X20BC0063

1 General information

PROFIBUS DP is based on the physics of the RS485 interface. Data transfer is controlled using a hybrid bus access procedure: Active stations receive communication rights via a token passing procedure and can then access all stations on the network according to the master-slave principle. The maximum time of circulation for a token can be configured, which results in a defined cycle time.

Access represents various services for the user for both cyclic and for acyclic data transfer.

This bus controller makes it possible to connect X2X Link I/O nodes to PROFIBUS DP. It supports PROFIBUS DP with all of its options and other additional properties. In addition to the device, module and channel diagnostics provided in the PROFIBUS standard, it is also possible, for example, to switch to the slot diagnostics option in S7 format.

X20 or other modules based on X2X Link can be connected to the bus controller. The configuration of the modular system is optimally supported by PROFIBUS DP.

- Fieldbus: PROFIBUS DP
- I/O configuration via the fieldbus
- Extensive device, module, and channel diagnosis according to PROFIBUS DP standard
- Communication with X2X Link I/O nodes even works when some nodes are missing or without power

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
	Bus controllers	
X20BC0063	X20 bus controller, 1 PROFIBUS DP interface, 9-pin DSUB connection, order bus base, power supply module and terminal block separately	
	Required accessories	
	System modules for bus controllers	
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	
	Terminal blocks	
X20TB12	X20 terminal block, 12-pin, 24 VDC keyed	
	Optional accessories	
	Infrastructure components	
0G1000.00-090	Bus connector, RS485, for PROFIBUS networks	

Table 1: X20BC0063 - Order data

3 Technical data

Model number	X20BC0063
Short description	
Bus controller	PROFIBUS DP V0 slave
General information	
B&R ID code	0x1F1C
Status indicators	Module status, bus function, data transfer
Diagnostics	
Module status	Yes, using status LED and software
Bus function	Yes, using status LED
Data transfer	Yes, using status LED
Power consumption	
Bus	2.3 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) FTZÚ 09 ATEX 0083X
Interfaces	
Fieldbus	PROFIBUS DP V0 slave
Variant	9-pin female DSUB connector
Max. distance	1200 m
Transfer rate	Max. 12 Mbit/s
Default transfer rate	Automatic transfer rate detection
Min. cycle time [1]	
Fieldbus	No limitations
X2X Link	400 µs
Synchronization between bus systems possible	No
Electrical properties	
Electrical isolation	PROFIBUS isolated from I/O PROFIBUS not isolated from bus
Operating conditions	
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
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 X20TB12 terminal block separately Order 1x X20PS9400 or X20PS9402 power supply module separately Order 1x X20BB80 bus base separately
Spacing [2]	37.5 $^{+0.2}$ mm

Table 2: X20BC0063 - 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 X20BB80 bus base. In addition, an X20PS9400 or X20PS9402 supply module is always required for the bus controller.

4 LED status indicators

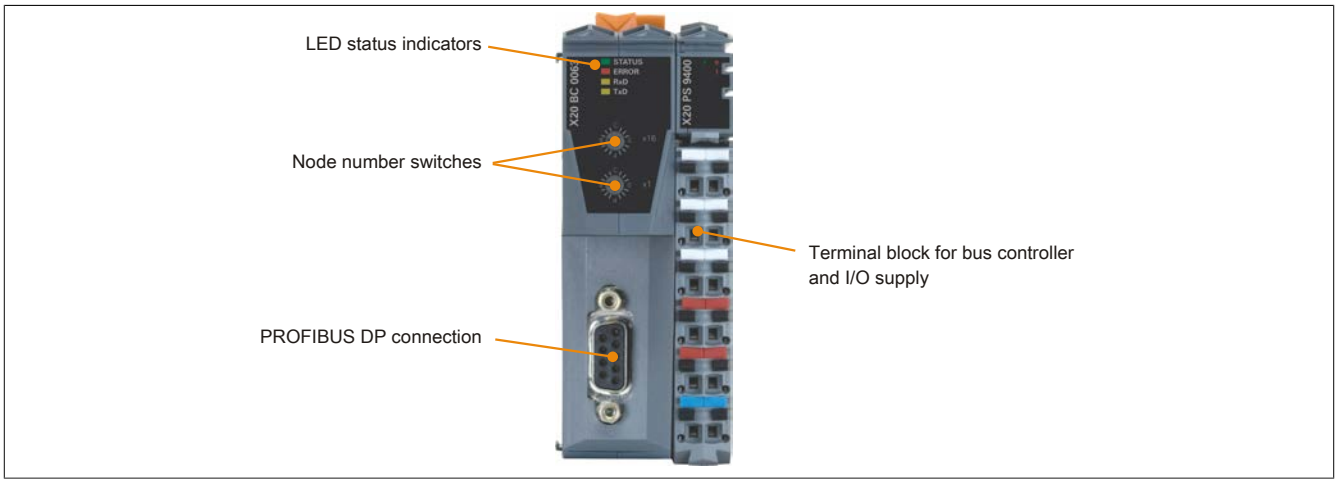
<table>
<tr><th>Figure</th><th>LED</th><th colspan="3">Description</th></tr>
<tr><td rowspan="12"> 
</td><td rowspan="11">STATUS and ERROR</td><td colspan="3">Status indicator for PROFIBUS DP bus controller.</td></tr>
<tr><td>STATUS (green)</td><td>ERROR (red)</td><td>Description</td></tr>
<tr><td>Off</td><td>Off</td><td>HARDWARE FAULT / POWER FAIL</td></tr>
<tr><td>On</td><td>On</td><td>BUS OFF</td></tr>
<tr><td>On</td><td>Blinking</td><td>WAIT FOR CONFIG</td></tr>
<tr><td>Blinking</td><td>Off</td><td>DATA EXCHANGE - DIAGNOSTICS</td></tr>
<tr><td>On</td><td>Off</td><td>DATA EXCHANGE - NO ERROR</td></tr>
<tr><td>Blinking</td><td>Blinking</td><td>CONFIG ERROR</td></tr>
<tr><td>Off</td><td>Blinking</td><td>SERVICE MODE - BOOT</td></tr>
<tr><td>Single flash</td><td>Single flash</td><td>HARDWARE FAULT</td></tr>
<tr><td colspan="3">For a more detailed description see "State diagnostics via the Status/Error LEDs" on page 3.</td></tr>
<tr><td>RxD</td><td colspan="3">This yellow LED lights up when the bus controller is receiving data from the PROFIBUS DP fieldbus.</td></tr>
<tr><td>TxD</td><td colspan="3">This yellow LED lights up when the bus controller is sending data via the PROFIBUS DP fieldbus.</td></tr>
</table>

