four RFID modules

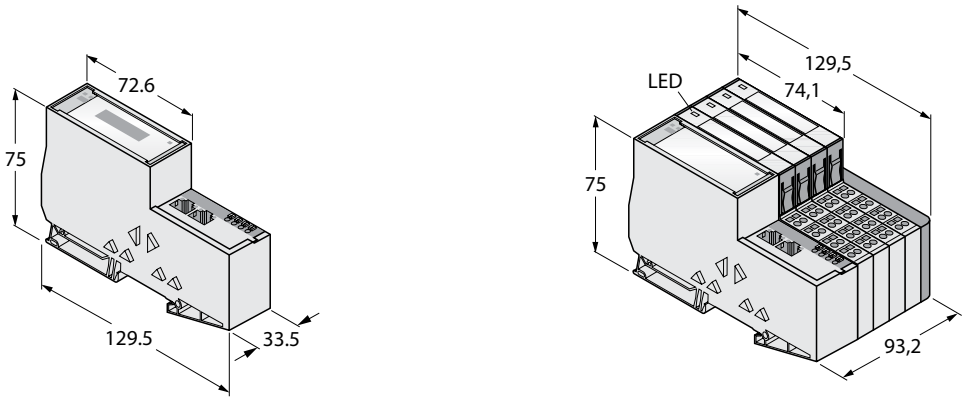


Fig. 2: BL20 ECO gateway for Modbus TCP and BL ident® interface set with BL20 ECO gateway and four RFID modules

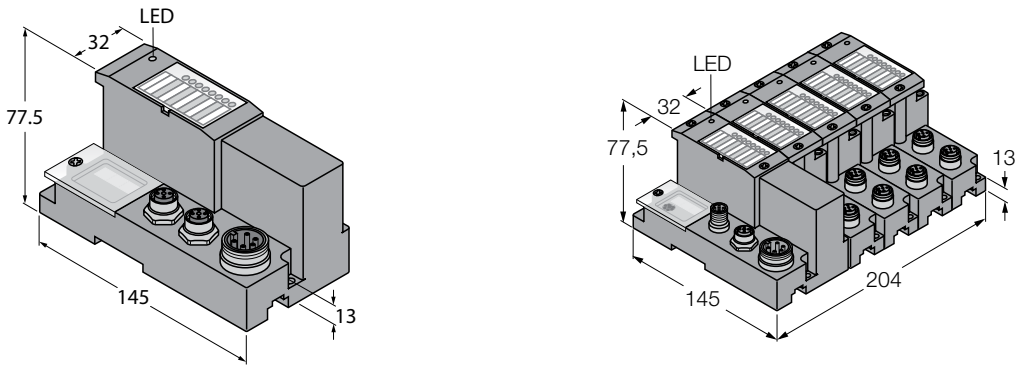


Fig. 3: BL67 gateway for Modbus TCP and
BL ident® interface set with BL67 gateway and four RFID modules

The compact BL compact interfaces combine the functions of gateway and I/O electronics in a fully encapsulated IP67 housing. Interfaces designed exclusively for connecting read/write heads and also for the additional connection of field devices such as sensors or actuators are available.

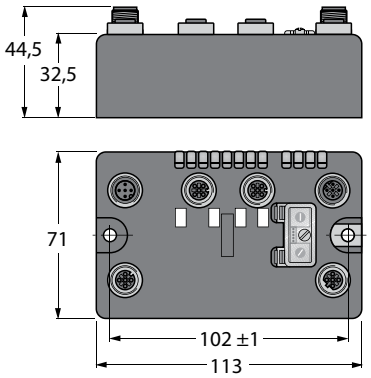


Fig. 4: Compact BL ident® interface in IP67 (BL compact) for Modbus TCP

4.1.1 BL ident® interfaces for Modbus TCP

The following BL20 interface sets are available for Modbus TCP:

BL20 interface sets

Interface set	Ident no.	Associated gateway
TI-BL20-E-EN-2	7030614	BL20-E-GW-EN
TI-BL20-E-EN-4	7030615	BL20-E-GW-EN
TI-BL20-E-EN-6	7030616	BL20-E-GW-EN
TI-BL20-E-EN-8	7030617	BL20-E-GW-EN
TI-BL20-PG-EN-2	1545053	BL20-PG-EN
TI-BL20-PG-EN-4	1545054	BL20-PG-EN
TI-BL20-PG-EN-6	1545055	BL20-PG-EN
TI-BL20-PG-EN-8	1545056	BL20-PG-EN
TI-BL20-PG-EN-S-2	1545086	BL20-PG-EN
TI-BL20-PG-EN-S-4	1545087	BL20-PG-EN
TI-BL20-PG-EN-S-6	1545088	BL20-PG-EN
TI-BL20-PG-EN-S-8	1545089	BL20-PG-EN

BL67 interface sets

The following BL67 interface sets are available for Modbus TCP:

Interface set	Ident no.	Associated gateway
TI-BL67-EN-S-2	1545150	BL67-GW-EN
TI-BL67-EN-S-4	1545151	BL67-GW-EN
TI-BL67-EN-S-6	1545152	BL67-GW-EN
TI-BL67-EN-S-8	1545153	BL67-GW-EN
TI-BL67-PG-EN-2	1545065	BL67-PG-EN
TI-BL67-PG-EN-4	1545066	BL67-PG-EN
TI-BL67-PG-EN-6	1545067	BL67-PG-EN
TI-BL67-PG-EN-8	1545068	BL67-PG-EN
TI-BL67-PG-EN-S-2	1545098	BL67-PG-EN
TI-BL67-PG-EN-S-4	1545099	BL67-PG-EN
TI-BL67-PG-EN-S-6	1545100	BL67-PG-EN
TI-BL67-PG-EN-S-8	1545101	BL67-PG-EN

BL compact interface sets

The following BL compact interface sets are available for Modbus TCP:

Interface set	Ident no.	Function
BLCEN-2M12LT-2RFID-S	6811450	2 × read/write head

4.1.2 Possible combination of interfaces/gateways and RFID modules

The following tables show the possible combinations of BL20 and BL67 gateways with the relevant RFID modules. Turck offers interface sets for all combination options with cage clamp terminals for 2, 4, 6 or 8 read/write heads.

Combination of BL20 gateways and RFID modules

BL ident® Interface (set): Gateway and electronic modules (each with base module) – degree of protection IP20					
Fieldbus	**Interface (set)**	**Gateway**		**Electronic modules**	
	Type x = Number of channels	**Type**	**Gateway programmable**	**BL20-2RFID-A PIB function block**	**BL20-2RFID-S 8-byte I/O communication**
Modbus TCP	TI-BL20-E-EN-x	BL20-E-GW-EN			x
	TI-BL20-PG-EN-x	BL20-PG-EN	x	x	
	TI-BL20-PG-EN-S-x	BL20-PG-EN	x		x

Combination of BL67 gateways and RFID modules

BL ident® Interface (set): Gateway and electronic modules (each with base module) – degree of protection IP67					
Fieldbus	**Interface (set)**	**Gateway**		**Electronic modules**	
	Type x = Number of channels	**Type**	**Gateway programmable**	**BL67-2RFID-A PIB function block**	**BL67-2RFID-S 8-byte I/O communication**
Multiprotocol: Modbus TCP, PROFINET and EtherNet/IP™	TI-BL67-EN-S-x	BL67-GW-EN			x
Modbus TCP	TI-BL67-PG-EN-x	BL67-PG-EN	x	x	
	TI-BL67-PG-EN-S-x	BL67-PG-EN	x		x

4.2 BL ident® read/write heads

The BL ident® read/write heads are used for contactless data exchange with the BL ident® tags. For this the controller sends commands and data via the BL ident® interface to the read/write head and receive the corresponding response data from the read/write head. The reading of the IDs of all RFID tags in the read area or the writing of an RFID tag with a specific production date are examples of typical commands.
To communicate with the tag, the data of the read/write head is coded and transferred via an electromagnetic field, which at the same time supplies the tags with power.
Each BL ident® read/write head can communicate with a number of BL ident® tags. This requires the read/write head and the tag to operate in the same frequency range. The detection ranges of the devices – depending on power and frequency – vary from a few millimeters to several meters. The specified maximum read/write distances only represent typical values under laboratory conditions without allowing for the effect of materials. The achievable distances may be different due to component tolerances, mounting location in the application, ambient conditions and the effect of materials (particularly metal and liquids).

4.3 BL ident® ident tags

A BL ident® tag is a mobile data memory consisting of a memory chip and a coupling element (coil or antenna) and can be written or read without contact in an RFID system. Tags with EEPROM and FRAM memories are available. Tags provide information on the object to which they are fitted, e.g. a unique identification number, batch number or specific production data. Prior to use, the tag is written with a worldwide uniquely assigned number, e.g. for UHF tags compliant with the EPCglobal Class 1 Gen 2 standard (ISO18000-6C) and for HF tags according to ISO 15693.
The BL ident® tags can be written and read by a number of BL ident® read/write heads without contact. This requires the read/write heads and the tags to operate in the same frequency range. The detection ranges of the devices – depending on power and frequency – vary from a few millimeters to several meters. The specified maximum read/write distances only represent typical values under laboratory conditions without allowing for the effect of materials. The achievable distances may be different due to component tolerances, mounting location in the application, ambient conditions and the effect of materials (particularly metal and liquids).

4.4 BL ident® handhelds

BL ident® handhelds enable tags to be read and written from any location. The read data is displayed on a touch screen. They can be edited via the handheld and written to a tag.

4.5 RFID cables

Pre-assembled connection cables are available in standard or economy versions for the communication between the components of the BL ident® system. RFID connection cables specially designed for the food industry are also available.

5 Mounting

DANGER
Potentially explosive atmosphere
Risk of explosion through spark ignition
When used in explosion hazardous areas:
- ➤ Mounting, connection and parameter setting are only permissible if there is no potentially explosive atmosphere present.
- ➤ Observe the special device conditions stipulated by the Ex approval (see operating instructions of the particular device).

5.1 Mounting BL20 interface sets

The BL20 interface set consists of a gateway with two mounting brackets, an end plate and up to four electronic modules (RFID-S or RFID-A) and BL20-S4T-SBBS base modules.

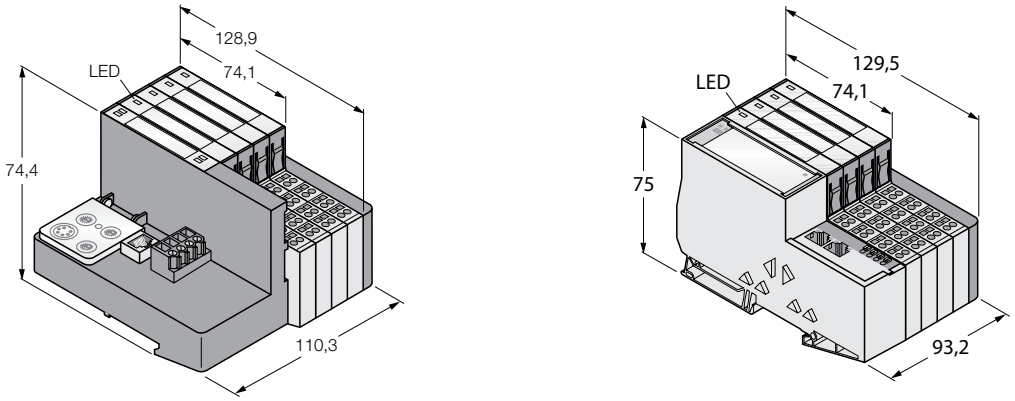


Fig. 5: BL20 interface sets (8-channel for Modbus TCP): Version with standard gateway (left) and
ECO gateway (right)

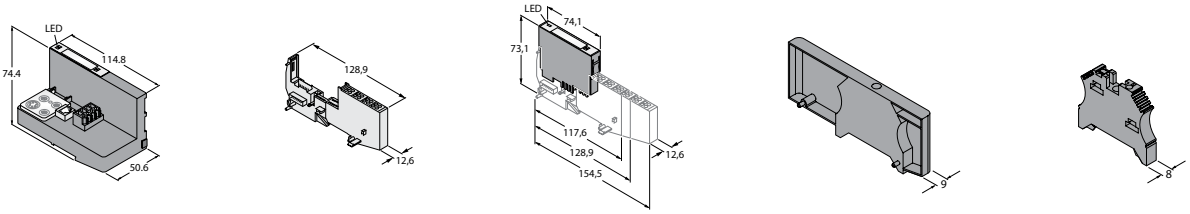


Fig. 6: Components of a BL20 interface set with a standard gateway: Gateway, base module, electronic module, end plate, mounting bracket

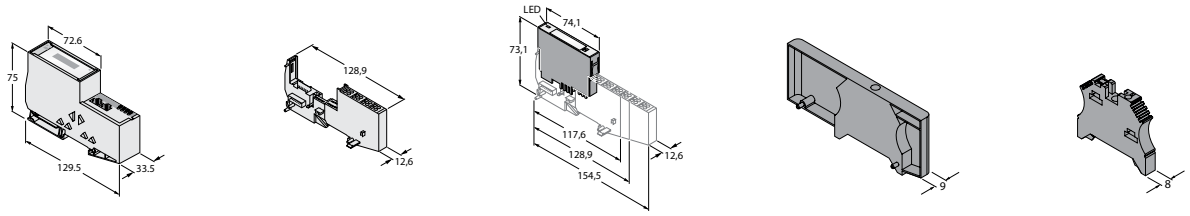


Fig. 7: Components of a BL20 interface set with an ECO gateway: Gateway, base module, electronic module, end plate, mounting bracket

The interface sets can be mounted in the control cabinet on a DIN rail according to EN 60715 (TH35).

5.1.1 General notes on mounting BL20 interface sets

- When mounted in the control cabinet, the minimum clearance of the BL20 interface sets from passive components is 10 mm. The minimum clearance from active components is 75 mm.
- The first electronic component of each BL20 interface set is a gateway.
- The mounting procedure is illustrated using the example of an interface set with a BL20 standard gateway. Interfaces with BL20 ECO gateways are mounted in the same way as standard interfaces.
- Depending on the power consumption, a bus refreshing module must be used after a certain number of electronic modules are used. Refer to the product data sheet for the power consumption.

NOTE
Connect the connection cable from the BL20 interface to the read/write heads to the base modules before the interface is mounted in the control cabinet.

5.1.2 Mounting gateways and base modules

➤ Keep the space on the DIN rail left of the gateway free for the end bracket.
➤ Mount the gateway as per Fig. 8.

Fig. 8: Mounting BL20 gateways (example: BL20 Standard gateway)

➤ Fasten the base module as per Fig. 9 on the DIN rail to the right of the gateway.
➤ Move the base module as far as possible to the left so that it is flush against the gateway or the adjacent base module.

The side catches lock into the gateway or the adjoining base module. This ensures a reliable connection between the modules and communication via the module bus.

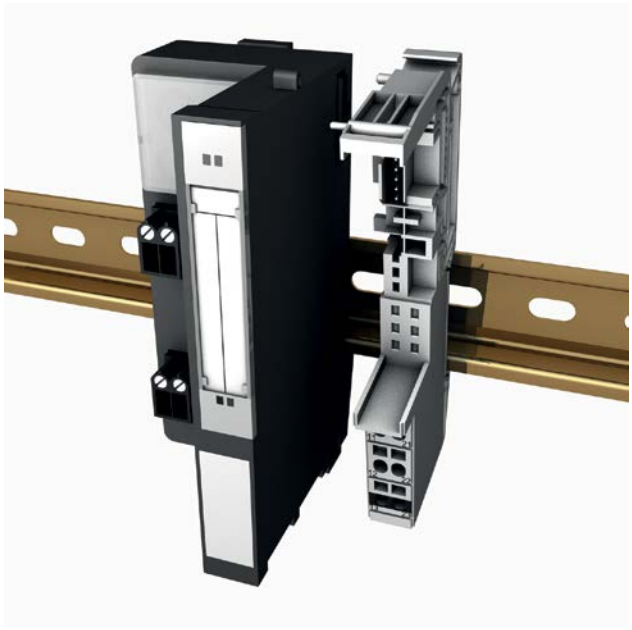


Fig. 9: Mounting BL20 base modules

5.1.3 Mounting the end bracket and end plate

➤ Snap fit a mounting bracket on the DIN rail to the left of the gateway.
➤ Move the mounting bracket flush up to the gateway.
➤ Screw the mounting bracket tight.

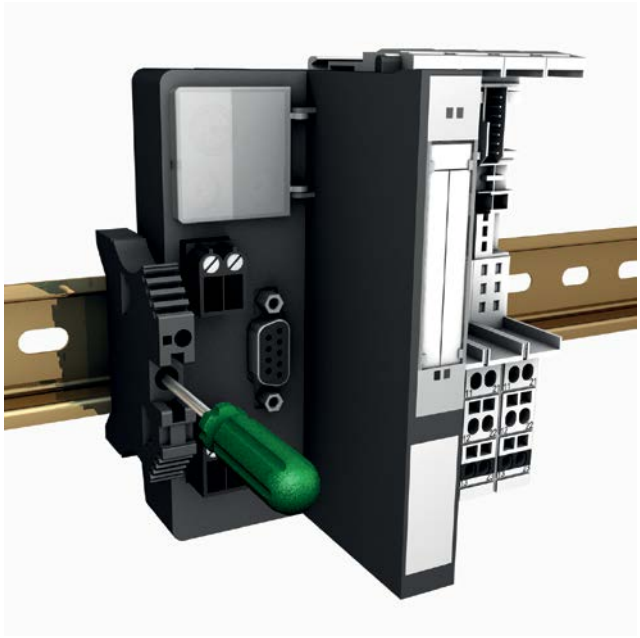


Fig. 10: Fastening the mounting bracket to the left of the gateway

➤ Clip the end plate and a mounting bracket as per Fig. 11 to the right of the last base module on the DIN rail.
➤ Move the end plate flush against the last base module until the plug connectors of the end plate are securely inserted in the recesses of the base module.
➤ Move the mounting bracket into the recess of the end plate.
➤ Screw the mounting bracket tight.

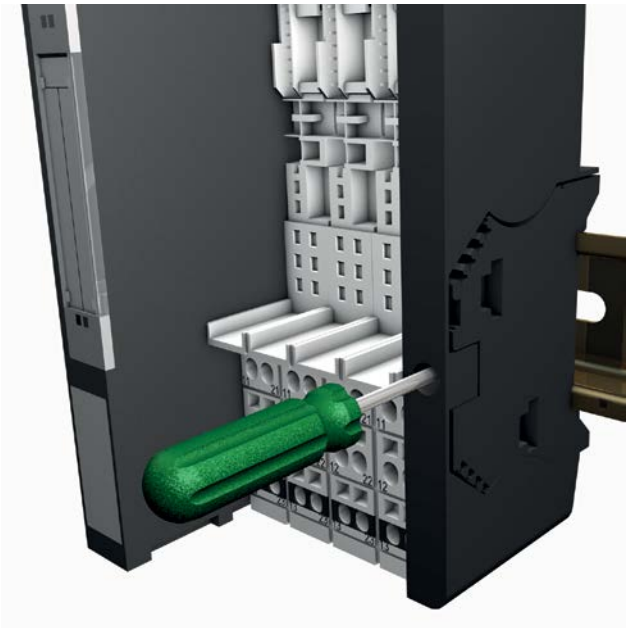


Fig. 11: Fastening the mounting bracket and end plate

5.1.4 Mounting BL20 electronic modules

NOTE
For fault-free data processing a station can be fitted with a maximum of ten BL20-RFID-S modules or four BL20-RFID-A modules. The reliability of the power supply depends on the power consumption of the read/write heads connected to the electronic modules. When using devices with a higher power consumption, at least one power feeding module should be fitted after two RFID electronic modules.

➤ Push the electronic module evenly onto the base module as per Fig. 12 until there is an audible click.

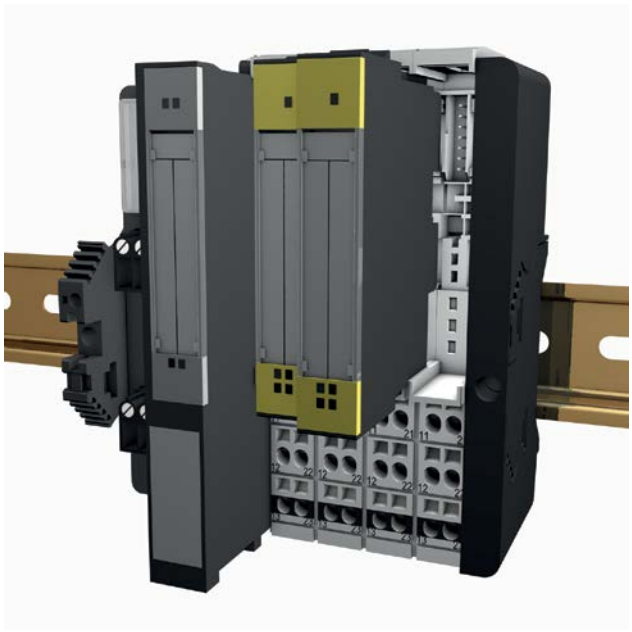


Fig. 12: Mounting BL20 electronic modules

5.2 Mounting BL67 interface sets

The BL67 interface set comprises a gateway with two mounting brackets and an end plate, the required number of appropriate electronic modules (RFID-S or RFID-A) and the same number of BL67-B-2M12 base modules.

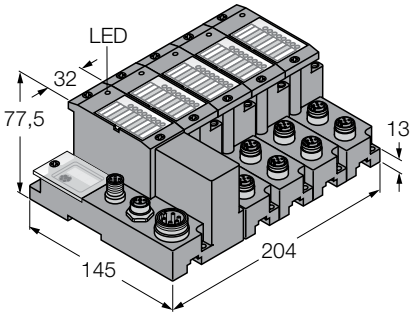


Fig. 13: BL67 interface set (8-channel for Modbus TCP)

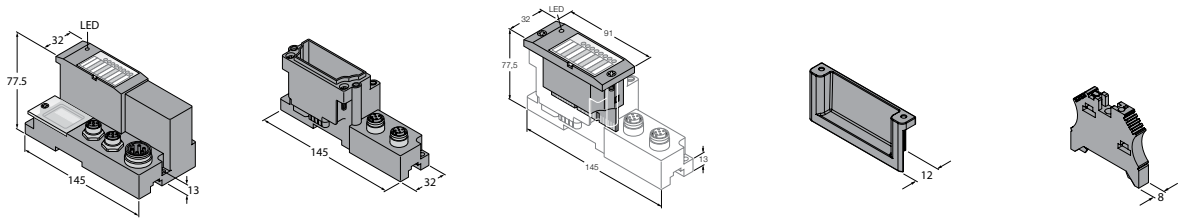


Fig. 14: Components of a BL67 interface set: Gateway, base module, electronic module, end plate, mounting bracket

The BL67 interface sets can be mounted on a DIN rail according to DIN EN 60715 (TH35) or screw mounted on a mounting plate. The interface sets can be aligned as required; they can be mounted both horizontally and vertically.

The BL67 interface sets are designed for operation in the field and do not therefore have to be mounted in the control cabinet.

5.2.1 General notes on mounting BL67 interface sets

- The first electronic component of each BL67 interface set is a gateway.
- Before mounting on the DIN rail or the mounting plate, screw the gateway and the base modules together.
- The maximum tightening torque for screws on the BL67 interface sets is 0.9…1.2 Nm

5.2.2 BL67 – Mounting gateways and base modules

➤ Insert the first base module as per Fig. 15 in the module bus contacts of the gateway.
➤ Screw the gateway and the base module together.
➤ Fit all other base modules into the module bus contacts of the last base module.
➤ Fit the end plate onto the open bus module contacts of the last base module.
➤ Screw together the end plate and the base module.

Fig. 15: BL67 – Mounting gateways and base modules

NOTICE
Loss of IP67 protection
Damage to the device through the penetration of dust and humidity
➤ Tighten the screws of the base modules and the end plate (max. tightening torque: 0.9…1.2 Nm).
➤ Check the seals of the base modules for any damage.

5.2.3 BL67 – Mounting electronic modules

NOTE
For fault-free data processing a station can be fitted with a maximum of ten BL20-RFID-S modules or four BL20-RFID-A modules. The reliability of the power supply depends on the power consumption of the read/write heads connected to the electronic modules. When using devices with a higher power consumption, at least one power feeding module should be fitted after two RFID electronic modules.

➤ Push the electronic module evenly onto the base module as per Fig. 16.
➤ Screw together the electronic module and the base module.

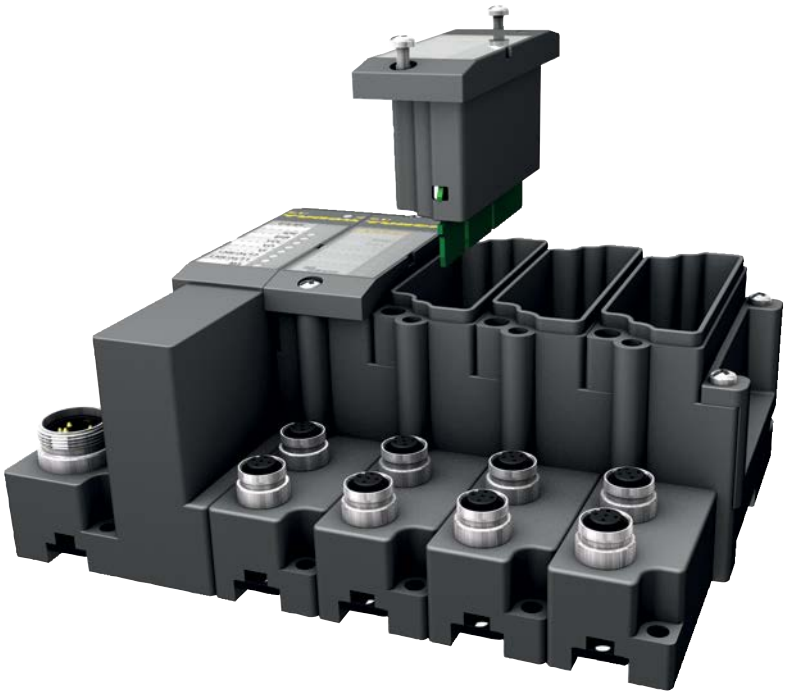


Fig. 16: Mounting BL67 electronic modules

NOTICE
Loss of IP67 protection
Damage to the device through the penetration of dust and humidity
➤ Tighten the screws of the electronic modules (max. tightening torque: 0.9…1.2 Nm).
➤ Check the seals of the electronic modules for any damage.

5.2.4 Mounting BL67 interfaces on a DIN rail

➤ Open the catches on the gateway and on the base modules with a screwdriver.
➤ Attach the BL67 interface to the DIN rail as per Fig. 17.
➤ Close the catches.
➤ Snap fit a mounting bracket on the DIN rail to the left of the gateway.
➤ Snap fit a mounting bracket on the DIN rail to the right of the last base module.
➤ Move the mounting bracket flush up to the interface set.
➤ Screw both mounting brackets tight.

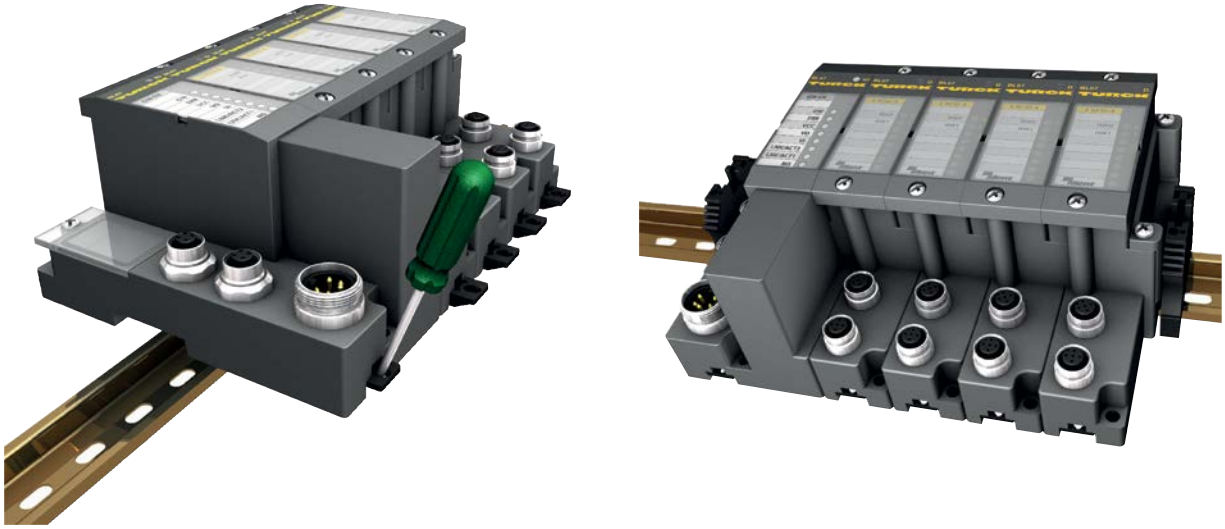


Fig. 17: Mounting BL67 interfaces on a DIN rail

5.2.5 Screw fastening BL67 interfaces on a mounting plate

➤ Connect the interface to the functional earth with a screw through the FE contact of the gateway.

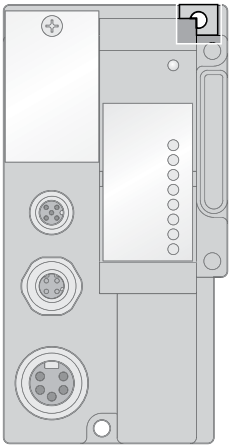


Fig. 18: FE contact on the top right hole of the gateway

NOTE
If the mounting plate is not grounded, the ground must be implemented via a separate grounding terminal on the FE contact of the gateway.

➤ Screw fasten the BL67 interface set on the mounting plate.

5.3 Mounting BL compact interfaces

The BL compact interface sets are designed for operation in the field and can be screwed onto a mounting plate.

5.4 Mounting HF read/write heads

NOTE
Refer to the specific product operating instructions for the read/write head for the mounting conditions.

➤ Mount the read/write heads with the associated fixing accessories.
➤ Avoid any type of metal in the vicinity of the read/write heads. Metal rails or similar objects must not intersect the transmission zone. This would otherwise affect the field data.
➤ Observe the following requirements when mounting the read/write heads:
  – Minimum distance between read/write heads
  – Metal-free space for mounting read/write heads and tags in metal
  – Mounting several read/write heads on a metal frame or support.

5.4.1 Mounting read/write heads on metal

Read/write heads mounted on metal couple part of the electromagnetic field onto the metal support. If the minimum distance **d** and the metal-free spaces are observed, there is normally no interaction between read/write heads. However susceptibility to interference may nevertheless result from a particularly poor orientation of the iron frame (example: Formation of a magnetic ring in roller conveyor applications). This causes longer data transmission times and error messages in the interface module.

Interaction between several read/write heads – Possible solutions

➤ Increase the distance **d** between the read/write heads.

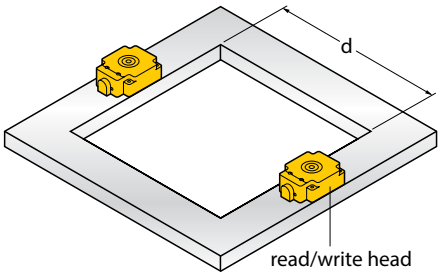


Fig. 19: Distance between two read/write heads

➤ Fit one or several iron stays in order to short parasitic fields.

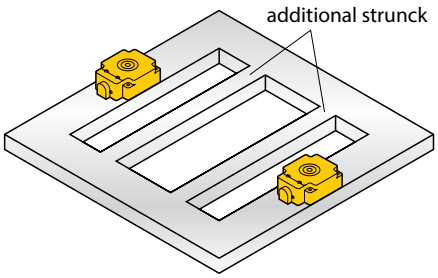


Fig. 20: Additional iron stays

➤ Fit a 20...40 mm thick non-metallic spacer between the read/write head and the iron frame. This reduces the parasitic interference of the field on the tag.

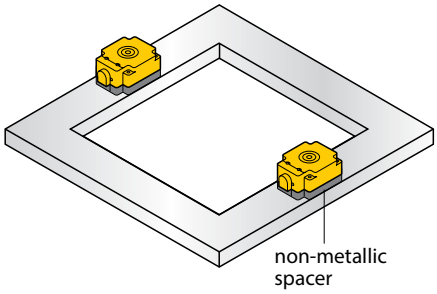


Fig. 21: Fitting a non-metallic spacer

When using a BLxx-2RFID-A module with the PIB function block, the mutual interference of the read/write heads can be prevented by using Selective mode. In Selective mode, only the channel with a tag located in its transmission window is active.

➤ Switch the read/write heads off and on via the PIB function block.

NOTE

The achievable distances may differ by up to 30 % due to component tolerances, mounting location and the effect of materials (particularly metal).
Before commissioning test the application particularly for read and write operations in motion.

5.4.2 Mounting read/write heads in roller conveyor applications

Only Q800L400... TNLR read/write heads are suitable for use in the BL ident® system in roller conveyor applications. Rollers electrically connected via the roller bearings and via the supporting structure can modulate the high frequency magnetic field of the read/write head via the roller bearings so severely when they rotate that no interference free data transmission is possible. The read/write head must be shielded from the interference by the mounting of additional shield plates.

➤ Design the shield plates as metal U profiles so that they do not touch the read/write head directly.
➤ Mount the shield plates flush with the top edge of the read/write head (see figure).
➤ Electrically connect the shield plates with the supporting structure.
➤ Use plastic spacers for mounting the read/write head.
➤ Determine the permissible read/write distance and passing speed in real conditions.

The following figure shows mounting examples of the TNLR-Q80L400-… read/write head. The dimensions used can vary depending on the application.

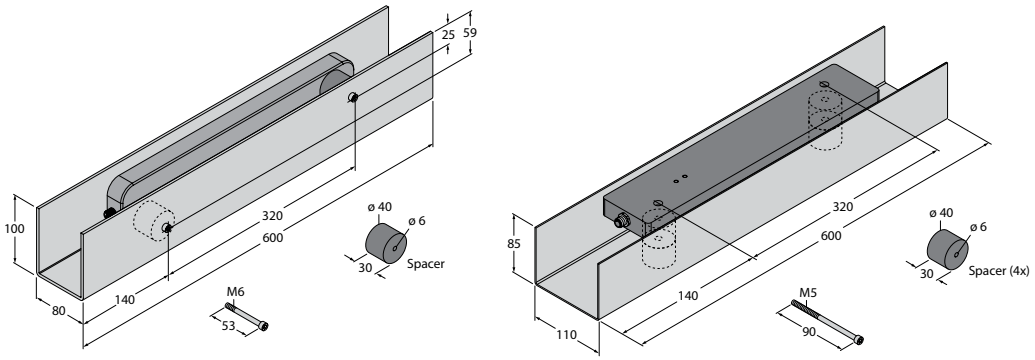


Fig. 22: Mounting the TNLR-Q80L400-… read/write head in a U profile

5.5 Mounting UHF read/write heads

NOTE
Refer to the specific product operating instructions for the read/write head for the mounting conditions.

➤ Mount the read/write heads with the associated fixing accessories.
➤ Observe the following points during engineering and when mounting the read/write heads:
- Minimum and maximum distance between read/write heads
- Minimum distance of read/write heads to conductive materials
- Interaction when using several read/write heads
- Parameter assignment of the read/write heads (e.g. setting of transmission output, operating frequency and RF transmission parameters) via the DTM or the RDemo and WebConfig software tools.

5.5.1 Minimum and maximum distance between two read/write heads

The minimum and maximum distance between two read/write heads mounted next to each other depends on the transmission output: The lower the transmission output, the smaller the minimum distance possible.
➤ At least 20 cm should be selected as a guide value, and a distance of 50 cm or greater is recommended.

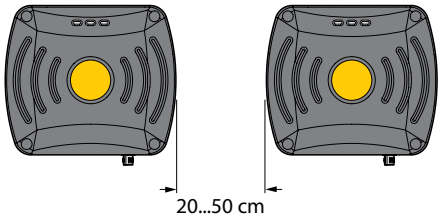


Fig. 23: Minimum distance between two read/write heads mounted next to or above each other

With a portal configuration, the maximum distance between the read/write heads is 3.5 m (Europe) and 4.0 m (USA, China).

Fig. 24: Maximum distance for portal configurations

5.5.2 Minimum distance of read/write heads to conductive materials

A conductive environment can cause the detuning of the read/write heads.

➤ Observe for mounting a minimum distance of 50 cm between a read/write head and the ground, liquids or metals.

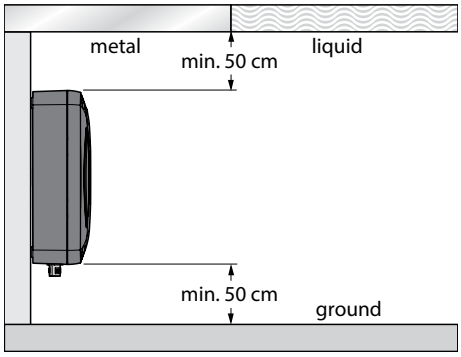


Fig. 25: Minimum distances to conductive materials for mounting read/write heads

NOTE

Conductive materials in the environment can affect the read/write head and cause detuning with an adverse effect on the resulting radio field. The read/write heads from firmware version 1.39 can be tuned by means of software tools in order to compensate any interference.

Interference can largely be compensated for by tuning the read/write head with the Antenna Tuning function in the RDemo software tool. The Autotuning function can also be activated in the WebConfig software tool. With this software the read/write head cyclically carries out an automatic tuning to the conditions of the interference environment.

NOTE

The achievable distances may differ due to component tolerances, mounting location and the effect of materials (particularly metal).

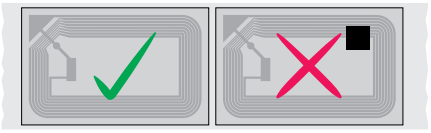
Before commissioning test the application particularly for read and write operations in motion.

5.6 Mounting HF tags

NOTE
Refer to the product-specific data sheets for the tags to find the mounting conditions.

➤ Mount the tags according to application requirements. The tags can be stuck on or mounted with screws.
➤ Use the plastic screws for screw mounting the tags.

