

# X20BT9400

Data sheet  
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# 1 General information

## 1.1 Other applicable documents

For additional and supplementary information, see the following documents.

### Other applicable documents

Document name	Title
MAX20	<a href="#">X20 System user's manual</a>

## 1.2 Order data


Order number	Short description	Figure
	<b>Bus receivers and transmitters</b>	
X20BT9400	X20 bus transmitter, X2X Link, supply for internal I/O power supply, X2X Link power supply for X67 modules, reverse polarity protection, short-circuit proof, overload-proof, parallel connection possible, redundancy operation possible	
	<b>Required accessories</b>	
	<b>Bus modules</b>	
X20BM11	X20 bus module, 24 VDC keyed, internal I/O power supply connected through	
X20BM15	X20 bus module, with node number switch, 24 VDC keyed, internal I/O power supply connected through	
	<b>Terminal blocks</b>	
X20TB12	X20 terminal block, 12-pin, 24 VDC keyed	
	<b>Optional accessories</b>	
	<b>X2X Link Cable</b>	
X67CA0X99.1000	Cable for custom assembly, 100 m	
X67CA0X99.5000	Cable for custom assembly, 500 m	

Table 1: X20BT9400 - Order data

## 1.3 Module description

To connect an X20 system to an X67 system, a bus transmitter is simply connected to the end of the X20 block so that the X2X Link cable can be clamped. The bus transmitter also provides the X2X Link supply voltage of the X67 system. The X67 system power supply module that was previously always necessary can be omitted.

- X2X Link bus transmitter
- For seamless expansion of the system
- Up to 100 m segment length
- Supply for internal I/O power supply
- Integrated X2X Link power supply of the X67 system
- Operation only on the rightmost slot

Functions:

- [Monitoring the operating limits](#)

### Monitoring operating limits

The voltage of the I/O power supply is monitored for voltage overshoot or undershoot.

## 2 Technical description

### 2.1 Technical data

Order number	<b>X20BT9400</b>
Short description	
Bus transmitter	X2X Link bus transmitter with supply for I/O and integrated X67 system power supply
General information	
B&R ID code	0xA238
Status indicators	X2X bus function, operating state, module status
Diagnostics	
Module run/error	Yes, using LED status indicator and software
X2X bus function	Yes, using LED status indicator
Power consumption for X2X Link power supply <sup>1)</sup>	1.38 W
Power consumption <sup>2)</sup>	
Bus	0.5 W
Internal I/O	
As bus transmitter	0.1 W
Additionally as supply module	0.6 W
Additional power dissipation caused by actuators (resistive) [W]	-
Certifications	
CE	Yes
UKCA	Yes
ATEX	Zone 2, II 3G Ex nA nC IIA T5 Gc IP20, Ta (see X20 user's manual) FTZÚ 09 ATEX 0083X
UL	cULus E115267 Industrial control equipment
HazLoc	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5
KC	Yes
<b>X67 X2X Link power supply input</b>	
Input voltage	24 VDC -15% / +20%
Input current	Max. 0.5 A
Fuse	Integrated, cannot be replaced
Reverse polarity protection	Yes
<b>X67 X2X Link power supply output</b>	
Parallel connection with X67PS1300	Yes <sup>3)</sup>
Overload characteristics	Temporarily short-circuit and overload-proof Observe the corresponding status message (LED "I") or evaluate the software status.
X67 modules supplied by BT9400	
Horizontal mounting orientation	Max. 8 (nominal output power: 6 W)
Vertical mounting orientation	Max. 6 (nominal output power: 4.5 W)
<b>Input I/O power supply</b>	
Input voltage	24 VDC -15% / +20%
Fuse	Required line fuse: Max. 10 A, slow-blow
Reverse polarity protection	No
<b>Output I/O power supply</b>	
Nominal output voltage	24 VDC
Behavior on short circuit	Required line fuse
Permissible contact load	10 A
<b>Operating conditions</b>	
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

Table 2: X20BT9400 - Technical data

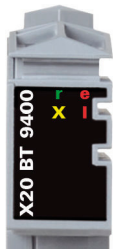
Order number	X20BT9400
Ambient conditions	
Temperature	
Operation	
Horizontal mounting orientation	-25 to 60°C
Vertical mounting orientation	-25 to 50°C
Derating	-
Storage	-40 to 85°C
Transport	-40 to 85°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Note	Order 1x terminal block X20TB12 separately. Order 1x bus module X20BM11 or 1x bus module X20BM15 separately.
Pitch	12,5 <sup>+0,2</sup> mm

