TURCK

Industrial Automation

COMMISSIONING WITH CoDeSys FOR PROGRAMMABLE GATEWAYS

CoDeSys Automation Alliance

BL ident®

Edition 01/09

0 About this manual

1 The TURCK *BL ident*®-system

2 Mounting and installation

Safety Instructions!

Before beginning installation work

- Disconnect the device from the power supply
- Ensure against accidental restart
- Verify isolation from the supply
- Earth and short-circuit the supply
- Cover or close off neighbouring units that are live.
- The assembly instructions provided for the device are to be complied with.
- Only suitably qualified personnel according to EN 50 110-1/-2 (VDE 0105 part 100) are authorised to carry out work on this device/system.
- When conducting installation work ensure that you are free of electrostatic charge before touching the device.
- The functional earth (FE) must be connected to the protective earth (PE) or the equipotential bonding. The system installer is responsible for establishing this connection.
- Connection and signal cables are to be installed so that any inductive or capacitive interference does not impair the automation functions.
- The installation of automation devices and their operating elements is to be carried out in such a way as to prevent unintentional operation.
- In order to prevent cable or wire breakage on the signal side generating undefined states in the automation devices, appropriate safety measures are to be taken for the I/O coupling on the hardware and software side.
- Ensure a reliable isolation of the extra-low voltage for the 24 volt supply. Only those power supply units that comply with IEC 60 364-4-41, i.e. HD 384.4.41 S2 (VDE 0100 part 410) are to be deployed.
- Fluctuations or deviations of the mains voltage from the nominal value should not exceed the tolerance limits specified in the technical data, otherwise malfunctions and dangerous states may occur.
- Emergency stop devices complying with IEC/EN 60 204-1 must remain effective in all operating modes of the automation installation. Releasing the emergency stop devices must not cause a restart.
- Devices for mounting in housings or cabinets, desktop or portable units, are only to be operated and controlled with the housing closed.
- Measures are to be taken to ensure the correct restarting of a program following interruption due to a voltage drop or failure. Dangerous operating conditions, even short term, should not occur as a result. If required an emergency stop should be carried out.
- External measures are to be implemented at those locations where faults in the automation installation could lead to injury to persons or damage to property. These measures must guarantee safe operating conditions even in the event of a fault or malfunction (e.g. by means of independent limit switches or mechanical locking devices etc.).
- The electrical installation must be carried out in accordance with the relevant regulations (e.g. in respect of the cable cross sections, uses and protective earth connections).
- All work involving transport, installation, commissioning and maintenance is to be carried out exclusively by qualified personnel. (in accordance with IEC 60 364 i.e. HD 384 or DIN VDE 0100 and national accident prevention regulations).
- All covers and doors must be kept closed during operation..

0 About this manual

Concept of documentation

In the first chapter of this manual you are provided with an overview of the TURCK *BL ident*® system.

In the second chapter "mounting and installation" the correct connections of the *BL ident*®-system with suitable connection cables is explained.

The third chapter contains instructions for commissioning of a *BL ident*® systems. The standard function block "Proxy Ident Function Block" is used for the start-up of systems with BLxx-2RFID-A modules. Systems with BLxx-2RFID-S modules have 12 bytes process data with 8 bytes user data for read/write commands. The basic commands are part of the process data. The commissioning example is realized using a programmable Ethernet gateway. The 61131-3 compliant programming system CoDeSys is used.

In the fourth chapter the setup of a control interface to a Modbus TCP-, PROFIBUS-DP- and a EtherNet/IP master is explained.

The fifth chapter contains an excerpt from the specification "Proxy Ident Function Block".

Explanations of used symbols

Warning

This symbol appears next to an alert which points to a source of danger. This may refer to injury of persons and damage to systems (hard- and software).
For the user this symbol means: Please, proceed with extreme causion.

Attention

This symbol appears next to an alert which points to a potential source of danger. This may refer to possible injury of persons and damage to systems (hard- and software) and installations.

Note

This symbol appears next to general instructions which point out important information concerning the procedure for one or more operational steps.

The relevant instructions may faciliate the work and may help prevent redundancy caused by incorrect operational steps, for example.

Attention

Please, consider it mandatory to read this chapter because safe handling of electrical devices should not be left to chance.

This manual contains the required information for the start-up of the TURCK *BL ident* ®-system.
The concept was specifically created for qualified staff with the necessary technical know-how.

Intended use

Warning

The devices described in this manual must be used only in the intended applications found in this manual and the respective technical description, and only together with certifed external devices and -components.

The correct and safe operation of the devices is based on the prerequisite of proper transport, storage, assembly and mounting, as well as carefuly operation and maintenance.

Instructions for project planning / installation of product

Warning

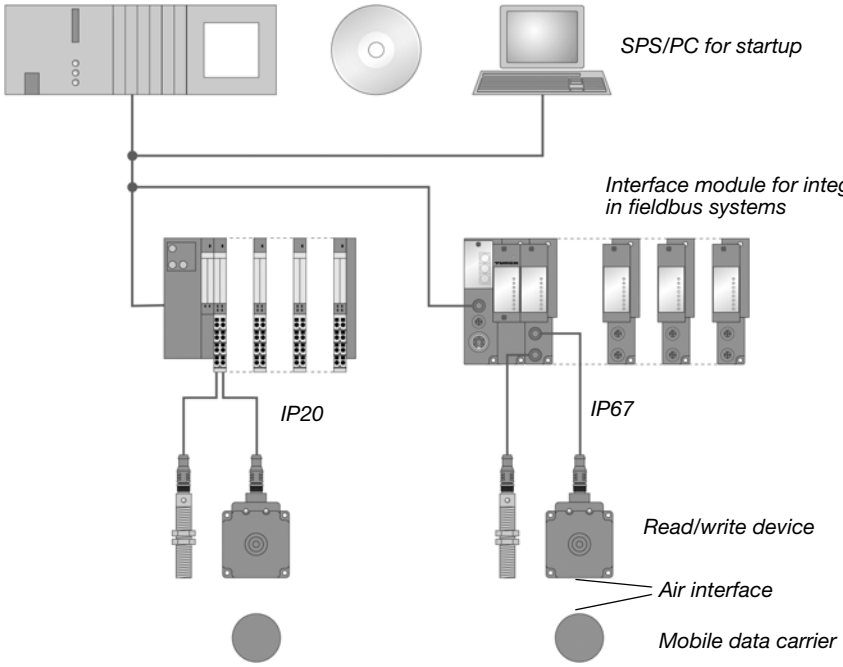
It is imperative that the instructions be followed for the safety and accident prevention for the respective application.

1 The TURCK *BL ident®*-system

Schematic diagram of the identification system *BL ident*®

The TURCK *BL ident*®-system has multiple levels. Each level offers opportunities for variation. An application that is adjusted to the complete system is possible.

Figure 1: System overview



Support for *BL ident*®-projects

The following software and documents will provide additional support for project planning, installation and startup:

- For simulation and optimization of an application, please access the internet and go to http://www.turck.com..for a free "*BL ident*®-simulator".
- D101583 - "Installation of the *BL ident*®-system“ - This manual contains the technical details of the available TURCK-data carriers and the TURCK read/write devices.
- D101581 - "Interface module for fieldbus connection". This manual describes the professional connection of the *BL ident*®-interface modules.
- D101607 - This manual contains a software description of a so-called "handheld" (programming device) which allows Read and Write access of data independent of location.
- D101585 - This manual contains a hardware description of a so-called "handheld" (programming device) which allows Read and Write access of data independent of location.
- D301033 - ”User Manual for BL67-PG-EN“ - This manual provides detailed information about the gateway BL67-PG-EN
- D101642 - "Set-up with DeviceNet™“
- D101644 - "Set-up with EtherNet/IP™“
- D101648 - "Set-up in PROFINET with the Proxy Ident Function Block“
- D101579 - "Set-up in PROFIBUS-DP“

The list of manuals may be downloaded from the internet.

Networking with *BL ident*®-systems

Based on the possibility to integrate *BL ident*®-systems in (existing) bus-systems, the opportunity exists to network together multiple *BL ident*®-systems.

Valid are the guidelines for the maximum extension of the respective, active bus system.

Identification systems with radio frequency technology (RFID)

RFID is an abbreviation for radio frequency identification.

A RFID-system consists of a data carrier, a device for Read and Write access to the data carrier, as well as other devices used for data transfer and processing.

The transfer of data from the data carrier to the read/write head occurs contact-free with the help of electromagnetic waves. The type of transmission is insensitive to dirt and temperature fluctuations.

The data carriers may be directly affixed to a product. This is why the term "mobile data memory" is used as well. Other terms for the data carrier are TAG or transponder. The data content may consist of production and manufacturing data. The data that identifies the product is important here. This is where the description "identification system" comes from.

Further reaching possibilities are a result of the fact that the data content can be changed by writing to the data carrier. Because of this production-/manufacturing processes can be retraced. Logistics/distribution may be optimized.

The "identification systems" may be integrated into (existing) fieldbus automation systems (for example Modbus TCP). The connection to the respective fieldbus system is done with suitable interface modules.

Standardized software modules (e.g. the Proxy Ident Function Block for PROFIBUS) enable simple system integration and commissioning.

Performance characteristics and applications of the *BL ident*®-system

To meet the requirements of a variety of applications, the TURCK *BL ident* ®-system offers multiple possibilities for combining data carriers and read/write heads, as well as interface modules to connect automation systems (for example Modbus TCP, EtherNet/IP™). Software modules enable simple integration and commissioning.

Performance characteristics of the TURCK *BL ident* ®-system are as follows:

Protection class

Some data carriers, as well as the applicable read/write heads have a high mechanical protection class (for example,**IP67**) and therefore may be used in the toughest industrial applications.

The read/write heads are also available in IP69K (wash-down design).

Connection to the fieldbus-system is realized with suitable TURCK interface modules. The interface-modules for CANopen are available in the protection class IP20. TURCK connection cables with the suitable protection class complement the identification system.

Temperature-resistant data carriers up to 210°C are available for the high temperature range.

Life cycle

The life cycle is a result of the possible read/write operations to the data carrier.

FRAM data carriers can provide for an **unlimited** number of Read operations and 10^{10} Write operations.

EEPROM data carriers can provide for an **unlimited** number of Read operations and 10^4 or 10^5 Writer operations.

The data carriers do not require batteries.

Transfer frequency

The TURCK *BL ident* ®-system operates with a transfer frequency of 13.56 MHz in the HF-band or with a country-specific transfer frequency in the UHF-range (860-960 MHz) between the data carriers and the read/write heads.

HF: Systems that operate with this transfer frequency are to a large extent insensitive to electromagnetic interferences. Therefore the 13.56 MHz transfer frequency has developed into the standard in many RFID applications.

UHF: Systems in this frequency band gain higher read/write ranges compared to HF, typically several meters. The carrier frequencies are country-specific, and in Europe, for example, they are between 865 and 868 MHz.

Models

Data carriers

HF: For the HF-operating frequency, TURCK supplies round, flat data carriers, for example, with 16, 20, 30 and 50 mm diameters.

The high temperature data carriers have a cylindric design (for example, 22 x 125 mm).

Inlays and adhesive labels have a foil thickness (size, for example, 43 x 43 mm).

Special designs are suitable for installation in and mounting on metal. Other designs are data carriers in a glass cylinder housing or as a flat bank card format. Some data carriers have holes so that they may be affixed with screws.

UHF: Data carriers for UHF have different designs and mounting possibilities and are optimized for either small housing dimensions or large data transfer ranges. Data carriers with high protection class, also for the application in the field, are available, as well as data carriers for direct mounting on metal or imprinted tags.

TURCK supplies customer-specific data carrier solutions upon request.

Read/write heads

HF: Read/write heads are available in different designs, from the standard unified threads M18 and M30 to cuboid designs Q14, CK40, Q80, S32XL including Q80L400 and Q350 for long distances of up to 500 mm.

UHF: Different cuboid designs are available, for example as compact read/write head in a housing with approx. 100 mm x 80 mm x 35 mm edge length (L x W x D) or in dimensions approx. 240 mm x 240 mm x 40 mm for high data transfer ranges of several meters. The read/write heads have protection class IP67 and are suitable for the application in the field. The quality of the air-data transfer between data carrier and read/write head is continuously checked, also when in operation. Each disturbance of the air interface is immediately diagnosed and signalled per LED-chain.

Memory slot

The memory capacity of the data carrier for the HF-range is 64 or 128 bytes (48 or 112 bytes user data) with an EEPROM-memory and 2 or 8 kbytes (2000 or 8000 bytes user data) with a FRAM-memory. For the UHF-range there is an EEPROM-data carrier with 110 bytes (94 bytes user data).

FRAM: (Ferroelectric Random Access Memory), non-volatile, longer life cycle because of a greater number of read/write operations and faster Write operations compared to EEPROM.

EEPROM: (Electrically eraseable programmable read only memory), non-volatile.

The data carrier for the HF-operating frequency meet the communication standard ISO 15693.

The data carriers in the UHF-frequency band meet the communication standard ISO 18000-6C and EPCglobal Class 1 Gen 2.

Relative speed of data carrier to read/write head

Note

The speed with which the data carrier can pass by the read/write head is influenced by the data volume to be processed and varies according to the respective combination of read/write head and data carrier that is being used.
This is why numerical data for max. speed and data volumes can only be seen as examples!

The speed with which the data carrier can pass by the read/write head may be increased, for example, with the data carrier TW-R50-K2 and the read/write head TN-CK40-H1147 to up to 2.5 m/s for 8 bytes at a distance of 36 mm. With the help of the "*BL ident*®-simulator" (see below) the application parameters "speed", "data volume" and "range" can be changed. The optimum combination read/write head and data carrier for the respective application is apparent in the simulator.

The simulator is online at http://www.turck.com.. In any case, please follow the instructions including limits in this chapter.

Note

Next to the data processing time in the read/write head, the processing time within the complete installation of the identification system must also be taken under consideration.(„System overview" page 1-2). Depending on the application, the time for data transfer and processing within the complete installation may vary!
If your application requires a fast sequence of data carriers, it may be necessary to decrease the speed with which the data carrier passes by the read/write head.
When in doubt, we recommend to empirically determine the possible speed!

Note

The transfer curves (max. read/write distance, length of transfer zone) only represent typical values and test lab conditions.
Because of component tolerances, installation situation of the application, ambient conditions and interferences caused by materials (especially metals) the distances that can be reached may differ up to 30 %.
This is why it is absolutely necessary to test the application (especially during Read and Write when movement occurs) under real conditions!
In addition, the recommended distance from data carrier to read/write head should be complied with if possible in order to gain errorless read/write operations despite of possible discrepancies.
Depending on the actual transfer curve of the respective application, the parameters of reachable pass over speeds (Read and Write on the Fly) and the max. transferable data volume also change.

Read range / Write range

The reachable read/write distances depend on the respective combination of data carrier and read/write head. The possible read/write distance is influenced by the data volume to be written and to be read, and by the speed with which the data carrier passes by the read/write head. The read/write heads that use UHF-operating frequencies will reach a distance of several meters. Read/write heads that operate with 13.56 MHz (HF) transfer frequencies will reach shorter distances. Here the longest distance (approx. 500 mm) will be reached with the model TNLR-Q350-H1147 if a round data carrier with a 50 mm diameter is used.

With the help of the software "*BL ident*®-simulator“ the application parameters "speed", "range" and "data volume" may be changed. Therefore an optimum combination read/write head and data carrier may be selected for the appropriate application.

You may find the simulator online at http://www.turck.com..

Figure 2: BL ident®-simulator

Compatibility

All technical data refer to the *BL ident*®-system, this means to the combination of *BL ident*®-data carriers, read/write heads and interface modules. Entirely different values may be valid for data carriers of other manufacturers. This is why external products may only be used after they have been released by TURCK.

Applications (examples):

The performance characteristics described in the prior chapter support the application of a TURCK *BL ident*®-system in the following industries:

- Automobile
- Transport and handling
- Machine building
- Food and beverages
- Chemical industry
- Pharmaceutical and petrochemical industries

The application in all areas is possible here, like:

- Assembly lines
- Materials handling
- Industrial manufacturing
- Inventory and storage
- Logistics
- Distribution
- Consignment
- Transport logistics

2 Mounting and installation

Diagrams and designs of the interface modules

The *BL ident*®-Ethernet-interface is available with **2, 4, 6, 8** ports. The gateways are programmable (**PG**) and may be used in Modbus TCP (**EN**) or EtherNet/IP (**EIP**) depending on the design version.

Interface-modules with the add-on "-*S*" (Simple) stand for a user-friendly startup opportunity. With a Write or Read command 8 bytes may be transferred. Interface modules without the add-on "S" offer a higher number of possible commands and a large data transfer volume per command.

Figure 3: BL ident®-Interface module with Protection Class IP20 (2- and 8-port version)

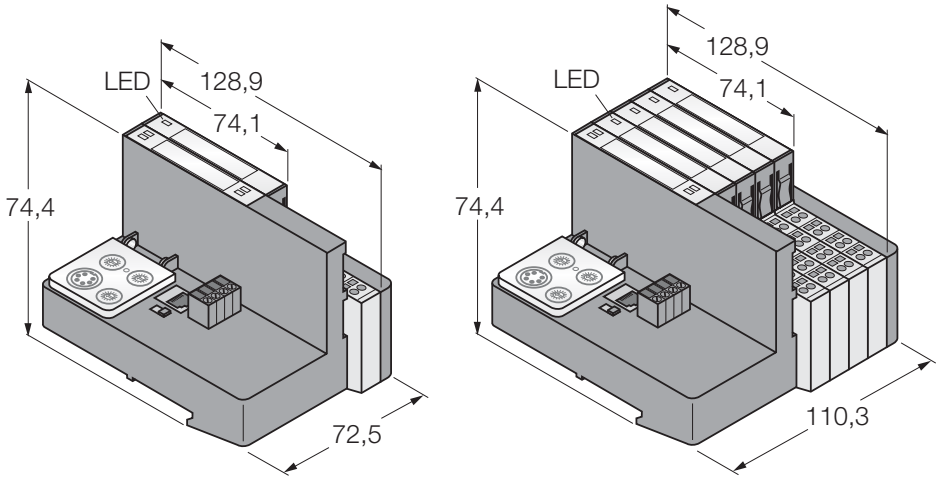


Table 1: BL ident®-Interface module with Protection Class IP20

Product description	Ident-No.
TI-BL20-PG-EN-2	1545053
TI-BL20-PG-EN-4	1545054
TI-BL20-PG-EN-6	1545055
TI-BL20-PG-EN-8	1545056
TI-BL20-PG-EN-S-2	1545086
TI-BL20-PG-EN-S-4	1545087
TI-BL20-PG-EN-S-6	1545088
TI-BL20-PG-EN-S-8	1545089
TI-BL20-PG-EIP-2	1545020
TI-BL20-PG-EIP-4	1545021
TI-BL20-PG-EIP-6	1545022

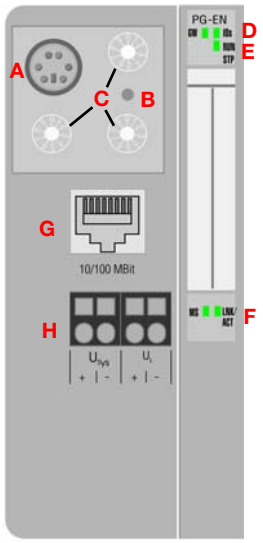
Table 1: BL ident®-Interface module with Protection Class IP20

Product description	Ident-No.
TI-BL20-PG-EIP-8	1545023
TI-BL20-PG-EIP-S-2	1545090
TI-BL20-PG-EIP-S-4	1545091
TI-BL20-PG-EIP-S-6	1545092
TI-BL20-PG-EIP-S-8	1545093

The integration of *BL ident®* in Modbus TCP and EtherNet/IP makes programmable Ethernet-gateways possible:

- Modbus TCP
- EtherNet/IP

Figure 4: Modbus TCP EtherNet/IP



A *"Service-interface" page 2-8*
B *"SET-scanner" page 2-8*
C *Rotary switch - "Addressing" page 2-6*
D *CPU/Module Bus LEDs ("LEDs of the fieldbus side" page 2-13)*
E *RUN/STOP LED ("LEDs of the fieldbus side" page 2-13)*
F *Ethernet LEDs ("LEDs of the fieldbus side" page 2-13)*
G *Ethernet ("Ethernet-connection" page 2-5)*
H *Power supply ("Power supply voltage" page 2-5)*

Power supply voltage

The BL20-station is supplied via the two connection terminals U_{SYS} and U_L (system supply and field supply). A voltage within the range of 18 to 30 VDC (nominal value 24 VDC) is connected to each of the 2-pole screw terminals.

The **system supply voltage** is transformed 5 VDC (from 24 VDC) and may supply max. 0.5 A. This voltage is internally led over a wire pair of the 7-wire module bus and serves to supply the module electronics on the module bus side.

The **field supply voltage** is 24 VDC and may supply max. 10 A. This voltage is led through the BL20-station via a conductor line. The module electronics on the fieldbus side and the connected read/write devices are fed by the field supply voltage ("Read/write head connections" page 2-10).

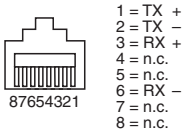
Table 2: Pin assignment of the screw terminal strips.

Signal	Description
U_{SYS} +	System supply (gateway, module bus)
U_{SYS} -	
U_L+	Field supply (max. 10 A)
U_L-	

Ethernet-connection

The BL20-gateway is connected to Ethernet via a female RJ45-connector.

Figure 5: Female RJ45-connector



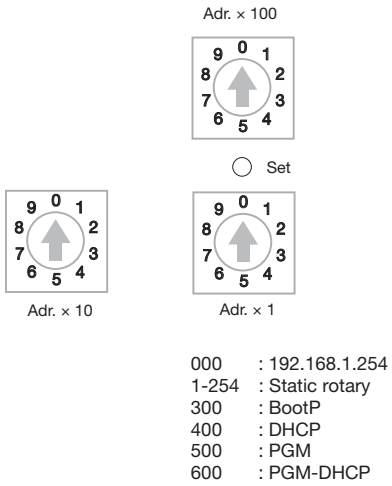
Attention

No equalizing current must flow across the shield. For this purpose a safe system must be created for potential equalization!

Addressing

The three decimal rotary switches are used for Ethernet-addressing of the programmable gateways.

Figure 6: Decimal rotary switches for setting the Ethernet-address



Note

A voltage reset must be completed when the addressing mode is changed!

Table 3: Switch settings for different modes for assigning addresses

Switch setting	Addressing mode
000	The gateway has the default IP-address: 192.168.1.254 and the default subnet mask 255.255.255.0 The newly set digit sequence "000" is accepted after a voltage reset!
1 to 254	Rotary mode This mode allows the manual setting of the last three digits of the 12-digit IP-address. Acceptance of the newly set 3-digit sequence occurs after a voltage reset! The last three digits of an IP-address stored in the EEPROM are ignored in this mode, but the first 9 digits and the subnet mask are relevant! The IP-address stored in the EEPROM and the subnet mask can be changed with the modes 300, 400, 500, and 600. The 3-digit setting done here is not stored in the EEPROM of the gateway.
300	BootP_Mode The IP-address of the gateway and the subnet mask ("Network mask" page 6-2) are assigned with the help of a BootP-server. Both network settings are permanently stored in the EEPROM of the gateway.

Table 3: (cont.) Switch settings for different modes for assigning

Switch setting	Addressing mode
400	DHCP_Mode The IP-address of the gateway and the subnet mask ("Network mask" page 6-2) are assigned with the help of a DHCP-server. Both network settings are permanently stored in the EEPROM of the gateway.
500	PGM_Mode The PGM-mode allows access of the I/O-ASSISTANT to the network settings of the gateway. The IP-address of the gateway and the subnet mask ("Network mask" page 6-2) are permanently stored in the EEPROM of the gateway.
600	PGM_DHCP_Mode like DHCP_Mode

Attention

The protection cover on top of the rotary switch should be firmly locked after addressing. It serves to protect from dirt!

SET-scanner

You will only require the functions of the SET-scanner if you change the interface module configuration after the first switch-on. A modification may occur when modules are added or when one or more modules are pulled.

When the *BL ident*®-interface module is connected for the first time, the current configuration is automatically read. The continuously illuminated green LED "IOs" page 2-14 signals in sequence that the process was successfully executed.

Press the SET-button for approx. 10 seconds if you changed the interface module configuration. The current station configuration is stored as Actual-configuration and is transferred to both the Temp-Should-be configuration buffer and the Should-be configuration buffer.
During the operation, the "GW"-LED remains blinking.

Service-interface

The service-interface connects the Ethernet gateway to a PC. Projecting is possible with the software
I/O-ASSISTANT, and diagnostic messages can be displayed.

A special standard cable must be used for the service-interface/PC connection.

- BL20-connection cable (I/O-ASSISTANT-ADAPTERCABLE-BL20/BL67)

Connection with the BL20-cable

The BL20-cable has a PS/2-connector (connection of female connector to gateway) and a SUB-D female connector (connection of connector to PC).

Figure 7: PS/2-connector on the connection cable to the gateway (top view)

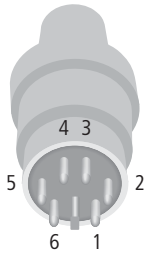


Figure 8: 9-pole SUB-D female connector on the connection cable to the PC (top view)

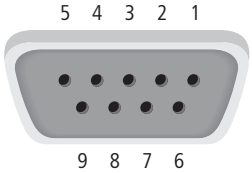
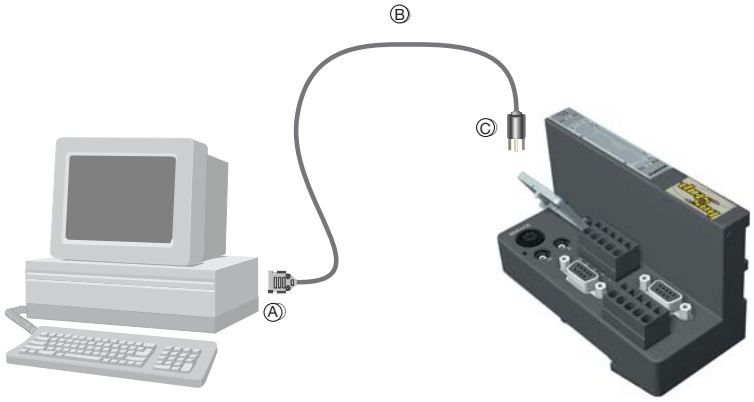


Table 4: Pin assignment PS/2- and SUB-D-interface

Pin	BL20-gateway female PS/2 connector	Sub-D-interface on PC	Pin
1	CLK	DTR, DSR	4, 6
2	GND	GND	5
3	DATA	–	–
4	n.c. (DATA2)	RxD	2
5	+5 V	RTS	7
6	n.c. (CLK2)	TxD	3

Figure 9: Connection between PC and BL20-gateway via the BL20-connection cable

A *Female SUB-D-connector*
B *BL20-connection cable*
C *PS/2-connector*



Firmware-update

A firmware-download may be done on the gateway via the "Service-interface" page 2-8 or via the "Ethernet-connection" page 2-5 with the help of the software I/O-ASSISTANT (please refer to Online Help for more information).

Please go to the TURCK web site at www.turck.com to locate the current firmware for your gateway and an instruction for executing the actualization.

Attention

During the download, the station should be disconnected from the fieldbus. The firmware download may only be performed by authorized staff. The field side must be switched free!

Read/write head connections

The read/write heads are connected to the BL20-2RFID-A/S-modules via connection cables on the connection terminals of the base modules (BL20-S4x-SBBS).

Ready-made connection cables

The following table displays ready-made connection cables with a coupling to connect the read/write head and an open end to connect to the spring-type terminals of the interface module. The connection to the spring-type terminals of the interface module is explained in the paragraphs "Connection terminal when using the connection cables RK4.5T... and WK4.5T..." page 2-11 and "Connection terminals when using the connection cables FB4.5T..." page 2-12.

Table 5: Ready-made connection cables (BL20)

Type description (Ident number)	**Coupling[A)] straight = s angled = a**	**2 m**	**5 m**	**10 m**	**25 m**	**50 m**
RK4.5T-2/S2500 (8035244)	g	x				
RK4.5T-5/S2500 (6699206)	g		x			
RK4.5T-10/S2500 (6699207)	g			x		
RK4.5T-25/S2500 (6699421)	g				x	
RK4.5T-50/S2500 (6699422)	g					x
WK4.5T-2/S2500 (8035245)	a	x				
WK4.5T-5/S2500 (6699208)	a		x			
WK4.5T-10/S2500 (6699209)	a			x		
WK4.5T-25/S2500 (6699423)	a				x	
WK4.5T-50/S2500 (6699424)	a					x
For the food and beverage range (FB = Food and Beverage) - IP69K						
FB-RK4.5T-5/S2502 (8036404)	g		x			
FB-RK4.5T-10/S2502 (8036405)	g			x		
FB-RK4.5T-25/S2502 (8037011)					x	

A *The "coupling" serves to connect the read/write head*

Characteristics of the connection cables of type RK... and WK...

- Shielded
- PUR outer jacket, PVC-, silicone- and halogen-free
- Highly flexible
- Crosslinked by irradiation, resistant to weld flash, oils
- High mechanical durability
- Approval

Characteristics of connection cables of type FB....

- Shielded
- PVC outer jacket
- Approval ,

Connection cables for installing a coupling

Self-assembly of "CABLE-BLIDENT-100M" suitable for *BL ident*® is possible. For this please install the M12-coupling "B8151-0/9" (6904604) to connect the read/write head.

Note

When installing the coupling, please pay attention to "Color Assignment RK4.5T... and WK4.5T..." from "Pin assignment for the connection cables" page 2-39!

Note

Please connect the open end of the connection cable per the "Connection terminal when using the connection cables RK4.5T... and WK4.5T..." page 2-11!

Connection terminal when using the connection cables RK4.5T... and WK4.5T...

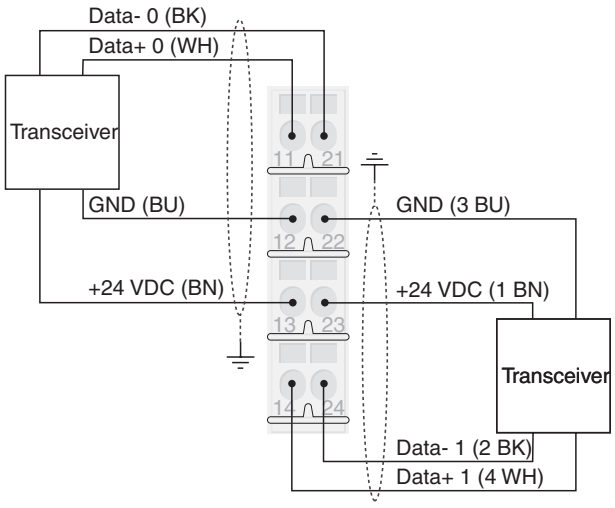


Figure 10: Connection of read/write head (transceiver) for connection cables RK4.5T... and WK4.5T... to BL20-S4x-SBBS

Table 6: Color assignment of connection cables RK4.5T... and WK4.5T...

Signal	Color assignment
$V_{r/w\ head}$	Brown (BN)
GND	Blue (BU)
Data+	White (WH)
Data-	Black (BK)

Connection terminals when using the connection cables FB4.5T...

Figure 11: Connection of the read/write head (transceiver) for connection cables FB4.5T... to BL20-S4x-SBBS

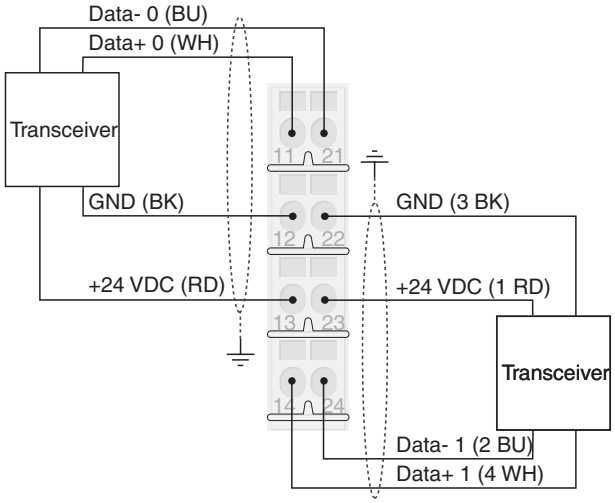


Table 7: Color mapping of connection cables FB4.5T...

Signal	Color mapping
$V_{r/w\ head}$	Red (RD)
GND	Black (BK)
Data+	White (WH)
Data-	Blue (BU)

Diagnostics via LEDs

LEDs of the fieldbus side

Table 8: LED-displays

LED	Status	Meaning	Remedy
GW	OFF	CPU is not supplied by voltage.	– Please check the supply voltage of the system connected to the gateway.
	green	Firmware active, gateway ready for operation and sending.	–
	green blinking, 1 Hz	Firmware inactive.	– When LED "**IOs**" is red, firmware download is needed.
	green blinking, 4 Hz	Firmware active, hardware of gateway defective.	– Replace the gateway.
	red	CPU not ready for operation, V_{CC} too low→ possible causes: – too many modules on gateway – short circuit in connected module – gateway defective	– Please check the voltage supply of the system connected to the gateway and the wiring. – Pull surplus modules. – Replace the gateway if need be.

Table 8: (cont.) LED-displays

LED	Status	Meaning	Remedy
IOs	OFF	CPU is not supplied by voltage.	– Please check the supply voltage of the system connected to the gateway.
	green	Configured constellation of the module bus participants corresponds to the real one; communication is active.	–
	green blinking, 1 Hz	Station is in the Force-mode of the I/O-ASSISTANT.	– Please deactivate the Force-mode of the I/O-ASSISTANT.
	green blinking, 4 Hz	The allowed max. number of modules connected to the gateway has been exceeded.	– Please check the number of modules connected to the gateway and pull surplus modules if needed.
	red	CPU not ready for operation. Either V_{cc} is too low or Bootload is needed. → possible causes: – too many modules on gateway – short circuit in connected module – gateway defective	– Please check the voltage supply of the system connected to the gateway and the wiring. – Pull surplus modules. – Replace the gateway if need be.
	red blinking, 1 Hz	Inadaptable modification of the real constellation of the module bus participants.	– Please compare the projection of your BL20-station to the real constellation. – Please check the configuration of your BL20-station for defective or wrongly plugged electronic modules.
	red blinking, 4 Hz	No communication via the module bus.	– At least 1 electronic module must be plugged in and able to communicate with the gateway.
	red/green blinking, 1 Hz	The current and the projected module lists do not match, but the data exchange continues.	– Please check the BL67-station for pulled or new modules that are not projected.

Table 8: (cont.) LED-displays

LED	Status	Meaning	Remedy
RUN/ STP	OFF	No program loaded into the gateway.	
	green	Application loaded into gateway, program is running.	
	green blinking	Application loaded into gateway, but PLC has not started or rather has stopped.	– Please start the gateway/the PLC-program.
	red	PLC-test at start-up of the gateway	
LINK/ ACT	green	Link established, 100 Mbit/s	
	green blinking	Ethernet traffic 100 Mbit/s	
	orange	Link established, 10 Mbit/s	
	orange blinking	Ethernet traffic 10 Mbit/s	
	OFF	No Ethernet link	– Please check the Ethernet connection
MS	green	Display of the logical connection to the Master (1. Modbus TCP-connection)	
	green blinking	Gateway signals operational readiness.	
	red	Gateway signals errors.	
	red blinking	DHCP/BootP-search of setting	

LEDs for the RFID-connections

Table 9: RFID-connections

LED	Status	Meaning	Remedy
DIA	OFF	Normal data exchange	
	red	Module bus communication failure	Please check whether more than two adjacent electronic modules were pulled. Relevant are those modules which are positioned between the gateway and this particular module.
	red blinking 0.5 Hz	Diagnostic present	
RW 0 **RW 1**	OFF	No Tag in received range	
	green	Tag in received range	
	green blinking 2 Hz	Data transfer from / to Tag	
	red	Error in read/write head	
	red blinking 2 Hz	Short circuit supply read/write head	

Diagnostic messages and parameterization of the gateway

A full description of the gateway diagnostic messages and the parameterization possibilities can be found in the manuals:

"User Manual for BL20-PG-EN" D301048

"User Manual for BL20-PG-EN-IP" D301051

Parameterization of the BL20-2RFID-A/BL20-2RFID-S-modules

BL20-2RFID-A

At this time, parameterization is not possible.

BL20-2RFID-S

The only parameter "Bridging Time Kx[n*4ms]" must only be changed/adjusted when a certain error message appears at startup. Please refer to Paragraph "Parameter" page 3-50 for more details.

Diagnostic messages of the *BL ident*®-ports

Possible software diagnostic messages (I/O-ASSISTANT):

Table 10: Diagnostics of the BL ident®-modules

Diagnostic byte and bit		Description I/O-ASSISTANT
Diagnostic Port 1		
0	0	reserved
	1	reserved
	2	"Ident Overcurrent" (the supply of the read/write head (transceiver) is switched off).
	3 to 7	reserved
1	0	"Transceiver hardware error"
	1 to 2	reserved
	3	"Transceiver voltage supply error"
	4 to 7	reserved
Diagnostic Port 2		
2	0	reserved
	1	reserved
	2	"Ident Overcurrent" (the supply of the read/write head (transceiver) is switched off).
	3 to 7	reserved

Table 10: (cont.) Diagnostics of the BL ident®-modules

Diagnostic byte and bit		**Description I/O-ASSISTANT**
3	0	"Transceiver hardware error"
	1 to 2	reserved
	3	"Transceiver voltage supply error"
	4 to 7	reserved

Technical data

Warning

This device may cause radio interference in living quarters and in small industry (living-, business- and commercial areas, small business). In this case the user may be asked to implement respective measures at his own expense.

Attention

The auxiliary supply must meet the requirements of the safety low voltage (SELV = Safety extra low voltage) per IEC 364-4-41.

Approvals and tests of the interface module

Table 11: Approvals and tests per EN 61131-2

Description	Value
Approval	
CE	
cULus	
UL	
Ambient temperature	
Operating temperature	0 to +55 °C /32 to 131 °F
Storage temperature	-25 to +85 °C /-13 to 85.00 °F
relative humidity	5 to 95 % (internal), Level RH-2, no condensation (at 45 °C storage)
Vibration test	Per EN 61131
Shock test	Per IEC 68-2-27
Falling and tumbling	Per IEC 68-2-31 and free fall per IEC 68-2-32
Electromagnetic compatibility	Per EN 61131-2
Protection Class	IP 20
Reliability	
Life cycle MTBF	120000 h
Pull-/Plug Cycle of Electronic modules	20

Note

Additional technical specifications for the tests for the TURCK products of the BL20 product family can be found in the catalog "Modular I/O systems and compact I/O modules in IP20 and IP67" (D301053) and the Manual "BL20 – I/O Modules Hardware and Engineering" (D300717).

Gateway connection level

Table 12: Technical data

Description	Value
Power supply	
Field supply	
U_L nominal value (range)	24 VDC (18 to 30 VDC)
I_L max. field current	10 A
System supply	
U_{SYS} nominal value (range)	24 VDC (18 to 30 VDC)
I_{SYS}	Max. 500 mA
I_{MB} (supply of the module bus participants)	1.2 A
Physical interfaces	
Fieldbus	
Transfer rate	10/100 Mbit/s
Passive LWL-adaptors are connectable	Current consumption max. 100 mA
Fieldbus connection technology	Female RJ45-connector
Fieldbus shield connection	Via Ethernet cable
Address setting	3 decimal rotary switches
Service-interface	Female PS/2-connector
Isolation voltage	
U_{RS} (Ethernet/ Service-interface)	500 V AC
U_{EN} (Ethernet/ Module Bus)	500 V AC
U_{sys} (U_L contra U_{sys})	1000 VDC

Table 12: Technical data

Description	Value
PLC-data	
Programming	
– Software – for RFID	CoDeSys V 2.3 V 2.3.6.4
– Programming languages	IEC 61131-3 (AWL, KOP, FUP, AS, ST)
– Application tasks	1
– Number POUs (Program Organization Units)	1024
– Programming interface	RS232-interface, Ethernet
Processor	RISC, 32 Bit
– Cycle time	< 1 ms for 1000 AWL-commands (No I/O-cycle)
– Real-time clock	yes
Memory	
– Program memory	512 kByte
– Data memory	512 kByte
– Input data	4 kByte (physical inputs plus network variables)
– Output data	4 kByte (physical outputs plus network variables)
– Residual memory	16 kByte

Connection level of read/write head

Table 13: Technical data

Description	Value
Number of ports	2
Nominal voltage from supply terminal	24 VDC
Nominal current from field supply	≤100 mA
Nominal current from module bus	≤30 mA
Power loss, typical	≤1 W
Inputs/Outputs	
Transfer rate	115.2 kBit/s
Cable length	50 m
Cable impedance	120 Ω
Potential isolation	Isolation of electronics and field level via optocoupler
Utilization factor	1
Supply of sensors	250 mA per port, short circuit protected
Sum current (via both ports)	500 mA
Number of diagnostic byte	4 (BL20-2RFID-A, BL20-2RFID-S)
Number of parameter byte	8 (BL20-2RFID-A, BL20-2RFID-S)
Number of input byte	4 (BL20-2RFID-A) 24 (BL20-2RFID-S)
Number of output byte	4 (BL20-2RFID-A) 24 (BL20-2RFID-S)
Transfer rate	Serial differential transfer to read/write head
Data buffer receive/send	8/8 kByte
Connection technology read/write heads	Spring-type terminals
Protection Class	IP 20
Stripped isolation length	8 mm
max. terminal range	0.5 to 2.5 mm^2
Conductors suitable for clamping	
"e" single-wire H 07V-U	0.5 to 2.5 mm^2
"f" fine-wire H 07V-K	0.5 to 1.5 mm^2
"f" with wire sleeve per DIN 46228/1 (wire sleeve crimped on gastight)	0.5 to 1.5 mm^2

Table 13: (cont.) Technical data

Description	Value
Plug gauge per IEC 947-1/1988	A1
Measuring data per VDE 0611 Part 1/8.92/IEC 947-7-1/1989	
Measuring voltage	250 V
Measurement current	17.5 A
Measurement diameter	1.5 mm^2
Measurement surge voltage	4 kV
Degree of pollution	2

Interfaces with the Protection Class IP67

Diagrams and designs of the interface modules

The *BL ident*®-Ethernet-interface is available with **2, 4, 6, 8** ports. The gateways are programmable (**PG**) and may be used in Modbus TCP (**EN**), EtherNet/IP (**EIP**) or PROFIBUS-DP (**DP**) depending on the design.

Interface-modules with the add-on "-*S*" (Simple) stand for a user-friendly startup opportunity. With a Write or Read command 8 bytes may be transferred. Interface modules without the add-on "S" offer a higher number of possible commands and a large data transfer volume per command.

Figure 12: BL ident®-Interface module with the Protection Class IP67 (2- and 8-port)

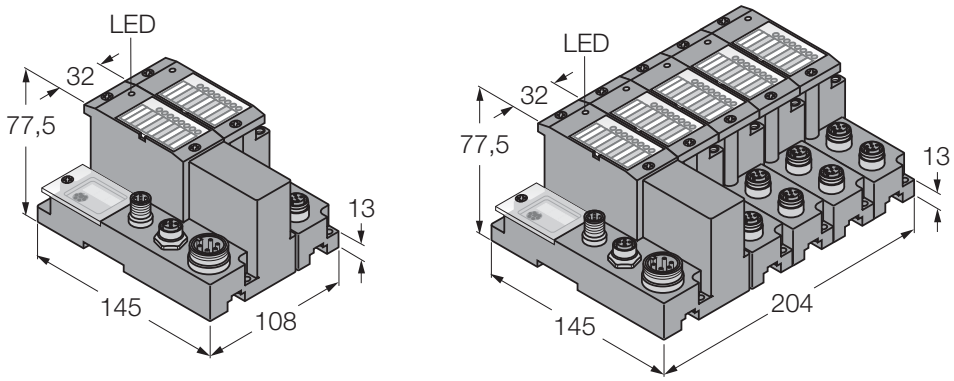


Table 14: BL ident®-Interface module with Protection Class IP67

Product description	Ident-No.
TI-BL67-PG-EN-2	1545065
TI-BL67-PG-EN-4	1545066
TI-BL67-PG-EN-6	1545067
TI-BL67-PG-EN-8	1545068
TI-BL67-PG-EN-S-2	1545098
TI-BL67-PG-EN-S-4	1545099
TI-BL67-PG-EN-S-6	1545100
TI-BL67-PG-EN-S-8	1545101
TI-BL67-PG-EIP-2	1545069
TI-BL67-PG-EIP-4	1545070
TI-BL67-PG-EIP-6	1545071

Table 14: (cont.) *BL ident®*-Interface module with Protection Class IP67

Product description	Ident-No.
TI-BL67-PG-EIP-8	1545072
TI-BL67-PG-EIP-S-2	1545102
TI-BL67-PG-EIP-S-4	1545103
TI-BL67-PG-EIP-S-6	1545104
TI-BL67-PG-EIP-S-8	1545105
TI-BL67-PG-DP-2	1545061
TI-BL67-PG-DP-4	1545062
TI-BL67-PG-DP-6	1545063
TI-BL67-PG-DP-8	1545064
TI-BL67-PG-DP-S-2	1545094
TI-BL67-PG-DP-S-4	1545095
TI-BL67-PG-DP-S-6	1545096
TI-BL67-PG-DP-S-8	1545097

The integration of *BL ident®* in Modbus TCP, EtherNet/IP and PROFIBUS-DP make programmable Ethernet-gateways possible:

- Modbus TCP
- EtherNet/IP
- PROFIBUS-DPV1

The following diagram shows the connection level of the programmable gateway:

left: Gateway connection level TI-BL67-PG-EN-X (also TI-BL67-PG-EN-IP-X)

right: Gateway connection level TI-BL67-PG-DP-X

Figure 13: Gateway connection level

A *"Service-interface" page 2-34*
B *"SET-scanner" page 2-35*
C *Rotary switch - "Addressing" page 2-31*
D *Status LED ("Diagnostics via LEDs" page 2-40)*
E *RUN/STOP LED ("Diagnostics via LEDs" page 2-40)*
F *LEDs for supply voltage check ("Diagnostics via LEDs" page 2-40)*
G *left: not assigned, right: PROFIBUS-LED*
H *Ethernet LEDs ("Diagnostics via LEDs" page 2-40)*
I *Module Bus LED ("Diagnostics via LEDs" page 2-40)*
J *left: currently not assigned, right: PROFIBUS "PROFIBUS-connection (only TI-BL67-PG-DP-X)" page 2-29*
K *"Ethernet-connection" page 2-29*
L *"Power supply voltage" page 2-28*

Simplified switching diagram

The following diagrams show among other things how the voltages V_I(Pin 4) and V_O (Pin 5) from the programmable Ethernet-gateways are used and then transmitted:

Figure 14: Power supply and simplified switching diagram Modbus TCP and for EtherNet/IP

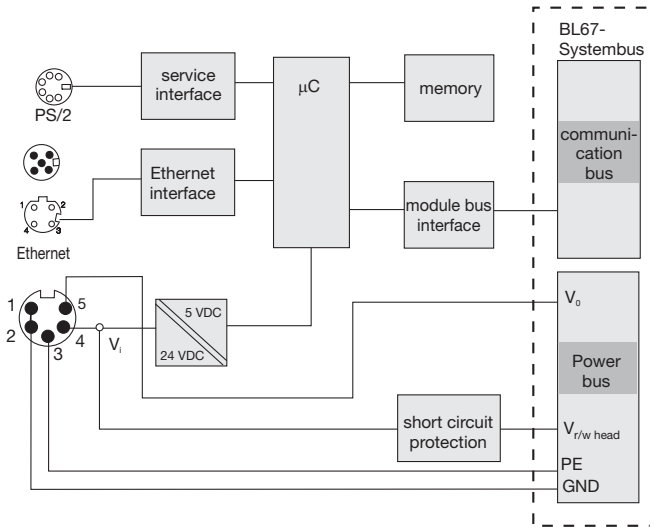
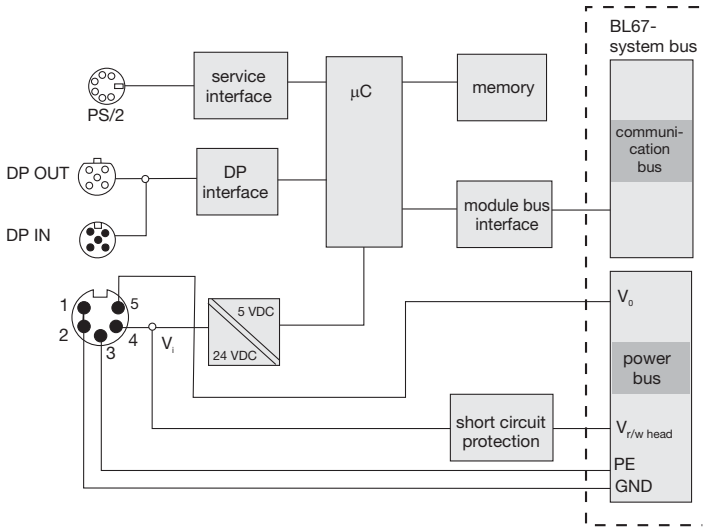


Figure 15: Power supply and simplified switching diagram PROFIBUS-DP (DPV0)



The read/write heads are fed via the voltage $V_{r/w\ head}$ (V_I). This connection is overload- and short circuit protected.