NOTE
For production reasons some smart label tags may not meet the conditions of the final test. These tags are labelled by a black marking and can be disposed of.



NOTE
Carry out tests in real conditions in all cases.

5.6.1 Aligning the tags in the room

➤ Position the tags parallel to the active face of the read/write head.

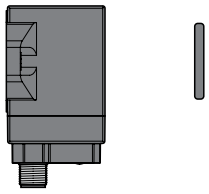


Fig. 26: Parallel alignment of tag and read/write head (example)

NOTE
Special conditions apply to the alignment of TW-R10-… and TW-R12-… tags (see product data sheet).

5.6.2 Mounting tags on metal

The following tags are suitable for direct mounting on metal:
- TW-R10-M-B146
- TW-R12-M-B146
- TW-R30-M-B128
- TW-R30-M-K2
- TW-R50-M-B128
- TW-R50-M-K2
- TW-R80-M-B128
- TW-R80-M-K2

Other types of tag must not be mounted directly on metal. The following measures must be taken if these tags nevertheless have to be mounted in metal environments.

➤ Observe the required minimum distance from metals **a** when mounting. The minimum distance **a** depends on the design of the tag, a = 10 mm serves as a guideline.

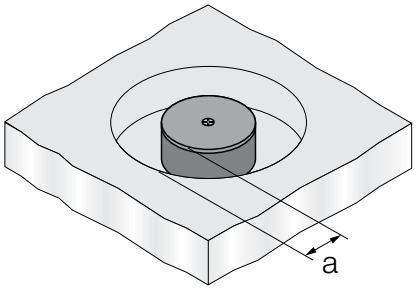


Fig. 27: Figure: Minimum distance **a**

➤ Fit a non-metallic spacer between the metal environment and the tag. The height **h** is at least 10 mm and depends on the combination of tag and read/write head.
➤ Carry out tests in real application conditions.

NOTE
Non-metallic spacers enable mounting that does not interrupt the correct operation of functions. The possible read/write distance can nevertheless be reduced.

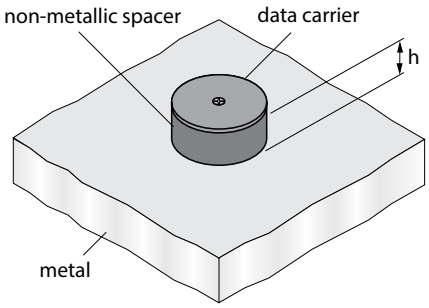


Fig. 28: Mounting with a non-metallic spacer

Reducing metallic influences

Metal supports above the transmission zone between tag and read/write head affect the entire field; the transmission zone is reduced.

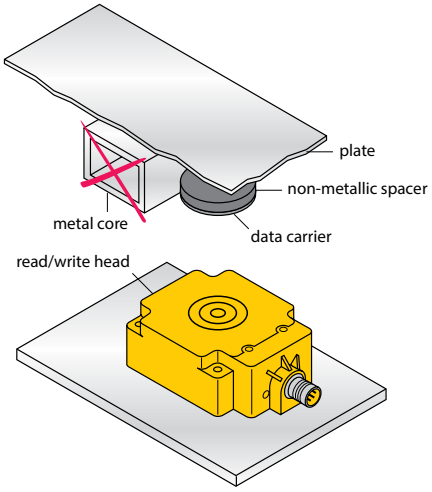


Fig. 29: Interfering metal supports

➤ Position the tags and read/write head in such a way that there are no more metal supports in the transmission zone (see Fig. 30).

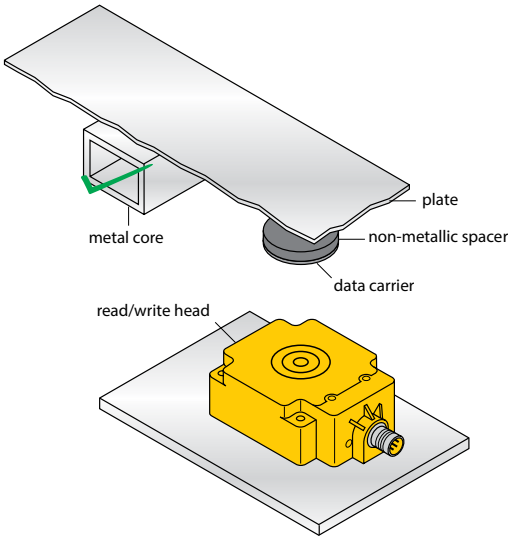


Fig. 30: Metal support outside of the transmission zone between the tag and the read/write head.

➤ The transmission zone between the read/write head and the tag is no longer affected.

5.6.3 Minimum distance between tags

➤ With single tag applications: Observe the recommended minimum distances (see product data sheet). The minimum distance between the tags depends on the combination of tag and read/write head.

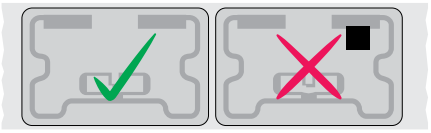
➤ With multi-tag applications: Arrange the tags next to each other parallel to the active face of the read/write head.

5.7 Mounting UHF tags

NOTE
Refer to the product-specific data sheets for the tags to find the mounting conditions.

➤ Mount the tags according to application requirements. The tags can be stuck on or mounted with screws.
➤ Use the plastic screws for screw mounting the tags.

NOTE
For production reasons some smart label tags may not meet the conditions of the final test. These tags are labelled by a black marking and can be disposed of.



NOTE
Carry out tests in real conditions in all cases.

5.7.1 Aligning the tags in the room

➤ In order to obtain the maximum read range, the tag antenna must be aligned parallel to the read/write head.

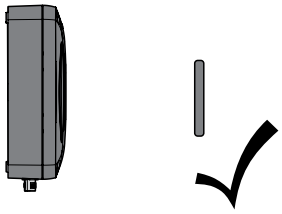


Fig. 31: Parallel alignment of tags

A vertical alignment of tag antenna and read/write head antenna reduces performance and results in a minimum read/write range.

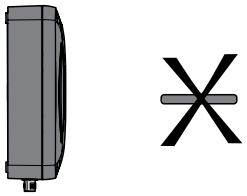


Fig. 32: Vertical alignment of tags

5.7.2 Mounting tags on metal

The following tags are suitable for direct mounting on metal:
- TW865-868-Q14L60-M-B110
- TW902-928-Q14L60-M-B110
- TW860-960-Q27L97-M-B112

Other types of tag must not be mounted directly on metal.
Liquids such as water and aqueous substances, ice, carbon have high RF attenuation in the UHF band. The electromagnetic energy is partly reflected and absorbed by liquids.
➤ Observe a minimum mounting distance of 5…20 cm between tag and conductive materials.
➤ Do not mount directly on containers with liquids.
➤ Mount the tags with non-metallic fixing elements on a non-conductive material such as plastic or wood.

5.7.3 Minimum distance between tags

➤ Observe a minimum distance of 50 mm between the tags.

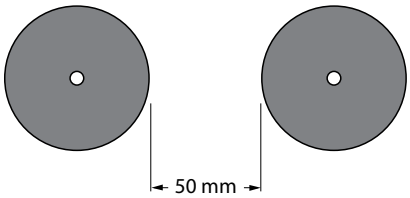


Fig. 33: Minimum distance between tags

Minimum distance of smart label tags between each other

➤ Observe the required minimum distances between the smart label tags.

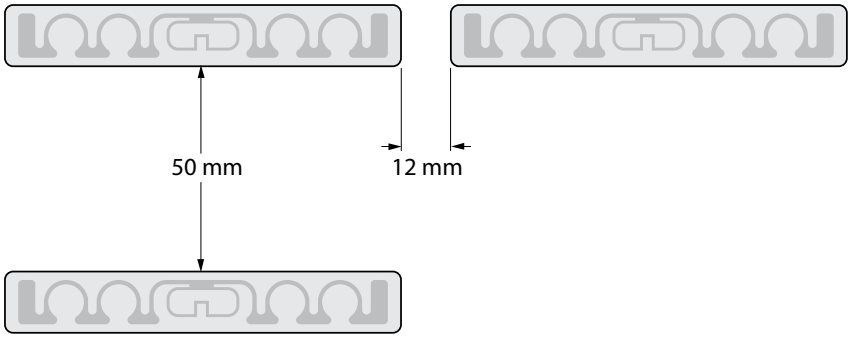


Fig. 34: Minimum distances between smart labels tags

5.7.4 Minimum distance of tags to conductive walls

Conductive walls and limits to the surrounding environment can shadow the radio field.
➤ Observe a minimum distance of 50...200 mm between the tags and conductive walls.

The effect of walls on the RF field is minimized in all cases if the polarization axis is vertical to the wall.

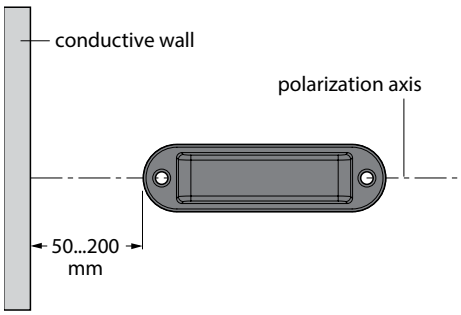


Fig. 35: Minimum distances of tags to a conductive wall, polarization axis vertical

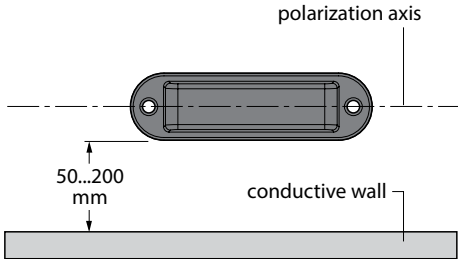


Fig. 36: Minimum distances of tags to a conductive wall, polarization axis parallel

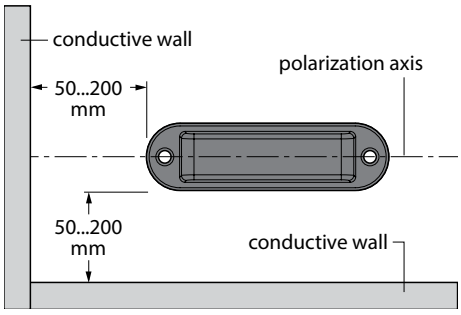


Fig. 37: Minimum distance of tags to two conductive walls

6 Installation

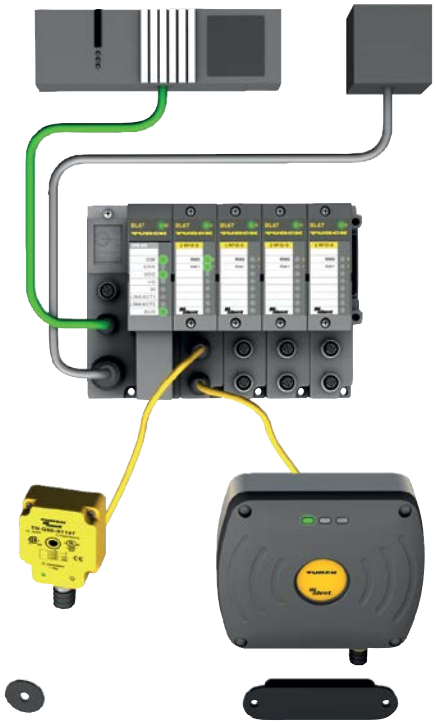


Fig. 38: Connection of BL ident® components

DANGER
Potentially explosive atmosphere
Risk of explosion through spark ignition
When used in explosion hazardous areas:
- ➤ Mounting, connection and parameter setting are only permissible if there is no potentially explosive atmosphere present.
- ➤ Observe the special device conditions stipulated by the Ex approval (see operating instructions of the particular device).

Observe the following procedure when connecting and installing the BL ident® components:
1. Connect the connection cables to the read/write heads to the base modules of the interface.
2. Mount the BL ident® interface at the required location.
3. Connect the connection cables to the read/write heads.
4. Connect the BL ident® interface to the fieldbus.
5. Connect the BL ident® interface to the power supply.

6.1 Connecting BL20 interfaces and read/write heads

NOTICE
Compensation currents may occur if potential equalization is poor or if long cables are used
Damage to the cables by exceeding the permissible shield current
➤ Connect the shield of the connection cable using a gateway shield terminal (BS3511/KLBUE4-31.5) on one side at the interface (see Fig. 39).

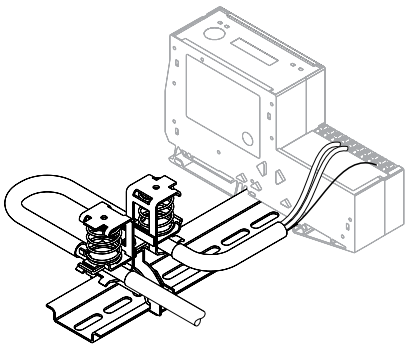


Fig. 39: Shield terminal (gateway)

6.1.1 Connecting HF read/write heads to BL20 interfaces

➤ Connect the open end of the connection cables to the base modules of the BL20 interface as shown in the wiring diagram below.
➤ Connect the M12 female connector of the connection cable to the read/write head.

Terminal layout with …/S2500 connection cable

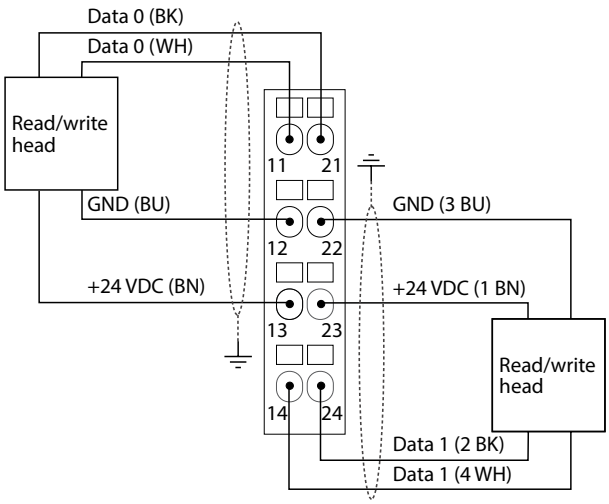


Fig. 40: Connection of HF read/write heads with …/S2500 connection cables

Terminal layout with …/S2501 connection cable

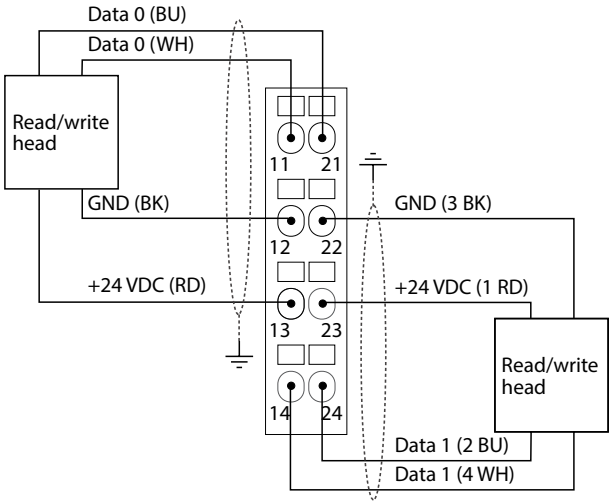


Fig. 41: Connection of HF read/write heads with …/S2501 connection cable

Terminal layout with …/S2503 connection cable

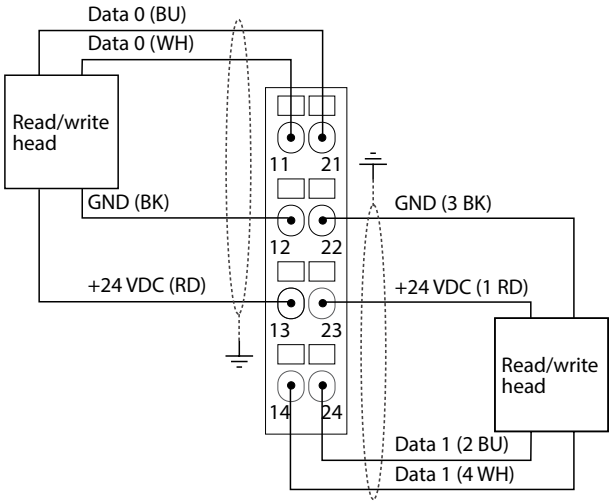


Fig. 42: Connection of HF read/write heads with …/S2503 connection cable

6.1.2 Connecting UHF read/write heads to BL20 interfaces

DANGER
Effect on electrically controlled medical devices such as pacemakers
Danger to life due to malfunction or failure of medical equipment
➤ Find out the extent to which the radiation strength of your medical devices is affected
➤ Find out the permissible distances from radiation sources for the devices you are using.
➤ Observe an additional distance from active radiation sources up to the maximum transmission distance of the radiation source.

NOTICE
Faulty connection of the power supply with UHF read/write heads
Damage to the BL20 interface
➤ Connect the connection cables as shown in the wiring diagrams.
➤ Connect the power supply separately.

Terminal layout with …/S2500 connection cable

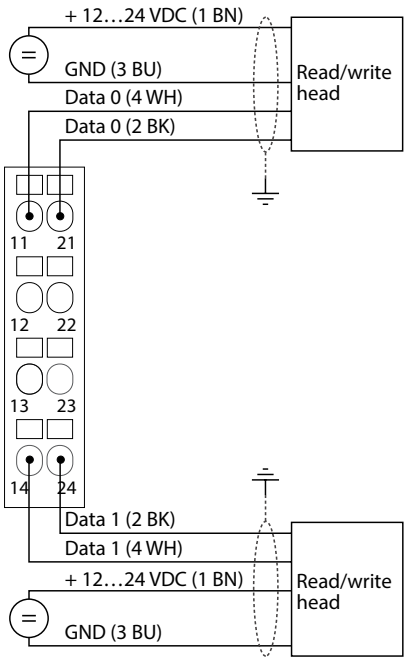


Fig. 43: Connection of UHF read/write heads with …/S2500 connection cable

Terminal layout with …/S2501 connection cable

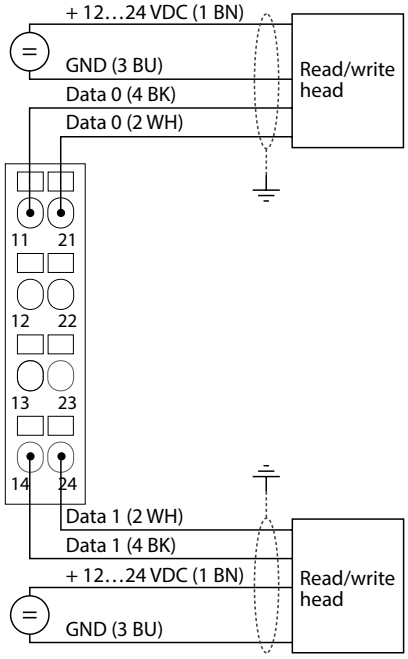


Fig. 44: Connection of UHF read/write heads with …/S2501 connection cable

Terminal layout with …/S2503 connection cable

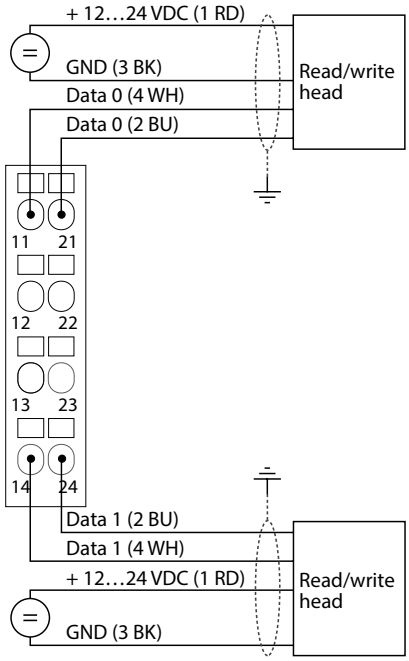
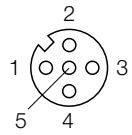


Fig. 45: Connection of UHF read/write heads with …/S2503 connection cable

Terminal layout for the connection cables

Wiring diagram	Contact	…/S2500 and FB…/S2500		…/S2503 (ECO)		…/S2501	
		Signal	Color assignment	Signal	Color assignment	Signal	Color assignment
	1	$V_{R-W\ head}$	Brown (BN)	$V_{R-W\ head}$	Red (RD)	$V_{R-W\ head}$	Brown (BN)
	2	Data	Black (BK)	Data	Blue (BU)	Data	White (WH)
	3	GND	Blue (BU)	GND	Black (BK)	GND	Blue (BU)
	4	Data	White (WH)	Data	White (WH)	Data	Black (BK)
	5	n. c.	–	n. c.	–	n. c.	–

6.1.3 Connecting BL20 interfaces to the fieldbus

The BL20 Standard interfaces are connected to the fieldbus via the RJ45 socket on the gateway.

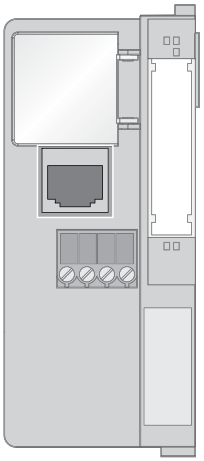


Fig. 46: BL20 gateway – RJ45 socket on the gateway

The BL20-ECO interfaces are connected to the fieldbus via an integrated RJ45 Ethernet switch (marked red)

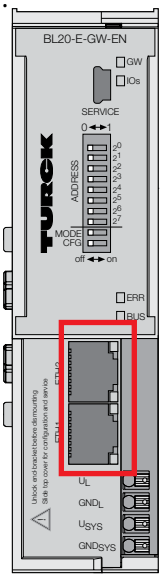


Fig. 47: BL20-ECO gateway – RJ45 Ethernet switch on the gateway

➤ Connect the gateway to the controller as per the following terminal layout with an RJ45 terminal using an Ethernet cable.

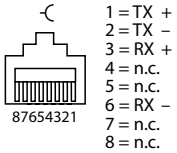


Fig. 48: BL20 gateway – Terminal layout of the RJ45 socket

➤ If the BL ident® interface is used as the first or last station in the fieldbus communication, connect a special bus plug connector with integrated terminating resistor. Otherwise communication malfunctions may occur.

6.1.4 Connecting BL20 interfaces to the power supply

The power supply of the BL20 interface consists of the system power supply and the field power supply.
The transformed system power supply is 5 VDC (from 24 VDC) and can supply a maximum of 1.5 A (Standard interfaces) and 0.5 A (ECO interfaces with a maximum number of connected RFID electronic modules). This voltage is transferred with a core pair of the 7-core module bus and is used to supply the module electronics on the module bus.
The field supply voltage is 24 VDC and can supply up to 10 A. This voltage is fed via a busbar through the interface. The fieldbus module electronics and the connected devices are fed from the field supply voltage.

Connecting BL20 Standard interfaces to the power supply

➤ Connect the power supply to the two connection terminals U_L and U_{SYS} (field power supply and system power supply) according to the following wiring diagram.
➤ Connect a voltage of 18…30 VDC (rated value 24 VDC) to the 2-pole screw terminals.

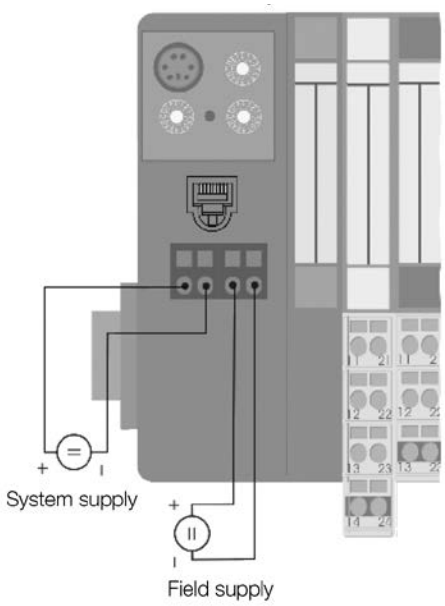


Fig. 49: BL20 gateway – Power supply terminal

Connecting BL20 ECO interfaces to the power supply

➤ Connect the power supply to the two connection terminals U_L and U_{SYS} (field power supply and system power supply) according to the following wiring diagram.
➤ Connect a voltage of 18…30 VDC (rated value 24 VDC) to the 2-pole cage clamp terminals.

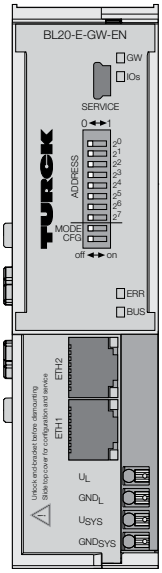


Fig. 50: BL20 ECO gateway – Power supply terminal

6.2 Connecting BL67 interfaces and read/write heads

6.2.1 Connecting read/write heads to BL67 interfaces

➤ Connect the M12 plug connector of the connection cables to the base modules of the BL67 interface as shown in the wiring diagram below.
➤ Connect the M12 female connector of the connection cable to the read/write head.

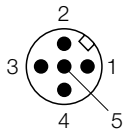
Wiring diagram	Contact	…/S2500 and FB…/S2500		…/S2503 (ECO)		…/S2501	
		Signal	Color assignment	Signal	Color assignment	Signal	Color assignment
	1	$V_{R-W\ head}$	Brown (BN)	$V_{R-W\ head}$	Red (RD)	$V_{R-W\ head}$	Brown (BN)
	2	GND	Blue (BU)	GND	Black (BK)	GND	Blue (BU)
	3	Data	Black (BK)	Data	Blue (BU)	Data	White (WH)
	4	Data	White (WH)	Data	White (WH)	Data	Black (BK)
	5	n. c.	–	n. c.	–	n. c.	–

Fig. 51: Connection cables – Terminal layout of plugs

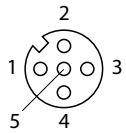
Wiring diagram	Contact	…/S2500 and FB…/S2500		…/S2503 (ECO)		…/S2501	
		Signal	Color assignment	Signal	Color assignment	Signal	Color assignment
	1	$V_{R-W\ head}$	Brown (BN)	$V_{R-W\ head}$	Red (RD)	$V_{R-W\ head}$	Brown (BN)
	2	Data	Black (BK)	GND	Blue (BU)	Data	White (WH)
	3	GND	Blue (BU)	GND	Black (BK)	GND	Blue (BU)
	4	Data	White (WH)	Data	White (WH)	Data	Black (BK)
	5	n. c.	–	n. c.	–	n. c.	–

Fig. 52: Connection cables – Terminal layout of female connector

6.2.2 Connecting BL67 interfaces to the fieldbus

Programmable gateways and Standard gateways before version VN03-00 are provided with a 4-pole M12 × 1 socket for connecting to Ethernet. Standard gateways from version VN 03-00 are provided with two identical Ethernet terminals.

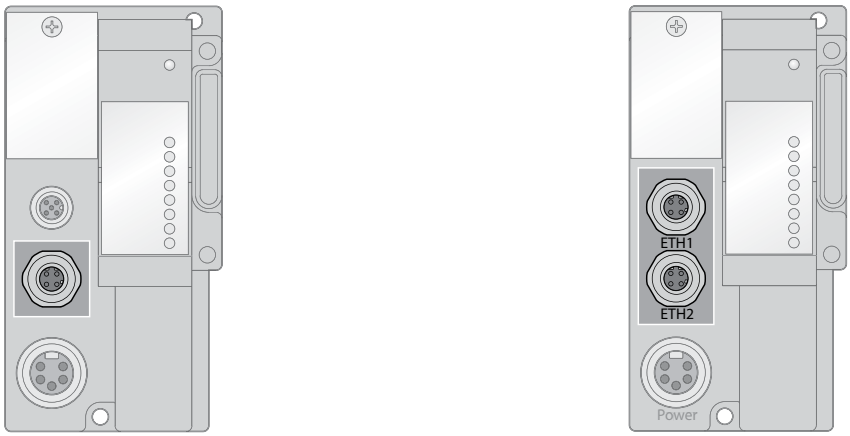


Fig. 53: Ethernet terminal: programmable gateway and standard gateway before version VN 03-00 (left), standard gateway from version VN 03-00 (right)

➤ Connect the M12 plug connector of the connection cable to the Ethernet terminal of the gateway.
➤ Connect the RJ45 plug of the connection cable to the controller.
➤ If the BL ident® interface module is used as the first or last station in the fieldbus communication, connect a special bus plug connector with integrated terminating resistor. Otherwise communication malfunctions may occur.

6.2.3 Connecting BL67 interfaces to the power supply

The power supply of the BL67 interface consists of the system power supply and the field power supply.
The transformed system supply voltage is 5 VDC (from 24 VDC) and can supply up to 1.5 A. This voltage is transferred with a core pair of the 7-core module bus and is used to supply the module electronics on the module bus.
The field supply voltage is 24 VDC and can supply up to 10 A. This voltage is fed via a busbar through the interface. The fieldbus module electronics and the connected devices are fed from the field supply voltage.

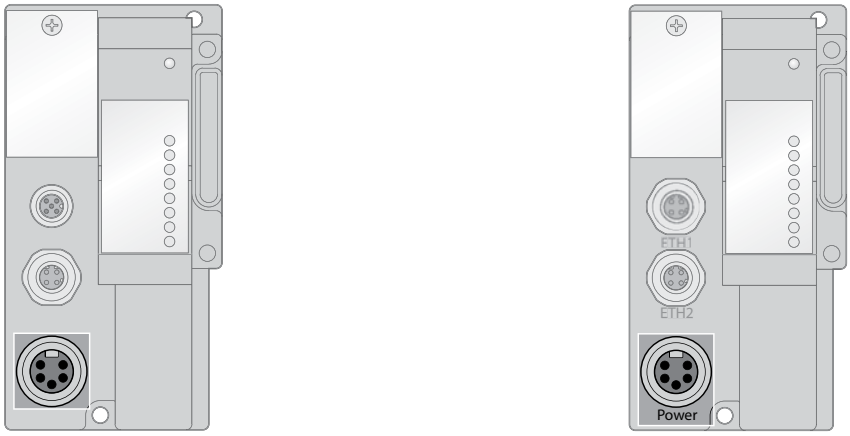


Fig. 54: Power supply connection: programmable gateway and Standard gateway before version VN 03-00 (left), Standard gateway from version VN 03-00

➤ Connect the power supply via the 7/8 " connector on the gateway as shown in .

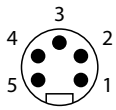
Wiring diagram	Contact	Color	7/8“	Designation
	1	black	GND	
	2	blue	GND	
	3	green/ yellow	PE	Protective earth
	4	brown	V_I (U_{MB})	Supply of the nominal voltage for inputs (sensor supply $V_{R/W\ head}$). This also provides the system supply
	5	white	V_0 (U_L)	Supply of the nominal voltage for outputs (with the BL67-2RFID module supplies the fieldbus microcontroller)

Fig. 55: 7/8" plug connector on the gateway

6.3 Connecting BL compact interfaces and read/write heads

6.3.1 Connecting read/write heads to BL compact interfaces

The BL compact interfaces are provided with two M12 socket connectors for connecting read/write heads.

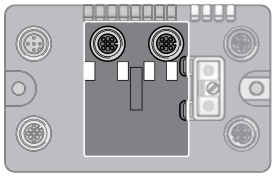


Fig. 56: BL compact – Connections for the read/write heads

➤ Connect the M12 plug connector of the connection cables to the BL compact interface as shown in the wiring diagram below.
➤ Connect the M12 female connector of the connection cable to the read/write head.

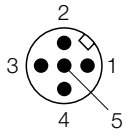
Wiring diagram	Contact	…/S2500 and FB…/S2500		…/S2503 (ECO)		…/S2501	
		Signal	Color assignment	Signal	Color assignment	Signal	Color assignment
	1	$V_{R-W\ head}$	Brown (BN)	$V_{R-W\ head}$	Red (RD)	$V_{R-W\ head}$	Brown (BN)
	2	GND	Blue (BU)	GND	Black (BK)	GND	Blue (BU)
	3	Data	Black (BK)	Data	Blue (BU)	Data	White (WH)
	4	Data	White (WH)	Data	White (WH)	Data	Black (BK)
	5	n. c.	–	n. c.	–	n. c.	–

Fig. 57: Connection cables – Terminal layout of plugs

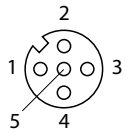
Wiring diagram	Contact	…/S2500 and FB…/S2500		…/S2503 (ECO)		…/S2501	
		Signal	Color assignment	Signal	Color assignment	Signal	Color assignment
	1	$V_{R-W\ head}$	Brown (BN)	$V_{R-W\ head}$	Red (RD)	$V_{R-W\ head}$	Brown (BN)
	2	Data	Black (BK)	GND	Blue (BU)	Data	White (WH)
	3	GND	Blue (BU)	GND	Black (BK)	GND	Blue (BU)
	4	Data	White (WH)	Data	White (WH)	Data	Black (BK)
	5	n. c.	–	n. c.	–	n. c.	–

Fig. 58: Connection cables – Terminal layout of female connector

6.3.2 Connecting BL compact interfaces to the fieldbus

The BL compact interfaces are provided with two M12 socket connectors for connecting to the Ethernet.

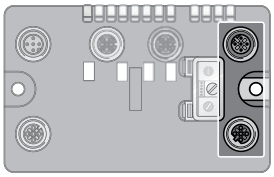


Fig. 59: Ethernet terminal: BL compact interfaces

➤ Connect the M12 plug connector of the connection cable to the Ethernet terminal of the interface.
➤ Connect the RJ45 plug of the connection cable to the controller.
➤ If the BL ident® interface is used as the first or last station in the fieldbus communication, connect a special bus plug connector with integrated terminating resistor. Otherwise communication malfunctions may occur.

6.3.3 Connecting BL compact interfaces to the power supply

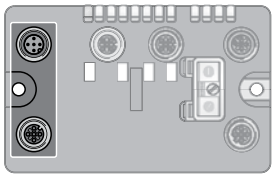


Fig. 60: Power supply connection: BL compact interfaces

➤ Connect the power supply via the M12 plug connectors on the interface as shown in wiring diagrams below.

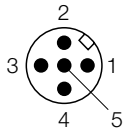
Wiring diagram	Contact	M12	Designation
	1	V_I	Supply of the nominal voltage for inputs (sensor supply $V_{R/W\ head}$)
	2	V_0	Supply of the nominal voltage for outputs
	3	GND	
	4	GND	
	5	PE	Protective earth

Fig. 61: Terminal layout of the M12 plug connector

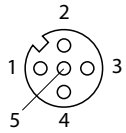
Wiring diagram	Contact	M12	Designation
	1	V_I	Supply of the nominal voltage for inputs (sensor supply $V_{R/W\ head}$)
	2	V_0	Supply of the nominal voltage for outputs
	3	GND	
	4	GND	
	5	PE	Protective earth

Fig. 62: Terminal layout of the M12 socket connector

7 Commissioning

7.1 Connecting a BL ident® interface with a PC

The PACTware™ software enables access to the BL ident® interfaces via a host PC. The following are some of the functions that can be executed:

- Addressing gateways
- Creating a station report
- Interface parameterization

7.1.1 PACTware™ – Creating a project

➤ Connect the gateway to a host PC via the Ethernet interface.
➤ Launch PACTware™.
➤ Right-click Host PC.
➤ Choose Add Device

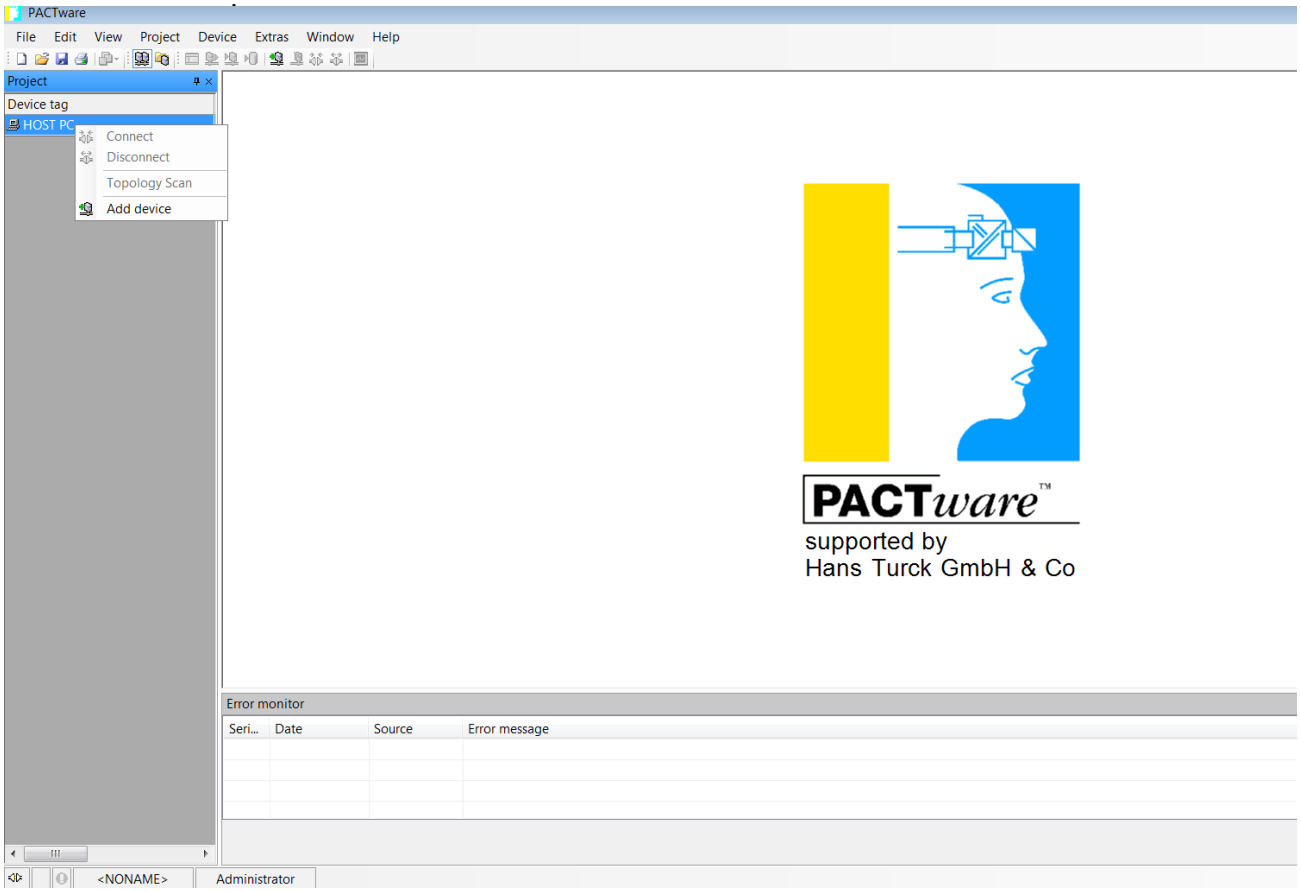


Fig. 63: Adding a device

➤ Add BL Service Ethernet to the project tree.

