X20(c)BC1083

1 General information

The bus controller makes it possible to connect X2X Link I/O nodes to POWERLINK. It is also possible to operate the X2X Link cycle synchronously 1:1 or synchronous to POWERLINK using a prescaler.

POWERLINK is a standard protocol for Fast Ethernet with hard real-time characteristics. The POWER-LINK Standardization Group (EPSG) ensures that the standard remains open and is continually developed. www.ethernet-powerlink.org

The bus modules expanded to the left allow connection of up to 2 interface modules in addition to the bus controller.

- POWERLINK
- I/O configuration and firmware update via the fieldbus
- Integrated hub for efficient cabling
- Up to 2 slots for interface modules

2 Coated modules

Coated modules are X20 modules with a protective coating for the electronics component. This coating protects X20c modules from condensation and corrosive gases.
The modules' electronics are fully compatible with the corresponding X20 modules.

> **For simplification purposes, only images and module IDs of uncoated modules are used in this data sheet.**

The coating has been certified according to the following standards:

- Condensation: BMW GS 95011-4, 2x 1 cycle
- Corrosive gas: EN 60068-2-60, Method 4, exposure 21 days

3 Order data

Model number	Short description	Figure
	Expandable bus controllers	
X20BC1083	X20 bus controller, 1 POWERLINK interface, integrated 2-port hub, supports X20 interface module expansions, 2 RJ45, order bus base, power supply module and terminal block separately	
X20cBC1083	X20 bus controller, coated, 1 POWERLINK interface, integrated 2-port hub, supports X20 interface module expansions, 2 RJ45, order bus base, power supply module and terminal block separately	
	Required accessories	
	System modules for bus controllers	
X20PS9400	X20 power supply module, for bus controller and internal I/O power supply, X2X Link power supply	
X20PS9402	X20 power supply module, for bus controller and internal I/O power supply, X2X Link power supply, supply not electrically isolated	
X20cPS9400	X20 power supply module, coated, for bus controller and internal I/O power supply, X2X Link power supply	
	System modules for expandable bus controllers	
X20BB81	X20 bus base, for X20 base module (BC, HB, etc.) and X20 power supply module, with one expansion slot for an X20 add-on module (IF, HB, etc.), X20 locking plates (left and right) X20AC0SL1/X20AC0SR1 included	
X20BB82	X20 bus base, for X20 base module (BC, HB, etc.) and X20 power supply module, with 2 expansion slots for 2 X20 add-on modules (IF, HB, etc.), X20 locking plates (left and right) X20AC0SL1/X20AC0SR1 included	
X20cBB81	X20 bus base, coated, for X20 base module (BC, HB, etc.) and X20 power supply module, with one expansion slot for an X20 add-on module (IF, HB, etc.), X20 locking plates (left and right) X20AC0SL1/X20AC0SR1 included	
X20cBB82	X20 bus base, coated, for X20 base module (BC, HB, etc.) and X20 power supply module, with two expansion slots for two X20 add-on modules (IF, HB, etc.), X20 locking plates (left and right) X20AC0SL1/X20AC0SR1 included	
	Terminal blocks	
X20TB12	X20 terminal block, 12-pin, 24 VDC keyed	
	Optional accessories	
	System modules for expandable bus controllers	
X20IF1091-1	X20 interface module, for expandable bus controller, 1 X2X Link master interface, electrically isolated, order 1x TB704 terminal block separately	
	X20 interface module communication	
X20IF1041-1	X20 interface module, for DTM configuration, 1 CANopen master interface, electrically isolated, order 1x TB2105 terminal block separately	
X20IF1043-1	X20 interface module, for DTM configuration, 1 CANopen slave interface, electrically isolated, order 1x TB2105 terminal block separately	
X20IF1051-1	X20 interface module, for DTM configuration, 1 DeviceNet scanner (master) interface, electrically isolated, order 1x TB2105 terminal block separately	
X20IF1053-1	X20 interface module, for DTM configuration, 1 DeviceNet adapter (slave) interface, electrically isolated, order 1x TB2105 terminal block separately	
X20IF1061-1	X20 interface module for DTM configuration, 1 PROFIBUS DP V0/V1 master interface, electrically isolated	
X20IF1063-1	X20 interface module, for DTM configuration, 1 PROFIBUS DP V1 slave interface, electrically isolated	
X20IF1083-1	X20 interface - POWERLINK controlled node (slave)	
X20IF10A1-1	X20 interface module, for DTM configuration, 1 ASi master interface, electrically isolated, order 1x TB704 terminal block separately	
X20IF10D1-1	X20 interface module, for DTM configuration, 1 EtherNet/IP scanner (master) interface, electrically isolated	
X20IF10D3-1	X20 interface module, for DTM configuration, 1 EtherNet/IP adapter (slave) interface, electrically isolated	
X20IF10E1-1	X20 interface module for DTM configuration, 1 PROFINET RT controller (master) interface, electrically isolated	
X20IF10E3-1	X20 interface module, for DTM configuration, 1 PROFINET RT device (slave) interface, electrically isolated	
X20IF10G3-1	X20 interface module for DTM configuration, 1 EtherCAT slave interface, electrically isolated	
X20IF10H3-1	X20 interface module for DTM configuration, 1 Sercos III slave interface, electrically isolated	

