X20BR7300

1 General information

The bus receiver 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 43 logical I/O modules can be connected to the bus receiver. Up to 16 of these can be analog modules.

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

Information:

Modules that follow a gap in X2X Link node numbers are not configured by the bus receiver. This gap results from unconnected X20 modules.

Information:

Dummy modules and bus modules with an integrated node number switch are not supported by the bus receiver.

Information:

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

Information:

A hardware upgrade ≥2.0.0.0 for bus module X20BM01 is required in order to use the bus receiver.

The hardware upgrade is only permitted to be installed in the following versions of Automation Studio!

- **Automation Studio 4.2.7.54 to 4.2.x.x**
- **Automation Studio ≥4.3.2.103**
- **Automation Runtime ≥4.26**

A hardware upgrade ≥ 2.0.0.0 for bus module X20BM01 with Automation Studio versions < 4.2.7.54 and Automation Studio versions from 4.3.1.0 to 4.3.2.102 cause faulty behavior on bus module X20BM01.

Unconfigured X20 modules

A specific blinking behavior for LED "r" or "S" indicates X20 modules that are connected to the bus receiver but not configured.

The green LED blinks with a single or double flash. This blinking behavior depends on the respective X20 module.

Information:

In this case, a double flash indicates a missing configuration and not a firmware update.

2 Order data

Model number	Short description	Figure
	Bus receivers and transmitters	
X20BR7300	X20 bus receiver, CAN I/O, supply for X2X Link and internal I/O power supply, X20 end cover plates (left and right) X20AC0SL1/ X20AC0SR1 included	
	Required accessories	
	Bus modules	
X20BM01	X20 power supply bus module, 24 VDC keyed, internal I/O supply interrupted to the left	
X20BM05	X20 power supply bus module, with node number switch, 24 VDC keyed, internal I/O supply interrupted to the left	
	Terminal blocks	
X20TB12	X20 terminal block, 12-pin, 24 VDC keyed	

Table 1: X20BR7300 - Order data

3 Technical data

Model number	X20BR7300
Short description	
Bus receiver	CAN I/O slave
General information	
B&R ID code	0xEBED
Status indicators	Module status, bus function, data transfer, I/O power supply, bus power supply
Diagnostics	
Module status	Yes, using LED status indicator
Bus function	Yes, using LED status indicator
Data transfer	Yes, using LED status indicator
Overload	Yes, using LED status indicator and software
Power consumption for X2X Link power supply	0.6 W
Power consumption	
Internal I/O	0.6 W
Additional power dissipation caused by actuators (resistive) [W]	-
Certifications	
CE	Yes
EAC	Yes
ATEX	Zone 2, II 3G Ex nA nC IIA T5 Gc IP20, Ta (see X20 user's manual) FTZÚ 09 ATEX 0083X
X2X Link and I/O power supply	
Input voltage	24 VDC -15% / +20%
Fuse	Required line fuse: Max. 16 A, slow-blow for wiring Integrated fuse for module, non-replaceable
Reverse polarity protection	Yes
X2X Link power supply output	
Nominal output power	2 W
Parallel connection	No [1)]
Redundant operation	No
Overload characteristics	Short-circuit proof, temporary overload
Output I/O power supply	
Nominal output voltage	24 VDC
Behavior on short circuit	Required line fuse
Permissible contact load	10 A
Interfaces	
Fieldbus	CAN I/O slave
Variant	Connection made using 12-pin terminal block X20TB12
Max. distance	1000 m
Transfer rate	Max. 1 Mbit/s
Default transfer rate	Automatic transfer rate detection
X2X Link cycle time	Permanently set to 1 ms [2)]
Synchronization between bus systems possible	No
Electrical properties	
Electrical isolation	X2X Link supply not isolated from X2X Link power supply I/O supply not isolated from I/O power supply CAN I/O not isolated from I/O or X2X Link power supply

Table 2: X20BR7300 - Technical data

Model number	X20BR7300
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
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	
Note	Order 1x terminal block X20TB12 separately. Order 1x power supply bus module X20BM01 separately, X20 end cover plates (left and right) X20AC0SL1/X20AC0SR1 included.
Spacing	12.5 $^{+0.2}$ mm

