1 General information

1.1 Other applicable documents

For additional and supplementary information, see the following documents.

Other applicable documents

Document name	Title
MAX20	X20 System user's manual

1.2 Order data

Order number	Short description	Figure
	X20 interface module communication	
X20IF1086-2	X20 interface module, 1 POWERLINK interface, managing or controlled node, PRC function, 1 fiber optic connection	

Table 1: X20IF1086-2 - Order data

1.3 Module description

The interface module is used for application-specific expansion of the X20 controllers. It is equipped with a POWERLINK interface.

Functions:

- POWERLINK

POWERLINK

POWERLINK is a standard protocol for Fast Ethernet equipped with hard real-time characteristics.

2 Technical description

2.1 Technical data

Order number	X20IF1086-2
Short description	
Communication module	1x POWERLINK (V1/V2) managing or controlled node
General information	
B&R ID code	0xB455
Status indicators	Module status, bus function
Diagnostics	
Module status	Yes, using LED status indicator and software
Bus function	Yes, using LED status indicator and software
Power consumption	1.8 W (rev. <D0: 2 W)
Additional power dissipation caused by actuators (resistive) [W]	-
Certifications	
CE	Yes
UKCA	Yes
ATEX	Zone 2, II 3G Ex nA nC IIA T5 Gc IP20, Ta (see X20 user's manual) FTZÚ 09 ATEX 0083X
UL	cULus E115267 Industrial control equipment
HazLoc	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5
CCS	Yes
KC	Yes
Interfaces	
Fieldbus	POWERLINK (V1/V2) managing or controlled node
Type	Type 4 [1)]
Standard (compliance)	ANSI/IEEE 802.3
Variant	1x duplex LC
Transfer rate	100 Mbit/s
Transfer	
Physical layer	100BASE-FX
Half-duplex	Yes
Full-duplex	POWERLINK mode: No / Ethernet mode: Yes
Autonegotiation	No
Auto-MDI/MDIX	No
Controller	POWERLINK MAC
Wave length	Typ. 1300 nm Rx range: 1270 to 1380 nm Tx range: 1270 to 1380 nm
Cable fiber type	Multimode fiber with 62.5/125 µm or 50/125 µm core diameter LC connector on both sides
Optical power budget	
Glass fiber 62.5/125 µm, NA = 0.275	11 dB
Glass fiber 50/125 µm, NA = 0.200	7.5 dB
Line length	
Ethernet TCP/IP	Max. 400 m between 2 stations (segment length)
POWERLINK	Max. 2 km between 2 stations (segment length)
Electrical properties	
Electrical isolation	PLC isolated from POWERLINK (X1)
Operating conditions	
Mounting orientation	
Horizontal	Yes
Vertical	Yes
Installation elevation above sea level	
0 to 2000 m	No limitation
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m
Degree of protection per EN 60529	IP20