Table 1: X20BC1083, X20cBC1083 - Order data

Model number	Short description	Figure
X20cIF1041-1	X20 interface module, coated, for DTM configuration, 1 CANopen master interface, electrically isolated, order 1x TB2105 terminal block separately	
X20cIF1061-1	X20 interface module coated, for DTM configuration, 1 PROFIBUS DP V0/V1 master interface, electrically isolated	
X20cIF1063-1	X20 interface module, coated, for DTM configuration, 1 PROFIBUS DP V1 slave interface, electrically isolated	
X20cIF10D3-1	X20 interface module, coated, for DTM configuration, 1 EtherNet/IP adapter (slave) interface, electrically isolated	
X20cIF10E3-1	X20 interface module, coated, for DTM configuration, 1 PROFINET RT device (slave) interface, electrically isolated	

Table 1: X20BC1083, X20cBC1083 - Order data

4 Technical data

Model number	X20BC1083	X20cBC1083
Short description		
Bus controller	POWERLINK (V1/V2) controlled node with up to 2 slots for interface modules	
General information		
B&R ID code	0x2268	0xE217
Status indicators	Module status, bus function	
Diagnostics		
Module status	Yes, using status LED and software	
Bus function	Yes, using status LED and software	
Power consumption		
Bus	2 W	
Additional power dissipation caused by the actuators (resistive) [W]	-	
Electrical isolation		
Fieldbus - X2X Link	Yes	
Fieldbus - I/O	Yes	
Certification		
CE	Yes	
KC	Yes	-
UL	cULus E115267 Industrial control equipment	
HazLoc	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5	
ATEX	Zone 2, II 3G Ex nA nC IIA T5 Gc IP20, Ta = 0 - Max. 60°C FTZÚ 09 ATEX 0083X	
DNV GL	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **B** (4 g) EMC: **B** (Bridge and open deck)	
LR	ENV1	
GOST-R	Yes	
Interfaces		
Fieldbus	POWERLINK (V1/V2) controlled node	
Design	2x shielded RJ45 (hub)	
Cable length	Max. 100 m between 2 stations (segment length)	
Transfer rate	100 Mbit/s	
Transmission		
Physical layer	100BASE-TX	
Half-duplex	Yes	
Full-duplex	No	
Autonegotiation	Yes	
Auto-MDI / MDIX	Yes	
Hub propagation delay	0.96 to 1 µs	
Min. cycle time [1]		
Fieldbus	200 µs	
X2X Link	200 µs	
Synchronization between bus systems possible	Yes	
Cyclic data		
Input data	Max. 1488 bytes	
Output data	Max. 1488 bytes	
Operating conditions		
Mounting orientation		
Horizontal	Yes	
Vertical	Yes	
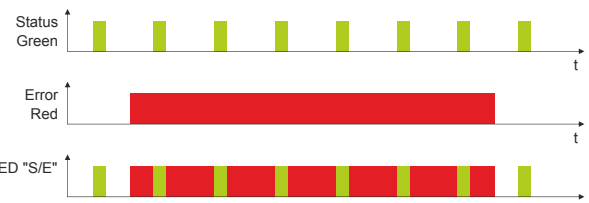
Table 2: X20BC1083, X20cBC1083 - Technical data

