

# X20BC0073

## 1 General information

The bus controller makes it possible to connect X2X Link I/O nodes to CAN I/O. CAN I/O is a transfer protocol based on standard CAN bus that is fully integrated in the B&R system.

Up to 44 logical I/O modules can be connected to the bus controller. Up to 16 of these can be analog modules including power supply module.

- Fieldbus: CAN bus
- Automatic firmware update via the fieldbus
- Integrated I/O access in B&R Automation Studio
- Integrated terminating resistor

### Information:

The bus controller is unable to detect modules after a gap in the X2X Link station numbers. This can be caused by:

- X20 modules not being connected
- Modules with integrated node number switch, such as the X20BM05

### Information:

Only the standard function model (see the respective module description) is supported when the bus controller is used together with multi-function modules it has automatically configured itself.

## 2 Order data


Model number	Short description	Figure
	<b>Bus controllers</b>	
X20BC0073	X20 bus controller, 1 CAN I/O interface, order 1x TB2105 terminal block separately Order bus base, power supply module and terminal separately	
	<b>Required accessories</b>	
	<b>System modules for bus controllers</b>	
X20BB80	X20 bus base, for X20 base module (BC, HB, etc.) and X20 power supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included	
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	
	<b>Terminal blocks</b>	
0TB2105.9010	Accessory terminal block, 5-pin, screw clamps 2.5 mm <sup>2</sup>	
0TB2105.9110	Accessory terminal block, 5-pin, push-in terminal block 2.5 mm <sup>2</sup>	
X20TB12	X20 terminal block, 12-pin, 24 VDC keyed	

Table 1: X20BC0073 - Order data


### 3 Technical data

<b>Model number</b>	<b>X20BC0073</b>
<b>Short description</b>	
Bus controller	CAN I/O slave
<b>General information</b>	
B&R ID code	0x1F1D
Status indicators	Module status, bus function, data transfer, terminating resistor
Diagnostics	
Module status	Yes, using status LED and software
Bus function	Yes, using status LED
Data transfer	Yes, using status LED
Terminating resistor	Yes, using status LED
Power consumption	
Bus	1.5 W
Additional power dissipation caused by actuators (resistive) [W]	-
Certifications	
CE	Yes
KC	Yes
EAC	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 (see X20 user's manual) FTZU 09 ATEX 0083X
<b>Interfaces</b>	
Fieldbus	CAN I/O slave
Variant	5-pin male multipoint connector
Max. distance	1000 m
Transfer rate	Max. 1 Mbit/s
Default transfer rate	Automatic transfer rate detection or fixed rate setting
X2X Link cycle time	Permanently set to 1 ms <sup>1)</sup>
Synchronization between bus systems possible	No
Terminating resistor	Integrated in the module
<b>Electrical properties</b>	
Electrical isolation	CAN IO isolated from I/O CAN IO not isolated from bus
<b>Operating conditions</b>	
Mounting orientation	
Horizontal	Yes
Vertical	Yes
Installation elevation above sea level	
0 to 2000 m	No limitations
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m
Degree of protection per EN 60529	IP20
<b>Ambient conditions</b>	
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
<b>Mechanical properties</b>	
Note	Order 1x TB2105 terminal block separately Order 1x X20TB12 terminal block separately Order 1x X20PS9400 or X20PS9402 power supply module separately Order 1x X20BB80 bus base separately
Spacing <sup>2)</sup>	37.5 <sup>+0.2</sup> mm

Table 2: X20BC0073 - Technical data

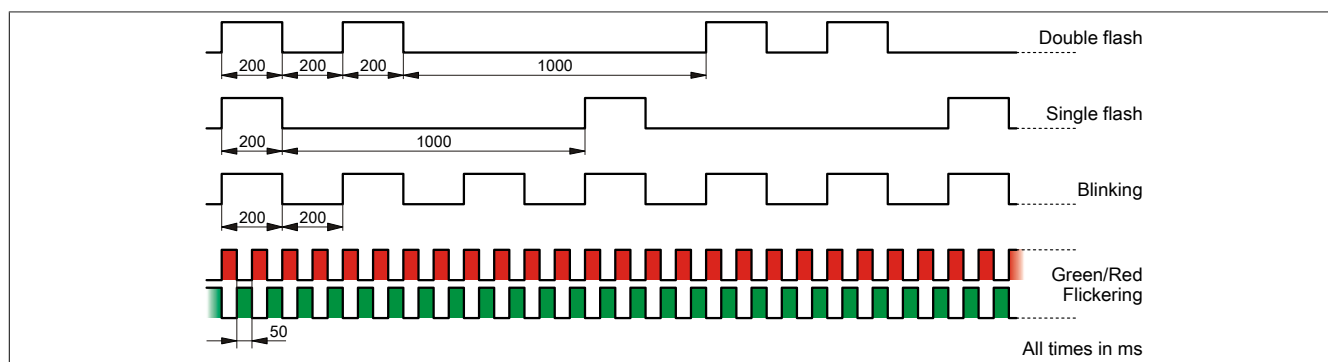
- CAN I/O data points are processed in Automation Runtime in a separate cycle set to 10 ms (CAN I/O cycle).
- Spacing is based on the width of the X20BB80 bus base. In addition, an X20PS9400 or X20PS9402 supply module is always required for the bus controller.