Table 2: X20BR7300 - Technical data

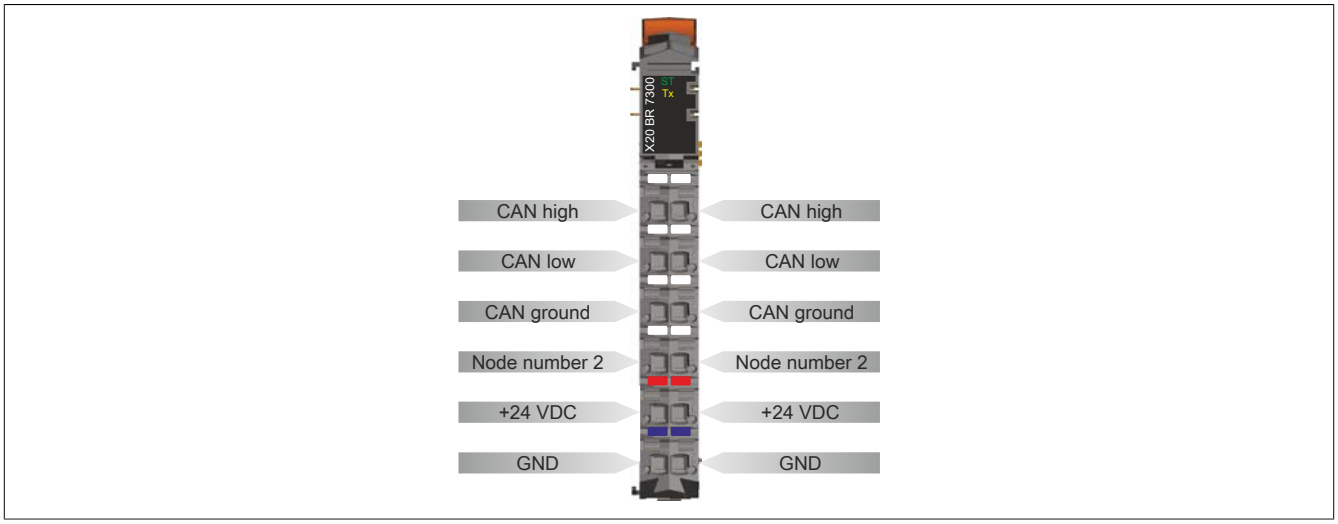
1) Power supply modules X20PS3300 and X20PS3310 can be used. The 2 W nominal output power of module X20BR7300 is not included in the calculation of the X2X Link power supply, however.
2) CAN I/O data points are processed in Automation Runtime in a separate cycle set to 10 ms (CAN I/O cycle).

4 LED status indicators

Figure	LED	Color	Status	Description
	ST[1]	Green	Off	No power supply
			Double flash	Mode BOOT (during firmware update)[2]
			Blinking	Mode PREOPERATIONAL
			On	Mode RUN
		Red	Double flash	The LED indicates one of the following states: • The X2X Link power supply of the power supply is overloaded. • The input voltage for the X2X Link power supply is too low.
			On	CAN connection reports BusOff status
		Green/Red	Flickering	Transfer rate detection in progress
			Blinking	I/O power supply too low
		Blinking green / Single red flash		PREOPERATIONAL mode: CAN connection reports warning limit reached
		Steady green / Single red flash		RUN mode: CAN connection reports warning limit reached
	Tx	Yellow	Off	Bus receiver not transmitting any data via CAN I/O fieldbus
			On	Bus controller transmitting data via the CAN I/O fieldbus

1) LED "ST" is a green/red dual LED.
2) Depending on the configuration, a firmware update can take up to several minutes.

