

3IF789.9-1

1 General information

Interface module 3IF789.9-1 is an aPCI module and can be operated in any corresponding interface module slot, e.g. in the CP360.

3IF789.9-1 is a POWERLINK interface module. It can be used as a managing or controlled node. It is connected via an RJ45 port.

The module is also equipped with an X2X Link interface.

- POWERLINK for real-time Ethernet communication

2 Order data

Model number	Short description	Figure
	POWERLINK	
3IF789.9-1	aPCI interface module, 1 POWERLINK V1/V2 interface, managing or controlled node, 1 X2X Link master interface, electrically isolated, order 1x terminal block TB704 separately!	
	Required accessories	
	Terminal blocks	
0TB704.9	Accessory terminal block, 4-pin, screw clamp terminal block 2.5 mm ²	
0TB704.91	Accessory terminal block, 4-pin, push-in terminal block 2.5 mm ²	

Table 1: 3IF789.9-1 - Order data

3 Technical data

Model number	3IF789.9-1
Short description	
Communication module	1x X2X Link master, 1x POWERLINK (V1/V2) managing or controlled node
General information	
Status indicators	Transmitting/Receiving data for IF1 Status of the POWERLINK station, network activity, link/collision for IF2
Diagnostics	
Bus function (IF2)	Yes, using status LED and software
Data transfer (IF1)	Yes, using status LED and software
Station status (IF2)	Yes, using status LED and software
Power consumption	
3.3 VDC	2.3 W
5 VDC	0.5 W
Total	2.8 W
Electrical isolation	
IF1 - IF2	Yes
PLC - IFx	Yes
Certifications	
CE	Yes
KC	Yes
UL	cULus E115267 Industrial control equipment
Interfaces	
Interface IF1	
Fieldbus	X2X Link master
Design	4-pin male multipoint connector
Number of stations	Max. 253
Bus terminating resistor	Internal
Internal bus supply	No
Network topology	Line
Distance between 2 stations	Max. 100 m
Interface IF2	
Fieldbus	POWERLINK (V1/V2) managing or controlled node
Type	Type 2 ¹⁾
Design	1x shielded RJ45 port
Cable length	Max. 100 m between two stations (segment length)
Transfer rate	100 Mbit/s
In/Out buffer	20 kB ²⁾
Transfer	
Physical layer	100BASE-TX
Half-duplex	Yes
Full-duplex	POWERLINK mode: No / Ethernet mode: Yes
Autonegotiation	Yes
Auto-MDI / MDIX	Yes
Operating conditions	
Degree of protection per EN 60529	IP20
Environmental conditions	
Temperature	
Operation	0 to 60°C
Storage	-25 to 70°C
Relative humidity	
Operation	5 to 95%, non-condensing
Mechanical characteristics	
Note	Order 1x TB704 terminal block separately
Slot	Slot, e.g. in the CP360

Table 2: 3IF789.9-1 - Technical data

- 1) See the POWERLINK section of Automation Help under "General information, Hardware - IF/LS".
 2) Firmware version V50 and later. Before that, 11 kB.

4 Operating and connection elements



Figure 1: Operating and connection elements

5 X2X Link interface - Status indicators

Figure	LED	Color	Description
	RxD	Orange	The module is receiving data via the X2X Link interface.
	TxD	Orange	The module is transmitting data via the X2X Link interface.

Table 3: X2X Link interface - Status indicators

6 POWERLINK interface - Status indicators

Figure	LED	Color	Description
	Status	Red/Green	see "LED "S/E" (LED "Status/Error")" on page 3
	Tx	Orange	POWERLINK station transmitting data
	Rx	Orange	LED Rx is lit whenever POWERLINK activity is taking place on the bus.
	L/C	Red	Collision
		Green	The link to the remote station is established.

Table 4: POWERLINK interface - Status indicators

7 LED "S/E" (LED "Status/Error")

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.

7.1 Ethernet mode

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

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

Table: LED "S/E": Interface in Ethernet mode

7.2 POWERLINK V1 mode

LED "S/E"		Status of the POWERLINK node
Green	Red	
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 5: LED "S/E": POWERLINK V1 mode

7.3 POWERLINK V2 mode

Error message

LED "S/E"		Description
Green	Red	
Off	On	The interface is in the 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 "S/E" - Error message (interface in POWERLINK mode)

Interface status

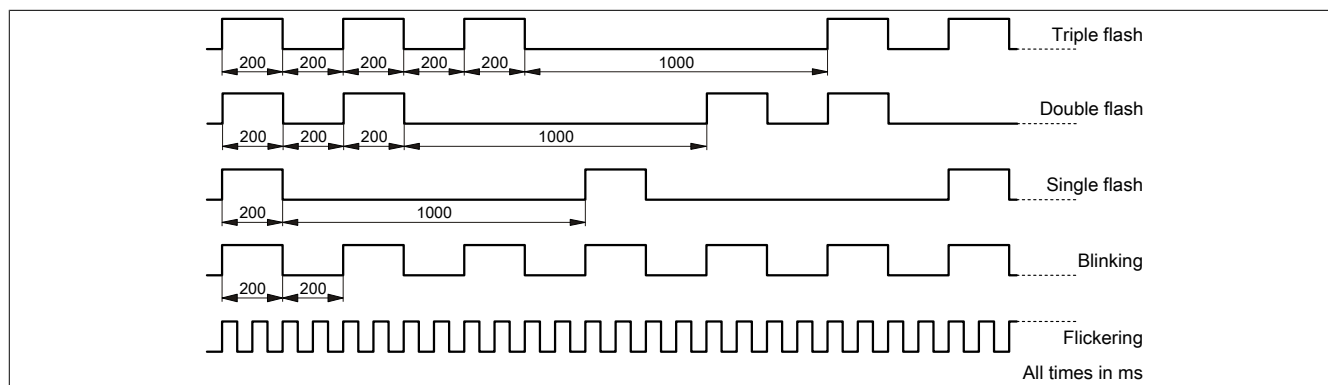
LED "S/E"		Description
Green	Red	
Off	Off	Mode: NOT_ACTIVE The interface is either in mode NOT_ACTIVE or one of the following modes or errors is present: • The device is switched off. • The device is in the startup phase. • The interface or device is not configured correctly in Automation Studio. • The 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 expires, however, then the MN is not started.
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.