## 4 LED status indicators

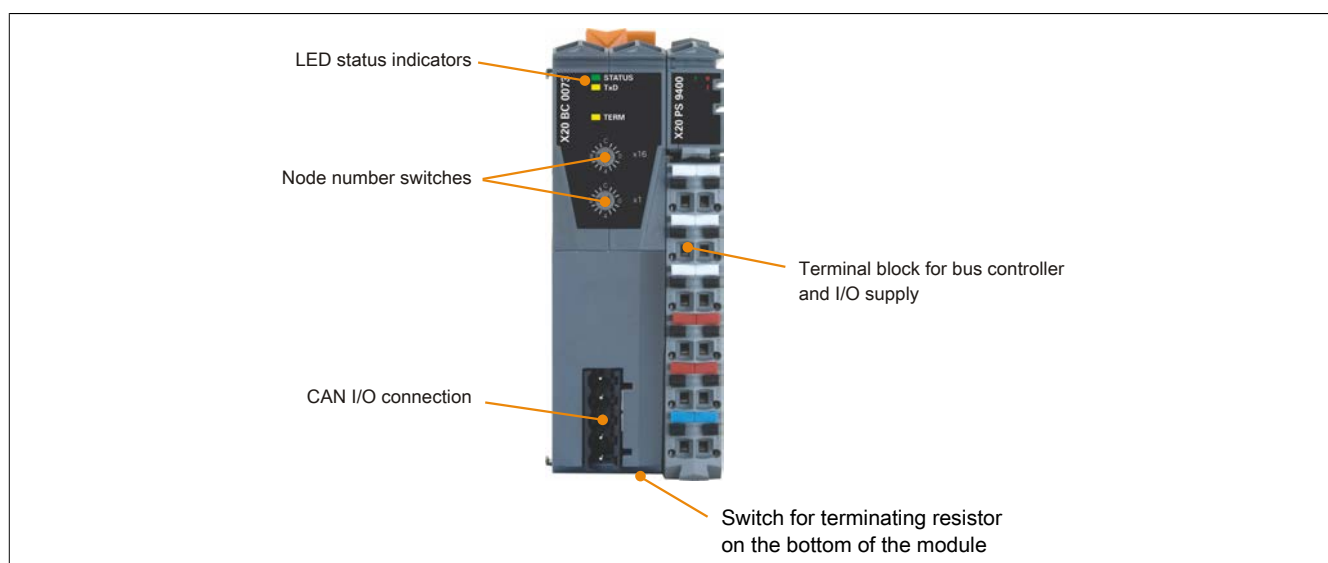
Figure	LED	Color	Status	Description
	STATUS <sup>1)</sup>	Green	Off	No power supply
			Blinking	PREOPERATIONAL mode
			On	RUN mode
		Red	On	CAN connection reports BusOff status
		Green/red	Flickering	Transfer rate detection in progress
		Green blinking / red single flash		PREOPERATIONAL mode; CAN connection reports: Warning limit reached
		Steady green / single red flash		RUN mode; CAN connection reports: Warning limit reached
	TxD	Yellow	Off	The bus controller is not transmitting any data via the CAN I/O fieldbus
			On	The bus controller is transmitting data via the CAN I/O fieldbus
	TERM	Yellow	Off	The terminating resistor integrated in the bus controller is turned off
On			The terminating resistor integrated in the bus controller is turned on	

1) The "STATUS" LED is a green/red dual LED.