The LED "V_I" page 2-42 indicates when this voltage is defective.

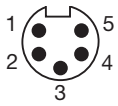
Note

Please refer to the appendix of this product catalog "Fieldbus Technology" for order information for available cable types. The TURCK-catalog "Modular I/O systems and compact I/O modules in IP20 and IP67" D301053 is located in the download area of the web page http://www.turck.com.

Power supply voltage

The BL67-system is supplied via the 7/8"-panel connector marked "Power".

Figure 16: 7/8"-connector



Note

Please refer to the appendix of the product catalog for order information for available couplings and cable types. The TURCK-catalog "Modular I/O systems and compact I/O modules in IP20 and IP67" D301053 is located on the website http://www.turck.com.

Table 15: Pin assignment of the 7/8"-connector

Pin-No.	Color	7/8"	Description
1	black	GND	
2	blue	GND	
3	green/ yellow	PE	Protective earth
4	brown	V_I (U_B)	Feed in of nominal voltage for inputs (sensor supply $V_{r/w\ head}$); from it the system is supplied as well.
5	white	V_O (U_L)	Feed in of nominal voltage for outputs (in case of the BL67-2RFID-X module supplies the microcontroller at the fieldbus side).

Ethernet-connection

The BL67 Ethernet-gateway is connected to Ethernet via the 4-pole, M12 female panel connector "Ethernet".

The M12 female connector on the gateway has a 4-pole and D-coded design per IAONA-specifications.

Note

Please refer to the appendix of the product catalog for order information for available bus cables for Ethernet. The TURCK-catalog "Modular I/O systems and compact I/O modules in IP20 and IP67" D301053 is located in the download area of the website: http://www.turck.com.

PROFIBUS-connection (only TI-BL67-PG-DP-X)

The PROFIBUS-DP is connected via a 5-pole M12 x 1 female panel connector, inverse coded.

For integration into a PROFIBUS-DP-system, TURCK offers "Bus-Y-Parts". The two female connectors of the Y-connector are either used as PROFIBUS-DP-input and PROFIBUS-DP-output or as PROFIBUS-DP-input and "Bus termination" page 2-30.

Note

Please refer to the appendix of the product catalog for order information for connectors and connection cables for PROFIBUS-DP. The TURCK-catalog "Modular I/O systems and compact I/O modules in IP20 and IP67" D301053 is located on the website: http://www.turck.com

Note

Please note that the specific connector should have 4 inductors (from 100 nH to 110 nH each) in the P- and N-feed lines (as recommended by the PROFIBUS user organization).

Figure 17: PBDP female connector - "DP OUT"

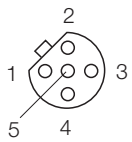


Table 16: Pin assignment of M12 x 1-female connector

Pin-No.	M12 x 1	Description
1	5 V	Supply of external devices
2	A	+)-Data cable; Received-/Send-Data-P; green
3	GND	Data reference potential
4	B	(-)-Data cable; Received-/Send-Data-N; red
5	Shield	Shield connection/function earth

Attention

No equalizing current must flow across the shield. For this purpose a safe system must be created for potential equalization!

Bus termination

If the BL67-PG-DP is used as first or last participant in the bus communication (at the end of a bus segment), the fieldbus must be terminated. The gateway itself offers no opportunity to terminate the fieldbus. The female connector of the Y-Part for connecting the PROFIBUS-DP-output must be terminated with a integrated termination resistance (for example RSS4.5-PDP-TR, Ident-No.: 6601590 as passive terminating resistance or PDP-TRA, Ident-No.: 6825346 as active terminating resistance).

Note

The bus termination is done externally with a connector with integrated terminating resistance.

Addressing

The three decimal rotary switches are used for Ethernet-addressing of the programmable gateways.

In addition, PROFIBUS-DP-addressing can be done via the three rotary switches. For this the gateway-parameter "DPSlaveAddrMode" must be set to the value "RotaryMode". In this case the last three digits of the Ethernet-address and the PROFIBUS-DP-address are the same.

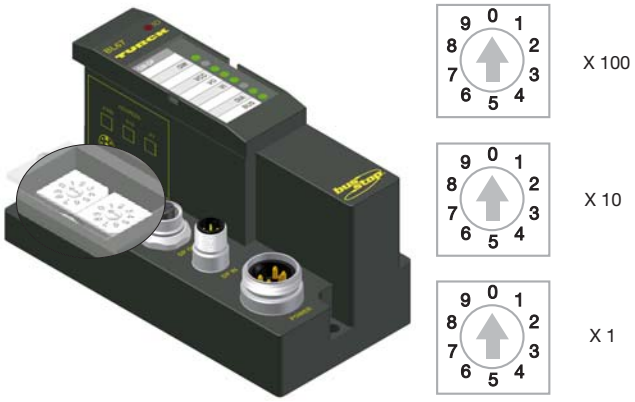


Figure 18: Decimal rotary switches for setting the Ethernet-address

Note

Generally the voltage is reset when the "Addressing Mode" is changed.

Table 17: Switch settings for different modes for assigning addresses

Switch setting	Addressing mode
000	The gateway has the Default-IP address: 192.168.1.254 and the default subnet mask 255.255.255.0 The newly set digit sequence is accepted after the voltage reset!
1 to 254	Rotary mode This mode allows the manual setting of the last three digits of the 12-digit IP-address. Acceptance of the newly set 3-digit sequence occurs after a voltage reset! The last three digits of an IP-address stored in the EEPROM are ignored in this mode, but the first 9 digits and the subnet mask are relevant! The IP-address stored in the EEPROM and the subnet mask can be changed with the modes 300, 400, 500, and 600. The 3-digit setting done here is not stored in the EEPROM of the gateway. **TI-BL67-PG-DP-X:** The address set here may be jointly used for the Ethernet-communication and the PROFIBUS-DP-communication. When jointly used, a value between 1 and 125 must be set and the gateway-parameter "DPSlaveAddrMode" must be set to the value "RotaryMode".
300	BootP_Mode The IP-address of the gateway and the subnet mask ("Network mask" page 6-2) are assigned with the help of a BootP-server. Both network settings are permanently stored in the EEPROM of the gateway.
400	DHCP_Mode The IP-address of the gateway and the subnet mask ("Network mask" page 6-2) are assigned with the help of a DHCP-server. Both network settings are permanently stored in the EEPROM of the gateway.
500	PGM_Mode The PGM-mode allows access of the I/O-ASSISTANT to the network settings of the gateway. The IP-address of the gateway and the subnet mask ("Network mask" page 6-2) are permanently stored in the EEPROM of the gateway.
600	PGM_DHCP_Mode like DHCP_Mode

Note

You may also set the PROFIBUS-DP-address of the TI-BL67-PG-DP-X in the program software (for example CoDeSys). For this the parameter "DPSlaveAddrMode" must be set to the value "NormalMode". In this case the switch setting of the rotary switches has no effect on the PROFIBUS-DP-address.

Attention

After addressing, the protective cover must be tightly affixed with screws on top of the rotary switches.

Please ensure that the seal of the protective cover is not damaged or moved.

Protection Class IP67 can only be guaranteed when the cover is correctly locked.

Service-interface

The service-interface connects the *BL ident*®-interface module to the PC. With the software I/O-ASSISTANT the interface module can be projected and diagnostic messages can be displayed.

A special, standard cable is used for the service-interface/PC connection.

- TURCK connection cable (I/O-ASSISTANT-ADAPTERCABLE-BL20/BL67; Ident No.: 6827133)

The cable has a PS/2 connector (connection for female connector to gateway) and a SUB-D female connector (for connector/PC connection).

Figure 19: PS/2-connector on connection cable of the gateway (top view)

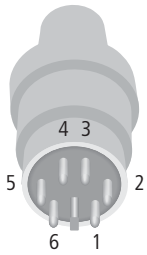


Figure 20: 9-pole SUB-D female connector on the connection cable to the PC (top view)

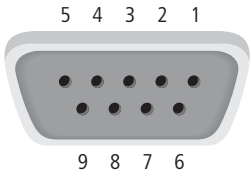
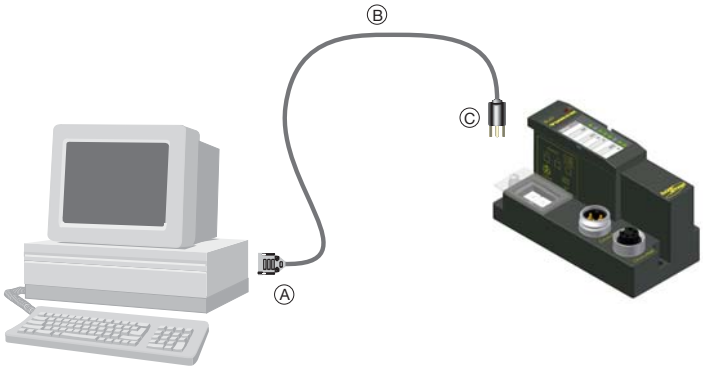


Figure 21: Connection between PC and BL67-interface module via the TURCK-connection cable.



Pin assignment

The table shows the pin assignment when using the PS/2-cable:

Table 18: Pin assignment with PS/2-cable

PS/2			**9-pole serial interface on PC**	
Pin-No.	Standard PS/2-connector	BL67 Gateway: PS/2 female connector	Pin-No.	**Connector**
1	CLK	+5 V (from Gateway)	4, 6	DTR, DSR
2	GND	GND	5	GND
3	DATA	Not used	–	–
4	n.c. (DATA2)	TxD	2	RxD
5	+5 V	/CtrlMode	7	RTS
6	n.c. (CLK2)	RxD	3	TxD

Firmware-update

A firmware-download may be done on the gateway via the "Service-interface" page 2-34 or via the "Ethernet-connection" page 2-29 with the help of the software I/O-ASSISTANT (please refer to Online Help for more information).

Please go to the TURCK web site at www.turck.com to locate the current firmware for your gateway and an instruction for executing the actualization.

Attention

During the download, the station should be disconnected from the fieldbus. The firmware download may only be performed by authorized staff. The field side must be switched free.

SET-scanner

You will only require the functions of the SET-scanner if you change the interface module configuration after the first switch-on. A modification may occur when modules are added or when one or more modules are pulled.

When the *BL ident*®-interface module is connected for the first time, the current configuration is automatically read. The continuously illuminated green LED "IO" page 2-40 signals in sequence that the process was successfully executed.

Press the SET-button for approx. 10 seconds if you changed the interface module configuration. The current station configuration is stored as Actual-configuration and is transferred to both the Temp-Should-be configuration buffer and the Should-be configuration buffer.
During the operation, the "GW"-LED remains blinking.

Read/write head connections

Ready-made connection cables with coupling and connector

Table 19: Ready-made connection cables (BL67)

Type description (Ident number)	Coupling[A] straight = s angled = a	Connector[B] straight = s	2 m	5 m	10 m
RK4.5T-2-RS4.5T/S2500 (6699200)	g	g	x		
RK4.5T-5-RS4.5T/S2500 (6699201)	g	g		x	
RK4.5T-10-RS4.5T/S2500 (6699202)	g	g			x
WK4.5T-2-RS4.5T/S2500 (6699203)	a	g	x		
WK4.5T-5-RS4.5T/S2500 (6699204)	a	g		x	
WK4.5T-10-RS4.5T/ S2500 (6699205)	a	g			x
Type description (Ident_Number)	**Coupling[A] straight = s angled = a**	**Connector[B] straight = s**	**0.3 m**	**25 m**	**50 m**
RK4.5T-0.3-RS4.5T/ S2500 (6699210)	g	g	x		
RK4.5T-25-RS4.5T/S2500 (6699211)	g	g		x	
RK4.5T-50-RS4.5T/S2500 (8035246)	g	g			x
WK4.5T-25-RS4.5T/ S2500 (6638425)	a	g		x	
WK4.5T-50-RS4.5T/ S2500 (6638426)	a	g			x

A *The "coupling" serves to connect the read/write head*
B *The "Connector" is connected to the interface module*

Ready-made connection cables with coupling

The "coupling" serves to connect the read/write head M12-connectors BS8151-0/9 (6904613) are used to connect the interface module.

Note

When installing the connector, please note the "Pin assignment for the connection cables" page 2-39!

Table 20: Ready-made connection cables (BL67)

Type description (Ident number)	Coupling[A] straight = s angled = a	2 m	5 m	10 m	25 m	50 m
RK4.5T-2/S2500 (8035244)	g	x				
RK4.5T-5/S2500 (6699206)	g		x			
RK4.5T-10/S2500 (6699207)	g			x		
RK4.5T-25/S2500 (6638421)	g				x	
RK4.5T-50/S2500 (6638422)	g					x
WK4.5T-2/S2500 (8035245)	a	x				
WK4.5T-5/S2500 (6699208)	a		x			
WK4.5T-10/S2500 (6699209)	a			x		
WK4.5T-25/S2500 (6699423)	a				x	
WK4.5T-50/S2500 (6638424)	a					x
For the food and beverage range (FB = Food and Beverage) - IP69K						
FB-RK4.5T-5/S2502 (8036404)	g		x			
FB-RK4.5T-10/S2502 (8036405)	g			x		
FB-RK4.5T-25/S2502 (8037011)	g				x	

A *The "coupling" serves to connect the read/write head*

Connection cables for installing a connector and a coupling

Self-assembly of "CABLE-BLIDENT-100M" suitable for *BL ident*® is possible. For this purpose install the M12-connector "BS8151-0/9" (6904613) to connect the interface module, and the M12-coupling "B8151-0/9" (6904604) to connect the read/write head.

Note

When installing the connector and the coupling, please note the "Pin assignment for the connection cables" page 2-39.

Connection level - base module BL67-B-2M12

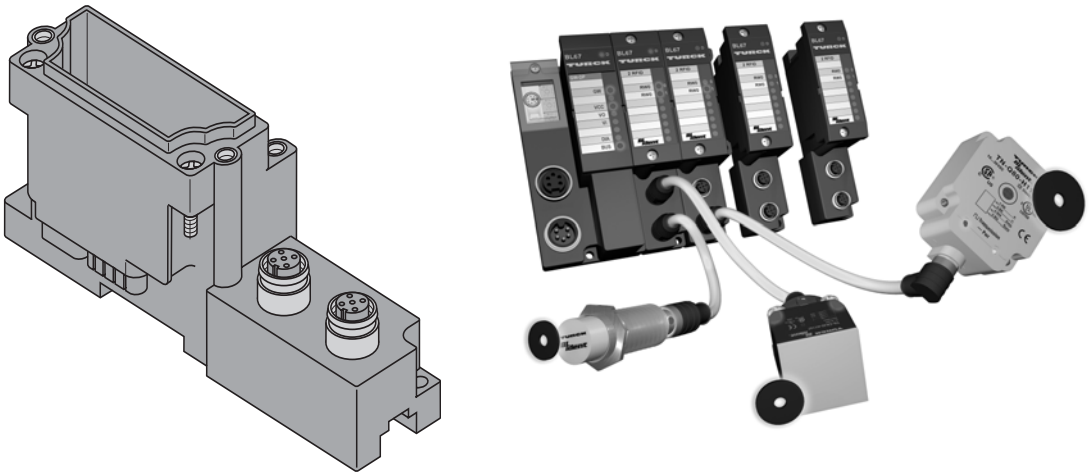


Figure 22: Connection level

Pin assignment for the connection cables

Figure 23: Pin assignment connector (left) and coupling (right)

Table 21: Pin assignment to BL67-2RFID

Port	Pin assignment of the BL67-B-2M12	Pin assignment of the connector	Signal[B)]	Color mapping[A)] RK4.5T... and WK4.5T..	Color mapping[A)] FB4.5T..
1	0.1	1	$V_{r/w\ head}$[B)]	Brown (BN)	Red (RD)
	0.3	3	GND	Blue (BU)	Black (BK)
	0.2	2	Data-	Black (BK)	Blue (BU)
	0.4	4	Data+	White (WH)	White (WH)
2	1.1	1	$V_{r/w\ head}$[B)]	Brown (BN)	Red (RD)
	1.3	3	GND	Blue (BU)	Black (BK)
	1.2	2	Data-	Black (BK)	Blue (BU)
	1.4	4	Data+	White (WH)	White (WH)

A *This specification refers to the standard TURCK-connectors for BL ident®.*
B *"Power supply voltage" page 2-28*

Diagnostics via LEDs

LEDs of the fieldbus side

Table 22: LED-displays

LED	Status	Meaning	Remedy
GW	OFF	CPU is not supplied by voltage.	Please check the supply voltage of the system connected to the gateway.
	green	Firmware active, gateway ready for operation and sending.	
	green blinking, 1 Hz	Firmware inactive.	When LED "**IOs**" is red, firmware download is needed.
	green blinking, 4 Hz	Firmware active, hardware of gateway defective.	Replace the gateway.
	red and LED "IOs" OFF	CPU not ready for operation, V_{CC} too low→ possible causes: – too many modules on gateway – short circuit in connected module – gateway defective	– Please check the voltage supply of the system connected to the gateway and the wiring. – Pull surplus modules. – Replace the gateway if need be.
IO	OFF	CPU is not supplied by voltage.	Please check the supply voltage of the system connected to the gateway.
	green	Configured constellation of the module bus participants corresponds to the real one; communication is active.	
	green blinking, 1 Hz	Station is in the Force-mode of the I/O-ASSISTANT.	Please deactivate the Force-mode of the I/O-ASSISTANT.
	green blinking, 4 Hz	The allowed max. number of modules connected to the gateway has been exceeded.	Please check the number of modules connected to the gateway and pull surplus modules if needed.

Table 22: (cont.) LED-displays

LED	Status	Meaning	Remedy
IO	red	CPU not ready for operation. Either V_{cc} is too low or Bootload is needed. → possible causes: – too many modules on gateway – short circuit in connected module – gateway defective	– Please check the voltage supply of the system connected to the gateway and the wiring. – Pull surplus modules. – Replace the gateway if need be.
	red blinking, 1 Hz	Inadaptable modification of the real constellation of the module bus participants.	– Please compare the projection of your BL67-station to the real constellation. – Please check the configuration of your BL67-station for defective or wrongly plugged electronic modules.
	red blinking, 4 Hz	No communication via the module bus.	– At least 1 electronic module must be plugged in and able to communicate with the gateway.
	red/green blinking, 1 Hz	The current and the projected module lists do not match, but the data exchange continues.	– Please check the BL67-station for pulled or new modules that are not projected.
RUN/ STOP	OFF	No program loaded into gateway.	
	green	Application loaded into gateway, program is running.	
	green blinking	Application loaded into gateway, but PLC has not started or rather has stopped.	– Please start the gateway/the PLC-program.
	red	PLC-test at start-up of the gateway	
V_{cc}	green	Module bus and CPU o.k.	
	OFF	CPU is not supplied or short circuit of the module bus supply.	– Please check the system supply on the gateway.

Table 22: (cont.) LED-displays

LED	Status	Meaning	Remedy
V_O	green	Supply of outputs o.k.	
	green blinking, 1 Hz	Low voltage V_O; system running.	– Please check the supply voltage of the system connected to the gateway.
	green blinking, 4 Hz	High voltage V_O; system running.	
	OFF	Voltage supply missing	
V_I	green	V_I o.k.	
	red	Short circuit or overload on sensor supply $V_{r/w\ head}$ → switching off sensor supply	– An automatic restart occurs as soon as the error no longer exists.
	green blinking, 1 Hz	Low voltage V_I; system running	– Please check the supply voltage of the system connected to the gateway.
	green blinking, 4 Hz	High voltage V_I; system running	
	OFF	Voltage supply missing	– Please check the supply voltage of the system connected to the gateway.
Only the BL67-PG-DP has a DP-LED:			
DP	green	PROFIBUS-DP communication established	–
	red	PROFIBUS-DP communication interrupted	– Please check the PROFIBUS-DP wiring as well as the setting of the Slave-address and the baud rate.
LINK/ ACT	green	Link established, 100 Mbit/ s	
	green blinking	Ethernet traffic, 100 Mbit/s	
	orange	Link established, 10 Mbit/s	
	orange blinking	Ethernet traffic, 10 Mbit/s	
	OFF	No Ethernet link	– Please check the Ethernet connection

Table 22: (cont.) LED-displays

LED	Status	Meaning	Remedy
MS	green	Display of the logical connection to the Master (1. Modbus TCP-connection)	
	green blinking	Gateway signals operational readiness.	
	red	Gateway signals errors.	
	red blinking	DHCP/BootP-search of setting	

LEDs for the RFID-connections

The LEDs are positioned on the modules above the connection plane.

Table 23: RFID-connections

LED	Status	Meaning	Remedy
D	OFF	Normal data exchange	
	red	Module bus communication failure	Please check whether more than two neighboring electronic modules were pulled. Relevant are those modules which are positioned between the gateway and this particular module.
	red blinking 0.5 Hz	Diagnosis present	
RW 0 **RW 1**	OFF	No Tag in received range	
	green	Tag in received range	
	green blinking 2 Hz	Data transfer from / to Tag	
	red	Error in read/write head	
	red blinking 2 Hz	Short circuit supply read/write head	

Diagnostic messages and parameterization of the programmable gateways

A full description of the gateway diagnostic messages and the parameterization possibilities can be found in the manuals:

"BL67 User Manual BL67-PG-EN" D301032

"BL67 User Manual BL67-PG-EN-IP" D301044

"BL67 User Manual BL67-PG-DP" D301046

Parameterization of the BL67-2RFID-A/BL67-2RFID-S-modules

BL67-2RFID-A

At this time, parameterization is not possible.

BL67-2RFID-S

The only parameter "Bridging Time Kx[n*4ms]" must only be changed/adjusted when a certain error message appears at startup. Please refer to the respective Chapter "Startup..“ for details.

Diagnostic messages of the BL67-2RFID-A/BL67-2RFID-S-module with BL67-PG-EN / BL67-PG-EN-IP / BL67-PG-DP

Possible software diagnostic messages (for example "Modbus Server Tester") may be obtained via Registers 0xA000 to 0xA400. Here, 32 registers are available to each module. The diagnoses for the first module of the station can be located in Register 0xA000 , the diagnoses for the second module starting at 0xA020, for the third starting at 0xA040, etc. The diagnostic messages are the last byte of the Modbus TCP-telegram. For the BL67-2RFID-A-module, it is 2 Byte (4 hexadecimal digits).

The error messages for the first port are represented by the last two hexadecimal digits. The error messages for the second port by the digit pair before last.

Please change the hexadecimal values to binary values and evaluate per the following table ("1" means error):

Table 24: Diagnoses of the Ident-ports

Diagnosis byte and bit		Description I/O-ASSISTANT
Diagnoses Port 1		
0	0	reserved
	1	reserved
	2	"Ident Overcurrent" (the supply of the read/write head (transceiver) is switched off).
	3 to 7	reserved
1	0	"Transceiver hardware fault"
	1 to 2	reserved
	3	"Transceiver supply voltage error"
	4 to 7	reserved

Table 24: (cont.) Diagnoses of the Ident-

Diagnosis byte and bit		**Description I/O-ASSISTANT**
Diagnoses Port 2		
2	0	reserved
	1	reserved
	2	"Ident Overcurrent" (the supply of the read/write head (transceiver) is switched off).
	3 to 7	reserved
3	0	"Transceiver hardware fault"
	1 to 2	reserved
	3	"Transceiver supply voltage error"
	4 to 7	reserved

Technical data

Warning

This device may cause radio interference in living quarters and in small industry (living, business- and commercial areas, small business). In this case the user may be asked to implement respective measures at his own expense.

Attention

The auxiliary supply must meet the requirements of the safety low voltage (SELV = Safety extra low voltage) per IEC 364-4-41.

Approvals and tests of the interface module

Table 25: Approvals and tests per EN 61131-2

Approval	
CE	
cULus	
UL	
Ambient temperature	
Operating temperature	0 to +55 °C /32 to 131 °F
Storage temperature	-25 to +85 °C /-13 to 85.00 °F
relative humidity	5 to 95 % (internal), Level RH-2, no condensation (at 45 °C storage)
Vibration test	per EN 61131-2
Shock test	per IEC 68-2-27
Falling and tumbling	per IEC 68-2-31 and free fall per IEC 68-2-32
Electromagnetic compatibility	per EN 61131-2
Protection Class	IP 67
Reliability	
Life cycle MTBF	min. 120000 h
Pull-/Plug Cycle of Electronic modules	20

Note

Additional technical specifications for testing TURCK products of the BL67 product family can be found in the catalog "Modular I/O systems and compact I/O modules in IP20 and IP67" (D301053) and the manuals "BL67–User Manual for BL67-PG-EN" D301033, "BL67 – programmable Gateway BL67-PG-EN-IP User Manual" D301044, "BL67- programmable Gateway BL67-PG-DP User Manual" D301047.

BL67-PG-EN, BL67-PG_EN-IP, BL67-PG_DP

Table 26: Technical data of the programmable Ethernet-gateway

Description	Value	Meaning
Supply voltage		
System supply V_I (U_B)	24 VDC	Made available by the galvanically isolated module bus supply.
acceptable range	18 to 30 VDC	
Field supply V_O (U_L)	24 VDC	
acceptable range	18 to 30 VDC	
I_{sys}	600 mA	Current consumption CPU + module bus when station is at full capacity
I_{MB}	max. 1.3 A	Max. output current of the module bus supply
I_{VI}	max. 4 A	Protection of the sensor supply from gateway or power-feeding module against overload and short circuit.
Fieldbus - only for BL67-PG-DP		
PROFIBUS-DP		
Transfer rate fieldbus	9.6 kbit/s to 12 Mbit/s	
Address range fieldbus	1...125	
Isolation voltage		
U_{RS} (Ethernet/ Service-interface)	500 VAC	
U_{EN} (Ethernet/ Module Bus)	500 VAC	

Table 26: (cont.) Technical data of the programmable Ethernet-gateway

Description	Value	Meaning
U_{sys} (V_O/V_I contra U_{sys})	1000 VDC	
U_{Field} / service interface	1000 VDC	
PLC-data		
Programming		
– Software – for RFID	CoDeSys V 2.3 from V 2.3.6.4	
– Programming languages	IEC 61131-3 (AWL, KOP, FUP, AS, ST)	
– Application tasks	1	
– Number POUs (Program Organization Units)	1024	
– Programming interface	RS232-interface, Ethernet	
Processor	RISC, 32 Bit	
– Cycle time	< 1 ms for 1000 AWL-commands (no I/O-cycle)	
– Real-time clock	yes	
Memory		
– Program memory	512 kByte	
– Data memory	512 kByte	
– Input data	4 kByte (physical inputs plus network variables)	
– Output data	4 kByte (physical outputs plus network variables)	
– Residual memory	16 kByte	
Ambient conditions		
Ambient temperature		
– $t_{Ambient}$	0 to +55 °C /32 to 131 °F	
– t_{Store}	- 25 to +85 °C / - 13 to 185 °F	
relative humidity	5 to 95 % (internal), Level RH-2, no condensation (at 45 °C storage); per IEC 61131-2	
Climate check	per IEC 61131-2	
Damaging gas	per IEC 60068-2-42/43	

Table 26: (cont.) Technical data of the programmable Ethernet-gateway

Description	Value	Meaning
– SO_2	10 ppm (rel. humidity < 75 %, no condensation)	
– H_2S	1.0 ppm (rel. humidity < 75 %, no condensation)	
Vibration resistance	per IEC 61131-2	
– 10 to 57 Hz, constant amplitude 0.075 mm, 1 g	yes	
– 57 to 150 Hz, constant acceleration 1 g	yes	
– Mode	Frequency cycles with a rate of change of 1 Octave/min	
– Mode duration	20 frequency cycles per coordination axes	
Protection Class	per IEC 60529, IP67	
Shock resistance	per IEC 68-2-27, 18 shocks, half sinus 15 g peak value/11 ms, each in ± direction per space coordinate	
Permanent shock resistance	per IEC 29.02.68, 1000 shocks, half sinus 25 g peak value/6 ms, each in ± direction per space coordinate	
Falling and toppling/ free fall	per IEC 68-2-31/ per IEC 68-2-32	
– Fall height (weight < 10 kg)	1.0 m	
– Fall height (weight 10 to 40 kg)	0.5 m	
– Test cycles	7	
Transient emissions		
high-frequency radiated	per EN 55011, Class A	
Electromagnetic compatibility (EMC)	per EN 61131-2/EN 50082-2 (Industry)	
Static electricity per EN 61000-4-2		
– Air discharge (direct)	8 kV	
– Relay discharge (indirect)	4 kV	
Electromagnetic HF-fields	per EN 61131-2	

Table 26: (cont.) Technical data of the programmable Ethernet-gateway

Description	Value	Meaning
Rapid transients (Burst)	per IEC 61131-2	
Cable-bound interference sizes, induced by HF-fields	per IEC 61000-4-6 10 V Criterion A	
Energy rich transients [A] voltage supply	per IEC 61000-4-5 0.5 kV CM, 12 Ω/ 9 µF 0.5 kV DM, 2 Ω/ 18 µF Criterion B	
Reliability		
Life cycle MTBF	min. 120000 h	
Pull-/Plug cycles of the electronic modules	20	
Housing material	PC-V0 (Lexan)	
Dimensions		
Width/ Length/ Height (mm/inch)	64,5 × 145,0 × 77,5 / 2,54 × 5,71 × 3,05	
Diagnostic interface	PS/2 female connector	

A *I/O-cable length ≤30 m*

Connection plane of read/write head

Table 27: Technical data BL67-2RFID-A

Description	Value
Number of ports	2
Nominal voltage V_i	24 VDC
Nominal current from field supply	≤ 100 mA
Nominal current from module bus	≤ 30 mA
Power loss, typical	≤ 1 W
Inputs/Outputs	
Transfer rate	115.2 kBit/s
Cable length	50 m
Potential isolation	Isolation of electronics and field level via optocoupler

Table 27: Technical data BL67-2RFID-A

Description	Value
Connection technology read/write heads	M12 coupling
Data buffer receive/send	8/8 kByte
Cable impedance	120 Ω
Utilization factor	1
Supply of sensors	500 mA per port, short circuit protected
Number of diagnostic byte	4 (BL67-2RFID-A, BL67-2RFID-S)
Number of parameter byte	8 (BL67-2RFID-A, BL67-2RFID-S)
Number of input byte	4 (BL67-2RFID-A) 24 (BL67-2RFID-S)
Number of output byte	4 (BL67-2RFID-A) 24 (BL67-2RFID-S)
Dimensions (B x L x H)	32 x 91 x 59 mm

3 Startup of the TURCK *BL ident*®-system with CoDeSys

Example startup with BLxx-2RFID-A modules

TURCK provides example projects for this specific purpose. Order directly from TURCK the CD with the example projects and all other required software components: Ident-No. 1545052

Hardware description of the example project

The following hardware components were used for the example startup:

- *BL ident*®-interface module "TI-BL67-PG-EN-2" (1 x 2-port)
- *BL ident*®-read/write head "TN-CK40-H1147"
- Data carrier "TW-R30-B128" (user data = 112 bytes)
- Suitable connection and supply cables

Installation of the software "CoDeSys"

If you install the CoDeSys software directly from the *BL ident*®-CD (Ident-No. 1545052), you will automatically have the correct version for the example project.

Note

Please note that you will require the CoDeSys-version 2.3.6.4 (or earlier) for startup of the *BL ident*®-system!

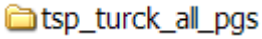
Note

The example project works with the target file folders as suggested by the CoDeSys!

Installation of the target with InstallTarget.exe

In order to support the operation of the TURCK-gateways with the CoDeSys, the installation of the gateway specific "Target" is needed. The Target Support Package (in short: TSP) is a file folder with various files needed for the operation of the gateways on CoDeSys. You may locate the TSP on the *BL ident*®-CD (Ident-No. 1545052). In addition to the Target file, this file folder also contains other manufacturer specific files like libraries, etc..

Figure 24: TSP file folder for the programmable gateways



Note

Please ensure that the directory structure of the TSP file folder remains intact. If this is not the case, problems may occur when the target is installed.

Note

Current Target files are also located online at http://www.turck.com.

The program TargetInstall.exe is needed for installation. In general, this program can be located via the following directory tree:

C > Programs > 3S Software > CoDeSys V2.3 > InstallTarget.exe

The program can also be started alternatively via:

Start > Programs > 3S Software > CoDeSys V2.3 >InstallTarget

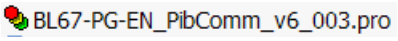
After the start of the InstallTarget program, please click on the "Open" button. Search for the TSP file folder for the programmable gateway (for example, TSP_turck_all_pgs_Vx.x.x.x) and select the .tnf-file (for example, Turck-PGs.tnf). Please click on the "Open" button again. Now the new Turck file folder is in the field "Possible Target Systems".

The respective installation directory is displayed. Mark the gateway type you used. Click the "Install" button. The new gateway now belongs to the "Installed Target Systems".

Downloading the example project to the CoDeSys

Start the 3S-software CoDeSys. Open the example project that is compatible with your gateway:

File > Open >



The example BL67-PG-EN_PibComm_xxx.pro belongs to the gateway BL67-PG-EN.

Completeness of the libraries of the example program

Check the completeness of the libraries. It is possible under certain circumstances that you will receive an error message if the libraries of the example program are incomplete.

The libraries are displayed when you open the tab "Resources" and then select "Library Manager" from the menu.

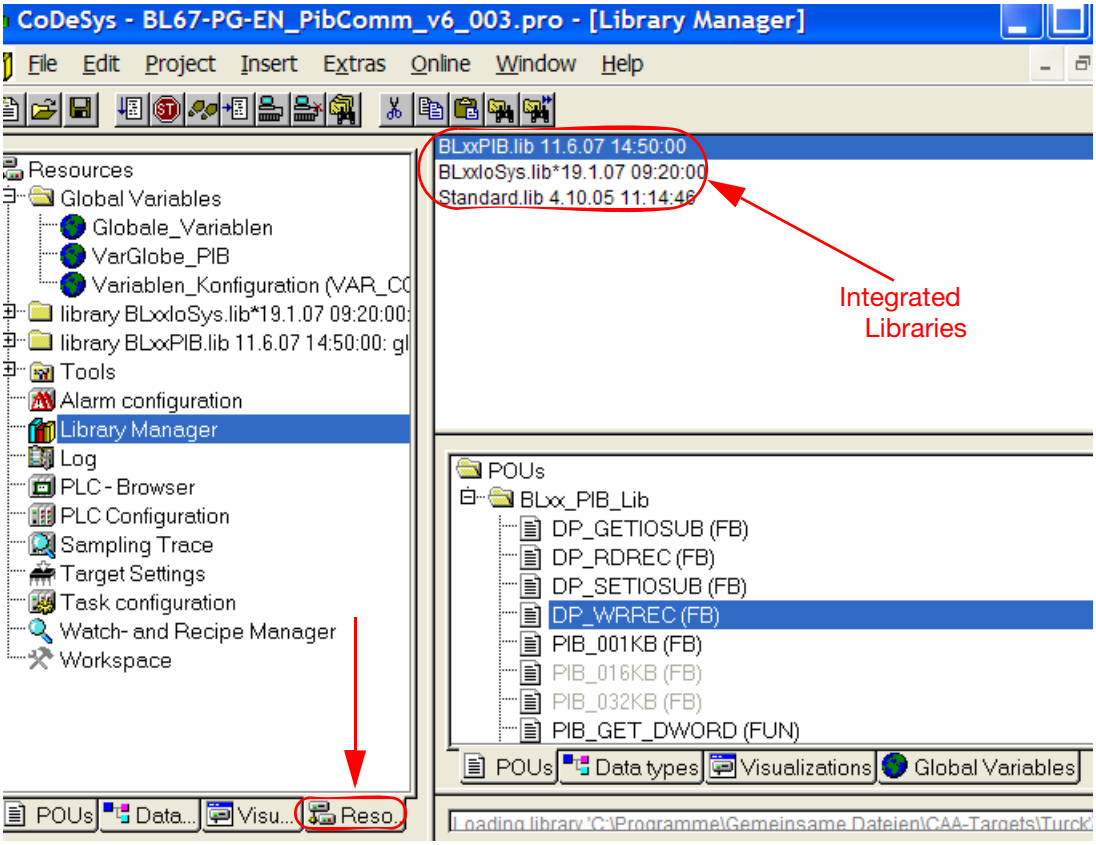
The list of the integrated libraries can be found on the top right next to the Resources menu.

For this example program, the following libraries are needed:

- BLxxPIB.lib
- BLxxIoSys.lib
- Standard.lib

Please open the window "Additional Libraries" to complement the libraries. The window is selected by right-clicking the mouse in the free space next to the library list.

Figure 25: Library manager



The libraries BLxxPIB.lib and BLxxIoSys.lib can be found in the TSP file folder:

C > Programs > Shared Files > CAA-Targets > Turck > BLxx

The library, Standard.lib, is located under:

C > Programs > 3S Software > CoDeSys V2.3 > Library

In the case that a missing library appears with a red text, delete the library first by right-clicking the mouse and then by clicking "Delete". The library can now be integrated without problems as described above.

Setting of the IP-addresses for Ethernet communication

With a few steps now check whether the IP-address of your gateway matches the IP-address of your PC-Ethernet connection.

1. Setting of the communication parameters in CoDeSys

In the software CoDeSys you may access "Communication Parameters" via Menu Online. Here, accept the following settings:

Figure 26: Setting of the communication parameters in CoDeSys

Name	Value	Comment
Address	192.168.001.001	IP address or hostname
Port	1200	
Blocksize	128	Must match with runtime
Motorola byteorder	Yes	

Here, the last three digits of the address must be "001". In the example, this corresponds to the switch setting of the rotary switches on the gateway. Differing switch settings must be accepted accordingly.

Note

After each change of the switch setting of the rotary switches on the gateway, a voltage-reset is needed!

Note

Please note that the parameter "Motorola byteorder" must have the value "Yes"!

2. Checking/setting of the IP-address of the network interface card or rather the PC

The procedure applies to the operating systems Windows 2000 and Windows XP.

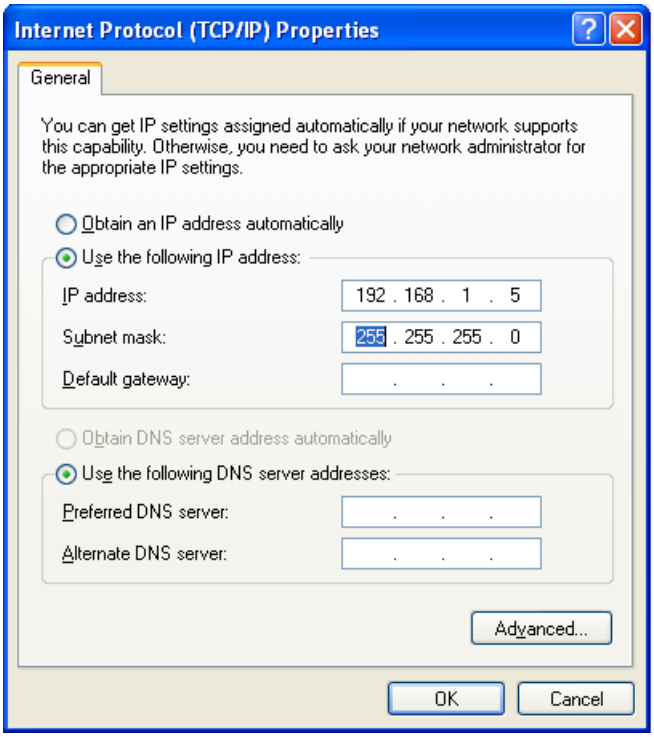
Here, you may access the network connections via:

Start > Control panel > Network Connections

Please select from the list the network connection for your gateway (for example, LAN-connection 3). Right-click on the mouse to open the file folder "Properties".

In the window "This connection uses the following elements" under "General", please check the bottom item "Internet Protocol (TCP/IP)". You may click on the "Properties" button if this entry is checked blue. Here, you can check whether the IP-address of the data processor/ network interface card matches the IP-address of the gateway in Figure 26.

Figure 27: IP-address of the data processor or rather the network interface card



It is possible to change the IP-address by selecting the item "Use the following IP address" or rather "Specify IP address".

Communication between the BL67 gateway and the data processor is possible if the digits of the first three ranges correspond. In this example it is 192.168.001.

Log-in and start

Log-in in the CoDeSys occurs via:

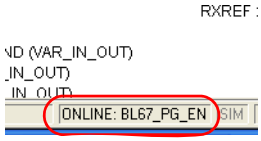
Online > Log in

or alternatively with 

Respond yes to the question whether the new program should be downloaded.

In the case that you receive an error message, please check the connection cables and read the previous chapters. The Turck BL67-PG-Ethernet gateways signal an intact Ethernet connection via the LED "LNK/ACT". In case that this LED is "off", please check whether the screw connection is correctly screwed on and not skewed, or whether the connector on your PC has come loose.

The successful log-in is confirmed when the message "ONLINE:BL67_PG_XX" (bottom right in the CoDeSys window) changes from gray to black:

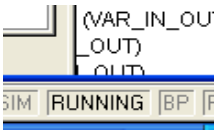


The start of the program is initiated in the CoDeSys via:

Online > Run

or alternatively with 

The successful start is confirmed when the message "RUNNING" (bottom right in the CoDeSys window) changes from gray to black:



Note

A complete description of the LED diagnostics can be found in chapter „Mounting and installation“.

