5LS182.6-1

1 Other applicable documents

For additional and supplementary information, see the following documents.

Additional documentation

Document name	Title
MAREDSYS	Redundancy for control systems

2 General information

Logic scanner module 5LS182.6-1 is a PCI half-size module. It supports plug and play and has 1 MB SRAM for remanent data (process variables and data objects). Memory available for remanent process variables depends on the CPU, Automation Runtime, etc.

5LS182.6-1 is a POWERLINK logic scanner module with an integrated 2-port hub. It can be used as a manager or bus controller module. It is connected via an RJ45 port.

The module is also equipped with a ready relay.

- POWERLINK (V1/V2) for real-time Ethernet communication
- Integrated hub for efficient cabling
- Configurable ring redundancy

3 Order data

Order number	Short description	Figure
	PCI communication modules	
5LS182.6-1	Logic scanner, PCI half-size module, 1 POWERLINK (V1/V2) interface, managing or controlled node, integrated 2-port hub, ring redundancy function, 1 MB SRAM (Automation Runtime), order 1x terminal block TB704 separately!	
	Required accessories	
	Terminal blocks	
0TB704.9	Accessory terminal block, 4-pin, screw clamp terminal block 2.5 mm²	
0TB704.91	Accessory terminal block, 4-pin, push-in terminal block 2.5 mm²	
	Optional accessories	
	Batteries	
0AC201.91	Lithium batteries 4 pcs., 3 V / 950 mAh button cell	
	Included in delivery	
4A0006.00-000	Lithium battery, 3 V / 950 mAh, button cell	

Table 1: 5LS182.6-1 - Order data

4 Technical data

| Order number	5LS182.6-1
Short description	
Communication module	1x POWERLINK (V1/V2) managing or controlled node
General information	
B&R ID code	0x2152
Ready relay	Normally open contact and normally closed contact, max. 30 VDC, max. 6 A
Status indicators	Status of the POWERLINK station, network activity, link
Diagnostics	
Bus function	Yes, using LED status indicator and software
Station status	Yes, using LED status indicator and software
Power consumption	2 W
Electrical isolation	
PC - IF1	Yes
Certifications	
CE	Yes
UL	cULus E115267 Industrial control equipment
EAC	Product family certification
Controller	
SRAM	1 MB, battery-backed
Interfaces	
Fieldbus	POWERLINK (V1/V2) managing or controlled node
Type	Type 3 [1]
Variant	2x shielded RJ45 (hub)
Line length	Max. 100 m between 2 stations (segment length)
Transfer rate	100 Mbit/s
Transfer	
Physical layer	100BASE-TX
Half-duplex	Yes
Full-duplex	POWERLINK mode: No / Ethernet mode: Yes
Autonegotiation	Yes
Auto-MDI/MDIX	Yes
Hub propagation delay	0.96 to 1 µs
Operating conditions	
Degree of protection per EN 60529	IP20 in installed state
Ambient conditions	
Temperature	
Operation	0 to 55°C
Storage	-25 to 70°C
Transport	-25 to 70°C
Relative humidity	
Operation	0 to 95%, non-condensing
Storage	0 to 95%, non-condensing
Transport	0 to 95%, non-condensing
Mechanical properties	
Note	Order 1x terminal block TB704 separately. Lithium battery included in content of delivery
Slot	Standard PCI half-size module, plug and play
Installation in	
B&R Automation PC	Yes
B&R Panel PC	Yes
Desktop PC	Yes

Table 2: 5LS182.6-1 - Technical data

[1] For additional information, see section "Communication / POWERLINK / General information / Hardware - IF/LS" in Automation Help.