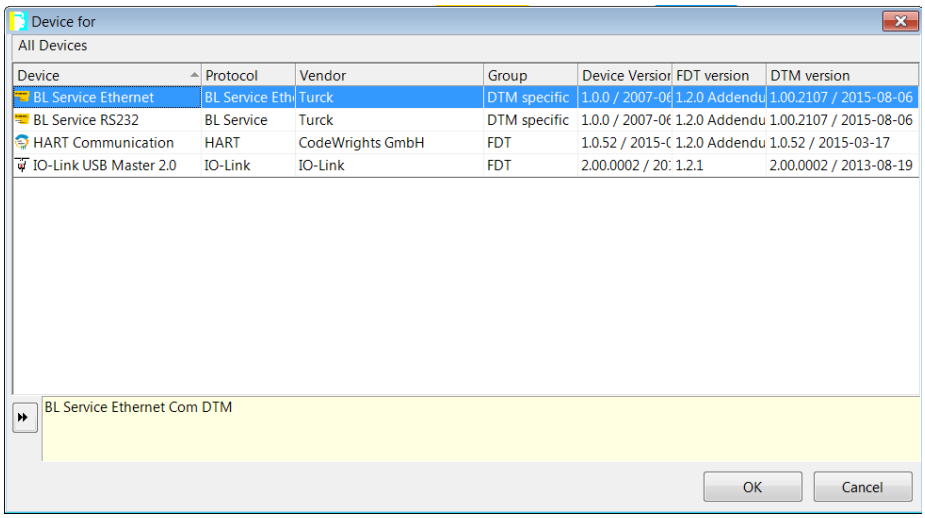


Fig. 64: Adding BL Service Ethernet to the project tree

➤ Right-click the device to be added.
➤ Open the Bus Address Management.

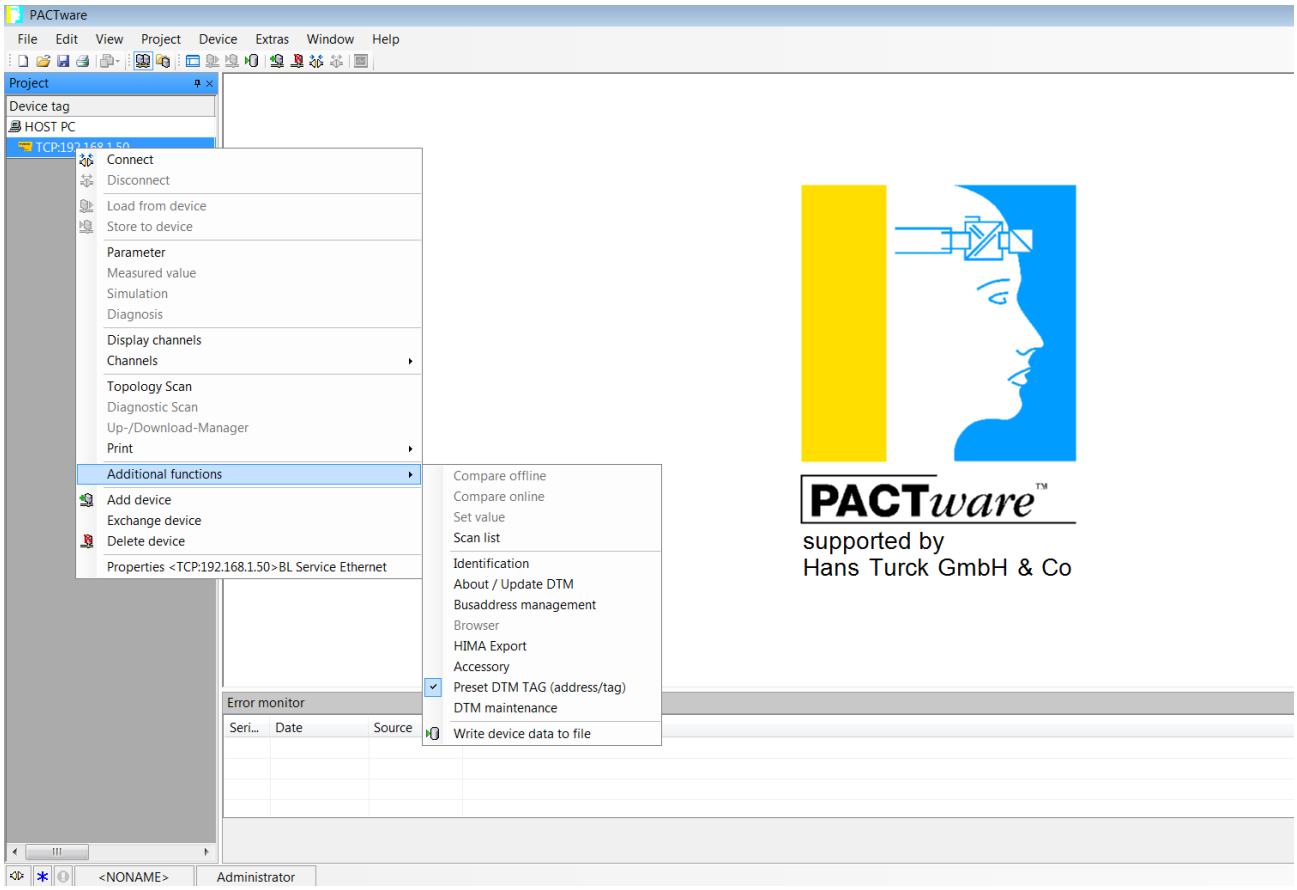


Fig. 65: Opening Bus Address Management

➤ Click the following icon to search for connected gateways

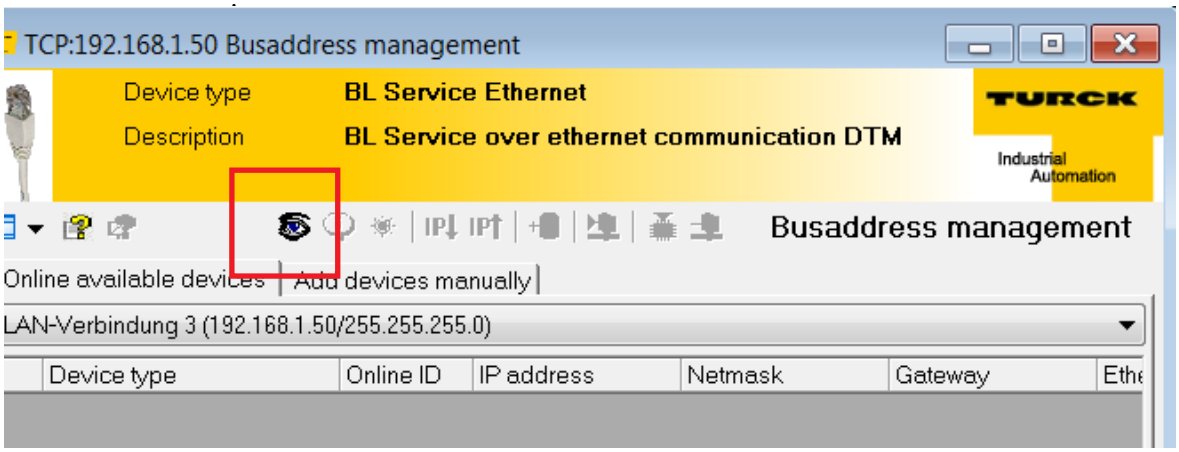


Fig. 66: Search function in the Bus address management

➤ Change the network settings of the gateway if necessary.
➤ Click Add device/DTM to the project

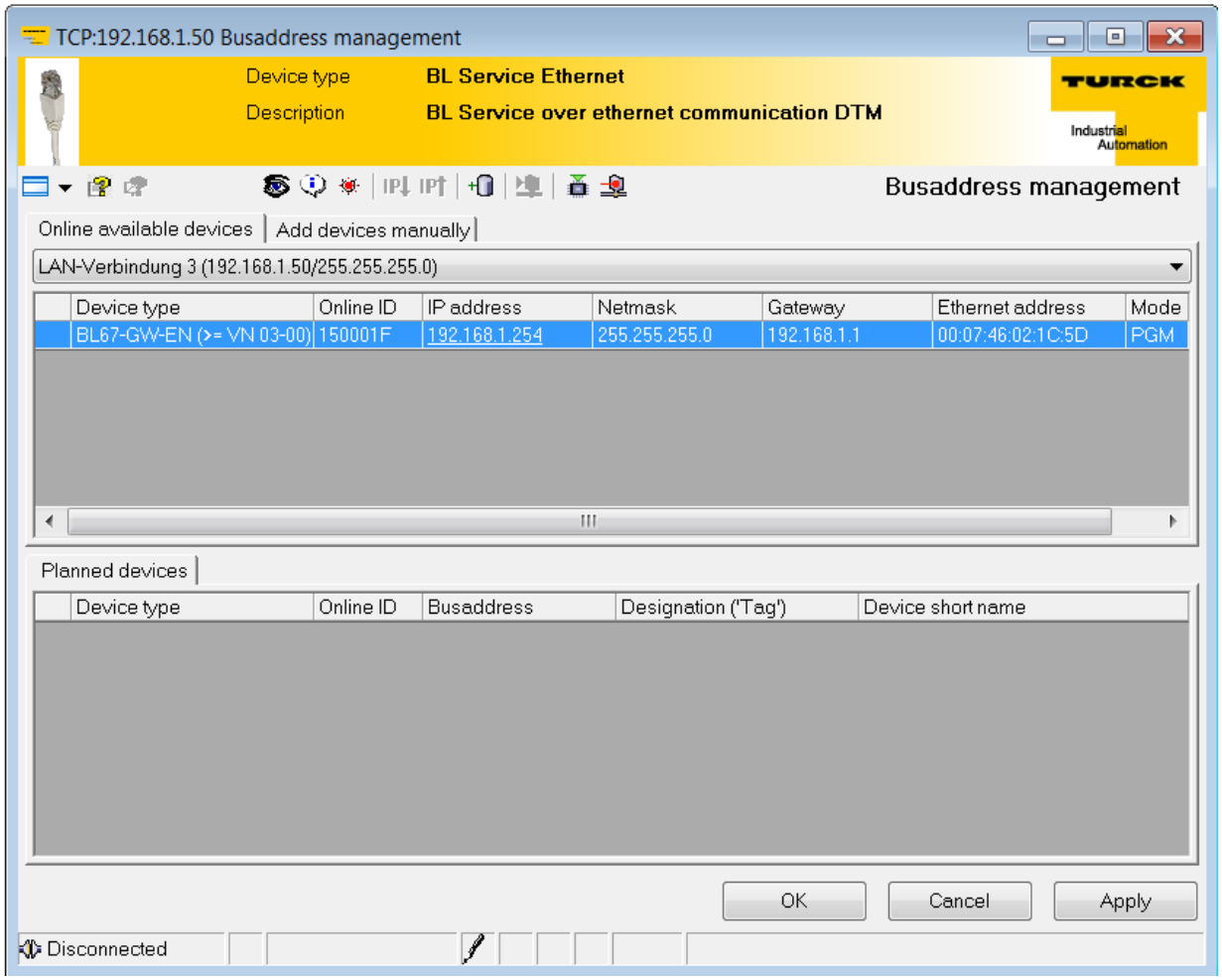


Fig. 67: Add device/DTM to project

➤ Confirm the subsequent prompt with OK.

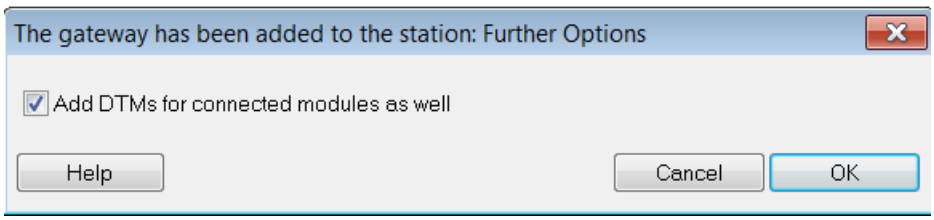
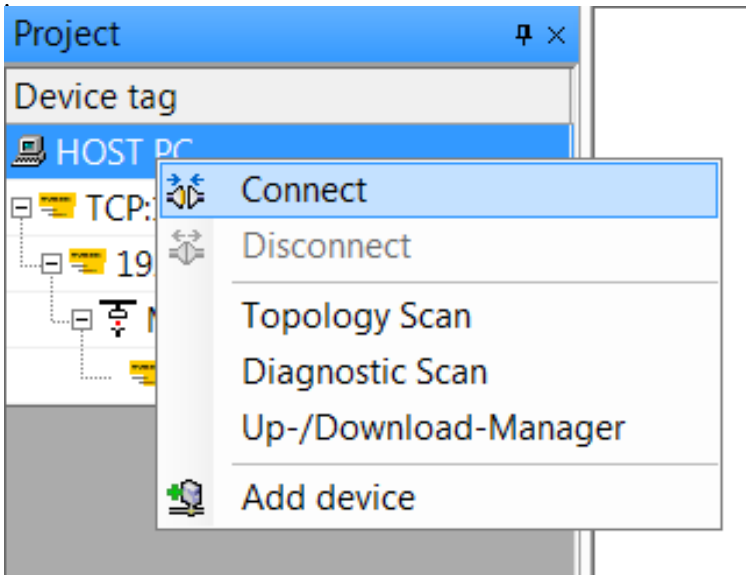


Fig. 68: Adding DTMs for the RFID electronic modules

7.1.2 Connecting a BL ident® interface to the host PC

➤ Right-click Host PC in the project tree



Connecting a BL ident® interface to the host PC

7.1.3 Creating a station report

➤ Right-click the gateway in the project tree.
➤ Choose Additional functions > Station report

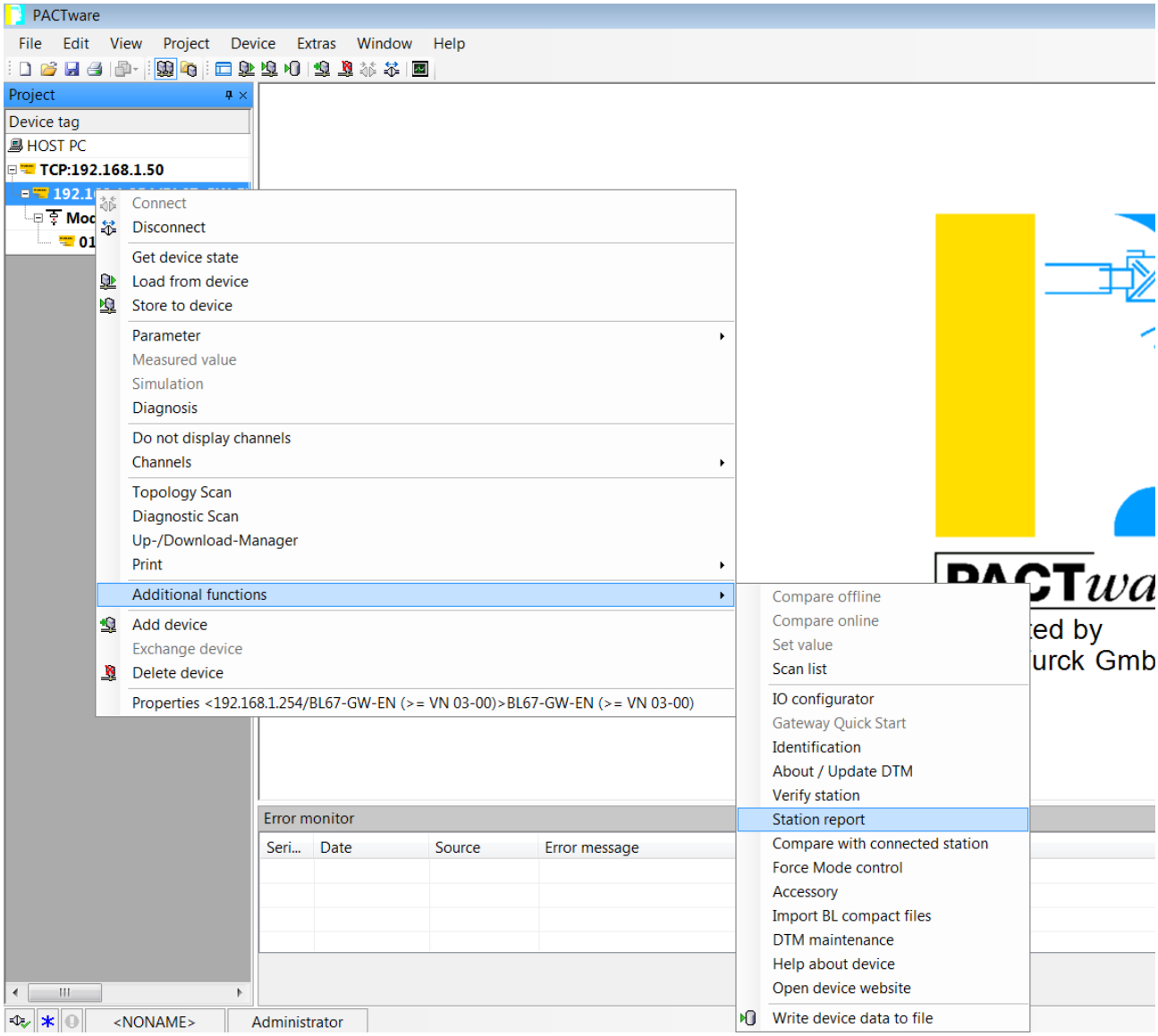


Fig. 69: Creating a station report

➤ Select the data the station report is to contain (example: only fieldbus report).
➤ Confirm the selection with OK.

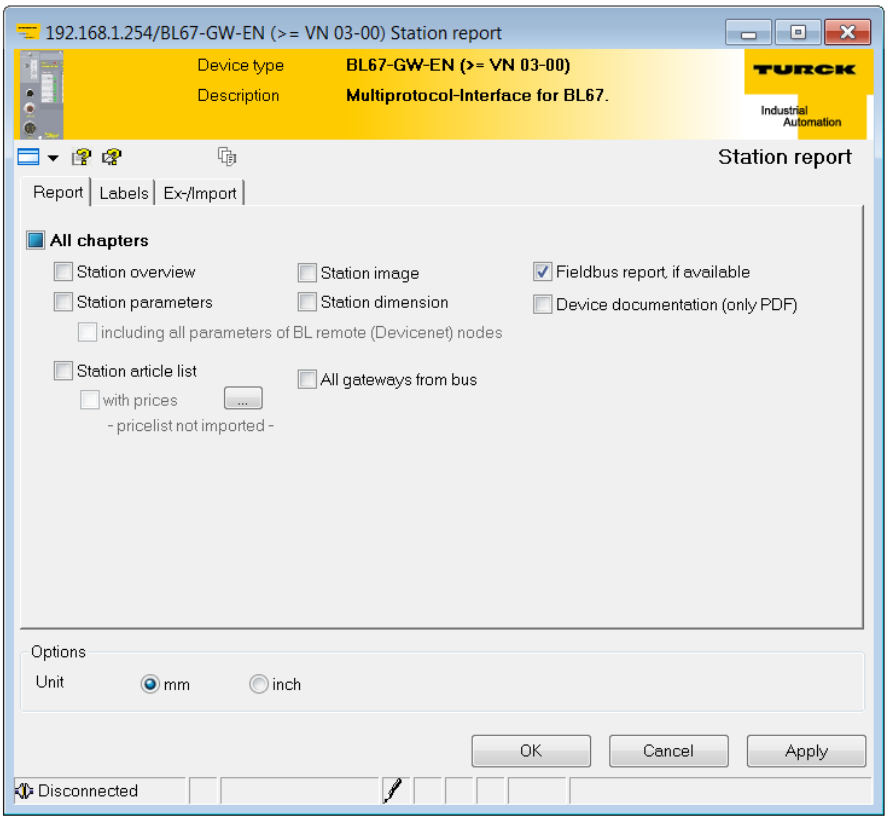


Fig. 70: Selecting data for the station report

7.2 Addressing gateways

The addressing of the gateway determines the position of the BL ident® interface as a network station. The IP address is based on the IPv4 standard. IPv4 addresses consist of four 8-bit number blocks (1 byte). This provides a value range per number block of 0…255.
Example of an IPv4 address: 192.168.1.254

7.2.1 Addressing Standard gateways (BL20 and BL67)

The BL20 Standard gateways and the BL67 gateways are provided with three decimal rotary coding switches for setting the IP address. The rotary coding switches are located together with the Service interface under a cover.

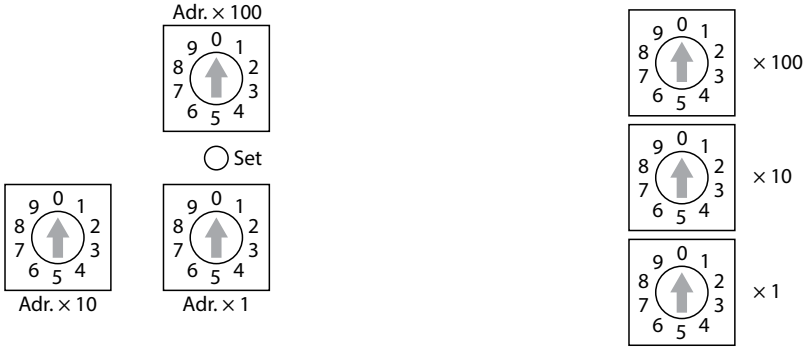


Fig. 71: Rotary coding switches on the BL20 gateway (left) and on the BL67 gateway (right)

LED indication during addressing

LED indication of BL20 gateways and BL67 gateways before VN03-00	LED indication of BL67 gateways from VN03-00	Meaning
"MS" LED flashing red	"BUS" LED flashing red	Gateway ready for addressing
"MS" LED flashing green	"BUS" LED flashing green	Addressing completed

BL20 Standard gateways and BL67 gateways – Addressing options

The IP address of the Standard gateways can be set in different ways. The following addressing options can be selected via the three rotary coding switches on the gateway:

Setting option	Rotary coding switch	Meaning
Default address	000	IP address: 192.168.1.254 Subnet mask: 255.255.255.0 Default gateway: 192.168.1.001
Rotary mode	1…254	In Rotary mode, the last byte of the IP address can be set manually on the gateway. The other network settings can be stored retentively in the gateway memory and cannot be changed in Rotary mode. Addresses from 1...254 can be set. The addresses 0 and 255 are used for broadcast messages in the subnet.
BootP mode	300	In BootP mode, the complete IP address is assigned automatically by a BootP server in the network. The subnet mask assigned by the BootP server and the default gateway address are stored retentively in the gateway memory.
DHCP mode	400	In DHCP mode, the complete IP address is assigned automatically by a DHCP server in the network. The subnet mask assigned by the DHCP server and the default gateway address are stored retentively in the gateway memory. DHCP supports three types of IP address assignment: Automatic address assignment: The DHCP server assigns a permanent IP address to the client. Dynamic address assignment: The IP address assigned by the server is always only reserved for a specific period. After this time has elapsed or after the explicit release by a client, the IP address is reassigned. Manual address assignment: A network administrator assigns an IP address to the client. DHCP is only used in this case to transfer the assigned IP address to the client.
PGM mode	500	In PGM mode, the complete IP address is assigned manually via the PACTware™ software or via a web server (gateways from version VN 03-00). In PGM mode, the set IP address and the subnet mask are stored in the gateway memory. All network settings (IP address, subnet mask, default gateway) are accepted by the internal EEPROM of the module.
PGM-DHCP mode	600	In PGM-DHCP mode, the gateway transmits DHCP requests until it is assigned a fixed IP address. The DHCP client is automatically deactivated if an IP address is assigned to the gateway via the DTM or a web server.

Addressing a Standard gateway in Rotary mode

➤ Open the cover above the rotary coding switches.
➤ Set the last byte of the required IP address manually via the rotary coding switches. Each switch represents one digit in the last byte of the IP address.

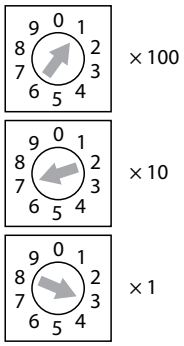


Fig. 72: Example: Setting of the rotary coding switches for the IP address 192.168.1.173 (BL67 gateway)

➤ Carry out a voltage reset.
➥ The set number block is accepted as the last byte of the IP address. The other bytes of the IP address as well as the subnet mask are automatically accepted by the internal non-volatile memory of the gateway.
➤ NOTICE! IP20 (BL20) or IP67 (BL67) protection is not provided when the cover is opened over the rotary coding switches. Device damage through penetrating foreign objects or liquids is possible. Close the cover tightly above the rotary coding switches.

NOTE
The number block set in Rotary mode, is not accepted in the gateway memory.

Addressing a Standard gateway in BootP mode
➤ Open the cover above the rotary coding switches.
➤ Set the rotary coding switches to 300.

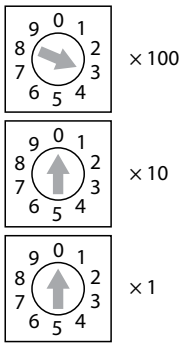


Fig. 73: Setting of the rotary coding switches for addressing in BootP mode (BL67 gateway)

➤ Carry out a voltage reset.
➤ NOTICE! IP20 (BL20) or IP67 (BL67) protection is not provided when the cover is opened over the rotary coding switches. Device damage through penetrating foreign objects or liquids is possible. Close the cover tightly above the rotary coding switches.

Addressing a Standard gateway in DHCP mode

➤ Open the cover above the rotary coding switches.

➤ Set the rotary coding switches to 400.

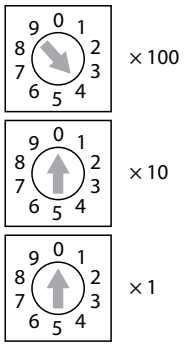


Fig. 74: Setting of the rotary coding switches for addressing in DHCP mode (BL67 gateway)

➤ Carry out a voltage reset.
➤ NOTICE! IP20 (BL20) or IP67 (BL67) protection is not provided when the cover is opened over the rotary coding switches. Device damage through penetrating foreign objects or liquids is possible. Close the cover tightly above the rotary coding switches.

Addressing a gateway in PGM mode

➤ Open the cover above the rotary coding switches.
➤ Set the rotary coding switches to 500.

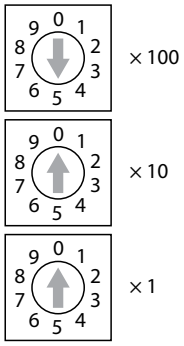


Fig. 75: Setting of the rotary coding switches for addressing in PGM mode (BL67 gateway)

➤ Carry out a voltage reset.
➤ NOTICE! IP20 (BL20) or IP67 (BL67) protection is not provided when the cover is opened over the rotary coding switches. Device damage through penetrating foreign objects or liquids is possible. Close the cover tightly above the rotary coding switches.
➤ Address the gateway via the DTM or a web server.

Addressing the gateway in PGM-DHCP mode

➤ Open the cover above the rotary coding switches.
➤ Set the rotary coding switches to 600.

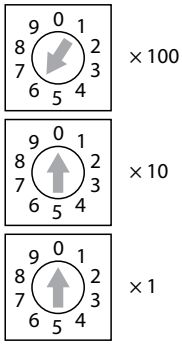


Fig. 76: Setting of the rotary coding switches for addressing in PGM-DHCP mode (BL67 gateway)

➤ Carry out a voltage reset.
➤ NOTICE! IP20 (BL20) or IP67 (BL67) protection is not provided when the cover is opened over the rotary coding switches. Device damage through penetrating foreign objects or liquids is possible. Close the cover tightly above the rotary coding switches.
➤ Optional: Address the gateway via the DTM or a web server.

7.2.2 Addressing ECO gateways (BL20)

The BL20 ECO gateways via DIP switches for setting the IP address. The address switches 2^0… 2^7 allow the setting of the last byte of the IP address as a binary number.

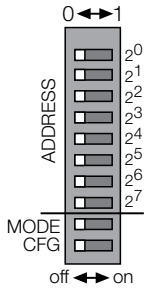


Fig. 77: DIP switches on the BL20-ECO gateway

The DIP switches have the following meaning:

Designation	Function
2^0…2^7	Switches for setting the last block of the gateway IP or for selecting the addressing mode
MODE	Switch for switching between manual addressing and software or server-based addressing
CFG	Switch for accepting the actual configuration. The gateway accepts the actual arrangement of modules in the non-volatile internal memory.

LED indication during addressing

LED indication of BL20 gateways and BL67 gateways before VN03-00	LED indication of BL20-ECO gateways	Meaning
"MS" LED flashing red	"BUS" LED flashing red/green	Gateway ready for addressing
"MS" LED flashing green	"BUS" LED flashing green	Addressing completed

BL20-ECO gateways – Addressing options

The IP address of the ECO gateways can be set in different ways. The following addressing options can be selected via the DIP switches on the gateway:

Setting option	DIP switches			Meaning
	MODE	CFG	$2^0 \ldots 2^7$	
Default address	off	off	0	IP address: 192.168.1.254 Subnet mask: 255.255.255.0 Default gateway: 192.168.1.001
Manual setting via DIP switches	off	off	1…254	The last block of the IP address can be set manually via DIP switches. The other network settings can be stored retentively in the gateway memory and cannot be changed manually via the DIP switches. Addresses from 1...254 can be set. The addresses 0 and 255 are used for broadcast messages in the subnet.
DHCP mode	on	off	1	In DHCP mode, the complete IP address is assigned automatically by a DHCP server in the network. The subnet mask assigned by the DHCP server and the default gateway address are stored retentively in the gateway memory. DHCP supports three types of IP address assignment: Automatic address assignment: The DHCP server assigns a permanent IP address to the client. Dynamic address assignment: The IP address assigned by the server is always only reserved for a specific period. After this time has elapsed or after the explicit release by a client, the IP address is reassigned. Manual address assignment: A network administrator assigns an IP address to the client. DHCP is only used in this case to transfer the assigned IP address to the client.
BootP mode	on	off	2	In BootP mode, the complete IP address is assigned automatically by a BootP server in the network. The subnet mask assigned by the BootP server and the default gateway address are stored retentively in the gateway memory.
PGM mode	on	off	4	In PGM mode, the complete IP address is assigned manually via the PACTware™ software or via a web server (gateways from version VN 03-00). In PGM mode, the set IP address and the subnet mask are stored in the gateway memory. All network settings (IP address, subnet mask, default gateway) are accepted by the internal EEPROM of the module.
PGM-DHCP mode	on	off	8	In PGM-DHCP mode, the gateway transmits DHCP requests until it is assigned a fixed IP address. The DHCP client is automatically deactivated if an IP address is assigned to the gateway via the DTM or a web server.
reserved	–	off	16	
F_Reset function	on	off	32	Resets the gateway to the factory setting.

Addressing the ECO gateway manually via DIP switches

➤ To access the DIP switches pull up the cover out of the housing.
➤ Set the last byte of the required IP address manually via the DIP switches.

Example: The number $173_{dec.}$ corresponds to $10101101_{bin.}$. The corresponding switch position from 2^7 to 2^0 is 10101101.

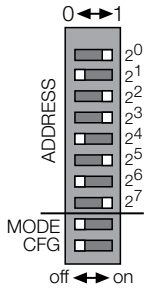


Fig. 78: Example: Setting of the DIP switches for the IP address 192.168.1.173 (BL20-ECO gateway)

➤ Carry out a voltage reset.
➥ The set number block is accepted as the last byte of the IP address. The other bytes of the IP address as well as the subnet mask are automatically accepted by the internal non-volatile memory of the gateway.

NOTE
The number block set manually via the DIP switches is not accepted in the gateway memory.

Addressing an ECO gateway in BootP mode

➤ To access the DIP switches pull up the cover out of the housing.
➤ Set the DIP switch 2^1 and MODE switch to 1.

Fig. 79: Setting of the DIP switches for the IP addressing in BootP mode (BL20-ECO gateway)

➤ Carry out a voltage reset.

Addressing the ECO gateway in DHCP mode

➤ To access the DIP switches pull up the cover out of the housing.
➤ Set the DIP switch 2^0 and MODE switch to 1.

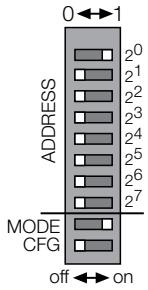


Fig. 80: Setting of the DIP switches for addressing in DHCP mode (BL20-ECO gateway)

➤ Carry out a voltage reset.

Addressing the ECO gateway in PGM mode

➤ To access the DIP switches pull up the cover out of the housing.
➤ Set the DIP switch 2^2 and MODE switch to 1.

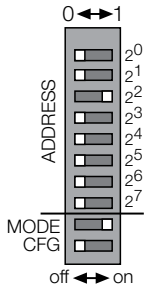


Fig. 81: Setting of the DIP switches for addressing in PGM mode (BL20 ECO gateway)

➤ Carry out a voltage reset.
➤ Address the gateway via the DTM or a web server.

Addressing the ECO gateway in PGM-DHCP mode

➤ Open the cover above the rotary coding switches.
➤ Set the DIP switch 2^3 and MODE switch to 1.

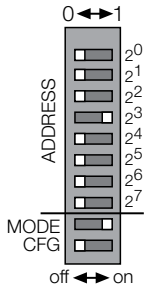


Fig. 82: Setting of the DIP switches for addressing in PGM DHCP mode (BL20 ECO gateway)

➤ Carry out a voltage reset.
➤ Optional: Address the gateway via the DTM or a web server.

7.2.3 Addressing BL compact interfaces

The BL20 compact interfaces are provided with two decimal rotary coding switches for setting the IP address. Up to 99 addresses (01...99) can be set with the rotary coding switches. The fieldbus address 00 must not be assigned. The rotary coding switches are located together with the Service interface under a cover.

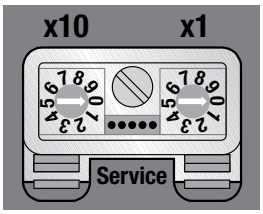


Fig. 83: Rotary coding switches on the BL compact interface

LED indication during addressing

LED indication	Meaning
"BUS" LED flashing red	Gateway ready for addressing
"BUS" LED flashing green	Addressing completed

BL compact interfaces – Addressing options

The IP address of the interfaces can be set in different ways. The following addressing options can be selected via the two rotary coding switches on the interface:

Setting option	Rotary coding switch	Meaning
Default address	00	IP address: 192.168.1.254 Subnet mask: 255.255.255.0 Default gateway: 192.168.1.001
Rotary mode	1…92	In Rotary mode, the last byte of the IP address can be set manually on the gateway. The other network settings can be stored retentively in the gateway memory and cannot be changed in Rotary mode. Addresses 1…92 can be set.
BootP mode	93	In BootP mode, the complete IP address is assigned automatically by a BootP server in the network. The subnet mask assigned by the BootP server and the default gateway address are stored retentively in the gateway memory.
DHCP mode	94	In DHCP mode, the complete IP address is assigned automatically by a DHCP server in the network. The subnet mask assigned by the DHCP server and the default gateway address are stored retentively in the gateway memory. DHCP supports three types of IP address assignment: Automatic address assignment: The DHCP server assigns a permanent IP address to the client. Dynamic address assignment: The IP address assigned by the server is always only reserved for a specific period. After this time has elapsed or after the explicit release by a client, the IP address is reassigned. Manual address assignment: A network administrator assigns an IP address to the client. DHCP is only used in this case to transfer the assigned IP address to the client.

Setting option	Rotary coding switch	Meaning
PGM mode	95	In PGM mode, the complete IP address is assigned manually via the PACT-ware™ software or via a web server. In PGM mode, the set IP address and the subnet mask are stored in the gateway memory. All network settings (IP address, subnet mask, default gateway) are accepted by the internal EEPROM of the module.
PGM-DHCP mode	96	In PGM-DHCP mode, the gateway transmits DHCP requests until it is assigned a fixed IP address. The DHCP client is automatically deactivated if an IP address is assigned to the gateway via the DTM or a web server.
	97…99	Vendor specific

Addressing an interface in Rotary mode

➤ Open the cover above the rotary coding switches.
➤ Set the last byte of the required IP address manually via the rotary coding switches. Each switch represents one digit in the last byte of the IP address.

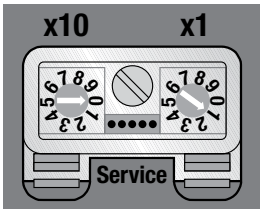


Fig. 84: Example: Setting of the rotary coding switches for the IP address 192.168.1.1

➤ Carry out a voltage reset.
➥ The set number block is accepted as the last byte of the IP address. The other bytes of the IP address as well as the subnet mask are automatically accepted by the internal non-volatile memory of the gateway.
➤ NOTICE! IP67 protection is not provided when the cover is opened over the rotary coding switches. Device damage through penetrating foreign objects or liquids is possible. Close the cover tightly above the rotary coding switches.

NOTE
The number block set in Rotary mode, is not accepted in the memory interface.

Addressing an interface in BootP mode

➤ Open the cover above the rotary coding switches.
➤ Set the rotary coding switches to 93.

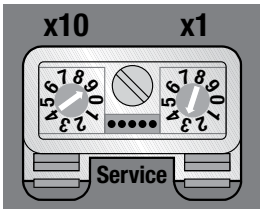


Fig. 85: Setting of the rotary coding switches for addressing in BootP mode

➤ Carry out a voltage reset.
➤ NOTICE! IP67 protection is not provided when the cover is opened over the rotary coding switches. Device damage through penetrating foreign objects or liquids is possible. Close the cover tightly above the rotary coding switches.

