# X20BT9400

## 1 General information

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

### 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.**

## 2 Order data

| Order number | Short description | Figure |
|---|---|---|
| | **Bus receivers and transmitters** |  |
| 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 | |
| | **Required accessories** | |
| | **Bus modules** | |
| 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 | |
| | **Terminal blocks** | |
| X20TB12 | X20 terminal block, 12-pin, 24 VDC keyed | |
| | **Optional accessories** | |
| | **X2X Link cable** | |
| X67CA0X99.1000 | Cable for custom assembly, 100 m | |
| X67CA0X99.5000 | Cable for custom assembly, 500 m | |

Table 1: X20BT9400 - Order data

# 3 Technical data

| Order number | X20BT9400 |
|---|---|
| **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 [1] | 1.38 W |
| Power consumption [2] | |
| 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<br>IP20, Ta (see X20 user's manual)<br>FTZÚ 09 ATEX 0083X |
| UL | cULus E115267<br>Industrial control equipment |
| HazLoc | cCSAus 244665<br>Process control equipment<br>for hazardous locations<br>Class I, Division 2, Groups ABCD, T5 |
| EAC | Yes |
| KC | Yes |
| **X67 X2X Link power supply input** | |
| Input voltage | 24 VDC -15% / +20% |
| Input current | Max. 0.5 A |
| Fuse | Integrated, cannot be replaced |
| Reverse polarity protection | Yes |
| **X67 X2X Link power supply output** | |
| Parallel connection with X67PS1300 | Yes [3] |
| Overload characteristics | Temporarily short-circuit and overload-proof<br>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) |
| **Input I/O power supply** | |
| Input voltage | 24 VDC -15% / +20% |
| Fuse | Required line fuse: Max. 10 A, slow-blow |
| Reverse polarity protection | No |
| **Output I/O power supply** | |
| Nominal output voltage | 24 VDC |
| Behavior on short circuit | Required line fuse |
| Permissible contact load | 10 A |
| **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 |

Table 2: X20BT9400 - Technical data

| Order number | X20BT9400 |
|---|---|
| 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.<br>Order 1x bus module X20BM11 or 1x bus module X20BM15 separately. |
| Pitch | 12.5$^{+0.2}$ mm |

Table 2: X20BT9400 - Technical data

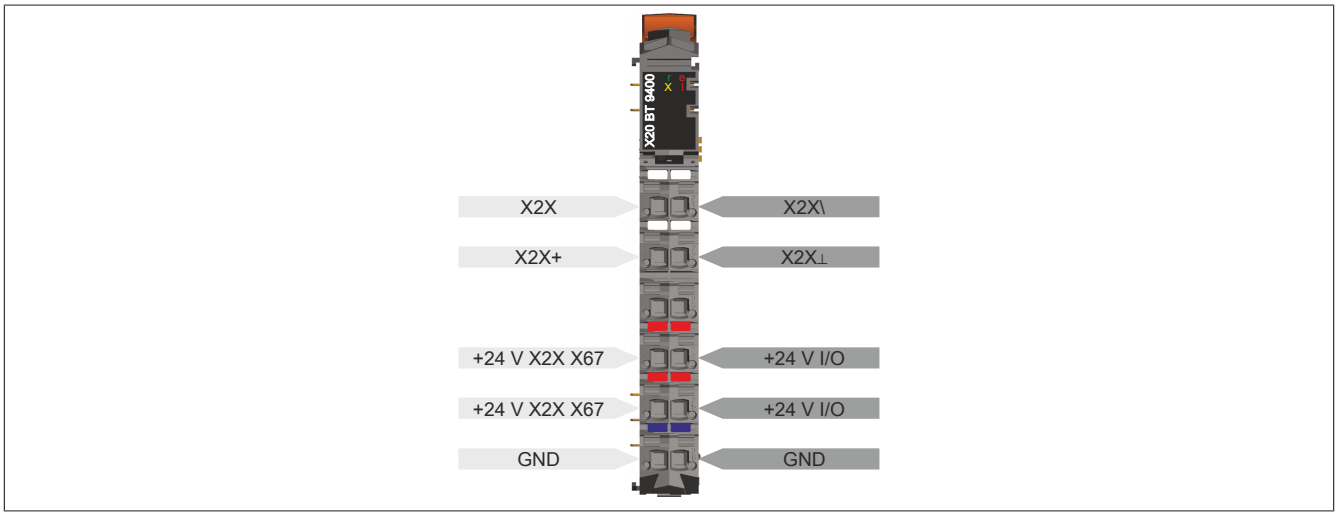
1) Maximum power consumption for X67 X2X Link power supply.
2) The specified values are maximum values. For examples of the exact calculation, see section "Mechanical and electrical configuration" in the X20 system user's manual.
3) In parallel operation with an X67 system supply module, the nominal 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.