### LED status indicators - Blink times

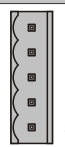


## 5 Operating and connection elements

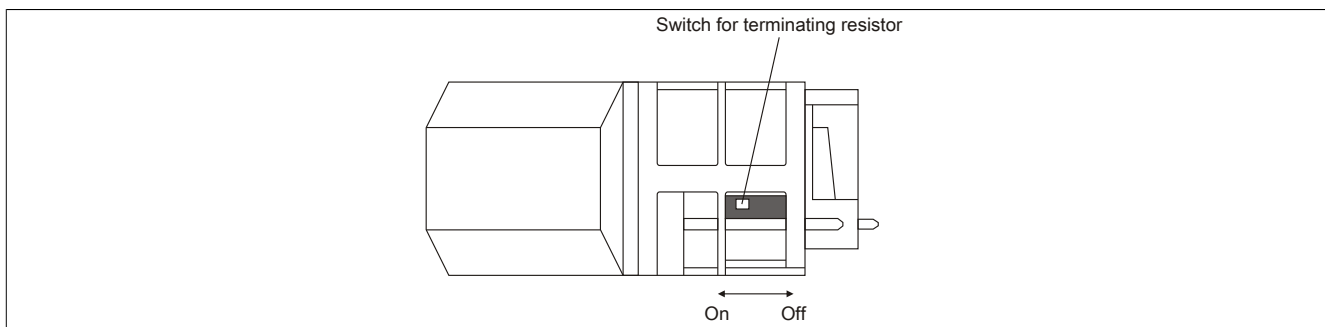


## 6 CAN bus interface

The interface is a 5-pin multipoint connector. Terminal block 0TB2105 must be ordered separately.

Interface	Pinout		
	Terminal	Function	
 5-pin male multipoint connector	1	CAN <sub>L</sub>	CAN ground
	2	CAN <sub>L</sub>	CAN low
	3	SHLD	Shield
	4	CAN <sub>H</sub>	CAN high
	5	NC	

## 7 Terminating resistor



A terminating resistor is already integrated on the bus controller. It can be turned on and off with a switch on the bottom of the housing. An active terminating resistor is indicated by the "TERM" LED.

## 8 Node number and transfer rate

The node number and transfer rate are configured using the two number switches on the bus controller. The switch positions 0x00 to 0x40 and 0x60 enable automatic transfer rate detection (see ["Automatic transfer rate detection" on page 5](#)). The rest of the switch positions have a fixed transfer rate (see table).



Switch position	Node number	Transfer rate
0x00 <sup>1)</sup>	From EEPROM	From EEPROM
0x01 - 0x3F	1 - 63	Automatic
0x40 <sup>1)</sup>	From EEPROM	From EEPROM
0x41 - 0x5F	1 - 31	1000 kbit/s
0x60 <sup>1)</sup>	From EEPROM	From EEPROM
0x61 - 0x7F	1 - 31	800 kbit/s
0x80	Reserved	-
0x81 - 0x9F	1 - 31	500 kbit/s
0xA0	Reserved	-
0xA1 - 0xBF	1 - 31	250 kbit/s
0xC0	Reserved	-
0xC1 - 0xDF	1 - 31	125 kbit/s
0xE0	Reserved	-
0xE1 - 0xFE	1 - 31	20 kbit/s
0xFF	Reserved	-

- 1) When one of these numbers is configured, the bus controller uses the operating parameters from the internal EEPROM. The EEPROM is programmed using library CANIO.

## 9 Automatic transfer rate detection

After startup, the bus controller goes into "Listen only" mode. This means the bus controller behaves passively on the bus and only listens.

The bus controller attempts to receive valid objects. If receive errors occur, the controller switches to the next transfer rate in the lookup table.

If no objects are received, all transfer rates are tested cyclically. This procedure is repeated until valid objects are received.

### Starting transfer rate

The bus controller begins the search with this transfer rate. The starting transfer rate can be defined in two different ways:

- Read from EEPROM
- The last detected transfer rate is used after a software reset (command code 20).

### Lookup table

The controller tests the transfer rate according to this table. Beginning with the starting transfer rate, the controller switches to the next lower transfer rate. At the end of the table, the bus controller restarts the search from the beginning.

Transfer rate
1000 kbit/s
500 kbit/s
250 kbit/s
125 kbit/s
50 kbit/s
20 kbit/s
10 kbit/s

## 10 SG4

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 latest firmware is made available automatically when updating Automation Runtime.

## 11 Logical I/O modules

Up to 44 I/O modules can be connected to the bus controller. A maximum of 28 digital and 16 analog modules including power supply module are possible. This value refers not to the physical but the logical I/O module slots.