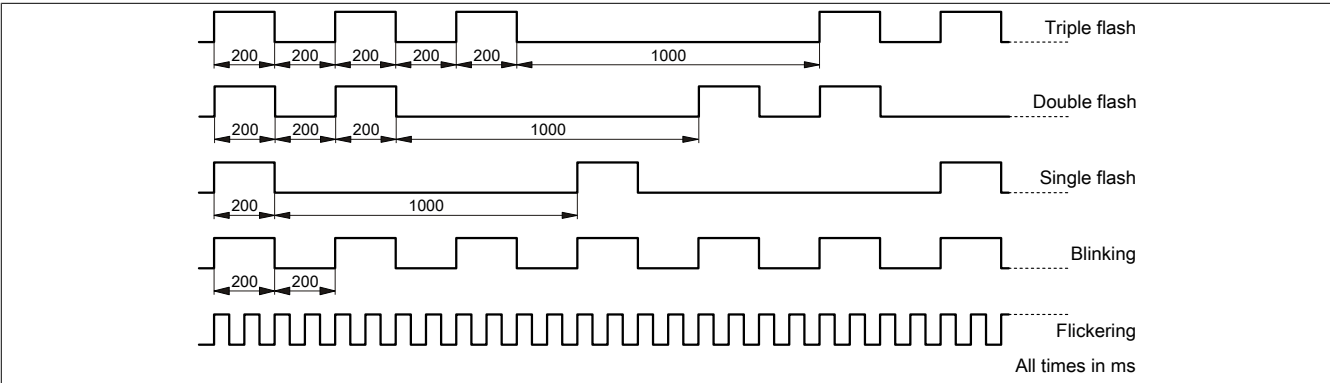| Model number	X20BC1083	X20cBC1083
Installation at elevations above sea level		
0 to 2000 m	No limitations	
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m	
EN 60529 protection	IP20	
Environmental conditions		
Temperature		
Operation		
Horizontal installation	-25 to 60°C	
Vertical installation	-25 to 50°C	
Derating	-	
Storage	-40 to 85°C	
Transport	-40 to 85°C	
Relative humidity		
Operation	5 to 95%, non-condensing	Up to 100%, condensing
Storage	5 to 95%, non-condensing	
Transport	5 to 95%, non-condensing	
Mechanical characteristics		
Note	Order 1x X20TB12 terminal block separately Order 1x X20PS9400 or X20PS9402 power supply module separately Order 1x X20BB81 or X20BB82 bus base separately	Order 1x X20TB12 terminal block separately Order 1x X20cPS9400 power supply module separately Order 1x X20cBB81 or X20cBB82 bus base separately
Spacing [2]		
X20BB81	$62.5^{+0.2}$ mm	
X20BB82	$87.5^{+0.2}$ mm	

Table 2: X20BC1083, X20cBC1083 - Technical data

1)   The minimum cycle time defines how far the bus cycle can be reduced without communication errors occurring.

2)   Spacing is based on the width of the X20BB81 or X20BB82 bus base. Up to two interfaces modules and one X20PS9400 or X20PS9402 supply module are also always required for the bus controller.

