# 6/12-pin terminal block
# TB06/TB12

The X20 24 VDC modules are wired using the TB06 and TB12 terminal blocks.

- Tool-free wiring thanks to push-in construction
- Simple wire release using lever
- Identification option for each terminal
- Plain text labeling also possible
- Test access for standard probes
- Can be customer-coded

| Short description | X20TB06 | X20TB12 |
|---|---|---|
| Terminal block | 6-pin | 12-pin |
| **Terminal block** | **X20TB06** | **X20TB12** |
| Type of terminal | Push-in terminal | Push-in terminal |
| Distance between contacts | | |
| Left - right | 4.2 mm | 4.2 mm |
| Above - below | 10.96 mm | 10.96 mm |
| Contact resistance | ≤5 mΩ | ≤5 mΩ |
| Rated voltage | 230 VAC | 230 VAC |
| Rated Current[1] | 10 A / contact | 10 A / contact |
| Connection cross section | | |
| Solid wire line | 0.08 mm$^2$ - 2.5 mm$^2$ / AWG 28 - 14 | 0.08 mm$^2$ - 2.5 mm$^2$ / AWG 28 - 14 |
| Fine wire line | 0.25 mm$^2$ - 2.5 mm$^2$ / AWG 24 - 14 | 0.25 mm$^2$ - 2.5 mm$^2$ / AWG 24 - 14 |
| With wire tip sleeves | 0.25 mm$^2$ - 1.5 mm$^2$ / AWG 24 - 16 | 0.25 mm$^2$ - 1.5 mm$^2$ / AWG 24 - 16 |
| | Up to 2x 0.75 mm$^2$ for double wire tip sleeves | Up to 2x 0.75 mm$^2$ for double wire tip sleeves |
| Cable type | Copper wires only (no aluminum wires!) | Copper wires only (no aluminum wires!) |

1) The respective limit data for the I/O modules must be taken into consideration.

# 12-pin terminal block
# TB32

The X20 240 VAC modules are wired using TB32 terminal blocks.

- Tool-free wiring with push-in technology
- Simple wire release using lever
- Ability to label each terminal
- Plain text labeling also possible
- Test access for standard probes
- Can be customer-coded
- Special color
- 240 V coding
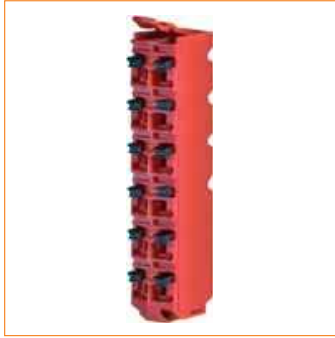
| Short description | X20TB32 |
|---|---|
| Terminal block | 12-pin terminal block for 240 VAC I/O modules |
| **Terminal block** | **X20TB32** |
| Type of terminal | Push-in terminal |
| Distance between contacts | |
|     Left - right | 4.2 mm |
|     Above - below | 10.96 mm |
| Contact resistance | ≤5 mΩ |
| Rated voltage | 230 VAC |
| Rated Current[1] | 10 A / contact |
| Connection cross section | |
|     Solid wire line | 0.08 mm$^2$ - 2.5 mm$^2$ / AWG 28 - 14 |
|     Fine wire line | 0.25 mm$^2$ - 2.5 mm$^2$ / AWG 24 - 14 |
|     With wire tip sleeves | 0.25 mm$^2$ - 1.5 mm$^2$ / AWG 24 - 16 |
| | Up to 2x 0.75 mm$^2$ for double wire tip sleeves |
| Cable type | Copper wires only (no aluminum wires!) |

1) The respective limit data for the I/O modules must be taken into consideration.

# CPU
# CP3486
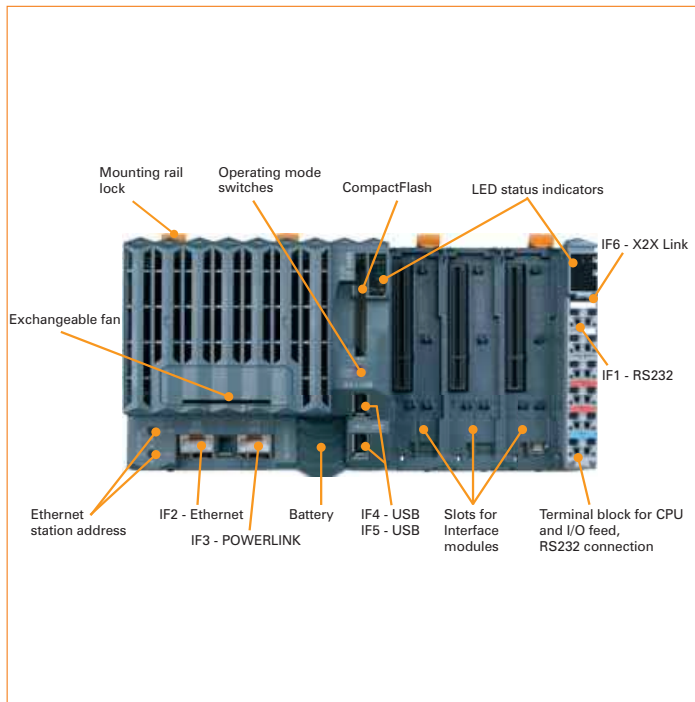
The CP3486 is a high-performance CPU for the X20 System. This CPU can be used anywhere from high-end applications in machine manufacturing to demanding tasks in process control.

Ethernet and USB are onboard. In addition, the CPU has a POWERLINK V1/V2 connection for real-time communication. In addition, there are three multi-purpose slots for additional interface modules.

- Intel Celeron 650 Performance with additional I/O processor
- Ethernet, POWERLINK V1/V2 and USB onboard
- 3 slots for modular interface expansion
- Compact Flash as removable application memory
- Fan can be exchanged from the outside, tool-free
- Extremely compact

ETHERNET
**POWERLINK**

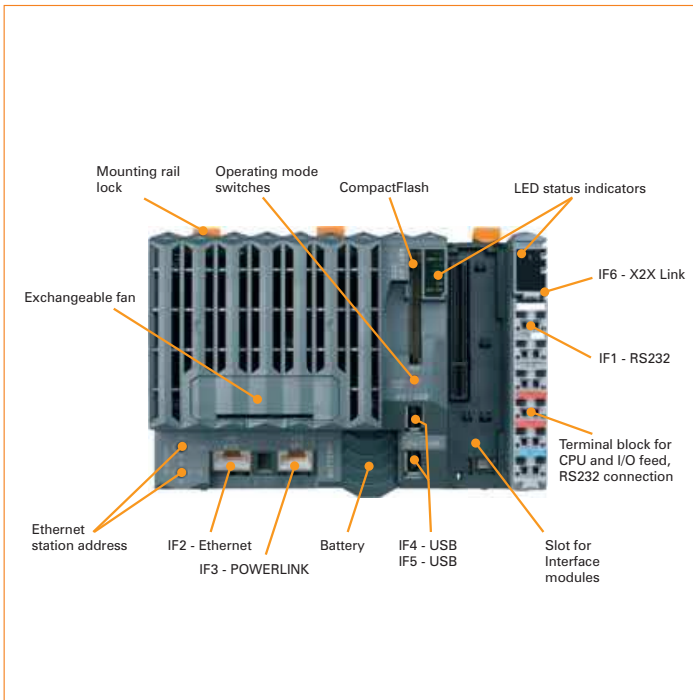| Short description | X20CP3486 |
|---|---|
| System module | CPU |
| Processor | Celeron 650 |
| Interfaces | 1x RS232, 1x Ethernet, 1x POWERLINK V1/V2, 2x USB, 1x X2X Link |
| **Controller** | **X20CP3486** |
| Fastest task class cycle time | 200 $\mu$s |
| Typical instruction cycle time | 0.01 $\mu$s |
| L1 cache for data and program code | 2x 16 KB |
| L2 cache | 256 KB |
| Standard memory | |
|     Working memory (SDRAM) | 64 MB SDRAM |
|     User RAM (SRAM) | 1 MB SRAM |
| Remanent variables | 256 KB |
| FPU | Yes |
| Integrated I/O processor | Processes I/O data points in the background |
| Data buffering | |
|     Lithium battery | At least 3 years |
|     Battery monitoring | Yes |
| CompactFlash slot | 1 |
| Real-time clock | Nonvolatile memory, resolution 1 second |
| Modular interface slots | 3 |

| Interfaces | X20CP3486 |
|---|---|
| Interface IF1 | |
|    Type | RS232 |
|    Design | Contact via 12-pin terminal block TB12 |
|    Maximum transfer rate | 115.2 kBit/s |
| Interface IF2 | |
|    Type | Ethernet |
|    Design | Shielded RJ45 port |
|    Transfer rate | 10/100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| Interface IF3 | |
|    Fieldbus | POWERLINK V1/V2 |
|    Type | 100 Base-T (ANSI/IEEE 802.3) |
|    Design | Shielded RJ45 port |
|    Transfer rate | 100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| Interfaces IF4 and IF5 | USB Rev. 1.1 |
| IF6 interface | X2X Link |

| CPU and X2X Link supply | X20CP3486 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 2.2 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |

| X2X Link supply output | X20CP3486 |
|---|---|
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation of X2X Link supply | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

| Input I/O supply | X20CP3486 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |

| Output I/O supply | X20CP3486 |
|---|---|
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |

| General supply | X20CP3486 |
|---|---|
| Status indicators | Overload, operating status, module status, RS232 data transfer |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Overload | Yes, with status LED and software status |
|    RS232 data transfer | Yes, with status LED |
| Electrical isolation | |
|    X2X bus supply | Yes |
|    I/O supply | No |

# CPU
# CP3486

| General information | X20CP3486 |
|---|---|
| Status indicators | CPU function, overtemperature, Ethernet, Ethernet POWERLINK, CompactFlash, battery |
| Diagnostics | |
|   CPU function | Yes, with status LED |
|   Over-temperature | Yes, with status LED |
|   Ethernet | Yes, with status LED |
|   Ethernet POWERLINK | Yes, with status LED |
|   CompactFlash | Yes, with status LED |
|   Battery | Yes, with status LED and software status |
|   Fans | Yes, with software status |
| Visual Components capability | Yes |
| ACOPOS capability | Yes |
| Cooling | Fan-free with derating (see operational conditions) |
| | Exchangeable fans for entire temperature range |
| | Fan is monitored |
| Electrical isolation | |
|   PLC - IF1/IF4/IF5 | No |
|   PLC - IF2/IF3/IF6 | Yes |
|   IF1/IF4/IF5 - IF2/IF3/IF6 | Yes |
|   IF1 - IF4/IF5 | No |
|   IF4 - IF5 | No |
| Power consumption, without memory card, without interface module and USB | 13.5 W |
| Internal power consumption of the X2X Link and I/O supply [1] | |
|   Bus | 1.42 W |
|   I/O internal | 0.6 W |
| Certification | CE, C-UL-US, GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20CP3486 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C, fan-free: 0°C to +45°C |
|   Vertical installation | 0°C to +55°C, fan-free not permitted |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20CP3486 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20CP3486 |
|---|---|
| Dimensions (W x H x D) | 200 x 99 x 85 mm |
| Comment | Order application memory (CompactFlash) separately |
| | Backup battery included in delivery |
| | X20 locking plate (right) included in delivery |
| | X20 terminal block (12-pin) included in delivery |
| | Interface module slot covers included in the delivery |

| Required accessories | | |
|---|---|---|
| 5CFCRD.0064-03 | CompactFlash 64 MB ATA/IDE SiliconSystems | |
| 5CFCRD.0128-03 | CompactFlash 128 MB ATA/IDE SiliconSystems | |
| 5CFCRD.0256-03 | CompactFlash 256 MB ATA/IDE SiliconSystems | |
| 5CFCRD.0512-03 | CompactFlash 512 MB ATA/IDE SiliconSystems | |
| 5CFCRD.1024-03 | CompactFlash 1024 MB ATA/IDE SiliconSystems | |
| 5CFCRD.2048-03 | CompactFlash 2048 MB ATA/IDE SiliconSystems | |
| 5CFCRD.4096-03 | CompactFlash 4096 MB ATA/IDE SiliconSystems | |
| 5CFCRD.8192-03 | CompactFlash 8192 MB ATA/IDE SiliconSystems | |

| Optional accessories | | |
|---|---|---|
| 4A0006.00-000 | Lithium battery, 3 V / 950 mAh, button cell | |
| 0AC201.9 | Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell | |
| X20IFxxxx | Communication with Ethernet POWERLINK, X2X Link, CAN bus, Profibus DP, RS232, RS422, RS485 | 72 |
| X20AC0EF1 | X20 CPU exchangeable fan | |

# CPU
# CP1486



Mounting rail lock
Operating mode switches
CompactFlash
LED status indicators
IF6 - X2X Link
Exchangeable fan
IF1 - RS232
Terminal block for CPU and I/O feed, RS232 connection
Ethernet station address
IF2 - Ethernet
IF3 - POWERLINK
Battery
IF4 - USB
IF5 - USB
Slot for Interface modules

The CP1486 is a high-performance CPU for the X20 System. This CPU can be used anywhere from high-end applications in machine manufacturing to demanding tasks in process control.

Ethernet and USB are onboard. In addition, the CPU has a POWERLINK V1/V2 connection for real-time communication. The only differences from the CP3486 are that the CP1486 only has one slot for interface modules and a smaller width.

- Intel Celeron 650 Performance with additional I/O processor
- Ethernet, POWERLINK V1/V2 and USB onboard
- 1 slot for modular interface expansion
- Compact Flash as removable application memory
- Fan can be exchanged from the outside, tool-free
- Extremely compact

ETHERNET
**POWERLINK**



| Short description | X20CP1486 |
|---|---|
| System module | CPU |
| Processor | Celeron 650 |
| Interfaces | 1x RS232, 1x Ethernet, 1x POWERLINK V1/V2, 2x USB, 1x X2X Link |
| **Controller** | **X20CP1486** |
| Fastest task class cycle time | 200 $\mu$s |
| Typical instruction cycle time | 0.01 $\mu$s |
| L1 cache for data and program code | 2x 16 KB |
| L2 cache | 256 KB |
| Standard memory | |
|     Working memory (SDRAM) | 64 MB SDRAM |
|     User RAM (SRAM) | 1 MB SRAM |
| Remanent variables | 256 KB |
| FPU | Yes |
| Integrated I/O processor | Processes I/O data points in the background |
| Data buffering | |
|     Lithium battery | At least 3 years |
|     Battery monitoring | Yes |
| CompactFlash slot | 1 |
| Real-time clock | Nonvolatile memory, resolution 1 second |
| Modular interface slots | 1 |

| Interfaces | X20CP1486 |
|---|---|
| Interface IF1 | |
|    Type | RS232 |
|    Design | Contact via 12-pin terminal block TB12 |
|    Maximum transfer rate | 115.2 kBit/s |
| Interface IF2 | |
|    Type | Ethernet |
|    Design | Shielded RJ45 port |
|    Transfer rate | 10/100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| Interface IF3 | |
|    Fieldbus | POWERLINK V1/V2 |
|    Type | 100 Base-T (ANSI/IEEE 802.3) |
|    Design | Shielded RJ45 port |
|    Transfer rate | 100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| Interfaces IF4 and IF5 | USB Rev. 1.1 |
| IF6 interface | X2X Link |

| CPU and X2X Link supply | X20CP1486 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 2.2 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |

| X2X Link supply output | X20CP1486 |
|---|---|
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation of X2X Link supply | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

| Input I/O supply | X20CP1486 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |

| Output I/O supply | X20CP1486 |
|---|---|
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |

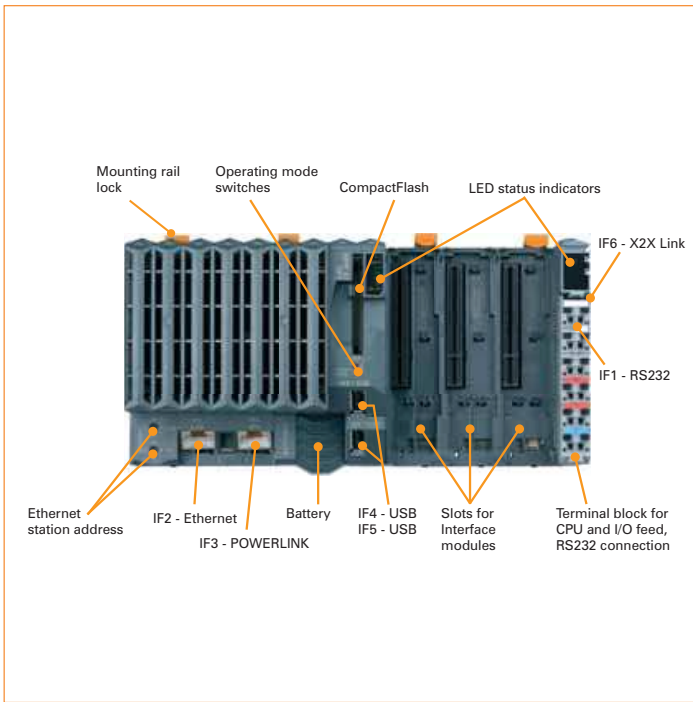| General supply | X20CP1486 |
|---|---|
| Status indicators | Overload, operating status, module status, RS232 data transfer |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Overload | Yes, with status LED and software status |
|    RS232 data transfer | Yes, with status LED |
| Electrical isolation | |
|    X2X bus supply | Yes |
|    I/O supply | No |

# CPU
# CP1486

| General information | X20CP1486 |
|---|---|
| Status indicators | CPU function, overtemperature, Ethernet, Ethernet POWERLINK, CompactFlash, battery |
| Diagnostics | |
|   CPU function | Yes, with status LED |
|   Over-temperature | Yes, with status LED |
|   Ethernet | Yes, with status LED |
|   Ethernet POWERLINK | Yes, with status LED |
|   CompactFlash | Yes, with status LED |
|   Battery | Yes, with status LED and software status |
|   Fans | Yes, with software status |
| Visual Components capability | Yes |
| ACOPOS capability | Yes |
| Cooling | Fan-free with derating (see operational conditions) |
| | Exchangeable fans for entire temperature range |
| | Fan is monitored |
| Electrical isolation | |
|   PLC - IF1/IF4/IF5 | No |
|   PLC - IF2/IF3/IF6 | Yes |
|   IF1/IF4/IF5 - IF2/IF3/IF6 | Yes |
|   IF1 - IF4/IF5 | No |
|   IF4 - IF5 | No |
| Power consumption, without memory card, without interface module and USB | 13.5 W |
| Internal power consumption of the X2X Link and I/O supply [1] | |
|   Bus | 1.42 W |
|   I/O internal | 0.6 W |
| Certification | CE, C-UL-US, GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20CP1486 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C, fan-free: 0°C to +45°C |
|   Vertical installation | 0°C to +55°C, fan-free not permitted |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20CP1486 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20CP1486 |
|---|---|
| Dimensions (W x H x D) | 150 x 99 x 85 mm |
| Comment | Order application memory (CompactFlash) separately |
| | Backup battery included in delivery |
| | X20 locking plate (right) included in delivery |
| | X20 terminal block (12-pin) included in delivery |
| | Interface module slot covers included in the delivery |

| Required accessories | | |
|---|---|---|
| 5CFCRD.0064-03 | CompactFlash 64 MB ATA/IDE SiliconSystems | |
| 5CFCRD.0128-03 | CompactFlash 128 MB ATA/IDE SiliconSystems | |
| 5CFCRD.0256-03 | CompactFlash 256 MB ATA/IDE SiliconSystems | |
| 5CFCRD.0512-03 | CompactFlash 512 MB ATA/IDE SiliconSystems | |
| 5CFCRD.1024-03 | CompactFlash 1024 MB ATA/IDE SiliconSystems | |
| 5CFCRD.2048-03 | CompactFlash 2048 MB ATA/IDE SiliconSystems | |
| 5CFCRD.4096-03 | CompactFlash 4096 MB ATA/IDE SiliconSystems | |
| 5CFCRD.8192-03 | CompactFlash 8192 MB ATA/IDE SiliconSystems | |

| Optional accessories | | |
|---|---|---|
| 4A0006.00-000 | Lithium battery, 3 V / 950 mAh, button cell | |
| 0AC201.9 | Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell | |
| X20IFxxxx | Communication with Ethernet POWERLINK, X2X Link, CAN bus, Profibus DP, RS232, RS422, RS485 | 📄 72 |
| X20AC0EF1 | X20 CPU exchangeable fan | |

# CPU
# CP3485

The CP3485 is a powerful CPU for the X20 System. This CPU is especially useful for applications which require short cycle times, have to process very large amounts of data, or carry out floating point operations.