# 4 LED status indicators

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

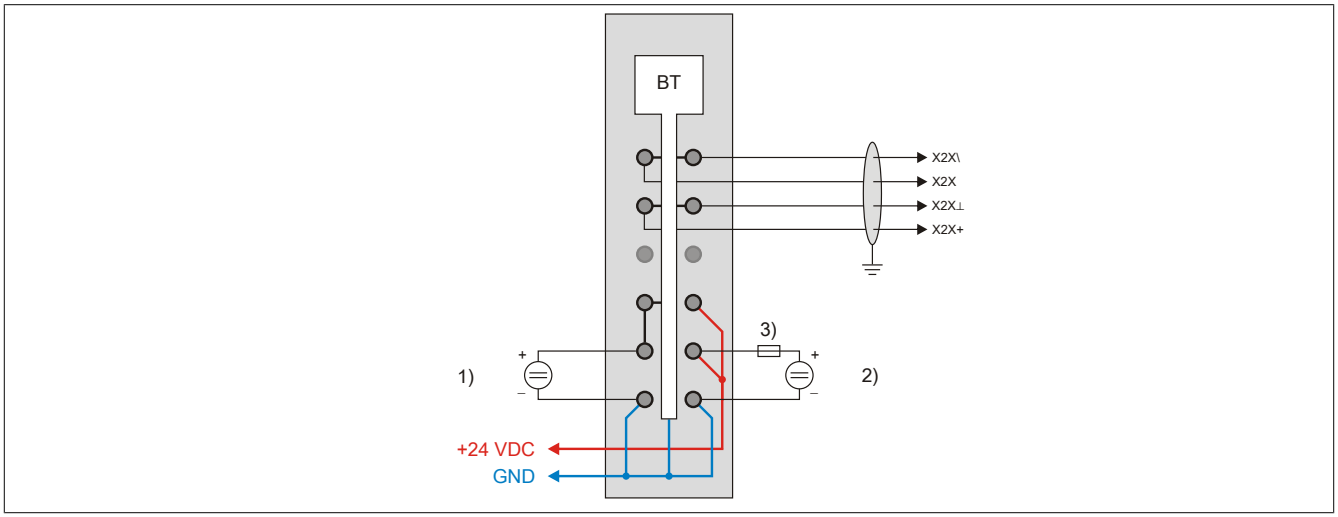
| Figure | LED | Color | Status | Description |
|---|---|---|---|---|
|  | r | Green | Off | No power to module |
| | | | Single flash | Mode RESET |
| | | | Blinking | Mode PREOPERATIONAL |
| | | | On | Mode RUN |
| | e | Red | Off | Module not supplied with power or everything OK |
| | | | Double flash | The LED indicates one of the following states:<br>• I/O power supply too low<br>• X2X Link voltage too low |
| | 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 |
| | l | 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.<br>**Solution:** Use additional X67 X67PS1300 power supply modules. |