Table 2: X20BT9400 - Technical data

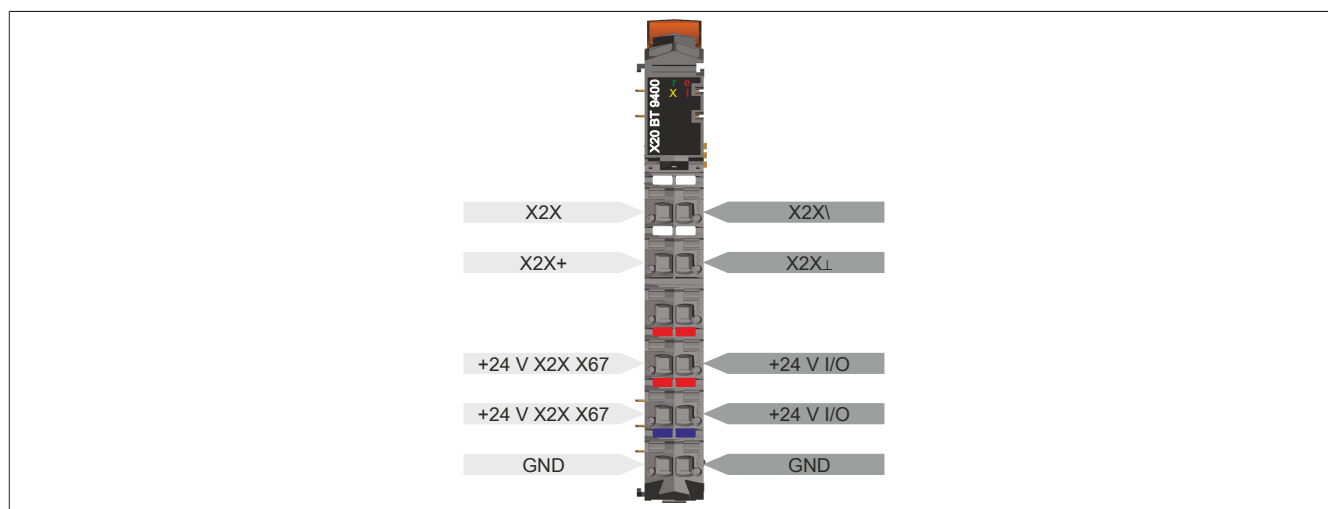
- 1) Maximum power consumption for X67 X2X Link power supply.
- 2) The specified values are maximum values. For examples of the exact calculation, see section "Mechanical and electrical configuration" in the X20 system user's manual.
- 3) In parallel operation with an X67 system supply module, the nominal power of the bus transmitter is not permitted to be added to the total power. Only the power provided by system supply module X67PS1300 is permitted to be used to calculate the total number of X67 modules.

## 2.2 LED status indicators

For a description of the various operating modes, see section "Additional information - Diagnostic LEDs" in the X20 system user's manual.

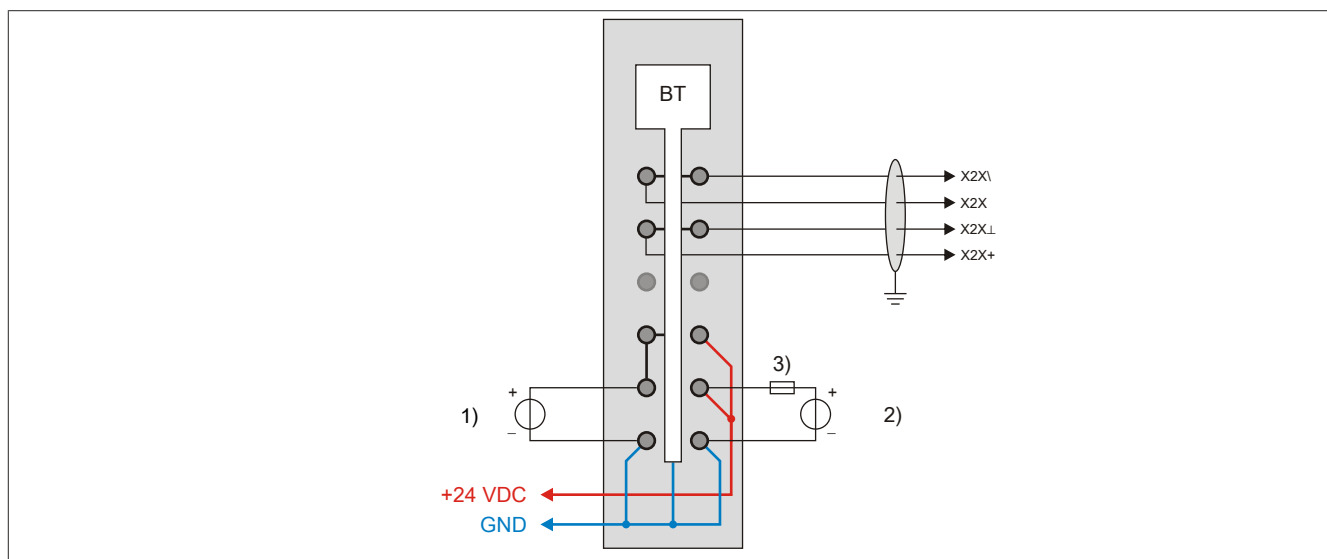
Figure	LED	Color	Status	Description
	r	Green	Off	No power to module
			Single flash	Mode RESET
			Blinking	Mode PREOPERATIONAL
			On	Mode RUN
	e	Red	Off	Module not supplied with power or everything OK
			Double flash	The LED indicates one of the following states: <ul style="list-style-type: none"> <li>• I/O power supply too low</li> <li>• X2X Link voltage too low</li> </ul>
	e + r	Solid red / Single green flash		Invalid firmware
	X	Orange	Off	No communication on X2X Link network
			On	Communication on X2X Link network running
	I	Red	Off	The X67 X2X Link power supply is within the valid range.
			On	The X67 X2X Link power supply of the power supply unit is overloaded. <b>Solution:</b> Use additional X67 X67PS1300 power supply modules.