Ethernet and USB are onboard. In addition, the CPU has a POWERLINK V1/V2 connection for real-time communication. In addition, there are three multi-purpose slots for additional interface modules.

- Intel Celeron 400 Performance with additional I/O processor
- Ethernet, POWERLINK V1/V2 and USB onboard
- 3 slots for modular interface expansion
- Compact Flash as removable application memory
- Fan-free
- Extremely compact

ETHERNET
**POWERLINK**

Mounting rail lock
Operating mode switches
CompactFlash
LED status indicators
IF6 - X2X Link
IF1 - RS232
Ethernet station address
IF2 - Ethernet
IF3 - POWERLINK
Battery
IF4 - USB
IF5 - USB
Slots for Interface modules
Terminal block for CPU and I/O feed, RS232 connection

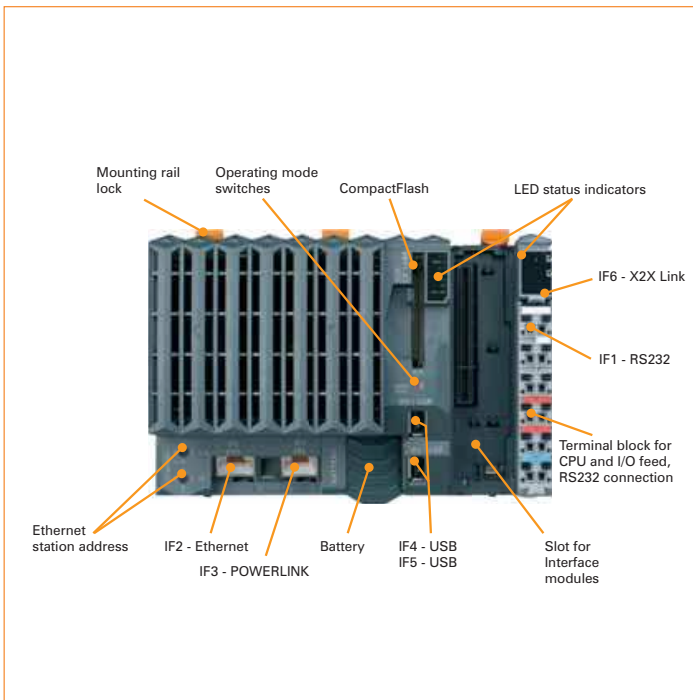| Short description | X20CP3485-1 |
| --- | --- |
| System module | CPU |
| Processor | Celeron 400 |
| Interfaces | 1x RS232, 1x Ethernet, 1x POWERLINK V1/V2, 2x USB, 1x X2X Link |
| **Controller** | **X20CP3485-1** |
| Fastest task class cycle time | 400 $\mu$s |
| Typical instruction cycle time | 0.015 $\mu$s |
| L1 cache for data and program code | 2x 16 KB |
| L2 cache | 256 KB |
| Standard memory | |
| Working memory (SDRAM) | 64 MB SDRAM |
| User RAM (SRAM) | 1 MB SRAM |
| Remanent variables | 256 KB |
| FPU | Yes |
| Integrated I/O processor | Processes I/O data points in the background |
| Data buffering | |
| Lithium battery | At least 3 years |
| Battery monitoring | Yes |
| CompactFlash slot | 1 |
| Real-time clock | Nonvolatile memory, resolution 1 second |
| Modular interface slots | 3 |

| Interfaces | X20CP3485-1 |
|---|---|
| Interface IF1 | |
|    Type | RS232 |
|    Design | Contact via 12-pin terminal block TB12 |
|    Maximum transfer rate | 115.2 kBit/s |
| Interface IF2 | |
|    Type | Ethernet |
|    Design | Shielded RJ45 port |
|    Transfer rate | 10/100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| Interface IF3 | |
|    Fieldbus | POWERLINK V1/V2 |
|    Type | 100 Base-T (ANSI/IEEE 802.3) |
|    Design | Shielded RJ45 port |
|    Transfer rate | 100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| Interfaces IF4 and IF5 | USB Rev. 1.1 |
| IF6 interface | X2X Link |
| **CPU and X2X Link supply** | **X20CP3485-1** |
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 2.2 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |
| **X2X Link supply output** | **X20CP3485-1** |
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation of X2X Link supply | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

| Input I/O supply | X20CP3485-1 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |
| **Output I/O supply** | **X20CP3485-1** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General supply** | **X20CP3485-1** |
| Status indicators | Overload, operating status, module status, RS232 data transfer |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Overload | Yes, with status LED and software status |
|    RS232 data transfer | Yes, with status LED |
| Electrical isolation | |
|    X2X bus supply | Yes |
|    I/O supply | No |

# CPU
# CP3485

| General information | X20CP3485-1 |
|---|---|
| Status indicators | CPU function, overtemperature, Ethernet, Ethernet POWERLINK, CompactFlash, battery |
| Diagnostics | |
|   CPU function | Yes, with status LED |
|   Over-temperature | Yes, with status LED |
|   Ethernet | Yes, with status LED |
|   Ethernet POWERLINK | Yes, with status LED |
|   CompactFlash | Yes, with status LED |
|   Battery | Yes, with status LED and software status |
| Visual Components capability | Yes |
| ACOPOS capability | Yes |
| Cooling | Fan-free |
| Electrical isolation | |
|   PLC - IF1/IF4/IF5 | No |
|   PLC - IF2/IF3/IF6 | Yes |
|   IF1/IF4/IF5 - IF2/IF3/IF6 | Yes |
|   IF1 - IF4/IF5 | No |
|   IF4 - IF5 | No |
| Power consumption, without memory card, without interface module and USB | 10.5 W |
| Internal power consumption of X2X Link and I/O supply [1] | |
|   Bus | 1.42 W |
|   I/O internal | 0.6 W |
| Certification | CE, C-UL-US, GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20CP3485-1 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20CP3485-1 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20CP3485-1 |
|---|---|
| Dimensions (W x H x D) | 200 x 99 x 85 mm |
| Comment | Order application memory (CompactFlash) separately |
| | Backup battery included in delivery |
| | X20 locking plate (right) included in delivery |
| | X20 terminal block (12-pin) included in delivery |
| | Interface module slot covers included in the delivery |

| Required accessories | |
| --- | --- |
| 5CFCRD.0064-03 | CompactFlash 64 MB ATA/IDE SiliconSystems |
| 5CFCRD.0128-03 | CompactFlash 128 MB ATA/IDE SiliconSystems |
| 5CFCRD.0256-03 | CompactFlash 256 MB ATA/IDE SiliconSystems |
| 5CFCRD.0512-03 | CompactFlash 512 MB ATA/IDE SiliconSystems |
| 5CFCRD.1024-03 | CompactFlash 1024 MB ATA/IDE SiliconSystems |
| 5CFCRD.2048-03 | CompactFlash 2048 MB ATA/IDE SiliconSystems |
| 5CFCRD.4096-03 | CompactFlash 4096 MB ATA/IDE SiliconSystems |
| 5CFCRD.8192-03 | CompactFlash 8192 MB ATA/IDE SiliconSystems |

| Optional accessories | | |
| --- | --- | --- |
| 4A0006.00-000 | Lithium battery, 3 V / 950 mAh, button cell | |
| 0AC201.9 | Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell | |
| X20IFxxxx | Communication with Ethernet POWERLINK, X2X Link, CAN bus, Profibus DP, RS232, RS422, RS485 | 72 |

# CPU
# CP1485



Mounting rail lock
Operating mode switches
CompactFlash
LED status indicators
IF6 - X2X Link
IF1 - RS232
Terminal block for CPU and I/O feed, RS232 connection
Ethernet station address
IF2 - Ethernet
IF3 - POWERLINK
Battery
IF4 - USB
IF5 - USB
Slot for Interface modules

The CP1485 is a powerful CPU for the X20 System. This CPU is especially useful for applications which require short cycle times, have to process very large amounts of data, or carry out floating point operations.

Ethernet and USB are onboard. In addition, the CPU has a POWERLINK V1/V2 connection for real-time communication. The only differences from the CP3485 are that the CP1485 only has one slot for interface modules and a smaller width.

- Intel Celeron 400 Performance with additional I/O processor
- Ethernet, POWERLINK V1/V2 and USB onboard
- 1 slot for modular interface expansion
- Compact Flash as removable application memory
- Fan-free
- Extremely compact

ETHERNET
**POWERLINK**



| Short description | X20CP1485-1 |
|---|---|
| System module | CPU |
| Processor | Celeron 400 |
| Interfaces | 1x RS232, 1x POWERLINK V1/V2, 2x USB, 1x X2X Link |
| **Controller** | **X20CP1485-1** |
| Fastest task class cycle time | 400 $\mu$s |
| Typical instruction cycle time | 0.015 $\mu$s |
| L1 cache for data and program code | 2x 16 KB |
| L2 cache | 256 KB |
| Standard memory | |
| Working memory (SDRAM) | 64 MB SDRAM |
| User RAM (SRAM) | 1 MB SRAM |
| Remanent variables | 256 KB |
| FPU | Yes |
| Integrated I/O processor | Processes I/O data points in the background |
| Data buffering | |
| Lithium battery | At least 3 years |
| Battery monitoring | Yes |
| CompactFlash slot | 1 |
| Real-time clock | Nonvolatile memory, resolution 1 second |
| Modular interface slots | 1 |

| Interfaces | X20CP1485-1 |
|---|---|
| Interface IF1 | |
|   Type | RS232 |
|   Design | Contact via 12-pin terminal block TB12 |
|   Maximum transfer rate | 115.2 kBit/s |
| Interface IF2 | |
|   Type | Ethernet |
|   Design | Shielded RJ45 port |
|   Transfer rate | 10/100 MBit/s |
|   Cable length | Max. 100 m between two stations (segment length) |
| Interface IF3 | |
|   Fieldbus | POWERLINK V1/V2 |
|   Type | 100 Base-T (ANSI/IEEE 802.3) |
|   Design | Shielded RJ45 port |
|   Transfer rate | 100 MBit/s |
|   Cable length | Max. 100 m between two stations (segment length) |
| Interfaces IF4 and IF5 | USB Rev. 1.1 |
| IF6 interface | X2X Link |
| **CPU and X2X Link supply** | **X20CP1485-1** |
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 2.2 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |
| **X2X Link supply output** | **X20CP1485-1** |
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation of X2X Link supply | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

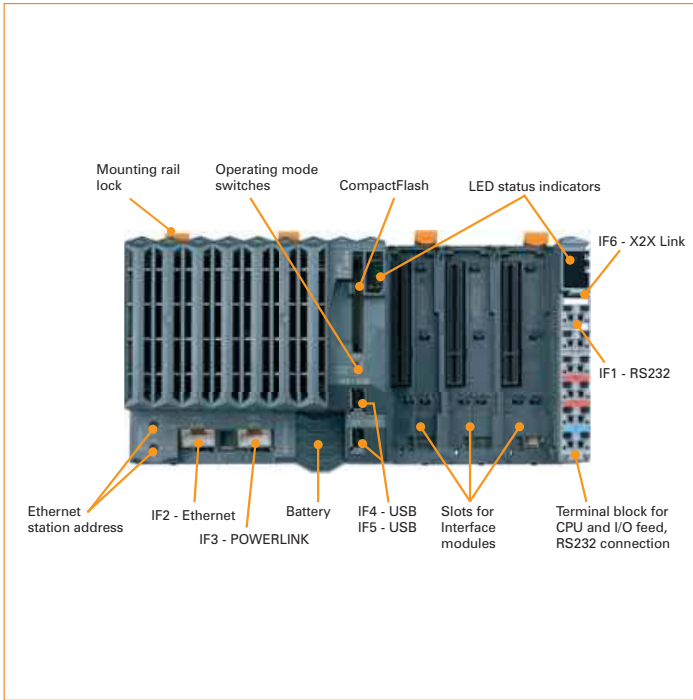| **Input I/O supply** | **X20CP1485-1** |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |
| **Output I/O supply** | **X20CP1485-1** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General supply** | **X20CP1485-1** |
| Status indicators | Overload, operating status, module status, RS232 data transfer |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Overload | Yes, with status LED and software status |
|   RS232 data transfer | Yes, with status LED |
| Electrical isolation | |
|   X2X bus supply | Yes |
|   I/O supply | No |

# CPU
# CP1485

| General information | X20CP1485-1 |
|---|---|
| Status indicators | CPU function, overtemperature, Ethernet, Ethernet POWERLINK, CompactFlash, battery |
| Diagnostics | |
| CPU function | Yes, with status LED |
| Over-temperature | Yes, with status LED |
| Ethernet | Yes, with status LED |
| Ethernet POWERLINK | Yes, with status LED |
| CompactFlash | Yes, with status LED |
| Battery | Yes, with status LED and software status |
| Visual Components capability | Yes |
| ACOPOS capability | Yes |
| Cooling | Fan-free |
| Electrical isolation | |
| PLC - IF1/IF4/IF5 | No |
| PLC - IF2/IF3/IF6 | Yes |
| IF1/IF4/IF5 - IF2/IF3/IF6 | Yes |
| IF1 - IF4/IF5 | No |
| IF4 - IF5 | No |
| Power consumption, without memory card, without interface module and USB | 10.5 W |
| Internal power consumption of X2X Link and I/O supply [1] | |
| Bus | 1.42 W |
| I/O internal | 0.6 W |
| Certification | CE, C-UL-US, GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20CP1485-1 |
|---|---|
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20CP1485-1 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20CP1485-1 |
|---|---|
| Dimensions (W x H x D) | 150 x 99 x 85 mm |
| Comment | Order application memory (CompactFlash) separately |
| | Backup battery included in delivery |
| | X20 locking plate (right) included in delivery |
| | X20 terminal block (12-pin) included in delivery |
| | Interface module slot covers included in the delivery |

| Required accessories | |
|---|---|
| 5CFCRD.0064-03 | CompactFlash 64 MB ATA/IDE SiliconSystems |
| 5CFCRD.0128-03 | CompactFlash 128 MB ATA/IDE SiliconSystems |
| 5CFCRD.0256-03 | CompactFlash 256 MB ATA/IDE SiliconSystems |
| 5CFCRD.0512-03 | CompactFlash 512 MB ATA/IDE SiliconSystems |
| 5CFCRD.1024-03 | CompactFlash 1024 MB ATA/IDE SiliconSystems |
| 5CFCRD.2048-03 | CompactFlash 2048 MB ATA/IDE SiliconSystems |
| 5CFCRD.4096-03 | CompactFlash 4096 MB ATA/IDE SiliconSystems |
| 5CFCRD.8192-03 | CompactFlash 8192 MB ATA/IDE SiliconSystems |

| Optional accessories | | |
|---|---|---|
| 4A0006.00-000 | Lithium battery, 3 V / 950 mAh, button cell | |
| 0AC201.9 | Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell | |
| X20IFxxxx | Communication with Ethernet POWERLINK, X2X Link, CAN bus, Profibus DP, RS232, RS422, RS485 | 72 |

# CPU
# CP3484

The CP3484 is the smallest Celeron based CPU for the X20 System. However, its shortest cycle time of 800 μs still shows its power. The basic features are the same as those of the larger types.

Ethernet and USB are onboard. In addition, the CPU has a POWERLINK V1/V2 connection for real-time communication. In addition, there are three multi-purpose slots for additional interface modules.