5 State diagnostics via the Status/Error LEDs

The condition of the PROFIBUS DP bus controller is diagnosed using the LED status indicators "STATUS" and "ERROR".

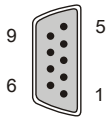
STATUS (green)	ERROR (red)	Function	Solution
Off	Off	HARDWARE FAULT / POWER FAILURE	• Check wiring of supply voltage.
On	On	BUS OFF • Baud rate not detected • No connection to the DP master • DP master not active	• Check the PROFIBUS network • Check the PROFIBUS master
On	Blinking	WAIT FOR CONFIG • Transfer rate has been detected, but the PROFIBUS master has not yet configured the bus controller	• Check the node number switch • Check the slave address in the master configuration
Blinking	Off	DATA EXCHANGE - DIAGNOSTICS • The bus controller is still initializing the I/O modules • The I/O modules configured by the master cannot be found • An error has occurred on one or more I/O modules (short circuit, etc.)	• Initialization can take a few seconds depending on the number of I/O modules connected • Check the wiring and power supply for the I/O modules • Read diagnostic messages in the respective PROFIBUS master's engineering tool
On	Off	DATA EXCHANGE • Cyclic data exchange with the PROFIBUS DP master	
Blinking	Blinking	CONFIG ERROR • One or more I/O modules found do not match with the configuration of the PROFIBUS DP master • The configuration received from the PROFIBUS master is invalid	• Check the wiring of the X2X Link and the order of I/O modules • Check configuration of the PROFIBUS master • Read diagnostic messages in the respective PROFIBUS master's engineering tool • Check the configuration being used - it is possible that the number of configured I/O modules is too high
Off	Blinking	SERVICE MODE - BOOT • The bus controller's node number has been set to 255 (0xFF) - after 2 s the bus controller starts in service mode	• Set a valid node number
Single flash	Single flash	HARDWARE FAULT	

6 Operating and connection elements



7 PROFIBUS DP interface

A shielded line must be used for the interface.

Interface	Pinout		
 9-pin female DSUB connector	**Pin**	**RS485**	
	1	Reserved	
	2	Reserved	
	3	RxD/TxD-P	Data[1)]
	4	CNTR-P	Transmit enable
	5	DGND	Power supply
	6	VP	Power supply
	7	Reserved	
	8	RxD/TxD-N	Data\[2)]
	9	CNTR-N	Transmit enable\
	CNTR ... Direction switch for external repeaters		

1) Cable color: Red
2) Cable color: Green

8 PROFIBUS DP node number switches

The PROFIBUS DP node number is configured using both number switches of the bus controller.

Switch position	Node number
0x00	Not allowed
0x01 - 0x7D	1 to 125
0x7E - 0xFF	Not allowed

9 Automatic transfer rate detection

After booting or after a communication timeout, the bus controller goes into the status "Baud Search". This means the bus controller behaves passively on the bus.

The bus controller always begins the search for the configured transfer rate with the highest transfer rate. If a complete error-free telegram is not received during monitoring time, then the search is continued using the next lowest transfer rate.

Transfer rate
12 Mbit/s
6 Mbit/s
3 Mbit/s
1.5 Mbit/s
500 kbit/s
187.5 kbit/s
93.75 kbit/s
45.45 kbit/s
19.2 kbit/s
9.6 kbit/s

10 Additional documentation and import files (EDS)

Additional documentation about bus controller functions as well as the necessary import files for the master engineering tool are available for download from the Downloads section of the B&R website (www.br-automation.com).