The function block PIB_001KB

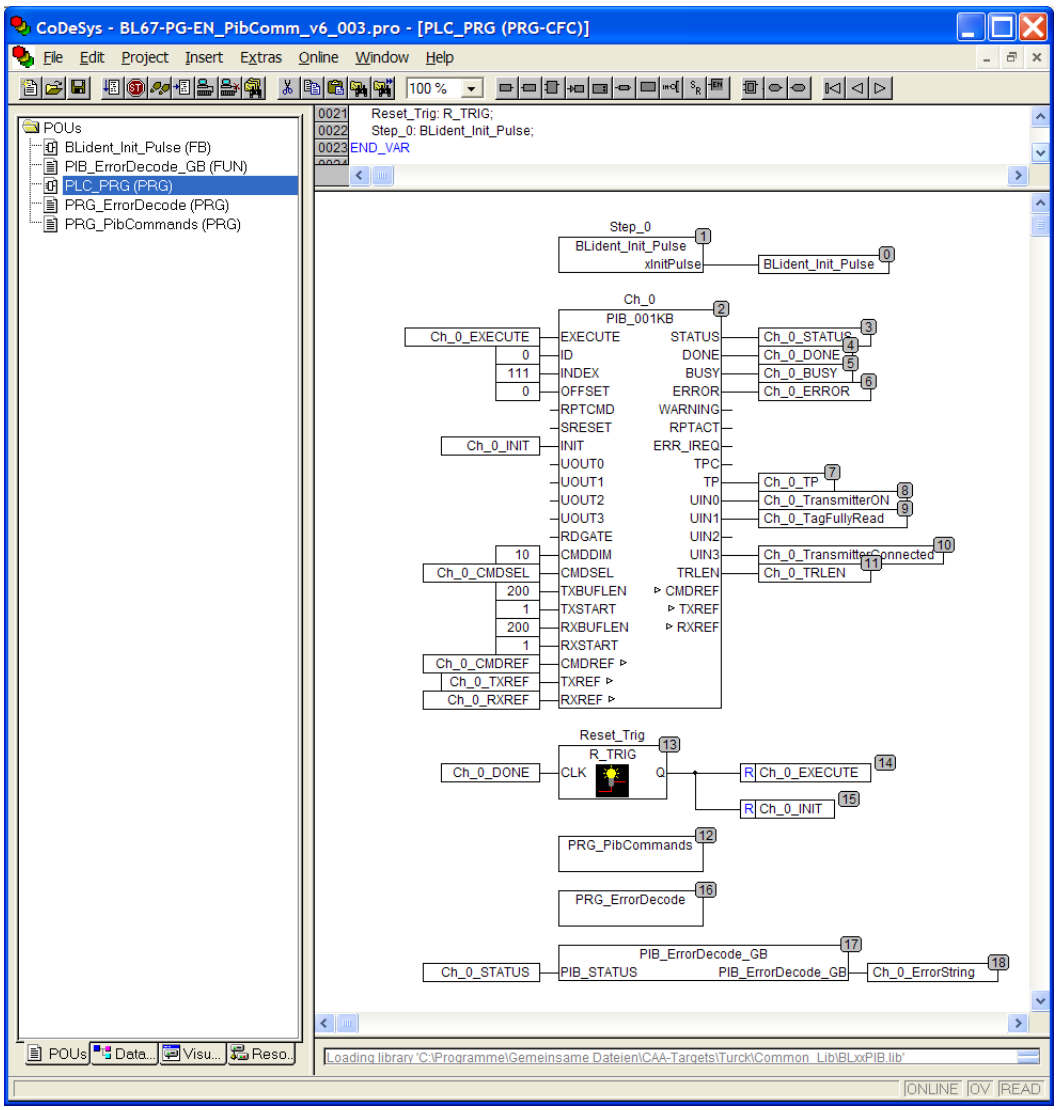
The basic settings have already been made in the example project.

The following explanations serve for overall comprehension so that you may also initiate applications that basically differ from this example project.

The top program level which is cyclically processed by the CPU is represented in the CoDeSys software by the component, PLC_PRG.

To examine this level, please select the "POUs" tab and double-click on PLC_PRG(PRG) to open the display of the component.

Figure 28: The component PLC_PRG (PRG)



Operation of the first port of a 2RFID-module can be initiated with this example project. Here, the addition, CH_0, represents the first port. For a second port an additional instance of the PIB should be created (mapped) and programmed in the same manner.

The following tables describe the variables of the function block PIB_001KB of this example program. The values of the configuration parameters that had been written first can only be changed "Offline" by overwriting them. The Offline mode is generated with:

Online > Logout

or alternatively with 

Table 28: Configuration parameters

Variable	Value here	Meaning
ID	0	This is the start address for the *BL ident*®-process data of the first module. The "ID" (start address) for a second module must be "4", for a third it must be "8", and for a fourth "12". (The address range for the first port is set with the "OFFSET"=0, and for the second port with the "OFFSET"=2).
INDEX	111	The index "111" indicates that the next execution initiates a data transfer (also parameter data) to Port 1. The index "112" refers to Port 2 of each *BL ident*®-module of the station. Differing indices (for example, "113") result in an error message "DW#16#E7FE06xx" page 3-55.
OFFSET	0	This offset is added to the start address (ID). The calculated address relates to the process data of a port. Here, the offset is "0" because the module CH_0 belongs to the 1st port. The process data for a *BL ident*®-port consist of 2 bytes. The corresponding offset for a module CH_1 that belongs to the 2nd port is "2".
CMDDIM	10	The input parameter CMDDIM defines the number of "CMD_STRUCT"-structures for command parameters. Multiple commands can be stored in the memory so that a more efficient user program can be written. The number of stored commands influences the memory range that is to be reserved for the respective PIB-instance.
TXBUFLEN	200	The send buffer for the 1st port (1st instance) occupies a range of 200 bytes in CH_0_TXREF. The array CH_0_TXREF defines the entire memory range for the send data and includes 1024 bytes. CH_0_TXREF can be found under the tab "Resources" in the file folder Global Variables in "VarGlobe_PIB".
TXSTART	1	The send buffer for the 1st port starts at Position 1 of the memory range. Here is the first byte of the array CH_0_TXREF: CH_0_TXREF[1]. Because of the length of 200 bytes (TXBUFLEN), the memory range CH_0_TXREF[1] to CH_0_TXREF[200] is available for the send data (write data) of the 1st port. A 2nd port could therefore occupy the range CH_0_TXREF[201] to CH_0_TXREF[400].
RXBUFLEN	200	The received buffer for the 1st port (1st. instance) occupies a range of 200 bytes in CH_0_RXREF. The array CH_0_RXREF defines the entire memory range for the received data and includes 1024 bytes. CH_0_RXREF can be found under the tab Resources in the file folder Global Variables in "VarGlobe_PIB".

Table 28: (cont.) Configuration parameters

Variable	Value here	Meaning
RXSTART	1	The received buffer for the 1st port starts with Position 1 of the memory range. Here is the first byte of the array CH_0_RXREF: CH_0_RXREF[1]. Due to the length of 200 bytes (RXBUFLEN), the memory range CH_0_RXREF[1] to CH_0_RXREF[200] is therefore available for the received data (read data) of the 1st port. A 2nd port could occupy accordingly the range CH_0_RXREF[201] to CH_0_RXREF[400].

You may access the control variables and the command selection in the following table via the tab "Visualizations" and by selecting "PLC_VISU".

Table 29: Control variables and command selection

Variable	Meaning
CH_0 _EXECUTE	Control variables for execution of a command. The command is executed with a positive edge of this variable. The positive edge is generated by setting the variable from "false" to "true".
CH_0 _INIT	The command "Initialization" is realized with a "positive edge" of this control variable. The positive edge is generated by setting the variable from "false" to "true".
CH_0 _CMDSEL	Command selection Here a value between 1 and 10 can be entered in order to execute 1 of the 10 possible commands. The definition of all commands can be found in the CoDeSys below the description of the PLC_PRG (PRG): PRG_PibCommands (PRG) (Figure 28, page 3-9). The explanation of the command structures can be found in this manual under "3.1.3 Commands" page 5-22. Also observe Chapter "Definitions on the command level" page 3-25 which points out deviations from the specifications. The following commands are supported by the visualization of this example program: 1: WriteConfig – initialization is executed when the configuration data is written. 3: Inventory – reading of the UIDs from the data carrier. 4: PhysicalRead – writing of data to the data carrier. 5: PhysicalWrite – reading of the data of a data carrier. 6: MemStatus - status of a data carrier (for example, memory size, existing capacity). 7: DevStatus - status of an Ident device. 8: Next – this command is used to end transponder operations.

The definitions of variables described in the following table can be found in the tab "Resources" in the file folder "Global Variables" in "VarGlobe_PIB".

Table 30: In_Out-Parameters

Variable	Meaning
CH_0 _CMDREF	This In_Out-variable refers to a global memory which is used to store commands and the respective parameters. The maximum number of commands mapped to a single PIB-instance may not exceed 10. The explanation of the structures can be found in this manual under "3.1.3 Commands" page 5-22. Also observe Chapter "Definitions on the command level" page 3-25 which points out deviations from the specifications.
CH_0 _TXREF	This In_Out-variable refers to a global memory used by multiple PIB-components for send data (write data). The PIB-instance may share the memory with other components.
CH_0 _RXREF	This In_Out-variable refers to a global memory used by multiple PIB-components for received data (read data). The PIB-instance may share the memory with other components.

Please observe the status messages of the following table also with the visualization for this example program (via the tab "Visualizations" with the selection of "PLC_VISU").

Table 31: Status messages

Variable	Meaning
CH_0 _STATUS	An error and alert code is sent with the help of this variable. A detailed description of all types of error codes can be found at "Alerts and error messages" page 3-53
CH_0 _DONE	With "TRUE" (blue) this variable signals that the command has been executed. During the execution of a command, this variable briefly switches to the mode "FALSE" (black).
CH_0 _BUSY	This value indicates with "FALSE" (black) that at this time, no command is being executed. This value indicates with "TRUE" (blue) when the PIB is occupied with processing a command, and when no further command is transferable.
CH_0 _ERROR	This output value is set to "TRUE" if an error has been detected. The detected error could exist locally (inside the host control) or in the peripherals (inside the Ident device). More detailed information concerning the error are provided via the "STATUS" parameter. (This flag is internally set by the PIB in the acknowledgment telegram (Bit 0 of CI) depending on the error bit. After a new request of a command this flag is reset to "FALSE".
CH_0 _TP	This output value is set to "TRUE" (blue) if a target (here a data carrier) is within the detection range of the read/write head. It is "FALSE" (black) if there is no target (here data carrier) within the detection range of the read/write head. If an Ident-device does not support this feature, the value is set to "0".

Table 31: (cont.) Status messages

Variable	Meaning
CH_0 _Transmitter ON	This output value indicates with "TRUE" whether the read/write head is active. An active read/write head creates an electromagnetic field (for example, the signal is transferred with 13.56 MHz). It is "FALSE" when the read/write head is inactive, this means no creation of an electromagnetic field.
CH_0 _TagFully Read	This output value indicates with "TRUE" that all data ranges of the data carrier were fully read from the *BL ident*®-system. Automatic reading always occurs when a data carrier is within the detection range of the read/write head. The output value only continues to signal "TRUE" as long as TP=1. The time between TP=1 and TFR=1 can not be seen as reference time for a read/write command. If only few bytes are written or read with a read/write command, the command is executed significantly faster than the time it takes to fully read a 2000 bytes data carrier, for example. Read commands can directly access data with TFR=1. The output value is "FALSE" when the data ranges of the data carrier were not fully read from the *BL ident*®-system, or if the data carrier is not within the detection range of the read/write head. This automatic read operation is interrupted by all user commands. The TFR-bit keeps its active value. The process is restarted if no other commands exist and TP=1.
CH_0 _Transmitter Connected	This output value signals with "TRUE" that a read/write head is connected. The value is "FALSE" when the read/write head is disconnected.
CH_0 _TRLEN	This output parameter indicates the number of the bytes last sent (depending on the executed command, sent or received bytes), after the command has been successfully executed.

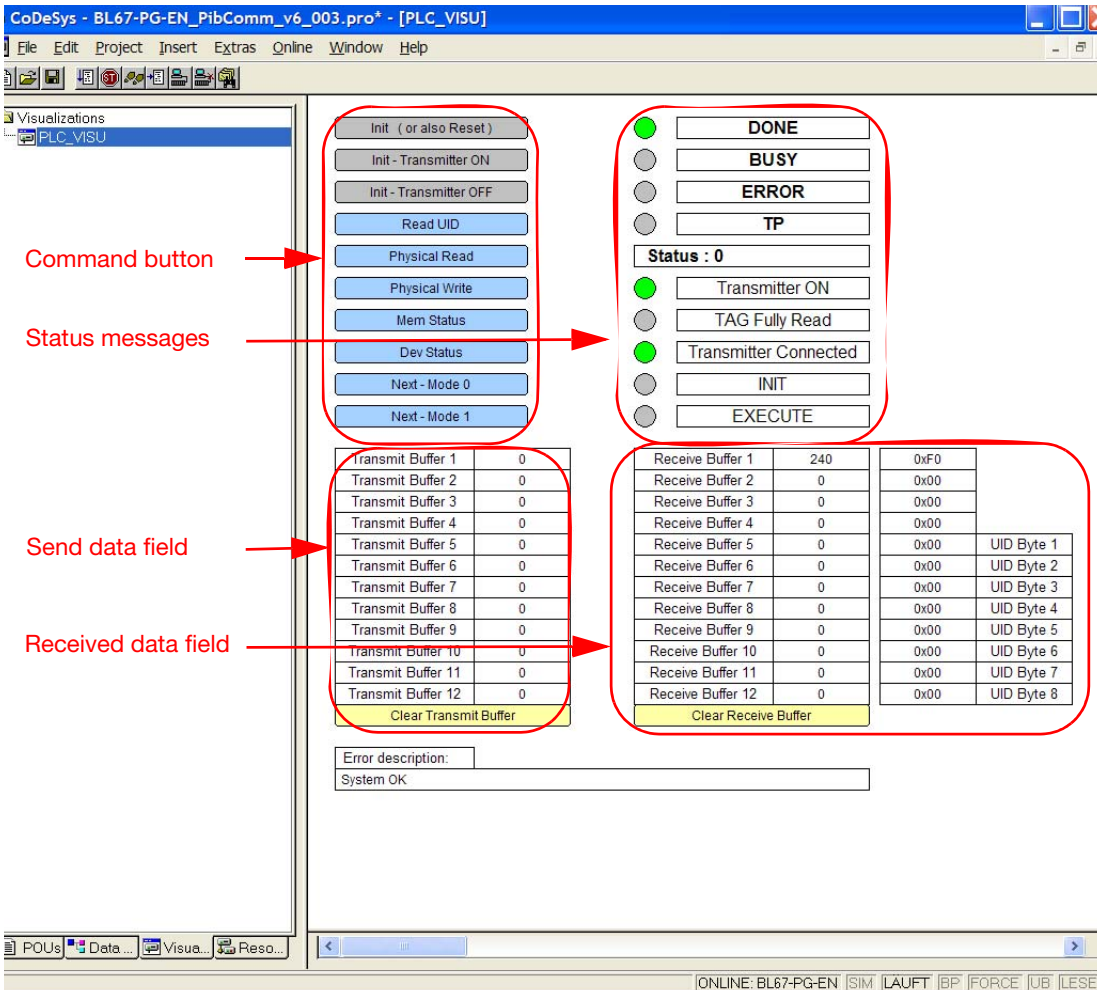
For a thorough description of all parameters, please refer to "3.1.1 Parameters" page 5-7.

Initialization of the 1st port (CH_0)

You have been introduced "The function block PIB_001KB" page 3-9 to the parameters of this example project in Chapter. In the case that your *BL ident*®-project differs from the example project, you have adjusted the values.

In order to implement initialization, please open the tab "Visualization" and select "PLC_VISU" by double-clicking it.

Figure 29: Visualization tab



The initialization occurs with "WriteConfig". The three offered alternatives differ as follows:

- Init (or also Reset) - initialization is implemented. The status of the read/write head is "activated" by default and is not changed.
- Init - Transmitter ON - initialization is implemented. The read/write head is activated or remains active.
- Init - Transmitter OFF - initialization is implemented. The read/write head is deactivated.

Now implement initialization with "Init (or also Reset)".

Please ensure that the online connection to your control is active and that the program is running. The mode "ONLINE:BL67_PG_EN" and "RUNNING" is highlighted black and displayed at the bottom right of the window.

You may monitor command execution via the status messages. Active modes are signalled here with the green illumination of the respective circular surface.

When initialization has been successful, the INIT-, BUSY-, and DONE-status ("3.1.1 Parameters" page 5-7) become consecutively active.

The first byte of the received buffer corresponds to the value "MaxPacketSize" page 5-25.

If initialization was not successfully implemented, the ERROR-status is active via "Status": An error code is sent to point out the cause of the error to the user. An explanation of all possible error codes can be found in "Alerts and error messages" page 3-53.

Reading of the UID from the data carrier / Port 1 (CH_0)

Every RFID data carrier receives a "UID" page 6-4 (unique identifier) from the manufacturer. The UID represents a worldwide unique TAG identification number and consists of 8 bytes.

Read of the UID is executed with the command "Read UID" in "PLC_VISU" of the tab "Visualization". For a thorough description of this command code, please refer to "Inventory" page 5-28.

Note

Please ensure that the online connection to your control is active and that the program is running. The mode "ONLINE:BL67_PG_EN" and "RUNNING" is highlighted black and displayed at the bottom right of the window.

You may monitor command execution via the status messages. Active modes are signalled here when the respective circles are illuminated green.

The request for command execution is created with the increasing edge of "EXECUTE". The readiness to read the UID is signalled with the active BUSY ("3.1.1 Parameters" page 5-7)-status.

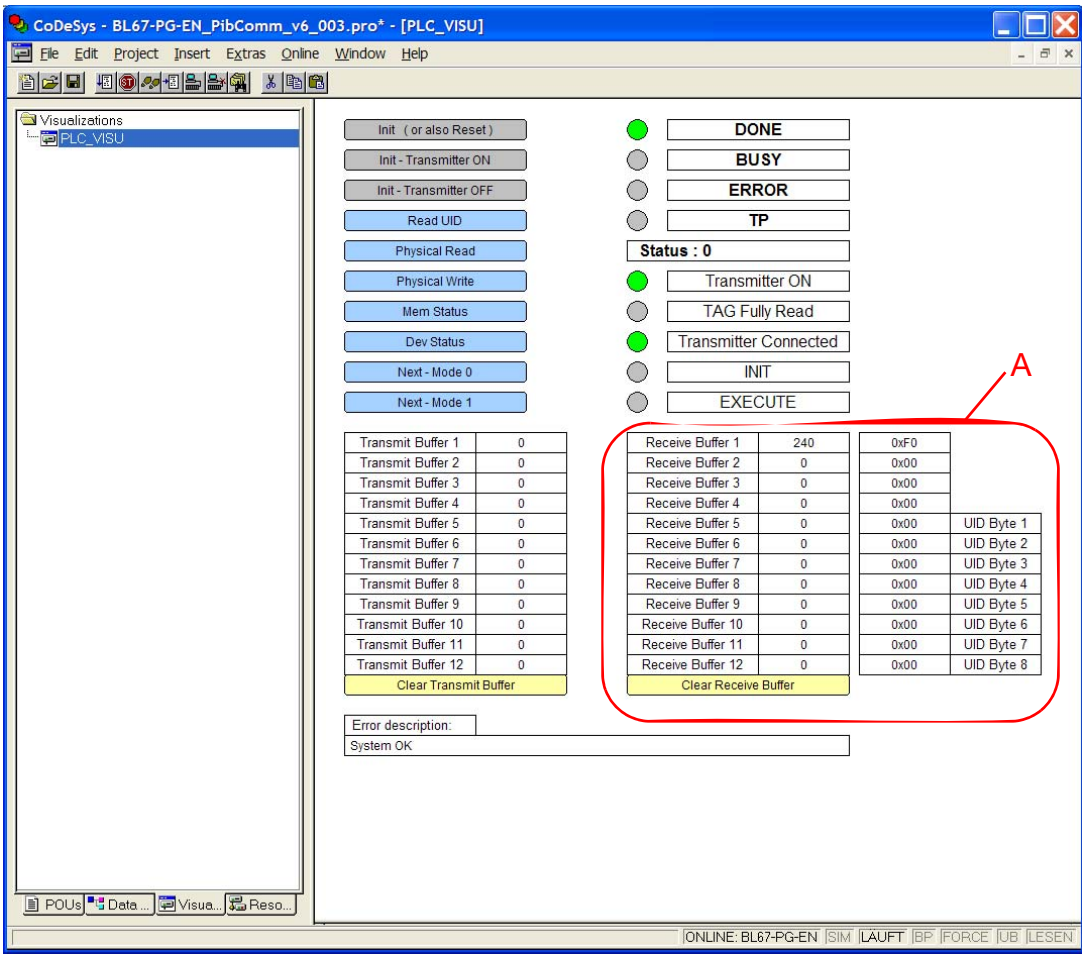
The status "TP" is active when a data carrier is within the received range of the read/write head.

The successful execution of the command "Read UID" is acknowledged with the active DONE-status.

If the command "Read UID" was not successfully executed, the ERROR-status is active via "Status": The sent error code points out the cause of the error to the user. A detailed error text can be found in the "Error description" in the bottom window area. For an explanation of all types of error codes, please refer to "Alerts and error messages" page 3-53.

Now you may read the "Unique Identifier / UID" only in the received field of the "PLC_VISU".

Figure 30: PLC_VISU after Inventory



A *The UID consisting of 8 bytes can be found in the received buffer starting with byte 5 (Received Buffer 5). Byte 5 represents the MSB, and byte 12 the LSB of the UID.*
Here, the 2 bytes of the Received Buffer 1 and the Received Buffer 2 always signal 0x0001. In case a group is compiled, it would be signalled here which data carrier was read.
Together the 2 bytes of the Received Buffer 3 and the Received Buffer 4 signal the number of read byte.

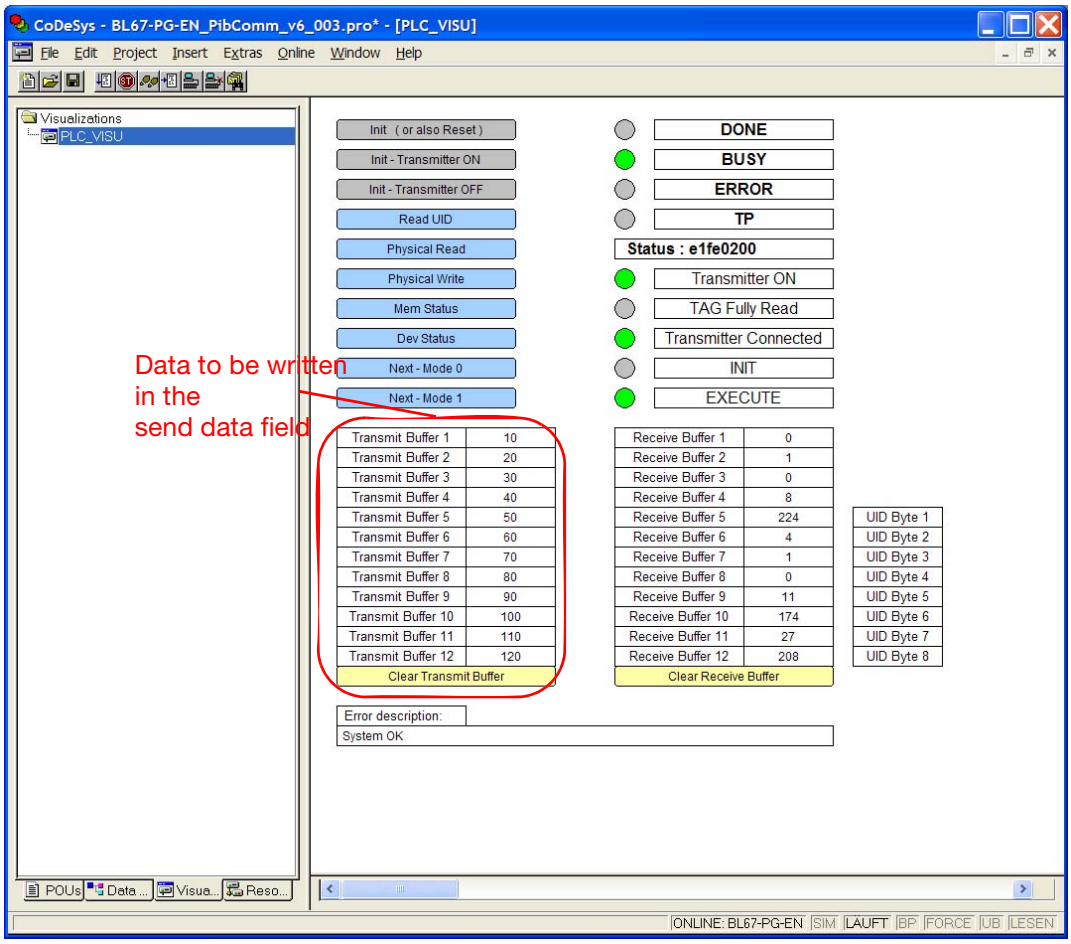
Writing to the data carrier / Port 1 (CH_0)

This paragraph explains the writing of 12 bytes data with any content to your RFID data carrier.

Writing to the data carrier of the 1st port is possible after you have executed "Initialization of the 1st port (CH_0)" page 3-14.

In this example, data was selected that can be easily recognized in the following "Reading from the data carrier / Port 1 (CH_0)" page 3-18. Please enter any sequence of digits into the send data field (Transmit Buffer 1 to Transmit Buffer 12). Based on the fact that the send data field is divided into 1 byte sized buffers, the decimal numerical values in the 0 to 255 range may be selected.

Figure 31: PLC_VISU with Write data



Writing is implemented with the command "Physical Write" (or physical writing) in "PLC_VISU" of the tab "Visualization". For a thorough description of this command code, please refer to "Physical_Write" page 5-24.

Note

Please ensure that the online connection to your control is active and that the program is running. The mode "ONLINE:BL67_PG_EN" and "RUNNING" is highlighted black and displayed at the bottom right of the window.

You may monitor command execution via the status messages. Active modes are signalled here when the respective circles are illuminated green.

The request for command execution is created with the increasing edge of "EXECUTE". Readiness to write is signalled with the active BUSY-status ("3.1.1 Parameters" page 5-7).

The status "TP" is active when a data carrier is within the received range of the read/write head.

Successful execution of the "Physical Write" command is acknowledged with the active status DONE.

If the command "Physical Write" could not be successfully executed, the ERROR status is active, and with the help of "Status": an error code is sent to point out the cause of the error to the user. A detailed error text can be found in the "Error description" in the bottom window area. For an explanation of all types of error codes, please refer to "Alerts and error messages" page 3-53.

Reading from the data carrier / Port 1 (CH_0)

This paragraph explains reading of 12 bytes of data of any content from your RFID data carrier.

Reading from the data carrier of the 1st port is possible if "Initialization of the 1st port (CH_0)" page 3-14 has been implemented.

The prior paragraph explained writing of any data to the data carrier with the "Physical Write" command. In this paragraph, the same data is read with the "Physical Read" command (or physical reading) from the data carrier.

For a thorough explanation of this command code, please refer to "Physical_ Read" page 5-23.

Note

If you use a different data carrier than indicated in "Hardware description of the example project" page 3-3 or if you like to access certain areas of the data carrier, please pay attention to "User data ranges of the data carrier versions." page 3-56.

Note

Please ensure that the online connection to your control is active and that the program is running. The mode "ONLINE:BL67_PG_EN" and "RUNNING" is highlighted black and displayed at the bottom right of the window.

You may monitor command execution via the status messages. Active modes are signalled here when the respective circles are illuminated green.

The request for command execution is created with the increasing edge of "EXECUTE". Readiness to read is signalled with the active status BUSY ("3.1.1 Parameters" page 5-7).

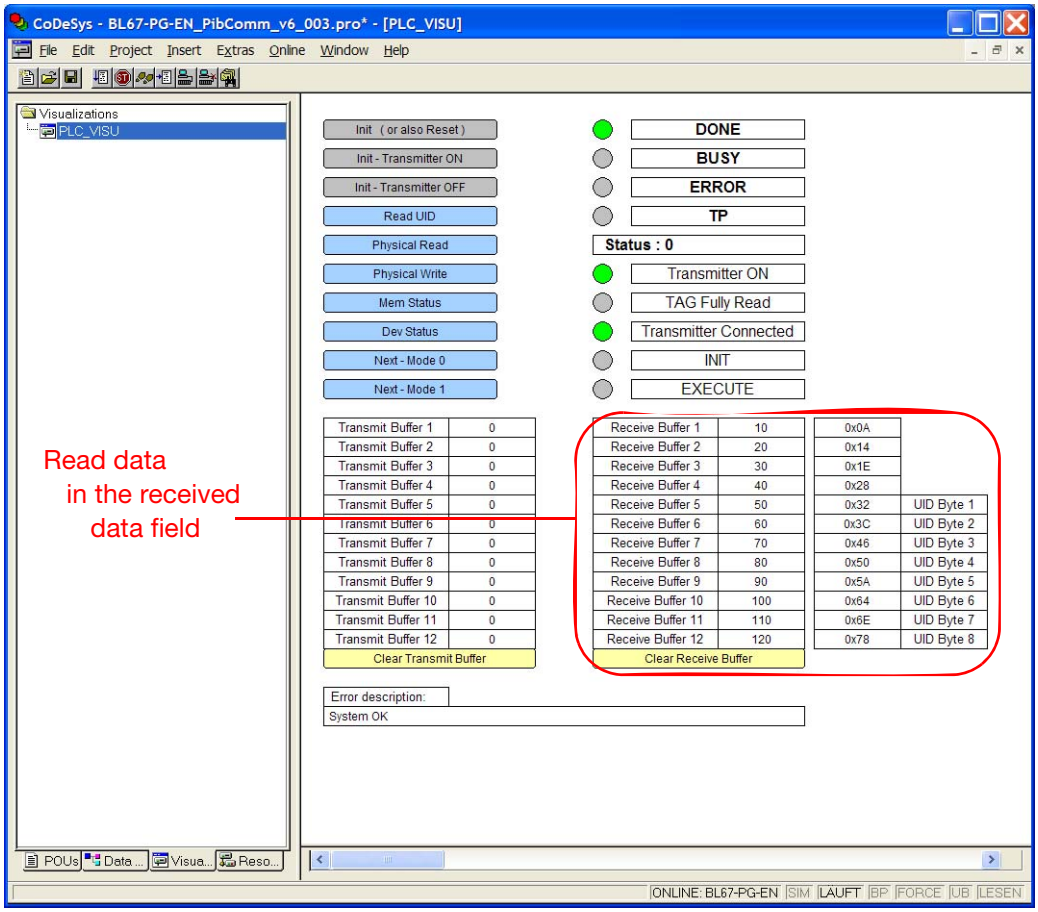
The status "TP" is active when a data carrier is within the received range of the read/write head.

Successful execution of the command "Physical Read" is acknowledged with the active status DONE.

If the "Physical Read" command could not be successfully executed, the status ERROR is active, and with the help of "Status": an error code is sent to point out the cause of the error to the user. A detailed error text can be found in the "Error description" in the bottom window space. For an explanation of all types of error codes, please refer to "Alerts and error messages" page 3-53.

You can now read the read data in the received data field of the "PLC_VISU".

Figure 32: PLC_VISU with read data



Information about the status of the data carrier

This paragraph explains the command "Mem Status" (or memory status). You may execute the command after a successful initialization ("Initialization of the 1st port (CH_0)" page 3-14).

For a thorough explanation of this command code, please refer to "Mem Status" page 5-26.

Note

If you use a different data carrier than indicated in "Hardware description of the example project" page 3-3 or if you like to access certain arrays of the data carrier, please pay attention to "User data ranges of the data carrier versions." page 3-56.

Note

Please ensure that the online connection to your control is active and that the program is running. The mode "ONLINE:BL67_PG_EN" and "RUNNING" is highlighted black and displayed at the bottom right of the window.

You may monitor command execution via the status messages. Active modes are signalled here when the respective circles are illuminated green.

The request for command execution is created with the increasing edge of "EXECUTE". Readiness to write is signalled with the active status BUSY ("3.1.1 Parameters" page 5-7).

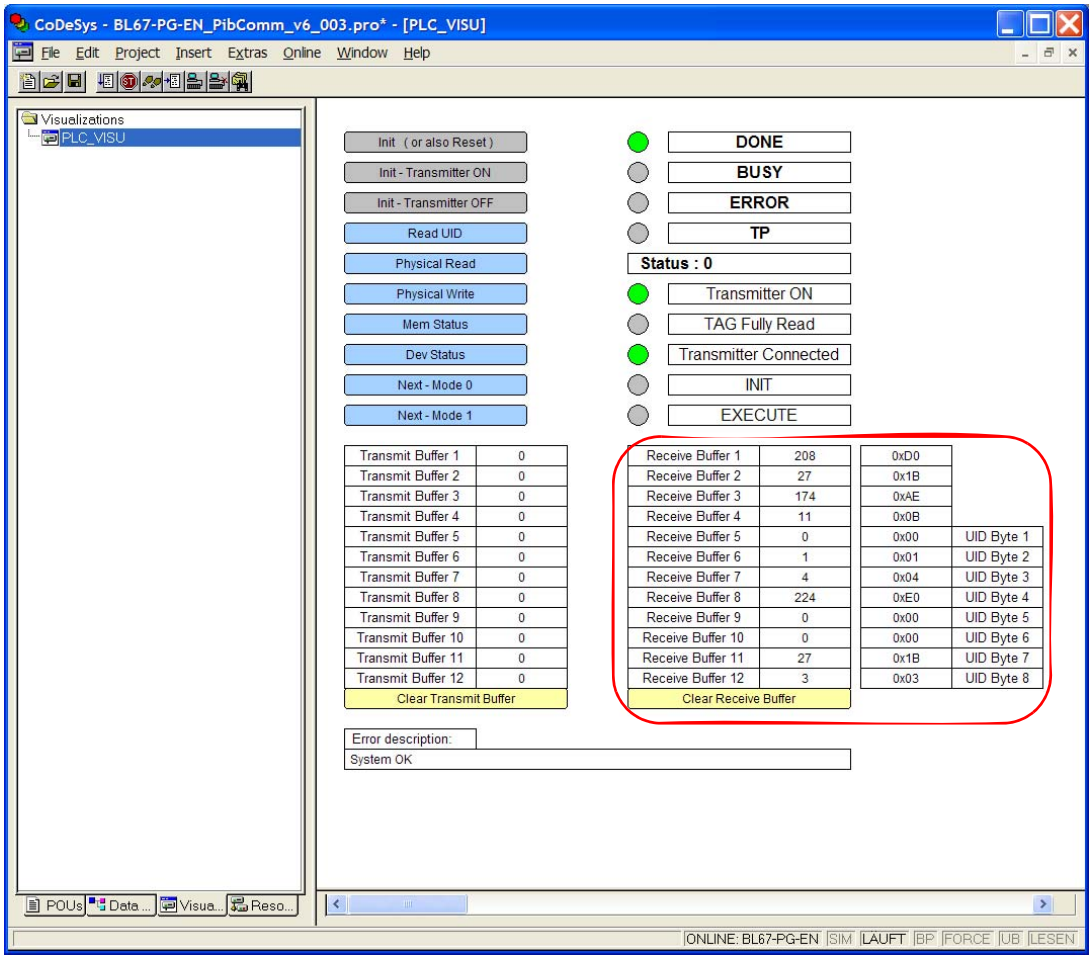
The status "TP" is active when a data carrier is within the received range of the read/write head.

The successful execution of the command "Mem Status" is acknowledged with the active status DONE.

If the command "Mem Status" could not be successfully executed, the status ERROR is active, and with the help of "Status": an error code is sent to point out the cause of the error to the user. A detailed error text can be found in the "Error description" in the bottom window space. For an explanation of all types of error codes, please refer to "Alerts and error messages" page 3-53.

Now you may read the first 12 bytes of the data from the data carrier in the received data field of the "PLC_VISU".

Figure 33: PLC_VISU with data from the data carrier



With the command Mem Status, 13 bytes of information is sent. The complete information is reproduced with the array CH_0_RXREF in the CoDeSys under the tab "Resources" in the file folder "Global variables" in "VarGlobe_PIB".

The following table explains the 13 bytes data carrier information:

Table 32: Data carrier information

Received buffer CH_0_RXREF[x]	Value in the example	Meaning
1 to 8		UID consisting of 8 bytes World-wide unique data carrier identification number
9	0	Data carrier format (DSFID - not supported by *BL ident*®.
10	0	Application recognition (AFI)- not supported by *BL ident*®.
11	27	Memory size: Block Number-1, this means the block number of the sample data carrier is 28.
12	3	Memory size: Byte/Block-1, this means the value Byte/Block of the sample data carrier is 4.
13	1	1: IC-identification is supported. 0: IC-identification is not supported.

Information about the read/write head

This paragraph explains the command "Dev Status" (or device status). You may execute the command after a successful initialization ("Initialization of the 1st port (CH_0)" page 3-14).

For a thorough explanation of this command code, please refer to "Dev Status" page 5-27.

Note

Please ensure that the online connection to your control is active and that the program is running. The mode "ONLINE:BL67_PG_EN" and "RUNNING" is highlighted black and displayed at the bottom right of the window.

You may monitor command execution via the status messages. Active modes are signalled here when the respective circles are illuminated green.

The request for command execution is created with the increasing edge of "EXECUTE". Readiness to write is signalled with the active status BUSY ("3.1.1 Parameters" page 5-7).

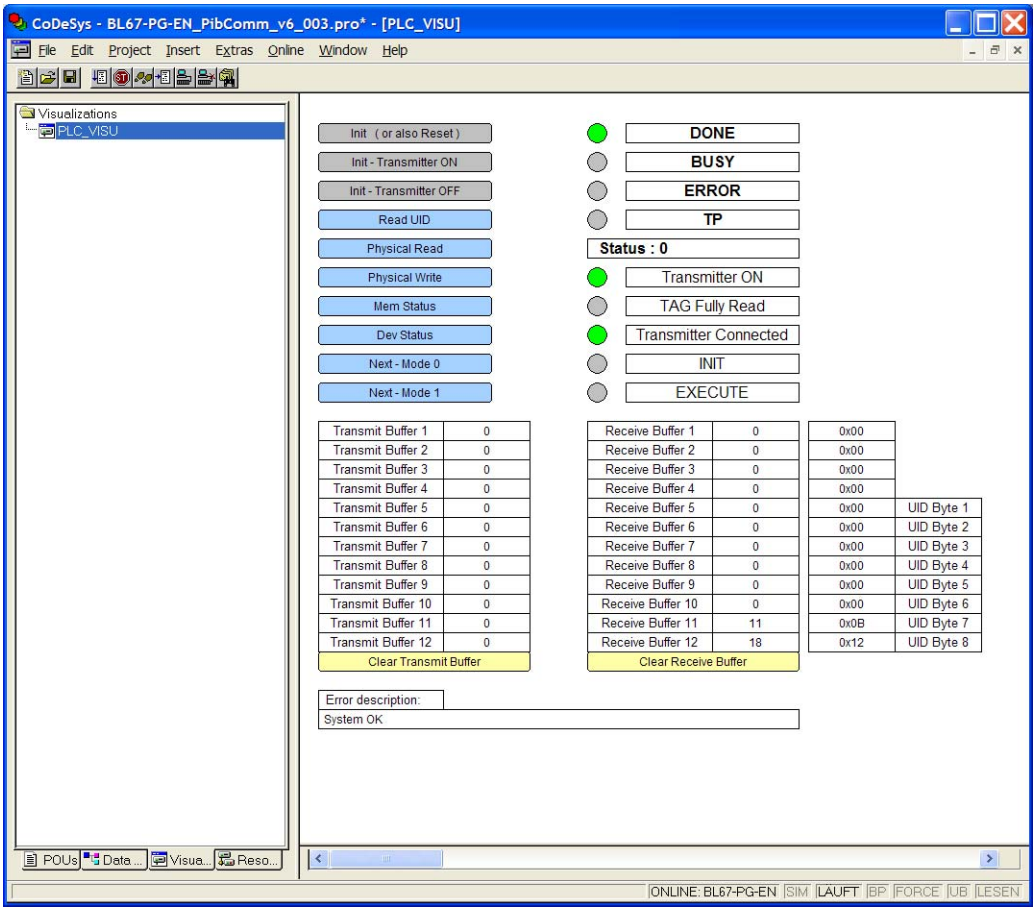
The status "TP" is active when a data carrier is within the received range of the read/write head.

The successful execution of the command "Dev Status" is acknowledged with the active status DONE.

If the "Dev Status" command could not be successfully executed, the status ERROR is active, and with the help of "Status": an error code is sent to point out the cause of the error to the user. A detailed error text can be found in the "Error description" in the bottom window space. For an explanation of all types of error codes, please refer to "Alerts and error messages" page 3-53.

You can only read the first 12 bytes of the read/write head data in the received data field of the "PLC_VISU".

Figure 34: PLC_VISU with data for the Ident-device (12 of 48 bytes).



With the command Dev Status, 64 bytes of information are sent. The complete information is reproduced with the array CH_0_RXREF in the CoDeSys under the tab "Resources" in the file folder "Global variables" in "VarGlobe_PIB".

The following tables explain the 64 bytes Ident-device information:

Table 33: Ident-device information

Received buffer CH_0_RXREF[x]	**Value in the example**	**Meaning**
1 to 10	0,0,0,0,0,0,0,0	Manufacturer specific data range. Is currently not used by *BL ident* ®.
11 to 12	11 <=> 0xB 18 <=> 0x12	Manufacturer identification number 0x12B <=> 299 <=> TURCK

Table 33: (cont.) Ident-device information

Received buffer CH_0_RXREF[x]	Value in the example	Meaning
13 to 32	84, 78, 45, 67, 75, 52, 48, 45, 72, 49, 49, 52, 55, 0, 32, 32, 32, 32, 32, 32 <=> 0x54, 0x4E, 0x2D, 0x43, 0x4B, 0x34, 0x30, 0x2D, 0x48, 0x2D, 0x2D, 0x34, 0x37, 0x00, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20	Product description – the hexadecimal values can be interpreted per an ASCII code table, and then the result is: TN-CK40-H1147
33 to 48	0x20,.....	Serial number Is currently not used by *BL ident*®.
49 to 50	0, 5 <=> 0x0005	Hardware version here V0.5
51 to 54	86, 1, 6, 0 <=> 0x56, 0x01, 0x06, 0x07	Software version here V1.6.7 0x56<=>V (ASCII Code Table) 0x010607<=>1.6.7
55 to 56	0, 0	Version counter Is currently not used by *BL ident*®.
57 to 58	91, 0 <=> 0x5B, 0x00	Profile Identification Number here: Identification system, PIB-profile
59 to 60	0, 0	Specific profile type Is currently not used by *BL ident*®.
61 to 62	1,1 <=> 0x0101	I&M version number here V1.1
63 to 64	0,1 <=> 0x0001	I&M0 support: here 0x01, this means yes

The "Next"-commands

This paragraph explains the "Next" command (or next). You may execute the command after a successful initialization ("Initialization of the 1st port (CH_0)" page 3-14) and after a data carrier was present in the received range of the read/write head.

This sample project contains the following variable for "Next" command:

- Next - Mode 0
  The command that follows "Next - Mode 0" is only executed when the data carrier linked to the prior command has at one time left the detection range of the read/write head.
- Next - Mode 1
  The command that follows "Next - Mode 1" is only executed when the "UID" linked to the data carrier in the received range is different from the "UID" linked to the prior command.

For a thorough explanation of this command code, please refer to "Next" page 5-24.

You may read the definition of "Next - Mode 0" and "Next - Mode 1" under the tab "Component" in "PRG-Pib-Commands".

Note

Please ensure that the online connection to your control is active and that the program is running. The mode "ONLINE:BL67_PG_EN" and "RUNNING" is highlighted black and displayed at the bottom right of the window.

The status "TP" is active when a data carrier is within the received range of the read/write head.

The request to execute the command that follows "Next" is created with the increasing edge of "EXECUTE". The readiness to execute the command following "Next" is signalled with the active status BUSY "3.1.1 Parameters" page 5-7). Only when the "Next" conditions are satisfied, the command may be executed and "DONE" is sent.

If the "Next" command could not be successfully executed, the status ERROR is active, and with the help of "Status": an error code is sent to point out the cause of the error to the user. A detailed error text can be found in the "Error description" in the bottom window space. For an explanation of all types of error codes, please refer to "Alerts and error messages" page 3-53.

Definitions on the command level

The startup of the TURCK *BL ident*®-system with the "Proxy Ident Function Block" entails some modifications from the "Extract from the specification" page 5-1 (specification). The differences pertain to the command- and diagnostic levels.

The following conformity table indicates which command and status- or rather diagnostic messages of the complete specification are not supported by *BL ident*®:

Table 34: Conformity table

Name	Type	Additional information about the TURCK specific version	conform? (Y/N)
To point 3.1.4 of the PROFIBUS specification			
Read	Command		N
Get	Command		Y
Physical_Read	Command		Y
Write	Command		N
Put	Command		N
Physical_Write	Command		Y
Format	Command		N
Create	Command		N
Delete	Command		N
Clear	Command		N
Update	Command		N
Next	Command		Y
Get-Directory	Command		N
Set-Attribute	Command		N
Get-Attribute	Command		N
Write Config	Command		Y
Read Config	Command		Y
Mem-Status	Command		Y
Dev-Status	Command		Y
Inventory	Command		Y
Read-Bar-Code	Command		N
To point 4.2.1 of the PROFIBUS specification			
Reading-Gate	Control Bit		N
Repeat-Command	Control Bit		N
Soft-Reset	Control Bit		Y

Table 34: (cont.) Conformity table

Name	Type	Additional information about the TURCK specific version	conform? (Y/N)
To point 4.2.2 of the PROFIBUS specification			
Target_Presence _Changed	Status Bit		Y
Target_Present	Status Bit		Y
Soft_Reset _Active	Status Bit		Y
Repeat_Command _Active	Status Bit		N
Busy	Status Bit		Y
Error	Status Bit		Y
UIN3	Status Bit	Read/write head is connected	Y
UIN2	Status Bit		N
UIN1	Status Bit	Data of the data carrier fully read to the read/write head	Y
UIN0	Status Bit	read/write head is activated (please also refer to WriteConfig)	Y

The following commands differ from the specification:

Write-Config

This command is triggered in the PIB by INIT and supports Config=1 (Reset only) and Config=3 (Write data and reset). 3 bytes Config-data can be written. The Config-data offer the opportunity to switch on and off the transmitter of the read/write head. The switching on and off of the transmitter can be used to avoid a mutual interference of closely positioned read/write heads.

Table 35: Configuration data

Byte	Bit	Meaning
0	0..7	Reserved, must be 0
1	0..7	Reserved, must be 0
2	0	1= Transmitter On / 0= Transmitter Off, (default = 1)
	1..7	Reserved, must be 0

Example for configuration data

"0x00, 0x00, 0x01"

Read-Config

This command reads Config-data written under Write-Config.

Possible command specific STATUS values after faulty execution:

Table 36: Error message

STATUS	Error description
DW#16#E**4**FE**82**xx	No read/write head is connected.

Inventory

Only the parameter Attributes=0 is supported. ("Inventory" page 5-28)

Physical_Read

The parameter StartAddress and Length (+StartAddress) must be within the address range of the data carrier. ("Physical_ Read" page 5-23)

Physical_Write

The parameter StartAddress and Length (+StartAddress) must be within the address range of the data carrier. ("Physical_Write" page 5-24)

Mem-Status

In connection with the command Mem-Status, the Attribute 0x40 (physical status information) is supported.
The response of the data carrier is transferred as data to a GET_SYSTEM_INFORMATION-command per ISO/IEC 15693-3.