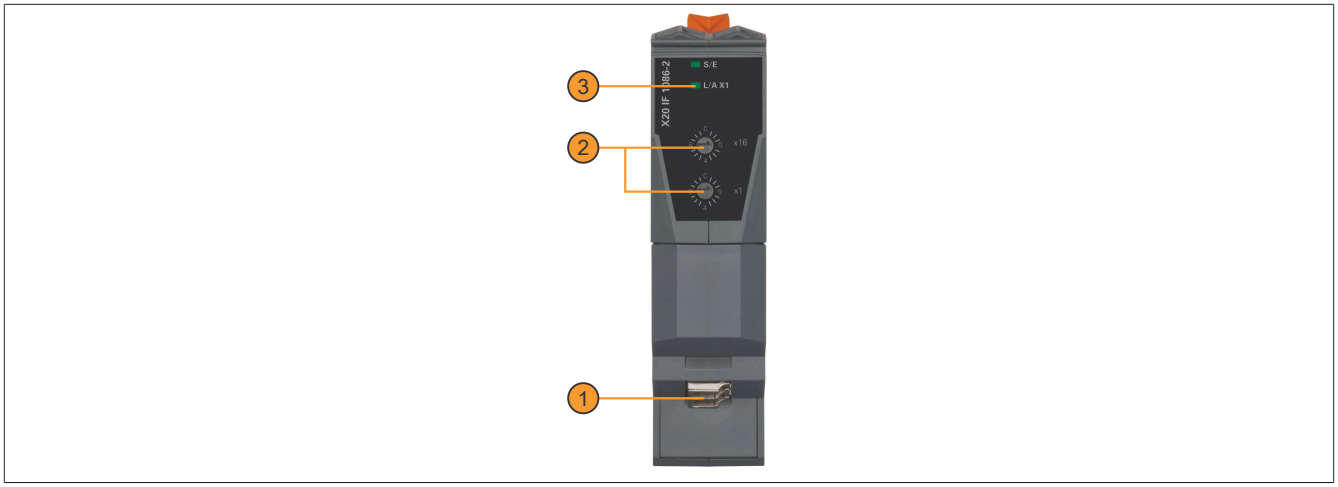
Table 2: X20IF1086-2 - Technical data

Order number	X20IF1086-2
Ambient conditions	
Temperature	
Operation	
Horizontal mounting orientation	-25 to 60°C
Vertical mounting orientation	-25 to 50°C
Derating	-
Storage	-40 to 85°C
Transport	-40 to 85°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Slot	In the X20 PLC

Table 2: X20IF1086-2 - Technical data

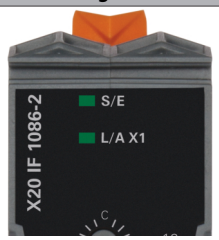
1) For additional information, see section "Communication / POWERLINK / General information / Hardware - IF/LS" in Automation Help.

2.2 Operating and connection elements



1	POWERLINK connection with duplex LC interface	2	Station number switches
3	LED status indicators	4	-

2.2.1 LED status indicators

Figure	LED	Color	Status	Description
	S/E	Green/Red		Status/Error LED. The LED indicators are described in section "LED "S/E" (status/error LED)" on page 5.
	L/A X1	Green	On	A link to the remote station has been established.
			Blinking	A link to the remote station has been established. Indicates Ethernet activity is taking place on the bus

2.2.1.1 LED "S/E" (status/error LED)

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.

2.2.1.1.1 Ethernet mode

In this mode, the interface is operated as an Ethernet interface.

LED "S/E"		
Green	Red	Description
On	Off	The interface is operated as an Ethernet interface.

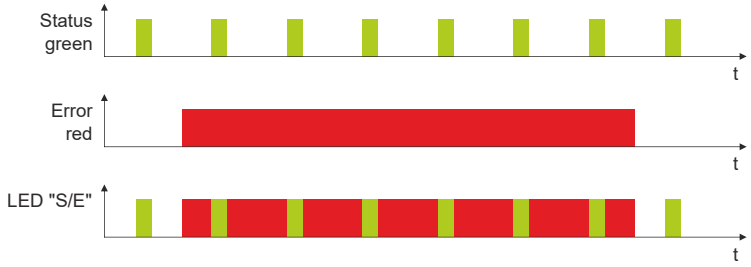
2.2.1.1.2 POWERLINK V1 mode

LED "S/E"		
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 8).
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 "S/E": POWERLINK V1 mode

2.2.1.1.3 POWERLINK V2 mode

Error message

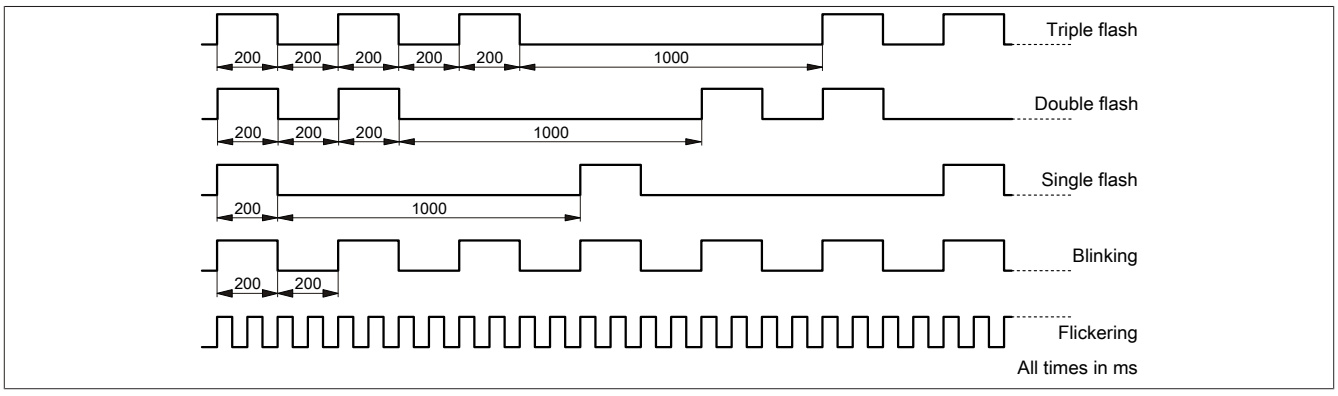
LED "S/E"		
Green	Red	Description
Off	On	The interface is in error mode (failed Ethernet frames, increased number of collisions on the network, etc.). Note: Several red blinking signals are displayed immediately after the device is switched on. These are not errors, however.
Blinking	On	If an error occurs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