Addressing an interface in DHCP mode

➤ Open the cover above the rotary coding switches.
➤ Set the rotary coding switches to 94.

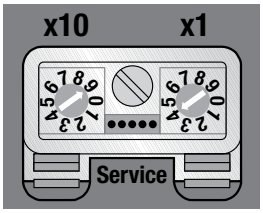


Fig. 86: Setting of the rotary coding switches for addressing in DHCP mode

➤ Carry out a voltage reset.
➤ NOTICE! IP67 protection is not provided when the cover is opened over the rotary coding switches. Device damage through penetrating foreign objects or liquids is possible. Close the cover tightly above the rotary coding switches.

Addressing an interface in PGM mode

➤ Open the cover above the rotary coding switches.
➤ Set the rotary coding switches to 95.

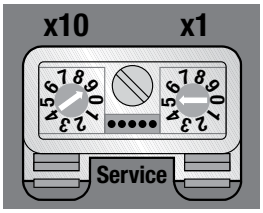


Fig. 87: Setting of the rotary coding switches for addressing in PGM mode

➤ Carry out a voltage reset.
➤ NOTICE! IP67 protection is not provided when the cover is opened over the rotary coding switches. Device damage through penetrating foreign objects or liquids is possible. Close the cover tightly above the rotary coding switches.
➤ Address the gateway via the DTM or a web server.

Addressing the gateway in PGM-DHCP mode

➤ Open the cover above the rotary coding switches.
➤ Set the rotary coding switches to 96.

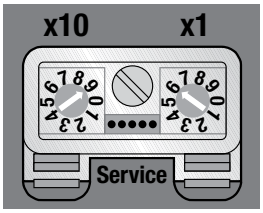


Fig. 88: Setting of the rotary coding switches for addressing in PGM-DHCP mode

➤ Carry out a voltage reset.
➤ NOTICE! IP67 protection is not provided when the cover is opened over the rotary coding switches. Device damage through penetrating foreign objects or liquids is possible. Close the cover tightly above the rotary coding switches.
➤ Optional: Address the gateway via the DTM or a web server.

7.2.4 Addressing gateways with the DTM (PGM mode and PGM-DHCP mode)

➤ Connect the gateway to a host PC via the Ethernet interface.
➤ Launch PACTware™.
➤ Right-click Host PC.
➤ Choose Add Device

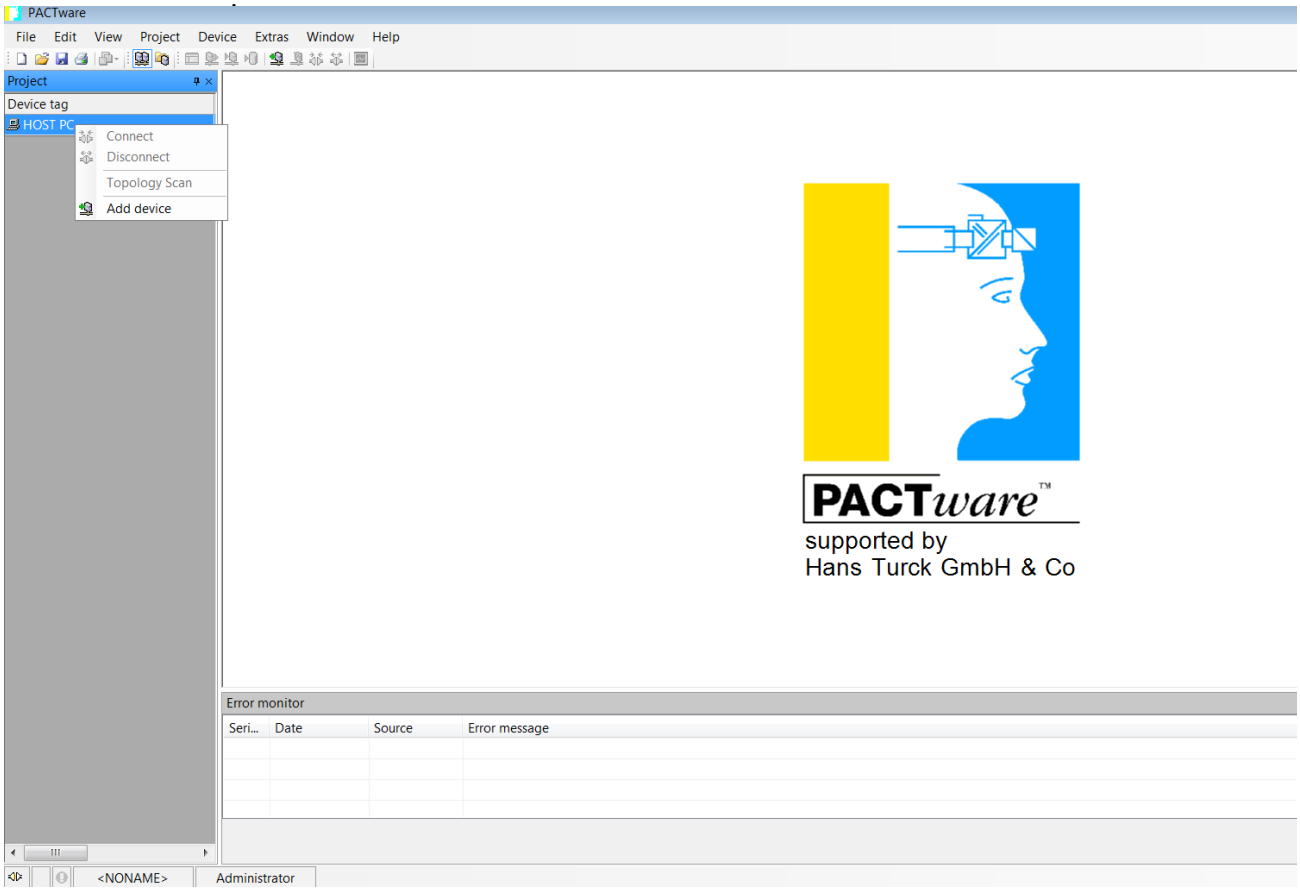
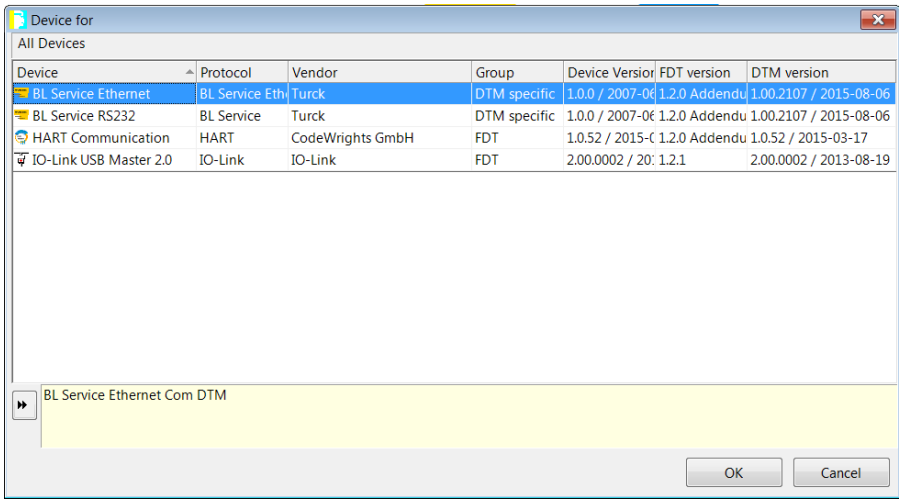


Fig. 89: PACTware™ – Adding a device

➤ Add BL Service Ethernet to the project tree.



➤ Right-click the device to be added.
➤ Open the Bus Address Management.

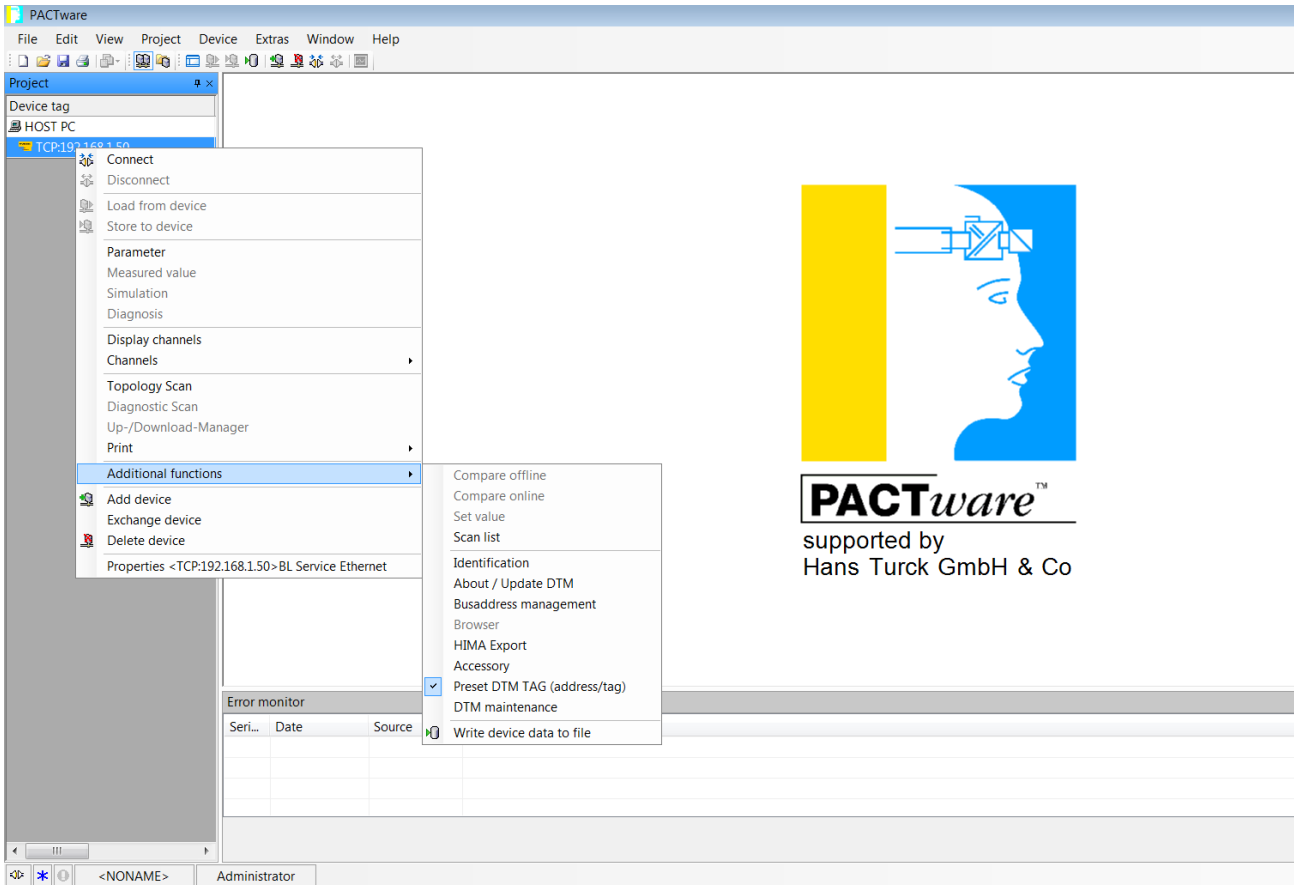


Fig. 91: Opening Bus Address Management

➤ Click the following icon (marked in red) to search for connected gateways

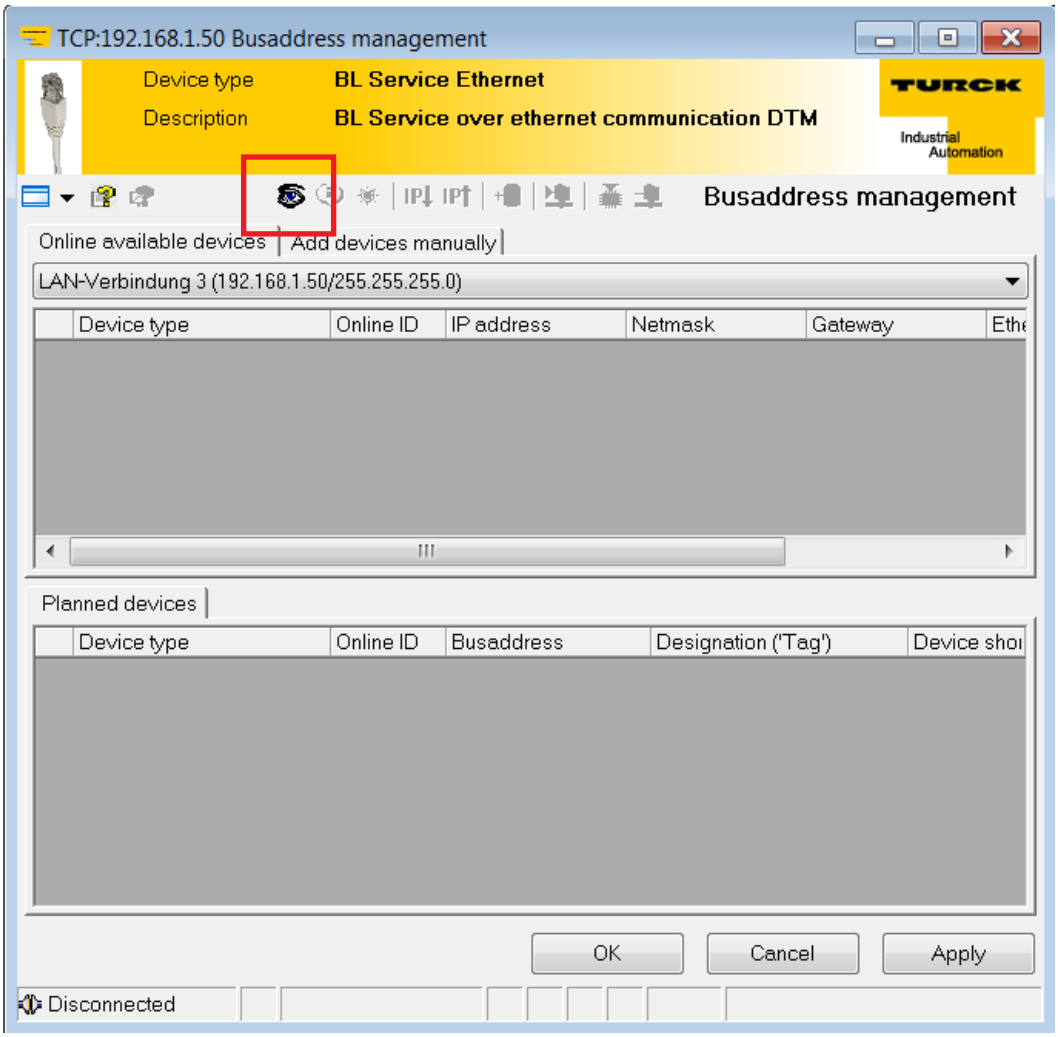


Fig. 92: Search function in the Bus address management

➤ Change the required network settings of the gateway if necessary.
➤ Confirm with Accept

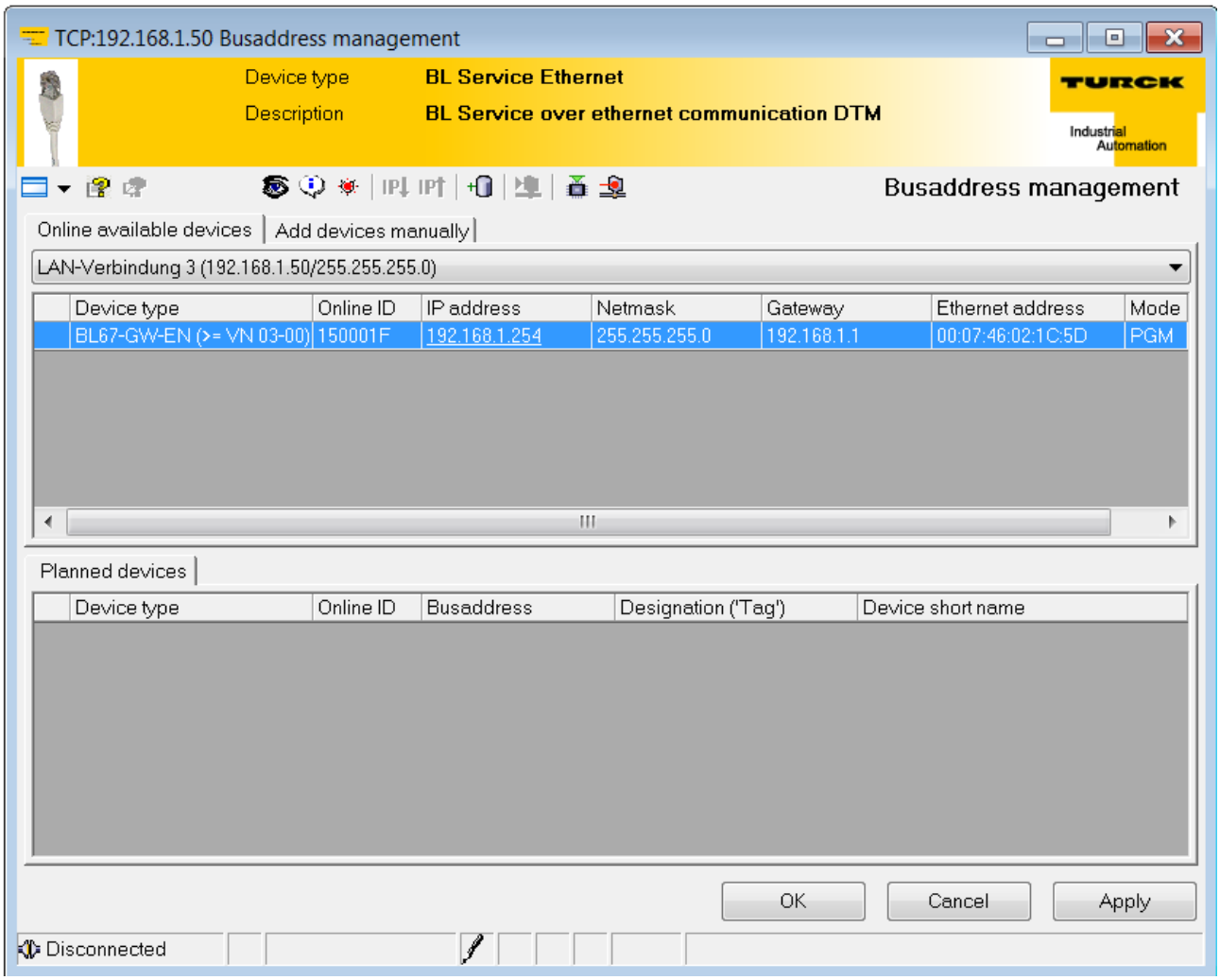


Fig. 93: Changing the network settings of the gateway

➤ Close the connection between host PC and gateway
➤ Close PACTware™
➤ NOTICE! IP20 (BL20) or IP67 (BL67) protection is not provided when the cover is opened over the rotary coding switches. Device damage through penetrating foreign objects or liquids is possible. Close the cover tightly above the rotary coding switches.

7.2.5 Addressing gateways via a web server (PGM mode and PGM-DHCP mode)

➤ Connect the gateway to a host PC via the Ethernet interface.
➤ Open a web browser.
➤ Enter "http:\\192.168.1.254" in the address field of the browser.
➤ Log onto the gateway with the default password "password".

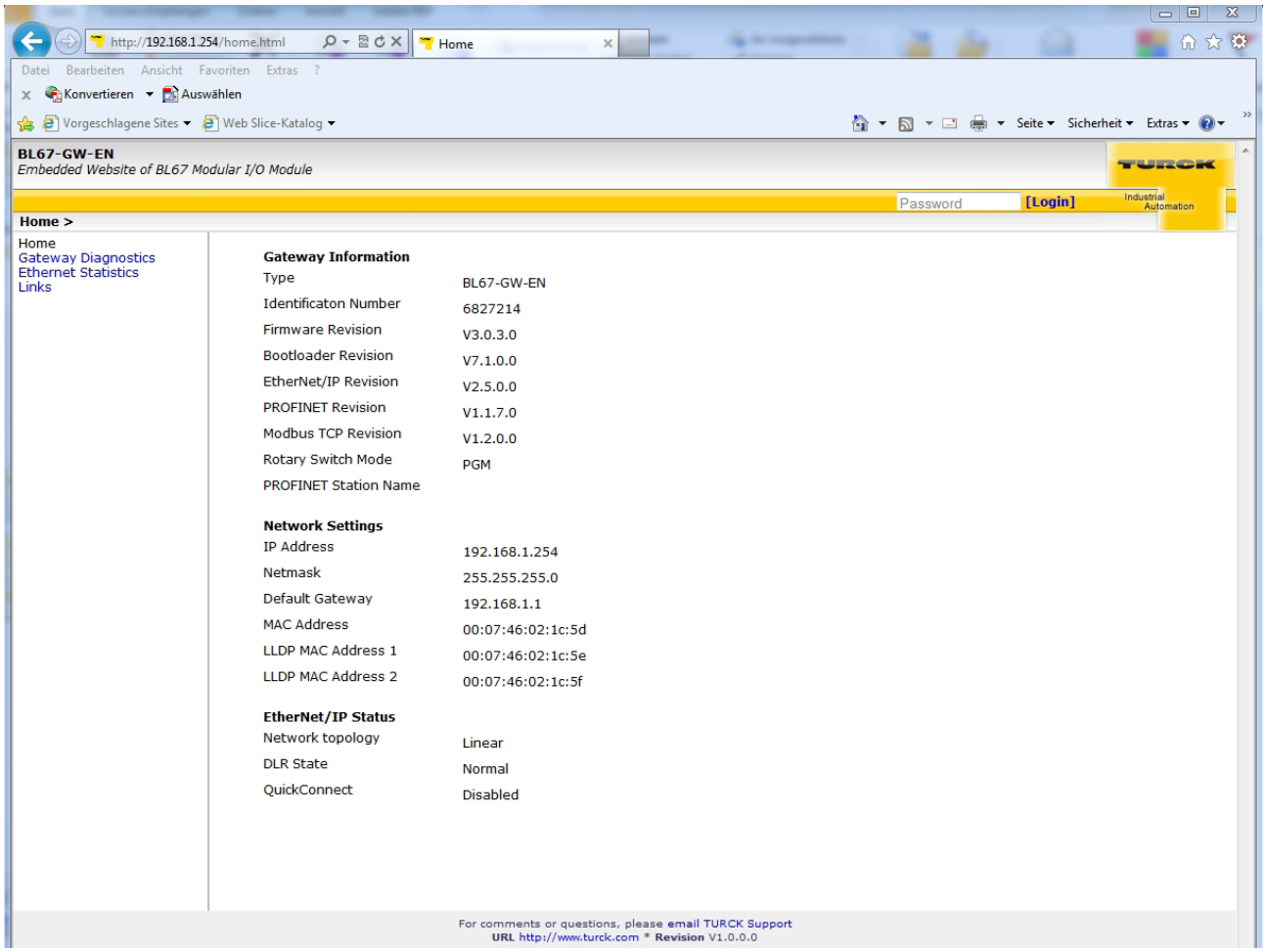


Fig. 94: Logging into the gateway – Start page (Example: BL67 gateway)

NOTE
The password can be changed after the login via the web server.

➤ Change the network settings via Network Configuration
➤ Confirm your changes with the Submit button.

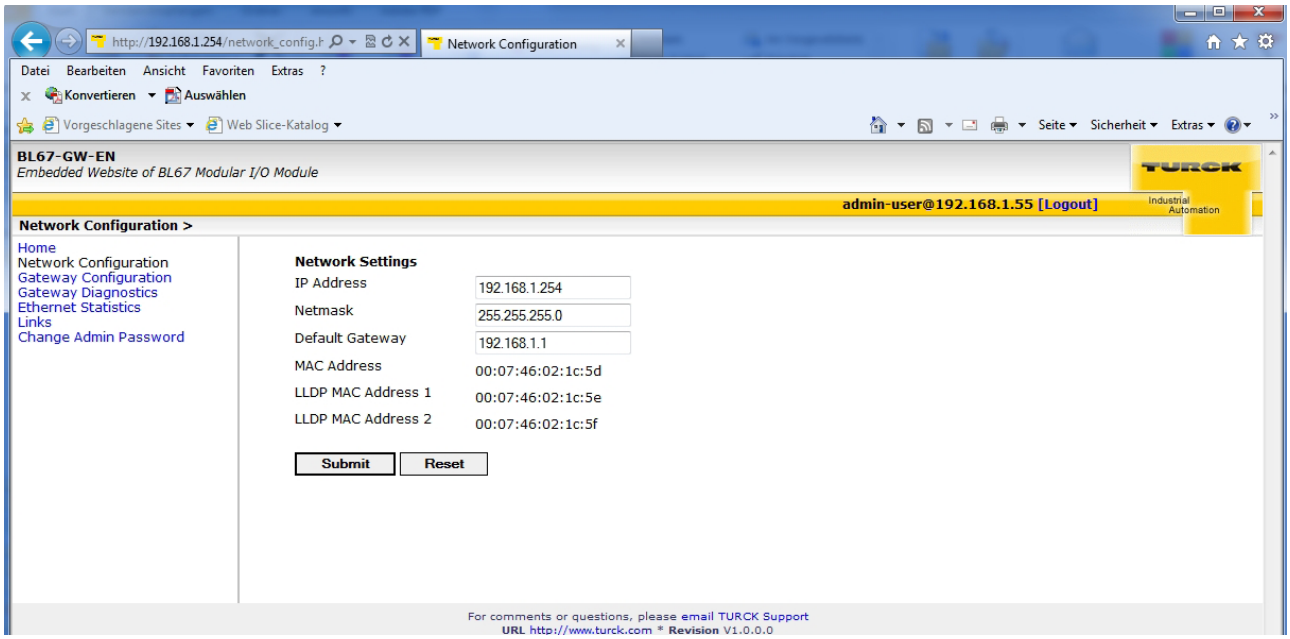


Fig. 95: Changing network settings via the web server (example: BL67 gateway)

7.2.6 Resetting the gateway address to the default settings

➤ Set the rotary coding switches to 000 (Standard gateways) or set all DIP switches to position 0 (ECO gateways).
➤ Carry out a voltage reset.

7.2.7 Changing addressing mode

➤ Set the rotary coding switches (Standard gateways) or set the DIP switches (ECO gateways) to the position for the required mode.
➤ Carry out a voltage reset.

7.2.8 Reading electronic modules

The electronic modules must be read in order to accept their arrangement in the gateway.
➤ BL20 gateways and BL67 gateways: Press the SET button for approx. 10 s.
➤ BL20-ECO gateways: Set the CFG DIP switch to ON.

Fig. 96: SET button (left BL20, middle BL67), CFG DIP switch CFG (BL 20-ECO gateways, right)

7.3 Connecting the BL ident® system to a Modbus TCP master (example)

The following example describes the connection of BL ident® interface sets to a Modbus master with the CODESYS programming software. The VT250-57P HMI is used as the Modbus master. For connection the system must be defined with a Modbus master and BL ident® interface set (Modbus slave), the Modbus channels defined and the required program for controlling the RFID program loaded into the Modbus master.

Hardware used

The following hardware components are used in this example:
- VT250-57P HMI, VT250-57P-L7-DPM FIRMWARE
- BL ident® interface set TI-BL67-EN-S-2 with
  - BL67-GW-EN gateway (IP address 192.168.1.12) as Modbus TCP slave
  - 1 × BL67-2RFID-S RFID module
- TN-Q80-H1147 HF read/write head

Software used

This example uses the following software:
- CODESYS 3.5 SP 1 Hotfix 1

7.3.1 Configuring the network and programming the Modbus master (VT250) with CODESYS

➤ Launch CODESYS.

7.3.2 Changing feature sets

In this example CODESYS is run with the Professional feature set. This setting extends the range of CODESYS functions.
➤ Choose Tools > Options… > Features.
➤ In the Predefined Feature Sets window choose the Professional setting.

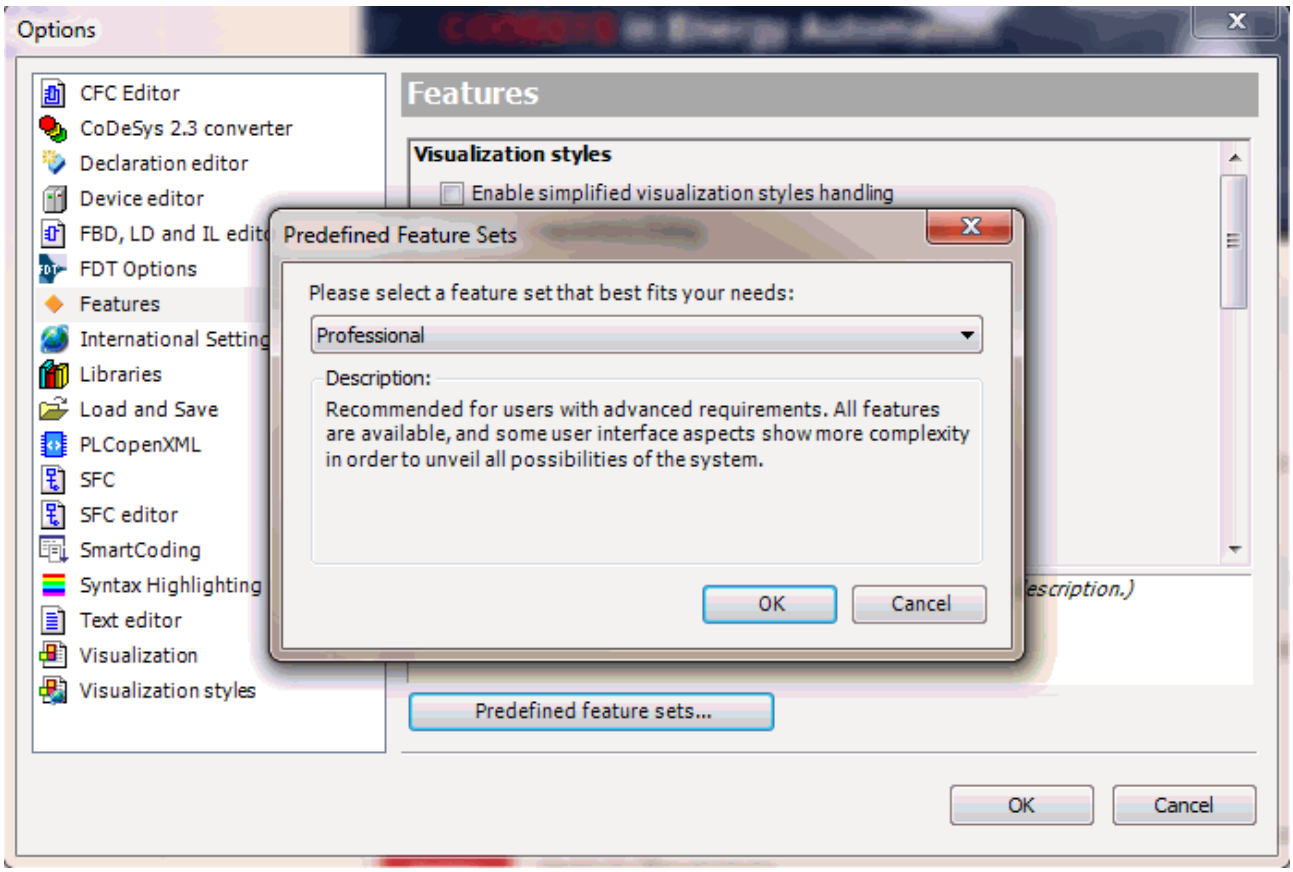


Fig. 97: Changing feature sets

7.3.3 Creating a new project in CODESYS

➤ Create a new project in CODESYS via File > New Project...

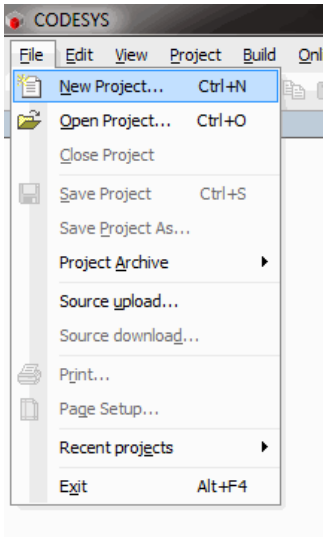


Fig. 98: Creating a new project

➥ This opens the New Project dialog.
➤ Choose the Standard project template.
➤ Give the project a name.
➤ Define a memory location for the project.

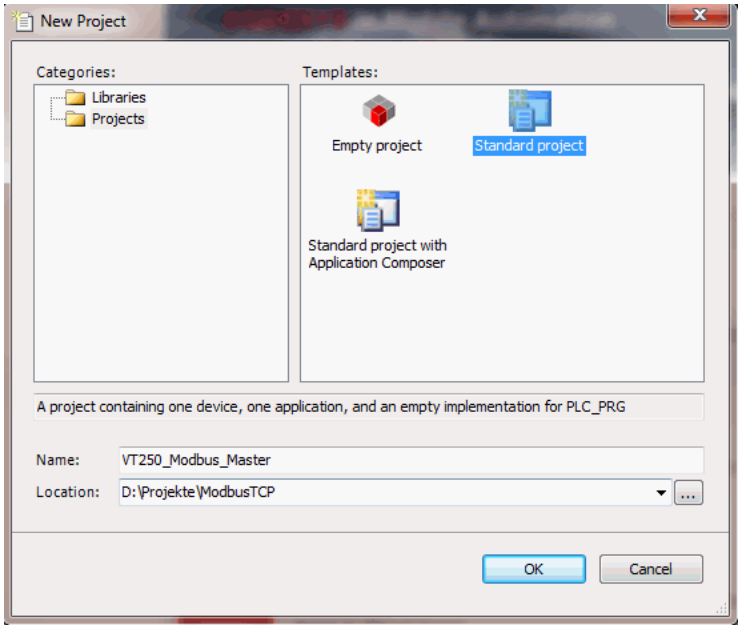


Fig. 99: Defining a standard project

➥ This opens the Standard Project dialog.
➤ Choose the Turck VT250-57x (Hans Turck GmbH & Co. KG) used as a device
➤ Select the preferred programming language for the central program block PLC_PRG. The following programming languages can be selected:
  – Sequential function chart (SFC)
  – Instruction list (IL)
  – Continuous function chart (CFC)
  – Function block diagram (FBD)
  – Ladder diagram (LD)
  – Structured text (ST)

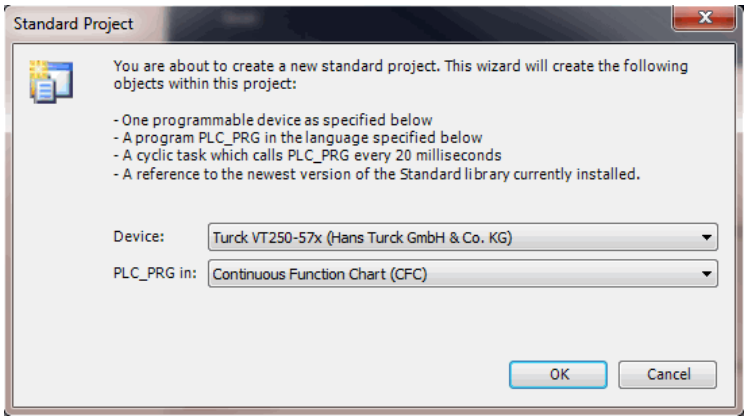


Fig. 100: Standard project dialog – Selecting the device and programming language

➥ The new project is created.
➥ The project tree in CODESYS is as follows:

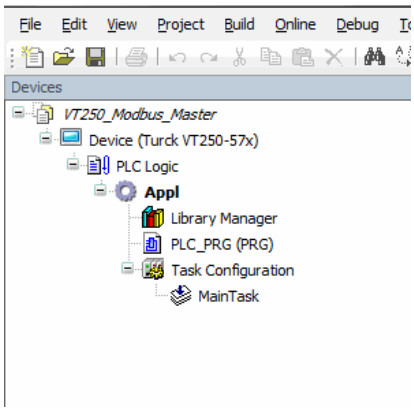


Fig. 101: Project tree in CODESYS

NOTE
You can show the Devices window via View > Devices.

7.3.4 Defining communication settings

The communication path (gateway) to the VT250-57x Modbus master is defined via the Communication Settings tab.

NOTE
The VT250-57x Modbus master and the PC on which CODESYS is installed, must be stations of the same Ethernet network. Otherwise no communication is possible.

➤ Click 2 × on Device (Turck VT250-57x) in the project tree.
➥ This opens the editor for the device.
➤ Choose the Communication Settings tab.
➤ Click Add Gateway…
➥ This opens the Gateway dialog.
➤ If desired assign a new gateway name.
➤ Define an IP address for the gateway or leave it on the setting "localhost".
➥ The "localhost" setting defines the local CODESYS communication gateway of the PC as the programming interface.