# 5 Pinout



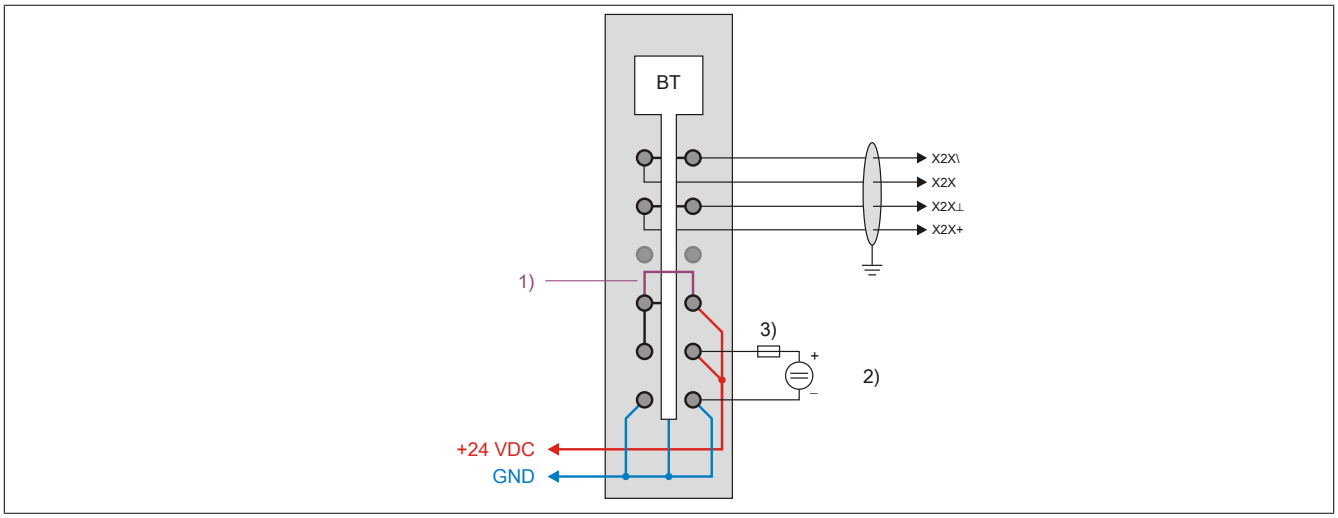
# 6 Connection examples

## With 2 isolated power supplies



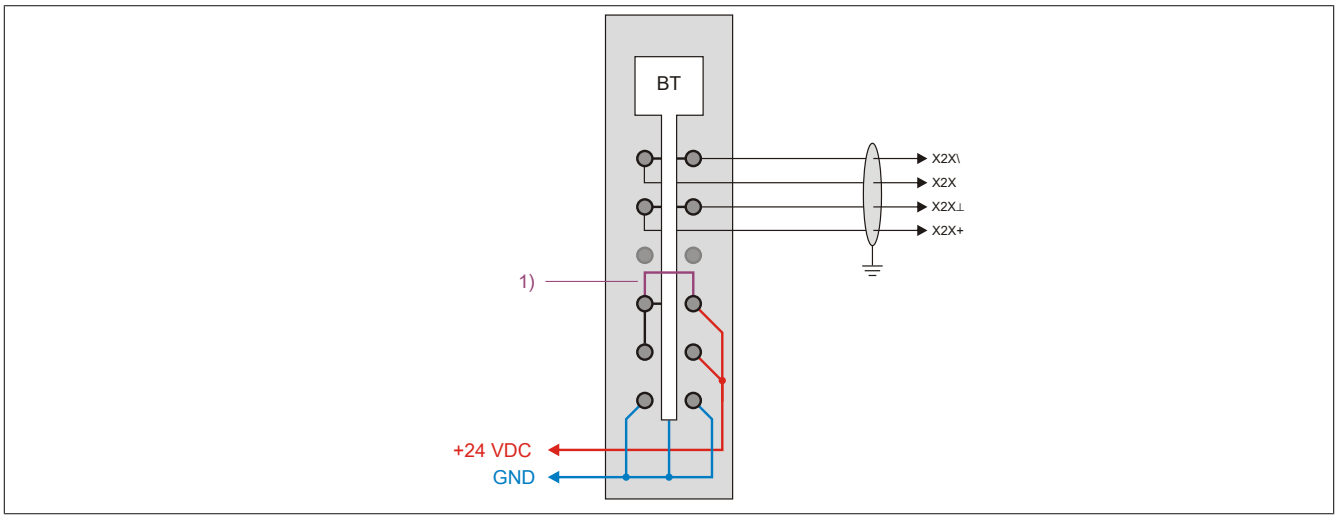

1) Supply for the X67 X2X Link power supply
2) Supply for the I/O power supply
3) Fuse, 10 A slow-blow