Interface status

LED "S/E"		
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 (time-out), 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 (time-out), 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.

LED "S/E"		
Green	**Red**	**Description**
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.
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.

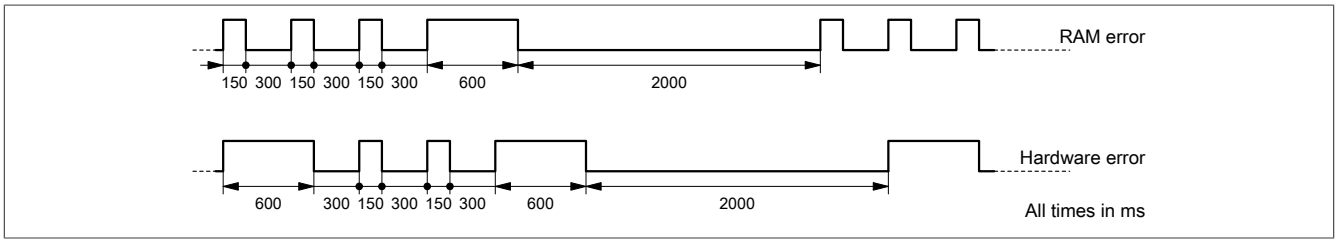
Blink times



2.2.1.1.4 System stop error codes

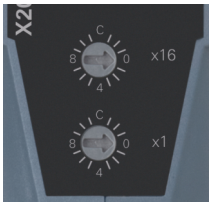
A system stop error can occur due to incorrect configuration or defective hardware.

The error code is indicated by LED "S/E" 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.

2.2.2 POWERLINK node number



The node number for the POWERLINK station is set using the two number switches. The node number can also be directly configured using Automation Studio.

2.2.2.1 POWERLINK V1

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.

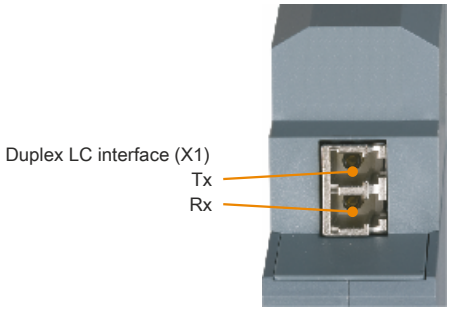
2.2.2.2 POWERLINK V2

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.

2.2.2.3 Ethernet mode

In this mode, the interface is operated as an Ethernet interface. The INA2000 station number is set using the Automation Studio software.

2.2.3 Duplex LC port

Figure	Description
	100 Base FX port, Duplex LC socket

2.2.3.1 Wiring guidelines for X20 modules with fiber optic cable

The following wiring guidelines must be observed:

- Cable fiber type: Multimode fiber with 62.5/125 µm or 50/125 µm core diameter
- On both sides: Duplex LC male connector
- Observe minimum cable flex radius (see data sheet for the cable)

4 Commissioning

4.1 Firmware

The module comes with preinstalled firmware. The firmware is part of the Automation Studio project. The module is automatically brought up to this level.

A hardware upgrade must be performed to upgrade the firmware included in Automation Studio (see Help "Project management - Workspace - Upgrades" in Automation Help).