- Intel Celeron 266 Performance with additional I/O processor
- Ethernet, POWERLINK V1/V2 and USB onboard
- 3 slots for modular interface expansion
- Compact Flash as removable application memory
- Fan-free
- Extremely compact

ETHERNET
POWERLINK

| Short description | X20CP3484 |
| --- | --- |
| System module | CPU |
| Processor | Celeron 266 comp. |
| Interfaces | 1x RS232, 1x Ethernet, 1x POWERLINK V1/V2, 2x USB, 1x X2X Link |
| **Controller** | **X20CP3484** |
| Fastest task class cycle time | 800 μs |
| Typical instruction cycle time | 0.022 μs |
| L1 cache for data and program code | 2x 16 KB |
| L2 cache | - |
| Standard memory | |
|     Working memory (SDRAM) | 32 MB SDRAM |
|     User RAM (SRAM) | 1 MB SRAM |
| Remanent variables | 64 KB |
| FPU | Yes |
| Integrated I/O processor | Processes I/O data points in the background |
| Data buffering | |
|     Lithium battery | At least 3 years |
|     Battery monitoring | Yes |
| CompactFlash slot | 1 |
| Real-time clock | Nonvolatile memory, resolution 1 second |
| Modular interface slots | 3 |

| Interfaces | X20CP3484 |
|---|---|
| Interface IF1 | |
|    Type | RS232 |
|    Design | Contact via 12-pin terminal block TB12 |
|    Maximum transfer rate | 115.2 kBit/s |
| Interface IF2 | |
|    Type | Ethernet |
|    Design | Shielded RJ45 port |
|    Transfer rate | 10/100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| Interface IF3 | |
|    Fieldbus | POWERLINK V1/V2 |
|    Type | 100 Base-T (ANSI/IEEE 802.3) |
|    Design | Shielded RJ45 port |
|    Transfer rate | 100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| Interfaces IF4 and IF5 | USB Rev. 1.1 |
| IF6 interface | X2X Link |
| **CPU and X2X Link supply** | **X20CP3484** |
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 2.2 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |
| **X2X Link supply output** | **X20CP3484** |
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation of X2X Link supply | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

| Input I/O supply | X20CP3484 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |
| **Output I/O supply** | **X20CP3484** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General supply** | **X20CP3484** |
| Status indicators | Overload, operating status, module status, RS232 data transfer |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Overload | Yes, with status LED and software status |
|    RS232 data transfer | Yes, with status LED |
| Electrical isolation | |
|    X2X bus supply | Yes |
|    I/O supply | No |

# CPU
# CP3484

| General information | X20CP3484 |
|---|---|
| Status indicators | CPU function, overtemperature, Ethernet, Ethernet POWERLINK, CompactFlash, battery |
| Diagnostics | |
|   CPU function | Yes, with status LED |
|   Over-temperature | Yes, with status LED |
|   Ethernet | Yes, with status LED |
|   Ethernet POWERLINK | Yes, with status LED |
|   CompactFlash | Yes, with status LED |
|   Battery | Yes, with status LED and software status |
| Visual Components capability | Yes |
| ACOPOS capability | Yes |
| Cooling | Fan-free |
| Electrical isolation | |
|   PLC - IF1/IF4/IF5 | No |
|   PLC - IF2/IF3/IF6 | Yes |
|   IF1/IF4/IF5 - IF2/IF3/IF6 | Yes |
|   IF1 - IF4/IF5 | No |
|   IF4 - IF5 | No |
| Power consumption, without memory card, without interface module and USB | 10.5 W |
| Internal power consumption of X2X Link and I/O supply [1] | |
|   Bus | 1.42 W |
|   I/O internal | 0.6 W |
| Certification | CE, C-UL-US, GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20CP3484 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20CP3484 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20CP3484 |
|---|---|
| Dimensions (W x H x D) | 200 x 99 x 85 mm |
| Comment | Order application memory (CompactFlash) separately |
| | Backup battery included in delivery |
| | X20 locking plate (right) included in delivery |
| | X20 terminal block (12-pin) included in delivery |
| | Interface module slot covers included in the delivery |

| Required accessories | |
|---|---|
| 5CFCRD.0064-03 | CompactFlash 64 MB ATA/IDE SiliconSystems |
| 5CFCRD.0128-03 | CompactFlash 128 MB ATA/IDE SiliconSystems |
| 5CFCRD.0256-03 | CompactFlash 256 MB ATA/IDE SiliconSystems |
| 5CFCRD.0512-03 | CompactFlash 512 MB ATA/IDE SiliconSystems |
| 5CFCRD.1024-03 | CompactFlash 1024 MB ATA/IDE SiliconSystems |
| 5CFCRD.2048-03 | CompactFlash 2048 MB ATA/IDE SiliconSystems |
| 5CFCRD.4096-03 | CompactFlash 4096 MB ATA/IDE SiliconSystems |
| 5CFCRD.8192-03 | CompactFlash 8192 MB ATA/IDE SiliconSystems |

| Optional accessories | | |
|---|---|---|
| 4A0006.00-000 | Lithium battery, 3 V / 950 mAh, button cell | |
| 0AC201.9 | Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell | |
| X20IFxxxx | Communication with Ethernet POWERLINK, X2X Link, CAN bus, Profibus DP, RS232, RS422, RS485 | 72 |

# CPU
# CP1484

Mounting rail lock    Operating mode switches    CompactFlash    LED status indicators

IF6 - X2X Link

IF1 - RS232

Terminal block for CPU and I/O feed, RS232 connection

Ethernet station address    IF2 - Ethernet    IF3 - POWERLINK    Battery    IF4 - USB   IF5 - USB    Slot for Interface modules

The CP1484 is the smallest Celeron based CPU for the X20 System. However, its shortest cycle time of 800 $\mu$s still shows its power. The basic features are the same as those of the larger types.

Ethernet and USB are onboard. In addition, the CPU has a POWERLINK V1/V2 connection for real-time communication. The only differences from the CP3484 are that the CP1484 only has one slot for interface modules and a smaller width.

- Intel Celeron 266 Performance with additional I/O processor
- Ethernet, POWERLINK V1/V2 and USB onboard
- 1 slot for modular interface expansion
- Compact Flash as removable application memory
- Fan-free
- Extremely compact

ETHERNET
**POWERLINK**

| Short description | X20CP1484 |
|---|---|
| System module | CPU |
| Processor | Celeron 266 comp. |
| Interfaces | 1x RS232, 1x Ethernet, 1x POWERLINK V1/V2, 2x USB, 1x X2X Link |
| **Controller** | **X20CP1484** |
| Fastest task class cycle time | 800 $\mu$s |
| Typical instruction cycle time | 0.022 $\mu$s |
| L1 cache for data and program code | 2x 16 KB |
| L2 cache | - |
| Standard memory | |
|     Working memory (SDRAM) | 32 MB SDRAM |
|     User RAM (SRAM) | 1 MB SRAM |
| Remanent variables | 64 KB |
| FPU | Yes |
| Integrated I/O processor | Processes I/O data points in the background |
| Data buffering | |
|     Lithium battery | At least 3 years |
|     Battery monitoring | Yes |
| CompactFlash slot | 1 |
| Real-time clock | Nonvolatile memory, resolution 1 second |
| Modular interface slots | 1 |

| Interfaces | X20CP1484 |
|---|---|
| Interface IF1 | |
|    Type | RS232 |
|    Design | Contact via 12-pin terminal block TB12 |
|    Maximum transfer rate | 115.2 kBit/s |
| Interface IF2 | |
|    Type | Ethernet |
|    Design | Shielded RJ45 port |
|    Transfer rate | 10/100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| Interface IF3 | |
|    Fieldbus | POWERLINK V1/V2 |
|    Type | 100 Base-T (ANSI/IEEE 802.3) |
|    Design | Shielded RJ45 port |
|    Transfer rate | 100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| Interfaces IF4 and IF5 | USB Rev. 1.1 |
| IF6 interface | X2X Link |
| **CPU and X2X Link supply** | **X20CP1484** |
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 2.2 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |
| **X2X Link supply output** | **X20CP1484** |
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation of X2X Link supply | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

| Input I/O supply | X20CP1484 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |
| **Output I/O supply** | **X20CP1484** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General supply** | **X20CP1484** |
| Status indicators | Overload, operating status, module status, RS232 data transfer |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Overload | Yes, with status LED and software status |
|    RS232 data transfer | Yes, with status LED |
| Electrical isolation | |
|    X2X bus supply | Yes |
|    I/O supply | No |

# CPU
# CP1484

| General information | X20CP1484 |
|---|---|
| Status indicators | CPU function, overtemperature, Ethernet, Ethernet POWERLINK, CompactFlash, battery |
| Diagnostics | |
|   CPU function | Yes, with status LED |
|   Over-temperature | Yes, with status LED |
|   Ethernet | Yes, with status LED |
|   Ethernet POWERLINK | Yes, with status LED |
|   CompactFlash | Yes, with status LED |
|   Battery | Yes, with status LED and software status |
| Visual Components capability | Yes |
| ACOPOS capability | Yes |
| Cooling | Fan-free |
| Electrical isolation | |
|   PLC - IF1/IF4/IF5 | No |
|   PLC - IF2/IF3/IF6 | Yes |
|   IF1/IF4/IF5 - IF2/IF3/IF6 | Yes |
|   IF1 - IF4/IF5 | No |
|   IF4 - IF5 | No |
| Power consumption, without memory card, without interface module and USB | 10.5 W |
| Internal power consumption of X2X Link and I/O supply [1] | |
|   Bus | 1.42 W |
|   I/O internal | 0.6 W |
| Certification | CE, C-UL-US, GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20CP1484 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20CP1484 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20CP1484 |
|---|---|
| Dimensions (W x H x D) | 150 x 99 x 85 mm |
| Comment | Order application memory (CompactFlash) separately |
| | Backup battery included in delivery |
| | X20 locking plate (right) included in delivery |
| | X20 terminal block (12-pin) included in delivery |
| | Interface module slot covers included in the delivery |

| Required accessories | |
|---|---|
| 5CFCRD.0064-03 | CompactFlash 64 MB ATA/IDE SiliconSystems |
| 5CFCRD.0128-03 | CompactFlash 128 MB ATA/IDE SiliconSystems |
| 5CFCRD.0256-03 | CompactFlash 256 MB ATA/IDE SiliconSystems |
| 5CFCRD.0512-03 | CompactFlash 512 MB ATA/IDE SiliconSystems |
| 5CFCRD.1024-03 | CompactFlash 1024 MB ATA/IDE SiliconSystems |
| 5CFCRD.2048-03 | CompactFlash 2048 MB ATA/IDE SiliconSystems |
| 5CFCRD.4096-03 | CompactFlash 4096 MB ATA/IDE SiliconSystems |
| 5CFCRD.8192-03 | CompactFlash 8192 MB ATA/IDE SiliconSystems |

| Optional accessories | | |
|---|---|---|
| 4A0006.00-000 | Lithium battery, 3 V / 950 mAh, button cell | |
| 0AC201.9 | Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell | |
| X20IFxxxx | Communication with Ethernet POWERLINK, X2X Link, CAN bus, Profibus DP, RS232, RS422, RS485 | 72 |

# CPU
# CP1483



Mounting rail lock
Operating mode switches
CompactFlash
LED status indicators
IF6 - X2X Link
IF1 - RS232
Terminal block for CPU and I/O feed, RS232 connection
Ethernet station address
IF2 - Ethernet
IF3 - POWERLINK
Battery
IF4 - USB
IF5 - USB
Slot for Interface modules

The x86 100 MHz-compatible CP1483 is the entry-level X20 CPU. With an optimum price/performance ratio, it has the same basic features as all of the larger CPUs.

Ethernet and USB are onboard. In addition, the CPU has a POWERLINK V1/V2 connection for real-time communication. In addition, a multi-purpose slot is provided for an additional interface module.

- Intel x86 100 MHz-compatible with additional I/O processor
- Ethernet, POWERLINK V1/V2 and USB onboard
- 1 slot for modular interface expansion
- Compact Flash as removable application memory
- Fan-free
- Extremely compact

ETHERNET
# POWERLINK



| Short description | X20CP1483 |
|---|---|
| System module | CPU |
| Processor | x86 100 comp. |
| Interfaces | 1x RS232, 1x Ethernet, 1x POWERLINK V1/V2, 2x USB, 1x X2X Link |
| **Controller** | **X20CP1483** |
| Fastest task class cycle time | 1 ms |
| Typical instruction cycle time | 0.076 $\mu$s |
| L1 cache for data and program code | 16 KB |
| L2 cache | - |
| Standard memory | |
|    Working memory (SDRAM) | 32 MByte |
|    User RAM (SRAM) | 128 KB |
| Remanent variables | 32 KB |
| FPU | Yes |
| Integrated I/O processor | Processes I/O data points in the background |
| Data buffering | |
|    Lithium battery | At least 3 years |
|    Battery monitoring | Yes |
| CompactFlash slot | 1 |
| Real-time clock | Nonvolatile memory, resolution 1 second |
| Modular interface slots | 1 |

| Interfaces | X20CP1483 |
|---|---|
| Interface IF1 | |
|     Type | RS232 |
|     Design | Contact via 12-pin terminal block TB12 |
|     Maximum transfer rate | 115.2 kBit/s |
| Interface IF2 | |
|     Type | Ethernet |
|     Design | Shielded RJ45 port |
|     Transfer rate | 10/100 MBit/s |
|     Cable length | Max. 100 m between two stations (segment length) |
| Interface IF3 | |
|     Fieldbus | POWERLINK V1/V2 |
|     Type | 100 Base-T (ANSI/IEEE 802.3) |
|     Design | Shielded RJ45 port |
|     Transfer rate | 100 MBit/s |
|     Cable length | Max. 100 m between two stations (segment length) |
| Interfaces IF4 and IF5 | USB Rev. 1.1 |
| IF6 interface | X2X Link |

| CPU and X2X Link supply | X20CP1483 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 2.2 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |

| X2X Link supply output | X20CP1483 |
|---|---|
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation of X2X Link supply | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

| Input I/O supply | X20CP1483 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |

| Output I/O supply | X20CP1483 |
|---|---|
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |

| General supply | X20CP1483 |
|---|---|
| Status indicators | Overload, operating status, module status, RS232 data transfer |
| Diagnostics | |
|     Module run/error | Yes, with status LED and software status |
|     Overload | Yes, with status LED and software status |
|     RS232 data transfer | Yes, with status LED |
| Electrical isolation | |
|     X2X bus supply | Yes |
|     I/O supply | No |

# CPU
# CP1483

| General information | X20CP1483 |
|---|---|
| Status indicators | CPU function, overtemperature, Ethernet, Ethernet POWERLINK, CompactFlash, battery |
| Diagnostics | |
|   CPU function | Yes, with status LED |
|   Over-temperature | Yes, with status LED |
|   Ethernet | Yes, with status LED |
|   Ethernet POWERLINK | Yes, with status LED |
|   CompactFlash | Yes, with status LED |
|   Battery | Yes, with status LED and software status |
| Fan diagnostics | - |
| Visual Components capability | Yes |
| ACOPOS capability | Yes |
| Cooling | Fan-free |
| Electrical isolation | |
|   PLC - IF1/IF4/IF5 | No |
|   PLC - IF2/IF3/IF6 | Yes |
|   IF1/IF4/IF5 - IF2/IF3/IF6 | Yes |
|   IF1 - IF4/IF5 | No |
|   IF4 - IF5 | No |
| Power consumption, without memory card, without interface module and USB | TBD |
| Internal power consumption of X2X Link and I/O supply [1] | |
|   Bus | 1.22 W |
|   I/O internal | 0.6 W |
| Certification | CE, C-UL-US (in development), GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20CP1483 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20CP1483 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20CP1483 |
|---|---|
| Dimensions (W x H x D) | 150 x 99 x 85 mm |
| Comment | Order application memory (CompactFlash) separately |
| | Backup battery included in delivery |
| | X20 locking plate (right) included in delivery |
| | X20 terminal block (12-pin) included in delivery |
| | Interface module slot covers included in the delivery |

| Required accessories | |
|---|---|
| 5CFCRD.0064-03 | CompactFlash 64 MB ATA/IDE SiliconSystems |
| 5CFCRD.0128-03 | CompactFlash 128 MB ATA/IDE SiliconSystems |
| 5CFCRD.0256-03 | CompactFlash 256 MB ATA/IDE SiliconSystems |
| 5CFCRD.0512-03 | CompactFlash 512 MB ATA/IDE SiliconSystems |
| 5CFCRD.1024-03 | CompactFlash 1024 MB ATA/IDE SiliconSystems |
| 5CFCRD.2048-03 | CompactFlash 2048 MB ATA/IDE SiliconSystems |
| 5CFCRD.4096-03 | CompactFlash 4096 MB ATA/IDE SiliconSystems |
| 5CFCRD.8192-03 | CompactFlash 8192 MB ATA/IDE SiliconSystems |

| Optional accessories | | |
|---|---|---|
| 4A0006.00-000 | Lithium battery, 3 V / 950 mAh, button cell | |
| 0AC201.9 | Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell | |
| X20IFxxxx | Communication with Ethernet POWERLINK, X2X Link, CAN bus, Profibus DP, RS232, RS422, RS485 | 72 |

# Compact CPUs

Compact CPU base
X20 BB 2x

Compact CPU supply module
X20 PS 950x

Compact CPU
X20 CP 02xx

Terminal block
X20 TB 12

## Compact CPUs with a modular design

The completely modular structure of the Compact CPUs allows the user to assemble a CPU that meets the unique power supply and interface requirements.

**Compact CPU**
- Embedded $\mu$P 25 with Ethernet on-board
- Embedded $\mu$P 16 with or without Ethernet on-board

**Bus module**
- Bus module with RS232 connection
- Bus module with RS232 and CAN bus connections

**Supply module**
- Supply module for Compact CPU, X2X Link bus supply and I/O
- RS232 interface
- CAN bus
- Without or without electrical isolation of the CPU/X2X Link supply

**Terminal block**
- 12-pin terminal block

## The battery-free CPU

To meet the high demands of the market, the Compact CPU was designed to run without a battery. The following features make operation without a buffer battery possible.

**Real-time clock**
The real-time clock is buffered for approx. 1000 hours by a gold foil capacitor.

**FRAM instead of SRAM for remanent variables**
This FRAM stores its contents ferromagnetically. Unlike normal SRAM, this does not require a battery.

## Compact design

Despite the sleek profile of only 37.5 mm, the CPU feed, the X2X Link bus supply, and the I/O module feed are integrated in the CPU. No additional power modules are necessary.

# Compact CPU
# CP0292

The structure of the X20 Compact CPU is described on page 🖹 124. In addition to the structure, other general information is also provided.

The CP0292 is the most powerful of the X20 Compact CPUs. Equipped with Embedded µP 25 and additional memory, it is predestined for drive and visualization applications.

The CPU is network-capable due to an onboard Ethernet interface.

- Embedded µP 25
- 750 KB User SRAM
- 3 MB User FlashPROM
- Ethernet on-board
- Only 37.5 mm wide
- Battery-free

LED status indicator

Node number switches

IF1 - RS232
IF3 - CAN bus (with BB27)

IF2 - Ethernet

Terminal block for CPU
and I/O feed,
RS232 connection
CAN bus connection (with BB27)

Switch for CAN bus
Terminating resistance on BB27

| Short description | X20CP0292 |
|---|---|
| System module | CPU |
| Processor | Embedded µP 25 |
| Interfaces | 1x Ethernet onboard |
| **Controller** | **X20CP0292** |
| Fastest task class cycle time | 2 ms |
| Typical instruction cycle time | 0.5 µs |
| Standard memory | |
|     User RAM | 750 KByte SRAM [1] |
|     User PROM | 3 MB FlashPROM |
| Remanent variables | 2.75 KByte FRAM [2] |
| Backup battery | No |
| Integrated I/O processor | Processes I/O data points in the background |
| Real-time clock [3] | Yes, resolution 1 s |

1) Not buffered.

2) The FRAM stores its contents ferromagnetically. Therefore, no buffer battery is needed.