- Byte 0 = serial number (UID), LSB

to

- Byte 7 = serial number (UID), MSB
- Byte 8 = data carrier format (DSFID)
- Byte 9 = application identification (AFI)
- Byte 10 = memory size: Block number 1
- Byte 11 = memory size: Bytes/Block-1,
- Byte 12 = IC-identification

Dev-Status

Only the parameter Attributes = 0x04 is supported. Resent is a data record per I&M-specification I&M0. The connected read/write head is being written to. ("Dev Status" page 5-27)

Example:

Table 37: Dev-Status example

From byte	to byte	Field	Content
0	9	Manufacturer specific header	0, 0, 0, 0, 0,0,0,0,0,0
10	11	MANUFACTURER_ID	0x0B12 (299 = TURCK)
12	31	ORDER_ID	‚TN-CK40-H1147', 0x00, 0x20, 0x20, 0x20, 0x20, 0x20, 0x20
32	47	SERIAL_NUMBER	(not supported)
48	49	HARDWARE_REVISION	0x0003
50	53	SOFTWARE_REVISION	‚V' (0x56), 0x01, 0x03, 0x00 (= V1.3.0)
54	55	REVISION_COUNTER	(not supported)
56	57	PROFILE_ID	0x5B00 (identification system, PIB profile)
58	59	PROFILE_SPECIFIC_TYPE	0x0000
60	61	IM_VERSION	0x01, 0x01 (= I&M V1.1)
62	63	IM_SUPPORTED	0x01, I&M0 supported

Next

Only the parameter NextMode = 0 or 1 is supported. ("Next" page 5-24)

Get

With this command it is possible to set the write protection of a block of a data carrier.

For this it is necessary to know how the memory of the used data carrier is arranged (number and size of the blocks).

Attention

Setting of the write protection for a block is not reversible!

Table 38: Send data field for the "Get" command

Bytes in the send data field	Content
0	0x02
1	UID of the data carrier, UID =0 -> arbitrary
2	UID of the data carrier
3	UID of the data carrier
4	UID of the data carrier
5	UID of the data carrier
6	UID of the data carrier
7	UID of the data carrier
8	UID of the data carrier
9	0x67
10	Block number of the write protected blocks (0x00 = 1. Block, 0xFF = 256. Block) to be switched

When successful, the following data is resent:

Table 39: Send data field for the "Get" command

Byte in the received data field	Content
0	0x02
1	0x67
2	Command index

The occurrence of an error is signalled accordingly in STATUS.

Other commands

For an overview of additional commands, please refer to "3.1.3 Commands" page 5-22. To execute the commands, please proceed as you do when writing and reading.

Startup with BLxx-2RFID-S modules

The following describes the startup of a *BL ident*®-systems with a BLxx-2RFID-S-module in a programmable gateway with the use of the programming software CoDeSys from the company "3S".

A first startup should be simple and possible without programming knowledge.

The following explanations are valid for all interface modules with programmable Ethernet gateways and BLxx-2RFID-S-modules.

Hardware description of the sample project

The following hardware components were used for the example startup:

- *BL ident*®-interface module "TI-BL67-PG-EN-S-2"
- *BL ident*®-read/write head "TN-CK40-H1147"
- Data carrier "TW-R30-B128" (user data=112 bytes)
- Suitable connection and supply cables

Please download D101583 which you may find in the download area of the TURCK website if you have questions or if you desire clarification concerning the read/write heads and the data carriers.

Installation of the software "CoDeSys"

If you install the CoDeSys software directly from the *BL ident*®-CD (Ident-No. 1545052), you will automatically have the correct version.

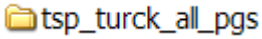
Note

Please note that CoDeSys Version 2.3.6.4 is required for *BL ident*®-system startup!

Installation of the target with InstallTarget.exe

In order to support the operation of the TURCK-gateways with the CoDeSys, the installation of the gateway-specific "Target" is needed. The Target Support Package (abbr.: TSP) is a file folder with various files that are needed for operating the gateway on the CoDeSys. To locate the TSP, please go to *BL ident*®-CD (Ident-No. 1545052). Next to the Target file this file folder contains other manufacturer specific files like libraries, etc..

Figure 35: TSP folder for the gateway BL67-PG-EN



Note

Please ensure that the directory structure of the TSP file folder remains intact. If this is not the case, problems may occur when the target is installed.

The program TargetInstall.exe is needed for installation. In general, this program can be located via the following directory tree:

C > Programs > 3S Software > CoDeSys V2.3 > InstallTarget.exe

Alternatively the program can also be started via:

Start > Programs > 3S Software > CoDeSys V2.3 >InstallTarget

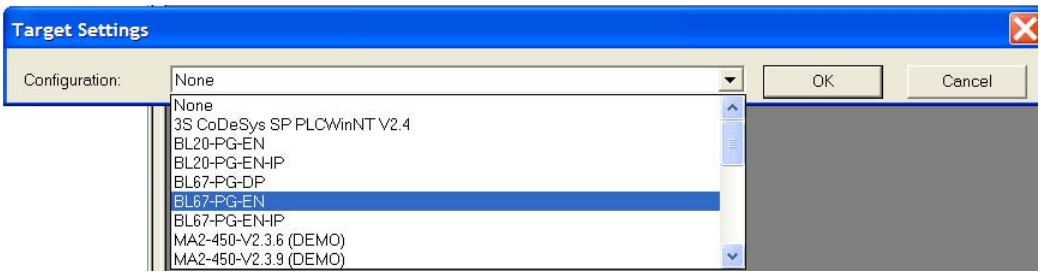
After the start of the InstallTarget program, please click on the "Open" button. Search for the TSP folder for your gateway (for example, TSP_Turck_BL67_PG_EN_Vx.x.x.x) and select the .tnf file (for example, BL67-PG-EN.tnf). Please click on the "Open" button again. Now the new Turck file folder is in the field "Possible Target Systems".

The respective installation directory is displayed. Click on the button "Install". The new gateway now belongs to the "Installed Target Systems".

Configuration in the CoDeSys

Start the software CoDeSys. Select File > New. Now you are asked to select your gateway-type from the list:

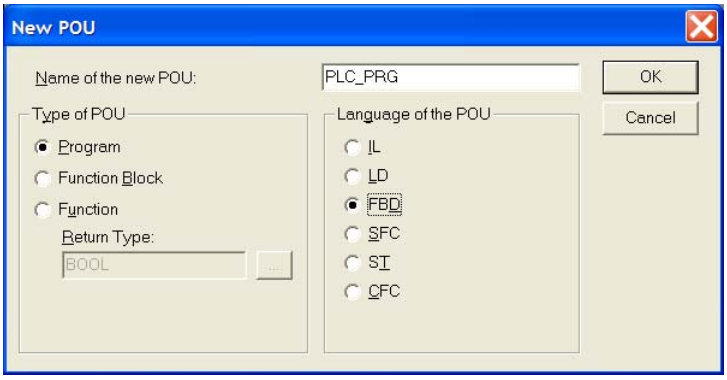
Figure 36: Selection of the gateway



Acknowledge with "OK".

Select the language of the component (here FUP, for example) and keep the suggested name PLC_PRG:

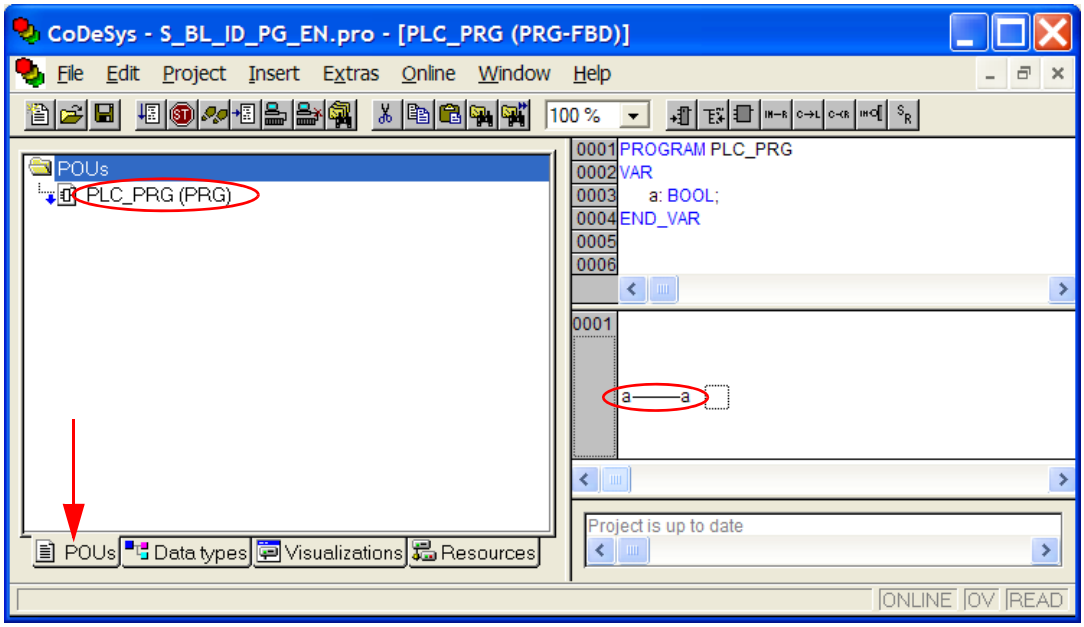
Figure 37: Selection of the programming language



Acknowledge with "OK".

You will need a correct project for log-in. Please check PLC-PRG and write at least one respective instruction (without effect) into the component "PLC-PRG".

Figure 38: Component PLC-PRG

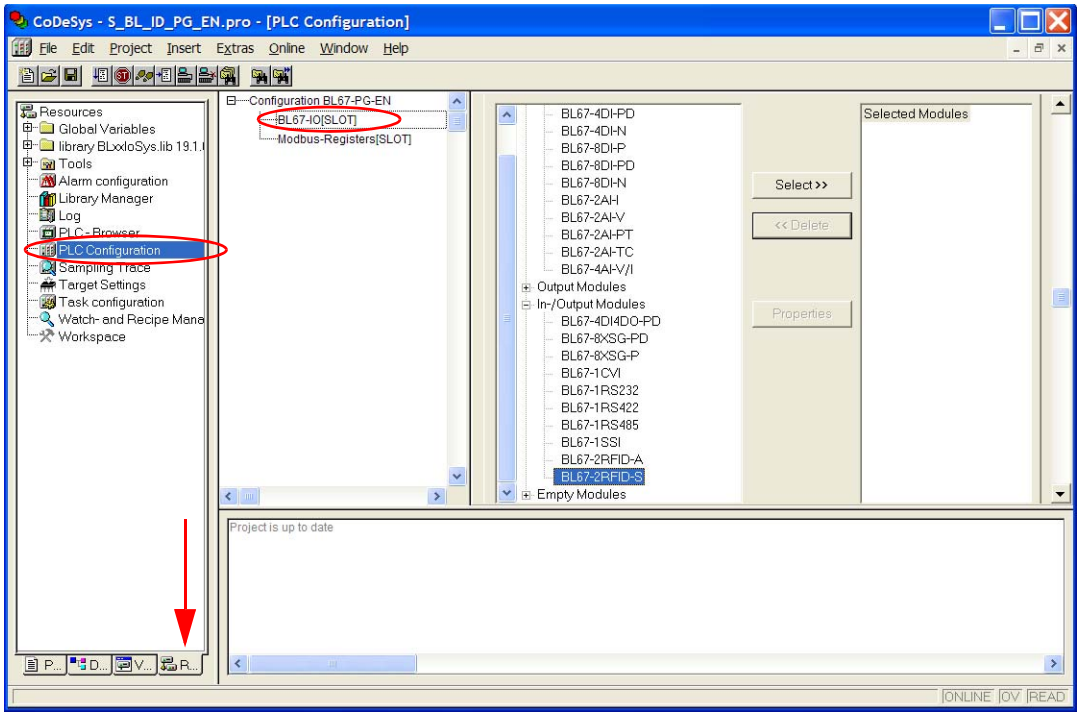


Please select the subitem "PLC Configuration" on the "Resources" tab.

Please check the subitem "BL67 -IO[Slot]" of "Configuration BL67-PG-EN" in the directory tree (middle window) for gateway configuration.

Please select the Input/Output tab in the right space of the window. Please check "BL67-2RFID-S" under input/output modules. Click on the button "Select". Thus the configuration of the station is already completed.

Figure 39: PLC Configuration



Setting of the IP-addresses for Ethernet communication

With a few steps now check whether the IP-address of your gateway matches the IP-address of your PC-Ethernet connection.

1. Setting of the communication parameters in CoDeSys

In the software CoDeSys you may access "Communication Parameters" via Menu Online. Here, accept the following settings:

Figure 40: Setting of the communication parameters in CoDeSys

Name	Value	Comment
Address	192.168.1.1	IP address or hostname
Port	1200	
TargetId	0	
Motorola byteorder	Yes	

Here, the last three digits for "Address" must be "001". In this example, this corresponds to the switch setting of the rotary (encoder) switches on the gateway. Differing switch settings must be accepted accordingly. The first 9 digits of the IP-address match the delivery status.

Note

Please note that the parameter "Motorola Byteorder" must have the value "Yes"!

2. Checking/setting of the IP-address of the network interface card or rather the PC

The procedure applies to the operating systems Windows 2000 and Windows XP.

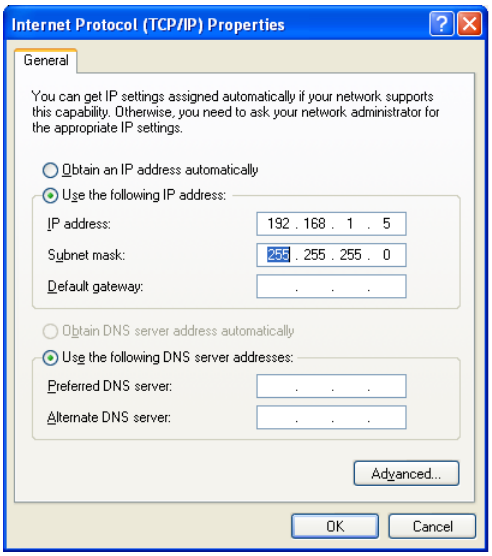
Here, you may access the network connections via:

Start > System Control > Network Connections

Please select from the list the network connection for your gateway. Please check the name of your connection. You may select the subitem "Properties" by right clicking it.

Please check under "General" the bottom item "Internet Protocol - (TCP/IP)" in the window "This Connection uses the following elements". You may click on the "Properties" button if this entry is checked blue. Check here whether the IP-address of the data processor/network interface card matches the IP-address of the gateway (here: 192.168.001.001).

Figure 41: IP-address of the data processor or rather the network interface card



The IP-address may be changed after you have selected the item "Use the following IP address" or rather "Specify IP address".

Communication between the BL67 gateway and the data processor is possible if the digits of the first three ranges match. In this example it is 192.168.001.

Process data

For testing purposes you may directly write and read the process data within the PLC Configuration range.

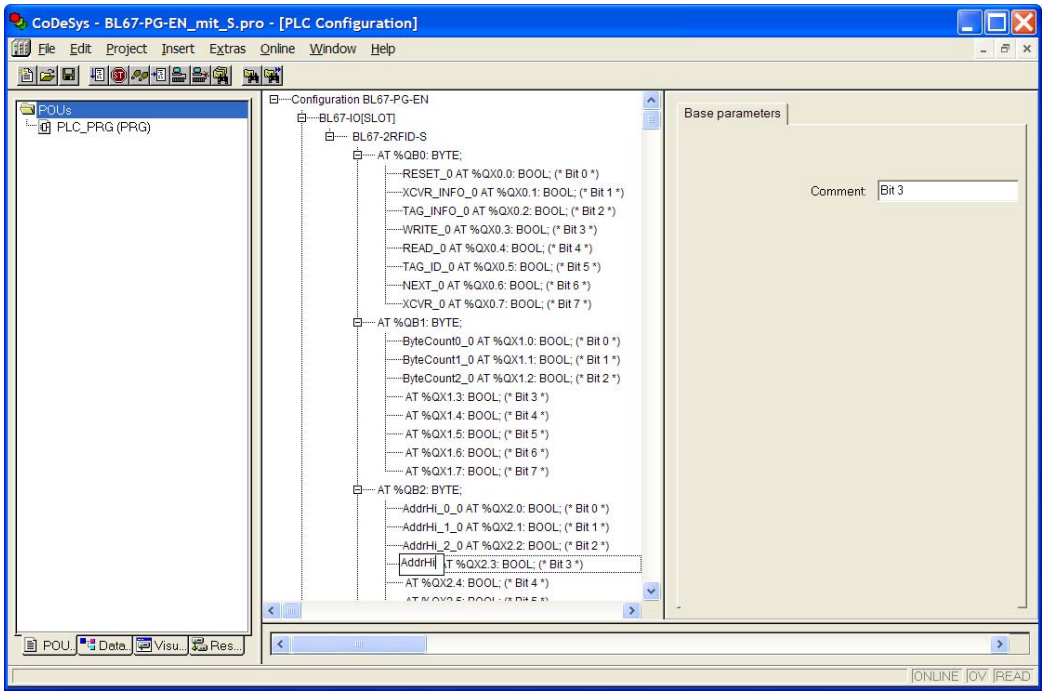
Please refer to the paragraph "Process image BLxx-2RFID-S-modules" page 3-43 for a description of the complete process image.

Please assign variable names for single bits of the process image for fast location and possibly for later programming. The input field opens by double-clicking on the respective bit.

Note

Please ensure that the online connection to your control is inactive. The "ONLINE" mode is shown inactive at the right bottom of the window.

Figure 42: Assigning variable names in the process image



Please switch to the "ONLINE" mode with online > login or  and start the program  .

Note

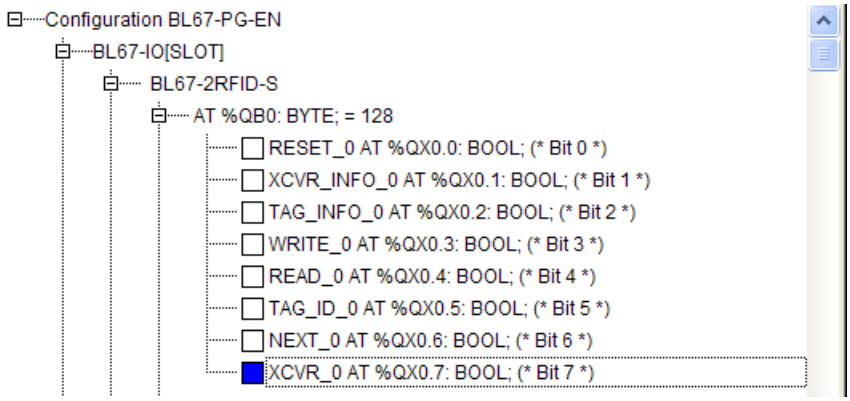
Please ensure that the online connection to your control is active and that the program is running. The mode "ONLINE:BL67_PG_EN" and "RUNNING" is highlighted black and displayed at the bottom right of the window.

Command functions

Please test the different functions as described in detail in the paragraph "Meaning of the command bits/control bits" page 3-47.

First, please activate the read/write head. An active read/write head creates an electromagnetic field.

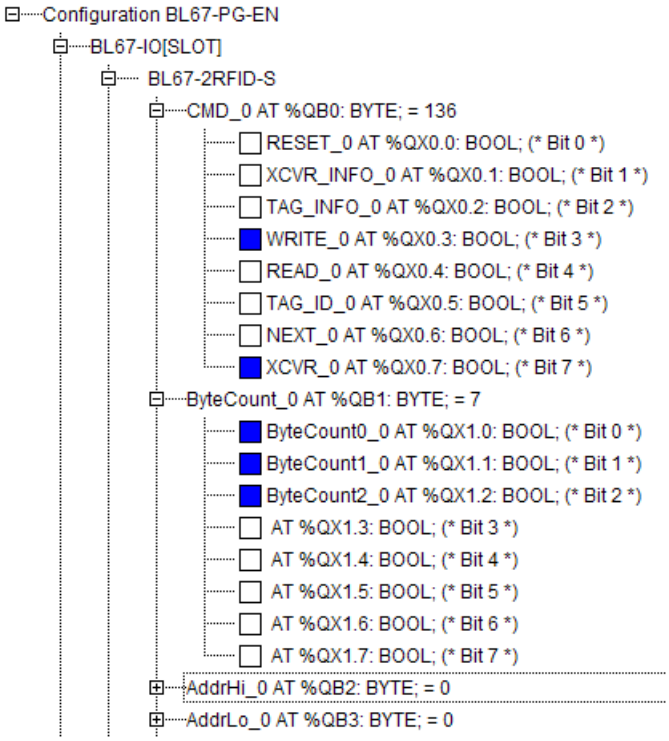
Figure 43: Switching on the read/write head



Please execute a Write command:

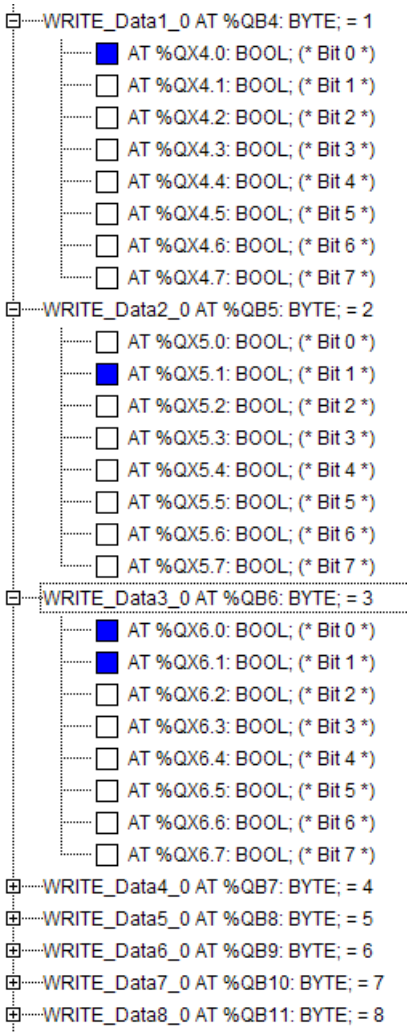
- Set the respective command bit (here: WRITE_0). Enter the number of the Byte -1 (ByteCount0_0 to ByteCount2_0) to be written (here: 8-1=7). The address on the data carrier (AddrHi_0, AddrLo_0) may be left at "0" if need be; at the same time, please note paragraph "Access to the data ranges of the data carriers." page 3-56.

Figure 44: Write errors, number and address on the data carrier - (example)



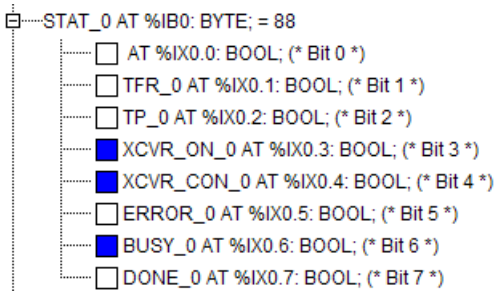
- Write any data into the 8 bytes data range "WRITE_DATA".

Figure 45: Write data (example)



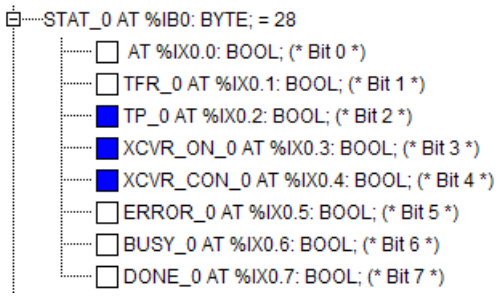
The following status messages indicate that the read/write head will execute the command as soon as a data carrier is in the received range:

Figure 46: Status message after WRITE-command



When a data carrier is in the detection range of the read/write head and recognized by it, "TP" becomes active (=1).

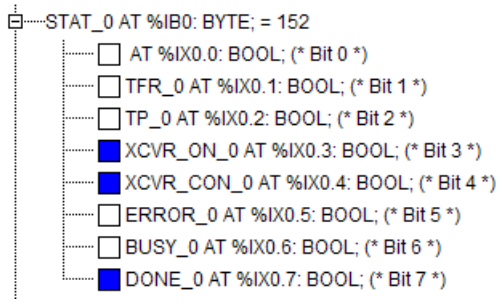
Figure 47: Data carrier in received range



When a data carrier is in the detection range of the read/write head, the user range of the data carrier is automatically and fully read. During this process, TFR=0 and changes to TFR=1 after the read operation is fully completed. Only after the detection range has been evacuated, TFR again becomes "0". This automatic read operation is interrupted by all user commands; the TFR-Bit keeps its active value. The process is restarted when no other commands exist and when TP=1. Read commands can directly access already stored data via TFR=1.

A new command is only accepted when all remaining commands were reset to "0". DONE switches to status "1" when the execution of the command is completed and a new command can be acknowledged. When "ERROR" = 0, the command was successfully executed.

Figure 48: The execution of the command was successful.



Additional commands are executed accordingly.

Error messages

The message whether a command was executed successfully or erroneously is sent as soon as the commands are reset to "0". "DONE" = 1 indicates that execution has ended and a new command can be acknowledged. "ERROR" = 1 indicates that command execution was unsuccessful.

In case that the bit "ERROR" = 1, you can receive more detailed information about the error via the two "Error-byte" of the process input data. When "ERROR" = 0, the two data bytes are irrelevant.

You may determine the cause of the error with the table "" page 3-53. Change the binary value or the decimal value into the respective hexadecimal value. The first byte corresponds to the first bold digit in the error code table, the two following bold digits are reproduced by the second byte.

Figure 49: ERROR-Byte 1 and 2 of the process input data

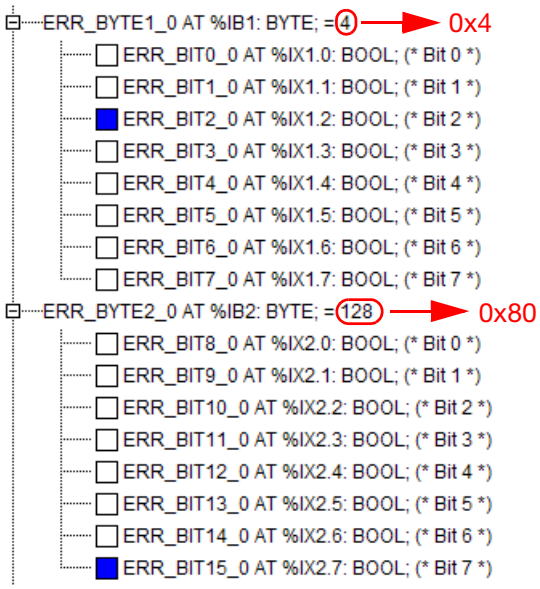


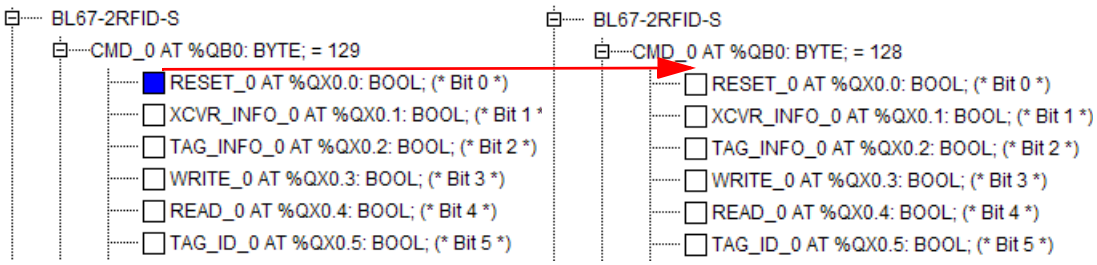
Figure 50: Mapping of values 0x4 and 0x80 in the error code table

DW#16#E4FE**07**xx§	An error not closely specified was signalled by the cyclic status word (for example, antenna out of service). The error is independent of the current command.§
***BL ident*® specific error codes§**	
DW#16#E4FE**80**xx§	No read/write head is connected.§
DW#16#E4FE**81**xx§	The read/write head is defective.§
DW#16#E4FE**84**xx§	Telegram content invalid (for data carriers of type TW-R22-HT-B64). Range write protected or not existing.§

Resetting of error messages

With the "RESET"-Bit, the two ERROR-Byte can be deleted/reset. Deletion is done with the falling edge (1->0) of the "RESET"-Bit.

Figure 51: RESET-command



Setting parameter values

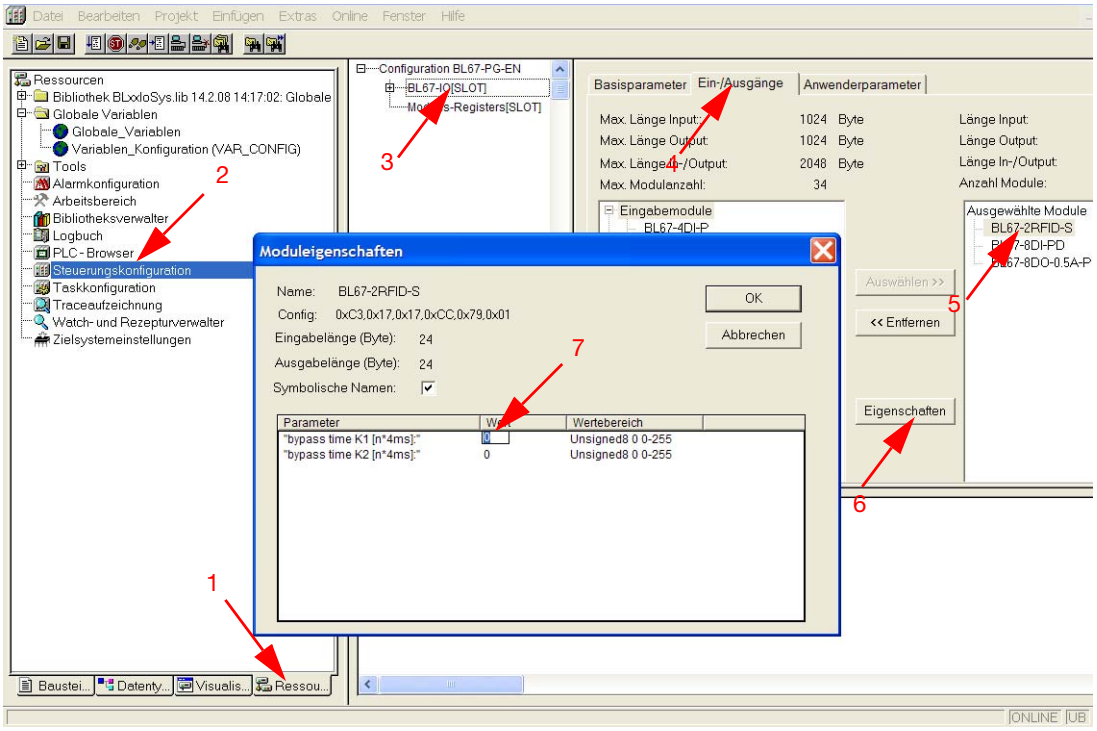
In case that the error message "Dwell time of the data carrier in the detection range was not sufficient for successful command processing." page 3-53 is received during startup, please check whether your application supports "Compliance with Recommended Distances" (Minimum Distances). The specification "Recommended" and "Maximum Distance" can be found in the manual D101583 in the Chapter "Operating Data".

In case the recommended distances can not be adhered to, or in case the error indication concerning the recommended distances continues due to external interferences, the parameter "Bridging Time Kx[n*4ms]" must be set to a suitable value. For each port, the BLxx-2RFID-S-module has the parameter "Bridging Time Kx[n*4ms]".

Parameterization is possible in the "OFFLINE" mode. For parameter setting, please select the "Resources" tab and the subitem "PLC Configuration" from the menu in the left space of the window. Check "BL67-IO[SLOT]" in the middle window and select the Input/Output tab in the right window. In the list of selected modules, please check the BL67-2RFID-S module and choose "Properties". You may directly enter a value in the window "Module Properties".

Please note the paragraph "Determination of the parameter value "Bridging Time Kx[n*4ms]"" page 3-51.

Figure 52: Setting parameter values



Diagnostics

All diagnostic messages are sent to the "Process input data" page 3-43 with 2 bytes error code.

Three diagnostic messages ("Diagnostics" page 3-52) concerning the read/write head can also be represented with the function "iIO_ReadModuleDiags" of the BLxxIoSys.lib.

Please refer to the manual "BLxxIoSys.lib – System Diagnostics" (D301114) for a description of the functions concerning the system diagnostics.

Please activate the "POUs" tab for installing the function component. Please select the "Offline" mode. Please open a new "Network (after)" by right-clicking the mouse in the right, middle area of the window. Please click directly after the three red question marks and select "Box" from the menu. Check "AND" (Default Component) and select input assistance with F2. Select from the list under "IoDiagnostic" the component "iIO_ReadModuleDiags".

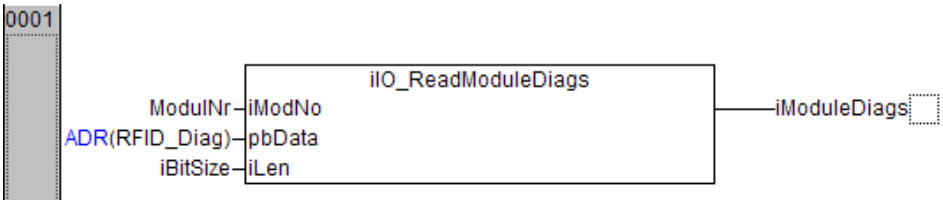
Define the four variables of the component:

Figure 53: Definition of the variables

```
0001 PROGRAM PLC_PRG
0002 VAR
0003     iBitSize: INT:=32;
0004     RFID_Diag: ARRAY [0..3] OF BYTE;
0005     iModuleDiags: INT;
0006     ModulNr: INT := 0; (*0=RFID*)
0007 END_VAR
```

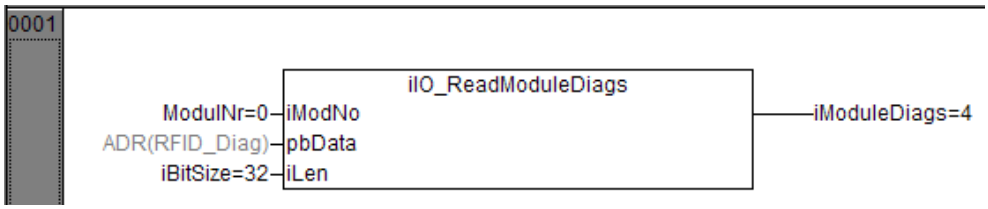
The variables may be mapped via the input assistance (F2). A pointer is expected at "pbData". Put the variable RFID_Diag in parentheses and write "ADR" in front of it.

Figure 54: Installing the function "iIO_ReadModuleDiags"



With Online > Login or , the "Online-Mode" is changed and the new program can be loaded into the control. With Online > Run or , the program in your gateway is started.

Figure 55: The function "iIO_ReadModuleDiags" when Program/online is running.



The "Diagnostics" page 3-52 are transferred into the variable RFID_Diag.

Figure 56: Display of the variable RFID_Diag

```
0001   iBitSize = 32
0002 ⊟ RFID_Diag
0003       RFID_Diag[0] = 0
0004       RFID_Diag[1] = 0
0005       RFID_Diag[2] = 0
0006       RFID_Diag[3] = 0
0007   iModuleDiags = 4
0008   ModulNr = 0
```

Flow diagram for command execution

The values of the command Bits (TAG-ID, READ, WRITE...) can be reset to the output value "0" prior or after command execution. The two following diagrams show the status messages depending on the procedural sequence:

Figure 57: Reset of the command bit after execution

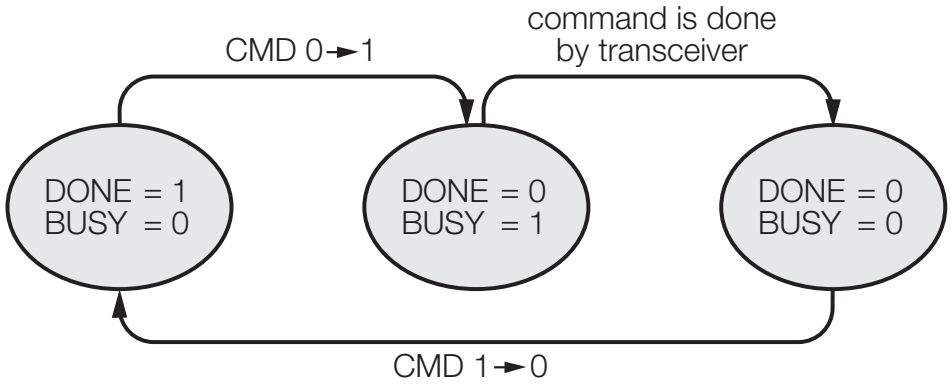
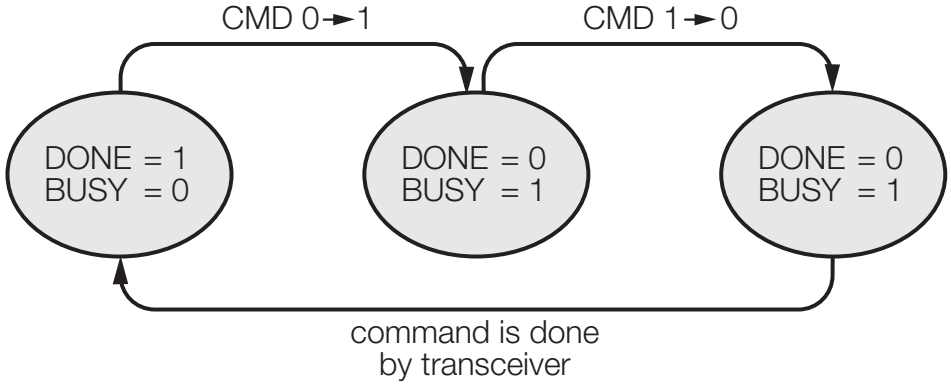


Figure 58: Reset of the command bit prior to execution



Process input data

Table 40: Input data byte

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
	Port 1							
0[A)]	DONE	BUSY	ERROR	XCVR_ CON	XCVR_ ON	TP	TFR	res.
1	2 bytes Error Code ("Alerts and error messages" page 3-53)							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								
Port 2								
12	DONE	BUSY	ERROR	XCVR_ CON	XCVR_ ON	TP	TFR	res.
13	2 bytes Error Code ("Alerts and error messages" page 3-53)							LSB
14	MSB							
15	res.	res.	res.	res.	res.	res.	res.	res.

Table 40: Input data byte

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
16	8 bytes Read Data (READ_DATA)							
17								
18								
19								
20								
21								
22								
23								

A *Byte-Number*

Meaning of the status bits

The following table provides the significance of the status bits of the process data indicated above:

Table 41: Meaning of the status bits

Description	**Meaning**
DONE	**1**: The system does not process a command at this time and is ready to receive another command. **0**: All arriving commands, except the RESET-command, are ignored. DONE only switches the status "1" when all command bits (READ, WRITE...) are "0". "Flow diagram for command execution" page 3-42
BUSY	**1**: The system is currently executing a command. **0**: Command execution was completed. BUSY is not the inversion of DONE and possibly can not be used with a handshake-operation. Use the variable DONE to set up a handshake-operation.
ERROR	**1**: An error has occurred during command execution. If this flag follows a write command (WRITE), for example, the data of the send-buffer were not written to the data carrier. If this flag follows a read command, no data was read from the data carrier and no new data was stored in the received data buffer. Details about the cause of the error is provided via the 2 bytes error code of the process image. Paragraph "Error messages" page 3-38 shows how the error code is displayed in the CoDeSys and the reference to the error code table "Status values" page 3-53. **0**: It was possible to successfully execute the last Write or Read command. The received data buffer contains valid data. The value of the 2 bytes error code is irrelevant in this case.

Table 41: Meaning of the status bits

Description	Meaning
XCVR_CON	**1**: The read/write head is correctly connected to the BL67-2RFID-S-module. **0**: The read/write head is not **yet** correctly connected to the BL67-2RFID-S-module.
XCVR_ON	**1**: The transfer with 13.56 MHz from read/write head to data carrier is active. **0**: The transfer with 13.56 MHz from read/write head to data carrier is **not** active.
TP (Tag Present)	**1**: A data carrier is in the received range of the read/write head and is recognized by it. **0**: There are no data carriers in the detection range of the read/write head or the read/write head has not recognized the data carrier.
TFR (Tag Fully Read)	**1**: All data ranges of the data carrier were fully read from the *BL ident*®-system, and the data carrier still remains within the detection range (TP=1). Automatic reading always occurs when a data carrier is within the detection range of the read/write head. The time between TP=1 and TFR=1 can not be seen as reference time for a read and write command. If only few bytes are written or read with a read/write command, the command is executed significantly faster than the time it takes to fully read a 2000 bytes data carrier, for example. Read commands can directly access already stored data with TFR=1. **0**: The *BL ident*®-system did not yet fully read all data ranges of the data carrier or the data carrier is outside the detection range of the read/write head. This automatic read operation is interrupted by all user commands; the TFR-Bit keeps its active value. The process is restarted if no other commands exist and TP=1.

Note

Depending on the system, the status bit "BUSY" can not be used for a handshake operation in many cases!

Process output data

Table 42: Output data bytes

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Port 1								
0[A)]	XCVR	NEXT	TAG_ID	READ	WRITE	TAG _INFO	XCVR _INFO	RESET
1	res.	res.	res.	res.	res.	Byte Count2	Byte Count1	Byte Count0
2	MSB	AddrHi						LSB
3	MSB	AddrLo						LSB
4	8 Byte Write Data (WRITE_DATA)							
5								
6								
7								
8								
9								
10								
11								
Port 2								
12	XCVR	NEXT	TAG_ID	READ	WRITE	TAG _INFO	XCVR _INFO	RESET
13	res.	res.	res.	res.	res.	Byte Count2	Byte Count1	Byte Count0
14	MSB	AddrHi						LSB
15	MSB	AddrLo						LSB
16	8 Byte Write Data (WRITE_DATA)							
17								
18								
19								
20								
21								
22								
23								

A *Byte-Number*

Meaning of the command bits/control bits

Note

If more than one command bit has been set via TAG_ID, READ, WRITE, TRANSCEIVER_INFO or TAG_INFO, the BL67-2RFID-S-module will generate an error message! The Bit "XCVR" must always be set to execute a command so that the read/write head remains active!

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

Table 43: Meaning of the command bits

Description	Meaning
XCVR	**1**: The read/write head is activated. **An active read/write head creates an electromagnetic field** (for example, the signal is transferred with 13.56 MHz). **0**: The read/write head is deactivated (a signal check is not done). When XCVR = 0 is set during the time the *BL ident*®-system is occupied with executing a command, the command is completed first. The read/write head is only deactivated when the Status-Bit is "DONE = 1".
NEXT	**1**: Exactly one command can be executed with the same data carrier. If another command is initiated with the same data carrier, the status bit remains "BUSY=1". The *BL ident*®-system must be reset (RESET) or the command must be executed with a different data carrier. **0**: Function is not used.
TAG_ID	**0 -> 1**: The command to read the UID is initiated with the increasing edge. The command is executed when a data carrier is within the detection range of the read/write head. ("UID" page 6-4) **0**: Function is not used.
READ	**0 -> 1**: The command to read is initiated with the increasing edge. The command is executed when a data carrier is within the detection range of the read/write head. The Byte number "ByteCount0..ByteCount2" is read from the data carrier address "AddrLo, AddrHi". **0**: Function is not used.
WRITE	**0 -> 1**: The command to write is initiated with the increasing edge. The command is executed when a data carrier is within the detection range of the read/write head. The Byte number "ByteCount0..ByteCount2" is written to the data carrier address "AddrLo, AddrHi". **0**: Function is not used.

Table 43: Meaning of the command bits

Description	**Meaning**
TAG_INFO	**0 -> 1**: The command TAG_INFO (information for data carrier) is initiated with the increasing edge. The command is executed when a data carrier is within the detection range of the read/write head. Together with the process input data the information about the data carrier is sent in the range read data with the following 8 bytes: Byte 0: Number of Block-1 of the data carrier (this means 27 -> 28 Blocks) Byte 1: Number of bytes-1 per block (this means 3 -> 4 bytes per block) Byte 2: Is not supported (DSFID-data carrier format) Byte 3: Is not supported (AFI - Application Identification) Byte 4: Is not supported (ICID - IC-identification (is not supported) Byte 5 to Byte 7: „0" **0**: Function is not used.
TRANSCEIVER _INFO	**0 -> 1**: The command TRANSCEIVER_INFO (information to read/write head) is initiated with the increasing edge and executed. Together with the process input data the information about the read/ write head is sent in the range read data with 8 bytes. The content of the information can be configured. The content of the information is selected with "AddrHi, AddrLo". **0x00F0**: The first 8 bytes of the ORDER_ID (here: product description) are sent, for example "TNER-Q80" = 0x54 4E 45 52 2D 51 38 30 (ASCII-Table) **0x00F0**: The second 8 bytes of the ORDER_ID (here: product description) are sent, for example: "-H1147\0\0" = 0x2D 48 31 31 34 37 5C 00 5C 00 **0x00F2**: The third 8 bytes of the ORDER_ID (here: product description) are sent. **0x00F3**: The fourth 8 bytes of the ORDER_ID (here: product description) are sent. **0x00F4**: 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 = 0x56 of the firmware version **V**x.y.z. Byte 3: Part x of the firmware version V**x**.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**: A "Reset" of the *BL ident*®-system is executed with the increasing edge. When the status bit "BUSY" is set, the execution of the active command is interrupted and the status bit "DONE" is set. The status bit "ERROR" and the two byte error message (error code) of the process input data are deleted.
ByteCount0..2	Number of Byte-1 that still need to be read (READ) or written (WRITE). 0x007 -> 8 byte still need to be read/written.

Table 43: Meaning of the command bits

Description	Meaning
AddrHi, AddrLo	Array of the length 2 bytes. Repeats the start address of the memory range in the data carrier which is to be accessed via the Write or Read command. The writable/readable start addresses of the data carriers can be ≠ 0. Paragraph "User data ranges of the data carrier versions." page 3-56 contains information concerning the writable/readable start addresses and data carrier versions.
WRITE_DATA	Write data - array of the length 8 bytes.