## 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

# 7 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.

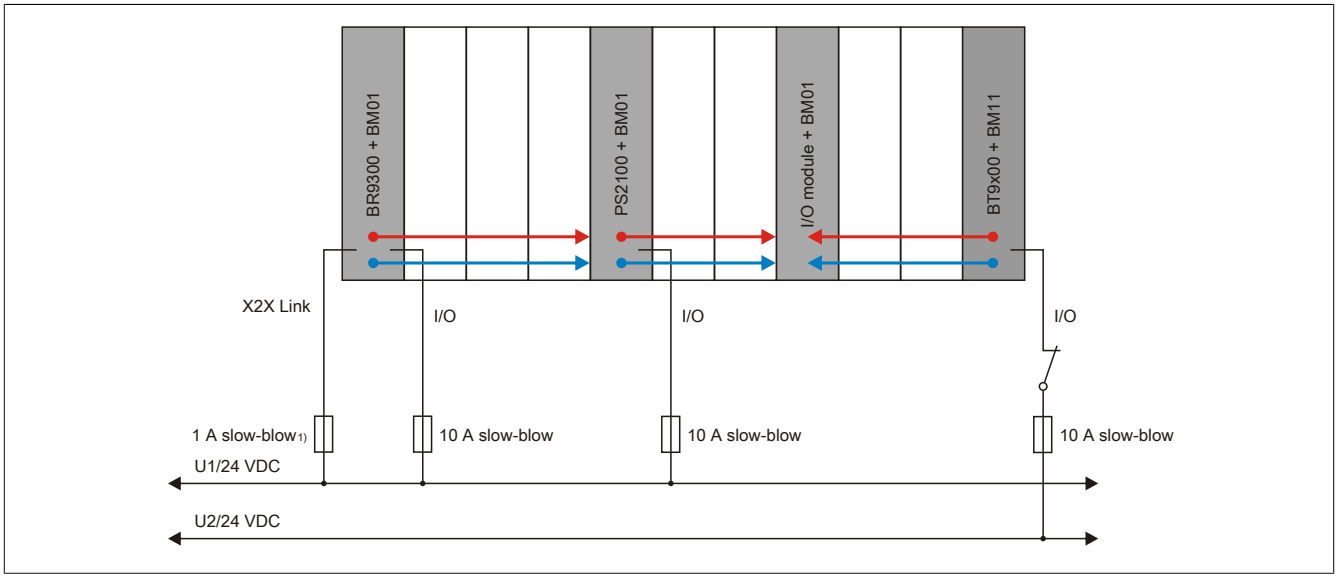



Figure 1: Fuse protection when supplied via bus transmitter

1) Recommended for line protection.

# 8 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.**

# 9 Register description

## 9.1 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.

## 9.2 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.

## 9.3 Function model 254 - Bus controller

| Register | Offset[1)] | 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.

### 9.3.1 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).

### 9.3.2 CAN I/O bus controller

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

## 9.4 Status of the module

Name:
Module status

The following module power supply voltages are monitored in this register:

| | |
|---|---|
| X67 bus supply current: | X67 bus supply current >0.4 A is displayed as a warning. |
| X67 bus supply voltage: | X67 bus supply voltage <18 V is displayed as a warning. |
| 24 VDC I/O supply voltage: | I/O supply voltage <20.4 V is displayed as a warning. |

| 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 undervoltage (<18 V) or overcurrent (>0.4 A) |
| 1 | Reserved | 0 | |
| 2 | StatusInput02 | 0 | I/O power supply above the warning limit of 20.4 V |
| | | 1 | I/O power supply below the warning limit of 20.4 V |
| 3 - x | Reserved | 0 | |

### 9.5 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 |

### 9.6 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 |

### 9.7 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 |

### 9.8 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 |