5 LED status indicators

Figure	LED	Color	Status	Description
	S/E[1]	Green	Off	No power supply or mode NOT_ACTIVE. The controlled node (CN) is either not getting power, or it is in the NOT_ACTIVE state. The CN waits in this state for about 5 seconds after a restart. Communication is not possible with the CN. If no POWERLINK communication is detected during these 5 seconds, the CN switches to the BASIC_ETHERNET state (flickering). If POWERLINK communication is detected before this time expires, however, the CN switches immediately to the PRE_OPERATIONAL_1 state.
			Flickering	BASIC_ETHERNET mode. The CN has not detected any POWERLINK communication. It is possible to communicate directly with the CN in this state (e.g. with UDP, IP, etc.). If POWERLINK communication is detected while in this state, the CN switches to the PRE_OPERATIONAL_1 state.
			Single flash	PRE_OPERATIONAL_1 mode. When operated on a POWERLINK V1 manager, the CN immediately switches to the PRE_OPERATIONAL_2 state. When operated on a POWERLINK V2 manager, the CN waits until an SoC frame is received and then switches to the PRE_OPERATIONAL_2 state.
			Double flash	PRE_OPERATIONAL_2 mode. The CN is normally configured by the manager in this state. Issuing a command (POWERLINK V2) or setting the data valid flag in the output data (POWERLINK V1) then switches to the READY_TO_OPERATE state.
			Triple flash	READY_TO_OPERATE mode. In a POWERLINK V1 network, the CN automatically switches to the OPERATIONAL state as soon as input data is present. In a POWERLINK V2 network, the manager switches to the OPERATIONAL state by issuing a command.
			On	OPERATIONAL mode. PDO mapping is active and cyclic data is being evaluated.
			Blinking	STOPPED mode. No output data is produced or input data supplied. It is only possible to switch to or leave this state after the manager has given the appropriate command.
		Red	On	The controlled node (CN) is in an error state (failed Ethernet frames, increased number of collisions on the network, etc.). If an error occurs in the following states, then the green LED blinks over the red LED: • PRE_OPERATIONAL_1 • PRE_OPERATIONAL_2 • READY_TO_OPERATE Note: • The LED blinks red several times immediately after startup. This is not an error, however. • The LED is lit red for CNs with configured physical node number 0 but that have not yet been assigned a node number via dynamic node allocation (DNA).
	L/A IFx	Green	On	Link established to the remote station
			Blinking	A link to the remote station has been established and there is activity on bus.

1)   The Status/Error LED "S/E" is a green/red dual LED.