3) The real-time clock is buffered for approx. 1000 hours by a gold foil capacitor. The gold foil capacitor is completely loaded after 18 continuous hours of operation.

| Interfaces | X20CP0292 |
|---|---|
| Interface IF2 | |
|    Type | Ethernet |
|    Design | Shielded RJ45 port |
|    Transfer rate | 100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| Additional interfaces | |
|    X20BB22 | Compact CPU base module with integrated RS232 interface |
|    X20BB27 | Compact CPU base module with integrated RS232 and CAN interfaces |
| **General information** | **X20CP0292** |
| Status indicators | CPU function, Ethernet |
| Diagnostics | |
|    CPU function | Yes, with status LED |
|    Ethernet | Yes, with status LED |
|    Over-temperature | Yes, with software status |
| Visual Components capability | Yes |
| ACOPOS capability | Yes |
| Temperature sensor | Yes |
| Electrical isolation | |
|    PLC - IF2 | Yes |
| Power consumption | 3.0 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20CP0292** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20CP0292** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CP0292** |
| Grid size [1] | 37.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9500 or X20PS9502 separately |
| | Order Compact CPU base 1x X20BB22 or X20BB27 separately |

1) Spacing is based on the width of the Compact CPU base X20BB22 or X20BB27. An X20PS9500 or X20PS9502 supply module is also always required for the CPU.

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BB22 | X20 Compact CPU base, for Compact CPU and Compact CPU supply module, base for integrated RS232 interface, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 📄 132 |
| X20BB27 | X20 Compact CPU base, for Compact CPU and Compact CPU supply module, base for integrated RS232 and CAN interfaces, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 📄 133 |
| X20PS9500 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply | 📄 134 |
| X20PS9502 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply, supply feed not electrically isolated | 📄 138 |

# Compact CPU
# CP0291



LED status indicator

Node number switches

IF1 - RS232
IF3 - CAN bus (with BB27)

IF2 - Ethernet

Terminal block for CPU
and I/O feed,
RS232 connection
CAN bus connection (with BB27)

Switch for CAN bus
Terminating resistance on BB27

The structure of the X20 Compact CPU is described on page ▤ 124. In addition to the structure, other general information is also provided.

With the same processor and the same amount of memory, the CP0291 is just as powerful as the CP0201.

The CP0291, however, also has an onboard Ethernet interface.

- Embedded µP 16
- 100 KB User SRAM
- 1 MB User FlashPROM
- Ethernet on-board
- Only 37.5 mm wide
- Battery-free



| Short description | X20CP0291 |
| --- | --- |
| System module | CPU |
| Processor | Embedded µP 16 |
| Interfaces | 1x Ethernet onboard |
| **Controller** | **X20CP0291** |
| Fastest task class cycle time | 4 ms |
| Typical instruction cycle time | 0.8 µs |
| Standard memory | |
|    User RAM | 100 KByte SRAM [1] |
|    User PROM | 1 MB FlashPROM |
| Remanent variables | 2.75 KByte FRAM [2] |
| Backup battery | No |
| Integrated I/O processor | Processes I/O data points in the background |
| Real-time clock [3] | Yes, resolution 1 s |

1) Not buffered.

2) The FRAM stores its contents ferromagnetically. Therefore, no buffer battery is needed.

3) The real-time clock is buffered for approx. 1000 hours by a gold foil capacitor. The gold foil capacitor is completely loaded after 18 continuous hours of operation.

| Interfaces | X20CP0291 |
|---|---|
| Interface IF2 | |
|     Type | Ethernet |
|     Design | Shielded RJ45 port |
|     Transfer rate | 100 MBit/s |
|     Cable length | Max. 100 m between two stations (segment length) |
| Additional interfaces | |
|     X20BB22 | Compact CPU base module with integrated RS232 interface |
|     X20BB27 | Compact CPU base module with integrated RS232 and CAN interfaces |
| **General information** | **X20CP0291** |
| Status indicators | CPU function, Ethernet |
| Diagnostics | |
|     CPU function | Yes, with status LED |
|     Ethernet | Yes, with status LED |
| Visual Components capability | Limited (User PROM) |
| ACOPOS capability | Limited (User PROM) |
| Temperature sensor | No |
| Electrical isolation | |
|     PLC - IF2 | Yes |
| Power consumption | 2.7 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20CP0291** |
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20CP0291** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CP0291** |
| Grid size [1] | 37.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9500 or X20PS9502 separately |
| | Order Compact CPU base 1x X20BB22 or X20BB27 separately |

1) Spacing is based on the width of the Compact CPU base X20BB22 or X20BB27. An X20PS9500 or X20PS9502 supply module is also always required for the CPU.

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BB22 | X20 Compact CPU base, for Compact CPU and Compact CPU supply module, base for integrated RS232 interface, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 132 |
| X20BB27 | X20 Compact CPU base, for Compact CPU and Compact CPU supply module, base for integrated RS232 and CAN interfaces, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 133 |
| X20PS9500 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply | 134 |
| X20PS9502 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply, supply feed not electrically isolated | 138 |

# Compact CPU
# CP0201

LED status indicator

Node number switches

IF1 - RS232
IF3 - CAN bus (with BB27)

Terminal block for CPU
and I/O feed,
RS232 connection
CAN bus connection (with BB27)

Switch for CAN bus
Terminating resistance on BB27

The structure of the X20 Compact CPU is described on page ▤ 124. In addition to the structure, other general information is also provided.

The CP0201 is the entry-level X20 Compact CPU. This CPU is used when a cycle time of 2 ms (typ. 5 ms) is sufficient and the cost/performance ratio is a key factor.

Going without an onboard Ethernet interface additionally reduces costs for the CP0201.

- Embedded $\mu$P 16
- 100 KB User SRAM
- 1 MB User FlashPROM
- Only 37.5 mm wide
- Battery-free

| Short description | X20CP0201 |
|---|---|
| System module | CPU |
| Processor | Embedded $\mu$P 16 |
| **Controller** | **X20CP0201** |
| Fastest task class cycle time | 4 ms |
| Typical instruction cycle time | 0.8 $\mu$s |
| Standard memory | |
|    User RAM | 100 KByte SRAM [1] |
|    User PROM | 1 MB FlashPROM |
| Remanent variables | 2.75 KByte FRAM [2] |
| Backup battery | No |
| Integrated I/O processor | Processes I/O data points in the background |
| Real-time clock [3] | Yes, resolution 1 s |

1) Not buffered.

2) The FRAM stores its contents ferromagnetically. Therefore, no buffer battery is needed.

3) The real-time clock is buffered for approx. 1000 hours by a gold foil capacitor. The gold foil capacitor is completely loaded after 18 continuous hours of operation.

| Interfaces | X20CP0201 |
|---|---|
| Interfaces are located on the base module | |
| X20BB22 | Compact CPU base module with integrated RS232 interface |
| X20BB27 | Compact CPU base module with integrated RS232 and CAN interfaces |
| **General information** | **X20CP0201** |
| Status indicators | CPU function |
| Diagnostics | |
| CPU function | Yes, with status LED |
| Visual Components capability | Limited (User PROM) |
| ACOPOS capability | Limited (User PROM) |
| Temperature sensor | No |
| Power consumption | 2.2 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20CP0201** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20CP0201** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CP0201** |
| Grid size [1] | 37.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9500 or X20PS9502 separately |
| | Order Compact CPU base 1x X20BB22 or X20BB27 separately |

1) Spacing is based on the width of the Compact CPU base X20BB22 or X20BB27. An X20PS9500 or X20PS9502 supply module is also always required for the CPU.

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BB22 | X20 Compact CPU base, for Compact CPU and Compact CPU supply module, base for integrated RS232 interface, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 132 |
| X20BB27 | X20 Compact CPU base, for Compact CPU and Compact CPU supply module, base for integrated RS232 and CAN interfaces, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 133 |
| X20PS9500 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply | 134 |
| X20PS9502 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply, supply feed not electrically isolated | 138 |

# Bus module
# BB22

The BB22 bus module is the base for all X20 Compact CPUs. The left and right locking plates are included in the delivery.

- Base for all X20 Compact CPUs
- RS232 connection

| Short description | X20BB22 |
|---|---|
| Bus module | X20 Compact CPU base - backplane for Compact CPU and Compact CPU supply module |
| Interfaces | 1x RS232 connection |
| **General information** | **X20BB22** |
| Electrical isolation | |
| Bus - RS232 | No |
| Power consumption | |
| Bus | 0.32 W |
| I/O internal | - |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20BB22** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BB22** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BB22** |
| Spacing | 37.5 $^{+0.2}$ mm |
| Comment | Left and right X20 end plates included in delivery |

## Potential control



+24 VDC
GND
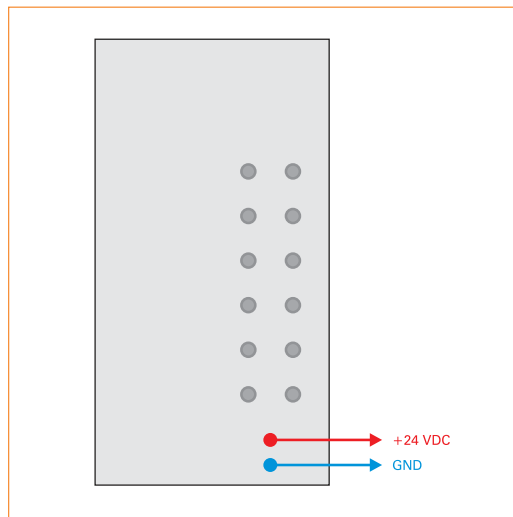
# Bus module
# BB27

The BB27 bus module is the base for all X20 Compact CPUs. The left and right locking plates are included in the delivery.

- Base for all X20 Compact CPUs
- RS232 connection
- CAN bus connection
- Integrated terminating resistor for CAN bus

| Short description | X20BB27 |
|---|---|
| Bus module | X20 Compact CPU base - backplane for Compact CPU and Compact CPU supply module |
| Interfaces | 1x RS232 connection, 1x CAN bus connection |
| **General information** | **X20BB27** |
| Electrical isolation | |
|    Bus - RS232 | No |
|    Bus - CAN bus | No |
|    RS232 - CAN bus | No |
| Power consumption | |
|    Bus | 0.53 W |
|    I/O internal | - |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20BB27** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BB27** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BB27** |
| Spacing | 37.5 $^{+0.2}$ mm |
| Comment | Left and right X20 end plates included in delivery |

## Potential control



+24 VDC

GND
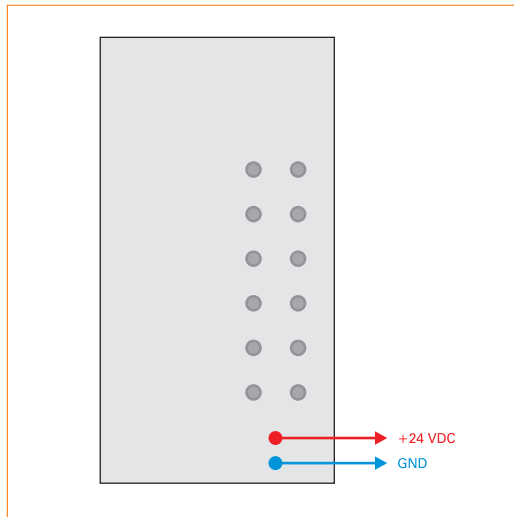
# Supply module
# PS9500

The supply module PS9500 is used together with an X20 Compact or Fieldbus CPU. It is equipped with a feed for the CPU, the X2X Link, and the internal I/O supply.

- Supply for the Compact or Fieldbus CPU, X2X Link, and internal I/O supply
- Electrical isolation of feed and CPU / X2X Link supply
- Redundancy of CPU / X2X Link supply possible by operating multiple supply modules simultaneously
- RS232 can be configured as an online interface
- CAN bus

| Short description | X20PS9500 |
|---|---|
| Power supply module | 24 VDC supply module for Compact or Fieldbus CPUs, X2X Link bus supply and I/O |
| Interfaces | 1x RS232, 1x CAN bus [1] |

1) CAN bus only together with the X20BB27 X20BB37 or X20BB47 bus module.

| CPU / X2X Link supply input | X20PS9500 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 0.7 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |

| CPU / X2X Link supply output | X20PS9500 |
|---|---|
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation of the CPU / X2X Link supply | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

| Input I/O supply | X20PS9500 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |

| Output I/O supply | X20PS9500 |
|---|---|
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |

| Interfaces | X20PS9500 |
|---|---|
| Interface IF1 | |
| Type | RS232 |
| Design | Contact via 12-pin terminal block TB12 |
| Maximum transfer rate | 115.2 kBit/s |
| Interface IF3 [1] | |
| Type | CAN bus |
| Design | Contact via 12-pin terminal block TB12 |
| Maximum transfer rate | 1 MBit/s |

1) CAN bus only together with the X20BB27 X20BB37 or X20BB47 bus module.

| General information | X20PS9500 |
|---|---|
| Status indicators | Overload, operating status, module status, RS232, CAN bus [1] |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Overload | Yes, with status LED and software status |
| RS232 data transfer | Yes, with status LED |
| CAN bus data transfer [1] | Yes, with status LED |
| Electrical isolation | |
| CPU / X2X bus supply | Yes |
| I/O supply | No |
| Power consumption [2] | |
| Bus | 1.42 W |
| I/O internal | 0.6 W |
| Certification | CE, C-UL-US, GOST-R |

1) CAN bus only together with the X20BB27 X20BB37 or X20BB47 bus module.

2) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20PS9500 |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PS9500** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PS9500** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order Compact CPU base 1x X20BB22 or X20BB27 separately |
| | Order Fieldbus CPU base 1x X20BB3x/4x separately |

# Supply module
# PS9500

## Pin assignments

| | |
|---|---|
| RS232 TxD | RS232 RxD |
| CAN GND | RS232 GND |
| CAN High | CAN Low |
| +24 V CPU/BUS | +24 V I/O |
| +24 V CPU/BUS | +24 V I/O |
| GND | GND |

## Connection example

PS

CPU/X2X Link
Power supply

T 10 A

I/O
Power supply

+24 VDC

GND

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BB22 | X20 Compact CPU base, for Compact CPU and Compact CPU supply module, base for integrated RS232 inter-face, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 132 |
| X20BB27 | X20 Compact CPU base, for Compact CPU and Compact CPU supply module, base for integrated RS232 and CAN interfaces, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 133 |
| X20BB32 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 interface, slot for X20 interface module, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 150 |
| X20BB37 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 and CAN interface, slot for X20 interface module, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 151 |
| X20BB42 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 interface, 2x slots for X20 interface modules, X20 connection, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 152 |
| X20BB47 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 and CAN interface, 2x slots for X20 interface modules, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 153 |

# Supply module
# PS9502

The supply module PS9502 is used together with an X20 Compact or Fieldbus CPU. It is equipped with a feed for the Compact or Fieldbus CPU, the X2X Link and the internal I/O supply.

The module is intended as a low-cost supply module for small X20 systems. Potential groups are able to be formed. An expansion or redundancy of the X2X Link with the PS3300 or PS3310 supply module is not possible. Expansion of the X20 system with a bus transmitter is not permitted either.

- Supply for the Compact or Fieldbus CPU, X2X Link, and internal I/O supply
- Low-cost supply module for small X20 systems
- No electrical isolation of feed and CPU / X2X Link supply
- Expansion or redundancy of CPU / X2X Link supply not possible by operating multiple supply modules simultaneously
- RS232 can be configured as an online interface
- CAN bus

| Short description | X20PS9502 |
|---|---|
| Power supply module | 24 VDC supply module for Compact or Fieldbus CPU, X2X Link bus supply and I/O |
| Interfaces | 1x RS232, 1x CAN bus [1] |

1) CAN bus only together with the X20BB27 or X20BB37 bus module.

| CPU / X2X Link supply input | X20PS9502 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 0.7 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |

| CPU / X2X Link supply output | X20PS9502 |
|---|---|
| Rated output power | |
|    Horizontal installation | 7.0 W at 45°C and 5.0 W at 55°C |
|    Vertical installation | 7.0 W at 40°C and 5.0 W at 50°C |
| Parallel operation | No |
| Redundant operation of the CPU / X2X Link supply | No |

| Input I/O supply | X20PS9502 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |

| Output I/O supply | X20PS9502 |
|---|---|
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |

| Interfaces | X20PS9502 |
|---|---|
| Interface IF1 | |
|    Type | RS232 |
|    Design | Contact via 12-pin terminal block TB12 |
|    Maximum transfer rate | 115.2 kBit/s |
| Interface IF3 [1] | |
|    Type | CAN bus |
|    Design | Contact via 12-pin terminal block TB12 |
|    Maximum transfer rate | 1 MBit/s |

1) CAN bus only together with the X20BB27 or X20BB37 bus module.

| General information | X20PS9502 |
|---|---|
| Status indicators | Operating status, module status, RS232, CAN bus [1] |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Overload | Yes, with status LED and software status |
|    RS232 data transfer | Yes, with status LED |
|    CAN bus data transfer [1] | Yes, with status LED |
| Electrical isolation | |
|    CPU / X2X bus supply | No |
|    I/O supply | No |
| Power consumption [2] | |
|    Bus | 1.44 W |
|    I/O internal | 0.6 W |
| Certification | CE, C-UL-US (in development), GOST-R |

1) CAN bus only together with the X20BB27 or X20BB37 bus module.

2) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20PS9502 |
| --- | --- |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PS9502** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PS9502** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order Compact CPU base 1x X20BB22 or X20BB27 separately |
| | Order Fieldbus CPU base 1x X20BB32 or X20BB37 separately |

# Supply module
# PS9502

## Pin assignments



| | |
|---|---|
| RS232 TxD | RS232 RxD |
| CAN GND | RS232 GND |
| CAN high | CAN low |
| +24 V CPU/BUS | +24 V I/O |
| +24 V CPU/BUS | +24 V I/O |
| GND | GND |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BB22 | X20 Compact CPU base, for Compact CPU and Compact CPU supply module, base for integrated RS232 interface, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 132 |
| X20BB27 | X20 Compact CPU base, for Compact CPU and Compact CPU supply module, base for integrated RS232 and CAN interfaces, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 133 |
| X20BB32 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 interface, slot for X20 interface module, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 150 |
| X20BB37 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 and CAN interface, slot for X20 interface module, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 151 |
| X20BB42 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 interface, 2 slots for X20 interface smodule, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 152 |
| X20BB47 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 and CAN interface, 2 slots for X20 interface modules, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 153 |

# Fieldbus CPUs



Fieldbus CPU base
X20 BB 3x/4x

Fieldbus CPU supply module
X20 PS 950x

Interface module

Fieldbus CPU
X20 XC 02xx

Terminal block
X20 TB 12
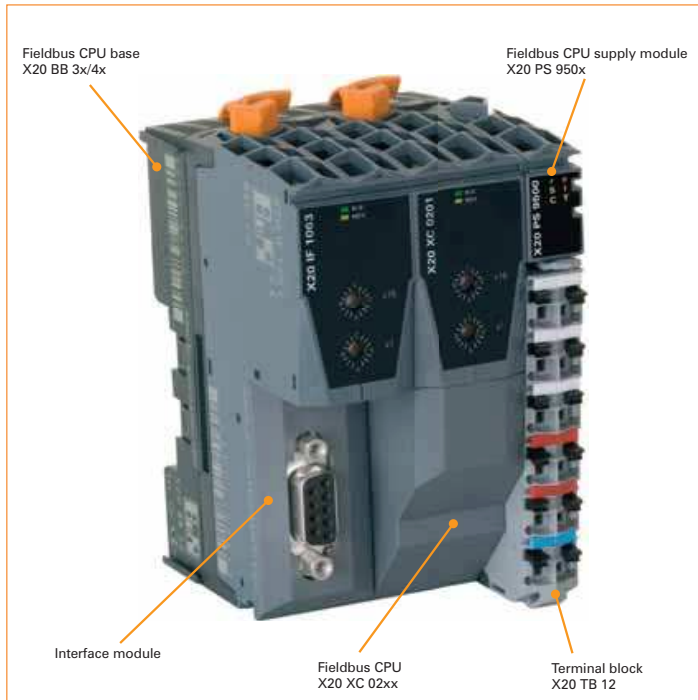
## Adaptable to individual requirements

Fieldbus CPUs are a variation of Compact CPUs. Their modular structure makes it easy to meet the individual requirements of an application.

**Fieldbus CPU**
- Embedded $\mu$P 25 with or without Ethernet on-board
- Embedded $\mu$P 16

**Interface module**
- Profibus DP master
- Profibus DP slave
- CAN bus
- RS232
- RS485/RS422

**Bus module**
- Bus module with RS232 connection
- Bus module with RS232 and CAN bus connections
- Both versions with one or two slots for interface modules

**Supply module**
- Supply module for Fieldbus CPU, X2X Link bus supply and I/O
- RS232 interface connection
- CAN bus connection
- Without or without electrical isolation of the CPU/X2X Link supply

**Terminal block**
- 12-pin terminal block

## The battery-free CPU

To meet the high demands of the market, the Fieldbus CPU was designed to run without a battery. This makes it completely maintenance-free. The following features make operation without a buffer battery possible.

**Real-time clock**
The real-time clock is buffered for approx. 1000 hours by a gold foil capacitor.

**FRAM instead of SRAM for remanent variables**
This FRAM stores its contents ferroelectrically. Unlike normal SRAM, this does not require a battery.

## Compact design

Despite the sleek profile of only 62.5 mm, the CPU supply, the X2X Link bus supply, and the I/O module supply are integrated in the CPU. No additional power supply modules are necessary.

# Fieldbus CPU
# XC0292



LED status indicator

Node number switches

Slot for
Fieldbus module

IF1 - RS232
IF3 - CAN bus (with BBx7)

Terminal block for CPU
and I/O feed,
RS232 connection
CAN bus connection (with BBx7)

IF2 - Ethernet

Switch for CAN bus
Terminating resistor on BBx7

The structure of the X20 Fieldbus CPU is described on page 141. In addition to the structure, other general information is also provided.

Fieldbus CPUs are variations of Compact CPUs. In addition to these features, there is also the option of connecting fieldbus modules to the left side. These CPUs make applications possible in which data preprocessing has to take place remotely within the I/O bus connection.

Equipped with Embedded µP 25 and additional memory, the XC0292 is predestined for drive and visualization applications. Unlike XC0202, the XC0292 is equipped with an Ethernet on-board interface.

- Embedded µP 25
- 750 KB User SRAM
- 3 MB User FlashPROM
- Ethernet on-board
- Up to two slots for fieldbus modules
- Only 62.5 mm wide
- Battery-free



| Short description | X20XC0292 |
| --- | --- |
| System module | CPU |
| Processor | Embedded µP 25 |
| Interfaces | 1x Ethernet onboard |
| **Controller** | **X20XC0292** |
| Fastest task class cycle time | 2 ms |
| Typical instruction cycle time | 0.5 µs |
| Standard memory | |
|     User RAM | 750 KByte SRAM [1] |
|     User PROM | 3 MB FlashPROM |
| Permanent variables | 2.75 KByte FRAM [2] |
| Backup battery | No |
| Integrated I/O processor | Processes I/O data points in the background |
| Real-time clock [3] | Yes, resolution 1 s |
| Slots for fieldbus modules | |
|     X20BB3x | 1 |
|     X20BB4x | 2 |

1) Not buffered.

2) The FRAM stores its contents ferromagnetically. Therefore, no buffer battery is needed.

3) The real-time clock is buffered for approx. 1000 hours by a gold foil capacitor. The gold foil capacitor is completely loaded after 18 continuous hours of operation.
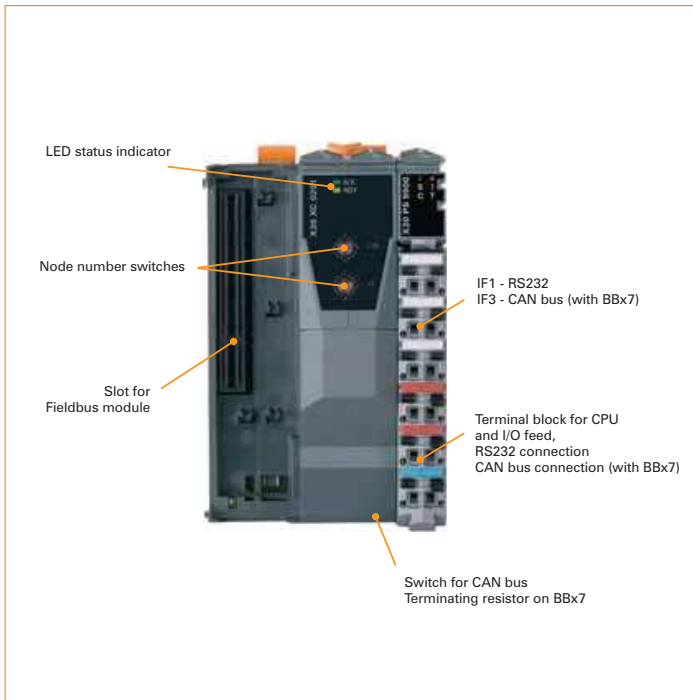
| Interfaces | X20XC0292 |
|---|---|
| Interface IF2 | |
|   Type | Ethernet |
|   Design | Shielded RJ45 port |
|   Transfer rate | 100 MBit/s |
|   Cable length | Max. 100 m between two stations (segment length) |
| Additional interfaces | |
|   X20BB32 and X20BB42 | Fieldbus CPU base module with integrated RS232 interface |
|   X20BB37 and X20BB47 | Fieldbus CPU base module with integrated RS232 and CAN interfaces |

| General information | X20XC0292 |
|---|---|
| Status indicators | CPU function, Ethernet |
| Diagnostics | |
|   CPU function | Yes, with status LED |
|   Ethernet | Yes, with status LED |
|   Over-temperature | Yes, with software status |
| Visual Components capability | Yes |
| ACOPOS capability | Yes |
| Temperature sensor | Yes |
| Power consumption | 2.8 W |
| Certification | CE, C-UL-US (in development), GOST-R |

| Operational conditions | X20XC0292 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20XC0292 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20XC0292 |
|---|---|
| Grid size [1] | |
|   X20BB3x | 62.5 $^{+0.2}$ mm |
|   X20BB4x | 87.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9500 or X20PS9502 separately |
| | Order Fieldbus CPU base 1x X20BB3x/4x separately |

1) Spacing is based on the width of the Fieldbus CPU base X20BB3x/4x. The CPU always requires up to two fieldbus modules and one supply module X20PS9500 or
  X20PS9502.

# Fieldbus CPU
# XC0292

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BB32 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 interface, slot for X20 interface module, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 150 |
| X20BB37 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 and CAN interface, slot for X20 interface module, X20 connection, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 151 |
| X20BB42 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 interface, 2 slots for X20 interface smodule, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 152 |
| X20BB47 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 and CAN interface, 2 slots for X20 interface modules, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 153 |
| X20PS9500 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply | 134 |
| X20PS9502 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply, Supply not electrically isolated | 138 |

| Optional accessories | | |
|---|---|---|
| X20IFxxxx | Communication with CAN bus, Profibus DP, RS232, RS422, RS485 | 70 |

# Fieldbus CPU
# XC0202



LED status indicator

Node number switches

Slot for
Fieldbus module

IF1 - RS232
IF3 - CAN bus (with BBx7)

Terminal block for CPU
and I/O feed,
RS232 connection
CAN bus connection (with BBx7)

Switch for CAN bus
Terminating resistor on BBx7

The structure of the X20 Fieldbus CPU is described on page ▤ 141. In addition to the structure, other general information is also provided.

Fieldbus CPUs are variations of Compact CPUs. In addition to these features, there is also the option of connecting fieldbus modules to the left side. These CPUs make applications possible in which data preprocessing has to take place remotely within the I/O bus connection.

Equipped with Embedded $\mu$P 25 and additional memory, the XC0202 is predestined for drive and visualization applications.

- Embedded $\mu$P 25
- 750 KB User SRAM
- 3 MB User FlashPROM
- Up to two slots for fieldbus modules
- Only 62.5 mm wide
- Battery-free



| Short description | X20XC0202 |
|---|---|
| System module | CPU |
| Processor | Embedded $\mu$P 25 |
| **Controller** | **X20XC0202** |
| Fastest task class cycle time | 2 ms |
| Typical instruction cycle time | 0.5 $\mu$s |
| Standard memory | |
| User RAM | 750 KByte SRAM [1] |
| User PROM | 3 MB FlashPROM |
| Permanent variables | 2.75 KByte FRAM [2] |
| Backup battery | No |
| Integrated I/O processor | Processes I/O data points in the background |
| Real-time clock [3] | Yes, resolution 1 s |
| Slots for fieldbus modules | |
| X20BB3x | 1 |
| X20BB4x | 2 |

1) Not buffered.

2) The FRAM stores its contents ferromagnetically. Therefore, no buffer battery is needed.

3) The real-time clock is buffered for approx. 1000 hours by a gold foil capacitor. The gold foil capacitor is completely loaded after 18 continuous hours of operation.

| Interfaces | X20XC0202 |
|---|---|
| Interfaces (located on the base module) | |
| X20BB32 and X20BB42 | Fieldbus CPU base module with integrated RS232 interface |
| X20BB37 and X20BB47 | Fieldbus CPU base module with integrated RS232 and CAN interfaces |

| General information | X20XC0202 |
|---|---|
| Status indicators | CPU function |
| Diagnostics | |
|    CPU function | Yes, with status LED |
|    Over-temperature | Yes, with software status |
| Visual Components capability | Yes |
| ACOPOS capability | Yes |
| Temperature sensor | Yes |
| Power consumption | 2.2 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20XC0202** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20XC0202** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20XC0202** |
| Grid size [1] | |
|    X20BB3x | 62.5 $^{+0.2}$ mm |
|    X20BB4x | 87.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9500 or X20PS9502 separately |
| | Order Fieldbus CPU base 1x X20BB3x/4x separately |

1) Spacing is based on the width of the Fieldbus CPU base X20BB3x/4x. The CPU always requires up to two fieldbus modules and one supply module X20PS9500 or X20PS9502.

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BB32 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 interface, slot for X20 interface module, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 150 |
| X20BB37 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 and CAN interface, slot for X20 interface module, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 151 |
| X20BB42 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 interface, 2x slots for X20 interface module, X20 connection, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 🗎 152 |
| X20BB47 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 and CAN interface, 2x slots for X20 interface module, X20 connection, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 🗎 153 |
| X20PS9500 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply | 🗎 134 |
| X20PS9502 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply, supply feed not electrically isolated | 🗎 138 |

| Optional accessories | | |
|---|---|---|
| X20IFxxxx | Communication with CAN bus, Profibus DP, RS232, RS422, RS485 | 🗎 70 |

# Fieldbus CPU
# XC0201

LED status indicator

Node number switches

IF1 - RS232
IF3 - CAN bus (with BBx7)

Slot for
Fieldbus module

Terminal block for CPU
and I/O feed,
RS232 connection
CAN bus connection (with BBx7)

Switch for CAN bus
Terminating resistor on BBx7

The structure of the X20 Fieldbus CPU is described on page 🖹 141. In addition to the structure, other general information is also provided.

Fieldbus CPUs are variations of Compact CPUs. In addition to these features, there is also the option of connecting fieldbus modules to the left side. These CPUs make applications possible in which data preprocessing has to take place remotely within the I/O bus connection.

The XC201 is the entry-level X20 Fieldbus CPU. This CPU is used when a cycle time of 2 ms (typ. 5 ms) is sufficient and the cost/performance ratio is a key factor.

- Embedded $\mu$P 16
- 100 KB User SRAM
- 1 MB User FlashPROM
- Up to two slots for fieldbus modules
- Only 62.5 mm wide
- Battery-free

| Short description | X20XC0201 |
| --- | --- |
| System module | CPU |
| Processor | Embedded $\mu$P 16 |
| **Controller** | **X20XC0201** |
| Fastest task class cycle time | 4 ms |
| Typical instruction cycle time | 0.8 $\mu$s |
| Standard memory | |
| User RAM | 100 KByte SRAM [1] |
| User PROM | 1 MB FlashPROM |
| Permanent variables | 2.75 KByte FRAM [2] |
| Backup battery | No |
| Integrated I/O processor | Processes I/O data points in the background |
| Real-time clock [3] | Yes, resolution 1 s |
| Slots for fieldbus modules | |
| X20BB3x | 1 |
| X20BB4x | 2 |

1) Not buffered.

2) The FRAM stores its contents ferromagnetically. Therefore, no buffer battery is needed.

3) The real-time clock is buffered for approx. 1000 hours by a gold foil capacitor. The gold foil capacitor is completely loaded after 18 continuous hours of operation.

| Interfaces | X20XC0201 |
| --- | --- |
| Interfaces (located on the base module) | |
| X20BB32 and X20BB42 | Fieldbus CPU base module with integrated RS232 interface |
| X20BB37 and X20BB47 | Fieldbus CPU base module with integrated RS232 and CAN interfaces |

| General information | X20XC0201 |
|---|---|
| Status indicators | CPU function |
| Diagnostics | |
|   CPU function | Yes, with status LED |
| Visual Components capability | Limited (User PROM) |
| ACOPOS capability | Limited (User PROM) |
| Temperature sensor | No |
| Power consumption | 2.0 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20XC0201** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20XC0201** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20XC0201** |
| Grid size [1] | |
|   X20BB3x | 62.5 $^{+0.2}$ mm |
|   X20BB4x | 87.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9500 or X20PS9502 separately |
| | Order Fieldbus CPU base 1x X20BB3x/4x separately |

1) Spacing is based on the width of the Fieldbus CPU base X20BB3x/4x. The CPU always requires up to two fieldbus modules and one supply module X20PS9500 or X20PS9502.

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BB32 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 interface, slot for X20 interface module, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | ▤ 150 |
| X20BB37 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 and CAN interface, slot for X20 interface module, X20 connection, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | ▤ 151 |
| X20BB42 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 interface, 2x slots for X20 interface module, X20 connection, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | ▤ 152 |
| X20BB47 | X20 Fieldbus CPU base, for Fieldbus CPU and Compact CPU supply module, base for integrated RS232 and CAN interface, 2x slots for X20 interface module, X20 connection, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | ▤ 153 |
| X20PS9500 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply | ▤ 134 |
| X20PS9502 | X20 supply module for Compact and fieldbus CPUs and internal I/O supply, X2X Link bus supply, supply feed not electrically isolated | ▤ 138 |

| Optional accessories | | |
|---|---|---|
| X20IFxxxx | Communication with CAN bus, Profibus DP, RS232, RS422, RS485 | ▤ 70 |

# Bus module
# BB32

The BB32 bus module is the base for all X20 Fieldbus CPUs. The left and right locking plates are included in the delivery.

- Base for all X20 Fieldbus CPUs
- RS232 connection

| Short description | X20BB32 |
|---|---|
| Bus module | X20 Fieldbus CPU base, backplane for Fieldbus CPU, Fieldbus CPU supply module and interface module |
| Interfaces | 1x RS232 connection |
| **General information** | **X20BB32** |
| Electrical isolation | |
| Bus - RS232 | No |
| Power consumption | |
| Bus | 0.35 W |
| I/O internal | - |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20BB32** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BB32** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BB32** |
| Spacing | 62.5 $^{+0.2}$ mm |
| Comment | Left and right X20 end plates included in delivery |

## Potential control



+24 VDC

GND
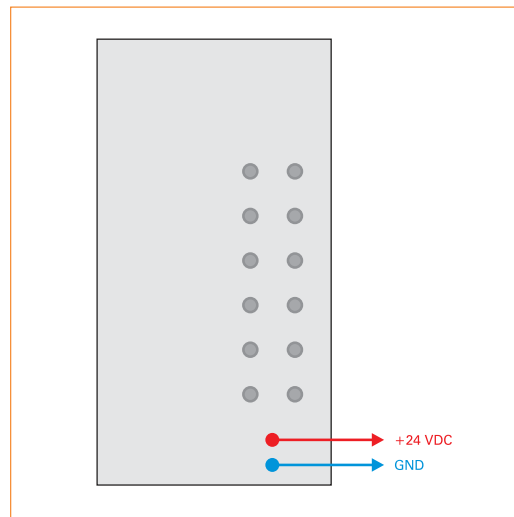
# Bus module
# BB37

The BB37 bus module is the base for all X20 Fieldbus CPUs. The left and right locking plates are included in the delivery.