5 Dimensions
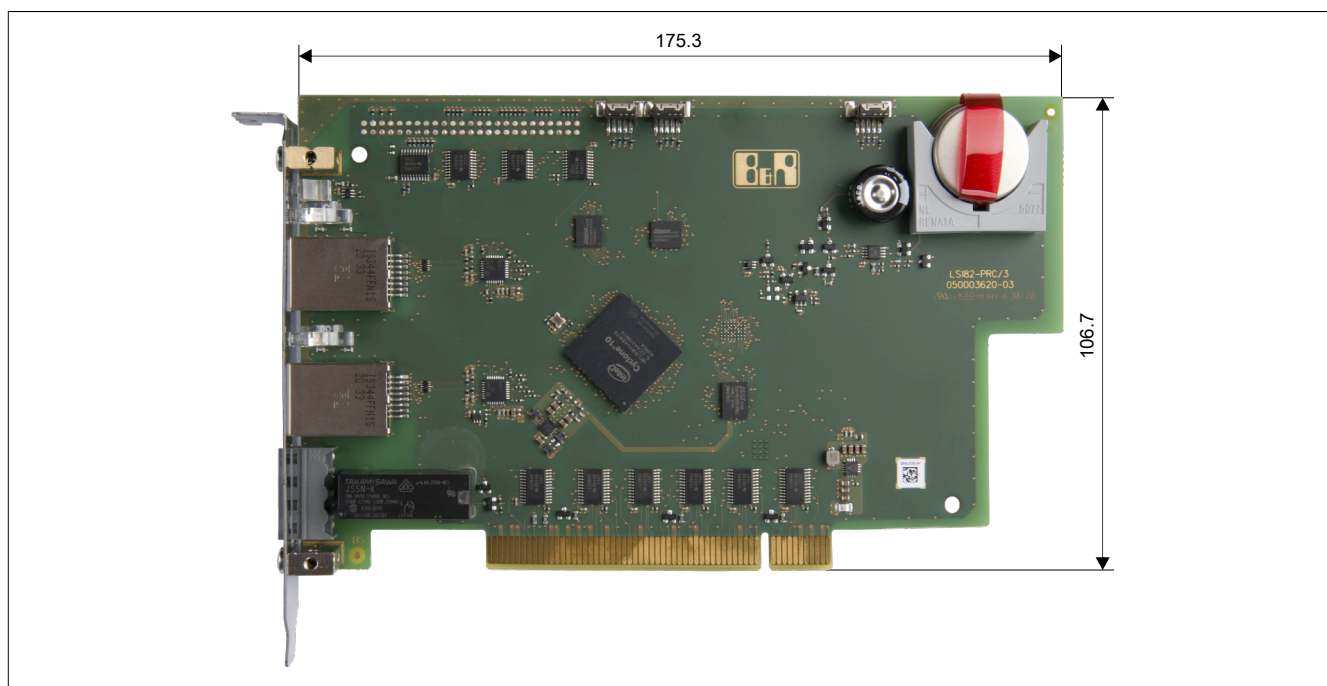
6 Operating and connection elements
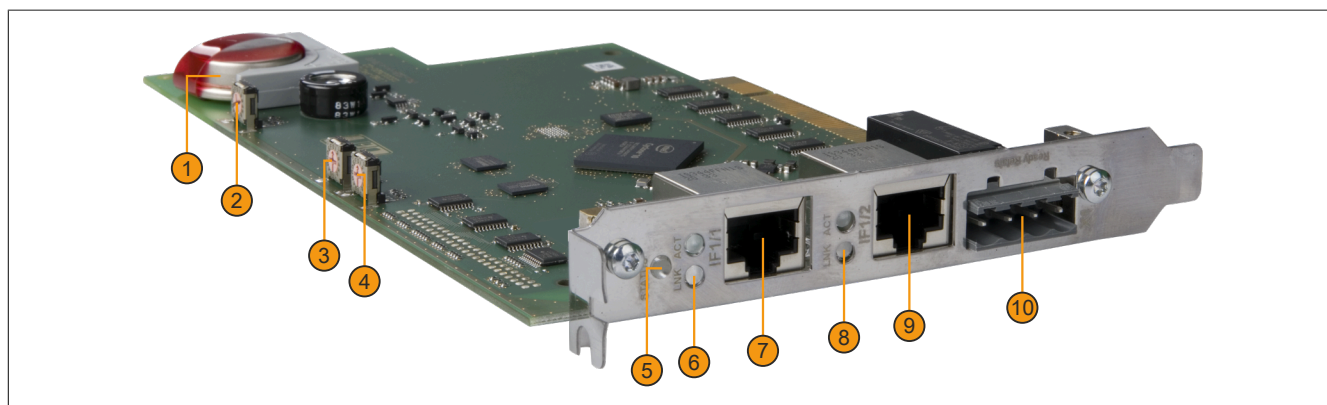
1	Backup battery	2	Card number switch
3	POWERLINK high	4	POWERLINK low
5	POWERLINK LED status indicator	6	Link/Activity LEDs IF1/1
7	IF1/1 - POWERLINK	8	Link/Activity LEDs IF1/2
9	IF1/2 - POWERLINK	10	Ready relay

6.1 LED status indicators

Figure	LED	Color	Description
POWERLINK	STATUS	Green/Red	Status/Error LED: LED states are described in section "LED "Status"" on page 4.
	LNK IF1/1 IF1/2	Green	The link to the remote station is established.
	ACT IF1/1 IF1/2	Orange	The link to the remote station is established. The LED lights up if Ethernet activity is taking place on the bus.
LED status indicators			

6.1.1 LED "Status"

This LED is a green/red dual LED and indicates the state of the POWERLINK interface. The LED states have a different meaning depending on the operating mode of the POWERLINK interface.