Status LEDs - Blinking patterns

6 Operating and connection elements
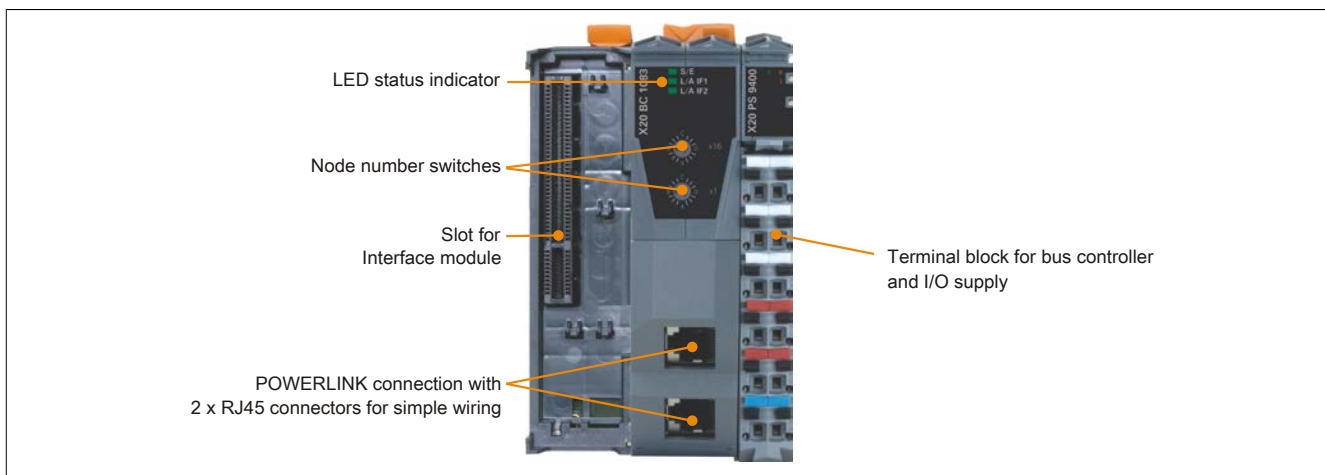
7 POWERLINK node number

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

Switch position	Description
0x00	Only permitted when operating the POWERLINK node in DNA mode.
0x01 - 0xEF	Node number of the POWERLINK node Operation as a controlled node.
0xF0 - 0xFF	Reserved, switch position not permitted

8 Dynamic node allocation (DNA)

The node numbers of all POWERLINK bus controllers can be assigned dynamically. This has the following advantages:

- No need to set the node number switch
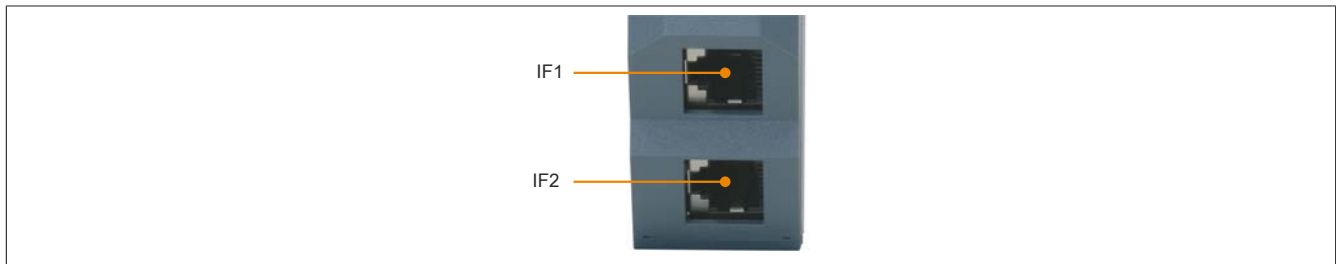- Easier installation
- Reduced error sources

For information about configuration as well as an example, see the AS help system (Communication → POWER-LINK → General information → Dynamic node allocation (DNA)).
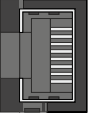
Information:

The IF1 interface must always be used as the input from the preceding node.

9 Ethernet interface

For information about cabling X20 modules with an Ethernet interface, see the module's download section on the B&R website (www.br-automation.com).

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	

10 Slot for interface modules

Depending on the bus base, up to two interface modules can be installed on the left side of the expandable bus controller:

Bus base	Slots for interface modules
X20BB81	1
X20BB82	2

Table 3: Slots for interface modules for various bus bases

11 Operating netX modules with bus controller X20BC1083

The following must be observed to operate netX modules with the bus controller without problems:

- A minimum revision ≥E0 is required for the bus controller.
- netX modules can only be operated with POWERLINK V2. V1 is not permitted.
- With SDO access to POWERLINK object 0x1011/1 on the bus controller, the netX firmware and the configuration stored on the bus controller are not reset. They can only be overwritten by accessing them again. This affects objects 0x20C0 and 0x20C8, subindexes 92 to 95.

12 SG3

This module is not supported on SG3 target systems.

13 SG4

The module comes with preinstalled firmware. The firmware is also part of the Automation Runtime operating system for the PLC. If the two versions are different, the Automation Runtime firmware is loaded to the module.

The latest firmware is made available automatically when updating Automation Runtime.