- Base for all X20 Fieldbus CPUs
- RS232 connection
- CAN bus connection
- Integrated terminating resistor for CAN bus

| Short description | X20BB37 |
|---|---|
| Bus module | X20 Fieldbus CPU base, backplane for Fieldbus CPU, Fieldbus CPU supply module and interface module |
| Interfaces | 1x RS232 connection, 1x CAN bus connection |
| **General information** | **X20BB37** |
| Electrical isolation | |
|   Bus - RS232 | No |
|   Bus - CAN bus | No |
|   RS232 - CAN bus | No |
| Power consumption | |
|   Bus | 0.56 W |
|   I/O internal | - |
| Certification | CE, C-UL-US (in development), GOST-R |
| **Operational conditions** | **X20BB37** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BB37** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BB37** |
| Spacing | 62.5 $^{+0.2}$ mm |
| Comment | Left and right X20 end plates included in delivery |

## Potential control



+24 VDC
GND
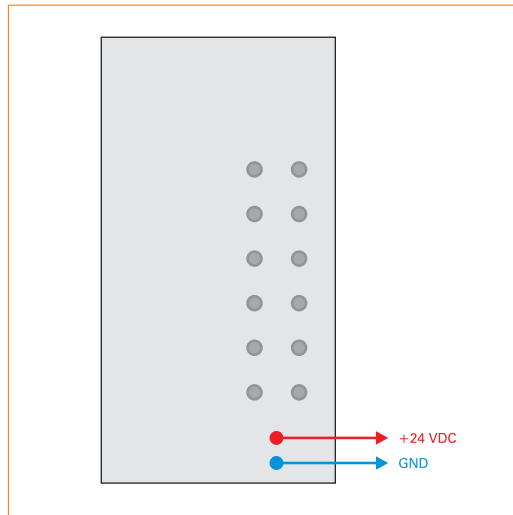
# Bus module
# BB42

The BB42 bus module is a base for all X20 Fieldbus CPUs. It is equipped with two slots for interface modules. The left and right locking plates are included in the delivery.

- Base for all X20 Fieldbus CPUs
- Two slots for interface modules
- RS232 connection

| Short description | X20BB42 |
| --- | --- |
| Bus module | X20 Fieldbus CPU base, backplane for Fieldbus CPU, Fieldbus CPU supply module and two interface modules |
| Interfaces | 1x RS232 connection |
| **General information** | **X20BB42** |
| Electrical isolation | |
| Bus - RS232 | No |
| Power consumption | |
| Bus | TBD |
| I/O internal | - |
| Certification | CE, C-UL-US (in development), GOST-R |
| **Operational conditions** | **X20BB42** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BB42** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BB42** |
| Spacing | 87.5 $^{+0.2}$ mm |
| Comment | Left and right X20 end plates included in delivery |

## Potential control



+24 VDC

GND
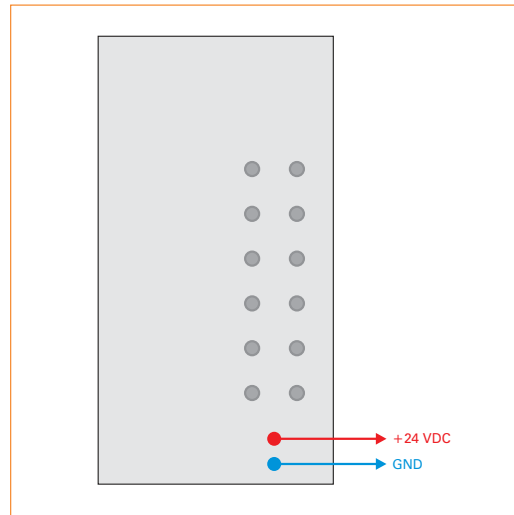
# Bus module
# BB47

The BB47 bus module is a base for all X20 Fieldbus CPUs. It is equipped with two slots for interface modules. The left and right locking plates are included in the delivery.

- Base for all X20 Fieldbus CPUs
- Two slots for interface modules
- RS232 connection
- CAN bus connection
- Integrated terminating resistor for CAN bus

| Short description | X20BB47 |
|---|---|
| Bus module | X20 Fieldbus CPU base, backplane for Fieldbus CPU, Fieldbus CPU supply module and two interface modules |
| Interfaces | 1x RS232 connection, 1x CAN bus connection |
| **General information** | **X20BB47** |
| Electrical isolation | |
|   Bus - RS232 | No |
|   Bus - CAN bus | No |
|   RS232 - CAN bus | No |
| Power consumption | |
|   Bus | TBD |
|   I/O internal | - |
| Certification | CE, C-UL-US (in development), GOST-R |
| **Operational conditions** | **X20BB47** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BB47** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BB47** |
| Spacing | 87.5 $^{+0.2}$ mm |
| Comment | Left and right X20 end plates included in delivery |

## Potential control
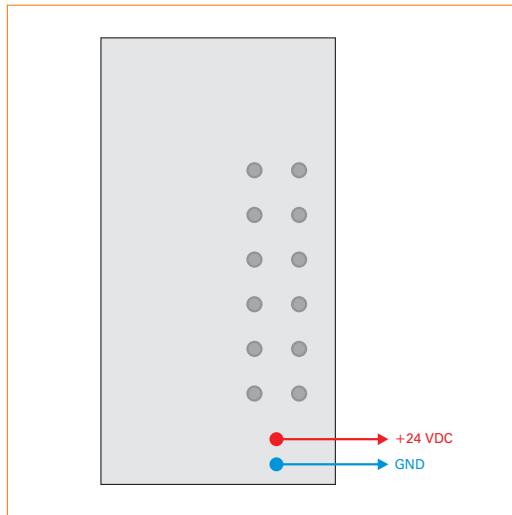
# Interface module IF1074

The IF1074 module is an interface module for the X20 fieldbus CPU.

- CAN bus connection
- Integrated terminating resistor

**CAN**

| Short description | X20IF1074 |
|---|---|
| Communication module | 1x CAN bus |
| **Interfaces** | **X20IF1074** |
| Interface IF1 | |
| Type | CAN bus |
| Design | 5-pin multipoint connector |
| Maximum transfer rate | 1 MBit/s |
| **General information** | **X20IF1074** |
| Status indicators | Module status, data transfer, terminating resistor |
| Diagnostics | |
| Module status | Yes, with status LED |
| Data transfer | Yes, with status LED |
| Terminating resistor | Yes, with status LED |
| Electrical isolation | |
| PLC - IF1 | Yes |
| Power consumption | 0.69 W |
| Certification | CE, C-UL-US (in development), GOST-R |
| **Operational conditions** | **X20IF1074** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20IF1074** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20IF1074** |
| Slot | In X20 fieldbus CPU |
| Comment | Order 1x TB2105 terminal block separately |

| Required accessories | | |
|---|---|---|
| 0TB2105.9010 | Accessory terminal block, 5-pin, screw clamp, 1.5 mm² | 681 |
| 0TB2105.9110 | Accessory terminal block, 5-pin, cage clamp, 2.5 mm² | 681 |

# Bus controller

## X20 bus controllers

The bus controllers are a continuation of the completely modular strategy used for the I/O slices. Made up of a base module, a supply module to supply the voltage for the entire system, and a fieldbus interface, the bus controller is an extremely flexible fieldbus connection.

The entire backplane can be preinstalled. With the removable terminals, the entire system can be wired separately from the electronics module. The individual modules are put in place during commissioning. This is where the I/O system is adapted to the fieldbus being used. Unlike the Compact CPU with integrated fieldbus connection, the bus controller does not need to be programmed in order to transfer or receive the I/O data on the fieldbus. It can be configured on the fieldbus master.

Bus controller base
X20 BB 80

Bus controller supply module
X20 PS 940x

Bus controller fieldbus interface
X20 BC 00xx

Terminal block
X20 TB 12
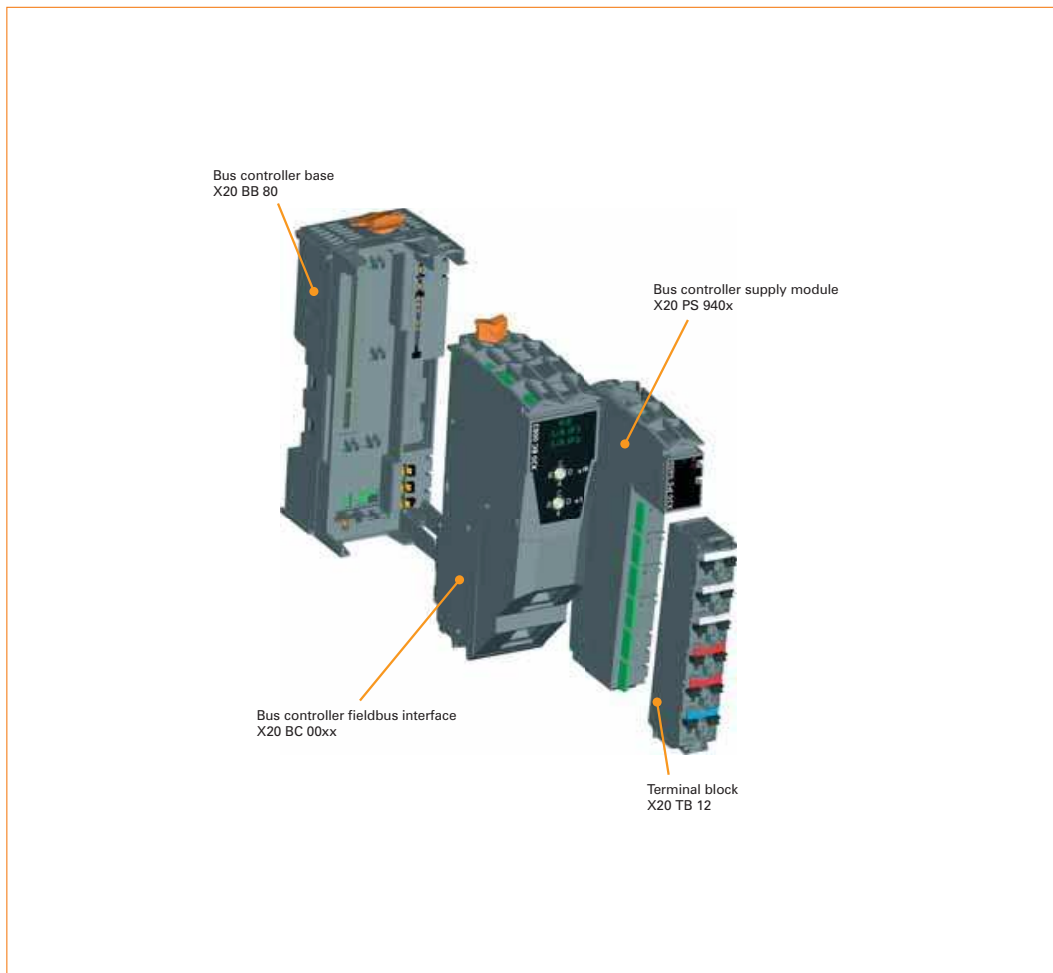
# CANopen bus controller
# BC0043

LED status indicators

Node number switches

Terminal block for
bus controller
and I/O supply

CANopen connection

Switch for terminating resistor
on bottom of module

The structure of the X20 bus controller is described on page ▤ 155. In addition to the structure, other general information is also provided.

CAN (Controller Area Network) has spread considerably in automation technology. CAN topology is based on a line structure and uses twisted pair wires for data transfer. CANopen is a higher-layer protocol based on CAN. This standardized protocol offers highly flexible configuration possibilities.

The BC0043 bus controller makes it possible to connect X2X Link I/O nodes to CANopen. It has automatic transfer rate detection and auto-mapping of the I/O modules connected with X2X Link. All CANopen operating modes such as synchronous, event, and polling modes are supported together with PDO linking, life/node guarding, emergency objects, and much more.

- Fieldbus: CANopen
- I/O configuration via the fieldbus
- 20 Receive PDOs and 20 Transmit PDOs
- Select between entry of a fixed transfer rate or automatic transfer rate detection.
- Integrated terminating resistor

| Short description | X20BC0043 |
|---|---|
| Bus controller | CANopen |
| **Fieldbus** | **X20BC0043** |
| Type | CANopen |
| Design | 5-pin multipoint connector |
| Maximum distance | 1000 m |
| Maximum transfer rate | 1 MBit/s |
| Determination of transfer rate | Automatic transfer rate detection or fixed rate setting |
| **General information** | **X20BC0043** |
| Status indicators | Module status, bus function, data transfer, terminating resistor |
| Diagnostics | |
|    Module status | Yes, with status LED and software status |
|    Bus function | Yes, with status LED |
|    Data transfer | Yes, with status LED |
|    Terminating resistor | Yes, with status LED |
| Electrical isolation | |
|    Fieldbus - X2X bus | No |
|    Fieldbus - I/O | Yes |
| Power consumption of the bus | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |

CANopen

| Operational conditions | X20BC0043 |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BC0043** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BC0043** |
| Grid size [1] | 37.5 $^{+0.2}$ mm |
| Comment | Order 1x TB2105 terminal block separately |
| | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9400 or X20PS9402 separately |
| | Order 1x X20BB80 bus base separately |

1)  The spacing is based on the width of the X20BB80 bus base. An X20PS9400 or X20PS9402 supply module is also always required for the bus controller.

Note:      This bus controller only supports the default function model of multi-function modules. The default function model is explained in the description for each multi-function module.

| Required accessories | | |
|---|---|---|
| 0TB2105.9010 | Accessory terminal block, 5-pin, screw clamp, 1.5 mm² | 📄 681 |
| 0TB2105.9110 | Accessory terminal block, 5-pin, cage clamps, 2.5 mm² | 📄 681 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20PS9400 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply | 📄 172 |
| X20PS9402 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply, | 📄 174 |
| | Supply not electrically isolated | |
| X20BB80 | X20 bus base, for X20 base module (BC, HB, etc.) and X20 supply module, X20 end plates (left and right) | 📄 170 |
| | X20AC0SL1/X20AC0SR1 included | |

# DeviceNet bus controller
# BC0053

The structure of the X20 bus controller is described on page ⊟ 155. In addition to the structure, other general information is also provided.

DeviceNet was developed by Allen Bradley as a CAN bus based automation network. It is based on a producer/consumer protocol. From the user's point of view, all data is handled separately from CAN bus transfer possibilities (e.g. longer data packets are automatically fragmented by DeviceNet). Access occurs using I/O messages with defined properties.

The BC0053 bus controller makes it possible to connect X2X Link I/O nodes to DeviceNet. It has automatic transfer rate detection and auto-mapping of the I/O modules connected with X2X Link. Explicit messaging, change of state, cyclic, polled and bit strobe are supported as DeviceNet operating modes. In addition to the standard communication objects, there are also a number of manufacturer-specific objects.

X20 or other modules that are based on X2X Link can be connected to the bus controller. The entire configuration of this type of modular system is supported by the DeviceNet standard. Allen Bradley developed this modular I/O configuration to simplify the necessary configuration steps and to achieve the required configuration of a modular DeviceNet device intuitively on a flat and very user-friendly interface. The X20 DeviceNet bus controller from B&R also supports this type of configuration.

- Fieldbus: DeviceNet
- I/O configuration via the fieldbus
- Support of both linear and modular systems (Allen Bradley)
- Integrated terminating resistor

LED status indicators

Node number switches

Terminal block for bus controller and I/O supply

DeviceNet connection

Switch for terminating resistor on bottom of module

| Short description | X20BC0053 |
|---|---|
| Bus controller | DeviceNet |
| **Fieldbus** | **X20BC0053** |
| Type | DeviceNet |
| Design | 5-pin multipoint connector |
| Maximum distance | 500 m at 125 kBit/sec |
| Maximum transfer rate | 500 kBit/s |
| Determination of transfer rate | Automatic transfer rate detection |
| **General information** | **X20BC0053** |
| Status indicators | Module status, bus function, 24 V DeviceNet voltage, data transfer, terminating resistor |
| Diagnostics | |
|    Module status | Yes, with status LED and software status |
|    Bus function | Yes, with status LED |
|    24 V DeviceNet voltage | Yes, with status LED |
|    Data transfer | Yes, with status LED |
|    Terminating resistor | Yes, with status LED |
| Electrical isolation | |
|    Fieldbus - X2X bus | No |
|    Fieldbus - I/O | Yes |
| Power consumption of the bus | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20BC0053 |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BC0053** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BC0053** |
| Grid size [1] | 37.5 $^{+0.2}$ mm |
| Comment | Order 1x TB2105 terminal block separately |
| | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9400 or X20PS9402 separately |
| | Order 1x X20BB80 bus base separately |

1)  The spacing is based on the width of the X20BB80 bus base. An X20PS9400 or X20PS9402 supply module is also always required for the bus controller.

Note:      This bus controller only supports the default function model of multi-function modules. The default function model is explained in the description for each multi-function module.

| Required accessories | | |
|---|---|---|
| 0TB2105.9010 | Accessory terminal block, 5-pin, screw clamp, 1.5 mm² | 📖 681 |
| 0TB2105.9110 | Accessory terminal block, 5-pin, cage clamps, 2.5 mm² | 📖 681 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📖 94 |
| X20PS9400 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply | 📖 172 |
| X20PS9402 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply, | 📖 174 |
| | Supply not electrically isolated | |
| X20BB80 | X20 bus base, for X20 base module (BC, HB, etc.) and X20 supply module, X20 end plates (left and right) | 📖 170 |
| | X20AC0SL1/X20AC0SR1 included | |

# Profibus DP bus controller
# BC0063

The structure of the X20 bus controller is described on page ▤ 155. In addition to the structure, other general information is also provided.

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 cyclic and for acyclic data transfer.

The BC0063 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 that are based on X2X Link can be connected to the bus controller. The modular system configuration 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

LED status indicators

Node number switches

Profibus DP connection

Terminal block for bus controller and I/O supply

| Short description | X20BC0063 |
|---|---|
| Bus controller | Profibus DP slave |
| **Fieldbus** | **X20BC0063** |
| Type | Profibus DP slave |
| Design | 9-pin DSUB socket |
| Maximum distance | See Profibus DP specifications |
| Maximum transfer rate | 12 MBit/s |
| Determination of transfer rate | Automatic transfer rate detection |
| **General information** | **X20BC0063** |
| Status indicators | Module status, bus function, data transfer |
| Diagnostics | |
| Module status | Yes, with status LED and software status |
| Bus function | Yes, with status LED |
| Data transfer | Yes, with status LED |
| Electrical isolation | |
| Fieldbus - X2X bus | No |
| Fieldbus - I/O | Yes |
| Power consumption of the bus | 2.3 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20BC0063 |
|---|---|
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BC0063** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BC0063** |
| Grid size [1] | 37.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9400 or X20PS9402 separately |
| | Order 1x X20BB80 bus base separately |

1) The spacing is based on the width of the X20BB80 bus base. An X20PS9400 or X20PS9402 supply module is also always required for the bus controller.

Note:        This bus controller only supports the default function model of multi-function modules. The default function model is explained in the description for each multi-function module.

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20PS9400 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply | 🗎 172 |
| X20PS9402 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply, Supply not electrically isolated | 🗎 174 |
| X20BB80 | X20 bus base, for X20 base module (BC, HB, etc.) and X20 supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 🗎 170 |

| Optional accessories | | |
|---|---|---|
| 0G1000.00-090 | Bus connector, RS485, for Profibus networks | 🗎 690 |

# CAN I/O bus controller
## BC0073

The structure of the X20 bus controller is described on page ≣ 155. In addition to the structure, other general information is also provided.

The bus controller BC0073 lets you connect X2X Link I/O nodes to CAN I/O. CAN I/O is a transfer protocol based on the CAN bus standard and is fully integrated into the B&R system. From the user's point of view, it doesn't matter if I/O points are operated locally or remotely via CAN I/O.