6.1.1.1 Ethernet mode

The interface can be operated as an Ethernet interface starting with Automation Studio version 2.5.3 and Automation Runtime 2.90.

LED "Status"		
Green	**Red**	**Description**
On	Off	The interface is operated as an Ethernet interface.

Table: LED "Status": Interface in Ethernet mode

6.1.1.2 POWERLINK V1 mode

LED "Status"		
Green	**Red**	**Current state of the POWERLINK node**
On	Off	The POWERLINK node is running with no errors.
Off	On	A system error occurred. The type of error can be read using the PLC logbook. An irreparable problem has occurred. The system can no longer properly carry out its tasks. This state can only be changed by resetting the module.
Blinking alternately		The POWERLINK managing node has failed. This error code can only occur when operated as a controlled node. This means that the set node number lies within the range 0x01 - 0xFD.
Off	Blinking	System stop. The red blinking LED indicates an error code (see "System stop error codes" on page 6).
Off	Off	The interface is either not active or one of the following states or errors is present: • The device is switched off. • The device is in the startup phase. • The interface or device is not configured correctly in Automation Studio. • The interface or device is defective.

Table 3: LED "Status": POWERLINK V1 mode
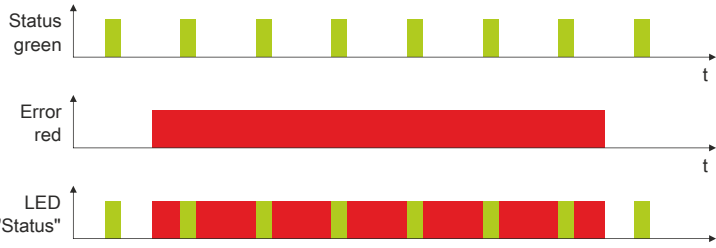
6.1.1.3 POWERLINK V2 mode

Error message

LED "Status"		
Green	Red	Description
Off	On	The interface is in error mode (failed Ethernet frames, increased number of collisions on the network, etc.). Note: Several red blinking signals are displayed immediately after the device is switched on. These are not errors, however.
Blinking	On	If an error occurs in the following modes, then the green LED blinks over the red LED: • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 • READY_TO_OPERATE

Table: LED "Status" - Error message (interface in POWERLINK mode)

### Interface status

LED "Status"		
Green	Red	Description
Off	Off	**Mode:** NOT_ACTIVE The interface is either in mode NOT_ACTIVE or one of the following modes or errors is present: • The device is switched off. • The device is in the startup phase. • The interface or device is not configured correctly in Automation Studio. • The interface or device is defective. **Managing node (MN)** The network is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface immediately enters mode PRE_OPERATIONAL_1. If POWERLINK communication is detected before the time has elapsed, however, the MN is not started. **Controlled node (CN)** The network is monitored for POWERLINK frames. If a frame is not received within the configured time window (timeout), the interface immediately enters mode BASIC_ETHERNET. If POWERLINK communication is detected before this time expires, however, the interface immediately enters mode PRE_OPERATIONAL_1.
Flickering (approx. 10 Hz)	Off	**Mode:** BASIC_ETHERNET The interface is in mode BASIC_ETHERNET. The interface is operated in Ethernet mode. **Managing node (MN)** This mode can only be exited by resetting the controller. **Controlled node (CN)** If POWERLINK communication is detected during this mode, the interface enters mode PRE_OPERATIONAL_1.
Single flash (approx. 1 Hz)	Off	**Mode:** PRE_OPERATIONAL_1 The interface is in mode PRE_OPERATIONAL_1. **Managing node (MN)** The MN is in "reduced cycle" mode. The CNs are configured in this mode. Cyclic communication is not yet taking place. **Controlled node (CN)** The CN can be configured by the MN in this mode. The CN waits until it receives an SoC frame and then switches to mode PRE_OPERATIONAL_2.
	On	**Controlled node (CN)** If the red LED lights up in this mode, this means that the MN has failed.
Double flash (approx. 1 Hz)	Off	**Mode:** PRE_OPERATIONAL_2 The interface is in mode PRE_OPERATIONAL_2. **Managing node (MN)** The MN starts cyclic communication (cyclic input data is not yet evaluated). The CNs are configured in this mode. **Controlled node (CN)** The CN can be configured by the MN in this mode. A command then switches the mode to READY_TO_OPERATE.
	On	**Controlled node (CN)** If the red LED lights up in this mode, this means that the MN has failed.