Table: LED "S/E" - Interface state (interface in POWERLINK mode)

LED "S/E"		Description
Green	Red	
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" operation. 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) A solid red LED in this mode indicates failure of the MN.
Double flash (approx. 1 Hz)	Off	Mode: PRE_OPERATIONAL_2 The interface is in mode PRE_OPERATIONAL_2. Managing node (MN) The MN begins 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) A solid red LED in this mode indicates failure of the MN.
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 is taking place. Any received PDO data is ignored. Controlled node (CN) The configuration of the CN is completed. Normal cyclic and asynchronous communication is taking place. The transmitted PDO data corresponds to the PDO mapping. Cyclic data is not yet evaluated, however.
	On	Controlled node (CN) A solid red LED in this mode indicates failure of the MN.
On	Off	Mode: OPERATIONAL The interface is in mode OPERATIONAL. The 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. It is only possible to enter or leave this mode by a corresponding command from the MN.

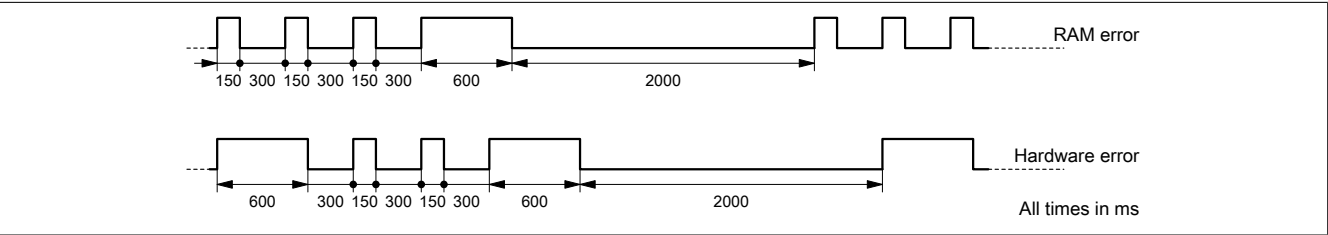
Table: LED "S/E" - Interface state (interface in POWERLINK mode)

Blink times



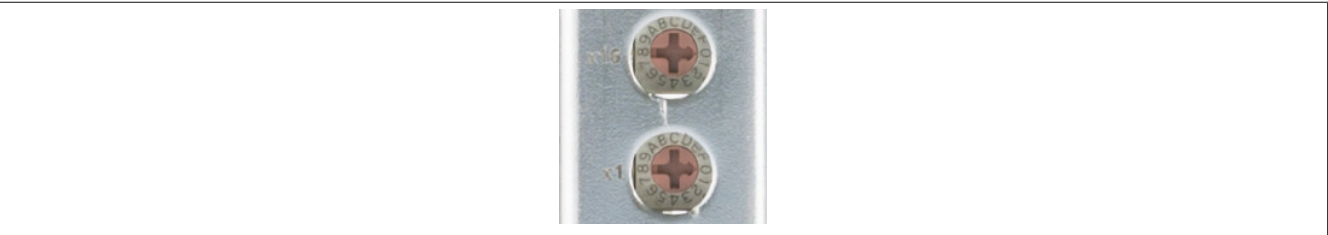
7.4 System stop error codes

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.

8 POWERLINK node number



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

9 POWERLINK interface



Figure 2: POWERLINK interface

For information about wiring with an Ethernet interface, see the Downloads section for the module on the B&R website (www.br-automation.com).

Pin	Assignment	
1	RxD	Receive data
2	RxD\	Receive data\
3	TxD	Transmit data
4	Termination	
5	Termination	
6	TxD\	Transmit data\
7	Termination	
8	Termination	

Table 6: POWERLINK interface

10 X2X Link interface

The electrically isolated X2X Link interface is a 4-pin multipoint connector.

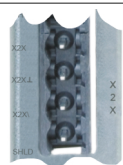


Figure 3: X2X Link interface

		Pinout	
Pin	X2X Link		
1	X2X		
2	X2X.L		
3	X2X\		
4	SHLD	Shield	

Table 7: X2X Link interface

11 Firmware

The module comes with preinstalled firmware. The firmware is a component of Automation Studio. The module is updated to this version automatically.

To update the firmware contained in Automation Studio, a hardware upgrade must be performed (see "Project management - Workspace - Upgrades" in Automation Help).