Up to 43 I/O modules can be connected to the bus controller. Up to 16 of them can be analog modules.

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

LED status indicator

Node number switches

Terminal block for bus controller and I/O supply

CAN I/O connection

Switch for terminating resistor on bottom of module

| Short description | X20BC0073 |
|---|---|
| Bus controller | CAN I/O slave |
| **Fieldbus** | **X20BC0073** |
| Type | CAN I/O slave |
| Design | 5-pin multipoint connector |
| Maximum distance | 1000 m |
| Maximum transfer rate | 1 MBit/s |
| Determination of transfer rate | Automatic transfer rate detection, permanently set or from internal EEPROM |
| **General information** | **X20BC0073** |
| Status indicators | Module status, bus function, data transfer, terminating resistor |
| Diagnostics | |
|    Module status | Yes, with status LED and software status |
|    Bus function | Yes, with status LED |
|    Data transfer | Yes, with status LED |
|    Terminating resistor | Yes, with status LED |
| Electrical isolation | |
|    Fieldbus - X2X bus | No |
|    Fieldbus - I/O | Yes |
| Power consumption of the bus | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20BC0073 |
|---|---|
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| Storage and transport conditions | X20BC0073 |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mechanical characteristics | X20BC0073 |
| Grid size [1] | 37.5 $^{+0.2}$ mm |
| Comment | Order 1x TB2105 terminal block separately |
| | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9400 or X20PS9402 separately |
| | Order 1x X20BB80 bus base separately |

1) The spacing is based on the width of the X20BB80 bus base. An X20PS9400 or X20PS9402 supply module is also always required for the bus controller.

Note:      This bus controller only supports the default function model of multi-function modules. The default function model is explained in the description for each multi-function module.

| Required accessories | | |
|---|---|---|
| 0TB2105.9010 | Accessory terminal block, 5-pin, screw clamp, 1.5 mm² | 📄 681 |
| 0TB2105.9110 | Accessory terminal block, 5-pin, cage clamps, 2.5 mm² | 📄 681 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20PS9400 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply | 📄 172 |
| X20PS9402 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply, Supply not electrically isolated | 📄 174 |
| X20BB80 | X20 bus base, for X20 base module (BC, HB, etc.) and X20 supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 📄 170 |

# Ethernet POWERLINK bus controller
# BC0083

LED status indicator

Node number switches

Terminal block for bus controllers and I/O supply

Ethernet POWERLINK connection with 2x RJ45 connectors for simple wiring

The structure of the X20 bus controller is described on page 🗎 155. In addition to the structure, other general information is also provided.

The BC0083 bus controller makes it possible to connect X2X Link I/O nodes to POWERLINK V1/V2. It is also possible to operate the X2X Link cycle synchronously 1:1 or synchronous to POWERLINK using a prescaler.

POWERLINK is a standard protocol for Fast Ethernet with true real-time properties. The Ethernet POWERLINK Standardization Group (EPSG, www.ethernet-powerlink.org) ensures that the standard remains open and is continually developed.

- POWERLINK V1/V2
- I/O configuration and firmware update via the fieldbus
- Integrated hub for efficient cabling

**ETHERNET**
**POWERLINK**

| Short description | X20BC0083 |
|---|---|
| Bus controller | POWERLINK V1/V2 controlled node |
| **Fieldbus** | **X20BC0083** |
| Type | POWERLINK V1/V2 100 Base-T (ANSI/IEE 802.3) |
| Design | Internal 2x hub, 2x shielded RJ45 port |
| Cable length | Max. 100 m between two stations (segment length) |
| Transfer rate | 100 MBit/s |
| **General information** | **X20BC0083** |
| Status indicators | Module status, bus function |
| Diagnostics | |
| Module status | Yes, with status LED and software status |
| Bus function | Yes, with status LED and software status |
| Electrical isolation | |
| Fieldbus - X2X bus | Yes |
| Fieldbus - I/O | Yes |
| Power consumption of the bus | 2.0 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20BC0083 |
|---|---|
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| Storage and transport conditions | X20BC0083 |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mechanical characteristics | X20BC0083 |
| Grid size [1] | 37.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9400 or X20PS9402 separately |
| | Order 1x X20BB80 bus base separately |

1) The spacing is based on the width of the X20BB80 bus base. An X20PS9400 or X20PS9402 supply module is also always required for the bus controller.

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20PS9400 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply | 🗎 172 |
| X20PS9402 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply, Supply not electrically isolated | 🗎 174 |
| X20BB80 | X20 bus base, for X20 base module (BC, HB, etc.) and X20 supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 🗎 170 |

# Bus controller Modbus/TCP
# BC0087
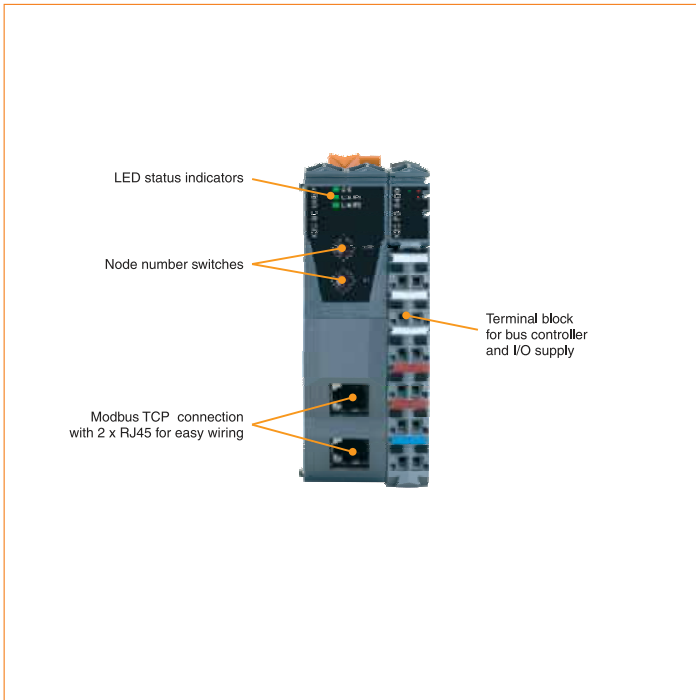
LED status indicators

Node number switches

Terminal block
for bus controller
and I/O supply

Modbus TCP  connection
with 2 x RJ45 for easy wiring

The structure of the X20 bus controller is described on page ▤ 155. In addition to the structure, other general information is also provided.

Ethernet TCP/IP has been permitted as an additional transfer method for Modbus protocol, which has been around since 1979. Today, Modbus/TCP is an open internet draft standard that Schneider Automation has introduced to the IETF (Internet Engineering Task Force), the organization responsible for Internet standardization. The Modbus services and the object model that have been preserved since the original have been kept unchanged for use with TCP/IP as the transfer medium.

Thus, a new member has been added to the Modbus family, which now consists of the classic Modbus RTU (asynchronous transfer via RS232 or RS485), Modbus Plus (high speed communication via a token passing network) and Modbus/TCP (Ethernet TCP/IP based client-server communication). All the variations share a common application protocol, which defines a universal object model for automation data and communication services for access.

The BC0087 bus controller makes it possible to connect X2X Link I/O nodes to Modbus/TCP. The bus controller is operated with the Modbus/TCP library or by external systems with a Modbus/TCP master function.

• Fieldbus: Modbus/TCP
• I/O configuration via the fieldbus
• DHCP capable
• Integrated 2x switch for efficient cabling
• Configurable I/O cycle (0.5 - 4 ms)
• Response time: 1 - 8 ms (depending on the load on the integrated switch)

**Modbus-IDA**
the architecture for distributed automation

| Short description | X20BC0087 |
|---|---|
| Bus controller | Modbus/TCP |
| **Fieldbus** | **X20BC0087** |
| Type | Ethernet |
| Design | Internal 2x switch, 2x shielded RJ45 port |
| Cable length | Max. 100 m between two stations (segment length) |
| Transfer rate | 100 MBit/s, auto-negotiation (automatic recognition of full-duplex/half-duplex), Auto-MDI/MDIX |
| **General information** | **X20BC0087** |
| Status indicators | Module status, bus function |
| Diagnostics | |
|    Module status | Yes, with status LED and software status |
|    Bus function | Yes, with status LED and software status |
| Electrical isolation | |
|    Fieldbus - X2X bus | Yes |
|    Fieldbus - I/O | Yes |
| Power consumption of the bus | 2.0 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20BC0087 |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BC0087** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BC0087** |
| Grid size [1] | 37.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9400 or X20PS9402 separately |
| | Order 1x X20BB80 bus base separately |

1)  The spacing is based on the width of the X20BB80 bus base. An X20PS9400 or X20PS9402 supply module is also always required for the bus controller.

Note:        Only the default function model is supported (see respective module description) when the bus controller automatically configures multi-function modules. All other function models are supported when configured accordingly (see BC0087 User's Manual).

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🖹 94 |
| X20PS9400 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply | 🖹 172 |
| X20PS9402 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply, Supply not electrically isolated | 🖹 174 |
| X20BB80 | X20 bus base, for X20 base module (BC, HB, etc.) and X20 supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 🖹 170 |

# Bus controller EtherNet/IP
# BC0088
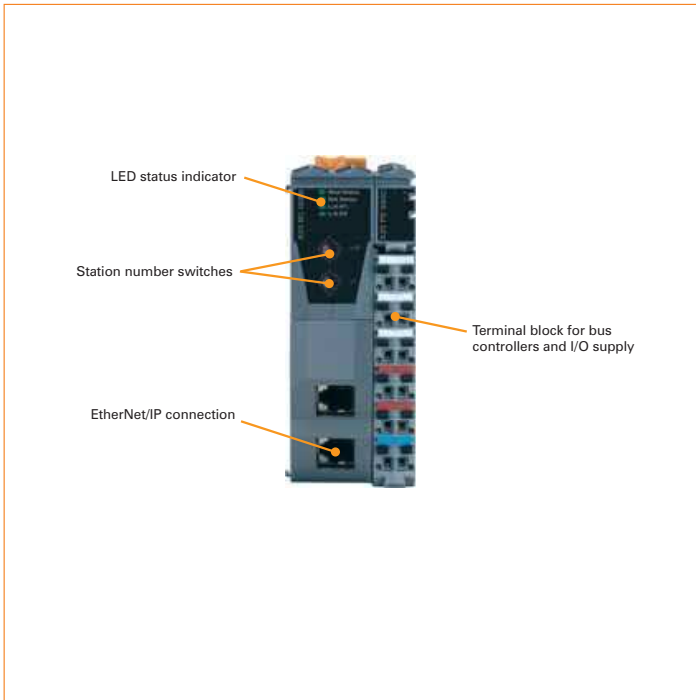
The structure of the X20 bus controller is described on page ▤ 155. In addition to the structure, other general information is also provided.

EtherNet/IP is a fieldbus based on Ethernet. EtherNet/IP was developed by Allen-Bradley (part of Rockwell Automation) and later transferred to the Open DeviceNet Vendor Association (ODVA) as open standard. In 1998 a ControlNet International working group designed a procedure to set the already released application protocol, Common Industrial Protocol, to Ethernet. EtherNet/IP was released in March 2000 as open industry standard based on this procedure.

The BC0088 bus controller makes it possible to connect X2X Link I/O nodes to Ethernet/IP. The bus controller is operated via the corresponding X20 interface module or with external systems that have an EtherNet/IP scanner function.

- Fieldbus: EtherNet/IP
- Integrated 3-port switch for efficient cabling
- Auto configuration of the I/O modules
- Can be configured by the scanner (master) using configuration assembly
- DHCP capable
- Configurable I/O cycle (0.5 - 4 ms)
- Minimum fieldbus cycle time (also Request Packet Interval or RPI): 1 ms

LED status indicator

Station number switches

Terminal block for bus controllers and I/O supply

EtherNet/IP connection

| Short description | X20BC0088 |
|---|---|
| Bus controller | EtherNet/IP |
| **Fieldbus** | **X20BC0088** |
| Type | Ethernet |
| Design | Internal 2-port hardware switch, 2x shielded RJ45 port |
| Cable length | Max. 100 m between two stations (segment length) |
| Transfer rate | 10/100 MBit/s |
| | Full-duplex / half-duplex |
| | Auto negotiation |
| | Auto-MDI/MDIX |
| **General information** | **X20BC0088** |
| Status indicators | Module status, network status, bus function |
| Diagnostics | |
|    Module status | Yes, with status LED and software status |
|    Network status | Yes, with status LED and software status |
|    Bus function | Yes, with status LED and software status |
| Electrical isolation | |
|    Fieldbus - X2X bus | Yes |
|    Fieldbus - I/O | Yes |
| Power consumption of the bus | 2.0 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20BC0088 |
|---|---|
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BC0088** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BC0088** |
| Grid size [1] | 37.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9400 or X20PS9402 separately |
| | Order 1x X20BB80 bus base separately |

1) The spacing is based on the width of the X20BB80 bus base. An X20PS9400 or X20PS9402 supply module is also always required for the bus controller.

Note:      Only the default function model is supported (see respective module description) when the bus controller automatically configures multi-function modules. Configuration assemblies can be created by using the B&R FieldbusDESIGNER. All other function models are supported when using a configuration assembly.

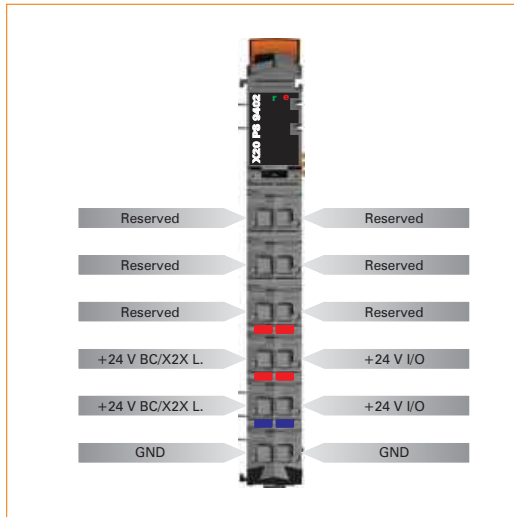| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗏 94 |
| X20PS9400 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply | 🗏 172 |
| X20PS9402 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply, Supply not electrically isolated | 🗏 174 |
| X20BB80 | X20 bus base, for X20 base module (BC, HB, etc.) and X20 supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 🗏 170 |

# Bus module
# BB80

The following expansion modules are used on the BB80 bus module:

- X20 base module (BC, HB, etc.)
- X20 supply module

The left and right locking plates are included in the delivery.

- X20 bus base

| Short description | X20BB80 |
|---|---|
| Bus module | Bus base - backplane for bus controller fieldbus interface and bus controller supply module |
| **General information** | **X20BB80** |
| Power consumption | |
|   Bus | - |
|   I/O internal | - |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20BB80** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BB80** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BB80** |
| Spacing | 37.5 $^{+0.2}$ mm |
| Comment | Left and right X20 end plates included in delivery |

## Potential control



+24 VDC
GND
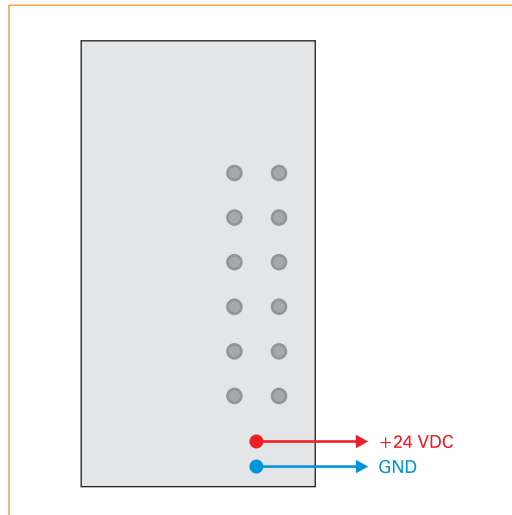
# Supply module
# PS9400



- Supply for the bus controller, X2X Link, and internal I/O supply
- Feed and bus controller / X2X Link supply electrically isolated
- Redundancy of bus controller / X2X Link supply possible by operating multiple supply modules simultaneously

| Short description | X20PS9400 |
|---|---|
| Power supply module | 24 VDC supply module for bus controller, X2X Link bus supply and I/O |
| **Bus controller / X2X Link supply input** | **X20PS9400** |
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 0.7 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |
| **Bus controller / X2X Link supply output** | **X20PS9400** |
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation of bus controller / X2X Link supply | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

| Input I/O supply | X20PS9400 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |
| **Output I/O supply** | **X20PS9400** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General information** | **X20PS9400** |
| Status indicators | Overload, operating status, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Overload | Yes, with status LED and software status |
| Electrical isolation | |
|   Bus controller / X2X bus supply | Yes |
|   I/O supply | No |
| Power consumption [1] | |
|   Bus | 1.42 W |
|   I/O internal | 0.6 W |
| Certification | CE, C-UL-US, GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20PS9400 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PS9400** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PS9400** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order 1x X20BB8x bus base separately |

## Pin assignments



| | |
|---|---|
| Reserved | Reserved |
| Reserved | Reserved |
| Reserved | Reserved |
| +24 V BC/X2X L. | +24 V I/O |
| +24 V BC/X2X L. | +24 V I/O |
| GND | GND |

## Connection example



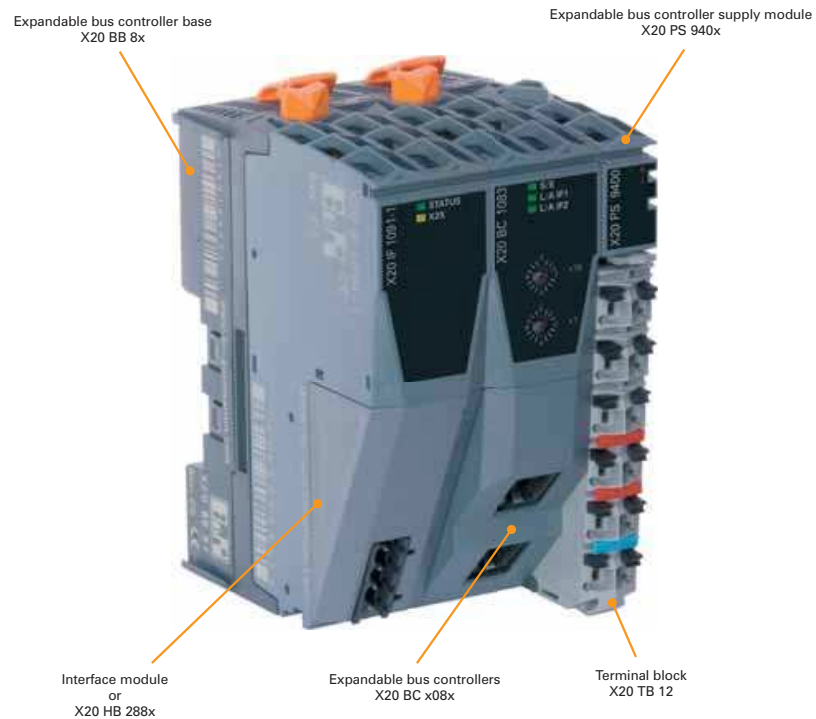| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BB80 | X20 bus base, for X20 base module (BC, HB, etc.) and X20 supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 📄 170 |
| X20BB81 | X20 bus base with 1 expansion slot, for X20 base module (BC, HB, etc.) and one X20 auxiliary module (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 📄 184 |
| X20BB82 | X20 bus base with 2 expansion slots, for X20 base module (BC, HB, etc.) and two X20 auxiliary modules (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 📄 185 |

# Supply module
# PS9402

The supply module PS9402 is used together with an X20 bus controller. It is equipped with a feed for the bus controller, the X2X Link, and the internal I/O supply.