Table: LED "Status" - Interface state (interface in POWERLINK mode)

LED "Status"		
Green	**Red**	**Description**
Triple flash (approx. 1 Hz)	Off	**Mode:** READY_TO_OPERATE The interface is in mode READY_TO_OPERATE. **Managing node (MN)** Cyclic and asynchronous communication. Received PDO data is ignored. **Controlled node (CN)** The configuration of the CN is completed. Normal cyclic and asynchronous communication. The transmitted PDO data corresponds to the PDO mapping. However, cyclic data is not yet evaluated.
	On	**Controlled node (CN)** If the red LED lights up in this mode, this means that the MN has failed.
On	Off	**Mode:** OPERATIONAL The interface is in mode OPERATIONAL. PDO mapping is active and cyclic data is evaluated.
Blinking (approx. 2.5 Hz)	Off	**Mode:** STOPPED The interface is in mode STOPPED. **Managing node (MN)** This mode does not occur for the MN. **Controlled node (CN)** Output data is not being output, and no input data is being provided. This mode can only be reached and exited by a corresponding command from the MN.

Table: LED "Status" - Interface state (interface in POWERLINK mode)

Blink times
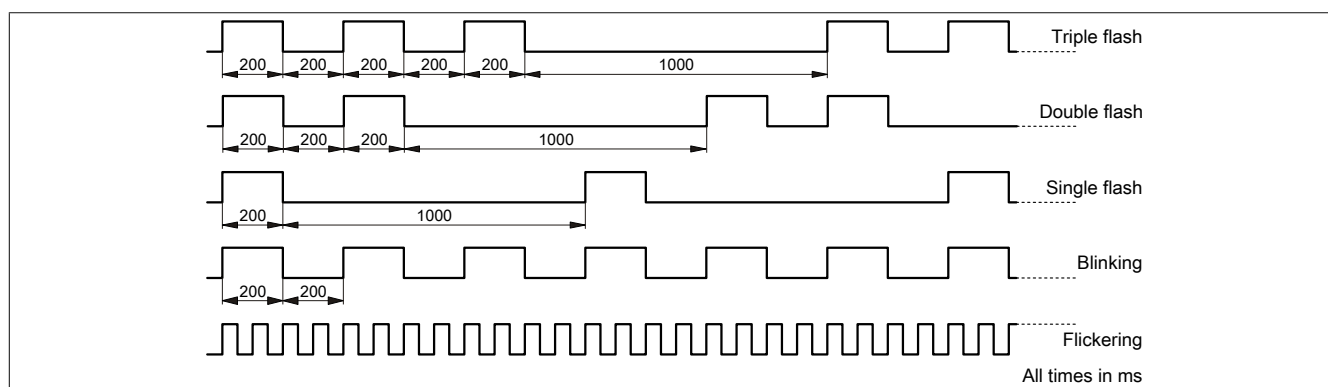
6.1.2 System stop error codes

A system stop error can occur due to incorrect configuration or defective hardware.
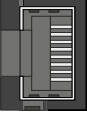
The error code is indicated by LED "Status" blinking red. The blinking signal of the error code consists of 4 switch-on phases with short (150 ms) or long (600 ms) duration. The error code is repeated every 2 seconds.
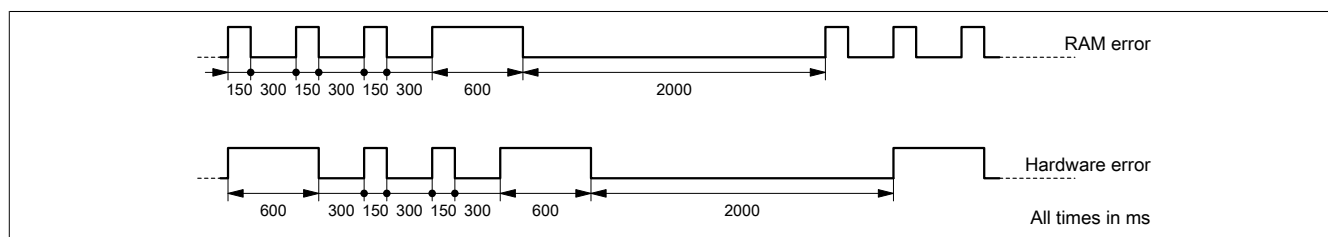
Error	Error description
RAM error	The device is defective and must be replaced.
Hardware error	The device or a system component is defective and must be replaced.