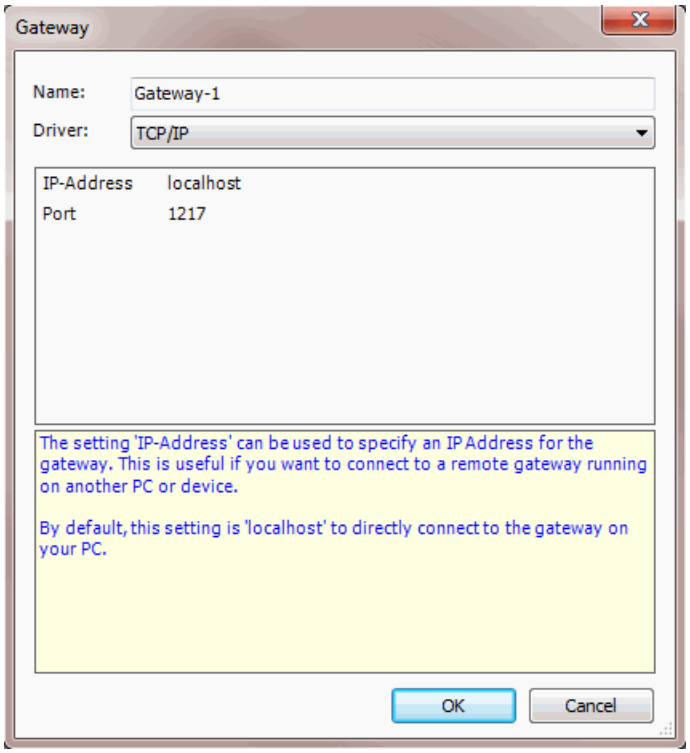


Fig. 102: Defining communication settings

7.3.5 Setting the communication path

➤ Select the gateway.
➤ Click the Scan network button.
➥ This finds the connected VT250-57x
➤ Select the VT250-57x.
➤ Click the Set active path button

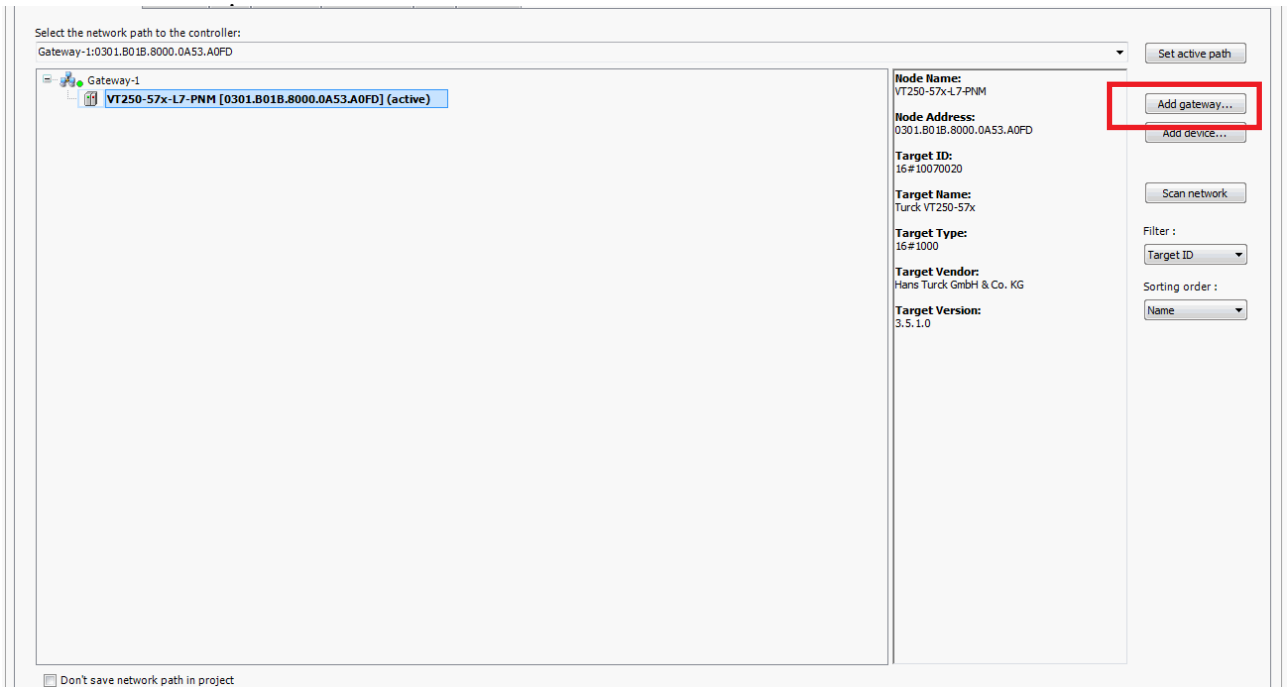


Fig. 103: Setting the communication path

7.3.6 Renaming the application

NOTE
You can skip this step if you are using CODESYS 3.5 or a higher version.

The rcX operating system requires file names to comply with the 8.3 naming convention. The name of the file saved in the device must therefore consist of no more than 8 letters or digits, a period and no more than 3 characters.

NOTE
An application name that does not comply with the naming convention may cause data loss and communication problems between PC and VT250.

➤ Right-click Application in the project tree to open the context menu.
➤ Select Properties.
➤ In the Common tab assign a name for the application that is no more than 7 characters long (here: APPL).
➤ Confirm your entry with OK.

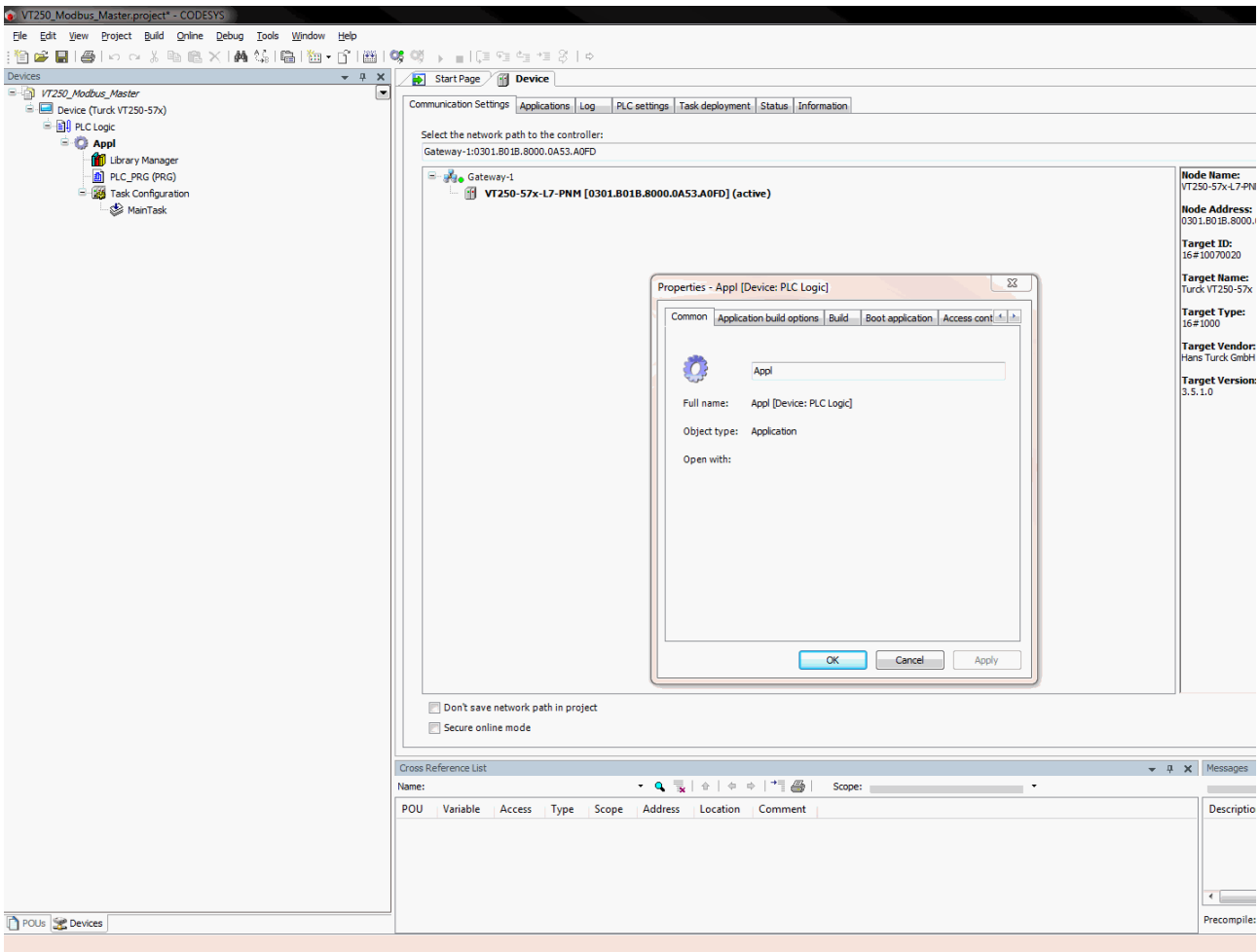


Fig. 104: Renaming the application

➤ Confirm the subsequent warning prompt with “Yes”

7.3.7 Adding an Ethernet adapter

➤ Right-click Device (Turck VT250-57x) in the project tree to open the context menu.
➤ Click Add device... in the context menu.
➥ This opens the Add device dialog.
➤ Choose Fieldbuses > Ethernet Adapter to select the Ethernet Adapter of 3S – Smart Software Solutions GmbH.
➤ Close the Add device dialog.
➥ The Ethernet adapter appears in the project tree.

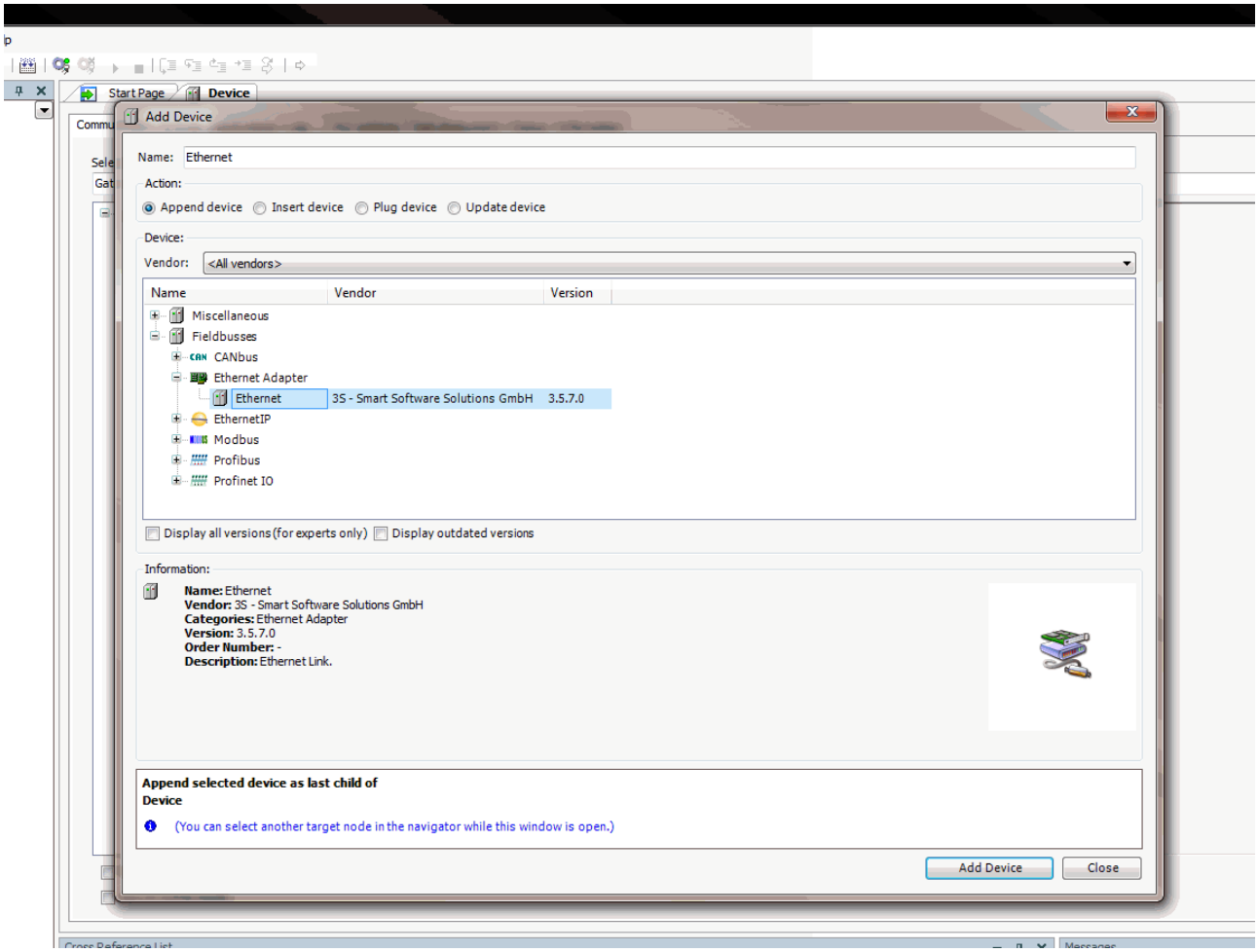


Fig. 105: Adding the Ethernet adapter as the device

7.3.8 Defining a VT250 HMI as the Modbus master

➤ Right-click Ethernet in the project tree to open the context menu.
➤ Click Add device... in the context menu.
➥ This opens the Add device dialog.
➤ Choose the Modbus TCP master.
➤ Close the Add device dialog.
➥ The Modbus TCP master appears in the project tree.

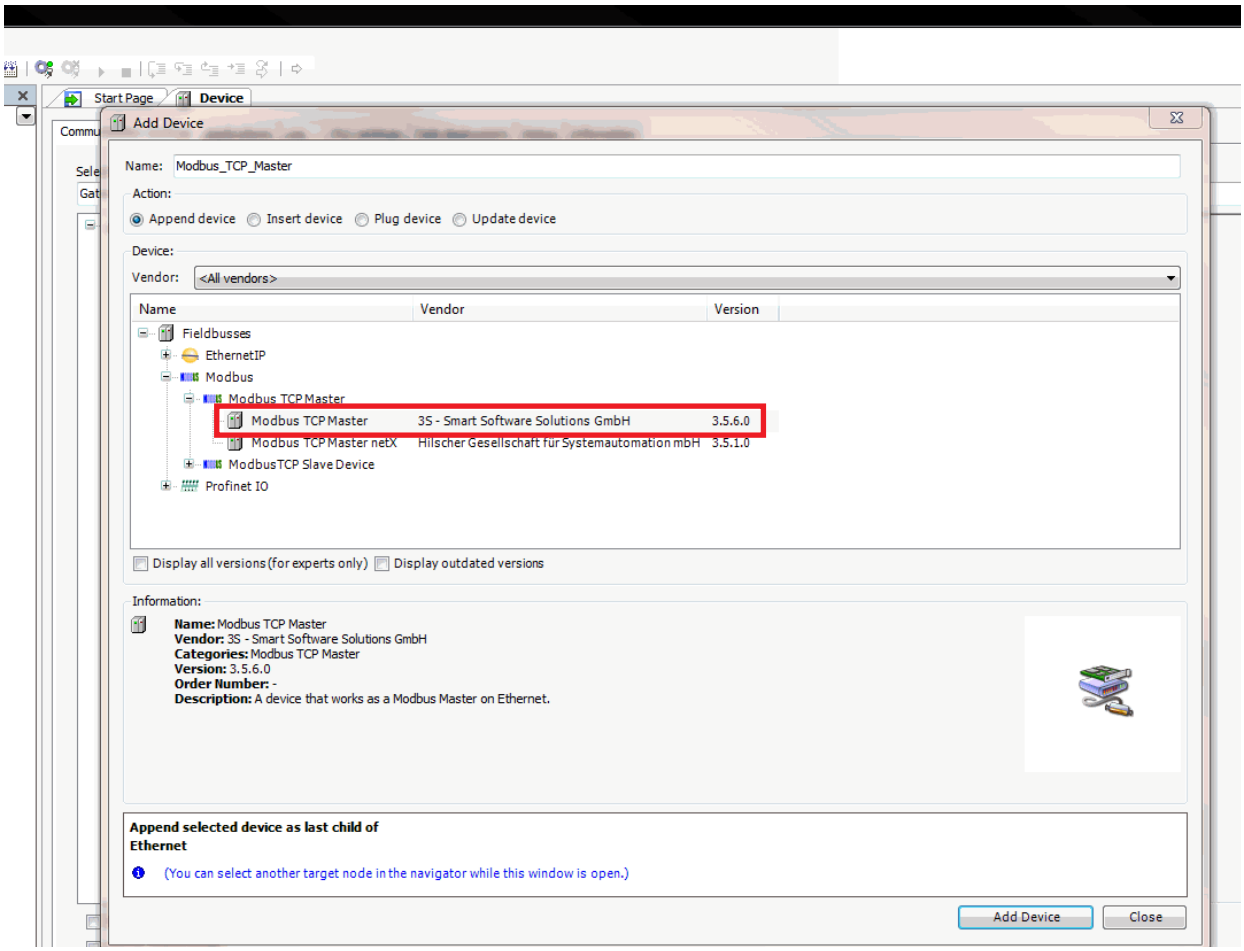


Fig. 106: Appending the Modbus master as the device

7.3.9 Adding a Modbus TCP slave

➤ Right-click Modbus TCP (Modbus TCP master) in the project tree to open the context menu.
➤ Click Add device... in the context menu.
➥ This opens the Add device dialog.
➤ Choose the Modbus TCP slave.
➤ Repeat the process according to the number of Modbus TCP slaves.
➤ Close the Add device dialog.
➥ The Modbus TCP slaves appear in the project tree.

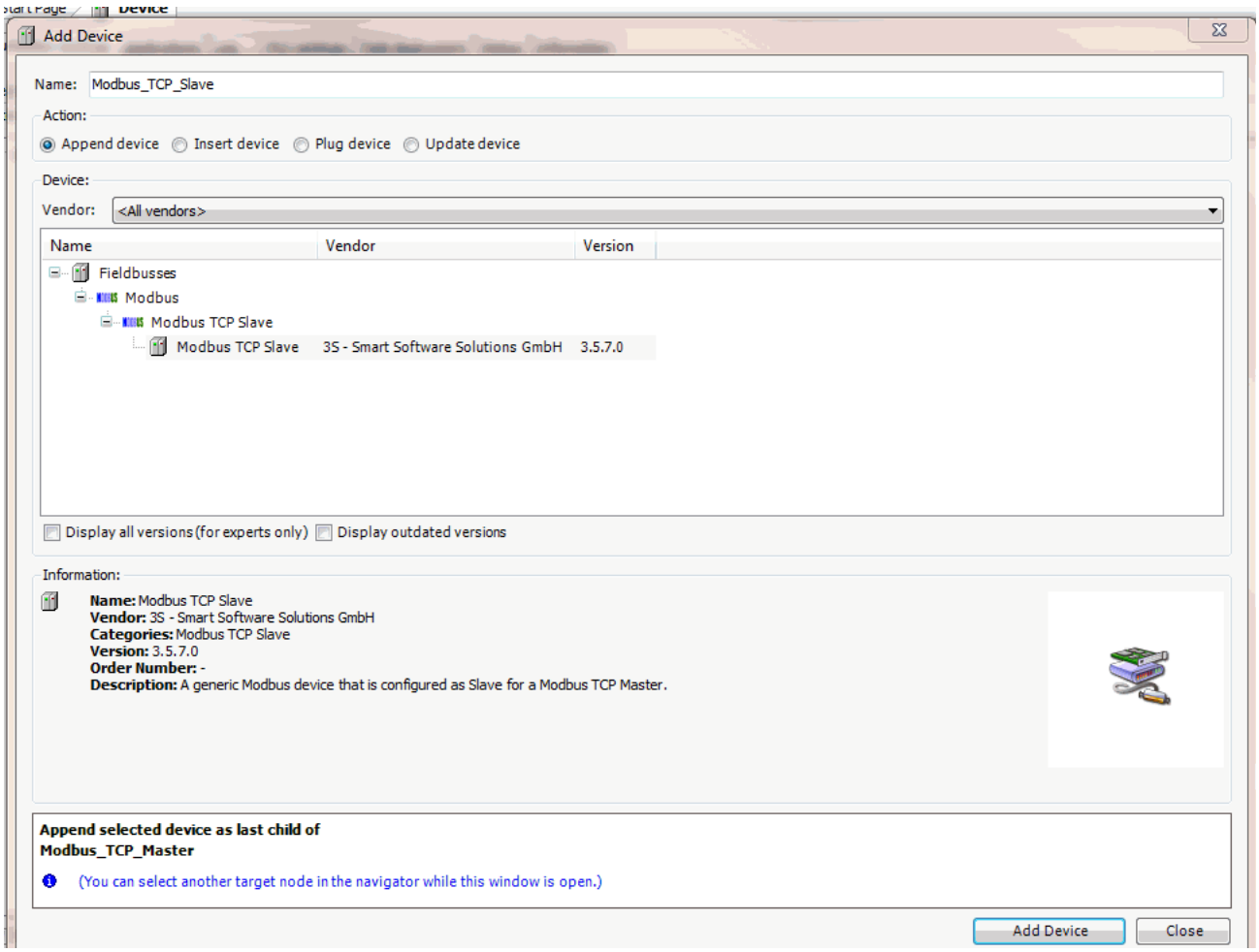


Fig. 107: Adding the Modbus TCP slaves as devices

➤ Rename the Modbus TCP slaves if required. (right-click on the Modbus TCP slaves in the Project tree > Properties)

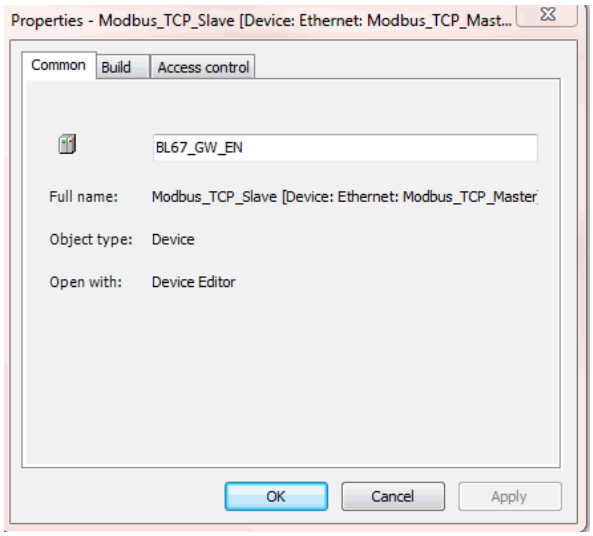


Fig. 108: Renaming Modbus TCP slavesClick the entry of the Modbus TCP slave 2 × in the project tree.

➥ This opens the associated editors.
➤ In the Modbus TCP slave tab enter the IP address (in the example: 192.168.1.12). All other settings can be retained.

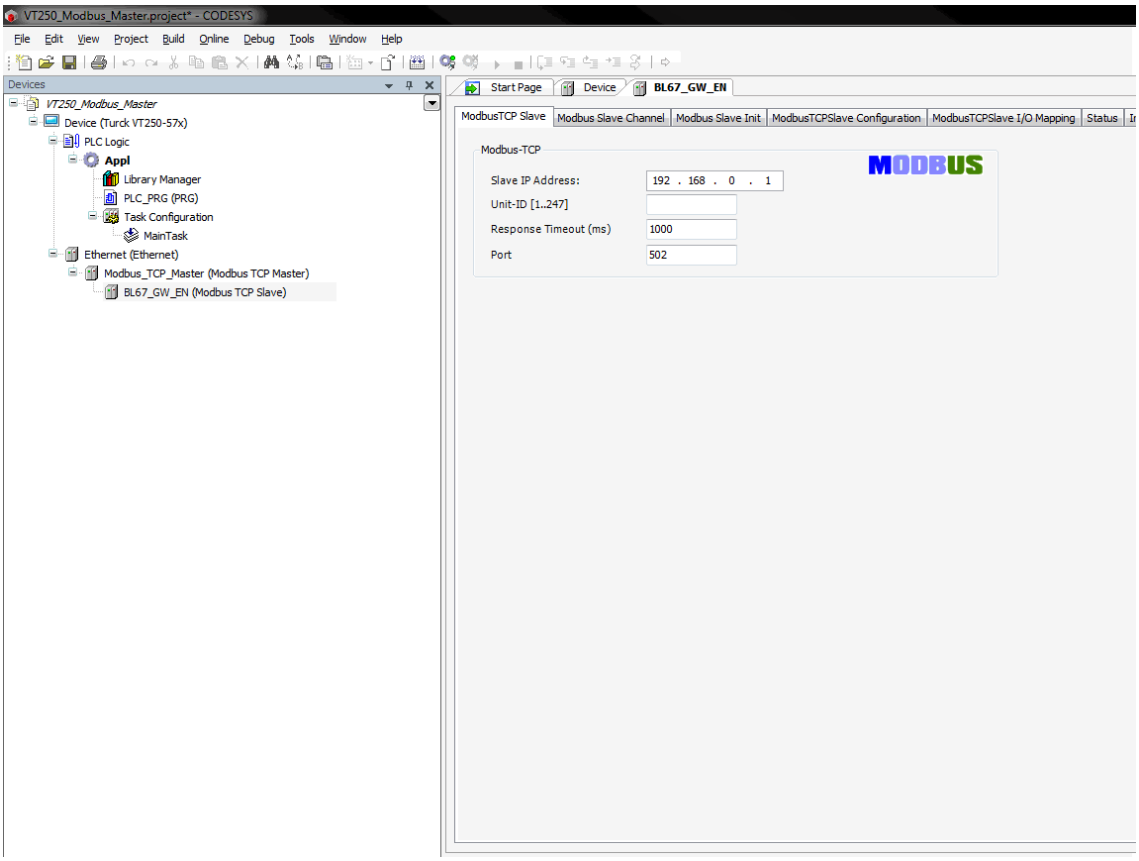


Fig. 109: Changing the IP address of the Modbus TCP slave

7.3.10 Modbus channels: Adding mapping

Modbus TCP master (here: VT250) and Modbus TCP slaves (here: BL67-GW-EN) communicate via defined Modbus channels. The Modbus channels are defined via the following parameters:

- Access type: Modbus function code which defines access type and method (bitwise or word-wise, read or write).
- READ Register > Offset or WRITE Register > Offset: Start address of the registers of the Modbus slave to be read or written. The register addresses are provided, for example, in the PACTware™ station report. The following start addresses apply to the gateways:

Gateway	Offset	
	READ register	WRITE register
BL20/67-PG-…	0x4000	0x4400
BL20/67-GW…	0x0000	0x0800

The start addresses for the channels of the BLxx-2RFID-S modules are provided in the following table:

Input	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Channel 0	n	DONE	BUSY	ERROR	XCVR CON	XCVR ON	TP	TFR	Reserved
	n+1	Error Code							
	n+2	Error Code 1							
	n+3	Reserved							
	n+4	READ DATA (8 bytes)							
	n+5								
	…								
	n+10								
	n+11								
Channel 1	n+12	DONE	BUSY	ERROR	XCVR CON	XCVR ON	TP	TFR	Reserved
	n+13	Error Code							
	n+14	Error Code 1							
	n+15	Reserved							
	n+16	READ DATA (8 bytes)							
	n+17								
	…								
	n+22								
	n+23								
Output	**Byte**	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
Channel 0	m	XCVR	NEXT	TAG ID	READ	WRITE	TAG INFO	XCVR INFO	RESET
	m+1	Error Code					Byte Count 2	Byte Count 1	Byte Count 0
	m+2	Address high byte							
	m+3	Address low byte							
	m+4	WRITE DATA (8 Byte)							
	m+5								
	…								
	m+10								
	m+11								
Channel 1	m+12	XCVR	NEXT	TAG ID	READ	WRITE	TAG INFO	XCVR INFO	RESET
	m+13	Reserved					Byte Count 2	Byte Count 1	Byte Count 0
	m+14	Address high byte							
	m+15	Address low byte							
	m+16	WRITE DATA (8 Byte)							
	m+17								
	…								
	m+22								
	m+23								

7.3.11 Setting up Modbus channels

Setting up Modbus channel 1 (READ register)

➤ Double-click the Modbus TCP slave in the project tree.
➤ Select the Modbus Slave Channel tab.
➤ Click the Add Channel… button
➤ Select the Read Holding Registers (function code 03) access type.
➤ Enter under Offset the start address of the register to be read (here: 0x0000).
➤ Enter the length of the register to be read (max. 14).
➤ Confirm your entries with OK

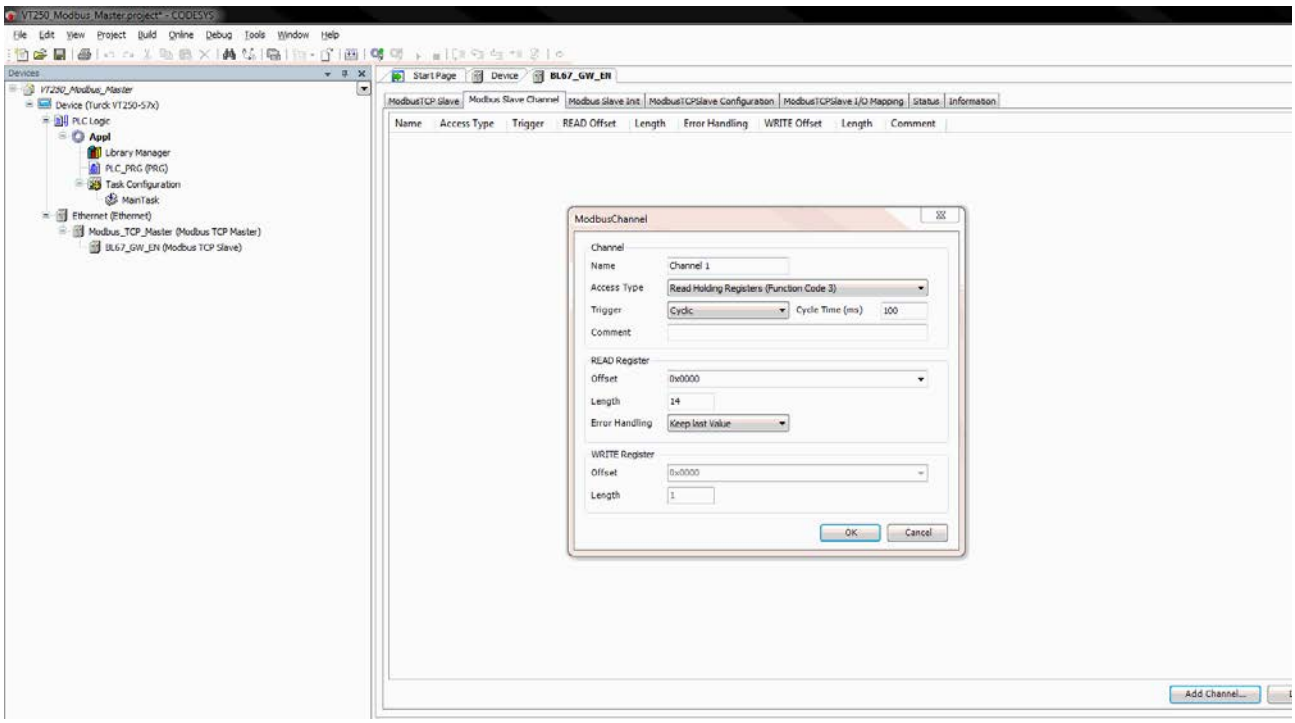


Fig. 110: Setting up a Modbus channel (READ register) – Example

Setting up Modbus channel 2 (WRITE register)

➤ Double-click the Modbus TCP slave in the project tree.
➤ Select the Modbus Slave Channel tab.
➤ Click the Add Channel… button
➤ Select the Write Holding Registers (function code 16) access type.
➤ Enter under Offset the start address of the register to be written (here: 0x0800).
➤ Enter the length of the register to be read (max. 14).
➤ Confirm your entries with OK.

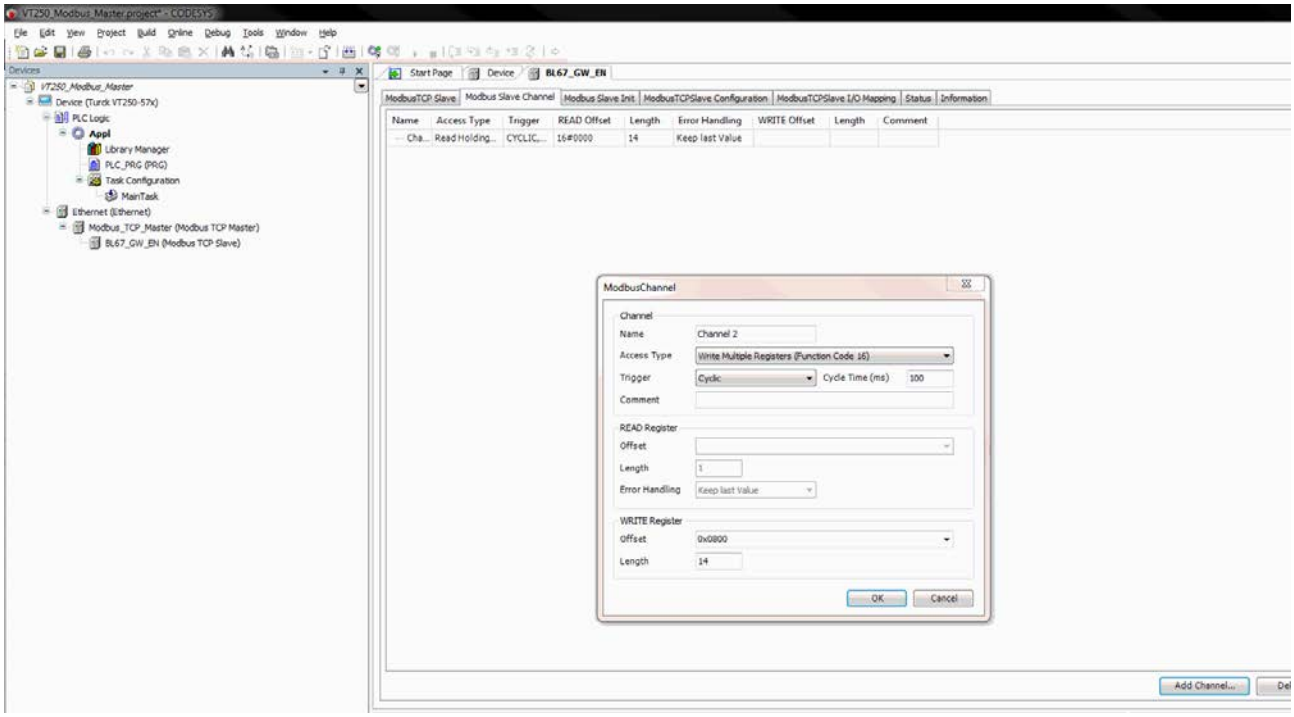


Fig. 111: Setting up a Modbus channel (WRITE register) – Example

7.3.12 Updating variables

➤ Select the Modbus TCPSlave I/O Mapping tab.
➤ Mark the Always update variables check box.

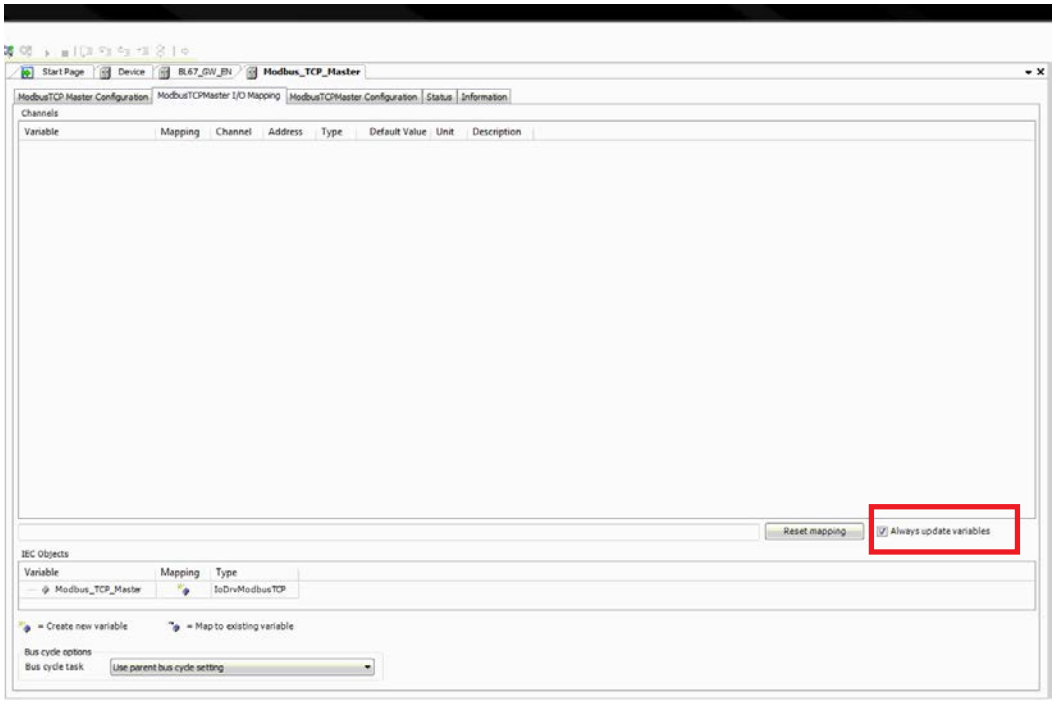


Fig. 112: Updating variables

7.3.13 Creating a program

➤ Create your application specific program

7.3.14 Loading the project in the Modbus TCP master VT250-57x

➤ Click Build > Recompile.
➤ Log into the device via Online > Login.
➥ The CODESYS project is loaded into the VT250-57x.
➤ Start the program via Debug > Start.
➥ The program runs.