## 2.3 Pinout



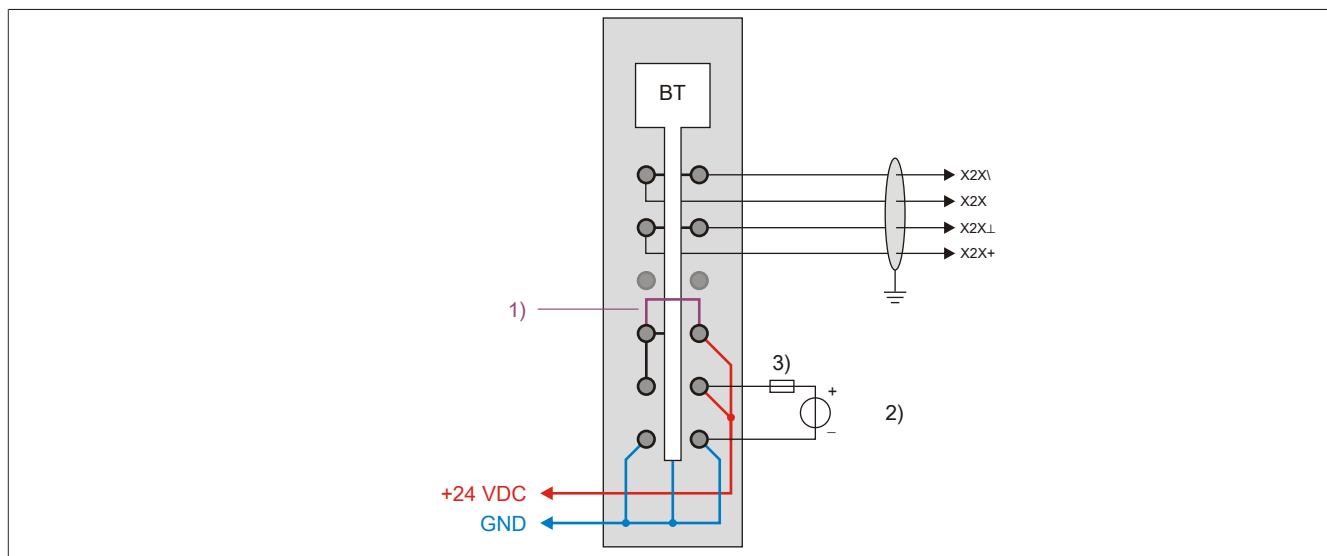
## 2.4 Connection examples

### With 2 isolated power supplies



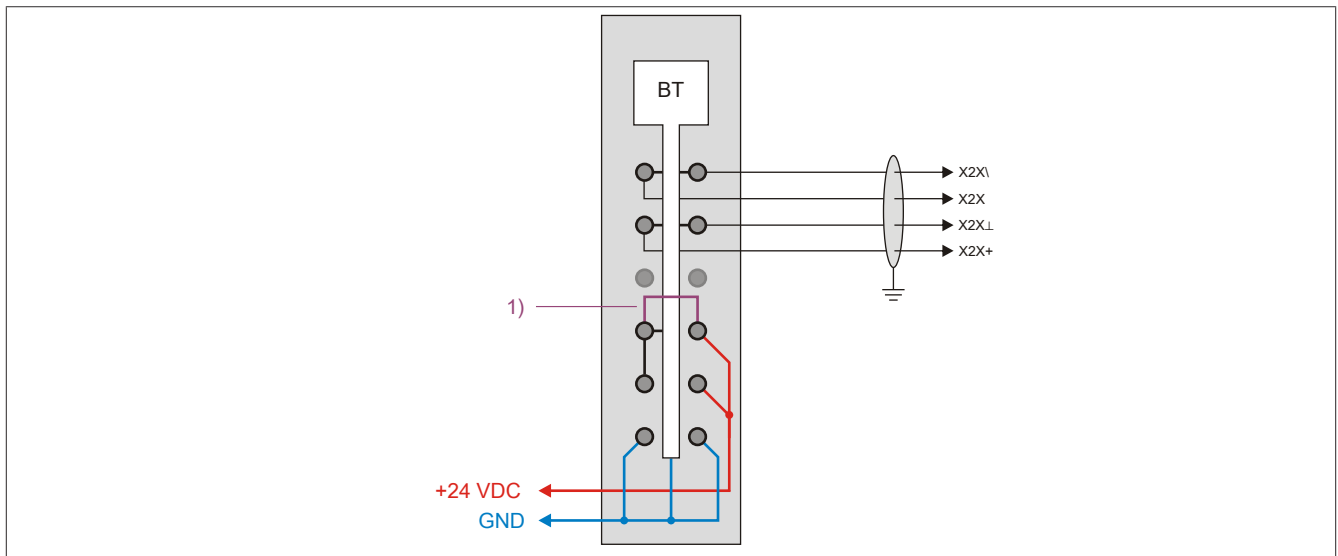
- 1) Supply for the X67 X2X Link power supply
- 2) Supply for the I/O power supply
- 3) Fuse, 10 A slow-blow

### With 1 power supply and jumper



- 1) Jumper
- 2) Supply for the I/O power supply
- 3) Fuse, 10 A slow-blow

## Without supply for internal I/O power supply



1) Jumper