5 Pinout



6 Setting the module's node number

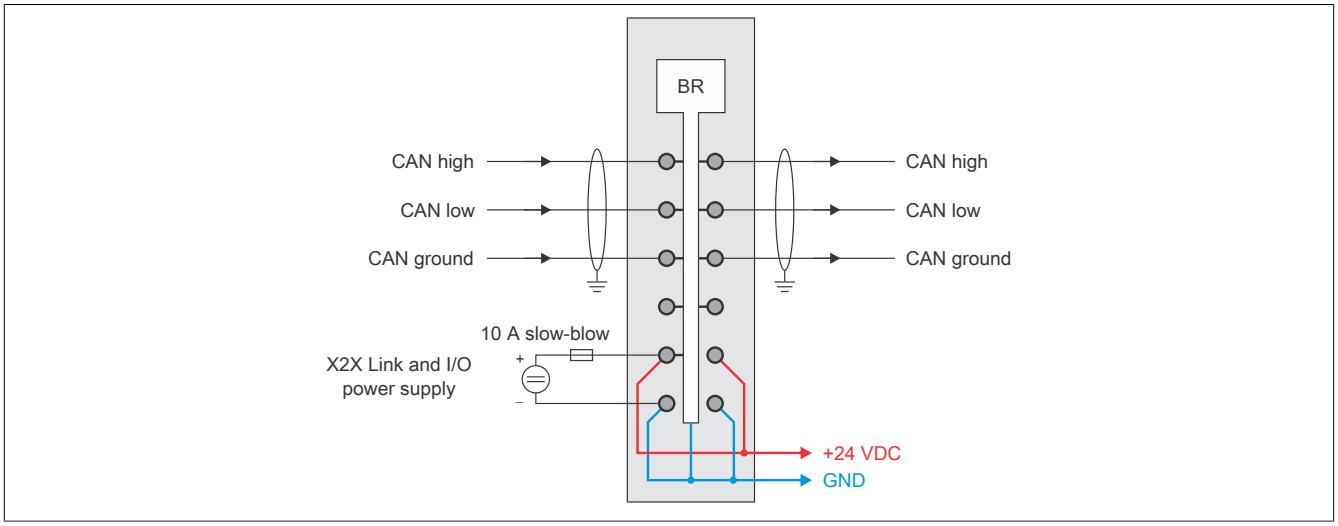
Node number 1 or 2 can be set on the module. By default, the module is set to node number 1. Node number 2 is set on the module by connecting terminal connections 14 and 24 using a jumper (see also "Connection examples", "Example 2: Node number 2" on page 5).

7 Terminating resistor

CAN networks are cabled using a bus structure where both ends of the bus must be wired with a terminating resistor. The terminating resistor must be wired externally (see also "Connection examples", "Example 3: With terminating resistor" on page 5).