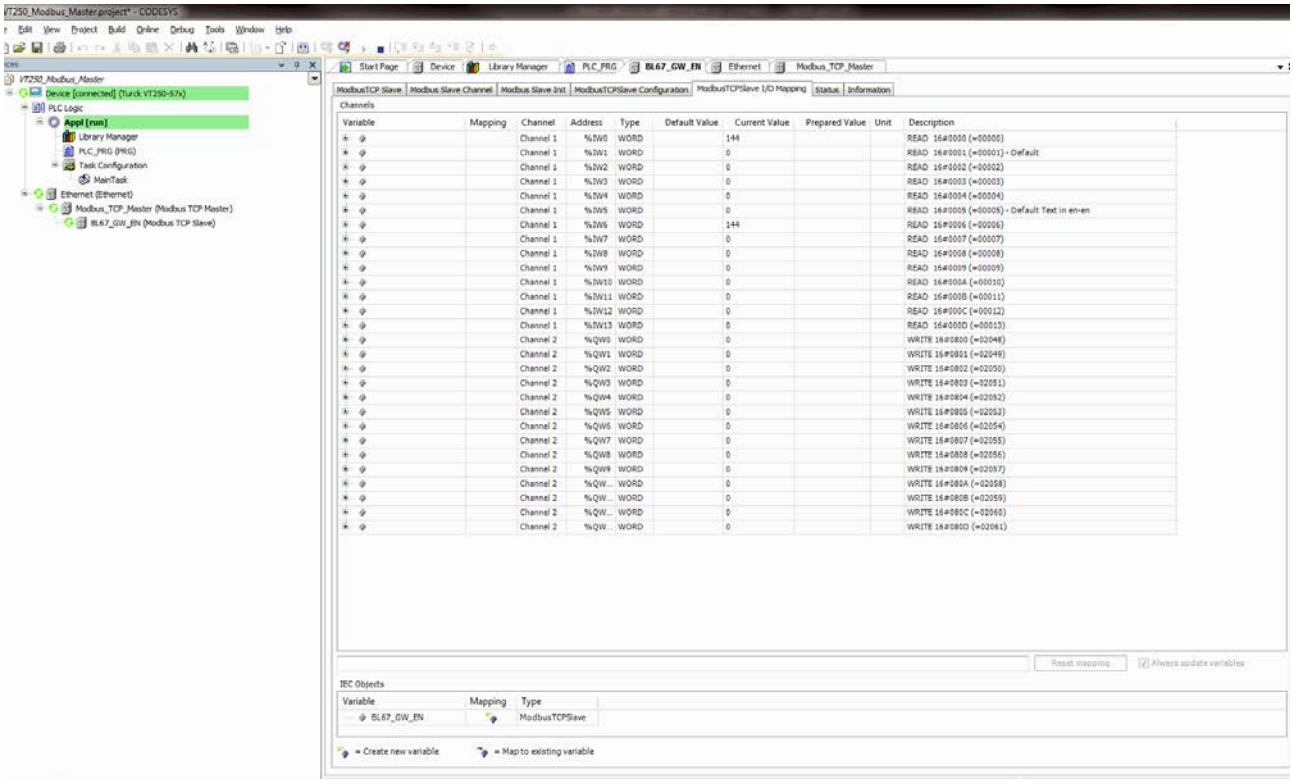


Fig. 113: Loading the project in the VT250-57x

7.3.15 Reading out process data

The process data is displayed in the Modbus TCP Slave I/O Mapping tab. The following figure shows that the status bit XCVR_CON is set on the both input bits 0.4 and 12.4. The status bit DONE is set on the input bits 0.7 and 12.7.

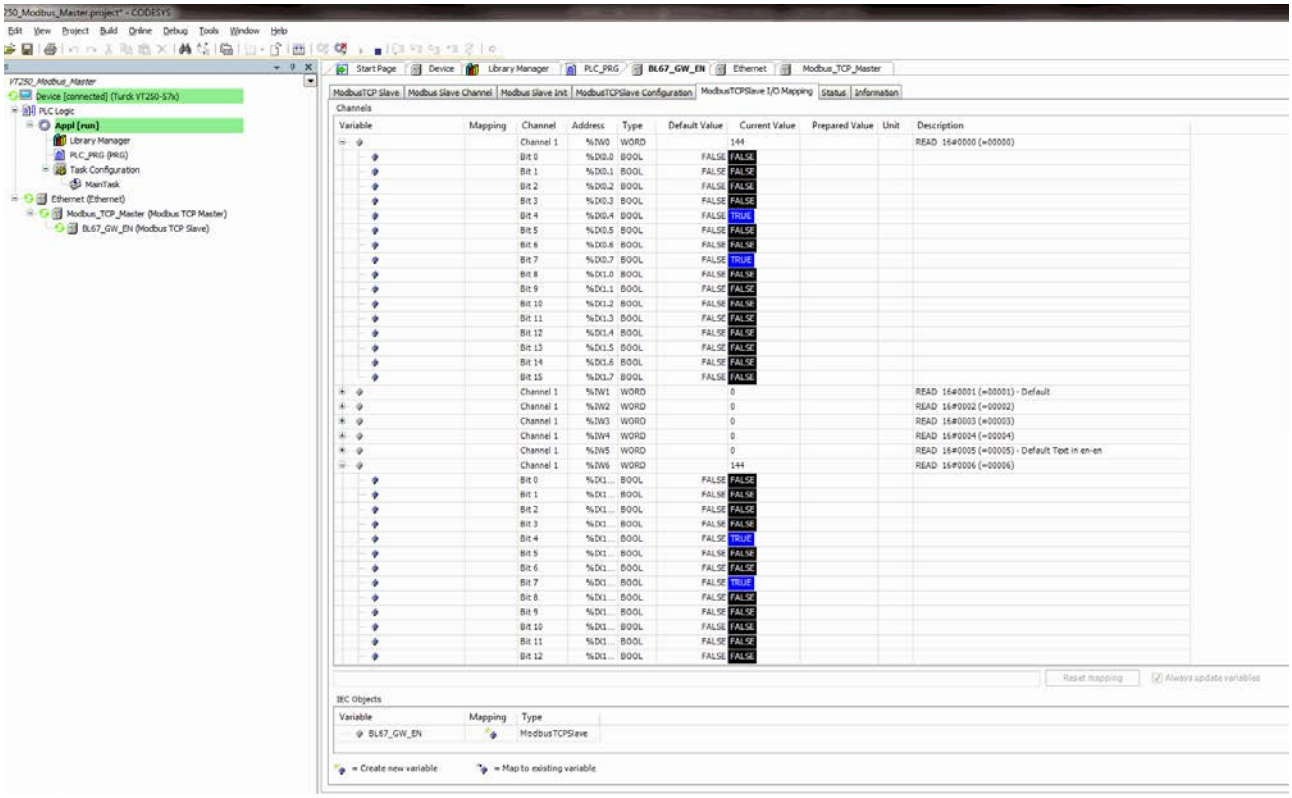


Fig. 114: Reading out process data

8 Setting and parameterization

8.1 BLxx-2RFID-S – Process input data

8.1.1 Process input data in HF applications

NOTE
The I/O mapping of the BL ident® interface must match up with the configuration of the entire BLxx station: Any other I/O modules fitted (not BLxx-2RFID-S) must be taken into account if they are located in front of the BLxx-2RFID-S modules.

Byte no.	Bit							
	7	6	5	4	3	2	1	0
0	DONE	BUSY	ERROR	XCVR_CON	XCVR_ON	TP	TFR	res.
1		Error code (2 bytes)						LSB
2	MSB							
3	res.	res.	res.	res.	res.	res.	res.	res.
4	8 bytes read data (READ_DATA)							
5								
6								
7								
8								
9								
10								
11								

8.1.2 Meaning of the status bits in HF applications

The following table explains the status bits of the process input data:

Designation	Meaning
DONE	1: The system is not currently processing a command and is ready to receive a subsequent command. 0: All incoming commands are ignored apart from the RESET command. DONE only switches to 1 if all command bits (READ,WRITE ..) are 0
BUSY	1: The system is currently executing a command. 0: The command execution was completed. BUSY is not the inversion of DONE and in certain circumstances cannot be used with a handshake procedure. To set up a handshake procedure use the variable DONE.
ERROR	1: An error occurred, during command execution. If this flag follows a write command (WRITE), for example, the data of the send buffer was not written to the tag. If this flag follows a read command, no data was read from the tag and no new data was loaded into the receive buffer. 0: The last write or read command could be executed successfully. The receive buffer contains valid data. Detailed information is supplied via the error code (2 bytes).
XCVR_CON	1: The read/write head is correctly connected on the BLxx-2RFID-S module. 0: The read/write head is not correctly connected on the BLxx-2RFID-S module.
XCVR_ON	1: The transmission at 13.56 MHz between read/write head and tag is active. 0: The transmission at 13.56 MHz between read/write head and tag is not active.
TP (Tag Present)	1: A tag is in the sensing range of the read/write head and is detected by it. 0: There is no tag in the sensing range of the read/write head or the read/write head has not detected it.
TFR (Tag fully read)	1: All data areas of the tag were completely read by the BL ident® system and the tag is still in the sensing range (TP=1). This automatic reading always takes place when there is a tag in the sensing range of the read/write head. The time between TP=1 and TFR=1 cannot be regarded as the reference time for a read and write command. If only a few bytes are read or written with a read or write command, the command is executed considerably faster than, for example, the complete reading of a 2000 byte tag. With TFR=1, read commands can directly access data already stored. 0: Data areas of the tag were not yet completely read by the BL ident® system or the tag is not in the sensing range of the read/write head. This automatic read operation is interrupted by all user commands, the TFR bit retains its actual value. The operation is restarted if no other commands are pending and TP=1.

NOTE
Depending on the system, the BUSY status bit cannot be used in many cases for a handshake procedure. To set up a handshake procedure use the DONE status bit.

8.1.3 Process input data in UHF applications

NOTE
The I/O mapping of the BL ident® interface must match the configuration of the station: Any other I/O modules fitted (not BLxx-2RFID-S) must be taken into account if they are located in front of the BLxx-2RFID-S modules.

Byte no.	Bit							
	7	6	5	4	3	2	1	0
0	DONE	BUSY	ERROR	XCVR_CON	XCVR_ON	TP	–	res.
1		Error code (2 bytes)						LSB
2	MSB							
3	res.	res.	res.	res.	res.	res.	res.	res.
4	8 bytes read data (READ_DATA)							
5								
6								
7								
8								
9								
10								
11								

8.1.4 Meaning of the status bits in UHF applications

The following table explains the status bits of the process input data:

Designation	Meaning
DONE	1: The system is not currently processing a command and is ready to receive a subsequent command. 0: All incoming commands are ignored apart from the RESET command. DONE only switches to 1 if all command bits (READ,WRITE ..) are 0
BUSY	1: The system is currently executing a command. 0: The command execution was completed. BUSY is not the inversion of DONE and in certain circumstances cannot be used with a handshake procedure. To set up a handshake procedure use the variable DONE.
ERROR	1: An error occurred, during command execution. If this flag follows a write command (WRITE), for example, the data of the send buffer was not written to the tag. If this flag follows a read command, no data was read from the tag and no new data was loaded into the receive buffer. 0: The last write or read command could be executed successfully. The receive buffer contains valid data. Detailed information is supplied via the error code (2 bytes).
XCVR_CON	1: The read/write head is correctly connected on the BLxx-2RFID-S module. 0: The read/write head is not correctly connected on the BLxx-2RFID-S module.
XCVR_ON	1: The UHF radio field of the read/write head is active. 0: The UHF radio field of the read/write head is not active.
TP (Tag Present)	1: A tag is in the sensing range of the read/write head and is detected by it. 0: There is no tag in the sensing range of the read/write head or the read/write head has not detected it.
ERROR_CODE_0…1	Representation of the error code - Array of length 2 bytes. The error code 0202 is output when multiple tags are detected
READ_DATA	Read data - Array of length 8 bytes. The read data (can also have information from the tag and about the UHF radio field).

NOTE
Depending on the system, the BUSY status bit cannot be used in many cases for a handshake procedure. To set up a handshake procedure use the DONE status bit.

8.2 BLxx-2RFID-S module – Process output data

8.2.1 Process output data in HF applications

Byte no.	Bit							
	7	6	5	4	3	2	1	0
0	XCVR	NEXT	TAG_ID	READ	WRITE	TAG_INFO	XCVR_INFO	RESET
1	GET	res.	res.	res.	res.	Byte_Count 2	Byte_Count 1	Byte_Count 0
2	MSB	AddrHi						LSB
3	MSB	AddrLo						LSB
4	8 bytes write data (WRITE_DATA)							
5								
6								
7								
8								
9								
10								
11								

8.2.2 Meaning of the status bits in HF applications

NOTE
The BLxx-2RFID-S module generates an error message if more than one command bit is set of TAG_ID, READ, WRITE, XCVR_INFO or TAG_INFO! Bit XCVR must always be set for the execution of a command in order for the read/write head to stay active.

The following table shows the meaning of the command bits of the above process output data. The flow charts for the commands are provided in the Appendix:

Designation	Meaning
XCVR	1: The read/write head is activated (signal transmission at 13.56 MHz). 0: The read/write head is deactivated (no signal transmission). If XCVR = 0 while the BL ident® system is processing the execution of a command, the command is not executed until the end. The read/write head is then not deactivated until the status bit DONE = 1.
NEXT	1: Exactly one command can be executed with the same tag. If another command is initiated with the same tag, the BUSY status bit = 1. The BL ident® system must be reset (RESET) or the command must be executed with a different tag. 0: Function is not used.
TAG_ID	0 → 1: The rising edge initiates the command for reading the UID. The command is executed if there is a tag in the sensing range of the read/write head. 0: Function is not used.
READ	0 → 1: The rising edge initiates the read command. The command is executed if there is a tag in the sensing range of the read/write head. The byte number ByteCount0..ByteCount2 is read from the tag address AddrLo, AddrHi. 0: Function is not used.

Designation	Meaning
WRITE	0 → 1: The rising edge initiates the write command. The command is executed if there is a tag in the sensing range of the read/write head. The byte number ByteCount0..ByteCount2 is written to the tag address AddrLo, AddrHi. 0: Function is not used.
TAG_INFO	0 → 1: The rising edge initiates the command TAG_INFO (information on the tag). The command is executed if there is a tag in the sensing range of the read/write head. The information on the tag in the read data area is sent with the process input data with the following 8 bytes: Byte 0: Number of blocks –1 of the tag (i.e. 27 -> 28 → blocks) Byte 1: Number of bytes 1 per block (i.e. 3 → 4 bytes per block) Byte 2: Not supported (DSFID – tag format) Byte 3: Not supported (AFI – application ID) Byte 4: Not supported (ICID - not supported) – IC code (not supported) byte 5 to byte 7: „0“ 0: Function is not used.
XCVR_INFO	0 → 1: The rising edge initiates and executes the command XCVR_INFO (information on the read/write head). The information on the read/write head is sent in the read data area with 8 bytes with the process input data. The information content can be configured. The information content is selected with AddrHi, AddrLo. $00F0_{hex}$: The first 8 bytes of the ORDER_ID (here: product designation) are sent, e.g. TNER-Q80 = 54 4E 45 52 2D 51 38 30 $_{hex}$ (ASCII table) $00F1_{hex}$: The second 8 bytes of the ORDER_ID (here: product designation) are sent, e.g.: -H1147\0\0 = 2D 48 31 31 34 37 5C 00 5C 00_{hex} $00F2_{hex}$: The third 8 bytes of the ORDER_ID (here: product designation) are sent. $00F3_{hex}$: The fourth 8 bytes of the ORDER_ID (here: product designation) are sent. $00F4_{hex}$: The hardware and firmware versions of the read/write head are sent. Byte 0: Part x of the hardware version x.y. Byte 1: Part y of the hardware version x.y. Byte 2: Letter V = 56_{hex} of the firmware version Vx.y.z. Byte 3: Part x of the firmware version Vx.y.z. Byte 4: Part y of the firmware version Vx.y.z. Byte 5: Part z of the firmware version Vx.y.z. Byte 6 to byte 7: is not used.
RESET	0 → 1: The rising edge causes a Reset of the BL ident® system. If the status bit BUSY is set, the execution of the current command is aborted and the status bit DONE is set. The status bit ERROR and the two error message bytes (error code) of the process input data are deleted.
GET	0 → 1: The rising edge initiates the GET command. The GET command enables tags to be protected with a password. For this the GET command contains the following commands: - Set tag PWD (start address 4) - Set transceiver PWD (start address 5) - Reset transceiver PWD (start address 6) - Set tag protection (start address 7) - Get tag protection status (start address 9) The start address of the command defines the function. Further information is provided in the chapter Protecting tags with a password.
Byte_Count 0…2	Number of bytes – 1; to be read (READ) or written (WRITE). 111 (7_{hex}) → 8 bytes are to be read or written.
AddrHi, AddrLo	Array of length 2 bytes. Represents the start address of the memory area on the tag which is to be accessed with the write or read command. The writable/readable start addresses of the tags can be ≠ 0. The manual BL ident® HF systems – Engineering (D500024) provides information on the writable/readable start address of the tag variants.
WRITE_DATA	Write data - Array of length 8 bytes.

8.2.3 BLxx-2RFID-S module – Process output data in UHF applications

Byte no.	Bit							
	7	6	5	4	3	2	1	0
0	XCVR	NEXT	TAG_ID	READ	WRITE	TAG_INFO	XVCR_INFO	RESET
1	res.	res.	Domain_ Count 1	Domain_ Count 0	res.	Byte_ Count 2	Byte_ Count 1	Byte_ Count 0
2	MSB	AddrHi						LSB
3	MSB	AddrLo						LSB
4	8 bytes write data (WRITE_DATA)							
5								
6								
7								
8								
9								
10								
11								

8.2.4 BLxx-2RFID-S – Meaning of the status bits in UHF applications

NOTE
The BLxx-2RFID-S module generates an error message if more than one command bit is set of TAG_ID, READ, WRITE, XCVR_INFO or TAG_INFO! Bit XCVR must always be set for the execution of a command in order for the read/write head to stay active! During a read/write operation, the bits for Byte_Count, Domain_Count and the bytes for AddrHi, AddrLo must always be set. The Domain_Count (Bit 4 and 5) must always be set so that the address range of the tag is determined.

NOTICE
Incorrect writing to the tag
Possible malfunction of the tags!
➤ Proceed with care when writing to the reserved area (bank address = 00) or to the first four bytes of the UII memory (bank address = 01).

The following table shows the meaning of the command bits of the above process output data:

Designation	Meaning
XCVR	1: The read/write head is activated. 0: The read/write head is deactivated (no signal transmission is taking place). If XCVR = 0 while the BL ident® system is processing the execution of a command, the command is not executed until the end. The read/write head is then not deactivated until the status bit DONE = 1.
NEXT	1: Exactly one command can be executed with the same tag. If another command is initiated with the same tag, the BUSY status bit = 1. The BL ident® system must be reset (RESET) or the command must be executed with a different tag. 0: Function is not used.
TAG_ID	0 → 1: The rising edge initiates the command for reading the UID. The command is executed if there is a tag in the sensing range of the read/write head. 0: Function is not used.
READ	0 → 1: The rising edge initiates the read command. The command is executed if there is a tag in the sensing range of the read/write head. The byte number ByteCount0..ByteCount2 is read from the tag address AddrLo, AddrHi. 0: Function is not used.
WRITE	0 → 1: The rising edge initiates the write command. The command is executed if there is a tag in the sensing range of the read/write head. The byte number ByteCount0..ByteCount2 is written to the tag address AddrLo, AddrHi. 0: Function is not used.
TAG_INFO	0 → 1: The rising edge initiates the command TAG_INFO (information on the tag). The command is executed if there is a tag in the sensing range of the read/write head. The information on the tag in the read data area is sent with the process input data with the following 8 bytes: Byte 0: Number of blocks –1 of the tag (i.e. 27 → 28 blocks) Byte 1: Number of bytes 1 per block (i.e. 3 → 4 bytes per block) Byte 2: Not supported (DSFID – tag format) Byte 3: Not supported (AFI – application ID) Byte 4: Not supported (ICID - not supported) – IC code (not supported) byte 5 to byte 7: „0“ 0: Function is not used.

Designation	Meaning
XCVR_INFO	0 → 1: The rising edge initiates and executes the command XCVR_INFO (information on the read/write head). The information on the read/write head is sent in the read data area with 8 bytes with the process input data. The information content can be configured. The information content is selected with AddrHi, AddrLo. $00F0_{hex}$: The first 8 bytes of the ORDER_ID (here: product designation) are sent. $00F1_{hex}$: The second 8 bytes of the ORDER_ID (here: product designation) are sent. $00F2_{hex}$: The third 8 bytes of the ORDER_ID (here: product designation) are sent. $00F3_{hex}$: The fourth 8 bytes of the ORDER_ID (here: product designation) are sent. The following product designations have been implemented: Type designation of the read/write head #Ident no.
RESET	0 → 1: The rising edge causes a Reset of the BL ident® system. If the status bit BUSY is set, the execution of the current command is aborted and the status bit DONE is set. The status bit ERROR and the two error message bytes (error code) of the process input data are deleted.
Byte_Count 0…2	Number of the bytes -1 that still have to be read (READ) or written (WRITE). 111 (7_{hex}) → 8 bytes are to be read or written.
Domain_Count_ 0…1	Address areas of the UHF tag banks (domain): 00: Reserved area 01: UII/EPC 1 0: TID 11: User area
AddrHi, AddrLo	Array of length 2 bytes. Represents the start address of the memory area on the tag which is to be accessed with the write or read command. The writable/readable start addresses of the tags can be ≠ 0. The manual BL ident® HF systems – Engineering (D500024) provides information on the writable/readable start address of the tag variants.
WRITE_DATA	Write data - Array of length 8 bytes.

8.3 Testing BLxx-2RFID-S modules with the DTM

The 2RFID-S modules can be tested with the DTM (Device Type Manager) via PACTware™. The functions of the DTM are displayed by right-clicking the RFID electronic modules in the project tree.

You can start the following functions:
- Parameters: Adapt parameters to the actual application
- Measured values: display of the data read by the RFID electronic module
- Simulation: Output parameter of the RFID electronic module for the function test
- Diagnosis: display of the diagnostic message of the RFID electronic modules or the entire RFID system

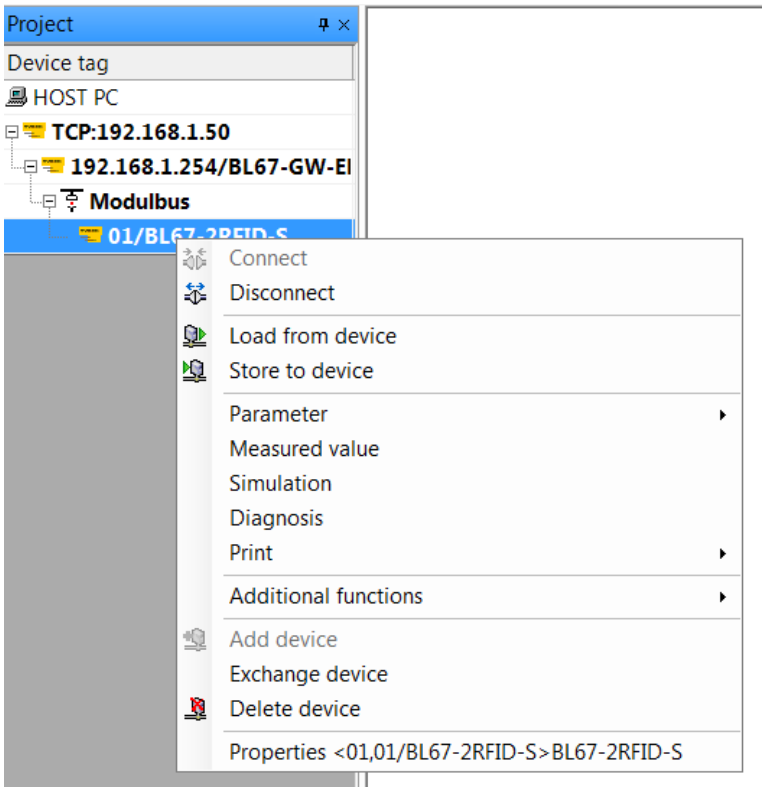


Fig. 115: DTM – Functions of the BLxx-S modules

8.3.1 BLxx-2RFID-S – Setting parameters

The following parameters can be set for each channel with the BLxx-2RFID-S modules:
- Operating mode
- UHF frequency band (only with UHF)
- UHF transmission signal (only with UHF)
- Bridging time
- Data arrangement
- Parameter set

➤ Establish the connection between host PC and BL ident® interface.
➤ Right-click the RFID electronic module.
➤ Choose Parameter > Parameterization or Online Parameterization.
➤ Set the parameters for each channel used.
➤ Click Accept.
➤ Carry out a voltage reset of the gateway.

NOTE
The gateway reads out the parameters of the RFID electronic modules after a voltage reset. Faulty parameters are also accepted by the gateway.

BLxx-2RFID-S – Bit assignment of the data bytes

Byte no	Bit							
	7	6	5	4	3	2	1	0
0	reserved (bit 7 must be set to 1)					Transmission level channel 1		
1	reserved (bit 7 must be set to 1)					Transmission level channel 2		
2	Operating mode channel 1		Transmission frequency channel 1		"0"			
3	Operating mode channel 2		Transmission frequency channel 2		"0"			
4	Error code	Tag type channel 1						
5	Bridging time channel 1							
6	Error code	Tag type channel 2						
7	Bridging time channel 2							

Parameters for HF application – Overview

Default values are shown in **bold** type.

Parameter name	Values	Description
Operating mode	**0 = Standard access**	The read/write head detects the tag type via a GET_SYSTEM_INFORMATION command. The automatic detection of the tag (see parameter Select tag type = automatic detection) is possible.
	1 = Fast access	Access is faster than with standard access. A GET_SYSTEM_INFORMATION command is not sent. The automatic tag detection is not possible (see Select tag type parameter).
Select Tag Type	**0 = Automatic detection**	The tag is detected by means of its UID (only valid with Philips I-CODE SLI SL2, Fujitsu MB89R118, TI Tag-it HF I Plus and Infineon SRF55V02P tag types).
	1 = Philips I-CODE SLI SL2	Selection of the tag used; the tag type used must be selected in all cases with Fast access mode.
	2 = Fujitsu MB89R118	
	3 = TI Tag-it HF I Plus	
	4 = Infineon SRF55V02P	
	5 = Philips I-CODE SLI S	
	6 = Fujitsu MB89R119	
	7 = TI Tag-it HF-I	
	8 = Infineon SRF55V01P	
	9 = Turck TW-R50-K8	
	10 = Melexis MLX90129	
	11 = NXP I-CODE SLI L	
	12 = Fujitsu MB89R112	
	13 = EM4233SLIC	
Bridging time	**0 = Use default value of the read/write head, normally 200 ms**	Set the bridging time, depending on the application
	1 = 4 ms	
	2 = 8 ms	
	…	
	255 = 1020 ms	
Data arrangement	**0 = Byte 1-2/13-14**	Defines the position of the error code in the data image. With word-based fieldbus systems such as Modbus TCP, choose the setting 1 = Byte 2-3/14-15
	1 = Byte 2-3/14-15	

Parameters for UHF applications – Overview

NOTE
With UHF only the functions of the RFID electronic modules can be set via the DTM. The WebConfig software application enables the extensive parameterization and configuration of the read/write heads. To connect with a PC we recommend the STW-RS485-USB interface converter (Ident no. 7030354) together with the STW-RS485-USB-PS power supply unit (Ident no. 7030355). This WebConfig software tool is only designed for users who wish to make more extensive settings to the read/write heads in addition to the parameter options via the DTM. Information on the WebConfig software is provided in the user manual BL ident® Software WebConfig for UHF Read/write heads" (D500010).

Default values are shown in **bold** type.

Parameter name	Values	Description	
Operating mode	**0 = Standard access**	With UHF the parameter must be set to 0 = Standard access.	
	1 = Fast access		
Transmission frequency	**0 = Band 1**	TN865… 865.7 MHz, channel 4	TN917… 917.3 MHz, channel 2
	1 = Band 2	TN865… 866.3 MHz, channel 7	TN917… 917.9 MHz, channel 5
	2 = Band 3	TN865… 866.9 MHz, channel 10	TN917… 918.5 MHz, channel 8
	3 = Band 4	TN865… 867.5 MHz, channel 13	TN917… 919.1 MHz, channel 11
Transmission level (ERP) If transmission level 8 is selected, the basic settings for the antennas and transmission output configuration are used which are defined in the WebConfig software application.		TN…-Q120L130-V1147	TN-Q175L200-H1147
	0 = Level 1	6 dBm	9 dBm
	1 = Level 2	9 dBm	12 dBm
	2 = Level 3	12 dBm	15 dBm
	3 = Level 4	15 dBm	18 dBm
	4 = Level 5	18 dBm	21 dBm
	5 = Level 6	21 dBm	24 dBm
	6 = Level 7	24 dBm	27 dBm
	7 = Level 8	max. 27 dBm	max. 30 dBm
Tag type selection	**0 = Automatic detection**	With BL ident® UHF the parameter must be set to 0 = automatic detection.	
Bridging time	adjustable between 0…255 (dec.) **Default: 0**	With UHF heads, the parameter defines the number of repeated write and read operations.	
Error code position	**0 = Byte 1-2/13-14**	The parameter defines the position of the error code in the data image. With word-based fieldbus systems such as Modbus TCP, choose the setting 1 = Byte 2-3/14-15.	
	1 = Byte 2-3/14-15		

8.3.2 HF applications – Setting the Mode parameter

➤ Choose between Standard access and Fast access from the drop-down menu.

8.3.3 HF applications – Selecting the Tag type parameter

➤ Choose between automatic detection or the used tag from the drop-down menu.

8.3.4 HF applications – Matching mode and tag type

The two parameters Mode and Tag type can be combined as follows:

Operating mode	Tag type
Standard access	Automatic detection
Standard access	Tag
Fast access	Tag

Combining Standard access and Automatic detection

➤ Select Standard access under Mode.
➤ Select Automatic detection under Tag type.
➥ The tag is automatically detected by the read/write head. The UID of the tag is read before access.

Combining standard access with a specific tag

➤ Select Standard access under Mode.
➤ Select the tag used under Tag type.
➥ Tags that cannot be detected by the read/write head can be accessed.

Combining fast access with a specific tag

➤ Under Mode select Fast access.
➤ Select the tag used under Tag type.
➥ Access to tags is faster because the tag type and the UID do not have to be read out. The specific properties of the tag used are known before access, the required UID is also transmitted with read/write operations.

NOTE
Fast access mode does not support the Philips SL1 and Turck TW-R50-K8 tags.

8.3.5 HF applications – Setting the Bridging time parameter

Due to the expansion of the HF transmission zone the tag may drop out momentarily during a write or read operation and then later return again. The period between the drop out and the return to the transmission zone must be bridged so that the write or read operation is completed. The bridging time is the time between the dropout and the return to the detection range. The bridging time parameter takes up 1 byte in the parameter data image (0…255).
The bridging time parameter depends on the components used, the write/read distances, the speed of the tag to the read/write head and other external factors.

The following figure shows the typical characteristics of the sensing range and the path covered by the read/write head. A shows the section to be bridged:

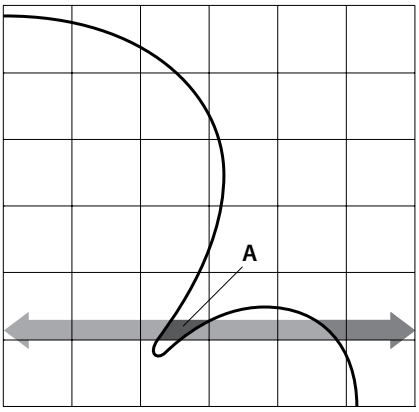


Fig. 116: Detection range of a read/write head

Retaining the default setting

➤ Retaining default setting 0: If the commissioning is successful, the parameter does not have to be adjusted to the application. If the commissioning is not successful, the error message "Dwell time of the tag in the sensing range was insufficient to process the command successfully" (error code: DW#16#E1FE02xx).
➤ If the error message appears, check whether the recommended distances can be achieved by reducing the speed or data volume. The information "Recommended distance" and "Maximum distance" is provided in the product-specific data sheet as well as in the RFID engineering manual (D500024). If this is not possible, the bridging time must be adapted to the application.

Adapting the bridging time to the application

➤ Measure the required bridging time directly on location. The LEDs of the read/write head and the TP status bit of process input data indicate whether the tag is in the sensing range or not.
➤ Enter the required bridging time in the DTM.

8.3.6 HF applications – Setting the Data arrangement parameter

The Data arrangement parameter defines the position of the error code in the data image.

➤ With word-based fieldbus systems such as Modbus TCP, choose the setting 1 = Byte 2-3/14-15.

8.3.7 UHF applications – Setting the Mode parameter

➤ Select Standard access from the drop-down menu. Standard access is not supported with UHF applications.

8.3.8 UHF applications – Setting the UHF frequency band parameter

The UHF frequency band parameter can be set for the TN865-… and TN917-… UHF read/write heads.
➤ Select the required frequency band from the drop-down menu.

8.3.9 UHF applications – Setting the UHF transmission level

The UHF transmission level parameter is used for selecting the transmission level 1 to 8 for the UHF read/write heads. Selecting transmission level 8 accepts the basic settings from the Web-Config parameter tool.
➤ Select the required transmission level from the drop-down menu.

The basic default settings of the read/write heads are as follows:

Parameters	TN…-Q120L130-V1147	TN…-Q175L200-H1147
Transmission frequency	Band 1 (865.7 MHz with TN865… and 917.3 MHz with TN 917…)	Band 1 (865.7 MHz with TN865… and 917.3 MHz with TN 917…)
Transmission level ERP [dBm] – circular	27	30

8.3.10 UHF applications – Selecting the Tag type parameter

➤ Select Automatic detection from the drop-down menu.

8.3.11 UHF applications – Setting the Bridging time parameter

The Bridging time parameter with UHF applications corresponds to the number of automatic retries for a read or write operation before the read or write operation is reported as failed.

Example:
- The bridging time parameter is 0. The tag is to be read but this is not possible due to a fault. The read operation is not repeated and has therefore failed.
- The bridging time parameter is 1. The tag is to be read but this is not possible due to a fault. The read operation is repeated automatically once, the data could be read. The read operation is successful.

➤ Enter the number of automatic retries.

NOTE
The setting of the Bridging time parameter to 20 has proved in practice to be useful for UHF applications.

8.3.12 UHF applications – Setting the Data arrangement parameter

The Data arrangement parameter defines the position of the error code in the data image.

➤ With word-based fieldbus systems such as Modbus TCP, choose the setting 1 = Byte 2-3/14-15.

8.4 Reading measured values with the DTM

The Measured values function enables the reading of all input values which the RFID electronic module has detected.

➤ Establish the connection between host PC and BL ident® interface.
➤ Right-click the RFID electronic module.
➤ Choose the Measured values function.
➥ The connection between host PC and RFID interface is active. The DTM of the BLxx-2RFID-S module indicates active communication with a green icon.

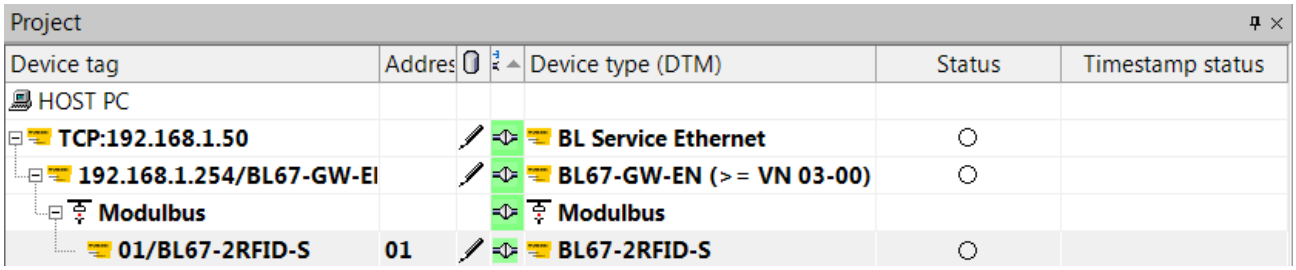


Fig. 117: Active connection between BL ident® interface and the host PC

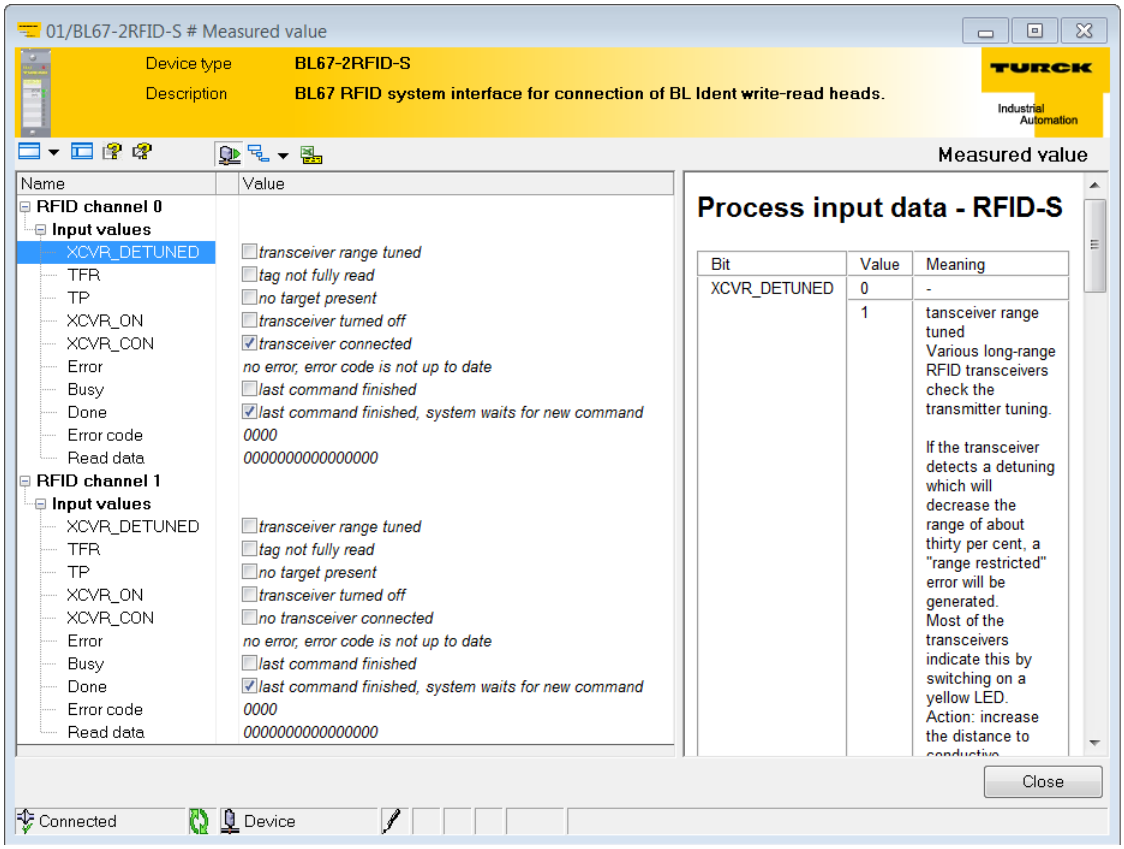


Fig. 118: Measured values window

8.5 Testing functions – Simulation

The Simulation function enables the values of the output parameters of the RFID electronic modules to be set directly using the Force mode in order to test and simulate the operation of the RFID system.