6.2 POWERLINK interface

The POWERLINK interface is designed as an integrated 2-port hub.

Interface	Pinout		
	Pin	Ethernet	
 Shielded RJ45	1	RXD	Receive data
	2	RXD\	Receive data\
	3	TXD	Transmit data
	4	Termination	
	5	Termination	
	6	TXD\	Transmit data\
	7	Termination	
	8	Termination	

POWERLINK cables offered by B&R can be used for wiring.

Order number	Connection type
X20CA0E61.xxxx	Connection cables - RJ45 to RJ45
X67CA0E41.xxxx	Attachment cables - RJ45 to M12

The following cabling guidelines must be observed:

- Cat 5 SFTP cables
- Observe the bend radius of the cable (see the data sheet of the cable)

Information:

Using POWERLINK cables offered by B&R (X20CA0E61.xxxx and X67CA0E41.xxxx) meets product standard EN 61131-2.

The customer must implement additional measures in the event of further requirements.

6.3 POWERLINK node number

POWERLINK high
POWERLINK low
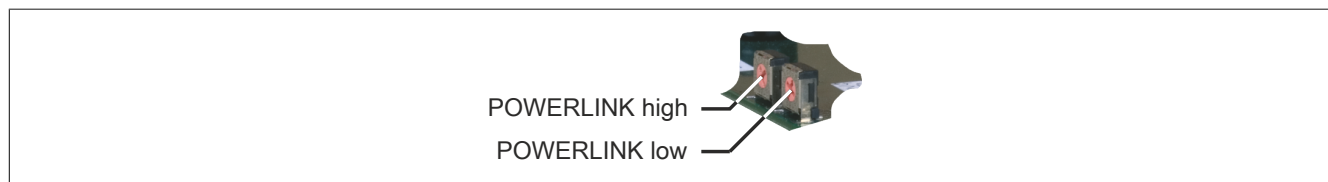
The node number for the POWERLINK node is set using the two node number switches.

6.3.1 POWERLINK V1

Node numbers between 0x00 and 0xFD are permitted.

Switch position	Description
0x00	Operation as managing node.
0x01 - 0xFD	Node number of the POWERLINK node. Operation as controlled node.
0xFE - 0xFF	Reserved, switch position not permitted.

6.3.2 POWERLINK V2

Node numbers between 0x01 and 0xF0 are permitted.

Switch position	Description
0x00	Reserved, switch position not permitted.
0x01 - 0xEF	Node number of the POWERLINK node. Operation as a controlled node (CN).
0xF0	Operation as a managing node (MN).
0xF1 - 0xFF	Reserved, switch position not permitted.

6.3.3 Ethernet mode

The interface can be operated as an Ethernet interface starting with Automation Studio V2.5.3 and Automation Runtime V2.90.

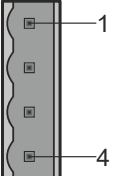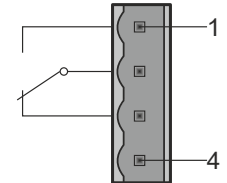The INA2000 station number is set using the Automation Studio software.

6.4 Ready relay

The module is equipped with a ready relay. After being enabled using software, the PC driver software must trigger the watchdog timer cyclically.

The relay enters the idle state with the following events:

- Trigger remains off for a defined time
- PC reset

The ready relay can be integrated into the control system to detect a corresponding error state on the Soft PLC.