Parameter

At this time only the parameter "Bridging Time K1[n*4ms]" and "Bridging Time K2[n*4ms]" are transferred with the 8 bytes parameter data image.

Table 44: Parameter data byte

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
0[A)]	reserved							
1								
2								
3								
4								
5	"Bridging Time K1[n*4ms]"							
6	reserved							
7	"Bridging Time K2[n*4ms]"							

A *Byte-Number*

Keep the default setting "=0" of this parameter when the startup occurred without the error message "Dwell time of the data carrier in the detection range was not sufficient for successful command processing." page 3-53.

If the error message "Dwell time of the data carrier in the detection range was not sufficient for successful command processing." page 3-53 appears, check whether your application supports "Compliance with Recommended Distances (Minimum Distances), a decrease of the speed or the data volume. Please refer to the manual D101583, Chapter "Operating Data" for the specification "Recommended and Maximum Distances".

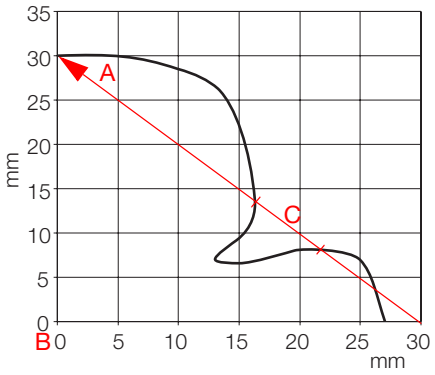
In case the recommended distances can not be adhered to or in case the error with the recommended distances continues to be sent based on external influences, the parameter "Bridging Time Kx[n*4ms]" must be set to a suitable value.

Determination of the parameter value "Bridging Time Kx[n*4ms]"

The parameter "Bridging Time Kx[n*4ms]" is the result of the used components, the distances, the speed of the data carrier to the read/write head and other external interferences.

Therefore measure all needed bridging times directly on location. The following diagram shows the typical run of the detection range:

Figure 59: Detection range of a read/write head



A *Distance bridged by the data carrier when passing by the read/write head*
B *Center of the read/write head*
C *Section of the distance that needs to be bridged.*

For the section "C" in the above diagram the data carrier must use maximum the "Bridging Time K1[n*4ms]". The data carrier must be within the detection range before the bridging time elapses so that the transfer can continue.

Additional diagrams for the detection ranges of different read/write heads and data carriers are shown in the manual D101583 in the Chapter "Overtravel Ranges".

The LEDs of the read/write head or rather the status bit "TP" of the process input data indicate if the data carrier is within the detection range or not.

Diagnostics

There are three diagnostics for read/write head with 2 bytes for each port. These diagnostics are also displayed with the ERROR-Byte of the process input data.

Table 45: Diagnostic Bytes

	Bit							
	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
Port 1								
0[A)]						TR_PS_OVL		
1					TR_PS_ERR			TR_HW_ERR
Port 2								
2						TR_PS_OVL		
3					TR_PS_ERR			TR_HW_ERR

Table 46: Meaning of the diagnostic bits

Description	**Meaning**
TR_PS_OVL	The voltage supply of the read/write head was switched off because of over-current ("DW#16#E4FE01xx" page 3-53).
TR_HW_ERR	A hardware error of the read/write head exists ("DW#16#E4FE81xx" page 3-53).
TR_PS_ERR	The voltage supply of the read/write head is not in the required range ("DW#16#E4FE88xx" page 3-53).

Alerts and error messages

The following table provides information in regards to the meaning of some STATUS values:

Table 47: Status values

Status value of CHX_STATUS	Meaning of the error code
RFID standard profile	
DW#16#E**1**FE**01**xx	Data carrier memory error (for example, CRC error).
DW#16#E**1**FE**02**xx	Dwell time of the data carrier in the detection range was not sufficient for successful command processing.
DW#16#E**1**FE**03**xx	The indicated address range or command does not match the used data carrier type.
DW#16#E**1**FE**04**xx	Data carrier is defective and must be replaced.
DW#16#E**1**FE**08**xx	Data carrier in the transfer range does not have the expected UID.
DW#16#E**1**FE**09**xx	Data carrier does not support the current command.
DW#16#E**1**FE**0A**xx	At least one section of the defined data carrier range is write protected.
DW#16#E**4**FE**01**xx	Supply of the read/write head was switched off because of the increased current consumption, for example short circuit.
DW#16#E**4**FE**03**xx	Antenna or rather transmitter of the read/write head is switched off. Execution of the service "Write-Config" is needed ("Write Config" page 5-25, Seite 3-14).
DW#16#E**4**FE**05**xx	The requested data volume exceeds the capacity of the internal memory.
DW#16#E**4**FE**06**xx	A parameter of the current command is not supported.
DW#16#E**4**FE**07**xx	An error not closely specified was signalled by the cyclic status word (for example, antenna out of service). The error is independent of the current command.
***BL ident*® specific error codes**	
DW#16#E**4**FE**80**xx	No read/write head is connected.
DW#16#E**4**FE**81**xx	The read/write head is defective.
DW#16#E**4**FE**84**xx	Telegram content invalid (for data carriers of type TW-R22-HT-B64). Range write protected or not existing.
DW#16#E**4**FE**88**xx	The read/write head is insufficiently fed.
DW#16#E**4**FE**89**xx	The read/write head signals permanent CRC error on the RS485 cable. EMC problem?
DW#16#E**4**FE**8A**xx	The Ident Unit signals permanent CRC error on the RS485 cable. EMC problem?

Table 47: (cont.) Status values

Status value of CHX_STATUS	Meaning of the error code
DW#16#E**4**FE**90**xx	The read/write head does not recognize a command sent via GET.
RFID standard profile	
DW#16#E**5**FE**01**xx	The Ident Unit signals a false sequence number (SN).
DW#16#E**5**FE**02**xx	The PIB FB signals a false sequence number.
DW#16#E**5**FE**04**xx	The Ident Unit signals an invalid data block number.
DW#16#E**5**FE**05**xx	The PIB FB signals an invalid data block number.
DW#16#E**5**FE**07**xx	The PIB FB signals an invalid data block length.
DW#16#E**5**FE**09**xx	The Ident Unit completes a hardware reset (Init_Active is set to "1"), Init (Bit 15 within the cyclic "Control Word") is expected by the PIB.
DW#16#E**5**FE**0A**xx	The command code "CMD" and the respective received confirmation do not match. This involves a software or synchronization error here which must not occur in normal operation mode.
DW#16#E**5**FE**0B**xx	The sequence of the telegrams to acknowledge received is wrong.
DW#16#E**5**FE**0C**xx	Synchronization error (Step width of AC_H/AC_L and CC_H/CC_L in the cyclical "Control Word" is wrong). Initialization must be completed anew.
DW#16#E**6**FE**01**xx	Invalid command
DW#16#E**6**FE**02**xx	The Ident Unit signals an invalid command index.
DW#16#E**6**FE**05**xx	The Ident Unit signals that only Write commands (Write-Config) are permitted at this time.
***BL ident*® specific error codes**	
DW#16#E**6**FE**80**xx	No prior data carrier recognized, no UID stored (at Next).
DW#16#E**6**FE**FF**xx	Unknown error
RFID standard profile	
DW#16#E**7**FE**01**xx	Only INIT command is permitted in this state (signalled by the PIB).
DW#16#E**7**FE**02**xx	CMDSEL > CMDDIM or command code "CMD" not permitted.
DW#16#E**7**FE**03**xx	The PIB signals: Parameter "Length" of the command is too long for the global data range which is reserved within the TXBUF.
DW#16#E**7**FE**04**xx	RXBUF overflow (more data has been received than can be saved in the RXBUF memory).

Table 47: (cont.) Status values

Status value of CHX_STATUS	**Meaning of the error code**
DW#16#E**7**FE**05**xx	The next command must be an "INIT" command in all cases. All other commands will be rejected.
DW#16#E**7**FE**06**xx	The index is outside the range 111/112 (101 to 108) and therefore wrong.
DW#16#E**7**FE**07**xx	BLxx-2RFID-y does not respond to the INIT command. Check that the correct ID is set!
DW#16#E**7**FE**08**xx	Timeout during initialization.
DW#16#E**7**FE**09**xx	A repeat of the command is not supported by the PIB*.
DW#16#E**7**FE**0A**xx	Error in the PIB during the determination of the data packet size.

User data ranges of the data carrier versions.

Access to the data ranges of the data carriers.

In the case that a different data carrier is used than indicated in "Hardware description of the example project" page 3-3, or in case you want to access certain ranges of the data carrier, you must change the value "Start Address" in the command structure of the example project.

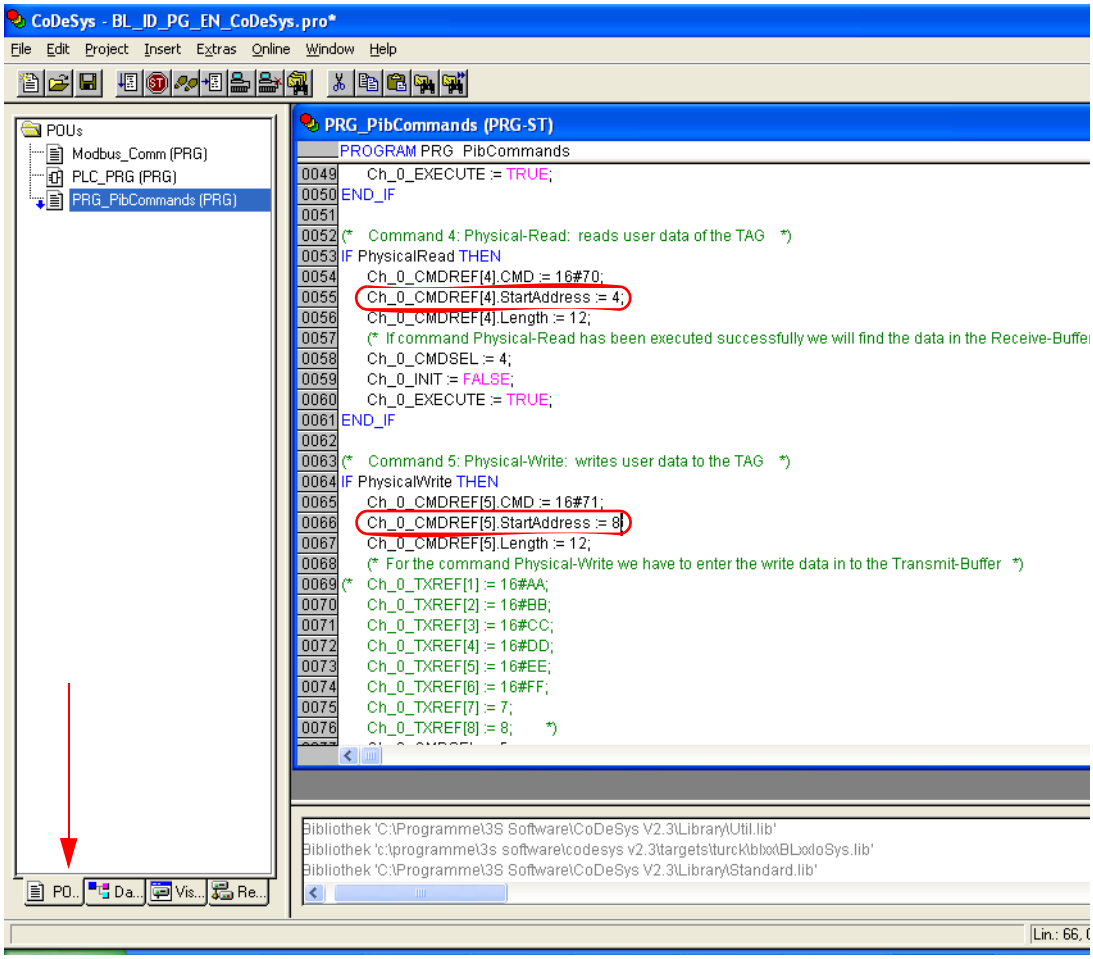
Note

Please ensure that the online connection to your control is **not** active. The "ONLINE" mode at the bottom right of the window is not highlighted.

For this open the program PRG_PibCommands (PRG) in the file folder "Components". Here, you may locate the default settings for the commands "Physical_ Read" page 5-23 and "Physical_Write" page 5-24.

The "Start Byte Number" matches the "Start Address". Please pay attention to the following paragraph when assignment is completed.

Figure 60: Changing the start byte number



Overview of the Turck data carriers

Starting at byte number 0 to byte number 111 , the data carriers of type **I-Code SL2** are writable and readable.

The "Start byte number" is part of the command structure "Physical_ Read" page 5-23 and "Physical_Write" page 5-24, and there it is designated as "Start Address".

The table describes the data structure of the data carrier:

- TW-I14-B128
- TW-L43-43-F-B128
- TW-L82-49-P-B128
- TW-R16-B128
- TW-R20-B128
- TW-R30-B128
- TW-R50-B128
- TW-R50-90-HT-B128
- ...

Table 48: Data structure of the I-Code SL2 data carriers

Byte number (StartAddress)	Content	Access	Block number (a block consists of 4 bytes)
-16 to -9	UID	Read only via "Inventory" page 5-28	-4 to -3
-8 to -5	Information about the data carrier	Read only via special commands	-2
-4 to -1	Conditions for write access		-1
0 to 111	User data range	Read / write via "Physical_ Read" page 5-23 and "Physical_Write" page 5-24	0 to 27

Starting at byte number 18 to byte number 63, the data carriers of type **I-Code SL1** are writable and readable.

The "Start byte number" is part of the command structure "Physical_ Read" page 5-23 and "Physical_Write" page 5-24, and there it is designated as "Start Address".

The table describes the data structure of the data carriers:

- TW-R16-B64
- TW-R22-HT-B64
- ...

Table 49: Data structure of I-Code SL1 data carriers

Byte number (StartAddress)	Content	Access	Block number (a block consists of 4 bytes)
0 to 7	UID	Read only via "Inventory" page 5-28	0 to 1
8 to 11	Conditions for write access	Read only via special command	2
12 to 15	Special functions (for example, EAS / QUIET)	Read / write via special commands	3/4
16	family code		
17	application identifier		
18 to 63	User data range	Read / write via "Physical_ Read" page 5-23 and "Physical_Write" page 5-24	4/5 to 15

Starting at byte number 0 to byte number 1999, the data carriers of type **FRAM** are writable and readable.

The "Start byte number" is part of the command structure "Physical_ Read" page 5-23 and "Physical_Write" page 5-24, and there it is designated as "Start Address".

The table describes the data structure of the data carriers:

- TW-R20-K2
- TW-R30-K2
- TW-R50-K2
- TW-R50-90-HT-K2
- ...

Table 50: Data structure of the FRAM data carriers

Byte number (StartAddress)	Content	Access	Block number (a block consists of 8 bytes)
0 to 1999	User data range	Read / write via "Physical_ Read" page 5-23 and "Physical_Write" page 5-24	0 to 249
2000 to 2007	UID	Read only via "Inventory" page 5-28	250

Table 50: Data structure of the FRAM data carriers

Byte number (StartAddress)	Content	Access	Block number (a block consists of 8 bytes)
2008 to 2015	AFI, DSFID, EAS	Read / write (with limitations) via a special command	251
2016 to 2047	Special functions (for example, EAS / QUIET)	Read only via a special command	252 to 255

4 Installation of the control interface

Modbus-TCP master

The following description is based on the prerequisite that an initial startup of the *BL ident*® system was completed with the programming software CoDeSys from the company "3S". The previous chapter contains instructions.

Installation of the interface with BLxx-2RFID-A-modules

The following paragraphs describe the procedural method for the transfer of 1 byte Tag-data:

- from the Receive-buffer of the PIB function block to a Modbus-TCP-master of a HMI-PLC.
- from a Modbus-TCP-master of a HMI-PLC to the Transmit-buffer of the PIB function block.

Variable names for the Modbus-TCP-register

After startup of the *BL ident*®-system, open the tab Resources with the programming software CoDeSys and select the array "PLC Configuration".

Note

Please ensure that the online connection to your control is **not** active. The mode “ONLINE” at the bottom right of the window is not highlighted.

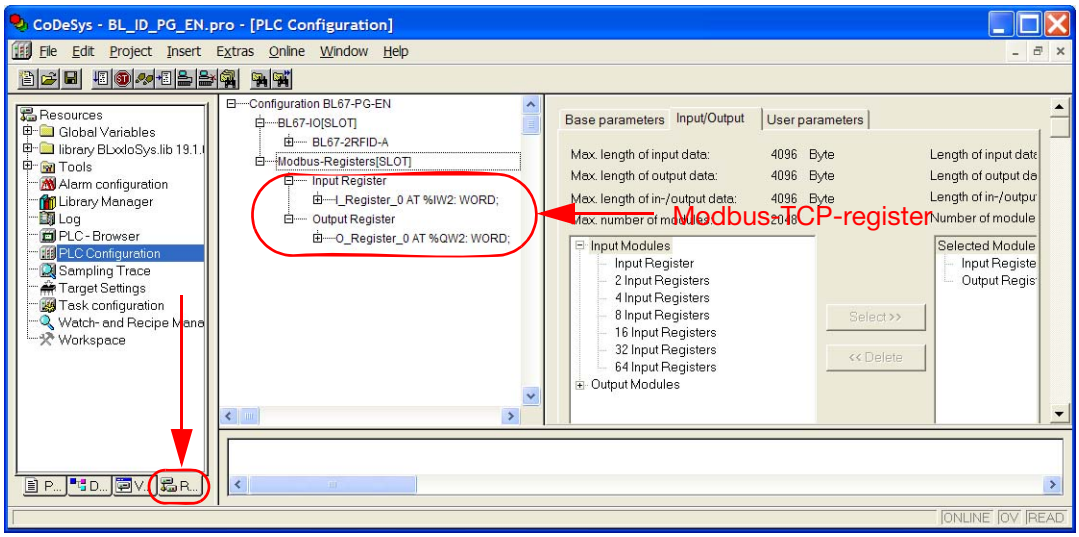
In the middle of the window of the control configuration you may open the tab for the configuration of the Modbus-TCP-registers by double-clicking on "Modbus-Registers [SLOT]". Open the tab Input/Output.

Under "Input Modules" select an "Input Register", and under "Output Modules" an "Output Register".

Now assign the variable names to both selected registers in the middle window:

- Double-click on "AT %IW2:WORD" to open the input field and enter "I_Register_0".
- Double-click on "AT %QW2:WORD" to open the input field and enter "O_Register_0".

Figure 61: Modbus-TCP-register

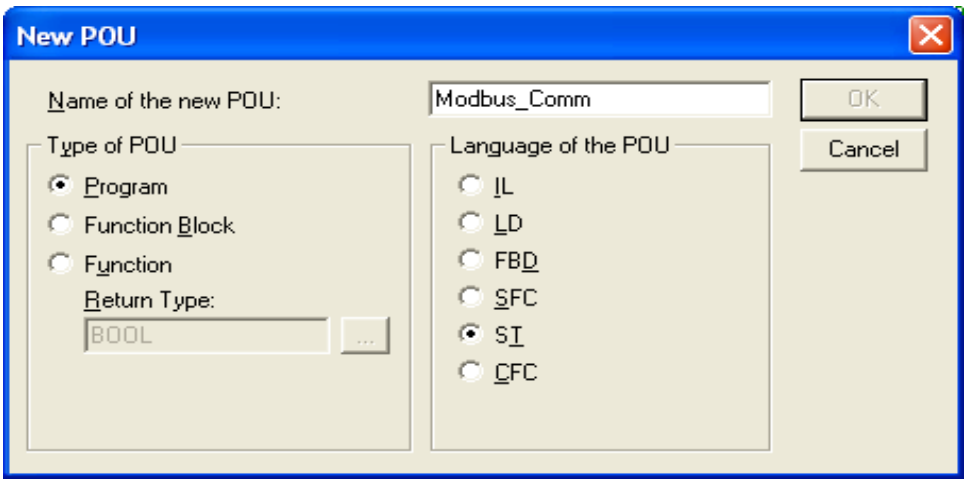


Program expansion

Open the tab POUs, select the main PLC_PRG (PRG) and expand it as described below:

Right-click on the component "Add Object..." and make a selection. Accept the entries of the following diagram:

Figure 62: Entries for the new component



Open the newly created component Modbus_Comm. This new component is to execute the following tasks:

- Data of the register "I_Register_0" is to be transferred to the Send-buffer CH_0_TXREF.
- Data of the Receive-buffer CH_0_RXREF is to be transferred to register "O_Register_0".

Send-buffer CH_0_TXREF and Receive-buffer CH_0_RXREF are "byte" type arrays and belong to the global variables of the PIB-component ("The function block PIB_001KB" page 3-9).

Modbus-TCP-registers are "Word" type registers. The functions WORD_TO_BYTE and BYTE_TO_WORD adopt the appropriate format.

Take the instructions in the following diagram:

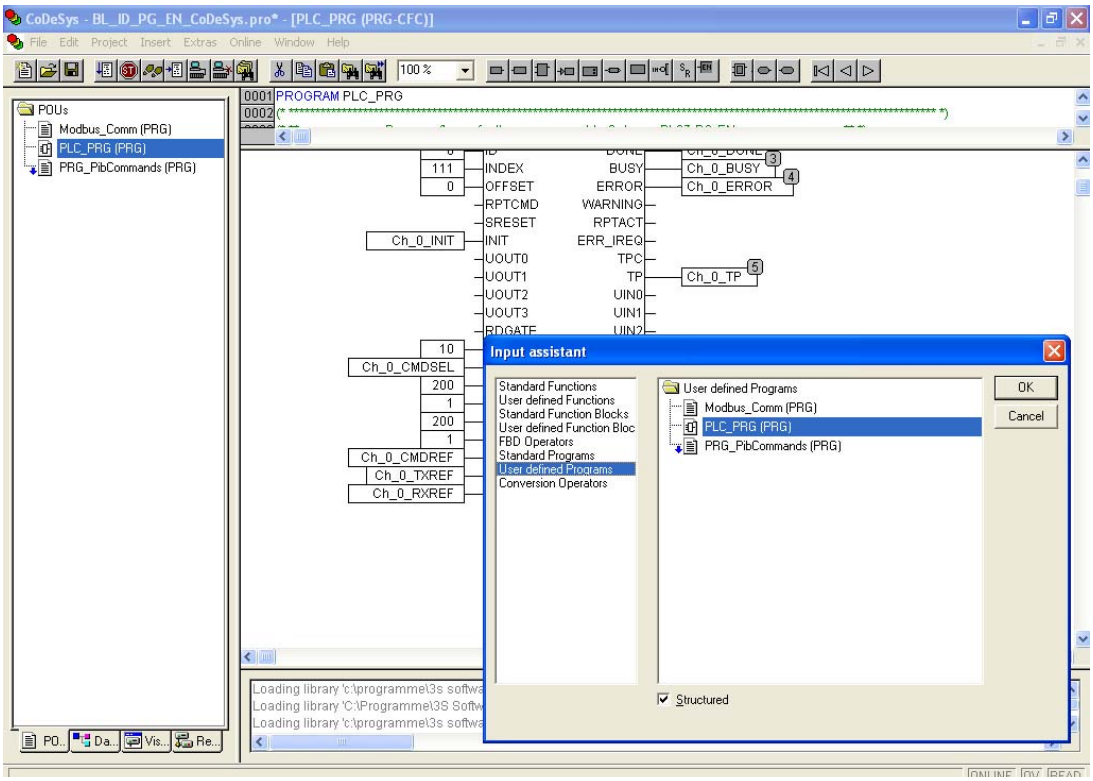
Figure 63: Instruction text

Now select "Project > Build". In case of a typing error, you will receive an error message in the subjacent message field.

In the opened main program PLC_PRG (PRG), you will receive a new component (alternatively with drag and drop via) via insert > box. Add it next to the component PIB_001KB. The component will receive a sequential number and by default, "AND" is assigned to it.

Check "AND". The input mask for the component is opened via the shortcut "F2". Select "User defined Programs" from the list in the left space of the window. Check the "Modbus_Comm" program defined above and acknowledge with OK.

Figure 64: Inserting the new component Modbus_Comm into the master program PLC_PRG.

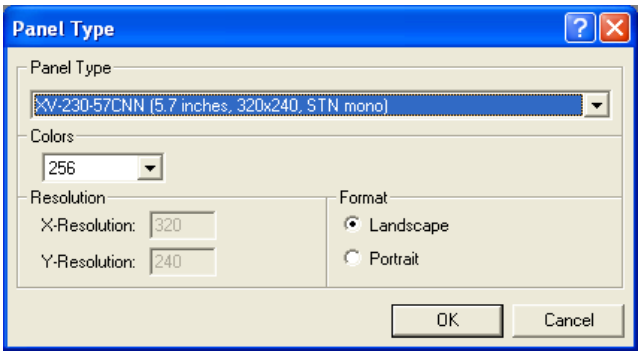


In the Online mode (Online > Login or) download the expanded program into the programmable gateway and start it ( )!

Configuration of the Modbus-TCP-interface in the control software

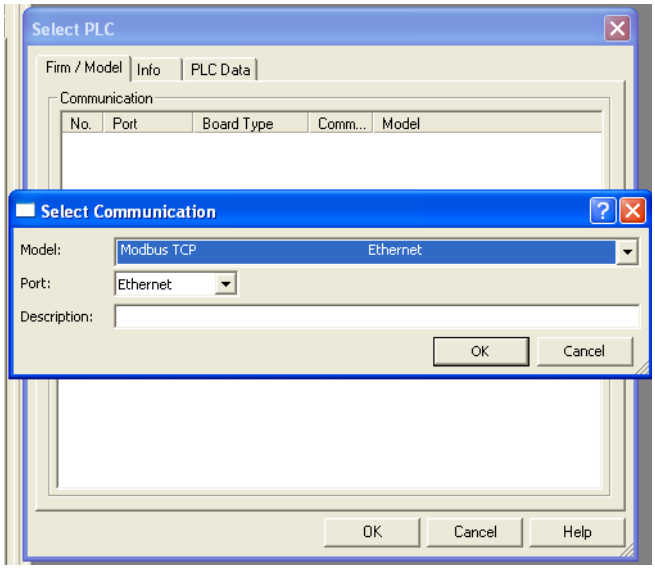
Open the visualization software "Galileo" and if need be, create a new project. In the first step you are asked to select the type of your control from the list:

Figure 65: Device type of the control



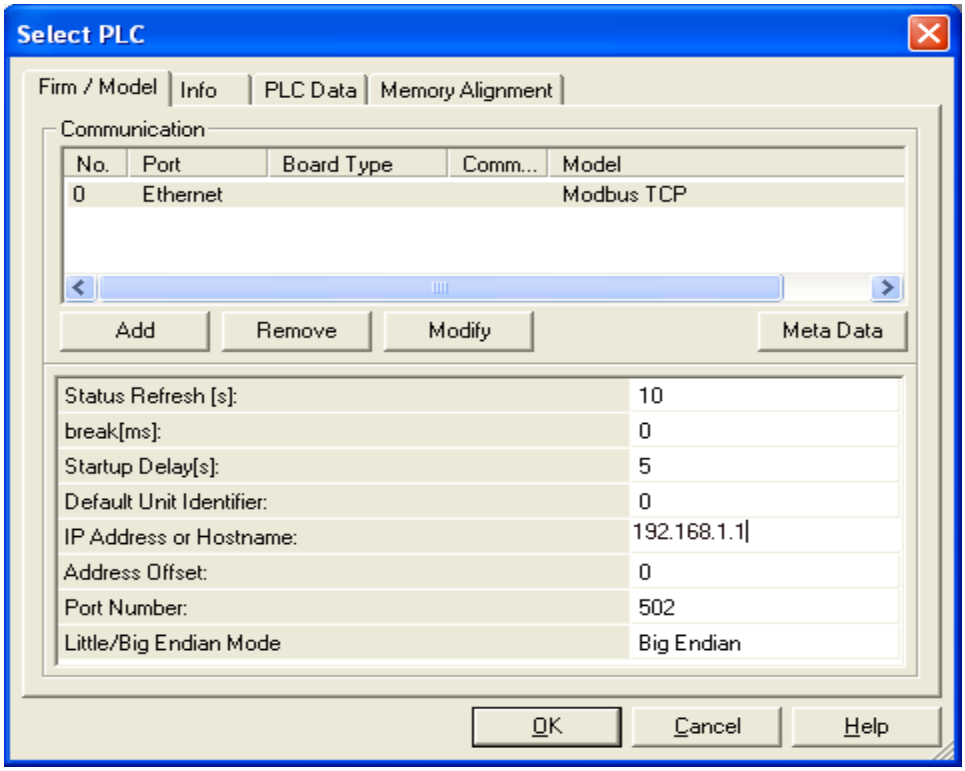
In the second step select the PLC-type. Via the button "Add" the window "Select PLC " opens. Open the pull-down menu for type, select "Modbus TCP" and acknowledge with OK.

Figure 66: PLC selection



On the tab "Firm / Model" you may indicate, next to other configurations, the IP-address of your gateway "BL67-PG-EN" (here: 192.168.1.1 "Setting of the IP-addresses for Ethernet communication" page 3-6). The port number of the Modbus-TCP-port is 502, the "Address Offset" is "0".

Figure 67: Configuration of the Modbus-connection



Variables for the Modbus-TCP-registers

Define two "Word" type variables for the Modbus-TCP-communication. For this open the tab "Tags". By right-clicking the mouse on "Word" you may select "New", and then enter the name of your new variable. Define one variable with the name "O_Register0", and one with the name "I_Register0".

For communication, Modbus-TCP provides certain register ranges:

- 0x4000 to 0x43FF for input data
- 0x4400 to 0x47FF for output data

Table 51: Modbus-TCP-register ranges

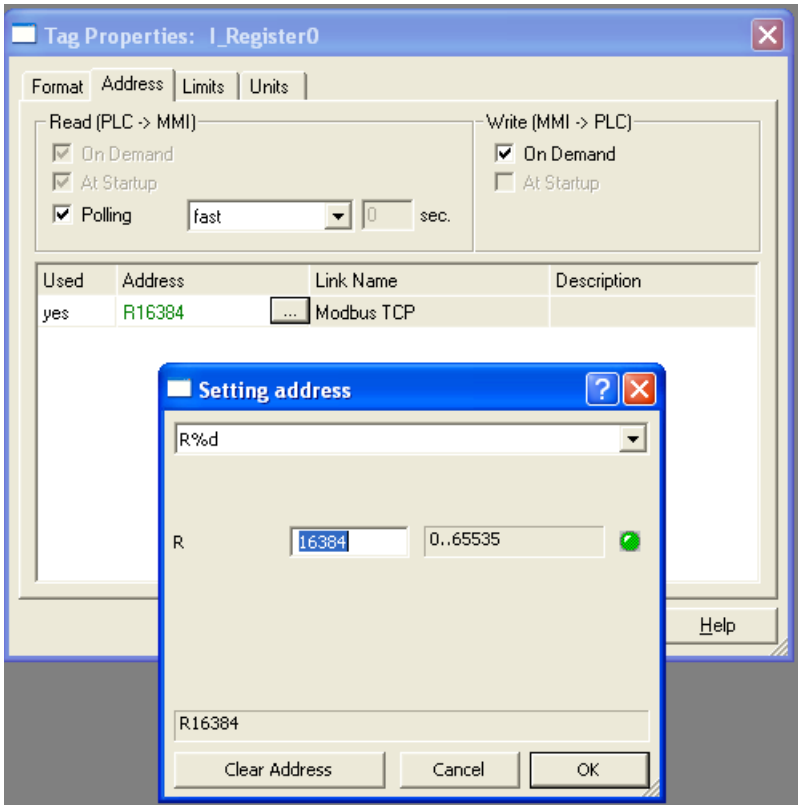
		HEX	DEC	Modicon
Inputs	Packed	0x0000	0	400001
		to		
		0x01FF	511	400512
Outputs	Packed	0x0800	2048	402049
		to		
		0x09FF	2559	402560
Gateway identification		0x1000	4096	404097
		to		
		0x1006	4102	404103
Gateway status		0x100C	4108	404109
Process image length in bits of the intelligent output modules		0x1010	4112	404113
Process image length in bits of the intelligent input modules		0x1011	4113	404114
Process image length in bits of the digital output modules		0x1012	4114	404115
Process image length in bits of the digital input modules		0x1013	4115	404116
Register-Mapping-Revision		0x1017	4119	404120
etc.				

Please refer to the user manual BL67-PG-EN (D301032) for an overview of all Modbus-TCP-register ranges.

Double-click on O_Register0 to open the tab Variable Definitions for this variable. Open the tab "Address" and enter the first address from the range of the output data "17408" (0x4400).

Double-click on I_Register0 to open the tab Variable Definitions for this variable. Open the tab "Address" and enter the first address from the range of the input data "16384" (0x4400).

Figure 68: Register-address entry



If the value "46" is now mapped to the register I_Register0 (16384), this value is written into the Transmit Buffer 1 via the newly created interface. With the next write command, this value is written to a physically present Tag.

The value from the Receive -buffer 1 is transferred to Register O_Register0 (17408) via the newly created interface.

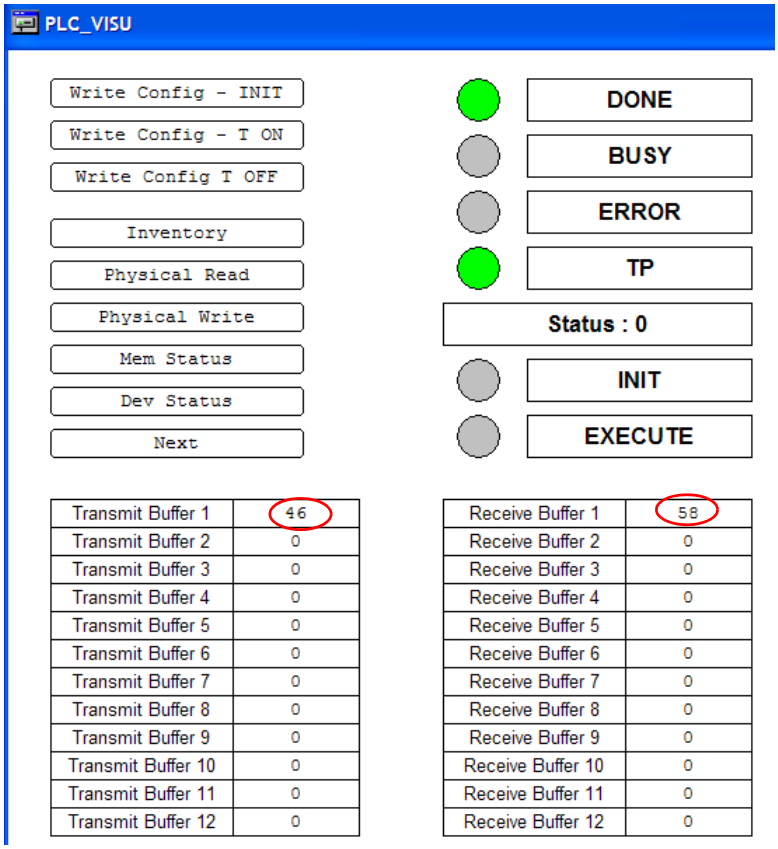


Figure 69: PLC_VISU with 1 byte data of Register 17408 and 1 byte data for Register 16384

Note

Please pay attention to the LED display on the gateway housing! Communication via the newly created interface is only possible when the expanded program runs on the gateway (RUN/STOP: green) and when Ethernet-communication is active (LNK/ACT: not OFF). Please refer to the user manual "BL67-PG-EN (D301033)" for the complete description of LED-diagnostics.

Installation of the interface with BLxx-2RFID-S-modules

The following paragraphs describe the procedural method for transferring 1 byte Tag-data:

- of the variables READ_Data1_0 to a Modbus-TCP-master of a HMI-SPS.
- from a Modbus-TCP-master of a HMI-PLC to the variable WRITE_Data1_0.

Variable names for the Modbus-TCP-registers

After startup of the *BL ident*®-system, open the tab Resources with the programming software CoDeSys and select the array "PLC Configuration".

Note

Please ensure that the online connection to your control is **not** active. The mode “ONLINE” at the bottom right of the window is not highlighted.

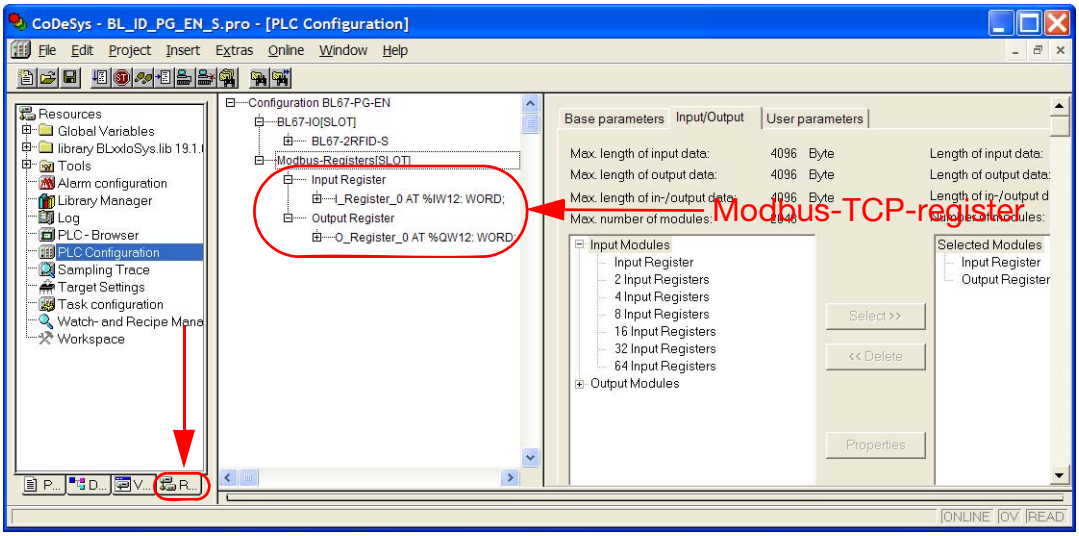
In the middle of the window of the control configuration you may open the tab for configuring the Modbus-TCP-registers by double-clicking "Modbus-Registers [SLOT]". Open the tab "Input/Output".

Under "Input Modules" select an "Input Register", and under "Output Modules" an "Output Register".

Now assign the variable names to both selected registers in the middle window:

- Double-click on "AT %IW2:WORD" to open the input field and enter "I_Register_0".
- Double-click on "AT %QW2:WORD" to open the input field and enter "O_Register_0".

Figure 70: Modbus-TCP-register

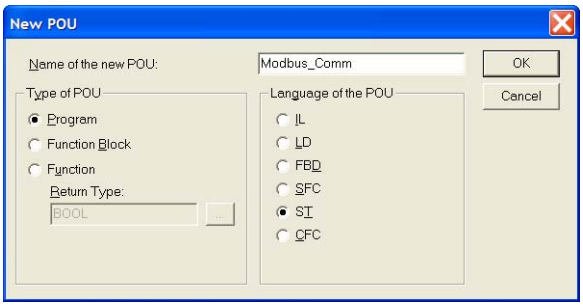


Program expansion

Open the tab POUs, select the main PLC_PRG (PRG) and expand it as described below:

Right-click on "POUs" and select "Add Object...". Accept the entries in the following diagram:

Figure 71: Entries for a new component



Open the newly created component Modbus_Comm. This new component is to execute the following tasks:

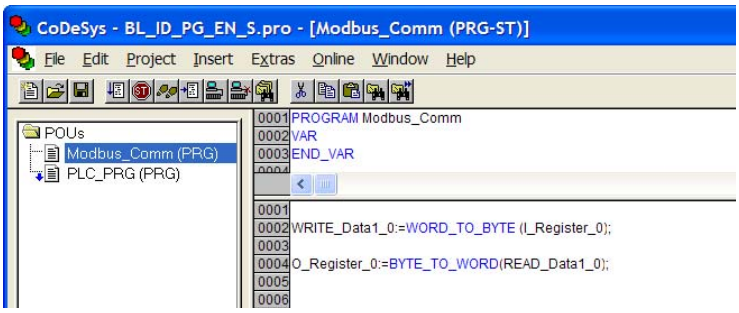
- Data of the register "I_Register_0" is to be transferred to the variable "WRITE_Data1_0". The description "WRITE_Data1_0" was selected here for Byte 4 of the process output data ("Process output data" page 3-46).
- The data of the variable READ_Data1_0 are to be transferred to the register "O_Register_0". The description "WRITE_Data1_0" was selected here for Byte 4 of the process input data ("Process input data" page 3-43).

The variables READ_Data1_0 and WRITE_Data1_0 are "byte" type variables and belong to the global variables.

Modbus-TCP-registers are "Word" type registers. The functions WORD_TO_BYTE and BYTE_TO_WORD adopt the appropriate format.

Accept the instructions in the following diagram:

Figure 72: Instruction text

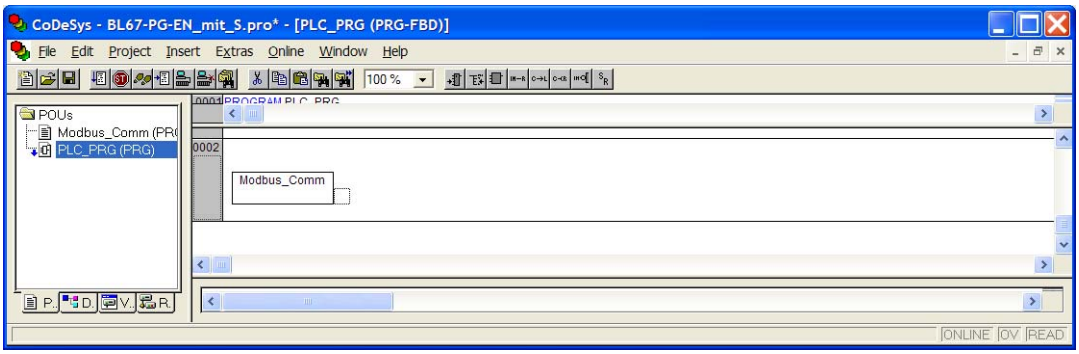


Now select "Project > Build". In case of a typing error, you will receive an error message in the subjacent message field.

In the opened master program PLC_PRG (PRG) you will receive a new range after "Insert > Network (after)". Insert a new component here with "Insert > Box". By default, "AND" is assigned to the component.

Check "AND". The input mask for the component is opened via the shortcut "F2". Select "User defined Programs" from the list in the left space of the window. Check the "Modbus_Comm" program defined above and acknowledge with OK.

Figure 73: Inserting the new component Modbus_Comm into the master program PLC_PRG.

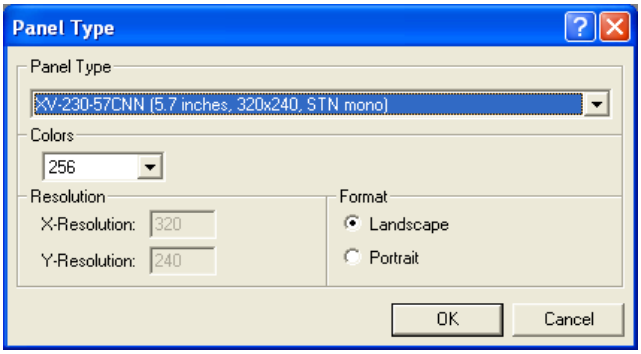


In the Online mode (Online > Login or ) download the expanded program into the programmable gateway and start it ()!

Configuration of the Modbus-TCP-interface in the control software

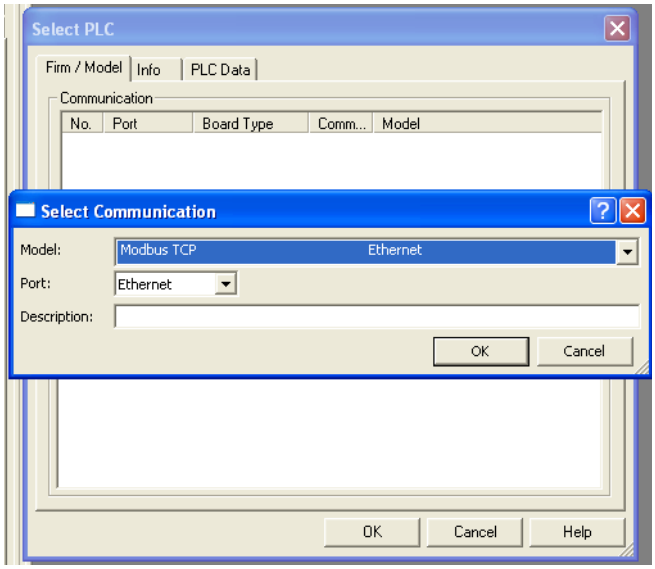
Open the visualization software "Galileo" and if need be, create a new project. In the first step you are asked to select the type of your control from the list:

Figure 74: Device type of the control



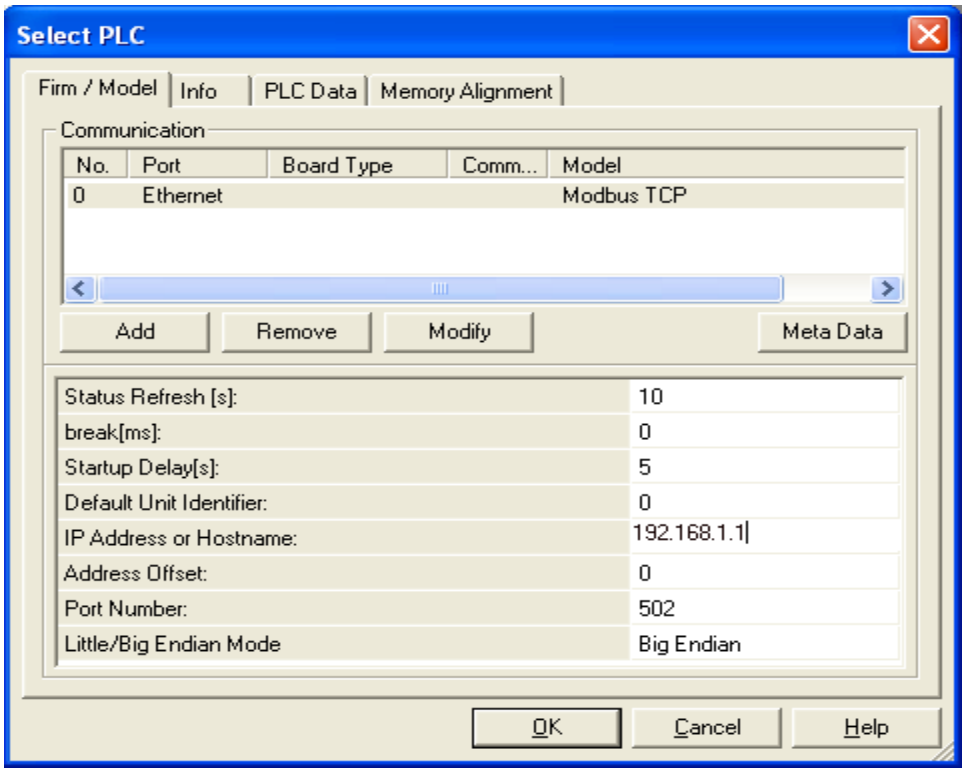
In the second step select the PLC-type. Via the button "Add", the window "Select PLC " opens. Open the pull-down menu for type, select "Modbus TCP" and acknowledge with OK.