➤ Establish the connection between host PC and BL ident® interface.
➤ Right-click the RFID electronic module.
➤ Choose the Simulation function.

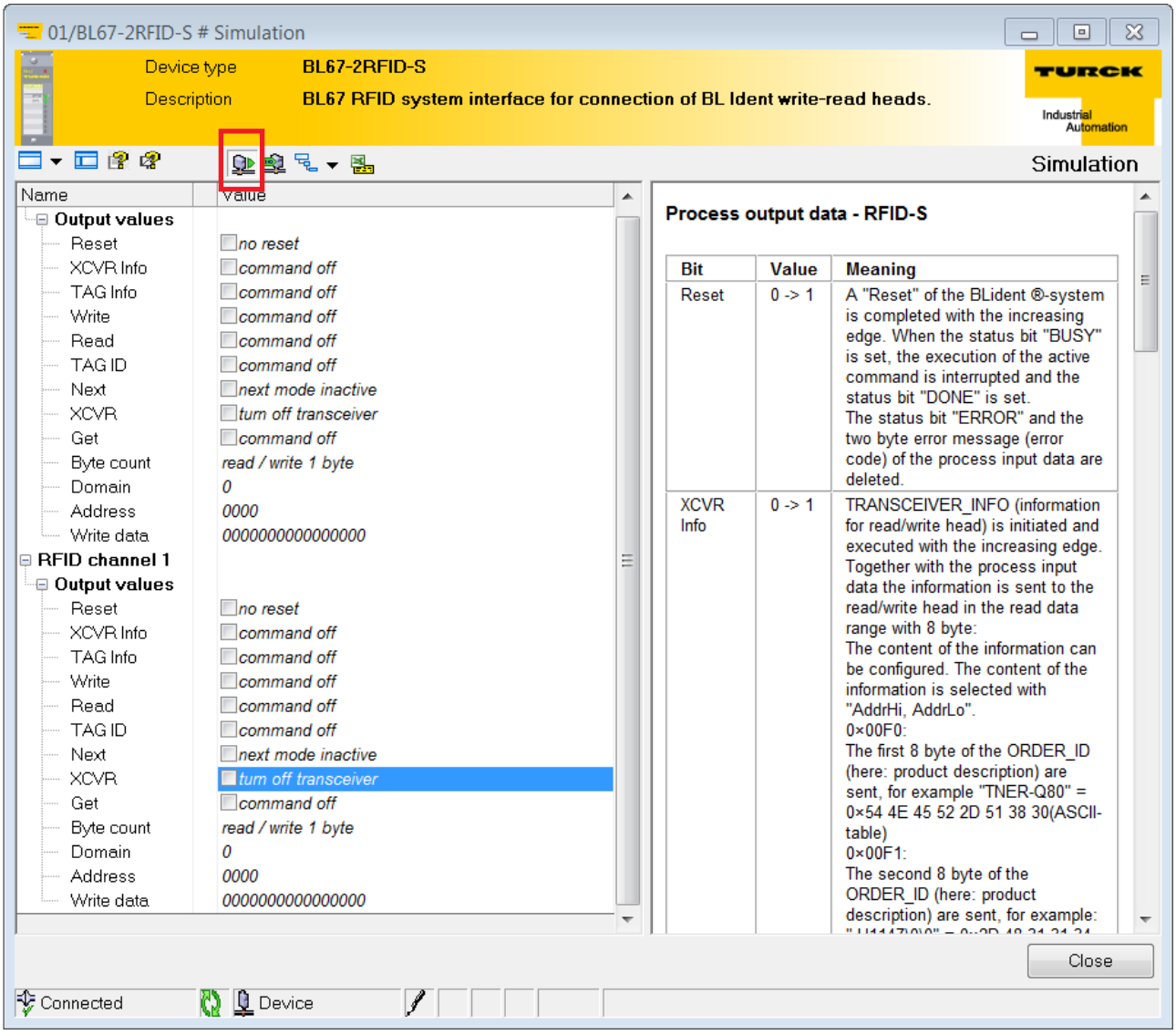


Fig. 119: Simulating operation

➤ Start Force mode by double-clicking an output value or via the Force Mode button (highlighted in red).
➤ Confirm the subsequent prompt with OK.

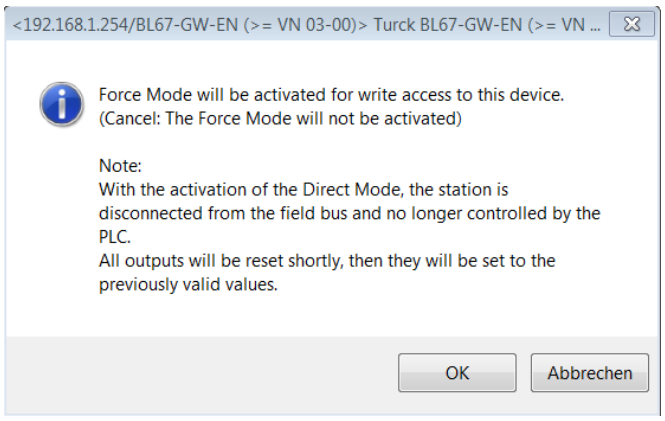


Fig. 120: Prompt: Activating Force mode

➥ Force mode is started and the values can be written directly to the BLxx-2RFID-S module. In Force mode the BL ident® interface is automatically disconnected from the PLC controlled by the host PC.
➤ Change the required output values.

8.6 Performing diagnostics with the DTM

The Diagnose DTM function enables the display of diagnostic messages for the entire RFID system as well as the individual RFID electronic modules.

Examples of global error messages for the RFID system:
- Faulty communication via the module bus
- Insufficient power supply

Examples of special error messages on the RFID electronic modules:
- Overcurrent
- Obsolete firmware
- Insufficient power supply

➤ Establish the connection between host PC and BL ident® interface.
➤ Right-click the RFID electronic module.
➤ Choose the Diagnose function.
➥ The connection between host PC and RFID interface is active. The DTM of the BLxx-2RFID-S module indicates active communication with a green icon.

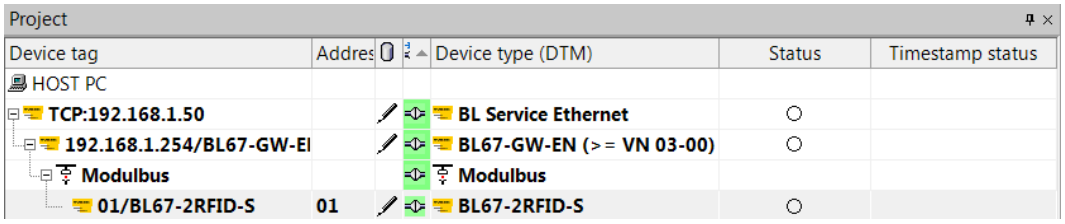


Fig. 121: Active connection between BL ident® interface and the host PC

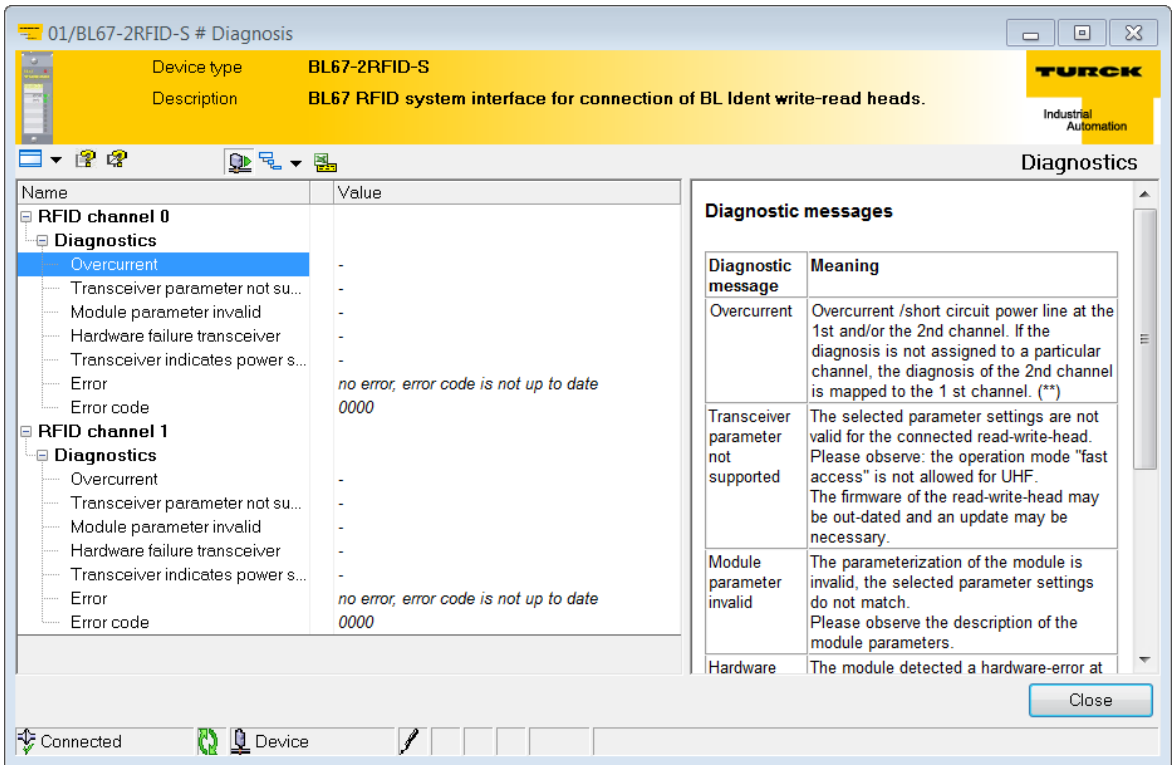


Fig. 122: Diagnosis window

9 Operation

9.1 LED indication functions

9.1.1 BL20 gateways

Standard gateways

LED	Status	Meaning	Remedy
IOs	OFF	No gateway power supply.	Check the system power supply present on the gateway.
	green	The configured components match the module bus stations present; Communication active.	
	green flashing, 1 Hz	Force mode active in the DTM	Deactivate the Force mode in the DTM.
	green flashing, 4 Hz	Too many modules connected to the gateway.	Remove surplus modules.
	red	Gateway not ready Possible causes: – Power supply V_{CC} too low – too many modules on gateway – short-circuit in connected module – Gateway faulty	– Check the system power supply present on the gateway and the connections. – Remove surplus modules. – Replace the gateway.
	red flashing, 1 Hz	The configured components do not match the module bus stations present. The gateway is not detecting the electronic modules automatically.	– Compare the configured components with the module bus stations present. – Check the setup of the interface for faulty or incorrectly fitted electronic modules.
	red flashing, 4 Hz	No communication via the module bus	Fit at least one electronic module.
	red/green flashing, 1 Hz	The configured components do not match the module bus stations present. The gateway detects the electronic modules automatically, the data exchange is active.	Check the interface for new unconfigured modules.
GW	OFF	No gateway power supply.	Check the system power supply present on the gateway.
	green	Gateway operational	
	green flashing, 1 Hz and LED IOs: red	Firmware not up-to-date or faulty	– Reload the firmware. – Contact your TURCK customer advisor.
	green flashing, 4 Hz	Hardware error, firmware active	Replace the gateway.
	red	Hardware error, firmware faulty Gateway not ready Possible causes: – Power supply V_{CC} too low – too many modules on gateway – short-circuit in connected module – Gateway faulty	– Check the system power supply present on the gateway and the connections. – Remove surplus modules if necessary. – Replace the gateway.
LINK/ACT	OFF	No Ethernet Link	Check the Ethernet connection.
	green	Ethernet link established, 100 Mbit/s	
	green flashing	Ethernet traffic 100 Mbit/s	
	yellow	Ethernet link established, 10 Mbit/s	
	yellow flashing	Ethernet traffic 10 Mbit/s	

LED	Status	Meaning	Remedy
MS	green	Logical connection to a master established	
	green flashing	Gateway operational	
	red	Gateway indicates error: IP address conflict Gateway in RESTORE mode F_Reset activated	Check the IP addresses in the network.
	red/green flashing	Auto-negotiation and/or DHCP/BootP search of the settings	Waiting for auto-negotiation and/or addressing.

BL20-ECO gateways

NOTE
The BL20-ECO gateways have different LEDs for displaying fieldbus communication, depending on the hardware version. With gateways before hardware version VN03-00 the fieldbus communication is indicated via the MS LED, with gateways from version VN 03-00 via 2 LEDs BUS and ERR.

LED	Status	Meaning	Remedy
IOs	OFF	No gateway power supply.	Check the system power supply present on the gateway.
	green	The configured components match the module bus stations present; Communication active.	
	green flashing, 1 Hz	Force mode active in the DTM	Deactivate the Force mode in the DTM.
	green flashing, 4 Hz	Too many modules connected to the gateway.	Remove surplus modules.
	red	Gateway not ready Possible causes: – Power supply V_{CC} too low – too many modules on gateway – short-circuit in connected module – Gateway faulty	– Check the system power supply present on the gateway and the connections. – Remove surplus modules. – Replace the gateway.
	red flashing, 1 Hz	The configured components do not match the module bus stations present. The gateway does not adapt the electronic modules automatically.	– Compare the configured components with the module bus stations present. – Check the setup of the interface set for faulty or incorrectly fitted electronic modules.
	red flashing, 4 Hz	No communication via the module bus	Fit at least one electronic module.
	red/green flashing, 1 Hz	The configured components do not match the module bus stations present. The gateway adapts the electronic modules automatically, the data exchange is active.	Check the interface set for new unconfigured modules.
GW	OFF	No gateway power supply.	Check the system power supply present on the gateway.
	green	Gateway operational	
	green flashing, 1 Hz and LED IOs: red	Firmware not up-to-date or faulty	– Reload the firmware. – Contact your TURCK customer advisor.
	green flashing, 4 Hz	Hardware error, firmware active	Replace the gateway.
	red	Hardware error, firmware faulty Gateway not ready Possible causes: – Power supply V_{CC} too low – too many modules on gateway – short-circuit in connected module – Gateway faulty	– Check the system power supply present on the gateway and the connections. – Remove surplus modules if necessary. – Replace the gateway.
LINK/ACT	OFF	No Ethernet Link	Check the Ethernet connection.
	green	Ethernet link established, 100 Mbit/s	
	green flashing	Ethernet traffic 100 Mbit/s	
	yellow	Ethernet link established, 10 Mbit/s	
	yellow flashing	Ethernet traffic 10 Mbit/s	

LED	Status	Meaning	Remedy
BUS	green	Logical connection to a master established	
	green flashing	Gateway operational	
	red	Gateway indicates error: – IP address conflict – Gateway in RESTORE mode – F_Reset activated	Check the IP addresses in the network.
	red/green flashing	Auto-negotiation and/or DHCP/BootP search of the settings	Waiting for auto-negotiation and/or addressing.
ERR	OFF	No fault present.	
	red	Diagnostic message of the gateway or an electronic module present	Check the diagnostic messages.

9.1.2 BL67 gateways

LED	Status	Meaning	Remedy
IOs	OFF	No gateway power supply.	Check the system power supply present on the gateway.
	green	The configured components match the module bus stations present; Communication active.	
	green flashing, 1 Hz	Force mode active in the DTM	Deactivate the Force mode in the DTM.
	red	Gateway not ready Possible causes: – too many modules on gateway – short-circuit in connected module – Gateway faulty	Check the system power supply present on the gateway and the connections. Remove surplus modules. Replace the gateway.
	red flashing, 1 Hz	The configured components do not match the module bus stations present. The gateway does not adapt the electronic modules automatically.	– Compare the configured components with the module bus stations present. – Check the setup of the interface set for faulty or incorrectly fitted electronic modules.
	red flashing, 4 Hz	No communication via the module bus	Fit at least one electronic module.
	red/green flashing, 1 Hz	The configured components do not match the module bus stations present. The gateway adapts the different modules, the data exchange is active. SET button actuated with V_O missing.	Check the interface set for new unconfigured modules. Check the system power supply present.
GW	OFF	No gateway power supply.	Check the system power supply present on the gateway.
	green	Gateway operational	
	green flashing, 1 Hz	Force mode active in the DTM	Deactivate the Force mode in the DTM.
	green flashing, 1 Hz and LED IOs: red	Firmware not up-to-date or faulty	– Reload the firmware. – Contact your TURCK customer advisor.
	green flashing, 4 Hz	Hardware error, firmware active	Replace the gateway.
	red	Hardware error, firmware faulty Gateway not ready Possible causes: – Power supply V_{CC} too low – too many modules on gateway – short-circuit in connected module – Gateway faulty	– Check the system power supply present on the gateway and the connections. – Remove surplus modules if necessary. – Replace the gateway.
	red flashing, 1 Hz	Wink command received	
ERR	OFF	System running fault-free	
	red	Diagnostic message of the gateway or an electronic module present	Check the diagnostic messages.
VCC	green	Power supply V_{CC} fault-free	
	OFF	Gateway not supplied VCC < 18 V or V_{CC} > 30 V (possibly short circuit)	Check the power supplies present on the gateway.

LED	Status	Meaning	Remedy
V_O	green	Output power supply V_O fault-free	
	green flashing, 1 Hz	Undervoltage V_O, system running	Check the power supplies present on the gateway.
	green flashing, 4 Hz	Overvoltage V_O, system running	
	OFF	Output power supply V_O missing	
V_I	green	Input power supply V_I fault-free	
	red	Short-circuit or overload on sensor power supply V_{sens}; Sensor supply disconnected	Rectify the short circuit or overload. The gateway restarts automatically as soon as the error is no longer present.
	green flashing, 1 Hz	Undervoltage V_I, system running	Check the power supplies present.
	green flashing, 4 Hz	Overvoltage V_I, system running	
	OFF	Input power supply V_I missing	
LINK/ACT	OFF	No Ethernet Link	Check the Ethernet connection.
	green	Ethernet link established, 100 Mbit/s	
	green flashing	Ethernet traffic 100 Mbit/s	
	yellow	Ethernet link established, 10 Mbit/s	
	yellow flashing	Ethernet traffic 10 Mbit/s	
BUS	green	Logical connection to a master established	
	green flashing	Gateway operational	
	red	Gateway indicates error: – IP address conflict – Gateway in RESTORE mode – F_Reset activated	Check the IP addresses in the network.
	red/green flashing	Auto-negotiation and/or DHCP/BootP search of the settings	Waiting for auto-negotiation and/or addressing.

9.1.3 RFID electronic modules

LED	Status	Meaning	Remedy
DIA	OFF	Normal data exchange	
	red	Module bus communication has failed	Check whether more than two adjacent electronic modules have been removed. Modules located between the gateway and the module concerned are relevant.
	red flashing, 0.5 Hz	Diagnostics present	
RW0 RW1	OFF	No tag in receive range	
	green	Tag in receive range	
	green flashing, 2 Hz	Data transmission from/to the tag	
	red	Channel error, details in the diagnostic message	
	red flashing, 2 Hz	Short-circuit of read/write head power supply	

9.1.4 BL compact interfaces

Station LEDs

LED	Status	Meaning	Remedy
IOs	OFF	Interface not supplied with power.	Check the system power supply present at the interface.
	green	Communication active	
	green flashing	Force mode active in the DTM	Deactivate the Force mode in the DTM.
	red	Interface not operational, no power supply present	Check the system power supply present at the interface and the connections.
	red flashing, 1 Hz	The configured components do not match the components present.	Compare the configured components with the components present.
	red flashing, 4 Hz	No communication via the module bus	
BUS	OFF	No fieldbus communication active	
	green	Fieldbus communication active	
	green flashing	No fieldbus communication active, device operational	
	red	Bus error, no data exchange	Check the bus connection
	red flashing	Wink command received	
	yellow	DHCP/BootP search of the settings	
LINK/ACT	OFF	No Ethernet Link	Check the Ethernet connection.
	green	Ethernet link established	
	green flashing	Data transmission via Ethernet active	
	yellow	Ethernet link established, 100 Mbit/s	

I/O LEDs

LED	Status	Meaning	Remedy
DIA	OFF	Normal data exchange	
	red	Module bus communication has failed	Check whether more than two adjacent electronic modules have been removed. Modules located between the gateway and the module concerned are relevant.
	red flashing, 0.5 Hz	Diagnostics present	
RW0 RW1	OFF	No tag in receive range	
	green	Tag in receive range	
	green flashing, 2 Hz	Data transmission from/to the tag	
	red	Channel error, details in the diagnostic message	
	red flashing, 2 Hz	Short-circuit of read/write head power supply	

9.1.5 HF read/write heads

Depending on the device type, the HF read/write heads are provided with different LEDs, e.g. to indicate the operating voltage and the operating state.

LED 1	LED 2	Function
continuously lit		Operating voltage switched on
flashing (1 Hz)		HF field switched off
flashing (2 Hz)		Tag within the detection range
	lit yellow (with read/write heads with automatic tuning)	less than 50 % range, too much metal in the environment

9.1.6 UHF read/write heads

LED 1 (green)	LED 2 (yellow)	LED 3 (red)	Function
off	off	off	Operating voltage switched off
white	white	white	Startup
continuously lit	off	off	Operating voltage switched on, radio field switched off, no internal error
continuously lit	continuously lit	off	Operating voltage switched on, radio field switched on, no internal error
continuously lit	continuously lit	continuously lit	Operating voltage switched on, radio field switched on, internal error
flashing	off	off	Access to the tag successful
flashing	continuously lit	off	Tag located in the radio field
Running light: green > yellow > red			Test mode

9.2 Diagnostic messages – RFID electronic modules

The error and warning code of an RFID electronic module is transferred with two bytes of the process input data.

Byte no.	Bit							
	7	6	5	4	3	2	1	0
0	DONE	BUSY	ERROR	XCVR_CON	XCVR_ON	TP	–	res.
1		Error code (2 bytes)						LSB
2	MSB							
3	res.	res.	res.	res.	res.	res.	res.	res.
4	8 bytes read data (READ_DATA)							
5								
6								
7								
8								
9								
10								
11								

In the table below, the first place of the error code in bold type is represented by the 2nd byte of the process input data, the two last places in bold type by the 3rd byte.
Example: DW#16#E**1**[2nd byte process input data]FE**01**[3rd byte process input data]xx
The following table shows the meaning of the error codes:

Error code	Meaning
DW#16#E**1**FE**01**xx	Tag memory error (e.g. CRC error).
DW#16#E**1**FE**02**xx	Dwell time of the tag in the sensing range was insufficient to process the command successfully.
DW#16#E**1**FE**03**xx	The stated address range or command does not fit the tag type used.
DW#16#E**1**FE**04**xx	Tag is faulty and must be replaced.
DW#16#E**1**FE**08**xx	Tag in the detection range does not have the expected UID/UII.
DW#16#E**1**FE**09**xx	Tag does not support the current command.
DW#16#E**1**FE**0A**xx	At least one part of the stated area in the tag is write protected.
DW#16#E**1**FE**80**xx	Tag reporting a non-specified error (undefined/general error per ISO 15693).
DW#16#E**1**FEFFxx	Tag reporting an unknown error (error code not defined in ISO 15693).
DW#16#E**2**FE**01**xx	Communication time between tag and read/write head exceeded.
DW#16#E**2**FE**02**xx	Too many tags in the detection range.
DW#16#E**2**FE**80**xx	CRC error at the air interface. The radio connection between the tag and the read/write head is disturbed (e.g. due to EMC problems).
DW#16#E**2**FEFFxx	Read/write head reports unknown error.
DW#16#E**4**FE**01**xx	Supply of the read/write head switched off due to increased current consumption (e.g. short-circuit).
DW#16#E**4**FE**03**xx	Antenna or transmitter of the read/write head is switched off.
DW#16#E**4**FE**04**xx	Overflow of the command memory buffer – more than one command flag set within the process data.
DW#16#E**4**FE**06**xx	A parameter of the current command is not supported.
DW#16#E**4**FE**07**xx	Unspecified error was reported by the cyclical status word (e.g. antenna out of operation). The error is independent of the actual command.

Error code	Meaning
DW#16#E**4**FE**80**xx	No read/write head connected.
DW#16#E**4**FE**81**xx	The read/write head is faulty.
DW#16#E**4**FE**82**xx	Command to read/write head is faulty.
DW#16#E**4**FE**84**xx	Telegram content invalid (with HF tags of type TW-R22-HT-B64). Range write-protected or not present.
DW#16#E**4**FE**88**xx	Insufficient power supply of the read/write head.
DW#16#E**4**FE**89**xx	The read/write head reports a permanent CRC error on the RS485 cable. Check the cable for EMC problems.
DW#16#E**4**FE**8A**xx	The RFID electronic module reports permanent CRC errors on the RS485 cable. Check the cable for EMC problems.
DW#16#E**4**FE**90**xx	A command transferred via Get is not known by the read/write head.
DW#16#E**4**FEFDxx	Parameter setting impermissible.
DW#16#E**4**FEFExx	The selected parameter settings do not match the connected read/write head. The firmware of the read/write head may be out of date and an update may be required.

9.2.1 Diagnostics via the DTM

Diagnostic byte and bit		DTM name
Diagnostic channel 1		
0	0	reserved
	1	reserved
	2	Ident overcurrent: The power supply of the read/write head is switched off.
	5	Software update for read/write head required
	6	Invalid parameter
1	0	Transceiver hardware error
	1…2	reserved
	3	Transceiver power supply error
	4…7	reserved
Diagnostic channel 2		
2	0	reserved
	1	reserved
	2	Ident overcurrent: The power supply of the read/write head is switched off
	5	Software update for read/write head required
	6	Invalid parameter
3	0	Transceiver hardware error
	1…2	reserved
	3	Transceiver power supply error
	4…7	reserved

10 Troubleshooting

Faults of the BL ident® system are reported by the system components. The meaning of the diagnostic messages is provided in the chapter Operation.
Information on EMC interference and possible remedies are provided in the RFID Systems Engineering User Manual (D500024).

11 Maintenance

11.1 Updating the firmware

NOTE
The user can only update the firmware of the gateways. Contact Turck Service for a firmware update of the read/write heads or the RFID electronic modules.

The current firmware is provided as a ZIP file on the Internet at www.turck.de. To update the firmware you need the FDT PACTware™ and the DTM of the gateway used.

➤ Download the firmware from www.turck.de.
➤ Unpack the ZIP file on your PC.
➤ Connect the gateway to a host PC via the Ethernet interface.
➤ Launch PACTware™.
➤ Right-click Host PC.
➤ Choose Add Device.

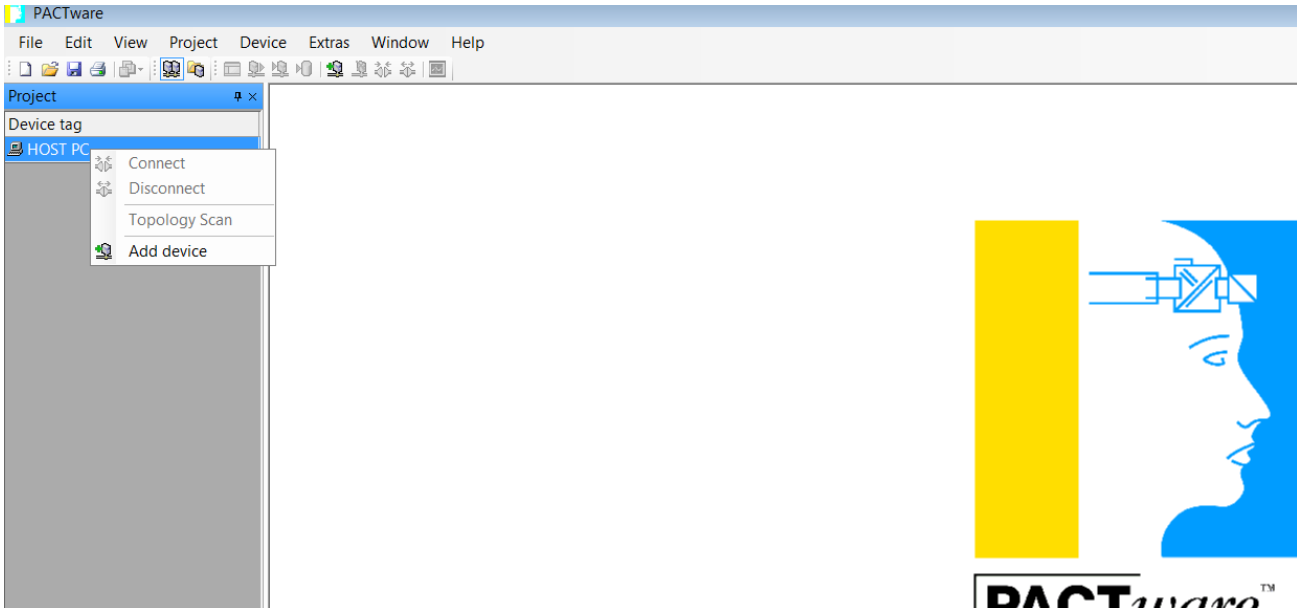


Fig. 123: PACTware™ – Adding a device

➤ Add BL Service Ethernet to the project tree.

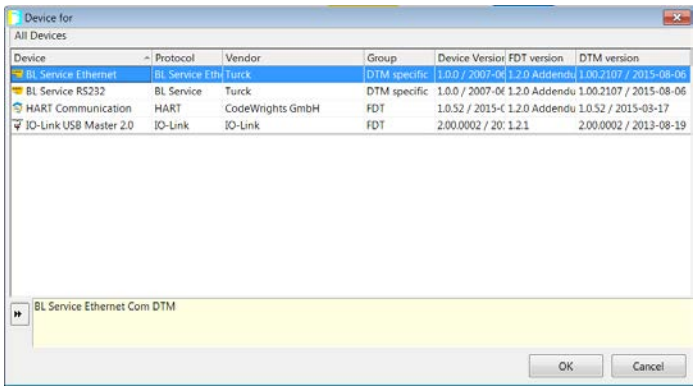


Fig. 124: Adding BL Service Ethernet to the project tree

➤ Right-click the device to be added.
➤ Open the Bus Address Management.

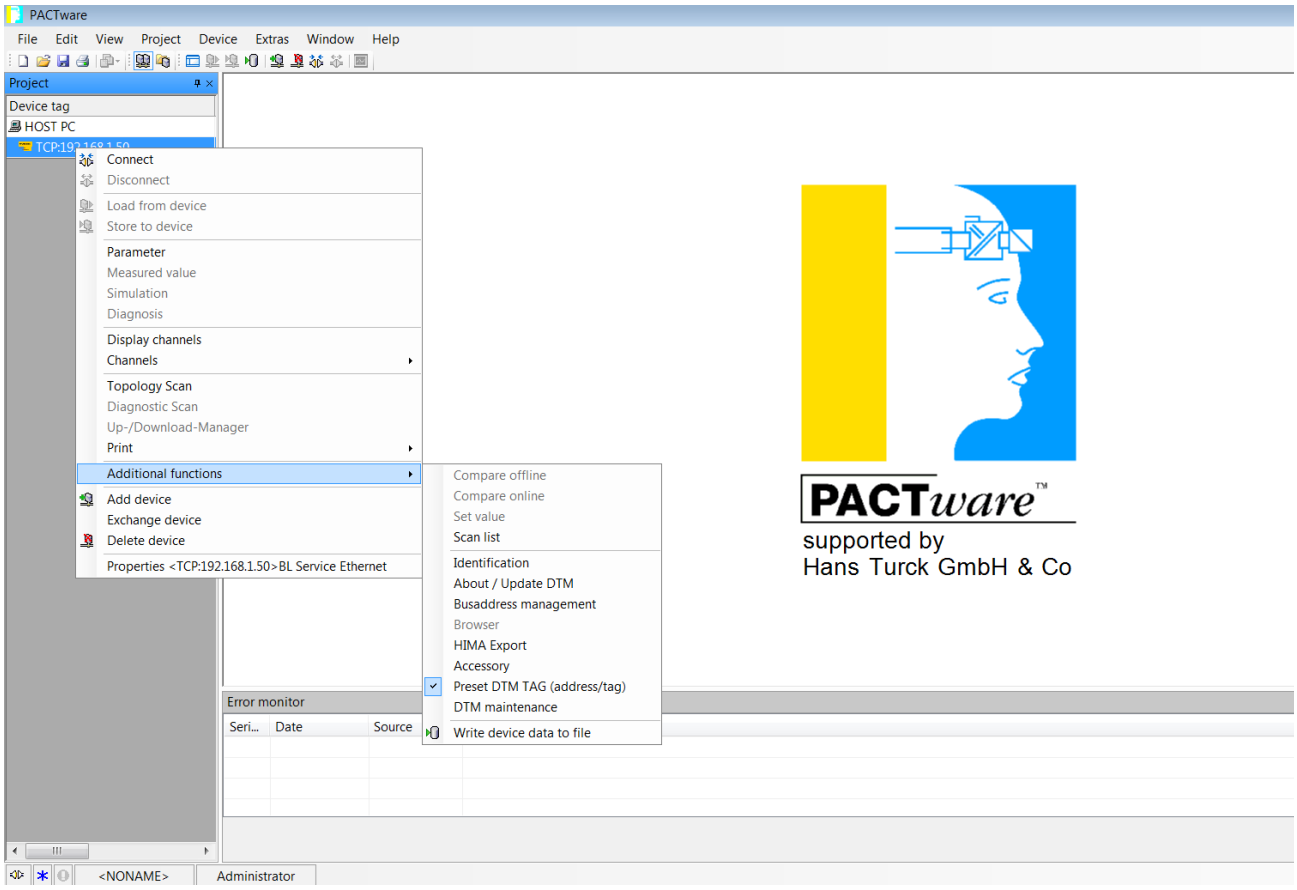


Fig. 125: Opening Bus Address Management

➤ Click the following icon (marked in red) to search for connected gateways

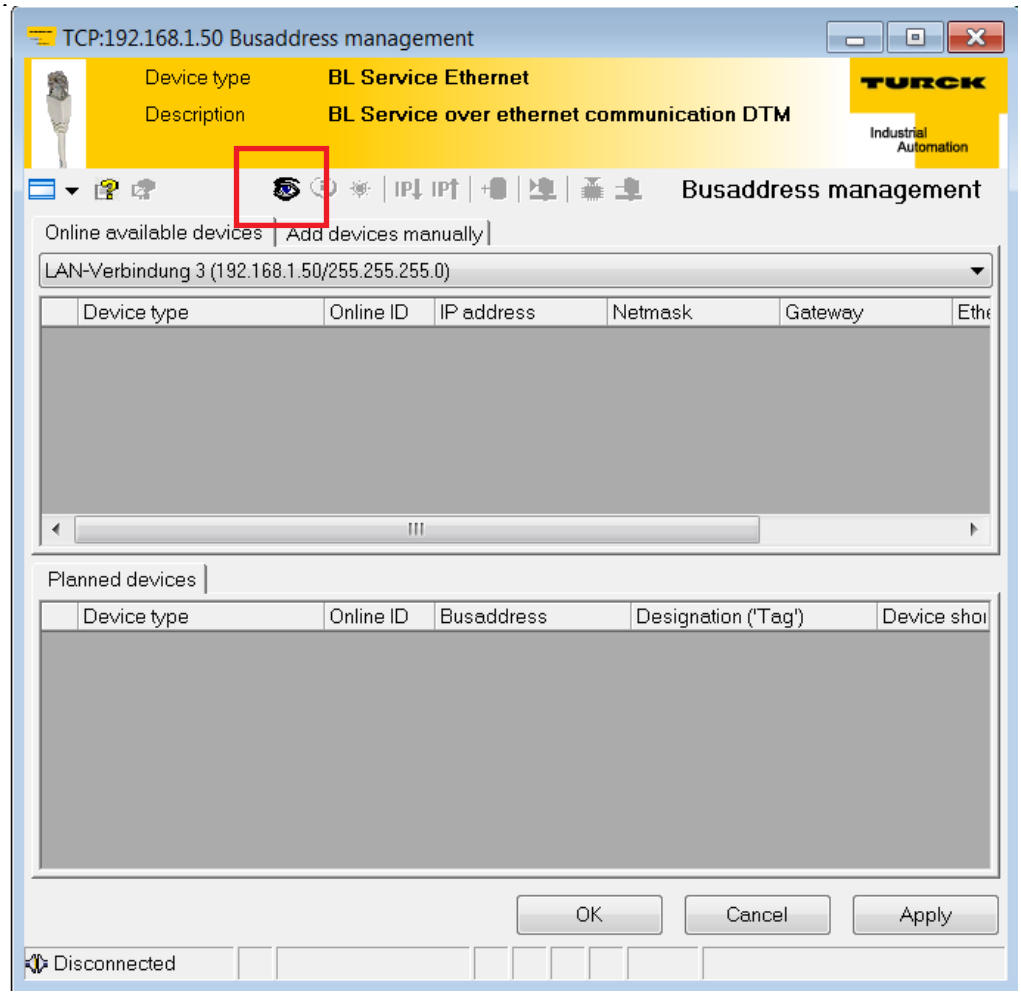


Fig. 126: Search function in the Bus address management

➤ Select the required gateway.
➤ Click the Info icon (highlighted in red) to display information on the latest firmware version.