## 2.5 Supply via bus transmitter

The bus transmitter has an integrated internal I/O power supply feed. This saves a power supply module for the last potential group.

It is important to note that this potential group is isolated from the remaining potential groups by an I/O module with bus module X20(c)BM01.

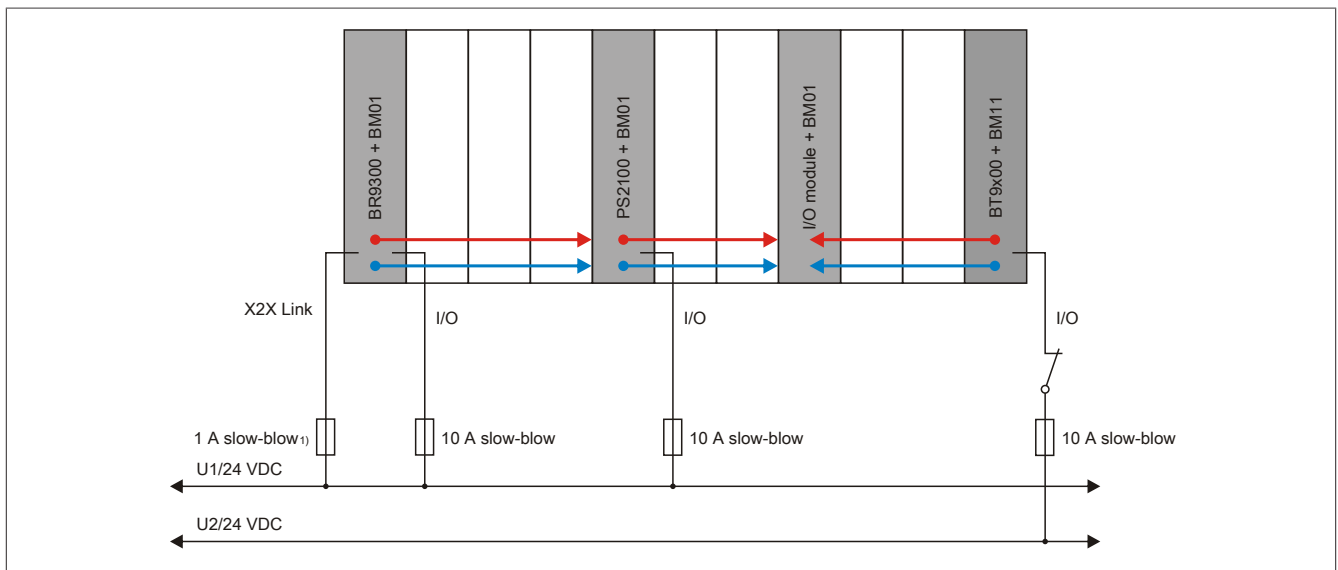


Figure 1: Fuse protection when supplied via bus transmitter

1) Recommended for line protection.