Figure 75: PLC selection



On the tab "Firm / Model" you may indicate, next to other configurations, the IP-address of your gateway "BL67-PG-EN" (here: 192.168.1.1 "Setting of the IP-addresses for Ethernet communication" page 3-6). The port number of the Modbus-TCP-port is 502, the "Address Offset" is "0".

Figure 76: Configuration of the Modbus-connection



Variables for the Modbus-TCP-registers

Define two "Word" type variables for the Modbus-TCP-communication. For this open the tab "Tags". By right-clicking the mouse on "Word" you may select "New", and then enter the name of your new variable. Define one variable with the name "O_Register0", and one with the name "I_Register0".

For communication, Modbus-TCP provides certain register ranges:

- 0x4000 to 0x43FF for input data
- 0x4400 to 0x47FF for output data

Table 52: Modbus-TCP-register ranges

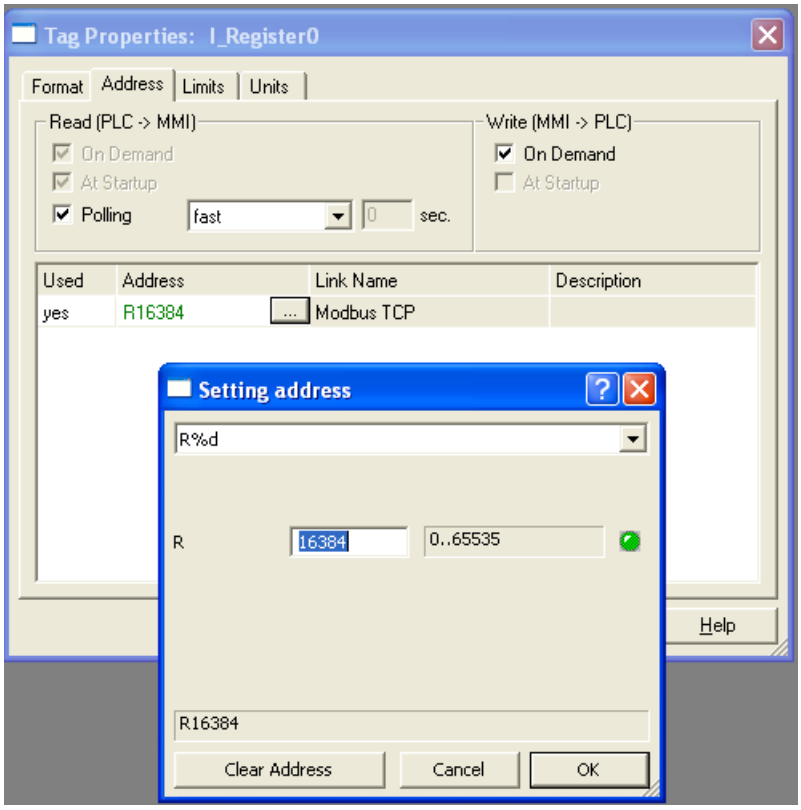
		HEX	DEC	Modicon
Inputs	Packed	0x0000	0	400001
		to		
		0x01FF	511	400512
Outputs	Packed	0x0800	2048	402049
		to		
		0x09FF	2559	402560
Gateway identification		0x1000	4096	404097
		to		
		0x1006	4102	404103
Gateway status		0x100C	4108	404109
Process image length in bits of the intelligent output modules		0x1010	4112	404113
Process image length in bits of the intelligent input modules		0x1011	4113	404114
Process image length in bits of the digital output modules		0x1012	4114	404115
Process image length in bits of the digital input modules		0x1013	4115	404116
Register-Mapping-Revision		0x1017	4119	404120
etc.				

Please refer to the user manual BL67-PG-EN (D301033) for an overview of all Modbus-TCP-register ranges.

Double-click on O_Register0 to open the tab Variable Definitions for this variable. Open the tab "Address" and enter the first address from the range of the output data "17408" (0x4400).

Double-click on I_Register0 to open the tab Variable Definitions for this variable. Open the tab "Address" and enter the first address from the range of the input data "16384" (0x4400).

Figure 77: Register-address entry



If the value "46" is now mapped to the register I_Register0 (16384), this value is written into the variable WRITE_Data_10 via the newly created interface. With the next write command, this value is written to a physically present tag.

The value of the variable READ_Data1_0 is transferred to the register O_Register0 (17408) via the newly created interface.

Note

Please pay attention to the LED display on the gateway housing! Communication via the newly created interface is only possible when the expanded program runs on the gateway (RUN/STOP: green) and when Ethernet-communication is active (LNK/ACT: not OFF). Please refer to the user manual "BL67-PG-EN (D301033)" for the complete description of LED-diagnoses.

The following description is based on the prerequisite that an initial startup of the *BL ident*® system was completed with the programming software CoDeSys from the company "3S". The previous Kapitel 3 provides instructions for this purpose.

Installation of the interface with BLxx-2RFID-A-modules

The following paragraphs describe the procedural method for transferring 1 byte Tag-data:

- from the Receive-buffer of the PIB function block to a PROFIBUS-DP-master of a SIMATIC S7/-300 control.
- from a PROFIBUS-DP-master of a SIMATIC S7/-300 control into the Transmit-buffer of the PIB function block.

Variable names for the PROFIBUS-DP I/Os

After startup of the *BL ident*®-system, open the tab Resources with the programming software CoDeSys and select the array "PLC Configuration".

Note

Please ensure that the online connection to your control is **not** active. The mode “ONLINE” at the bottom right of the window is not highlighted.

In the middle of the window of the control configuration double-click on "BL67-PG-DP[SLOT]" to open the tab for configuring your gateway BL67-PG-DP.

First open the tab "Module Parameters". Select "NormalMode" if you desire to assign the PROFIBUS-DP-address independent from the Ethernet-address (via rotary switch) and therefore solely via the software.

Select "RotaryMode" if you desire to use the PROFIBUS-DP-address set on the gateway with the rotary switches together with the Ethernet-communication. The 3-digit PROFIBUS-DP-address and the last three digits of the 12-digit Ethernet-address always match in this mode. In the following example the Ethernet-address is 192.168.1.**6** and the PROFIBUS-DP-address is "6".

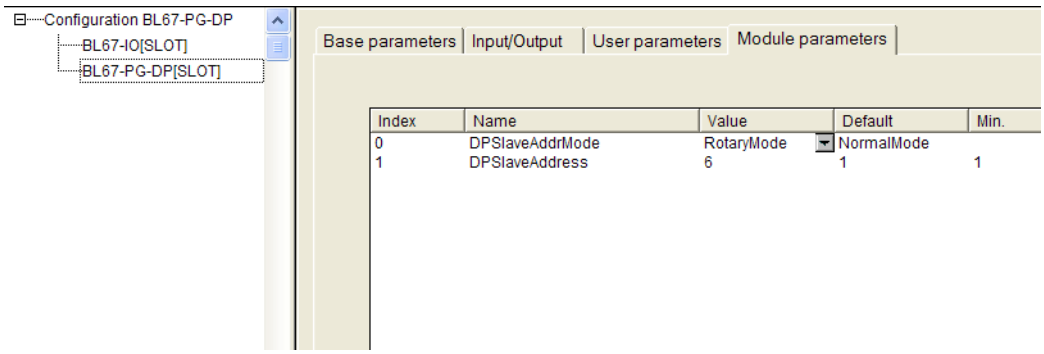


Figure 78: "RotaryMode" Ethernet-address and PROFIBUS-DP-address together via rotary switch

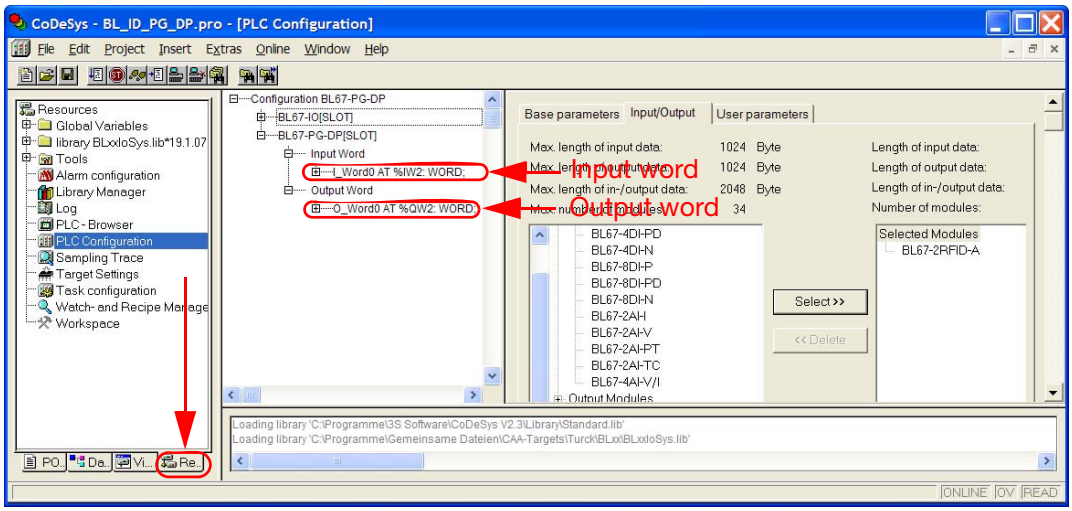
Open the tab Input/Output.

Here, select the module "2RFID-A" under "Input/Output Modules".

Now in the middle window assign the variable names for the “Input Word” and the “Output Word” of the selected module:

- Double-click on "AT %IW2:WORD" to open the input field and enter "I_Word0".
- Double-click on "AT %QW2:WORD" to open the input field and enter "O_Word0”.

Figure 79: PROFIBUS-DP inputs/outputs

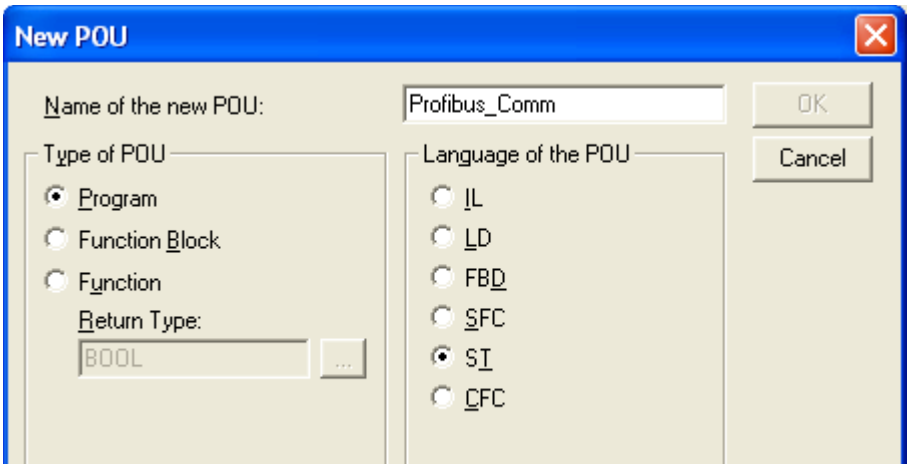


Program expansion

Open the tab POUs, select the main PLC_PRG (PRG) and expand it as described below:

Right-click on component "Add Object..." and make a selection. Accept the entries of the following diagram:

Figure 80: Entries for a new component



Open the newly created Profibus_Comm. This new component is to execute the following tasks:

- The first byte of the input word “I_Word0” is to be transferred to the first byte of the Send-buffer CH_0_TXREF.
- The first byte of the Receive-buffer CH_0_RXREF is to be transferred to the first byte of the output word O_Word0.

Send-buffer CH_0_TXREF and Receive-buffer CH_0_RXREF are "byte" type arrays and belong to the global variables of the PIB-component ("The function block PIB_001KB" page 3-9).

The functions WORD_TO_BYTE and BYTE_TO_WORD adopt the appropriate format.

Accept the instructions in the following diagram:

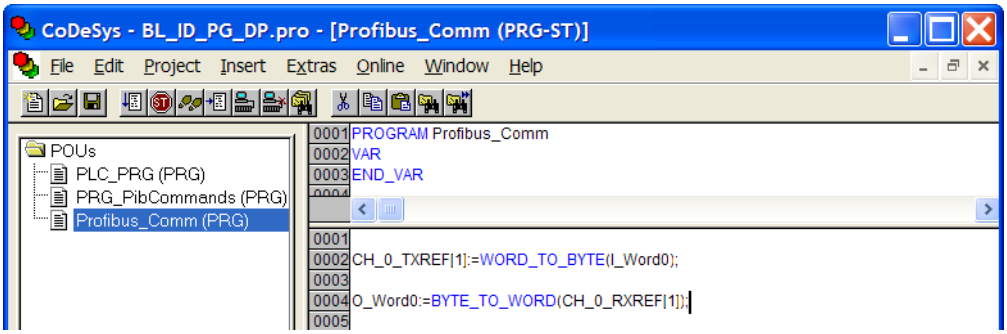


Figure 81: Instruction text for Profibus_Comm (PRG)

Now select "Project > Build". In case of a typing error, you will receive an error message in the subjacent message field.

In the opened master program PLC_PRG (PRG), you will receive > a new component via Insert Component (alternatively also via drag and drop). Add it next to the component PIB_001KB. The component will receive a sequential number and by default, "AND" is assigned to it.

Check "AND". The input mask for the component is opened via the shortcut "F2". Select "User defined Programs" from the list in the left space of the window. Check the program "Profibus_Comm" defined above and acknowledge with OK.

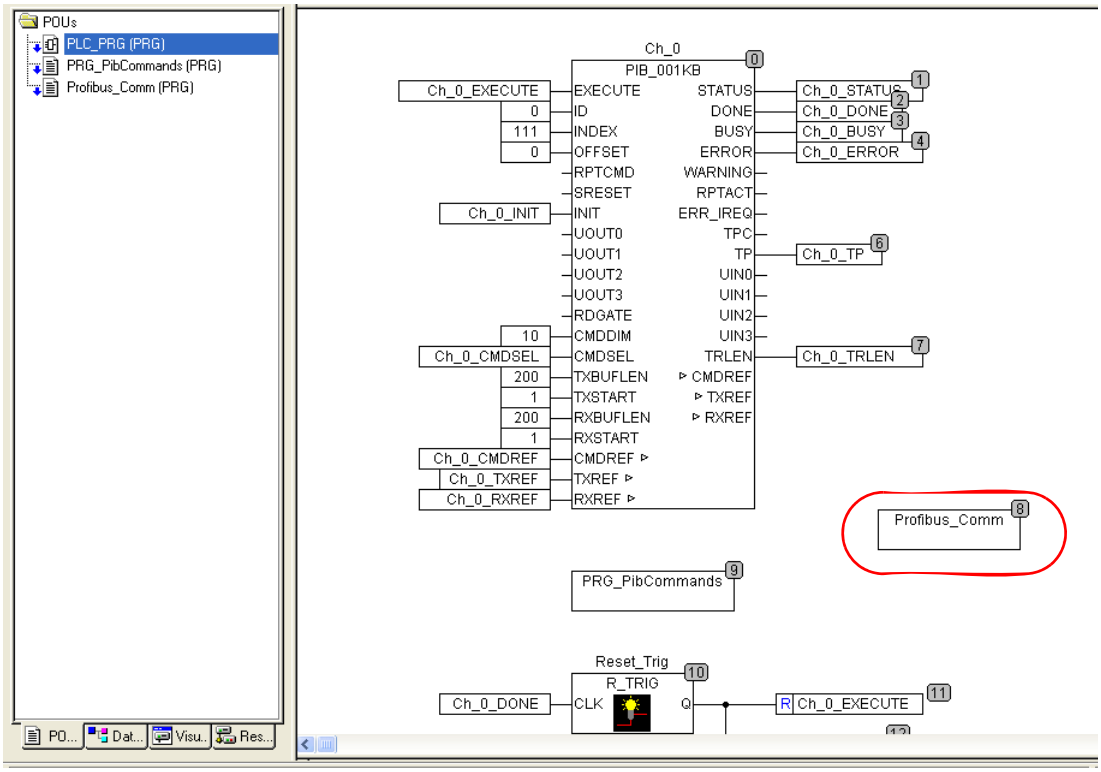


Figure 82: Inserting the new component Profibus_Comm into the master program PLC_PRG

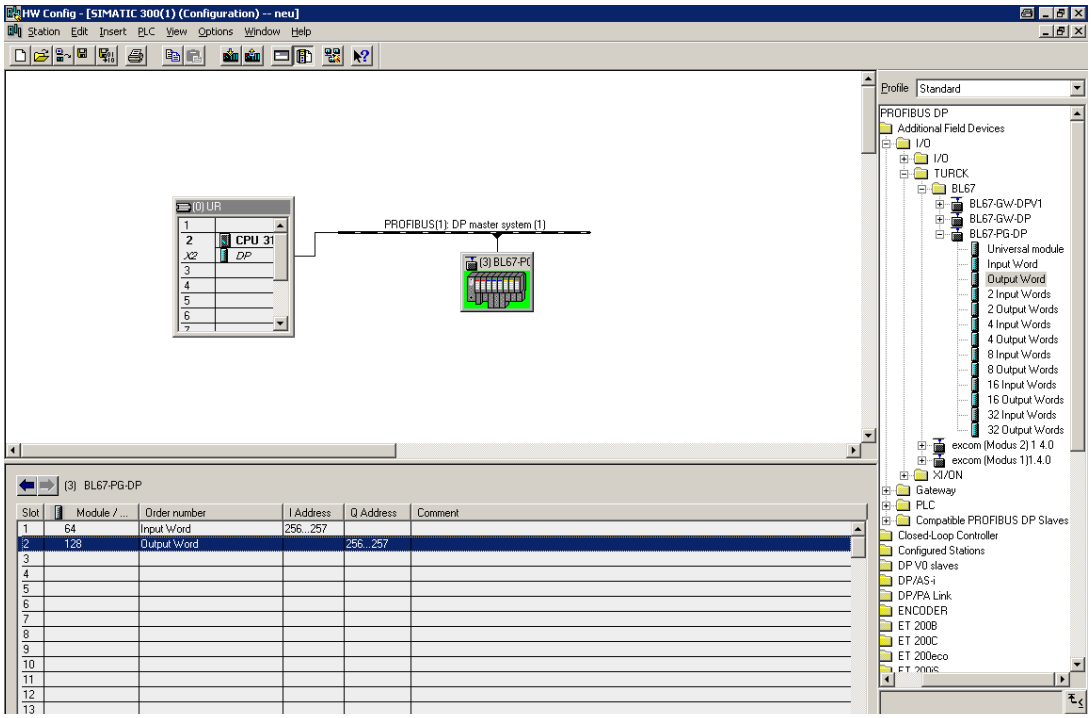
In the Online mode (Online > Login or) download the expanded program into the programmable gateway and start it ( )!

Configuration of the PROFIBUS-DP-interface in the control software

Here, the configuration of the BL67 station is implemented in the "SIMATIC Basic Software Step 7" as an example. Update the GSD file if necessary (before or after the start of the software). Open the array "Hardware" and complete the configuration of the PROFIBUS-DP-system. Please refer to "User Manual for PROFIBUS-DP" (D300527) for instructions.

In the file directory tree of the device catalog and on the right side of the screen select for your gateway "BL67-PG-DP" an "Input Word" and an "Output Word". The I/O addresses are suggested by the SIMATIC Manager.

Figure 83: Selection "Input Word" and "Output Word"



Data transfer via a variable table

Exit the array "Hardware" and go to the project directory of the "SIMATIC Manager". Expand the project tree in the left window and double-click on the bottom item "Components" to open it.

Right-click in the right window space and then click on "Insert New Object > Variable Table" to open the window for configuring the features of a new variable table. Here, enter "Var_watch" as a "Symbolic name" and acknowledge with OK.

First enter the variable name "Input Word" and then in the subjacent line, enter the address and the display format of the variable. The address is entered by right-clicking the line below the name, and then by clicking on "Insert Range...". Select the address like in Figure 83.

Load the modified program into the CPU (PLC >Download)!

Figure 84: Accessing the variables "Input Word" and "Output Word"

	Address	Symbol	Display format	Status value
1	//Input word			
2	IW 256		DEC	
3	//Output word			
4	QW 256		DEC	
5				

Activate the online connection to your control (PLC > Connect to > Direct CPU) to read the status values and load the control variables. The mode "RUN" is displayed highlighted in green in the right bottom of the window.

Note

Please pay attention to the LED display on the gateway housing! Communication via the newly created interface is only possible when the expanded program runs on the gateway (RUN/STOP: green) and when the PROFIBUS-DP-communication is not being interfered with (DP: green). Please refer to the user manual BL67-programmable Gateway BL67-PG-DP (D301047) for the complete description of the LED diagnoses.

Setup of the interface with BLxx-2RFID-S-modules

The following paragraphs describe the procedural method for transferring 1 byte Tag-data:

- of the variable "READ_Data1_0" of the process input data to a PROFIBUS-DP-master of a SIMATIC S7/-300 control.
- from a PROFIBUS-DP-master of a SIMATIC S7/-300 control to the variable WRITE_Data1_0 of the process output data.

Variable names for the PROFIBUS-DP I/Os

After startup of the *BL ident*®-system, open the tab Resources with the programming software CoDeSys and select the array "PLC Configuration".

Note

Please ensure that the online connection to your control is **not** active. The mode "ONLINE" at the right bottom of the window is not highlighted.

In the middle of the window of the control configuration double-click on "BL67-PG-DP[SLOT]" to open the tab for configuring your gateway BL67-PG-DP.

First open the tab "Module Parameters". Select "Normal Mode" if you desire to assign the PROFIBUS-DP-address independent from the Ethernet-address (via rotary switch) and therefore solely via the software.

Select "Rotary Mode" if you desire to use the PROFIBUS-DP-address set on the gateway with the rotary switches together with the Ethernet-communication. The 3-digit PROFIBUS-DP-address and the last three digits of the 12-digit Ethernet-address always match in this mode. In the following example the Ethernet-address is 192.168.1.**6** and the PROFIBUS-DP-address is "6".

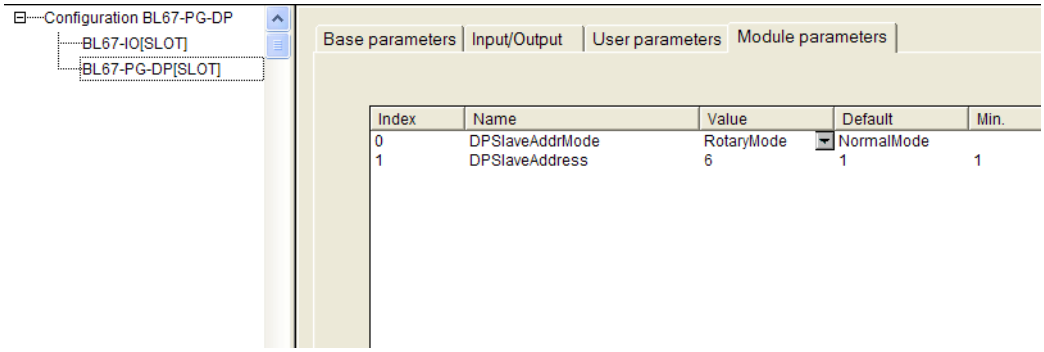


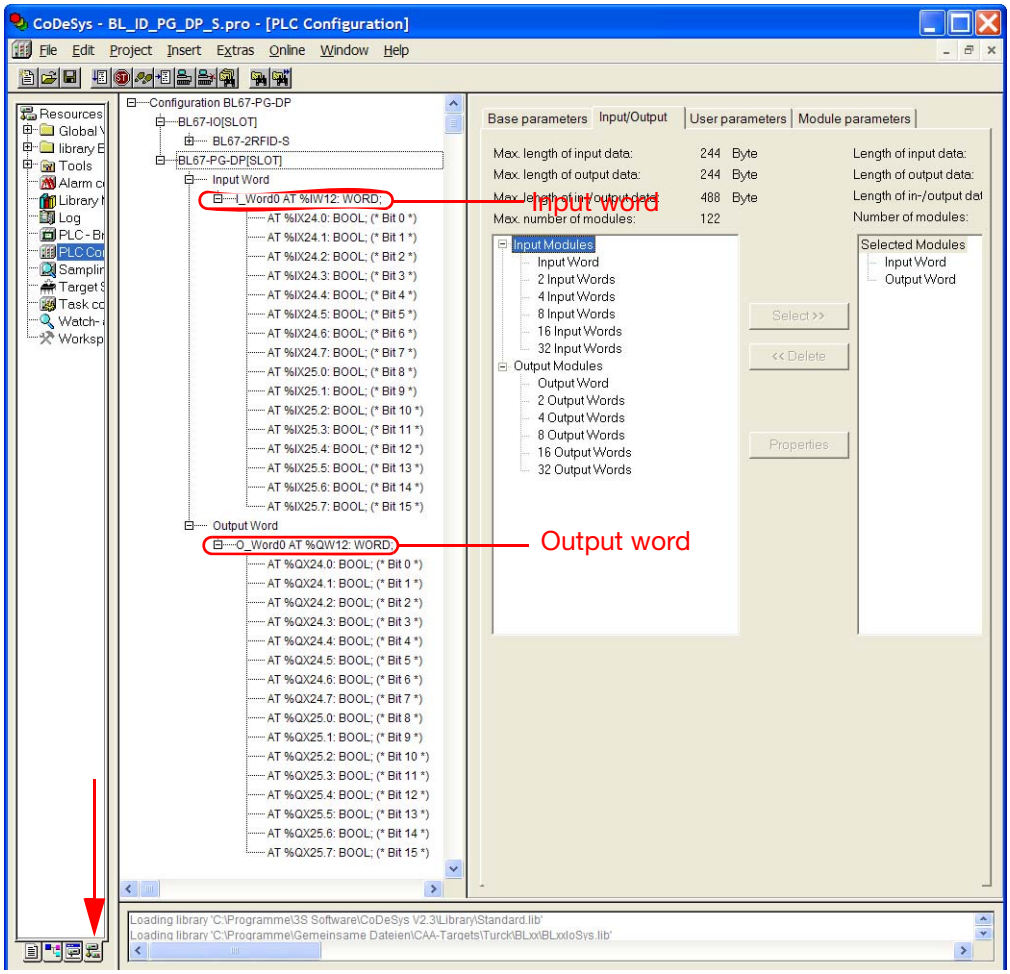
Figure 85: "RotaryMode" Ethernet-address and PROFIBUS-DP-address together via rotary switch

Open the tab Input/Output.

Select an "Input Word" and an "Output Word". In the middle window now assign the variable names for the “Input Word” and the “Output Word”.

- Double-click on "AT %IW2:WORD" to open the input field and enter "I_Word0".
- Double-click on "AT %QW2:WORD" to open the input field and enter "O_Word0”.

Figure 86: PROFIBUS-DP inputs/outputs

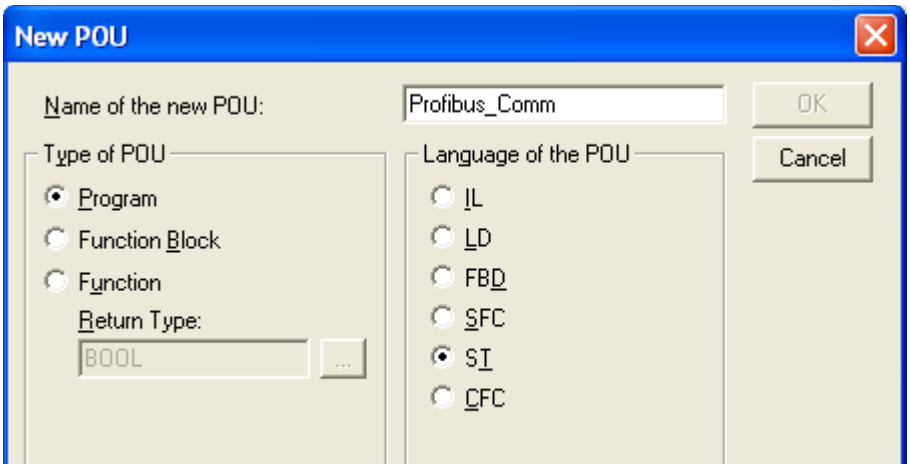


Program expansion

Open the tab POUs, select the main PLC_PRG (PRG) and expand it as described below:

Right-click on component "Add Object..." and make a selection. Accept the entries in the following diagram:

Figure 87: Entries for a new component



Open the newly created component Profibus_Comm. This new component is to execute the following tasks:

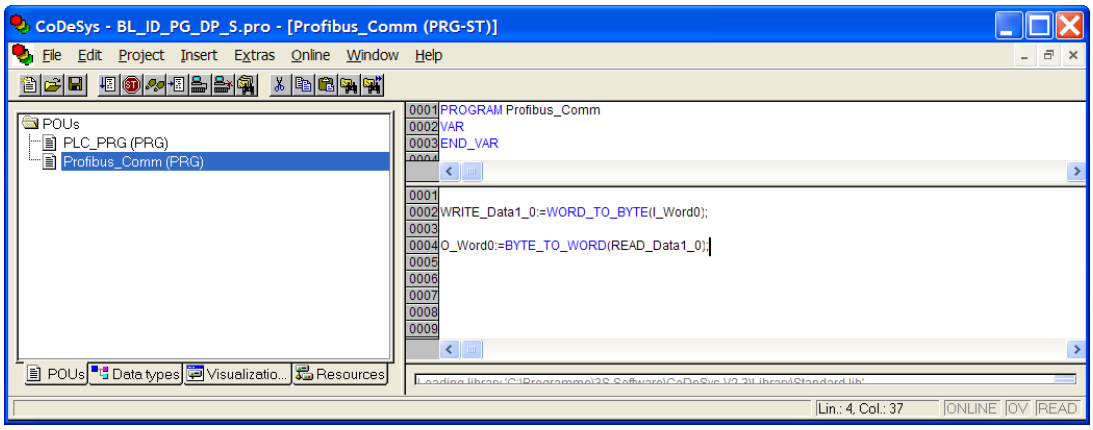
- The first byte of the input word "I_Word0" is to be transferred to the byte "WRITE_Data1_0" of the process output data. The description "WRITE_Data1_0" was selected here for Byte 4 of the process output data ("Process output data" page 3-46).
- The byte "READ_Data1_0" of the process input data is to be transferred to the first byte of the Output Word "O_Word0". The name "READ_Data1_0" was selected here for Byte 4 of the process input data ("Process input data" page 3-43).

The variables "READ_Data1_0" and "WRITE_Data1_0" are "byte" type variables and belong to the global variables.

The functions "WORD_TO_BYTE" and "BYTE_TO_WORD" adopt the appropriate format.

Accept the instructions in the following diagram:

Figure 88: Instruction text for Profibus_Comm (PRG)



Now select "Project > Build". In case of a typing error, you will receive an error message in the subjacent message field.

In the open master program PLC_PRG (PRG), the new component "Profibus_Comm" may be inserted into the master program via "Insert > Function Block".

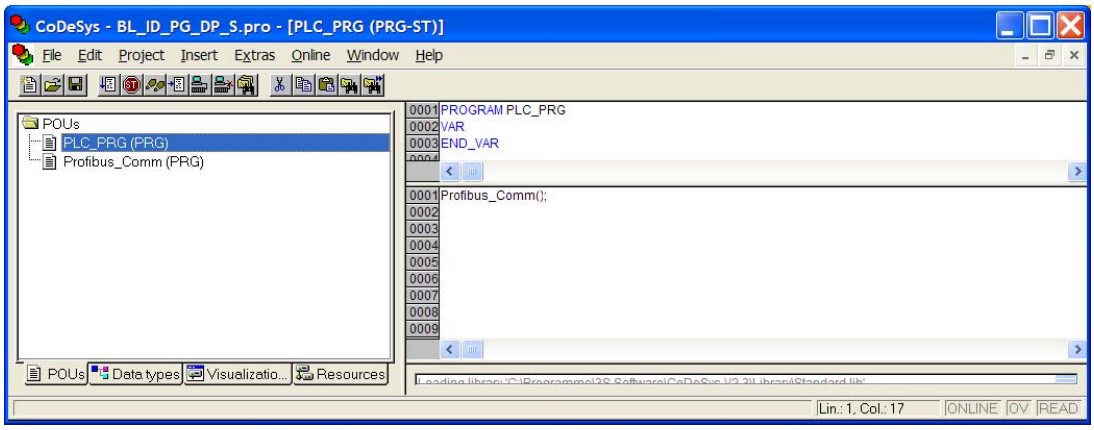


Figure 89: Inserting the new component Profibus_Comm into the master program PLC_PRG

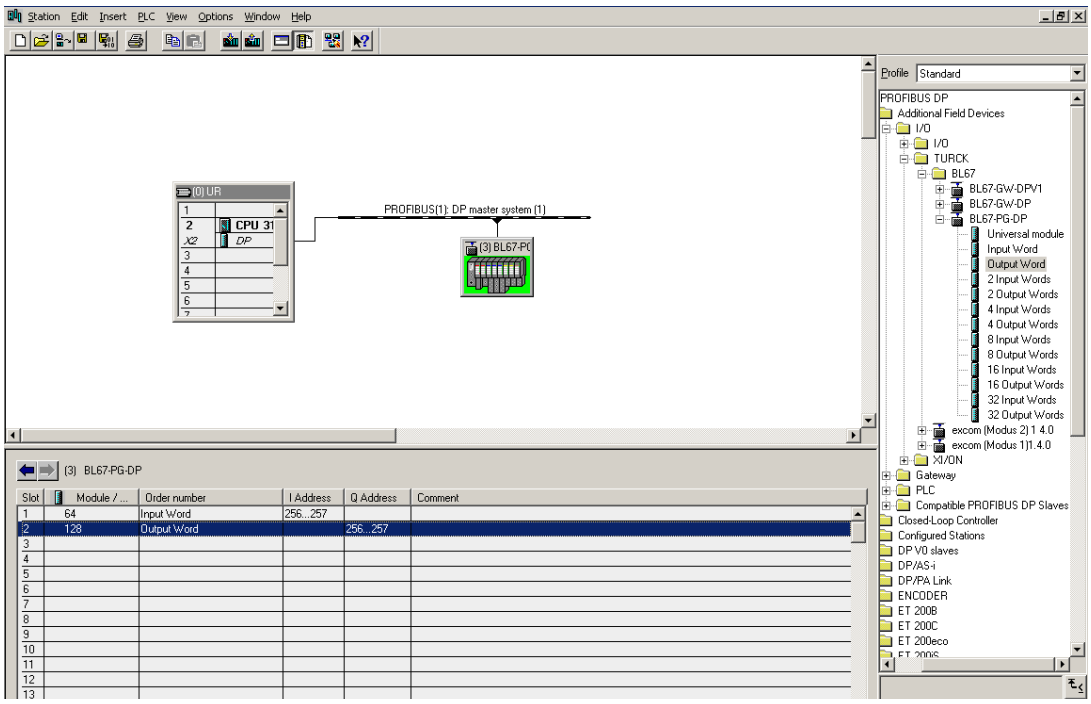
In the Online mode (Online > Login or ) download the expanded program into the programmable gateway and start it ()!

Configuration of the PROFIBUS-DP-interface in the control software

The configuration of the BL67 station is implemented here in the "SIMATIC Basic Software Step 7" as an example. Update the GSD file if necessary (before or after the start of the software). Open the array "Hardware" and complete the configuration of the PROFIBUS-DP-system. Please refer to "User Manual for PROFIBUS-DP" (D300570) for the procedural method.

In the file directory tree of the device catalog and on the right side of the screen select for your gateway "BL67-PG-DP" an "Input Word" and an "Output Word". The I/O-addresses are suggested by the SIMATIC Manager.

Figure 90: Selection "Input Word" and "Output Word"



Data transfer via a variable table

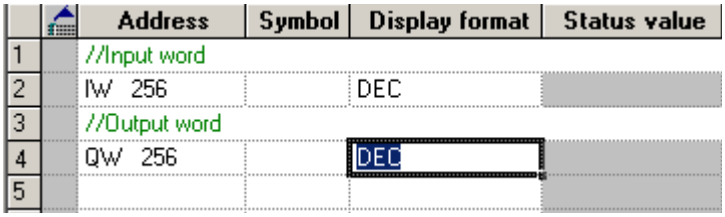
Exit the array "Hardware" and go to the project directory of the "SIMATIC Manager". Expand the project tree in the left window and double-click on the bottom item "Components" to open it.

Right-click in the right window space and then click on "Insert New Object > Variable Table" to open the window for configuring the features of a new variable table. Here enter "Var_watch" as a "symbolic name" and acknowledge with OK.

First enter the variable name "Input Word" and then in the subjacent line, enter the address and the display format of the variable. The address is entered by right-clicking the line below the name, and then by clicking on "Insert Range...". Select the address like in Figure 90.

Load the modified program into the CPU (PLC > Download)!

Figure 91: Accessing the variables "Input Word" and "Output Word"



Activate the online connection to your control (PLC > Connect to > Direct CPU) to read the status values and load the control variables. The mode "RUN" is displayed highlighted in green in the right bottom of the window.

Note

Please pay attention to the LED display on the gateway housing!
Communication via the newly created interface is only possible when the expanded program runs on the gateway (RUN/STOP: green) and when the PROFIBUS-DP-communication is not being interfered with (DP: green). Please refer to the user manual "BL67-programmable Gateway BL67-PG-DP" (D301047) for the complete description of the LED diagnostics.

EtherNet/IP master

The following description is based on the prerequisite that an initial startup of the *BL ident*® system was completed with the programming software CoDeSys from the company "3S". The previous Kapitel 3 provides instructions for this purpose.

Installation of the interface with BLxx-2RFID-A-modules

The following paragraphs describe the process for transferring 1 byte Tag-data:

- from the Receive-buffer of the PIB function component to the EtherNet/IP master CompactLogix™ (Allen-Bradley, CPU L35E).
- from the EtherNet/IP-master CompactLogix™ (Allen-Bradley, CPU L35E) to the Transmit-buffer of the PIB function component.

Variable names for the EtherNet/IP-registers

After startup of the *BL ident*®-system, open the tab Resources with the programming software CoDeSys and select the array "PLC Configuration".

Note

Please ensure that the online connection to your control is **not** active. The mode "ONLINE" at the right bottom of the window is not highlighted.

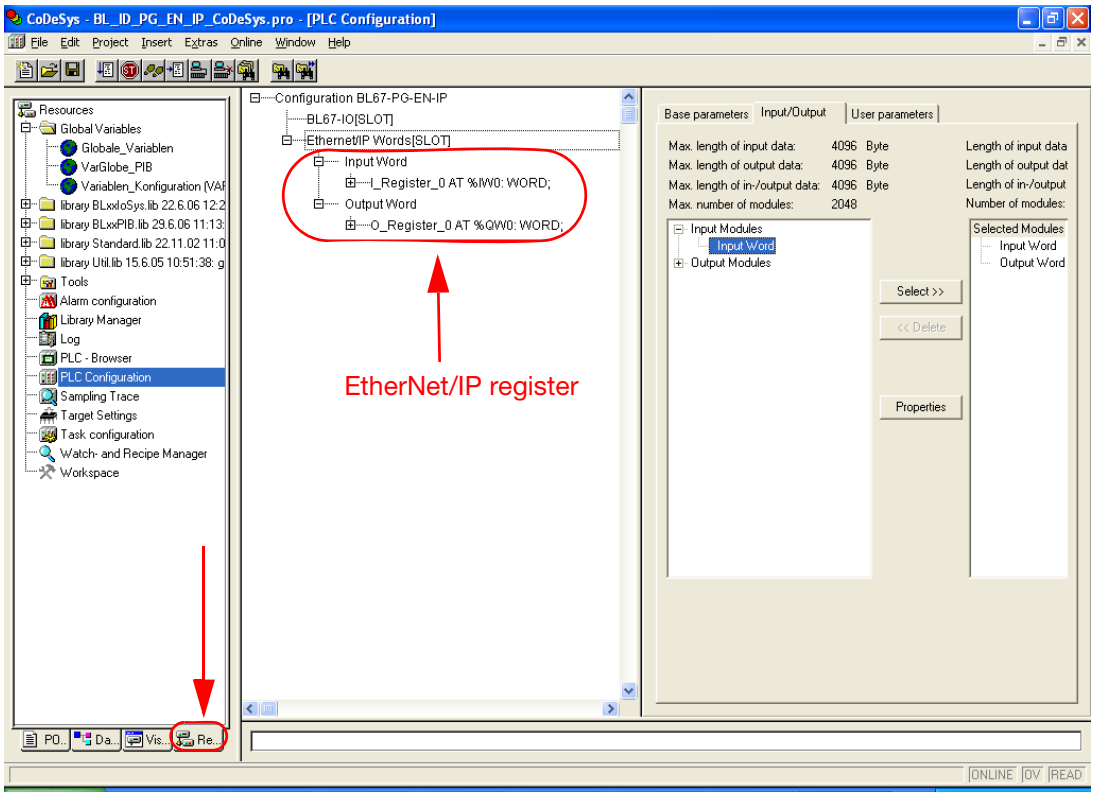
In the middle of the window of the control configuration double-click on "EtherNet/IP-register [SLOT]" to open the tab for configuration of the EtherNet/IP-register. Open the tab Input/ Output.

Under "Input Modules" select an "Input Register", and under "Output Modules" an "Output Register".

Now assign the variable names to both selected registers in the middle window:

- Double-click on "AT %IW2:WORD" to open the input field and enter "I_Register_0".
- Double-click on "AT %QW2:WORD" to open the input field and enter "O_Register_0".

Figure 92: EtherNet/IP register

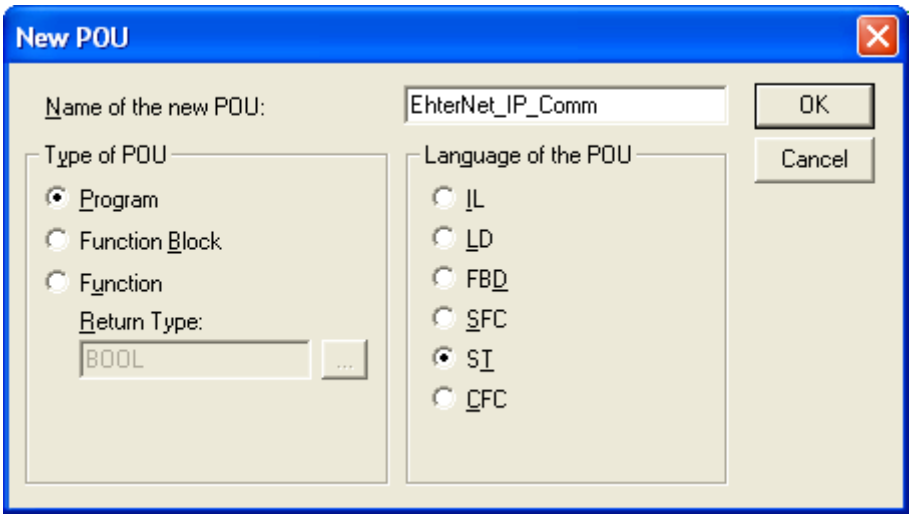


Program expansion

Open the tab POUs, select the main PLC_PRG (PRG) and expand it as described below:

Right-click on component "Add Object..." and make a selection. Accept the entries in the following diagram:

Figure 93: Entries for a new component



Open the newly created component "Ethernet_IP_Comm". This new component is to execute the following tasks:

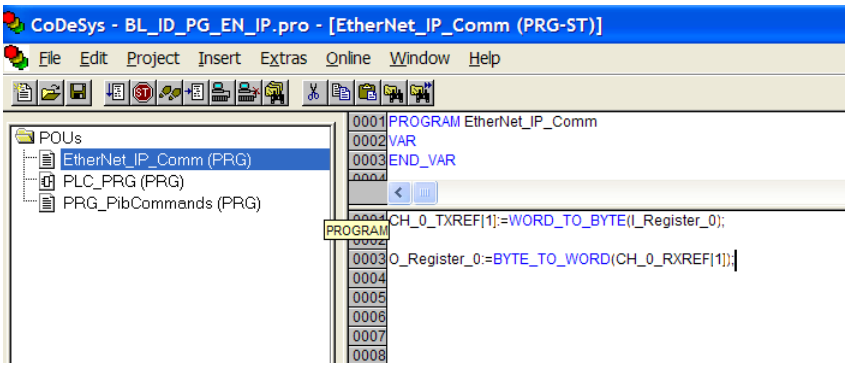
- Data of the register "I_Register_0" is to be transferred to the Send-buffer CH_0_TXREF.
- Data of the Receive-buffer CH_0_RXREF is to be transferred to the register O_Register_0.

Send-buffer CH_0_TXREF and Received buffer CH_0_RXREF are "byte" type arrays and belong to the global variables of the PIB-component ("The function block PIB_001KB" page 3-9).

Modbus-TCP-registers are "Word" type registers. The functions "WORD_TO_BYTE" and "BYTE_TO_WORD" adopt the appropriate format.

Accept the instructions in the following diagram:

Figure 94: Instruction text



Now select "Project > Build". In case of a typing error, you will receive an error message in the subjacent message field.