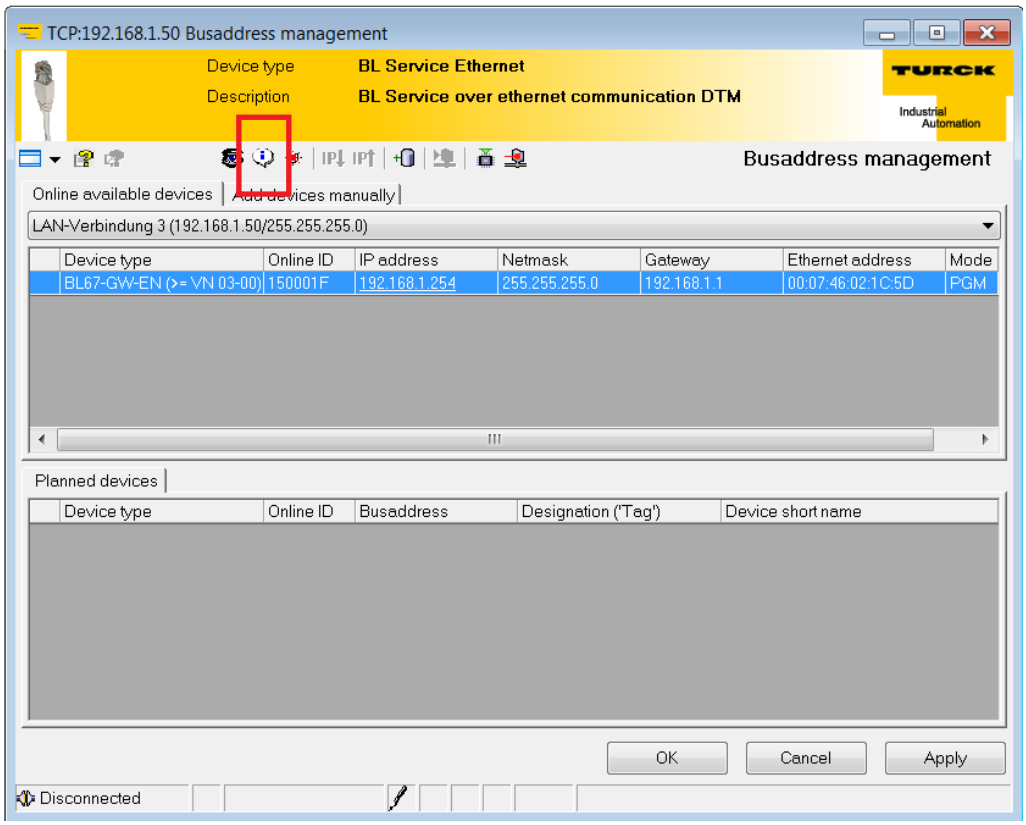


Fig. 127: Info icon

➤ Click the Firmware Download icon to update the firmware.

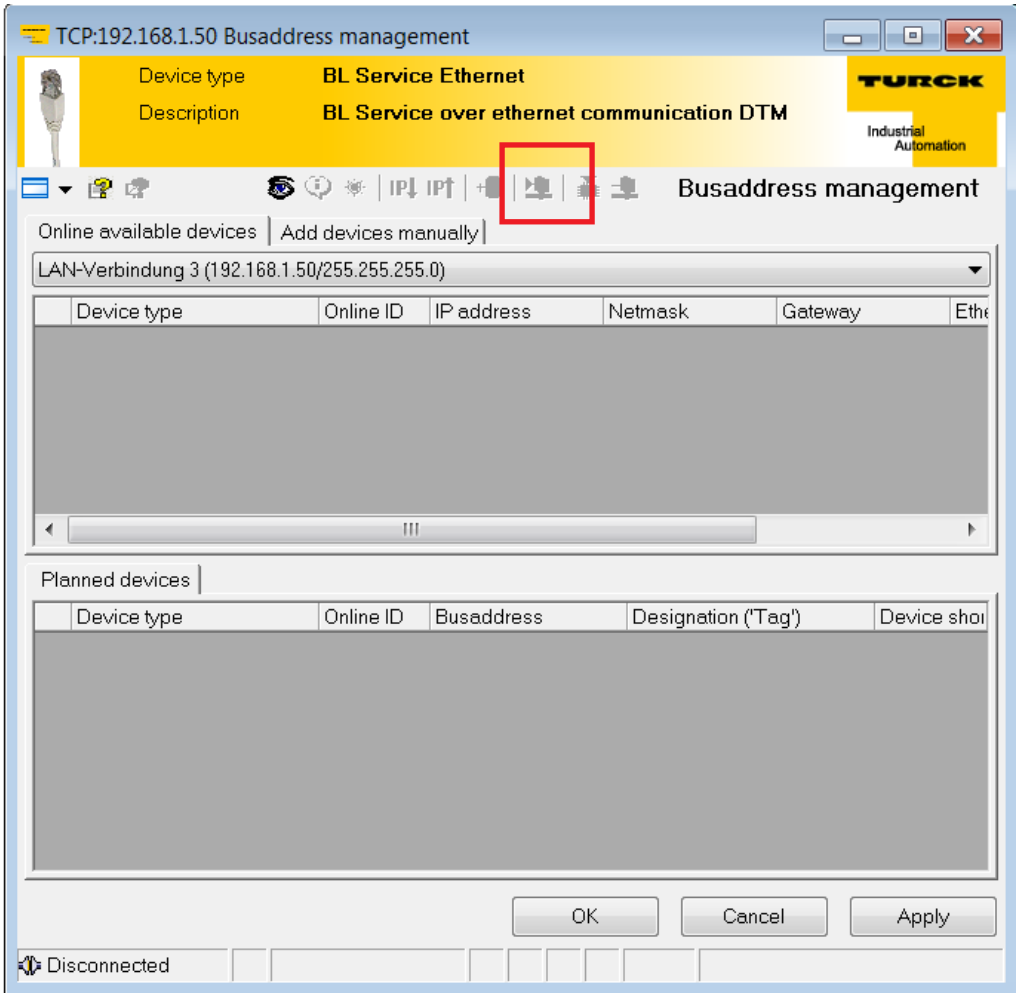


Fig. 128: Firmware Download icon

➤ Select the unpacked firmware file.
➤ Click Open.
➥ The current firmware is loaded in the gateway.

11.2 Replacing electronic modules

➤ Disconnect the BL ident® interface from the power supply.
➤ Detach the electronic module to be replaced from the base module.

NOTE
The BL ident® electronic modules are protected from incorrect mounting by a two-section coding element. The electronic module is supplied with the coding element fitted on the bottom. After the initial mounting, the bottom section of the coding element remains automatically in the corresponding recess of the base module.

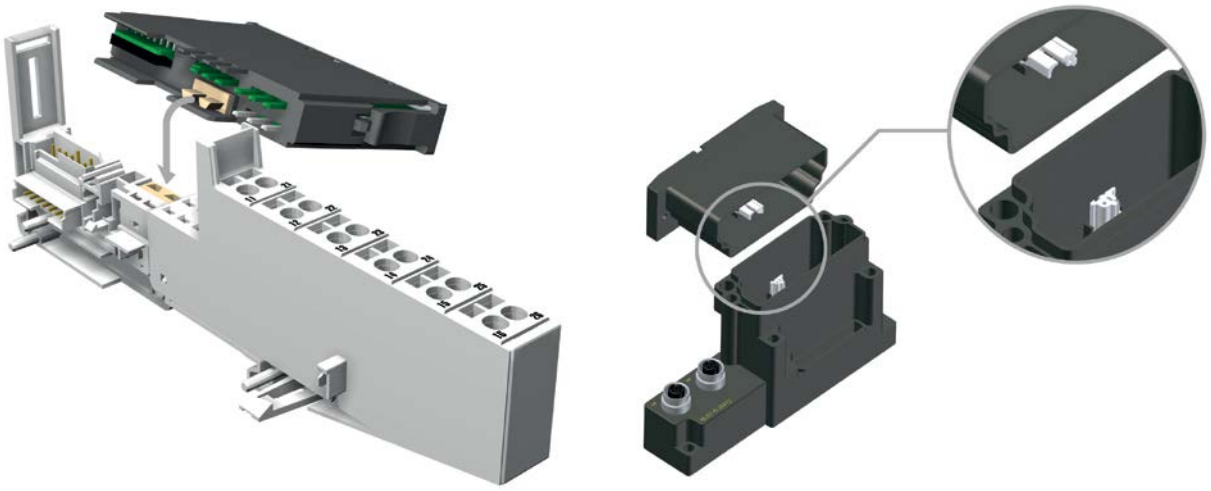


Fig. 129: Replacing electronic modules – Coding element (right: BL20 interfaces, left: BL67 interfaces)

➤ Remove the bottom section of the coding element from the electronic module.
➤ Mount the electronic module.
➤ Connect the interface to the power supply.
➤ Press the SET button (BL67 gateways) or actuate the CFG-DIP switch (BL20 gateways) to accept the actual configuration to the memory of the gateway.

12 Repair

The system must not be repaired by the user. If a device is faulty, decommission it and send it to Turck. Observe here the specific warranty conditions agreed with the shipment.

12.1 Returning devices

If a device has to be returned, bear in mind that only devices with a decontamination declaration will be accepted. This is available for download at
http://www.turck.de/static/media/downloads/01_Declaration_of_decontamination_EN.pdf
and must be completely filled in, and affixed securely and weather-proof to the outside of the packaging.

13 Decommissioning

➤ Disconnect the interface from the power supply.
➤ Undo the connections between the system components.

14 Disposal

The devices are designed for installation in large-scale industrial installations and equipment. The devices must be disposed of correctly and must not be included in normal household garbage.

15 Appendix: BLxx-2RFID-S module – Flow charts

15.1 Flow charts for the operation of the BLxx-2RFID-S module

The following flow charts provide an overview of the different commands and states of the BLxx-2RFID-S RFID electronic module.

NOTE
The scanning of the parameters DONE, ERROR, TP etc. must always be based on a signal change (edge signal).

15.1.1 Basic state

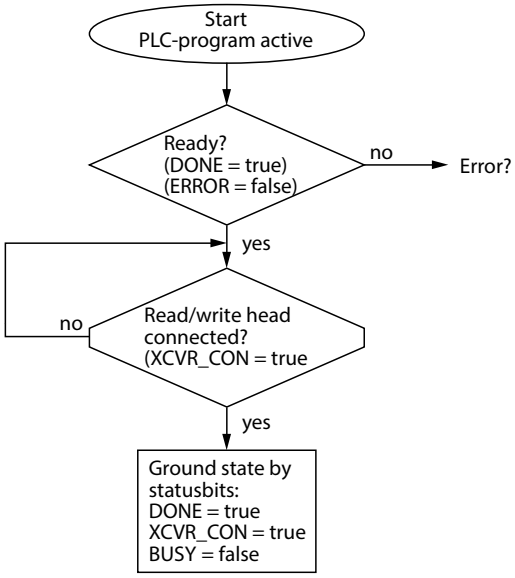


Fig. 130: Basic state flow chart

15.1.2 Fault state

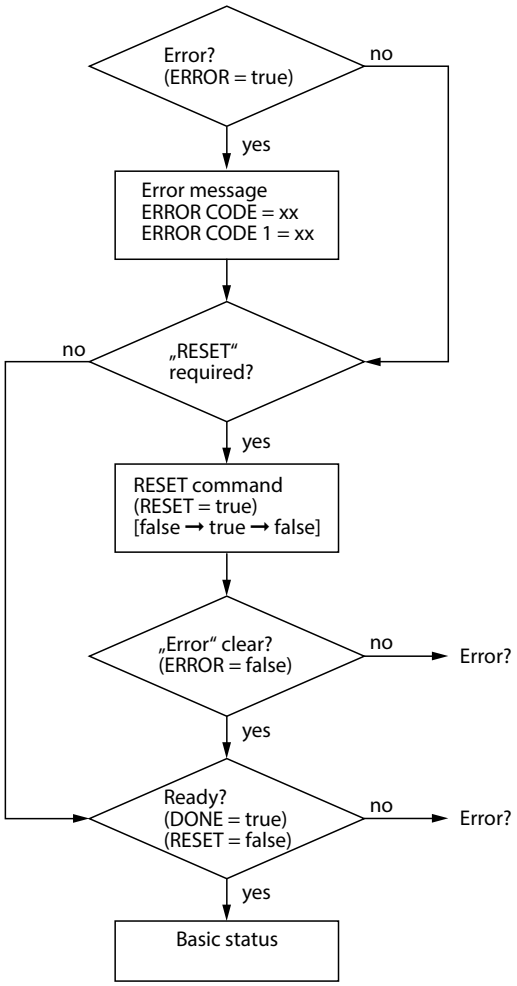


Fig. 131: Fault state flow chart

15.1.3 Switching the read/write head on and off

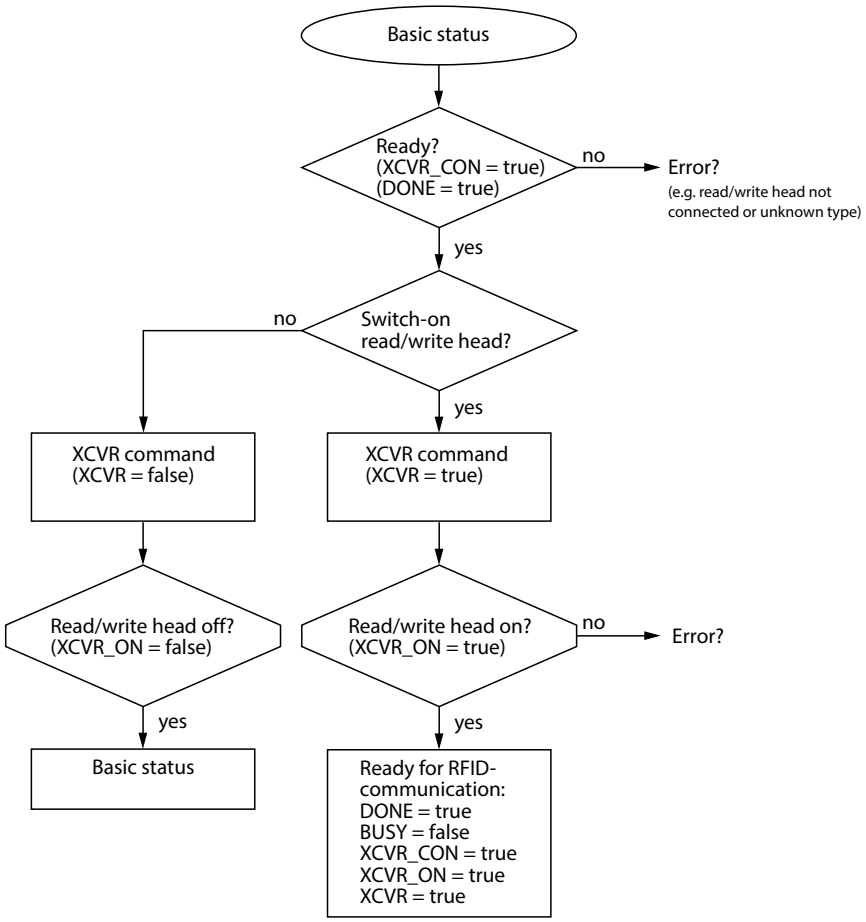


Fig. 132: Flow chart for switching the read/write head on and off

15.1.4 Read command

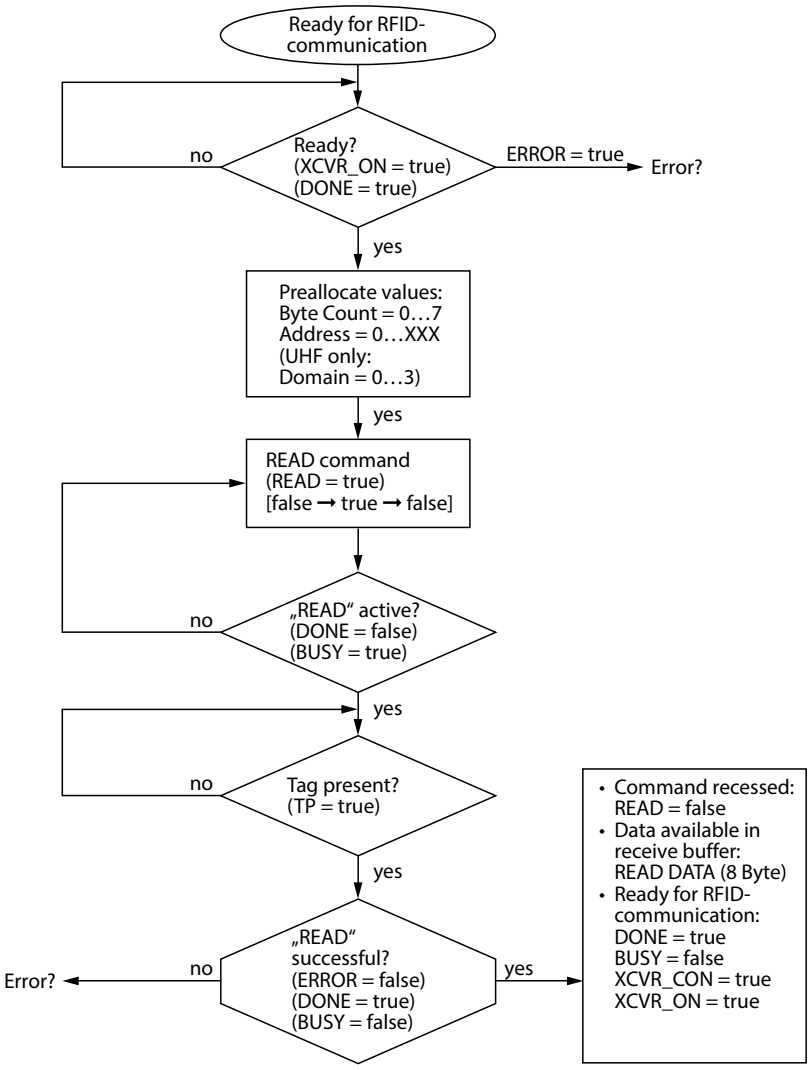


Fig. 133: Read flow chart

15.1.5 Write command

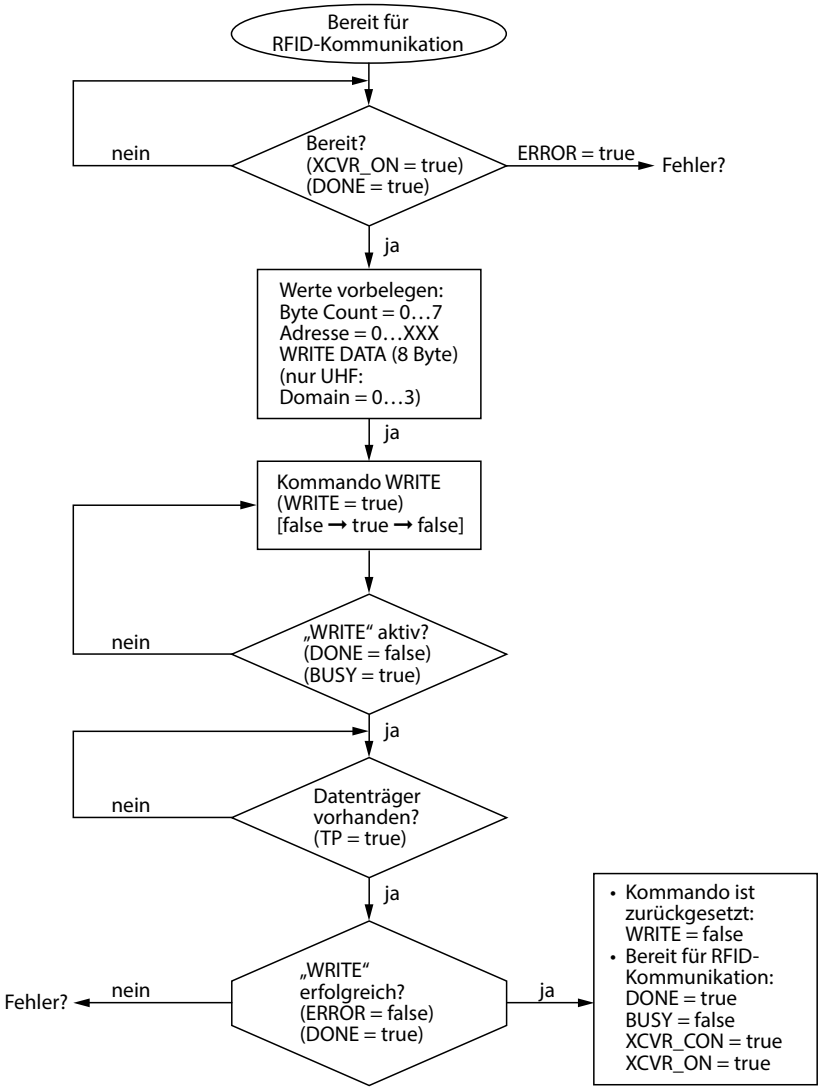


Fig. 134: Write flow chart

15.1.6 Tag-ID command

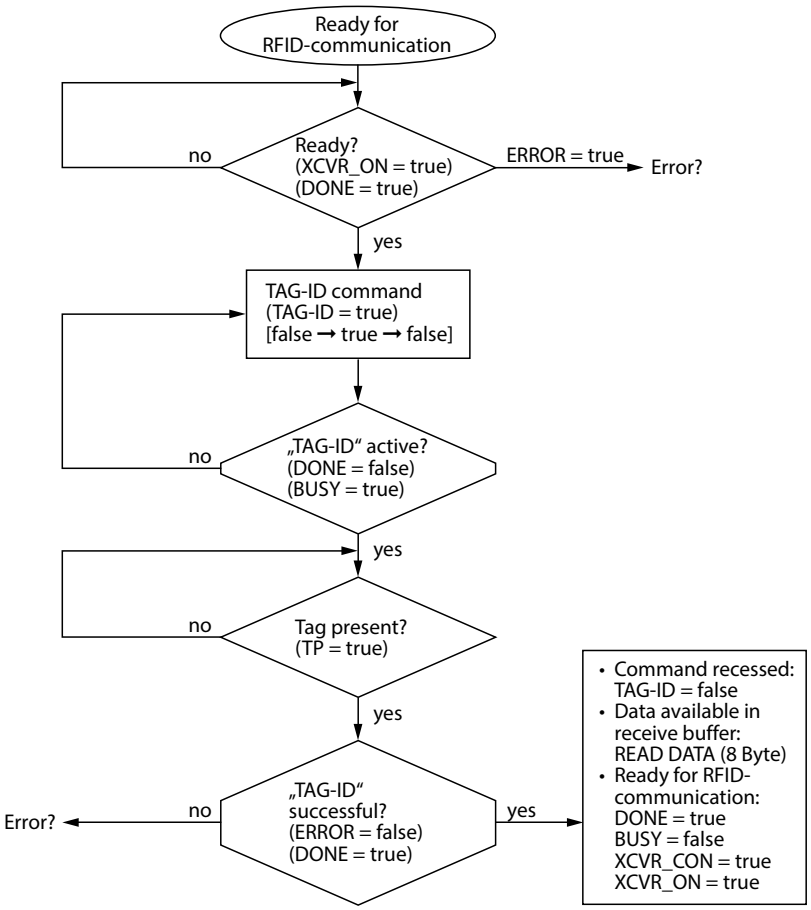


Fig. 135: Tag-ID flow chart

16 Glossary

AIDA

AIDA (Automation Initiative of German Automobile Manufacturers) is the name of the association of leading automobile manufacturers, which aims to establish a uniform standard for production processes in the sector.

Air interface

The air interface is the RFID transmission zone resulting from the combination of tag and read/write head. The air interface makes it possible to exchange information and supply the tags with power (only with passive tags).

Antenna, active

An antenna normally consists of a coil which is used as a transmitting and receiving unit. The radio signals are transmitted between the read/write head and the tag via the antenna. An active antenna is integrated in the electronics of the read/write head.

Anti-collision procedures

Anti-collision procedures are processes for the detection of multiple tags in the air interface of a read/write head. To avoid a possible collision when receiving data, the tags are not addressed exactly at the same time but in very rapid succession or via different frequencies within the frequency band.

Operating frequency

The operating frequency describes the frequency band which is used to exchange information between the tag and the read/write head. The frequency bands of the RFID applications are precisely specified for every technology and there are national restrictions on the operating frequency used.

BL compact

BL compact is the name of a compact I/O system from TURCK with IP67 protection. BL stands for Bus Link.

BL ident

BL ident® stands for "Bus Link Identification" and is the name of the modular RFID system from Turck.

BL20

BL 20 is the name of a compact I/O system from TURCK with IP20 protection. BL stands for Bus Link.

BL67

BL 67 is the name of a modular I/O system from TURCK with IP67 protection. BL stands here for Bus Link.

Bus

A bus is a group of signal conductors for the transfer of data and control information between different components (e.g. CPU, memory, I/O level) according to a defined protocol. A bus can be composed of a number of parallel cables for data transfer, addressing, control and power supply.

CODESYS

CODESYS (Controller Development System) is a development environment and programming system in accordance with IEC 61131-3 for PLCS and programmable automation components.

CPU

A CPU (central processing unit) is the processor of a computer which is the central element for handling all important computing processes.

Data retention

Data retention denotes the lifespan of the data on a tag in years, depending on the ambient temperature and other environmental factors.

Tag

A tag is a mobile data memory consisting of a memory chip and an antenna which can be written or read in an RFID system without contact. The tag receives the incoming signals and responds to the signals "independently".

Tag, active

Active tags have their own internal energy source; the energy is used for the active transmission of information and to supply the internal memory.

Tag, passive

Passive tags have no independent power supply and take their power for transmitting information and for writing in the internal memory from the alternating electromagnetic field, which is generated by the read/write head. This type of tag is mainly used in the Turck BL ident® system.

Class 1 DP master

A class 1 DP master (DPM1) is a central controller of a PROFIBUS-DP system, which exchanges information with the remote slaves cyclically in a fixed telegram cycle. The DPV1 functions (acyclical transmission of user data) can be used as an additional option. Typical devices are PLCS or PCs.

Class 2 DP master

Class 2 DP masters (DPM2) are used exclusively to transmit acyclical user data in a PROFIBUS-DP system and are used for tasks such as commissioning, maintenance and diagnostics in order to configure connected components. Typical devices include engineering or operating devices. A class 2 DP master does not have to be permanently connected to the bus system.

DPV1

DPV1 is an enhanced functionality of PROFIBUS-DP which allows the acyclical transfer of user data with acyclical communication functions in addition to the cyclical process data. The acyclical services are conducted at the same time and in addition to the cyclical process data transmission with lower priority.

DTM

DTM stands for Device Type Manager and denotes the application independent driver for computer-programmed devices and communication devices within an FDT defined frame application (such as PACTware™). The DTM includes:
- User interface for the device
- Device logic and parameterization

EAN

The EAN (European Article Number) is the previous designation (discontinued since 2009) for the internationally standardized global trade item number, GTIN.

EEPROM

An EEPROM (electrically erasable programmable read only memory) is a non-volatile electronic memory module, which is provided to ensure that data stored on it can only be read and not electronically deleted and reprogrammed.

EIRP – effective isotropic radiated power

EIRP denotes the radiated power including antenna gain. The EIRP value of antenna gain is based on an isotropic radiator.

Electronic module

The electronic modules provide the different functions of the Turck modular I/O systems in a fieldbus station, and are independent of the particular fieldbus used. The electronic modules are fitted to the base modules and form with them a functional unit. The electronic module remains independent of the wiring and can thus be replaced at any time with an electronic module of the same product series with the same functions. Possible functions:
- Digital inputs and outputs
- Analog inputs and outputs
- Technology modules such as RFID
- Power supply

EMC

By EMC (electromagnetic compatibility) is meant the ability of an electrical device to operate satisfactorily in an electromagnetic environment without adversely affecting or being adversely affected by other electrical equipment.

EPC

The electronic product code (EPC) is an internationally used key and coding system for the unique identification of products, packaging and product types through the individual allocation of serial numbers.

ERP – effective radiated power

ERP denotes the radiated power including antenna gain. The ERP value of antenna gain is based on a half-wave dipole.

FDT

FDT stands for Field Device Tool and describes the interface definition between the specific device DTMS used and the frame application (such as PACTware™). The FDT includes:
- Standard user environment for all DTMS
- User management
- Management of the used DTMS
- Network configuration

Fieldbus

A fieldbus connects the stations in the field (such as sensors and actuators) in order to communicate with the process components (such as PLC, SCADA, industrial PC). A fieldbus typically offers a high transmission security and a real-time behavior. Fieldbus systems can be exposed to severe external conditions and are primarily used in industry.

FRAM

An FRAM or Ferro RAM (ferroelectric random access memory) is a non-volatile electronic memory module based on crystals with ferroelectric properties, which can be read or written. The key features of the FRAM memories are the low power consumption, short write times and a high degree of data reliability.

Function block

A function block is a self-contained program which provides different status, input and output bits as well as routines. Several designated instances of a function block can be created.

Gateway

By gateway is meant the hardware and software which connects different networks with different protocols (protocol converters). For this all the information of a telegram apart from the user data is converted from the source protocol to the destination protocol. In the modular Turck I/O systems, the gateway is the head of the particular fieldbus station and forms the interface between the fieldbus and the field level.

Gateway, programmable

The gateways which can be programmed with CODESYS according to IEC 61131-3 can be used as a PLC to independently control applications or act as a subordinate instance in the network for faster remote signal processing. Programmable gateways are thus used to relieve the load of the central controller of a network.

GSD

The GSD file (general station description, previously "device master file") describes the properties of the devices which are used in PROFIBUS-DP. The GSD file is a text file and is supplied in different languages. Configuration tools require the device information in order to complete the configuration and commissioning. The GSD file normally contains general information (e.g. vendor name and version) and with modular devices the communication features (e.g. module designations, texts for diagnostic messages, parameter options, parameter names).

HF

HF stands for high frequency technology and denotes the RFID applications using the frequency band around 13.56 MHz. The HF frequency band is defined by the international ISO 15693 standard.

I/O system

An I/O system is the collection and distribution point for digital information or analog signals on the field level. With point-to-point wiring, the signals of the field instrumentation are collected on a remote I/O station in the plant, transferred to a digital protocol and fed via a bus cable to the controller.

IEC 61131

IEC standard (International Electrotechnical Commission) 61131 is an internationally recognized standard for programmable controllers, which specifies aspects such as the functional features, requirements and programming language of a PLC.

Initialization (memory media)

When a memory is initialized, the memory space is reserved and filled with initial values (such as variables, code, buffer, ...) required for the execution of tasks.

Inlay tags

An inlay is an RFID microchip and an antenna which are attached to a foil. These RFID inlays are further processed into a smart label for use as an RFID tag. Inlays are normally used as RFID tags before the conversion or the respraying process.

Interface set (BL ident®)

The interface sets of the BL ident® system are fieldbus stations with a permanently defined scope. They have a modular design and are each provided with a gateway and one of the four RFID modules or as a compact module of the BL compact system. The interface sets are available with up to 16 channels and for the simultaneous use of up to eight read/write heads. The gateway or compact station used depends on the fieldbus in use and the performance range of the RFID modules.

ISO 15693

The ISO 15693 standard is a worldwide ISO standard which specifies the physical properties of the RFID tag (e.g. dimensions, load, UV and X-radiation, maximum temperature), the air interface (e.g. carrier frequency, modularization, transmission output, data rates, coding), the initialization as well as the anti-collision protocol and the transmission protocol.

ISO 18000-6C

The ISO 18000 6C standard is compatible with EPC Global Class 1 Generation 2 (also called UHF Gen 2) and defines the physical and logical requirements for a transmission process between a passive tag and a read/write head in the UHF frequency band.

Item level tagging

The identification of all goods at item level with tags is known as item level tagging.

Configuring (modular fieldbus stations)

The configuration of a fieldbus station describes the systematic arrangement of the electronic modules according to their functions within a station.

Closed-loop system

In a closed-loop RFID system, the tags fitted to a workpiece carrier, container or a pallet do not leave the internal production process or intralogistic area of the company.

Open-loop system

In an open-loop RFID system the tags are fitted on each product (item level tagging) and leave the company after the internal production or intralogistics process.

Reading device

See read/write head

Read rate

The read rate is the maximum speed at which a tag is read. The read rate is defined in bits or bytes per second.

Read distance

The read distance is the maximum distance at which a read/write head can read data from a tag. With HF technology the read distance is virtually identical to the write distance; With UHF technology the read distance is normally greater than the write distance.

LSB

LSB stands for "Least significant bit"; in a digital signal of a specific length, the bit that represents the lowest value.

MSB

MSB stands for "Most significant bit"; in a digital signal of a specific length, the bit that represents the highest value.

PACTware™

PACTware™ stands for "Process Automation Configuration Tool" and is an open and manufacturer-independent operator interface for the plant-wide operation of devices, systems and communication components. The connection between the PACTware™ operator interface and the specific device DTM is implemented via an FDT interface. PACTware™ enables the devices of an installation to be configured and operated simply, quickly and efficiently, as well as diagnosed if required.

PIB (Proxy Ident Block)

The Proxy Ident Function Block (PIB) is based on a specification of the PNO (PROFIBUS user organization). In this profile manufacturers and suppliers have set communication conventions between an industrial controller and an identification system. The result is a standardized interface which guarantees interoperability between systems of different manufacturers. The uniform communication mechanism between field device and function block in the controller guarantees end-to-end data consistency. The PIB also provides a number of status bits and commands. Besides the interoperability, the benefits are the fast implementation of the system in the central controller, rapid project implementation and investment protection.
The BLident® modular RFID system from Turck is based on an open standard. A PIB function block for the Siemens S7 controller series is provided as well as a function block based on CODESYS, which can be operated, for example, in the programmable gateways of BL20/BL67 modular I/O systems.

Polarization (RFID)

Polarization describes the alignment of an electromagnetic wave. This is either linear or circulation polarization. Linearly polarized waves can be aligned vertically or horizontally depending on the alignment of the antenna. This may be a problem for RFID systems in which tags are fastened to goods as labels, as it mostly cannot be determined precisely how the antenna of the tag is aligned to the field. The solution is the radiation of circularly polarized electromagnetic waves. For this two antennas are arranged vertically to each other and one antenna is triggered with a 90° out of phase signal. Polarization is either left-hand or right-hand circular polarization (LHCP and RHCP).

Bulk detection

Bulk detection denotes the simultaneous detection (write/read) of multiple tags with a read/write head. It must be ensured that each tag is only detected once. Possible processes for this are, for example, the anti-collision procedure.

RFID

RFID stands for radio frequency identification, and describes the contactless or non-visual identification of objects using electromagnetic waves. For this data can be read as well as stored.

Read/write head

A read/write head transmits via radio signal data from a controller to a tag and reads the data stored on the tag and forwards this to a controller. The core element of the Turck read/write heads is an active antenna.

RFID/UHF read/write distances

The achievable read/write distances depend on the relevant combination of tag and read/write head. The possible read/write distance depends on the data volume to be written and read as well as the speed at which the tag moves past the read/write head. The UHF read/write heads normally have a read/write distance of several meters.
Note:
The maximum read/write distance of several meters is only an idealized value under laboratory conditions. The achievable distances may be reduced due to component tolerances, mounting location in the application, ambient conditions and the influence of materials (particularly metal and liquids). The parameters for achievable passing speed (read and write operations on the fly) and the maximum transmittable data volume also vary depending on the actual transmission in the relevant application. Depending on the tag, the maximum write distance can be considerably less (e.g. 50%) than the maximum read distance.
A test under actual conditions is therefore always required!
All UHF read/write heads of the BL ident® system are suitable for single and multiple access to tags.

Write distance

The write distance denotes the maximum distance that a read/write head can bridge to store data on a tag. With HF technology the write distance is virtually identical to the read distance; With UHF technology the write distance is normally less than the read distance.

Type of protection

The degree of protection to IEC/EN 60529 and DIN 40050-9 defines the protection of device housings from contact and the penetration of foreign objects and water. The most typical degrees of protection for TURCK devices are

- IP20: protection from solid foreign bodies with Ø > 50 mm; no protection from water (only use in the switch cabinet)
- IP65: full protection from dust and protection from water jets
- IP67: full protection from dust and protection from water with intermittent immersion
- IP69K: full protection from dust and protection from water with high pressure/steam cleaning

(Protective) ground

In electrical engineering, the name given to a conductive area with an electrical potential of zero at any point. The electrical potential of the ground may not equal zero in the area around grounding devices, in which case this is called the "reference ground".

Smart label tags

Smart label tags are particularly inexpensive flat tags made of foil. The smart label tags are available in different variants, which can be stuck or printed etc., and are frequently used as disposable tags.

TAG

See "Tags"

Tagging

Tagging denotes the fitting of an object with a tag.

Tracking & tracing

Tracking and tracing denotes the tracking and tracing of movable objects in intralogistics or logistics. The process provides information on where goods are located at a specific time.
Tracking denotes the location of a specific object at a defined time.
Tracing indicates events involving the materials, semi-finished goods and end products on their journey through the production and logistics chain.

Transponder

See "Tags"

Turck BL ident®/UHF transmission frequencies

The Turck BL ident® system operates at nationally specified transmission frequencies in the UHF range of (865...928 MHz) between the tags and read/write heads. UHF systems in this frequency band achieve a higher read/write distance than HF systems, typically several meters. The national frequencies for UHF are required due to the frequency ranges individually specified by the national regulation bodies. The BL ident® read/write heads in the UHF band can therefore only be used in the countries they are intended for and must not be put into operation outside of these regions.
As the BL ident® UHF tags are passive, and therefore do not radiate their own radio waves, these are suitable for use worldwide. Turck offers different tag variants that are specially designed and optimized for national frequency bands in order to achieve as large a communication range as possible. Wide-band multi-range tags for international use are also available as an alternative.
The various Turck read/write heads support the following transmission frequencies:
- 865...868 MHz (e.g.for Europe)
- 902...928 MHz (e.g. for USA/Canada)
- 920...925 MHz (e.g. China)
- 902...907.5 MHz and 915...928 MHz (e.g. Brazil)
- 917...920.8 MHz (e.g. Korea)

The relevant national specifications for UHF such as frequency range, output and the status of any national regulations can be obtained from the Internet at:
- http://www.gs1.org/docs/epcglobal/UHF_Regulations.pdf
- For more detailed information please contact the relevant authorities of the country where you wish to use the UHF RFID system.

Transmission zone (RFID)

see Air interface

UHF

UHF stands for ultra high frequency technology and denotes the RFID applications using the frequency bands between in the range 865…928 MHz. The requirements for the frequency band are defined in ISO 18000-6C, the specification of the frequency bands is made nationally by the relevant national authorities and is retained by the EPC.
The frequency ranges covered by Turck products are:
- 865…868 MHz: Europe
- 902…928 MHz: North and South America, except Brazil
- 902…907.5 MHz and 915…928 MHz: Brazil
- 920…925 MHz: China
- 917…920.8 MHz: South Korea

Wink command

A Wink command enables the identification of stations on an Ethernet network. If a gateway is an Ethernet station and receives a Wink command, it responds with an optical signal (e.g. flashing LED).

TURCK

...with 28 subsidiaries
and over 60 representations worldwide!

D500038 | 2015/11

www.turck.com