### Information:

**Physical I/O modules can take up more than one digital or analog slot.**

The following table lists all X20 modules capable of using CAN I/O and how many logical digital and analog slots are needed.

Module	Digital module slots	Analog module slots
X20AI1744, X20AI1744-3	0	1
X20AI2222	0	1
X20AI2237	0	1
X20AI2322	0	1
X20AI2437	0	1
X20AI2438	0	2
X20AI2622	0	1
X20AI2632, X20AI2632-1	0	1
X20AI2636	0	1
X20AI4222	0	1
X20AI4322	0	1
X20AI4622	0	1
X20AI4632, X20AI4632-1	0	1
X20AI4636	0	1
X20AI8221	0	2
X20AI8321	0	2
X20AI744	0	2
X20AIB744	0	4
X20AO2437	0	1

Module	Digital module slots	Analog module slots
X20AO2438	0	2
X20AO2622	0	1
X20AO2632, X20AO2632-1	0	1
X20AO4622	0	1
X20AO4632, X20AO4632-1	0	1
X20AO4635	0	1
X20AP31xx	0	3
X20AT2222	0	1
X20AT2311	0	1
X20AT2402	0	1
X20AT4222	0	1
X20AT4232	0	1
X20AT6402	0	2
X20ATA312	0	1
X20ATA492	0	1
X20ATB312	0	Firmware version ≤1.1.3.0: 1 Firmware version >1.1.3.0: 2
X20ATC402	0	2
X20BR9300	0	1
X20BT9100	0	1
X20BT9400	0	1
X20CM0985	0	8
X20CM0985-2	0	8
X20CM1201	0	1
X20CM1941	0	1
X20CM4323	0	1
X20CM4810	0	2
X20CM8281	0	1
X20CM8323	0	1
X20CMR010	0	1
X20CMR100	0	1
X20CMR111	0	4
X20CS1011	0	2
X20CS1012	0	3
X20CS1013	0	1
X20CS1020	0	1
X20CS1030	0	1
X20CS1070	0	1
X20CS2770	0	2
X20DC1073	0	1
X20DC1176	0	1
X20DC1178	0	1
X20DC1196	0	1
X20DC1198	0	1
X20DC11A6	0	1
X20DC1376	0	1
X20DC137A	0	1
X20DC1396	0	1
X20DC1398	0	1
X20DC1976	0	1
X20DC2190	0	4
X20DC2395	0	1
X20DC2396	0	1
X20DC2398	0	2
X20DC4395	0	2
X20DI0471	2	0
X20DI2371	1	0
X20DI2372	1	0
X20DI2377	0	1
X20DI2653	1	0
X20DI4371	1	0
X20DI4372	1	0
X20DI4375	1	0
X20DI4653	1	0
X20DI4760	1	0
X20DI6371	1	0
X20DI6372	1	0
X20DI6373	1	0
X20DI6553	1	0
X20DI8371	1	0
X20DI9371	2	0
X20DI9372	2	0
X20DID371	1	0
X20DIF371	2	0
X20DM9324	1	0

Module	Digital module slots	Analog module slots
X20DO2321	1	0
X20DO2322	1	0
X20DO2623	0	1
X20DO2633	0	1
X20DO2649	1	0
X20DO4321	1	0
X20DO4322	1	0
X20DO4331	1	0
X20DO4332	1	0
X20DO4332-1	0	1
X20DO4529	1	0
X20DO4613	0	1
X20DO4623	0	1
X20DO4633	0	1
X20DO4649	1	0
X20DO6321	1	0
X20DO6322	1	0
X20DO6325	1	0
X20DO6529	1	0
X20DO6639	1	0
X20DO8232	1	0
X20DO8322	1	0
X20DO8331	1	0
X20DO8332	1	0
X20DO9321	2	0
X20DO9322	2	0
X20DOD322	1	0
X20DOF322	2	0
X20DS1828	0	2
X20DS1928	0	2
X20DS4387	0	2
X20DS438A	0	3
X20MM2436	0	1
X20MM3332	0	1
X20MM4331	0	2
X20MM4455	0	4
X20MM4456	0	4
X20PD0011	1	0
X20PD0012	1	0
X20PD0016	1	0
X20PD2113	1	0
X20PS2100	0	1
X20PS2110	0	1
X20PS3300	0	1
X20PS3310	0	1
X20PS4951	1	0
X20PS9400	0	1
X20PS9402	0	1
X20SM1426	0	1
X20SM1436	0	1
X20SM1436-1	0	1
X20SM1446-1	0	2