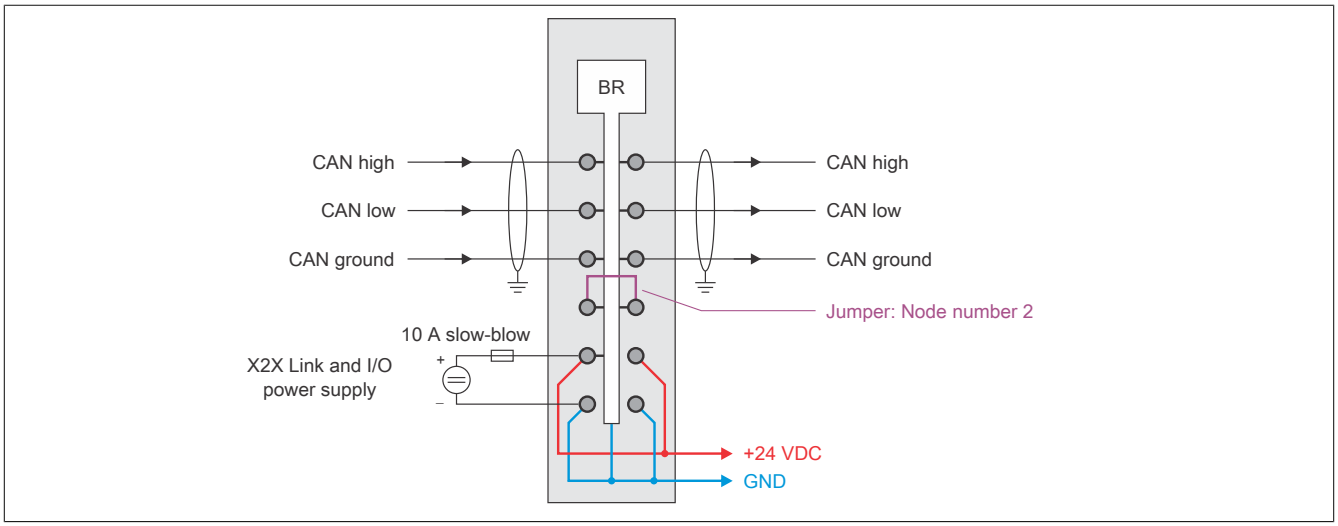
8 Connection examples

Example 1



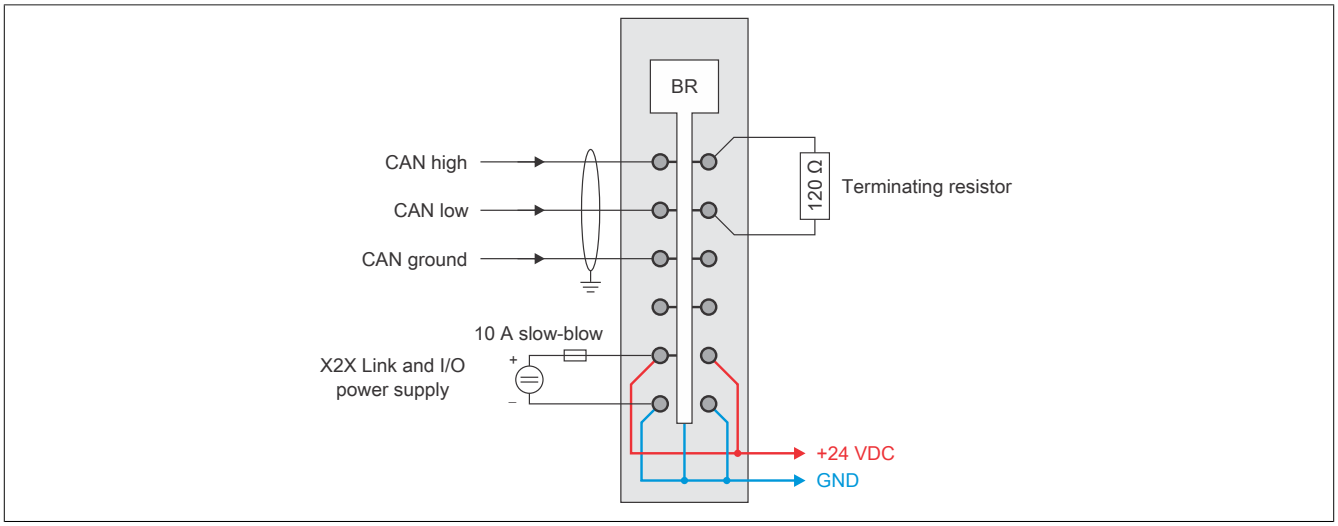
Example 2: Node number 2

By default, the module is set to node number 1. The module is set to node number 2 if terminal connection 14 is connected to 24 using a jumper.



Example 3: With terminating resistor

The terminating resistor must be wired externally.



9 Automatic transfer rate detection

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

The bus receiver attempts to receive valid objects. If receive errors occur, the bus receiver 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 receiver begins the search with this transfer rate. The last detected transfer rate is used after a software reset (command code 20).

Lookup table

The bus receiver 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 receiver 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 43 I/O modules can be connected to the bus receiver (up to 16 of these can be analog modules). 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**
X20AIA744	0	**2**
X20AIB744	0	**4**
X20AO2437	0	1
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	1
X20ATC402	0	**2**
X20BR9300	0	1
X20BT9100	0	1
X20BT9400	0	1
X20CM0985	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

Module	Digital module slots	Analog module slots
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
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
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

Module	Digital module slots	Analog module slots
X20PS4951	1	0
X20PS9400	0	1
X20PS9402	0	1
X20SM1426	0	1
X20SM1436	0	1

12 Register description

12.1 General data points

In addition to the registers described in the register description, the module has additional general data points. These are not module-specific but contain general information such as serial number and hardware variant.

General data points are described in section "Additional information - General data points" of the X20 system user's manual.

12.2 Overview of registers

Register	Name	Data type	Read		Write	
			Cyclic	Acyclic	Cyclic	Acyclic
0	Status of the module	USINT	•			
	IF1.ST1.StatusInput01	Bit 0				
	IF1.ST1.StatusInput02	Bit 1				

12.3 Status of the module

Name:
IF1.ST1.StatusInput01 and IF1.ST1.StatusInput02

The following voltage and current states of the module are monitored in this register:

- X2X Link supply current >0.4 A is indicated as a warning.
- X2X Link supply voltage <4.7 V is indicated as a warning.
- 24 VDC I/O supply voltage <20.4 V is indicated as a warning.

Data type	Values
USINT	See the bit structure.

Bit structure:

Bit	Description	Value	Information
0	IF1.ST1.StatusInput01 X2X Link supply current and X2X Link supply voltage	0	No error
		1	Warning in the event of overcurrent (>0.4 A) or undervoltage (<4.7 V)
1	IF1.ST1.StatusInput02 I/O supply voltage	0	I/O supply voltage greater than or equal to the warning level of 20.4 V
		1	I/O supply voltage less than the warning level of 20.4 V
2 - x	Reserved	0	