In the opened master program "PLC_PRG (PRG)", you will receive a new component via insert > box (alternatively with drag and drop via). Add it next to the component "PIB_001KB". The component will receive a sequential number and by default, "AND" is assigned to it.

Check "AND". The input mask for the component is opened via the shortcut "F2". Select "User defined Programs" from the list in the left space of the window. Check the program "Ethernet_IP_Comm" defined above and acknowledge with OK.

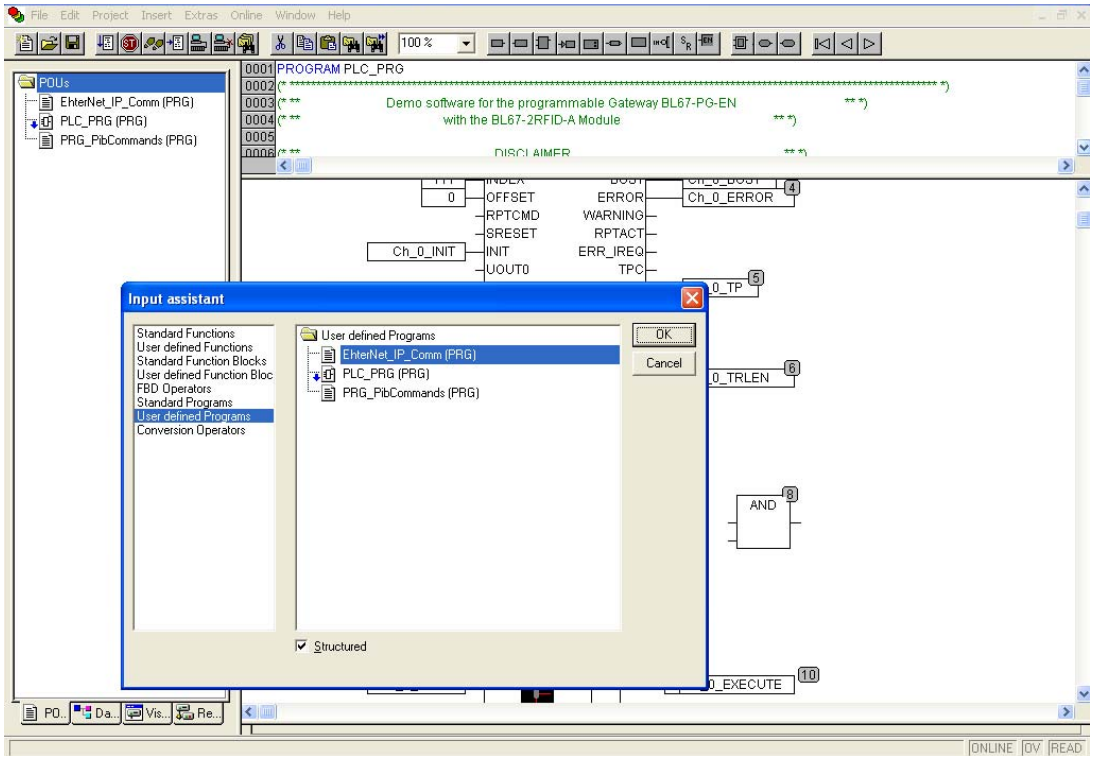


Figure 95: Inserting the new component "Ethernet_IP_Comm" into the master program "PLC_PRG"

In the Online mode (Online > Login or) download the expanded program into the programmable gateway and start it ( )!

Configuration of the EtherNet/IP-interface in the control software

Open the software RSLogix5000 and create a new project if necessary.

If you are not familiar with the software, read manual “BL67 - User manual for EtherNet/IP“ (D300888). The manual explains how to establish communication to the EtherNet/IP-network and the configuration of the network. The configuration of the controller and the configuration of the BL67 station are described step-by-step. The software contains an example of the structure and display of the configuration, the process input and process output data of a BL67 station.

For this example use the configuration setting of the EtherNet/IP-gateway from the following diagram:

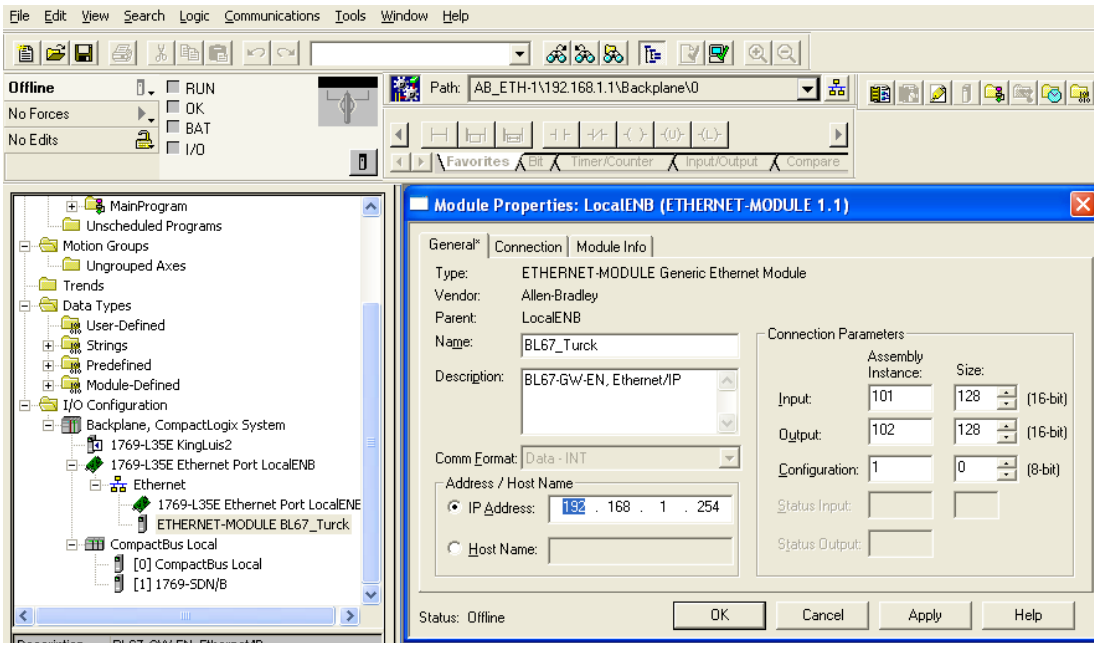


Figure 96: Configuration of the “BL67-PG-EN-IP” gateway

Data transfer via the new interface

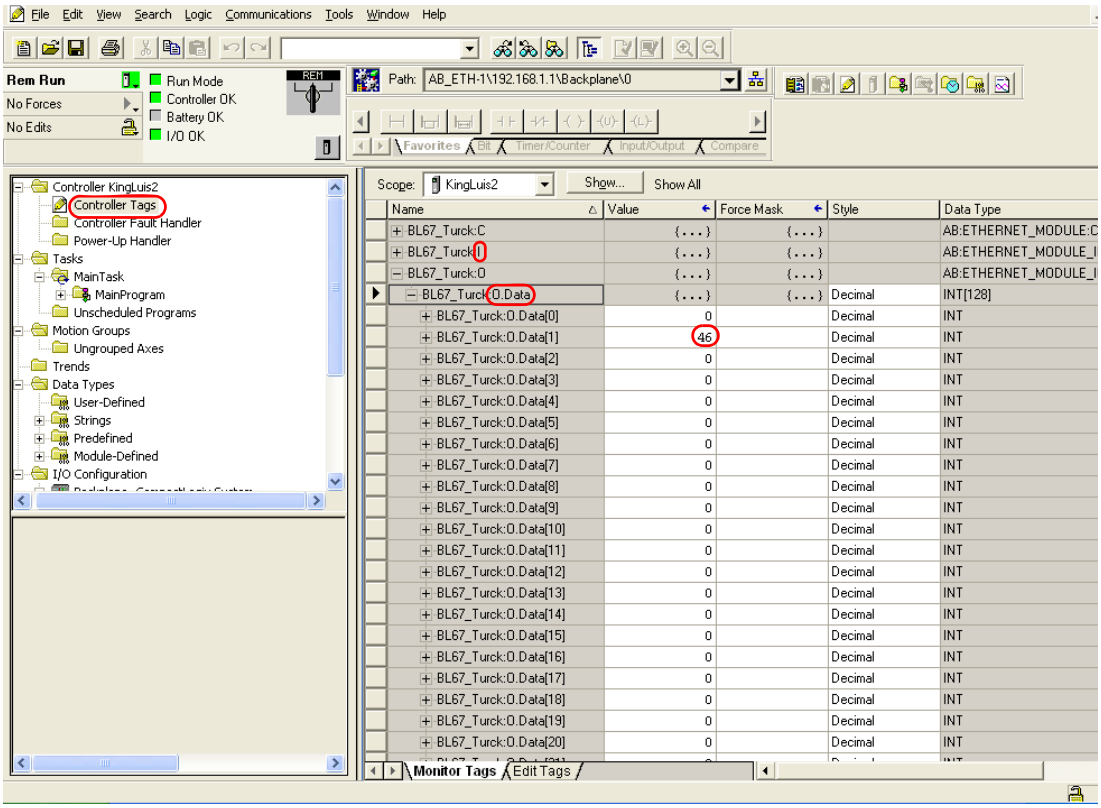
The configuration-, input- and output data are displayed in the software RSLogix5000 with so-called "Controller-Tags".

In this example, the first byte of the data with the identification **I.Data** is sent from the Receive-buffer 1 of the component PIB_001KB ("Display of the CoDeSys" page 4-32) via EtherNet/IP to the control.

In this example, the first byte of the data with the identification **O.Data** is sent from the control via EtherNet/IP to the Transmit-Buffer 1 of the function component PIB_001KB ("Display of the CoDeSys" page 4-32).

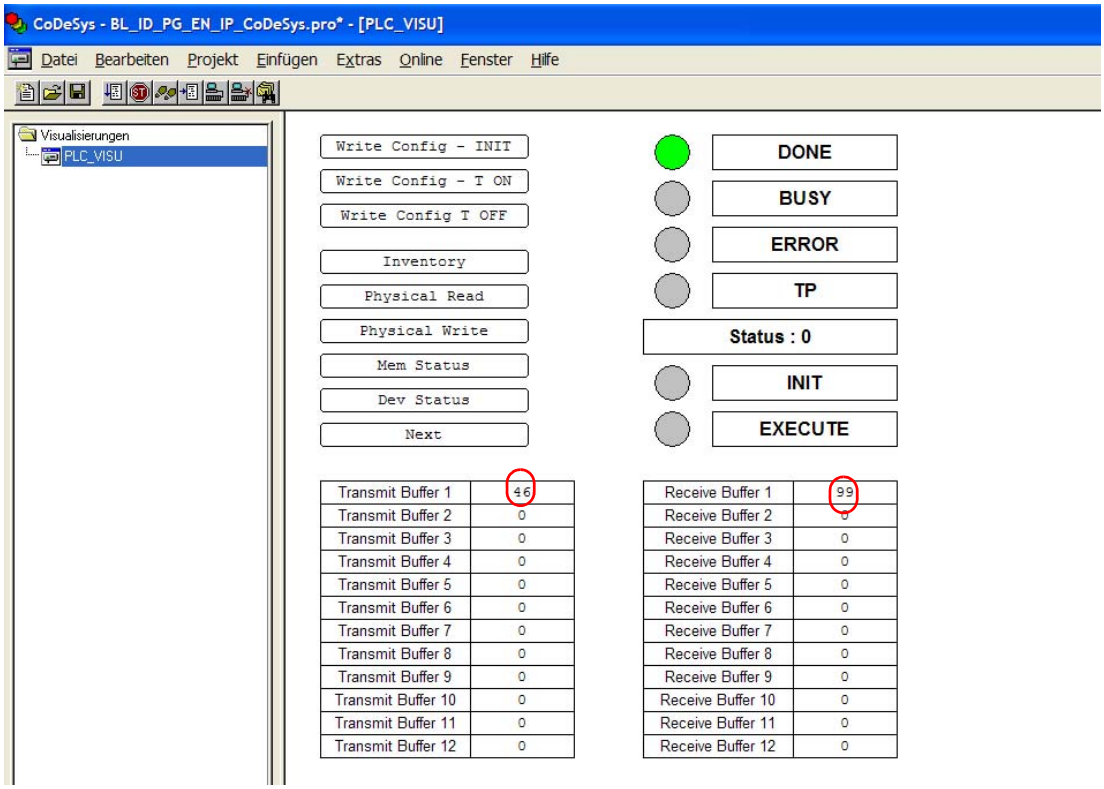
Enter a value between 0 and 255 (here 46) in O.Data[1]. O.Data [0] is reserved for the “Control Word” of the gateway.

Figure 97: Controller Tags



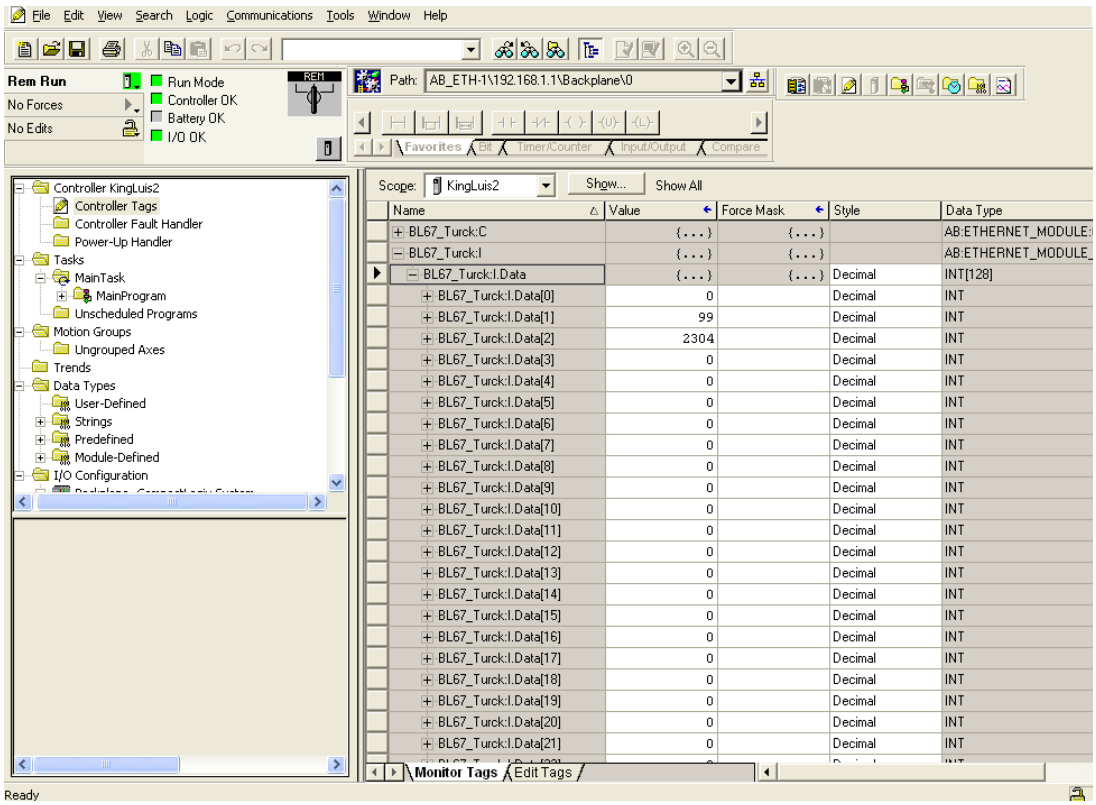
The data from O.Data[1] is transmitted to the Transmit-buffer 1 of the function component PIB_001KB via the newly created interface:

Figure 98: Display of the CoDeSys



In this example, the Receive-buffer 1 contains the value “99”. This value is transferred to I.Data[1] via the newly created interface. I.Data [0] is reserved for the “Status Word” of the gateway.

Figure 99: Input data of the control



Setup of the interface with BLxx-2RFID-S-modules

The following paragraphs describe the process for transferring 1 byte Tag-data:

- of the variables "READ_Data1_0" of the process input data to the EtherNet/IP-master CompactLogix™ (Allen-Bradley, CPU L35E).
- from the EtherNet/IP-master CompactLogix™ (Allen-Bradley, CPU L35E) to the variable WRITE_Data1_0. of the process output data.

Variable names for the EtherNet/IP-registers

After startup of the *BL ident*®-system, open the tab Resources with the programming software CoDeSys and select the array "PLC Configuration".

Note

Please ensure that the online connection to your control is **not** active. The mode "ONLINE" at the right bottom of the window is not highlighted.

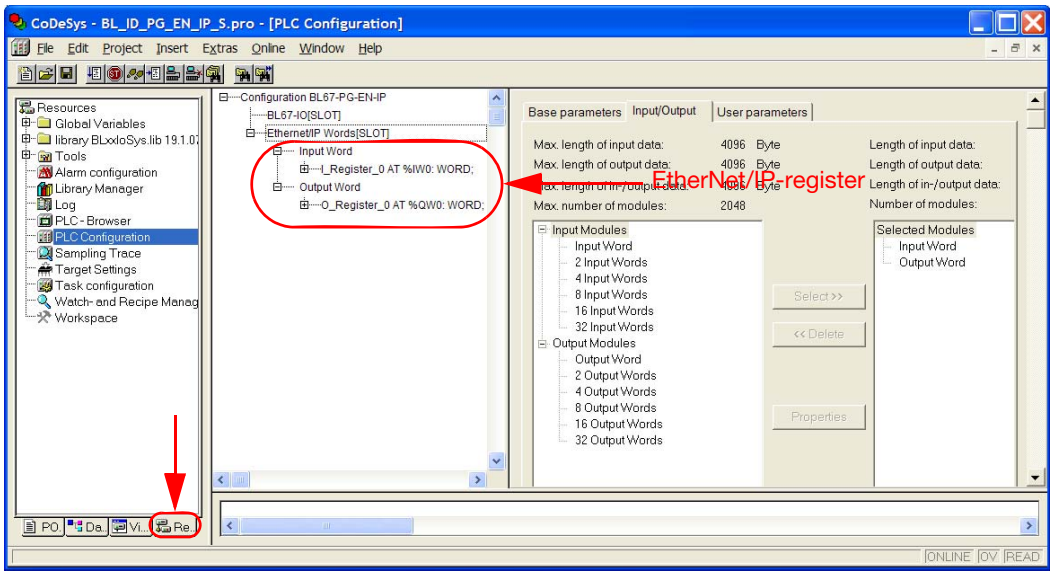
In the middle of the window of the control configuration double-click on "EtherNet/IP Words [SLOT]" to open the tab for configuration of the EtherNet/IP-register. Open the tab Input/ Output.

Under "Input Modules" select an "Input Word", and under "Output Modules" an "Output Word".

Now assign the variable names to both selected registers in the middle window:

- Double-click on "AT %IW2:WORD" to open the input field and enter "I_Register_0".
- Double-click on "AT %QW2:WORD" to open the input field and enter "O_Register_0".

Figure 100: EtherNet/IP register

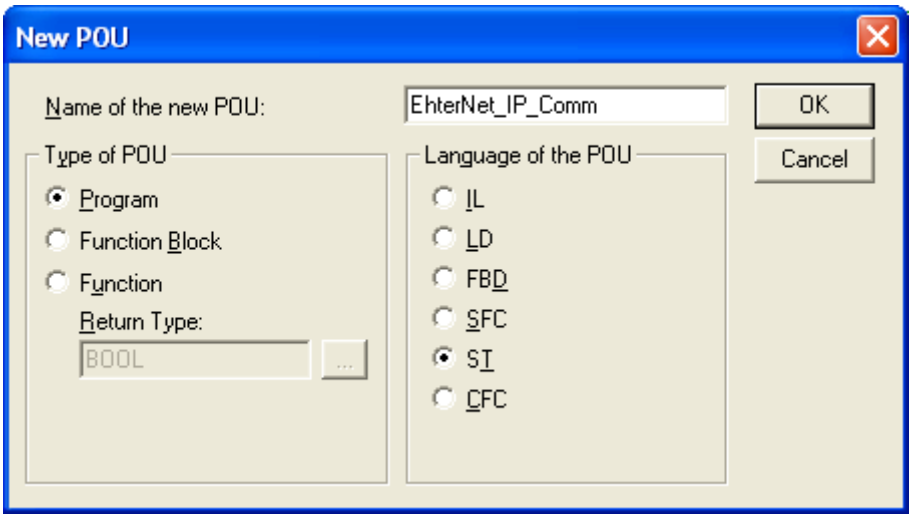


Program expansion

Open the tab POUs, select the main PLC_PRG (PRG) and expand it as described below:

Right-click on component "Add Object..." and make a selection. Accept the entries in the following diagram:

Figure 101: Entries for a new component



Open the newly created Ethernet_IP_Comm POU. This new component is to execute the following tasks:

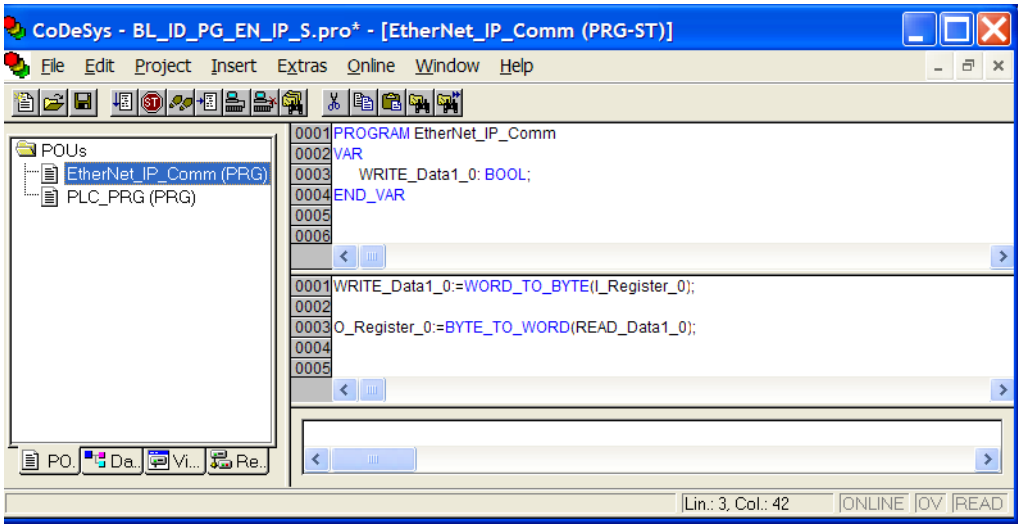
- The first byte of the input register "I_Register_0" is to be transferred to the byte "WRITE_Data1_0" of the process output data. The description "WRITE_Data1_0" was selected here for Byte 4 of the process output data ("Process output data" page 3-46).
- The byte "READ_Data1_0" of the process input data is to be transferred to the first byte of the output register O_Register_0. The description "READ_Data1_0" was selected here for Byte 4 of the process input data ("Process input data" page 3-43).

The variables "READ_Data1_0" and "WRITE_Data1_0" are "byte" type variables and belong to the global variables.

The functions "WORD_TO_BYTE" and "BYTE_TO_WORD" adopt the appropriate format.

Accept the instructions in the following diagram:

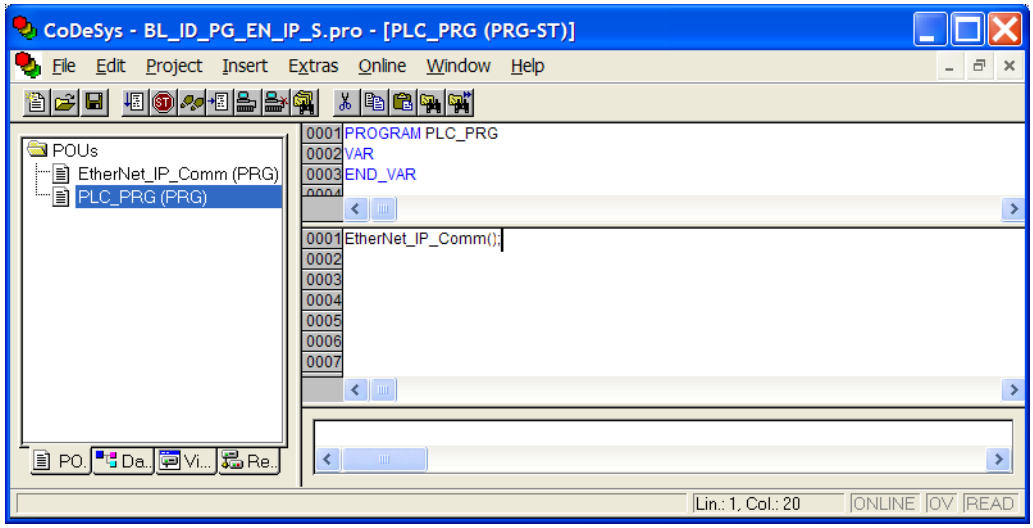
Figure 102: Instruction text



Now select "Project > Build". In case of a typing error, you will receive an error message in the subjacent message field.

In the open master program PLC_PRG (PRG), the new component may be inserted into the master program via "Insert > Function Block". The new component is in the array "User defined Programs".

Figure 103: Inserting the new component EtherNet_IP_ Comm into the master program PLC_PRG



In the Online mode (Online > Login or) download the expanded program into the programmable gateway and start it ( )!

Configuration of the EtherNet/IP-interface in the control software

Open the software RSLogix5000 and create a new project if necessary.

If you are not familiar with the software, read manual “BL67 - User manual for EtherNet/IP“ (D300888). The manual explains how to establish communication to the EtherNet/IP-network and the configuration of the network. The configuration of the controller and the configuration of the BL67 station are described step-by-step. The software contains an example of the structure and display of the configuration, the process input and process output data of a BL67 station.

For this example use the configuration setting of the EtherNet/IP-gateway from the following diagram:

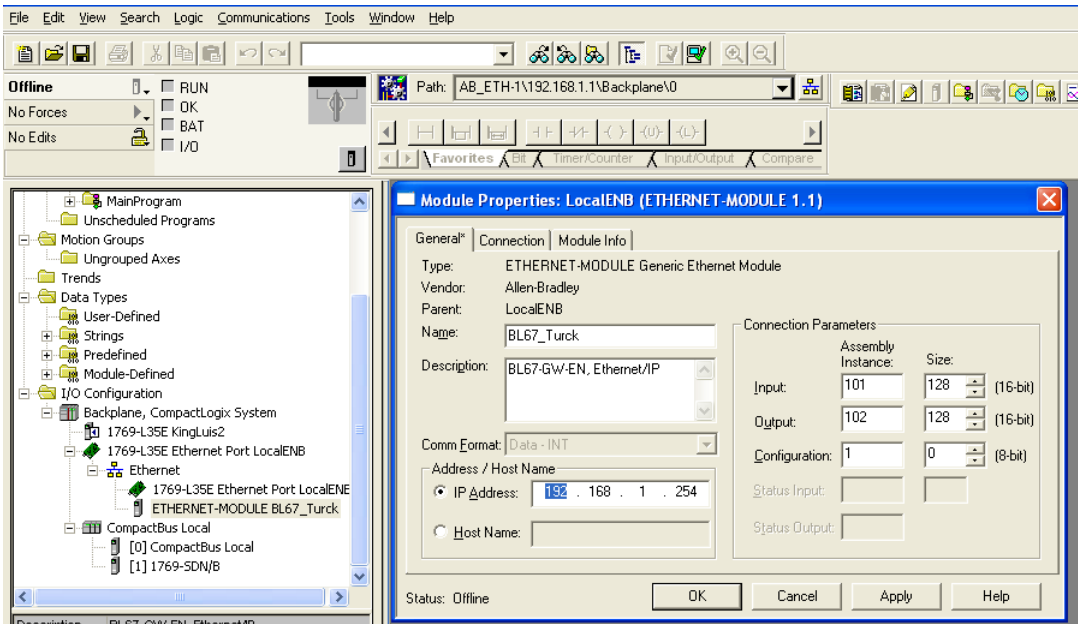


Figure 104: Configuration of the “BL67-PG-EN-IP” gateway

Data transfer via the new interface

The configuration-, input- and output data are displayed in the software RSLogix5000 with so-called "Controller-Tags".

In this example, the first byte of the data with the identification **I.Data** (I.Data [1]) is transferred from the process input data ("READ_Data1_0") via EtherNet/IP.

In this example, the first byte of the data with the identification **O.Data** (O.Data [1]) is transferred to the process output data (WRITE-Data1_0) via EtherNet/IP.

Enter a value between 0 and 255 (here 46) in O.Data[1]. O.Data [0] is reserved for the “Control Word” of the gateway.

Figure 105: Controller Tags

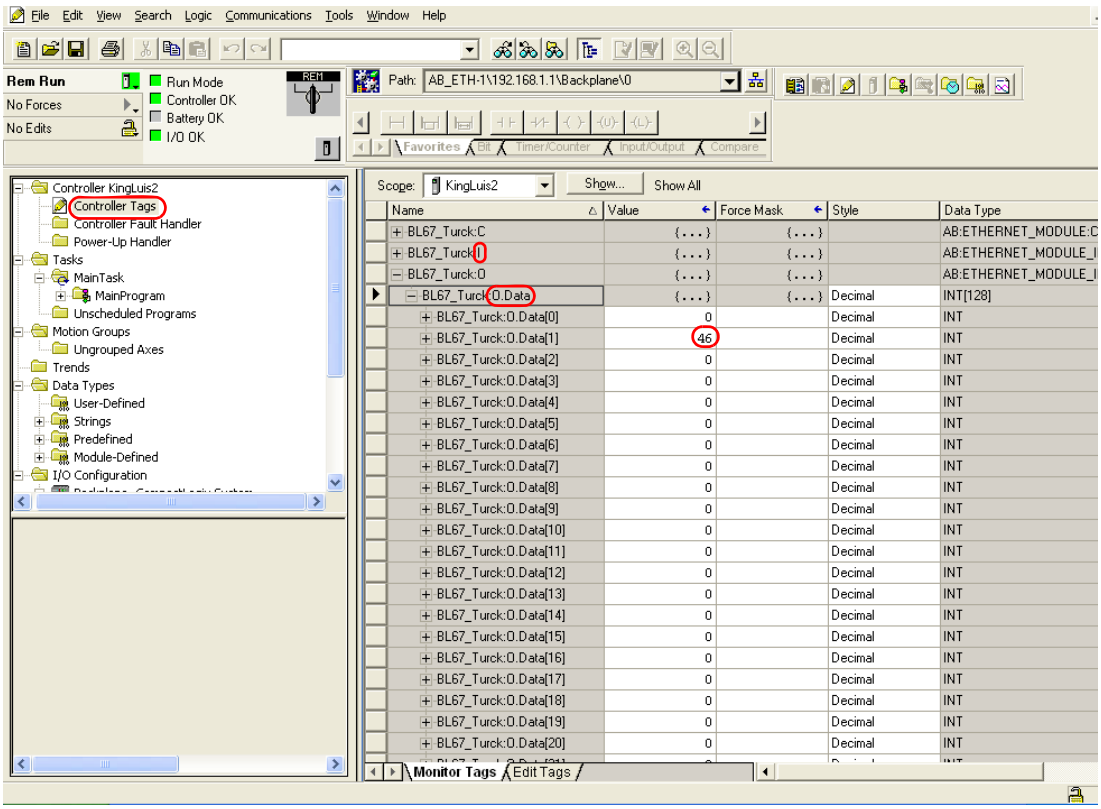
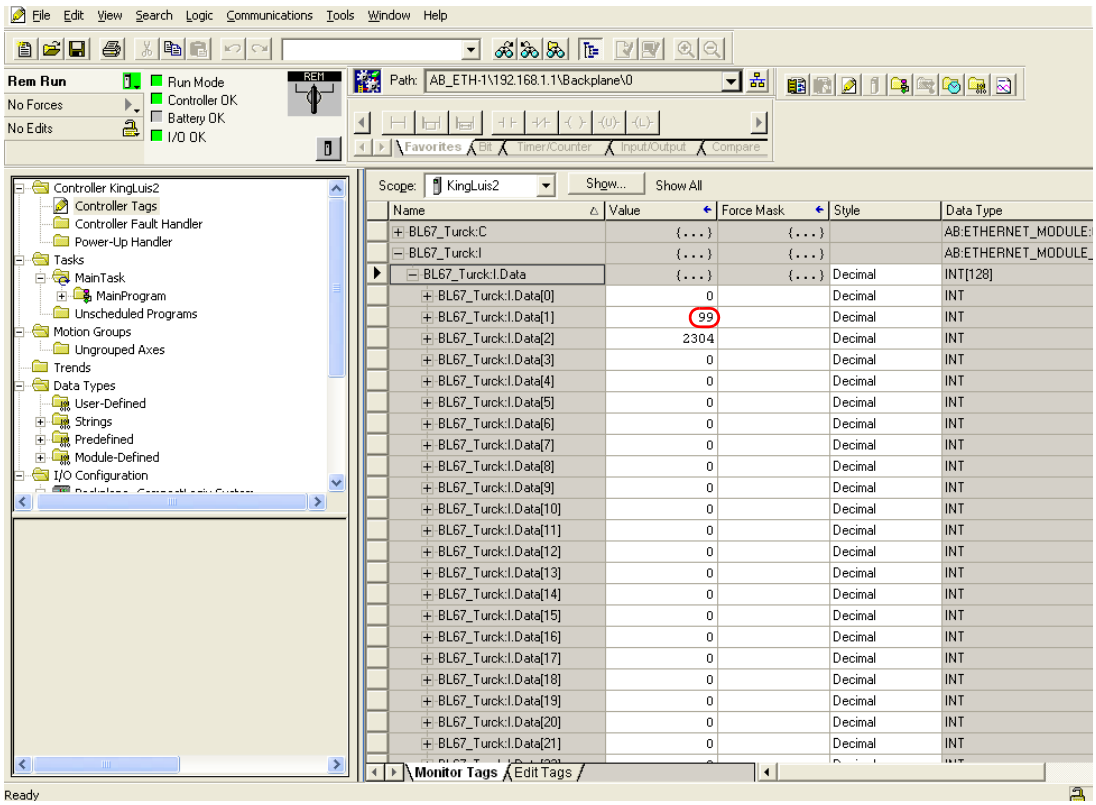


Figure 106: Input data of the control



5 Extract from the specification

1 General

TURCK publishes this excerpt of the PROFIBUS Specification „Profile for Identification Systems, Proxy Ident Function Block“ (Version 1.02, December 2005) by courtesy of the PNO (PROFIBUS Nutzer Organisation).

The PIB for CoDeSys is based on this specification.

Please also note the "Definitions in the command and diagnostics level" page 2-25.

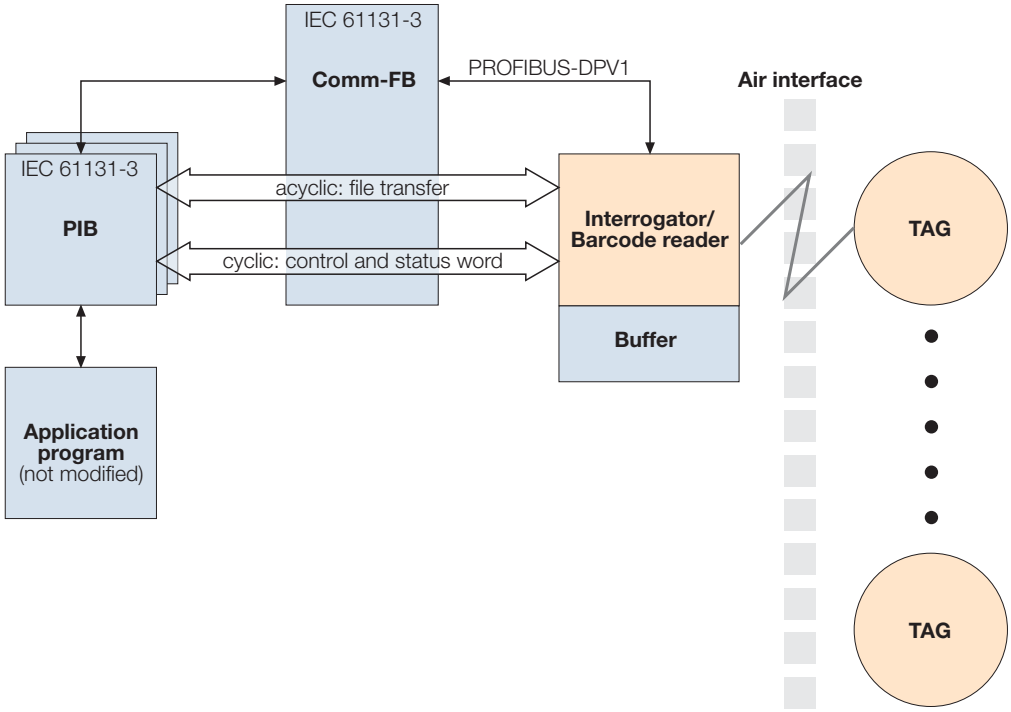
1.6 Function demands

In this section the function demands of the application of RFID and Barcode reader systems is defined. These demands define the limitations or limits which have to be observed with the development of the PIB and the functions which have to be realised within the field device. The RFID and barcode reader systems demands are described in parallel because of the different functions.

1.6.1 General demands

The basic concept involves the adaptation of existing RFID and barcode reader systems to Profibus technology, so that it can be integrated into existing systems, and to make sure that use in new systems can be simplified (see following illustration).

Figure 107:
Basic concept



As the existing proprietary solutions have to be mastered, there are certain limitations which have to be considered in addition to the Profibus conformity.

The following demands must be fulfilled:

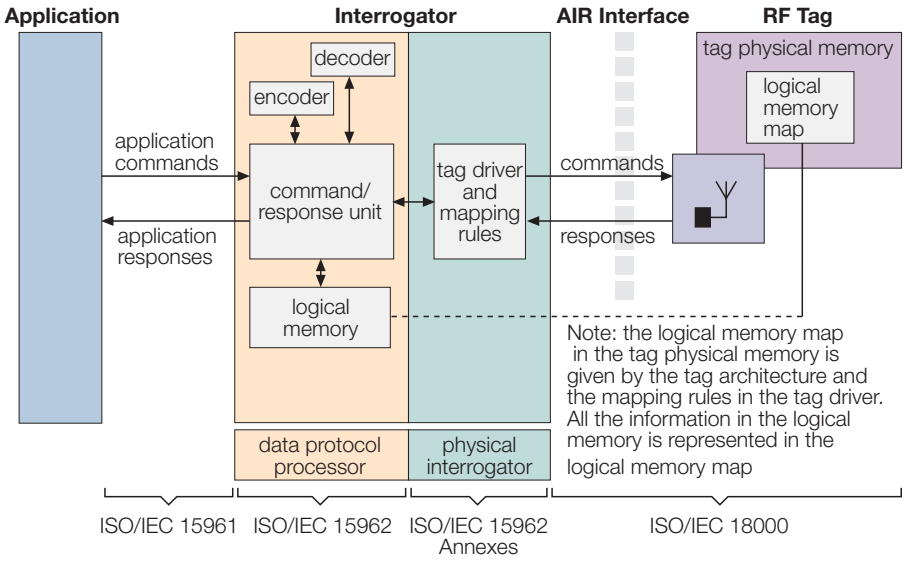
- Existing Profibus systems may only be minimally affected by the integration of RFID and barcode reader systems
- The control is implemented cyclically
- The data transfer is acyclic
- Application programs should be independent of the integration of the PIB
- Fragmentation and defragmentation of data packages should occur within the PIB

1.6.2 Demands with the use of RFID systems

Standardization activities for RFID systems are currently underway. The objectives here include the definition of air interfaces (ISO/IEC 18000), the file format as well as handling of files (ISO/IEC 15962). See below.

This profile specification explicitly deals with data transfer via industrial networks based on the Profibus as well as the integration in PLC systems.

Figure 108: Relevant standardisation activities

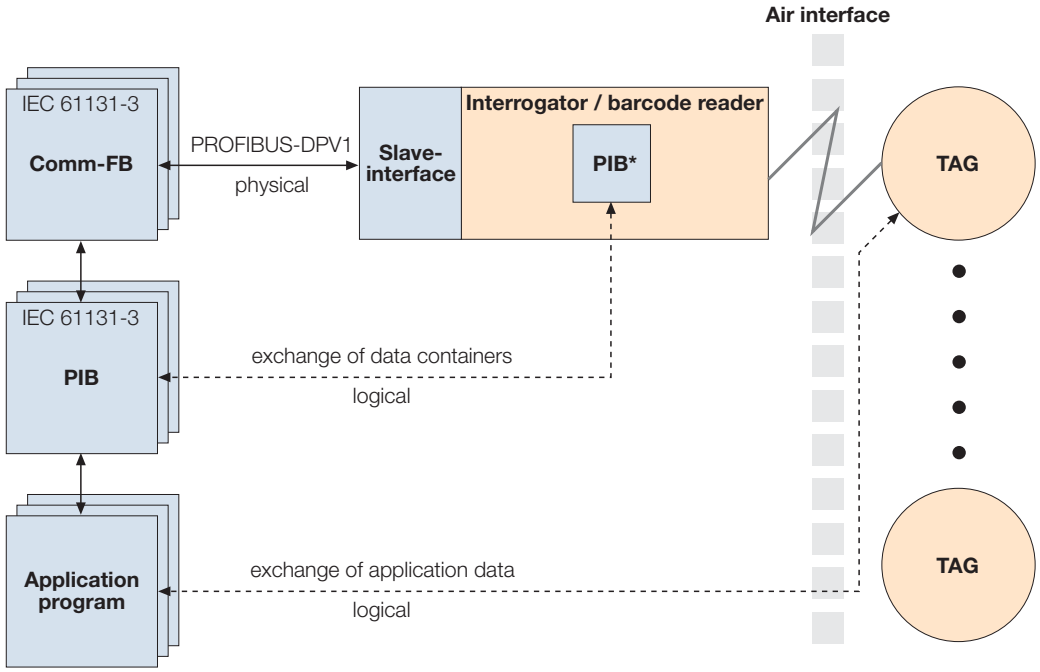


The topics concerning this specification do not need to be dealt with here as the process is ongoing. It will be possible to refer to the respective documents at a later stage when the standardisation to IEC is completed. For this reason the following points are not examined in this document:

- Air interface
- File format,
- File handler,
- Coding of application data.

At the moment the respective data is normally considered as a data package, which is interpreted both by the application in the Ident device as well as by the PLC application, which uses the PIB (see illustration below).

Figure: 109
Data transfer



2 Modelling of the Proxy Ident Block (PIB)

2.1 Fundamentals of modelling

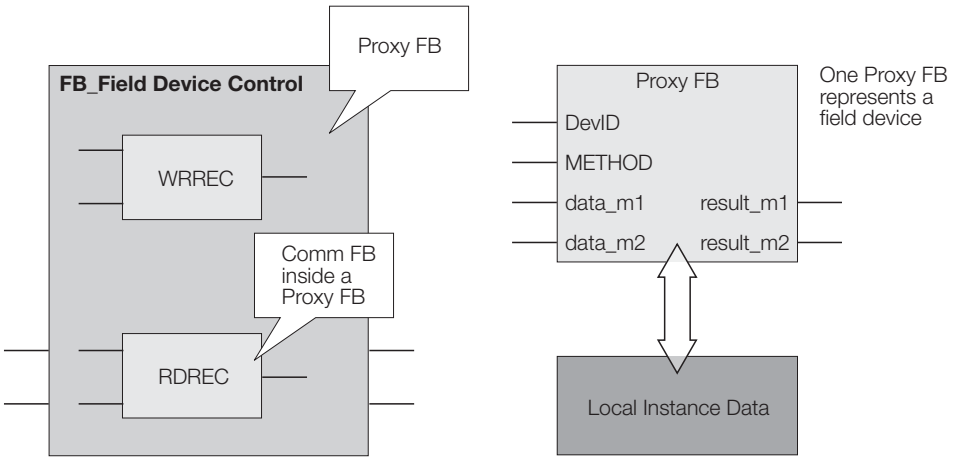
The modelling of the Proxy Ident Block (PIB) must be performed according to the following principles:

- It must correspond with the available PLC systems, e.g. by using the existing addressing concept
- It must be efficient and without overheads, i.e. the model must be performance oriented
- It must enable simple porting of the application program between different PLC systems
- It should directly use the existing Comm-FBs
- Dependencies on the hardware configuration should be avoided by good programming, i.e. such as the addressing of the application program.

2.2 General PIB model

The PIB is modelled as a Proxy-FB which represents a complete Ident device. Here the fundamentals of Proxy-FB modelling in accordance with [4] are observed.

Figure: 110
Use of Comm-FB and Proxy-FB for PIB modelling



2.3 Representation

The interface for the POU type is represented by text and graphics compliant to IEC 61131-3. The behaviour of the POU is represented as a graphic state diagram with tables for the transitions and actions.