## 2.6 Connection between the X20 and X67 systems

The bus transmitter establishes the connection between the X20 system and X67 system. In addition to the data lines, the X2X Link power supply is also relayed. Up to 8 X67 modules can be supplied from the module. An additional X67 supply module is only required if more than 8 X67 modules are used.



### Information:

**Only system power supply module X67PS1300 is permitted to be used to calculate the total number of X67 modules.**

## 3 Function description

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### 3.1 Monitoring the operating limits

The status of the X67 bus supply voltage and X67 bus current can be read out.

Bit	Description
0	No error
1	X67 bus supply warning for overcurrent (>0.4 A) or undervoltage

The status of the I/O supply voltage can be read out.

Bit	Description
0	Supply voltage OK
1	Supply voltage outside the valid range

**Information:**

The register is described in ["Status of the module" on page 10](#).



## 4 Commissioning

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### Information:

The bus transmitter module is only permitted to be operated with a bus module where the internal I/O power supply is connected through (e.g. X20BM11).

If the supply is used for the internal I/O power supply, this potential group is not permitted to be supplied by any other module. An I/O module with bus module X20BM01 must be used to isolate the potential group.

### 4.1 Using the module on the bus controller

Function model 254 "Bus controller" is used by default only by non-configurable bus controllers. All other bus controllers can use other registers and functions depending on the fieldbus used.

For detailed information, see section "Additional information - Using I/O modules on the bus controller" in the X20 user's manual (version 3.50 or later).

#### 4.1.1 CAN I/O bus controller

The module occupies 1 analog logical slot on CAN I/O.

## 5 Register description

### 5.1 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" in the X20 System user's manual.

### 5.2 Function model 0 - Standard

Register	Fixed offset	Name	Data type	Read		Write	
				Cyclic	Acyclic	Cyclic	Acyclic
0	1	Status of the module	USINT	•			
		StatusInput01	Bit 0				
		StatusInput02	Bit 2				
2	2	SupplyCurrent	USINT	•			
4	3	SupplyVoltage	USINT	•			

Fixed modules require their data points to be in a specific order in the X2X frame. Cyclic access occurs according to a predefined offset, not based on the register address.

Acyclic access continues to be based on the register numbers.

### 5.3 Function model 254 - Bus controller

Register	Offset <sup>1)</sup>	Name	Data type	Read		Write	
				Cyclic	Acyclic	Cyclic	Acyclic
0	0	Status of the module	UINT	•			
		StatusInput01	Bit 0				
		StatusInput02	Bit 2				
2	2	SupplyCurrent	UINT	•			
4	4	SupplyVoltage	UINT	•			

1) The offset specifies the position of the register within the CAN object.

### 5.4 Status of the module

Name:

Module status

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

Function model	Data type	Values
0 - Standard	USINT	See the bit structure.
254 - Bus controller	UINT	See the bit structure.

Bit structure:

Bit	Name	Value	Information
0	StatusInput01	0	No error
		1	X67 bus supply warning for overcurrent (>0.4 A) or under-voltage
1	Reserved	0	
2	StatusInput02	0	Supply voltage OK
		1	Supply voltage outside the valid range
3 - x	Reserved	0	

## 5.5 X67 bus supply current

Name:

SupplyCurrent

This register indicates the X67 bus supply current with a resolution of 0.01 A.

Function model	Data type
0 - Standard	USINT
254 - Bus controller	UINT

## 5.6 X67 bus supply voltage

Name:

SupplyVoltage

This register indicates the measured X67 bus supply voltage with a resolution of 0.1 V.



### Information:

The nominal bus supply voltage is 5 V and should not fall below 4.7 V.

Function model	Data type
0 - Standard	USINT
254 - Bus controller	UINT

## 5.7 Minimum cycle time

The minimum cycle time specifies how far the bus cycle can be reduced without communication errors occurring. It is important to note that very fast cycles reduce the idle time available for handling monitoring, diagnostics and acyclic commands.

Minimum cycle time
100 µs

## 5.8 Minimum I/O update time

The minimum I/O update time specifies how far the bus cycle can be reduced so that an I/O update is performed in each cycle.

Minimum I/O update time
2 ms