Interface	Pin	Description	Internal wiring
Ready relay	1	Normally open contact	
	2	Root	
	3	Normally closed contact	
	4	NC	
4-pin male multipoint connector			

6.5 Card number switch

The one-digit card number (0x1 - 0xF) is configured using the card number switch. This number is used to identify the module.
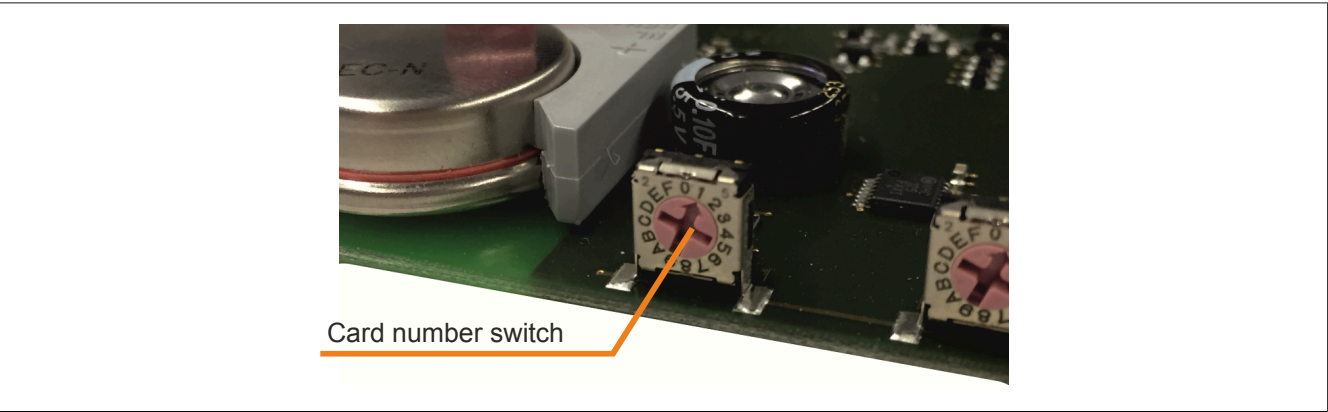

Figure 1: Card number switch

If the card is operated with Automation Runtime, then the card number switch must match the slot number in Automation Studio.

6.6 Backup battery

The module has 1 MB SRAM on board. The module is equipped with a backup battery for data buffering.

Backup battery data

Order number	
4A0006.00-000	1 pcs.
0AC201.91	4 pcs.
Short description	Lithium battery, 3 V / 950 mAh, button cell
Storage temperature	-40 to 85°C
Storage time	Max. 3 years at 30°C
Relative humidity	0 to 95% (non-condensing)

Battery monitoring

The battery voltage is checked cyclically. The cyclic load test of the battery does not considerably shorten its service life; instead, it gives an early warning of weakened battery capacity.

Status information about battery capacity is displayed to the user in the I/O mapping of the application.

Replacement interval for battery

The battery should be replaced every 4 years. The replacement intervals recommended by B&R reflect the batteries' average service life and operating conditions. They do not correspond to the maximum buffer duration!

Important information about the battery exchange

Information:

It is important to note that the backup battery must be replaced within 3 h as soon as low battery capacity is indicated.

Warning!

The battery is only permitted to be replaced by a Renata CR2477N battery. The use of any other battery may present a risk of fire or explosion.

The battery can explode if handled improperly. Do not recharge, disassemble or dispose of the battery in fire.

Procedure for replacing the battery

1. De-energize the power supply cable to the power supply unit of the industrial PC.
2. Perform electrostatic discharge at the top-hat rail or at the ground connection (do not reach into the power supply unit!)
3. Remove the cover from the industrial PC.
4. Pull the empty battery out of the battery holder using the removal strip.
5. It is important to ensure that the new battery is not handled with moist or greasy fingers. Plastic tweezers can also be used. Do not touch the battery with pliers or metal tweezers → short circuit!
6. Insert the new battery with the correct polarity. This is done by lifting the removal strip and inserting the battery into the battery holder with the "+" side facing the circuit board.
   In order for the battery to be pulled out again, it is essential that the removal strip is located above the battery.
7. Tuck the protruding end of the removal strip under the battery so that it does not protrude.
8. Install the cover of the industrial PC.
9. Energize the power supply cable to the power supply unit of the industrial PC.

Information:

Lithium batteries are hazardous waste! Used batteries should be disposed of in accordance with applicable local regulations.

7 Automation Runtime

Automation Runtime must be installed on the PC. The following runtime systems can be installed:

- ARwin
- ARemb

8 SRAM

The module supports plug and play and has 1 MB SRAM for remanent data (process variables and data objects). Memory available for remanent process variables depends on the CPU, Automation Runtime, etc.

9 Firmware update

The module comes with preinstalled firmware. The firmware is also part of the Automation Runtime operating system for the PLC. With different versions, the Automation Runtime firmware is loaded onto the module.

The most current firmware is made available automatically when updating Automation Runtime.