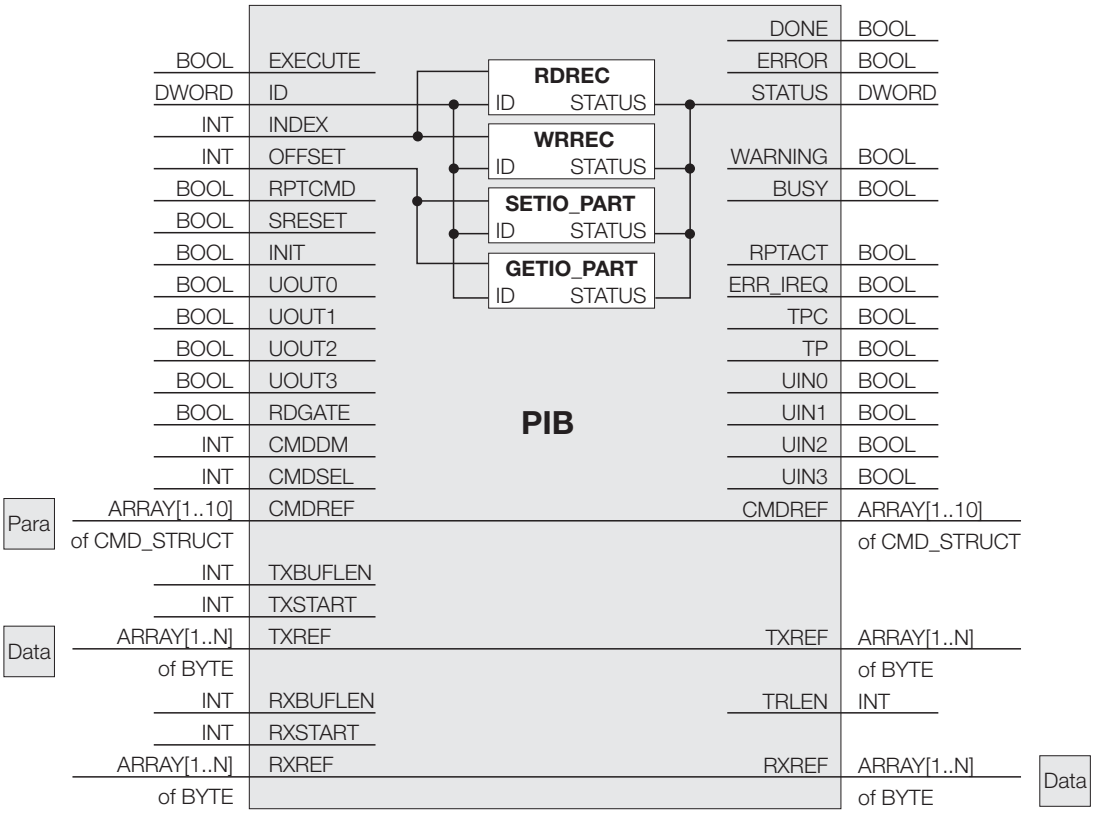
3 Definition of the Proxy Ident Block (PIB)

This section defines the specification of the Proxy Ident Block according to the guidelines set out in [4].

NOTE: If several PIB instances are operated simultaneously by an application program, it is necessary to ensure that the individual instances do not inhibit each other. Block definition

The following illustration is a graphic representation of the PIB interface:

Figure 111: Graphic representation of the PIB interface



3.1.1 Parameters

Table 53:

PIB parameter description

Name	Description
EXECUTE	By setting the input parameters from the types BOOL to TRUE the user (application program) can start an FB instance. Before the FB can be put into operation the command and the corresponding parameters must be written into memory, which is assigned to the CMDREF parameter. The CMDSEL parameter must be set correctly for this purpose. This parameter is set using a positive edge.
ID*	The value of this input parameter is used as a unique ID for addressing of an individual device or a slot within a device. A detailed description of this is contained in document [4]. This parameter addresses an individual Ident device in conjunction with the "INDEX" parameter.
INDEX*	The value of this input parameter is used for identifying an individual Ident channel within a slot on a device. The use of the parameter corresponds with the definition of the address parameter "Index" according to [1] and [2].
OFFSET*	The value of this input parameter is used for identifying the I/O data assigned to the channel, which is cyclically transferred as a subset of the data that is assigned to a slot (module).
RPTCMD*	If this parameter is set to "1", the Ident device will repeat the currently executed command or the subsequently completed command. The parameter is mirrored on the "Repeat_Command" bit in the cyclic control word (see section 4.2.1)
SRESET*	If this input parameter = "1", the command currently being executed in the Ident device is cancelled. The parameter is mirrored on the "Soft_Reset" in the cyclic control word (see section 4.2.1). This parameter is activated using a positive edge.
INIT*	With a change from "0" to "1" this input parameter forces the Ident device to start operation with the exception of the communication interface. Processes which are executed locally by the Ident device are manufacturer-specific. The parameter is mirrored on the **Init** bit in the cyclic control word (see section 4.2.1). After the sequence "Init_Active=0 -> Init_Active=1 Init_Active=0" (cyclic Status word) has been completed, the PIB must send a Write-Config command to the Ident device. This parameter is set using a positive edge.
UOUT0*	This parameter of type BOOL represents the user-specific bit 0 which is to be transmitted within the cyclic control word (see section 4.2.1). The parameter is mirrored on bit 0 of the cyclic control word.
UOUT1*	This parameter of type BOOL represents the user-specific bit 1 which is to be transmitted within the cyclic control word (see section 4.2.1). The parameter is mirrored on bit 1 of the cyclic control word.
UOUT2*	This parameter of type BOOL represents the user-specific bit 2 which is to be transmitted within the cyclic control word (see section 4.2.1). The parameter is mirrored on bit 2 of the cyclic control word.

Table 53: (cont.) PIB parameter description

Name	Description
UOUT3*	This parameter of type BOOL represents the user-specific bit 3 which is to be transmitted within the cyclic control word (see section 4.2.1). The parameter is mirrored on bit 3 of the cyclic control word.
RDGATE*	This parameter of type BOOL represents the optional bit 8 which is to be transmitted within the cyclic control word (see section 4.2.1). The operation starts if this bit is set to "1".
CMDDIM*	Several commands can be saved in memory so that a more efficient application program can be written. The number of stored commands influences the memory area which is to be reserved for the respective PIB instance. The input parameterCMDDIM defines the number of "CMD_STRUCT" structures for command parameters.
CMDSEL*	As a certain number of parallel stored commands can exist, a means of selection must exist in order to select the individual command to be executed. The input parameter CMDSEL is used for this purpose by assigning it a predefined command. The first CMD_STRUCT is reserved for the parameter, which are assigned to the command "Write_Config".
CMDREF*	These In_Out parameters refer to a global memory range, which is used for storage of commands and the associated parameters. The maximum number of commands which are assigned to an individual PIB instance may not exceed 10. Section 3.1.3 describes the commands which are supported by the profile version.
TXBUFLEN*	These input parameters determine the number of bytes which are used by this PIB instance for storing transmit data. The number of bytes are counted by the TXSTART parameter defined position within the memory range. For reasons of consistency it is recommended that these parameters should not be changed after the installation of the PIB.
TXSTART*	The input parameter TXSTART defines the relative position of the "TXBUF" defined by the "TXREF" within the global memory range. This location is the start of the memory range which is assigned to the PIB instance. For reasons of consistency it is recommended that these parameters should not be changed after instantiation of the PIB.
TXREF*	These In_Out parameters refer to a global memory range which is used by several PIB modules. The PIB instance may share the memory with other modules.
RXBUFLEN*	These input parameters determine the number of bytes which are used by this PIB instance for storing receive data. The number of bytes are counted by the RXSTART parameter defined position within the memory range. For reasons of consistency it is recommended that these parameters should not be changed after instantiation of the PIB.
RXSTART*	The input parameter RXSTART defines the relative position of the "RXBUF" defined by the "RXREF" within the global memory range. This location is the start of the memory range which is assigned to the PIB instance. For reasons of consistency it is recommended that these parameters should not be changed after instantiation of the PIB.

Table 53: (cont.) PIB parameter description

Name	Description
RXREF*	These In_Out parameters refer to a global memory range which is used by several PIB modules. The PIB instance may share the memory with other modules.
TRLEN	This output parameter indicates the number of the user bytes last sent (depending on the command sent or received), after the command has been successfully implemented. The number of transferred bytes from the position (TXSTART + OffsetBuffer) or (RXSTART + OffsetBuffer) is counted.
DONE	This output parameter is set to "TRUE" if a command with a positive result is executed. The user program can query this flag during the time that the command is being executed and before the transmitted data is computed.
ERROR	This output parameter is set to "TRUE" if a fault has been detected. The detected error can be locally (within the host control) or decentrally (within the Ident device). More detailed information about the error are defined in the "STATUS" parameter. This flag is set internally by the PIB in the acknowledgement telegram (Bit 0 of CI) depending on the error bit. After a renewed call of a command the flag is reset to "FALSE".
WARNING	This output parameter is set to "TRUE" if a warning has been detected. The detected warning can be locally (within the host control) or decentrally (within the Ident device). More detailed information about the warning is defined in the "STATUS" parameter. This flag is internally set by the PIB depending on the warn bit in the acknowledgement telegram (Bit 1..7 of CI: one or more bits are set to 1). After a renewed call of a command the flag is reset to "FALSE". Note: In case of a WARNING all user data assigned to a command are transmitted correctly (if ERROR is not set). In this case the data buffer receives valid values.
STATUS	The output parameter "STATUS" provides detailed error information and/or warning information about the last command, which has been implemented with a negative result or a warning. The value is retained until the next time a warning or an error occurs. The coding depends on the possible source of the respective warning or error message.
	The following sources are possible: the embedded Comm-FBs, the functions for cyclic data access, the Ident device, the tag or the internal functions of the PIB.
BUSY	If this output parameter is set to "TRUE" the PIB is “busy”. A command cannot be transferred for execution (exceptions: "INIT" and "SRESET"). The parameter indicates that the PIB is still in operation.
RPTACT	If this output parameter is set to "TRUE", the PIB* has accepted the requirement to repeat the command currently being implemented. The cyclic input data is mirrored by the bit "Repeat_Command_Active". The output parameters remain active as long as the bit is set within the cyclic telegram. As long as the output parameter is set, the PIB* provides data after an executed command. The user is in a position to read the result of the command.

Table 53: (cont.) PIB parameter description

Name	Description
ERR_REQ	This output parameter is set to "TRUE" if the PIB* has detected a fatal error. It is mirrored by the Error_Flag of the cyclic input data. The output parameters remain active as long as the bit is set within the cyclic telegram. The PIB remains in the current state (state machine). If this parameter is set to "TRUE" the user must set the INIT input parameter of the PIB POU or trigger a Dev-Status command (if possible).
UINO	This output parameter of type BOOL represents the user-specific bit 0 which is to be transmitted within the cyclic status word (see section 4.2.2).
UIN1	This output parameter of type BOOL represents the user-specific bit 1 which is to be transmitted within the cyclic status word (see section 4.2.2).
UIN2	This output parameter of type BOOL represents the user-specific bit 2 which is to be transmitted within the cyclic status word (see section 4.2.2).
UIN3	This output parameter of type BOOL represents the user-specific bit 3 which is to be transmitted within the cyclic status word (see section 4.2.2).
TP	This output parameter is set to "1" if a target is within the Ident device range. The parameter corresponds with the "Target_Present" bit of the cyclic status word (see section 4.2.2). It is reset if there is not target within the Ident device range. If an Ident device does not support this feature, the parameter is set to "0". This parameter is not used for barcode readers.
TPC	This output parameter is set to "1" if a new target is within the Ident device range. The parameter corresponds with the "Target_Presence_Changed" bit of the cyclic status word (see section 4.2.2). It is reset to "0" after the next "Inventory" command has been completed successfully. If an Ident device does not support this property the parameter is set to "0". This parameter is not used for barcode readers.

*The application program has the task of resetting and changing all input parameters.

Table 54: Properties of PIB parameters

Name	Data type	Area	Conditions of use c=compulsory, o=optional
EXECUTE	BOOL	If DONE≠O or ERROR≠O, the change of the parameter EXECUTE from "0" to "1" forces the function block to execute a command (if DONE=0 and ERROR=0, the PIB POU has not been initialised or the command is currently being executed)	c
ID	DWORD	0x00000000 .... 0xFFFFFFFF (see [4])	c
INDEX	INT	101...108, 111...118,201...254	c
OFFSET	INT	0...244	c
RPTCMD	BOOL	0 = No Repeat_Command 1 = Repeat_Command	o

Table 54: (cont.) Properties of PIB parameters

Name	Data type	Area	Conditions of use c=compulsory, o=optional
SRESET	BOOL	Change from "0" to "1" forces the function block to execute the command SRESET (ends the current command).	c
INIT	BOOL	Change from "0" to "1" forces the function block to execute the Init procedure.	c
UOUT0	BOOL	Bit 0 = 0/1	o
UOUT1	BOOL	Bit 0 = 0/1	o
UOUT2	BOOL	Bit 0 = 0/1	o
UOUT3	BOOL	Bit 0 = 0/1	o
RDGATE	BOOL	0 = Read gate not active 1 = Read gate active	o
CMDDIM	INT	2 ... 10	c
CMDSEL	INT	1 ...10	c
CMDREF	ARRAY[2..CMDDIM] of CMD_STRUCT	CMDDIM x 42	c
TXBUFLEN	INT	0 ... 32768	c
TXSTART	INT	0 ... 32768	c
TXREF	ARRAY [1..N]of BYTE		c
RXBUFLEN	INT	0 ... 32768	c
RXSTART	INT	0 ... 32768	c
RXREF	ARRAY [1..N]of BYTE	N	c
TRLEN	INT	0 ... 32768	c
DONE	BOOL	0 = Command not executed 1 = Command executed	c
ERROR	BOOL	0 = Last command completed without error 1 = Last command completed with error	c
WARNING	BOOL	0 = No warning information available 1 = Warning information available	c
STATUS	DWORD	See section 3.1.2	c

Table 54: (cont.) Properties of PIB parameters

Name	Data type	Area	Conditions of use c=compulsory, o=optional
BUSY	BOOL	0 = PIB does not currently execute a command 1 = Command currently being executed by the PIB	c
RPTACT	BOOL	0 = No command repetition on the PIB* active 1 = Command repetition on the PIB* active	o
ERR_REQ	BOOL	0 = No error reported from the PIB* 1 = Error reported via PIB*	c
UINO	BOOL	Bit 0 = 0/1	o
UIN1	BOOL	Bit 0 = 0/1	o
UIN2	BOOL	Bit 0 = 0/1	o
UIN3	BOOL	Bit 0 = 0/1	o
TP	BOOL	0 = No target available 1 = Target available	o (do not use for barcode reader)
TPC	BOOL	0 = No target changed 1 = Target changed	o (do not use for barcode reader)

In order to simplify access to individual elements of the command structure, a common structure has been defined for each command independently of which individual parameter has been used. The used parameter depends on the definition of the respective command. These parameters are defined in section 3.1.3.

Figure 112: Data type definitions of the PIB command:

```
TYPE
   CMD STRUCT
      STRUCT
         CMD : BYTE;
         Config : BYTE ;
         OffsetBuffer : INT;
         UID : ARRAY[1..8] OF BYTE;
         FileName : ARRAY[1..8] OF BYTE;
         Offset : DINT;
         Length : INT;
         StartAddress : DINT;
         Attributes : BYTE;
         NextMode : BYTE;
         Timeout : INT;
         ObjectNumber : INT;
         FileType : WORD;
      END STRUCT;
END TYPE
```

3.1.2 Errors and warnings

The PIB reports if the required command has been executed or not executed successfully. The error message serves two purposes:

1. To change the reaction to the process, i.e. to trigger an alternative reaction, e.g. the repetition of the command at another time or at another location, or the cancellation of the process task
2. To send an alarm message to a HMI system via the user program or automatically via the PLC system.

Note

In the first case there are only very few alternative reactions which are dependent on the respective error message. Detailer error information is barely used.

As other function blocks (Comm-FBs) and functions are embedded in the PIB, the parameter STATUS provides status information from several sources.

The STATUS parameter can also be used for warning information.

As an alternative to the use of STATUS parameters error and warning information can be transmitted within the diagnostics data (see section 4.4).

The STATUS output of type DWORD is interpreted as a packed array consisting of four bytes as shown in the following table.

Table 55: Structure of the STATUS output

Byte	Name	Definition	Data type
0	Function_Num	See Table 56:	Byte
1	Error_Decode	See Table 57:	Byte
2	Error_Code_1	See Table 58:	Byte
3	Error_Code_2	Warnings or manufacturer-specific faults	Byte

The definition of the byte Function_Num is based on (IEC 61158_6, Part 6; 1999) and expands the supplements realised in (PROFIBUS Communication and Proxy Function Blocks acc. to IEC 61131-3 Vers. 1,2). It us used to group errors and warnings.

Table 56:

Values from byte Function_ Num

Frame Select or (Bit 7), decimal	**PDU - designator (Bit 5 to 6), decimal**	**Error_Code_2 is used for warnings (Bit 4)***	**Function_ Code / Error Code (Bit 0 to 3) decimal**	**Description in accordance with this profile**
0	0 . . . 3	0/1	0 ... 15	No error
1	0, 1	0/1	0 . . . 15	Error not associated with the DP-protocol and not defined for this profile
1	2	0/1	0 . . . 15	Error messages associated with the DP-protocol, see /2/ and [4]
1	3	0/1	0	Manufacturer-specific coding of Error_Code_1 and Error_Code_2
1	3	0/1	1	Error_Code_1 provides error information concerning the Tag/ transponder/barcode Manufacturer-specific coding of Error_Code_2
1	3	0/1	2	Error_Code_1 provides error information about the air interface Manufacturer-specific coding of Error_Code_2
1	3	0/1	3	Error_Code_1 provides error information about the file system Manufacturer-specific coding of Error_Code_2

Table 56: (cont.) Values from byte Function_ Num

Frame Select or (Bit 7), decimal	PDU - designator (Bit 5 to 6), decimal	Error_Code_2 is used for warnings (Bit 4)*	Function_ Code / Error Code (Bit 0 to 3) decimal	Description in accordance with this profile
1	3	0/1	4	Error_Code_1 provides error information about the Ident device (Transponder/ Barcode reader) Manufacturer-specific coding of Error_Code_2
1	3	0/1	5	Error_Code_1 provides error information concerning communication between the PIB and Ident device (with the exception of DP errors) Manufacturer-specific coding of Error_Code_2
1	3	0/1	6	Error_Code_1 provides command-specific error information Manufacturer-specific coding of Error_Code_2
1	3	0/1	7	Error_Code_1 provides error information which is internally generated by the PIB Manufacturer-specific coding of Error_Code_2
1	3	0/1	8 ... 15	Not defined here

* Bit 4 = 0: Error_Code_2 contains manufacturer-specific information, Bit 4 = 1: Error_Code_2 contains warning information (Byte 5 (CI) of acknowledgement telegram)

The Error_Decode byte is used in order to define the Function_Num, Error Code 1 and Error Code 2.

Table 57: Values of byte Error Decode

Error_Decode	Source	Meaning
0x00	PLC	No error, no warnings
0x01 .. 0x7F	PLC	Warning (not used for this profile)
0x80	DP V1	Errors reported compliant to IEC 61158-6 *111*
0x81 .. 0x8F	PLC	0x8x reports an error after the x-th parameter of the Comm-FB call, as defined in [4]
0x90 .. 0xFD		reserved
0xFE	Profile (PIB, Ident device)	Profile-specific error
0xFF	Profile (PIB, Ident device)	Reserved for future use

Error_Code_1 provides the number which represents the error or warning. The byte Error_Decode is defined on 0xFE in the following table.

Table 58: Values of byte Error Code 1

Function _Code/ Error_ Code*	Error_ Code_1 (decimal)	Reported by	Meaning	Compulsory optional
1	1	IG	Tag memory error (e.g. CRC error).	o
1	2	IG	Presence error (reported by Ident device), Tag has left the transfer window	o
1	3	IG	Address or command does not correspond with the Tag properties (memory size) (reported by Ident device)	o
1	4	IG	Tag defective, (replace Tag or battery)	o
1	5	IG	Tag memory overflow	o
1	6	IG	Unformatted Tag	o
1	7	IG	Inconsistent Tag data structure. Reformat Tag	o
1	8	IG	Tag within the transfer window does not have the expected UID (reported by Ident device)	o
1	9	IG	Command not supported by the Tag	o

Table 58: (cont.) Values of byte Error Code 1

Function _Code/ Error_ Code*	Error_ Code_1 (decimal)	Reported by	Meaning	Compulsory optional
1	10	IG	Access violation (e.g. element inhibited); see ISO18000-X	o
1	11..127	IG	Reserved for future profile use	o
1	128..255	IG	Manufacturer-specific	o
2	1	IG	Communication timeout on the air interface (reported by the Ident device)	o
2	2	IG	More Tags/barcodes than permissible in the transfer window, (reported by Ident device)	o
2	3..127	IG	Reserved for future profile use	o
2	128..255	IG	Manufacturer-specific	o
3	1	IG	Incorrect file name (reported by Ident device)	o
3	2	IG	File not available (reported by Ident device)	o
3	3	IG	The Tag type is incorrect or not suitable for the selected operating mode. No file system available on the Tag. (reported by Ident device)	o
3	4	IG	Create command; no directory entries available, (reported by Ident device)	o
3	5	IG	Create command; file already available in directory, (reported by Ident device)	o
3	6	IG	Access violation (reported by Ident device)	o
3	7	IG	File length exceeded (reported by Ident device)	o
3	8	IG	File not available (falsified) (reported by Ident device)	o

Table 58: (cont.) Values of byte Error Code 1

Function _Code/ Error_ Code*	Error_ Code_1 (decimal)	Reported by	Meaning	Compulsory optional
3	9..127	IG	Reserved for future profile use	o
3	128..255	IG	Manufacturer-specific	o
4	1	IG	Voltage failure (reported by Ident device)	o
4	2	IG	Hardware error within the Ident device (reported by the Ident device)	o
4	3	IG	Antenna does not function (reported by the Ident device); e.g. switched off or disconnected	o
4	4	IG	Overflow of the command buffer of the Ident device (reported by the Ident device)	o
4	5	IG	Overflow of the data buffer of the Ident device (reported by the Ident device)	o
4	6	IG	Command not supported in this mode by the Ident device (reported by Ident device)	o
4	7	IG	Ident device reports an unspecific error which is reported via the cyclic status word (e.g. antenna does not function). This error is not assigned to a specific command.	o
4	8..127	IG	Reserved for future profile use	o
4	128..255	IG	Manufacturer-specific	o
5	1	IG	Incorrect sequence number (SN) reported by Ident device	c
5	2	PIB	Incorrect sequence number (SN) reported by PIB	c
5	4	IG	Invalid data block number (DBN) reported by Ident device	c

Table 58: (cont.) Values of byte Error Code 1

Function _Code/ Error_ Code*	Error_ Code_1 (decimal)	Reported by	Meaning	Compulsory optional
5	5	PIB	Invalid data block number (DBN) reported by PIB	c
5	6	IG	Invalid data block length (DBL) reported by Ident device	o
5	7	PIB	Invalid data block length (DBL) reported by PIB	c
5	8	IG	Command from another user is being executed (reported by Ident device)	o
5	9	PIB	The Ident device has implemented a hardware reset (InitActive set to "1"), Init (Bit 15 of the cyclic control word) expected by PIB.	c
5	10	PIB	The command code “CMD” and the corresponding acknowledgement do not correspond. This is a software or synchronisation error which may normally not occur in normal operation.	c
5	11	PIB	Incorrect sequence of the acknowledgement telegrams (TDB/DBN)	c
5	12	PIB	Synchronisation error (increment sizes of AC_H/ AC_L and CC_H/CC_L in cyclic control word is incorrect), INIT must be executed	c
5	13..127	IG	Reserved for future profile use (may not be used)	o
5	128..255	IG	Manufacturer-specific	o
6	1	IG	Invalid CMD	c
6	2	IG	Invalid command index CI, reported by Ident device.	c

Table 58: (cont.) Values of byte Error Code 1

Function _Code/ Error_ Code*	Error_ Code_1 (decimal)	Reported by	Meaning	Compulsory optional
6	3	IG	Invalid command parameters (e.g. data area) reported by Ident device.	o
6	4	IG	Incorrect synchronization between user program and Tag. An expected command is missing. (Object detection error)	o
6	5	IG	Only Write-Config is permissible in this state (reported by Ident device)	c
6	6..127	IG	Reserved for future profile use	o
6	128..255	IG	Manufacturer-specific	o
7	1	PIB	Only INIT command in this state is valid (reported by PIB)	c
7	2	PIB	Command code "CMD" is invalid	c
7	3	PIB	Parameter "Length" of the command is too long for the global data range which is reserved within the TXBUF. (reported by PIB)	c
7	4	PIB	RXBUF overflow (more received data than available memory in RXBUF)	c
7	5	PIB	This message informs the user that only an "INIT" is permissible as the next command. All other commands are rejected.	c
7	6	PIB	Incorrect index (out of range: 101 .. 108)	c
7	7	PIB	Ident device does not respond to INIT (Init_Active in cyclic status telegram expected)	c

Table 58: (cont.) Values of byte Error Code 1

Function _Code/ Error_ Code*	Error_ Code_1 (decimal)	Reported by	Meaning	Compulsory optional
7	8	PIB	Timeout during the Init process (60 seconds as defined in TC3WG9)	c
7	9	PIB	Command repetition not supported by PIB*	o
7	9..127	PIB	Reserved for future profile use	o
7	128..255	PIB	Manufacturer-specific	o

*) Bit 0 to 3 (decimal coded) of Function_Num IG ... Ident device

The byte Error_Code_2 provides either warning information (if bit 4 of Function_Num is set to "1") or optionally a manufacturer-specific error number (if bit 4 of function_Num is reset to "0"). The warnings are mirrored by byte 5 (CI) of the acyclic acknowledgement telegram.

Table 59: Coding of warnings

Error_ Decode	Error_ Code_2 (Bit position)	Source	Meaning
0xFE	0	Ident device	Bit fixed setting to "0"
0xFE	1	Ident device	Manufacturer-specific
0xFE	2	Ident device	If the Ident device is a barcode reader: manufacturer-specific If the Ident device is an RFID device: Battery almost empty
0xFE	3	Ident device	Manufacturer-specific
0xFE	4	Ident device	Manufacturer-specific
0xFE	5	Ident device	Manufacturer-specific
0xFE	6	Ident device	Manufacturer-specific
0xFE	7	Ident device	Manufacturer-specific

3.1.3 Commands

In this section commands are described which are supported by the PIB POU and their respective parameters. The following limitations apply for the use of commands:

- The cyclic control process has precedence over acyclically transmitted commands
- "INIT" and "SRESET" interrupt the execution of a command within the Ident device
- After transmission of a cyclic control telegram (INIT, SRESET) the continuous change of the "DONE" parameter relates to the cyclic control telegram and not to the INIT or SRESET interrupted command
- "INIT" resets the communication (cyclic control flow and status flow, cyclic commands) between the PIB and the Ident device. For this procedure the "Init" is first of all transmitted within the cyclic control word. After reset of the "Init_Active" bit in the status word a "Write-Config" command is triggered and sent to the Ident device. For this the user must provide "Write-Config" parameters within the command range before the "INIT" command is requested. (see section 4.2.3)
- The "Write-Config" command resets all functions in the Ident device with the exception of the communication
- The "SRESET" command ends the last command

Table 60:

Description of the PIB commands

Name	Description
Get	Manufacturer-specific data are read into the Ident device with this command. Hereby the TXBUF range is used as a manufacturer-specific memory range for the parameter data (optional transmission data). Received data are stored in the RXBUF area from the start of the range. The parameter TRLEN of the PIB POU indicates the number of received bytes.
	VAR CMD : BYTE := 0x62; (* b *) END_VAR
	Parameter / **Description**
	OffsetBuffer: This parameter defines the relative offset in the TXBUF. Herewith the address is defined in the memory range, in which the first byte of parameter data to be sent is stored. Further parameter data is stored accordingly in a consistent manner.
	Length: This parameter defines the number of bytes to be sent to the Ident device, which commence with the parameter defined by the OffsetBuffer. This range is between the following values: 0 ... 226.
Physical_ Read	The data is read from a transponder which are defined via a physical start address and the length of the data to be read with this command. The parameter TRLEN of the PIB POU indicates the number of received bytes.
	VAR CMD : BYTE := 0x70; (* p *) END_VAR
	Parameter / **Description**
	OffsetBuffer: This parameter defines the relative offset in the RXBUF. Herewith the address is defined in the memory range, in which the first byte of parameter data to be received is stored. All the following bytes must be stored at incremented addresses.
	UID: This parameter identifies an individual transponder. UID = 0: Any (no specific transponder) The currently available Tag is read.
	Length: This parameter defines the number of bytes to be read from the transponder which begin with the address defined by the StartAddress parameter.
	Start Address: This parameter defines a physical address within a transponder memory.

Table 60: (cont.) Description of the PIB commands

Name	Description	
Physical_Write	The data is written to a transponder which is defined via a physical start address and the length of the data to be written with this command.	
	VAR CMD : BYTE := 0x71; (* q *) END VAR	
	Parameter	**Description**
	OffsetBuffer	This parameter defines the relative offset in the TXBUF. Herewith the address is defined in the memory range, in which the first byte of parameter data to be sent is stored..
	UID	This parameter identifies an individual transponder. UID = 0: Any (no specific transponder) The currently available Tag is read.
	Length	This parameter defines the number of bytes to be sent to the transponder which begin with the address defined by the StartAddress parameter.
	Start Address	This parameter defines a physical address within a transponder memory.
Next	With this command the procedures are ended with a transponder. The Next command is executed when the next transponder is detected/ signalled.	
	VAR CMD : BYTE := 0x6E; (* n *) END VAR	
	Parameter	**Description**
	UID	This parameter identifies an individual transponder. UID = 0: Any The currently available Tag is read.
	NextMode	Valid values: NextMode = 0 (the Next command applies for all (another or the same) Tags) NextMode = 1 (only another Tag is dealt with)

Table 60: (cont.) Description of the PIB commands

Name	Description
Write Config	The operation of the Ident device is modified with this service. The communication will continue. Herewith new parameters can be sent to the Ident device (ConfigData). A reset can also be triggered with it where the Ident device is requested to restart operation. TXBUF is used as the manufacturer-specific area for configuration data, as configuration data (Config data) are manufacturer-specific. Normally the Write-Config command is automatically implemented by the PIB during the INIT phase. The Write Config command can be started optionally with EXECUTE. Config is forcibly supported: Config = 1 Config is optionally supported: Config = 2 or Config = 3
	VAR CMD : BYTE := 0x78; (* x *) END VAR

Parameter	Description
OffsetBuffer	This parameter defines the relative offset in the TXBUF. Herewith the address is defined in the memory range, in which the first byte of data to be sent is stored.
Length	With this parameter the number of "config data" bytes written to the Ident device is determined.
Config	Config = 0...not permitted Config = 1...Reset, no ConfigData Config = 2...No reset, ConfigData are transmitted Config = 3 Reset, ConfigData is transmitted Config > 3 ... reserved
Definition of the sub-parameters provided in the response:	
MaxPacketSize	This parameter is sent from the PIB* to the PIB. It contains information concerning the maximum length of the Ident PDU (Ident header + data), which the slave can receive or transmit. Based on this parameter, the PIB dynamically determines the PDU length supported by the PDU* during the initialisation phase (INIT) and sends it to the internal algorithm for packaging data and sets it according to the PDU length. 00 = Standard (corresponds to 240 bytes) 64. ..240 = max. permissible PDU length within the PIB* 01... 63 = reserved 241... 255 = reserved

Table 60: (cont.) Description of the PIB commands

Name	Description	
Read Config	With this service the configuration data are read from the Ident device. RXBUF is used as the manufacturer-specific area for configuration data, as configuration data (Config data) are manufacturer-specific. The parameter TRLEN of the PIB POU indicates the number of received bytes.	
	VAR CMD : BYTE := 0x61; (* a *) END VAR	
	Parameter	**Description**
	OffsetBuffer	This parameter defines the relative offset in the RXBUF. Herewith the address is defined in the memory range, in which the first byte of data to be read is stored.
Mem Status	With this service the status of a Tag (battery state, memory size, available capacity) are read. The RXBUF is used as the manufacturer-specific area for status data, as the status data is manufacturer-specific. The parameter TRLEN of the PIB indicates the number of received bytes.	
	VAR CMD : BYTE := 0x73; (* s *) END VAR	
	Parameter	**Description**
	UID	This parameter identifies an individual transponder. UID = 0: Any (no specific transponder). The currently available Tag is read.
	Attributes	This parameter defines the class of the information to be read. The following values are valid: 0x00...reserved 0x01...Warn Info 0x02...reserved 0x03...reserved 0x04...physical status information (manufacturer-detailed detail information) 0x05...Status information for file system (manufacturer-spec.,detail info) 0x06 - 0x7F reserved 0x80 - 0xFF manufacturer-specific
	OffsetBuffer	This parameter defines the relative offset in the RXBUF. Herewith the address is defined in the memory range, in which the first byte of data to be read is stored.

Table 60: (cont.) Description of the PIB commands

Name	Description
Dev Status	The status of an Ident device is read with this service. The RXBUF is used for status data as the manufacturer-specific area, as the status data is manufacturer-specific. The parameter TRLEN of the PIB POU indicates the number of received bytes.

```
VAR
CMD   :   BYTE   :=   0x74;    (*   t *)
END  VAR
```

Parameter	Description
Attributes	This parameter defines the class of the information to be read. The following values are valid: 0x00...reserved 0x01... Warn Info (manufacturer-specific, detailed information) 0x02... Error history (manufacturer-specific, detailed information) 0x03... Command history (manufacturer-specific, detailed information) 0x04... channel-related I&M Info (Data record I&M0) 0x05... channel-related I&M Info (Data record I&M1) 0x06... channel-related I&M Info (Data record I&M2) 0x07... channel-related I&M Info (Data record I&M3) 0x08... channel-related I&M Info (Data record I&M4) 0x09 - 0x7F reserved 0x80 - 0xFF manufacturer-specific
OffsetBuffer	This parameter defines the relative offset in the RXBUF. Herewith the address is defined in the memory range, in which the first byte of data to be read is stored.

Table 60: (cont.) Description of the PIB commands

Name	Description
Inventory	This command is used in order to request a list of all UIDs which can be contacted within the antenna beam. The possibility for manufacturer-specific additional information is provided. The RXBUF has the following structure. The following example indicates the structure of the file to be sent and should not be used as structured text in the PLC program. In the example 5 objects (ObjectNumber = 5) with ObjectLength = 16 are transmitted. VAR CONSTANT ObjectNumber : INT := 5; ObjectLength : INT := 16; END_VAR TYPE UID_STRUCT STRUCT UID : ARRAY[1..8] OF BYTE; Data : ARRAY[1.. (ObjectLength-8)] OF BYTE; END STRUCT; END_TYPE TYPE UidList: ARRAY[1..ObjectNumber] OF UID _STRUCT; END_TYPE

VAR
CMD : BYTE := 0x69; (* i *)
END VAR

Parameter	Description
Attributes	This parameter defines the class of the information to be read. The following values are valid: 0x00...All UIDs are read (without additional information) 0x01 - 0x7F reserved 0x80 - 0xFF manufacturer-specific
OffsetBuffer	This parameter defines the relative offset in the RXBUF. Herewith the address is defined in the memory range, in which the first byte of data to be read is stored.

Table 60: (cont.) Description of the PIB commands

Name	Description

Definition of the sub-parameters provided in the response:

Parameter	Description
Object Number	This parameter defines the number of UIDs which are provided in the acknowledgement telegram.
Object Length	This parameter defines the number of bytes which are assigned in an individual UID (UID length + additional data). With attributes =0x00 the following applies: ObjectLength = 8.
UidList:	These optional parameters contain a list of manufacturer-specific information which is assigned to the UIDs which are currently accessible within the antenna beam.

Annex A – Conformity table

The following table contains a list of the permissible "Implementation independent properties" of the PIB. A manufacturer who declares conformity with this PNO specification, must provide a list of all compliant properties of the supported PIB in this tabular format.

Table 61: Implementation independent properties for the PIB

Number	Property	Selected implementation
3	Maximum supported memory size for the TXBUF	
3	Maximum supported memory size for the RXBUF	
3	Maximum number of commands which should be stored in the CMDREF	

The following tables contain a listing of the communication relevant properties of the Ident device, which are relevant for this profile specification. The manufacturer of an Ident device, which communicates via a PIB instance, must provide a list of all compliant properties of the supported Ident device in this tabular format.

Table 62: Conformity table for Ident devices

Number	Property	Explanation	Implementation-specific additional information	Conform? (Y/N)
3.1.3	Read	Command		
3.1.3	Get	Command		
3.1.3	Physical_Read	Command		
3.1.3	Write	Command		
3.1.3	Put	Command		
3.1.3	Physical_Write	Command		
3.1.3	Format	Command		
3.1.3	Create	Command		
3.1.3	Delete	Command		
3.1.3	Clear	Command		
3.1.3	Update	Command		
3.1.3	Next	Command		
3.1.3	Get-Directory	Command		
3.1.3	Set-Attribute	Command		
3.1.3	Get-Attribute	Command		
3.1.3	Write Config	Command		
3.1.3	Read Config	Command		
3.1.3	Mem-Status	Command		
3.1.3	Dev-Status	Command		
3.1.3	Inventory	Command		
3.1.3	Read-BarCode	Command		
4.2.1	Reading_Gate	Control Bit		
4.2.1	Command repetition	Control Bit		
4.2.2	Target_Presence _Changed	Status Bit		
4.2.2	Target_Present	Status Bit		
	MaxPacketSize	Max. supported size of the Ident PDU		

Annex B - Elementary data types of this specification

This annex contains information about defined data types which are used in the profile specification.

Table 63: Data types

Name	Definition	Reference source
BOOL	Boolean (the possible values for variables of this data type must be 0 and 1, corresponding the keywords FALSE and TRUE.)	IEC 61131-3
DWORD	Bit sequence of length 32	IEC 61131-3
WORD	Bit sequence of length 16	IEC 61131-3
INT	Integer (the value range for variables of this data type ranges from - (2^{16-1}) to (2^{16-1})-1.)	IEC 61131-3
ANY		IEC 61131-3
DINT	Double integers (the value range for variables of this data type ranges from - (2^{32-1}) to (2^{32-1})-1.)	IEC 61131-3
BYTE	Bit sequence of length 8	IEC 61131-3
ARRAY[1..x] of Data Type		IEC 61131-3
CMD_ STRUCT	TYPE CMD STRUCT STRUCT CMD : BYTE; Config : BYTE; OffsetBuffer : INT; UID : ARRAY[1..8] OF BYTE; FileName : ARRAY[1..8] OF BYTE; Offset : DINT; Length : INT; StartAddress : DINT; Attributes : BYTE; NextMode : BYTE; Timeout : INT; ObjectNumber : INT; FileType : Word; END STRUCT; END TYPE	
DIRELEMENTS_ STRUCT	TYPE DIRELEMENTS_STRUCT STRUCT FileName : ARRAY[1..8] OF BYTE; UsedLength : DINT; Attributes : BYTE; FileLength : DINT; FileType : WORD END STRUCT; END_TYPE	

Table 63: (cont.) Data types

Name	Definition	Reference source
DIRLIST_ STRUCT	Even though this structure is defined in the ST language it should not be copied into an ST program, as it contains an array (field) with a dynamic length, which is not IEC 61131-3 (ST) compliant. ST has only been selected in the document for reasons of consistency. TYPE DIRLIST_ STRUCT STRUCT UID1 : ARRAY[1..8] OF BYTE; TagName : ARRAY[1..8] OF BYTE; FreeUserMem : DINT; Checksum : WORD FileCount : INT; FileList : ARRAY[1..FileCount] of DIRELEMENTS_STRUCT; END STRUCT; END TYPE	
UID_STRUCT	Even though this structure is defined in the ST language it should not be copied into an ST program, as it contains an array (field) with a dynamic length, which is not IEC 61131-3 (ST) compliant. ST has only been selected in the document for reasons of consistency. TYPE ObjectLength : INT; END_TYPE TYPE UID STRUCT STRUCT UID : ARRAY[1..8] OF BYTE; Data : ARRAY[1..(ObjectLength-8)] OF BYTE; END_STRUCT; END_TYPE	
UidList:	Even though this structure is defined in the ST language it should not be copied into an ST program, as it contains an array (field) with a dynamic length, which is not IEC 61131-3 (ST) compliant. ST has only been selected in the document for reasons of consistency. TYPE ObjectNumber : INT; END TYPE TYPE UIdList: ARRAY[1..ObjectNumber] OF UID_STRUCT; END TYPE	

The coding of a UID is defined as follows in the Technical Report ISO/IEC /TR 15963, Automatic identification - Radio Frequency Identification for item management - Unique identification for RF tags, Annex A:

Table 64: Coding of a UID

AC (Allocation Class)	UID issuer Registration Number	Serial number
8 Bit	Size of AC_value defined	Size of AC_value defined
MSB		LSB

Table 65: Registration

AC value	**Class**	**UID issuer identifier size**	**Size of the serial no.**	**Registration body (the "UID issuer Registration Number")**
'11100000'	7816-6	8 Bit	48 Bit	APACS (ISO/IEC 7816-6 registration body)
'11100001'	14816	perNEN	perNEN	NEN (ISO 14816 registration body)
'11100010'	EAN.UCC	per EAN.UCC	per EAN.UCC	EAN.UCC
000xxxxx	INCITS 256	per ANS INCITS 256	per ANS INCITS 256	ANSI ASC INCITS T6
'11100011' to '11101111'	RFU	not applicable	not applicable	Reserved for future ISO use

6 Glossary

B

Bus

Bus system for data exchange between hardware components (for example, CPU, memory, and I/O-level). A bus may consist of several parallel cables for data transfer (addressing, control, and power supply).

Bus system

The sum of all units that communicate with each other via a bus.

C

Configuration

Systematic arrangement of the I/O-modules of a station.

CPU

English abbr. for "Central Processing Unit". Central unit for data processing, the core piece of a processor.

D

DIN

Abbr. for "German Institute for Engineering Standards".

Distribution

Distribution involves all activities concerning the transfer of goods between economic entities.

DP-Master Class 1

The automation system (PLC) which mainly completes cyclic data processing. The „DPV1“-functions may be used additionally/optionally.
(also DPM1/DPC1).

DP-Master Class 2

Exclusively acyclic demand data are transferred. This data transfer may be implemented with the help of an engineering tool (PC user program), for example.

DPV1

Expanding functions for PROFIBUS-DP. In addition to the cyclic process data, demand data may be transferred with the help of acyclic communication functions. In regards to time, the acyclic services are processed in parallel and in addition to the cyclic process data transfer, they are processed as low priority.

E

Earth electrode

One or more components that have direct and good contact with the earth.

EEPROM - Electrically Erasable Programmable Read-Only Memory

EEPROM describes a non-volatile, electronic memory component. An EEPROM consists of a field effect transistor matrix with isolated floating gate in which each transistor represents a bit.

EMC

Electromagnetic compatibility (EMC) identifies the generally desireable state in which technical devices are not interfering with each other based on unintentional electric or electromagnetic effects.

Ethernet

Data network technology for local data networks (LANs).

F

Fieldbus

Data network on the sensor/actuator level. A fieldbus connects the devices on the field level with the control unit. Characteristic for a fieldbus is high transfer safety and real time behavior.

FRAM - Ferroelectric Random Access Memory

FRAM describes a non-volatile electronic memory type based on crystals with ferroelectric features.

Function Code

Are part of the data telegram with Modbus. Amongst others contain read/write commands of input, or rather output data.

G

Ground

Expression in electrical engineering for conductive earth of which its electrical potential equals zero at each point. In the environment of grounding equipment the electrical potential of the earth can be other than zero, and in this case one refers to "common ground reference potential".

to ground

Connection of an electrically conductive component with the earth electrode via a piece of grounding equipment.

H

Hexadecimal

Numerical system with the basis 16. The count is from 0 to 9 and continues with the letters A, B, C, D, E and F.

I

IEC 61131

IEC 61131 is an international standard which treats the basics of programmable controllers.

IP - International Protection

The protection class (IP) identifies the suitability of electrical operating devices (for example, devices, installation material) in regards to different ambient conditions, also the protection of people against potential dangers when the electric operating devices are being used.

IP protocol

Abbr: for Internet Protocol, protocol for the packet-oriented and connectionless transport of data packets from a sender to a receiver across multiple networks.

L

Logistics

Logistics involves the teachings of comprehensive planning, control, execution, allocation, optimization and control of processes for the movement from one location to another of goods, data, energy and persons as well as the needed means of transport.

LSB

Abbr. "Least Significant Bit". Bit with the lowest place value.

M

Modbus-TCP

TCP/IP packets are used to transfer data with Modbus-TCP.

The Modbus communicates with the help of function codes which are integrated into the data telegram. Modbus-TCP utilizes the transport control protocol (TCP) for the transfer of the Modbus application protocol for the data transfer in Ethernet-TCP/IP networks.

Mode

Operating mode

MSB

Abbr: "Most Significant Bit". Bit with the highest place value.

N

Network mask

The usable address range of a network is defined by the network mask. A network mask is exactly as long as the IP-address for which it is used. The binary display of the network mask "0" contains changeable ranges of the IP-address. Set ranges are "1".

O

Overhead

System administration time which the system needs once for each transfer cycle.

P

PIB

Abbr. for "Proxy Ident Function Block". This function block represents an Ident-system in the control. Thus a common programming interface exists for the actual application.

PLC

Abbr. for Programmable Logic Controller.

Pulk capture

Simultaneous, unequivocal recognition of multiple RFID data carriers which are directed around a read/write head (transceiver).

R

Read/write head

The Read/write head (also Read/write device) creates an electromagnetic high-frequency field. This is how data is transferred and the data carrier (transponder) is supplied with power. The data is displayed with the help of modulation of the electromagnetic field.

RFID

Radio frequency identification

RFID technology

This technology allows a non-contact transfer of data. The data is transferred on the basis of radio frequency technology. A „Transponder” Seite 6-3is used as a data carrier.

S

Station

A function unit or assembly consisting of multiple components.

T

Tag

RFID-tags are small transponders in an application suitable enclosure, for example, sticker, chip card, tag.

TCP

English abbr. for "Transmission Control Protocol", connection-oriented transport protocol. Certain error identification mechanisms (for example, acknowledgements of telegrams, time monitoring of telegrams) can guarantee a safe and error free data transfer.

TCP/IP

(Transmission Control Protocol/Internet Protocol) is a family of network protocols also called "Internet Protocol" because of its significance for the internet.

Transceiver

Sender and receiver combination

The RFID technology uses transceivers in form of so-called "Readers". These devices send a signal first which the transponder (for example, RFID-tag) acknowledges by sending a response which in turn is received by the transceiver and sent to a (computer) system for further processing.

Transponder

(**Trans**mitter + Res**ponder**)
response sending device A transponder consists of a microchip (with a unique identification number), a send/receive antenna and a housing. The data is transferred between the reading device and the transponder via electromagnetic waves.

Transponder technology

(also „RFID technology” Seite 6-3)

U

UHF - Ultra High Frequency

This frequency range belongs to the microwave range. RIFD functions in Europe with 865..868 MHz / USA 902..928 MHz / Japan 955MHz / China 840..845 MHz und 920..925 MHz.

UID

English abbr. "Unique Identifier". The UID is a unique serial number for transponders. As an address, it refers to the data that corresponds to the transponder or rather the tagged product. This data can be stored in a database, for example.

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