The module is intended as a low-cost supply module for small X20 systems. Potential groups are able to be formed. An expansion or redundancy of the X2X Link with the PS3300 or PS3310 supply module is not possible. Expansion of the X20 system with a bus transmitter is not allowed either.

- Supply for the bus controller, X2X Link, and internal I/O supply
- Low-cost supply module for small X20 systems
- Feed and bus controller / X2X Link supply not electrically isolated
- Expansion or redundancy of bus controller / X2X Link supply not possible by operating multiple supply modules simultaneously

| Short description | X20PS9402 |
|---|---|
| Power supply module | 24 VDC supply module for bus controller, X2X Link bus supply and I/O |
| **Bus controller / X2X Link supply input** | **X20PS9402** |
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 0.7 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |
| **Bus controller / X2X Link supply output** | **X20PS9402** |
| Rated output power | |
|   Horizontal installation | 7.0 W at 45°C and 5.0 W at 55°C |
|   Vertical installation | 7.0 W at 40°C and 5.0 W at 50°C |
| Parallel operation | No |
| Redundant operation of bus controller / X2X Link supply | No |
| **Input I/O supply** | **X20PS9402** |
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |
| **Output I/O supply** | **X20PS9402** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General information** | **X20PS9402** |
| Status indicators | Operating status, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Overload | Yes, with status LED and software status |
| Electrical isolation | |
|   Bus controller / X2X bus supply | No |
|   I/O supply | No |
| Power consumption [1] | |
|   Bus | 1.44 W |
|   I/O internal | 0.6 W |
| Certification | CE, C-UL-US (in development), GOST-R |
| 1) The specified values are maximum values. The exact calculation is also available for download as a data sheet with the other module documentation on the B&R homepage. | |
| **Operational conditions** | **X20PS9402** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PS9402** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PS9402** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order 1x X20BB8x bus base separately |

## Pin assignments



| | |
|---|---|
| Reserved | Reserved |
| Reserved | Reserved |
| Reserved | Reserved |
| +24 V BC/X2X L. | +24 V I/O |
| +24 V BC/X2X L. | +24 V I/O |
| GND | GND |

## Connection example



| | | | |
|---|---|---|---|
| | | | T 10 A |
| BC/X2X Link Power supply | | | I/O Power supply |
| | | | +24 VDC |
| | | | GND |

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BB80 | X20 bus base, for X20 base module (BC, HB,etc.) and X20 supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | ▤ 170 |
| X20BB81 | X20 bus base with 1 expansion slot, for X20 base module (BC, HB, etc.) and one X20 auxiliary module (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | ▤ 184 |

# Expandable bus controllers

**Expandable bus controllers**

The expandable bus controller is based on the POWERLINK bus controller BC0083. The expanded bus modules allow up to two interface or hub expansion modules to be mounted depending on the bus controller.

Despite the sleek profile of only 62.5 mm and 87.5 mm, the bus controller feed, the X2X Link bus supply, and the I/O module feed are integrated in the bus controller. No additional power modules are necessary.



Expandable bus controller base
X20 BB 8x

Expandable bus controller supply module
X20 PS 940x

Interface module
or
X20 HB 288x

Expandable bus controllers
X20 BC x08x

Terminal block
X20 TB 12

# Expandable bus controllers
## BC1083

The structure of the expandable bus controller is described on page 🖹 176. In addition to the structure, other general information is also provided.

The BC1083 bus controller makes it possible to connect X2X Link I/O nodes to POWERLINK V1/V2. It is also possible to operate the X2X Link cycle synchronously 1:1 or synchronous to POWERLINK using a prescaler.

POWERLINK is a standard protocol for Fast Ethernet with true real-time properties. The Ethernet POWERLINK Standardization Group (EPSG, www.ethernet-powerlink. org) ensures that the standard remains open and is continually developed.

- POWERLINK V1/V2
- I/O configuration and firmware update via the fieldbus
- Integrated hub for efficient cabling
- Up to two slots for interface modules

LED status indicator

Node number switches

Slot for interface module

Terminal block for bus controllers and I/O supply

Ethernet POWERLINK connection with 2x RJ45 connectors for simple wiring

ETHERNET
**POWERLINK**

| Short description | X20BC1083 |
|---|---|
| Bus controller | POWERLINK V1/V2 Controlled Node with up to two slots for interface modules |
| **Fieldbus** | **X20BC1083** |
| Type | POWERLINK V1/V2 100 Base-T (ANSI/IEE 802.3) |
| Design | Internal 2x hub, 2x shielded RJ45 port |
| Cable length | Max. 100 m between two stations (segment length) |
| Transfer rate | 100 MBit/s |
| **General information** | **X20BC1083** |
| Status indicators | Module status, bus function |
| Diagnostics | |
| Module status | Yes, with status LED and software status |
| Bus function | Yes, with status LED and software status |
| Electrical isolation | |
| Fieldbus - X2X bus | Yes |
| Fieldbus - I/O | Yes |
| Power consumption of the bus | 2.0 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20BC1083 |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BC1083** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BC1083** |
| Grid size [1] | |
|    X20BB81 | 62.5 $^{+0.2}$ mm |
|    X20BB82 | 87.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9400 or X20PS9402 separately |
| | Order 1x X20BB81 or X20BB82 bus base separately |

1) The spacing is based on the width of the X20BB81 or X20BB82 bus base. Up to two interfaces modules and one X20PS9400 or X20PS9402 supply module are also always required for the bus controller.

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20PS9400 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply | ▤ 172 |
| X20PS9402 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply, Supply not electrically isolated | ▤ 174 |
| X20BB81 | X20 bus base with 1 expansion slot, for X20 base module (BC, HB, etc.) and one X20 auxiliary module (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | ▤ 184 |
| X20BB82 | X20 bus base with 2 expansion slots, for X20 base module (BC, HB, etc.) and two X20 auxiliary modules (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | ▤ 185 |

| Optional accessories | | |
|---|---|---|
| X20IF1091-1 | X20 interface module for expandable bus controller, 1 X2X Link master interface, electrically isolated, order 1x TB704 terminal block separately. | ▤ 186 |

# Expandable bus controllers
# BC8083
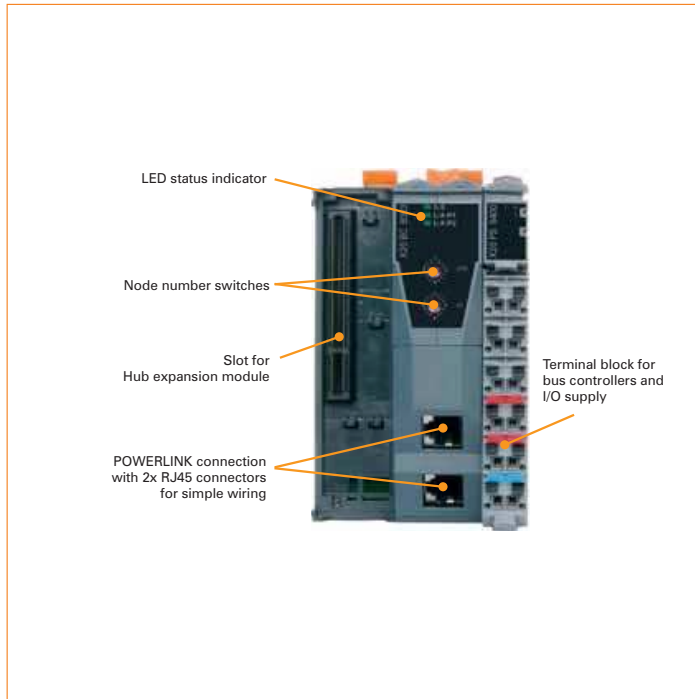


LED status indicator

Node number switches

Slot for
Hub expansion module

POWERLINK connection
with 2x RJ45 connectors
for simple wiring

Terminal block for
bus controllers and
I/O supply

The structure of the expandable bus controller is described on page 176. In addition to the structure, other general information is also provided.

The BC8083 bus controller makes it possible to connect X2X Link I/O nodes to POWERLINK V1 and V2. It is also possible to operate the X2X Link cycle synchronously 1:1 or synchronous to POWERLINK using a prescaler.

POWERLINK is a standard protocol for Fast Ethernet with true real-time properties. The Ethernet POWERLINK Standardization Group (EPSG, www.ethernet-powerlink. org) ensures that the standard remains open and is continually developed.

The expanded bus modules allow up to two hub expansion modules to be mounted next to the bus controller. Each expansion module is equipped with two RJ45 connections. Together with the main device, this means that up to six hub ports are available.

- POWERLINK V1/V2
- I/O configuration and firmware update via the fieldbus
- Integrated hub for efficient cabling
- Up to two slots for hub expansion modules
- 2/4/6x Fast Ethernet Hub



ETHERNET
**POWERLINK**

| Short description | X20BC8083 |
|---|---|
| Bus controller | POWERLINK V1/V2 Controlled Node with up to two slots for hub expansion modules |
| **Fieldbus** | **X20BC8083** |
| Type | POWERLINK V1/V2 100 Base-T (ANSI/IEE 802.3) |
| Design | Internal 2x hub, 2x shielded RJ45 port |
| Cable length | Max. 100 m between two stations (segment length) |
| Transfer rate | 100 MBit/s |
| **General information** | **X20BC8083** |
| Status indicators | Module status, bus function |
| Diagnostics | |
| Module status | Yes, with status LED and software status |
| Bus function | Yes, with status LED and software status |
| Electrical isolation | |
| Fieldbus - X2X bus | Yes |
| Fieldbus - I/O | Yes |
| Power consumption of the bus | 2.0 W |
| Certification | CE, C-UL-US (in development), GOST-R |

| Operational conditions | X20BC8083 |
|---|---|
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BC8083** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BC8083** |
| Grid size [1] | |
|     X20BB80 | 37.5 $^{+0.2}$ mm |
|     X20BB81 | 62.5 $^{+0.2}$ mm |
|     X20BB82 | 87.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9400 or X20PS9402 separately |
| | Order 1x X20BB8x bus base separately |

1) The spacing is based on the width of the X20BB8x bus base. Up to two X20HB2880 hub expansion modules and one X20PS9400 or X20PS9402 supply module are also always required for the bus controller.

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20PS9400 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply | 📄 172 |
| X20PS9402 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply, Supply not electrically isolated | 📄 174 |
| X20BB80 | X20 bus base, for X20 base module (BC, HB,etc.) and X20 supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 📄 170 |
| X20BB81 | X20 bus base with 1 expansion slot, for X20 base module (BC, HB, etc.) and one X20 auxiliary module (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 📄 184 |
| X20BB82 | X20 bus base with 2 expansion slots, for X20 base module (BC, HB, etc.) and two X20 auxiliary modules (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 📄 185 |

| Optional accessories | | |
|---|---|---|
| X20HB2880 | X20 hub expansion module, integrated 2x hub, status indicator LEDs, 2x RJ45 connection | 📄 187 |

# Expandable bus controllers
# BC8084

LED status indicators

Slots for two
hub expansion modules
(with X20BB82)

POWERLINK connection
with 2 x RJ45 for
easy wiring

Node number
switches

Terminal block for
bus controller and
I/O feed

The structure of the expandable bus controller is described on page ▤ 176. In addition to the structure, other general information is also provided.

The BC8084 bus controller makes it possible to connect X2X Link I/O nodes to POWERLINK V1 and V2. It is also possible to operate the X2X Link cycle synchronously 1:1 or synchronous to POWERLINK using a prescaler.

POWERLINK is a standard protocol for Fast Ethernet with true real-time properties. The Ethernet POWERLINK Standardization Group (EPSG, www.ethernet-powerlink.org) ensures that the standard remains open and is continually developed.

Using POWERLINK, systems with redundant cabling can be implemented. Unlike ring redundancy, cable looping, which can sometimes be problematic, is not required for cable redundancy. This allows the creation of all types of tree structures. When using a device with the link selector function, data is always transferred via the highest quality network lines. The Link Selector function is integrated in the BC8084 bus controller (see section "POWERLINK cable redundancy section", on page ▤ 57 and "X20 redundancy system", on page ▤ 57).

- POWERLINK V1/V2
- I/O configuration and firmware update via the fieldbus
- Integrated compact link selector function
- Two active hub expansion modules can be connected to the bus controller
- Redundant supply possible

**ETHERNET POWERLINK**

| Short description | X20BC8084 |
|---|---|
| Bus controller | POWERLINK V1/V2 Controlled Node with Compact Link Selector |
| **Fieldbus** | **X20BC8084** |
| Type | POWERLINK V1/V2 100 Base-T (ANSI/IEE 802.3) |
| Design | Internal 2x hub, 2x shielded RJ45 port |
| Cable length | Max. 100 m between two stations (segment length) |
| Transfer rate | 100 MBit/s |
| **General information** | **X20BC8084** |
| Status indicators | Module status, bus function |
| Diagnostics | |
| Module status | Yes, with status LED and software status |
| Bus function | Yes, with status LED and software status |
| Electrical isolation | |
| Fieldbus - X2X bus | Yes |
| Fieldbus - I/O | Yes |
| Power consumption of the bus | 2.0 W |
| Certification | CE, C-UL-US (in development), GOST-R |

| Operational conditions | X20BC8084 |
|---|---|
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BC8084** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BC8084** |
| Grid size [1] | |
| X20BB81 | 62.5 $^{+0.2}$ mm |
| X20BB82 | 87.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS9400 or X20PS9402 separately |
| | Order 1x X20BB81 or X20BB82 bus base separately |

1) The spacing is based on the width of the X20BB81 or X20BB82 bus base. Up to two X20HB2885 hub expansion modules and one X20PS9400 or X20PS9402 supply module are also always required for the bus controller.

| **Required accessories** | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20PS9400 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply | 🗎 172 |
| X20PS9402 | X20 supply module for bus controller and internal I/O supply, X2X link bus supply, Supply not electrically isolated | 🗎 174 |
| X20BB80 | X20 bus base, for X20 base module (BC, HB,etc.) and X20 supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 🗎 170 |
| X20BB82 | X20 bus base with 2 expansion slots, for X20 base module (BC, HB, etc.) and two X20 auxiliary modules (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 185 |

| **Optional accessories** | | |
|---|---|---|
| X20HB2885 | X20 hub expansion module, integrated active 2x hub, status indicator LEDs, 2x RJ45 connection | 🗎 188 |

# Bus module
# BB81

The BB81 bus module has an expansion slot. The following expansion modules are used on the module:

- X20 base module (BC, HB, etc.)
- X20 add-on module (IF, HB, etc.)
- X20 supply module

The left and right locking plates are included in the delivery.

- X20 bus base with one expansion slot

| Short description | X20BB81 |
|---|---|
| Bus module | X20 bus base with one expansion slot |
| **General information** | **X20BB81** |
| Power consumption | |
|    Bus | - |
|    I/O internal | - |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20BB81** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BB81** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BB81** |
| Spacing | 62.5 $^{+0.2}$ mm |
| Comment | Left and right X20 end plates included in delivery |

## Potential control


+24 VDC
GND
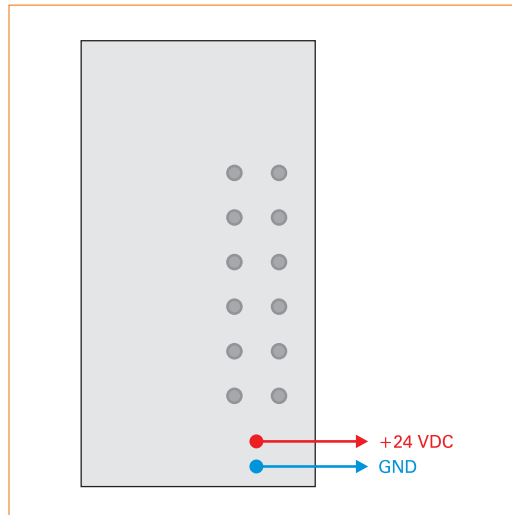
# Bus module
# BB82

The BB82 bus module has two expansion slots. The following expansion modules are used on the module:

- X20 base module (BC, HB, etc.)
- Two X20 add-on module (IF, HB, etc.)
- X20 supply module

The left and right locking plates are included in the delivery.

- X20 bus base with two expansion slots

| Short description | X20BB82 |
|---|---|
| Bus module | Bus base with two expansion slots |
| **General information** | **X20BB82** |
| Power consumption | |
|    Bus | - |
|    I/O internal | - |
| Certification | CE, C-UL-US (in development), GOST-R |
| **Operational conditions** | **X20BB82** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BB82** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BB82** |
| Spacing | 87.5 $^{+0.2}$ mm |
| Comment | Left and right X20 end plates included in delivery |

## Potential control



+24 VDC

GND
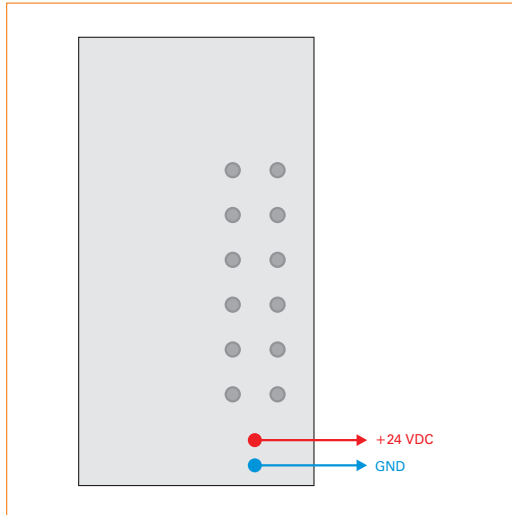
# Interface module
# IF1091-1

The IF1091-1 interface module is operated in the BC1083 expandable bus controller. It is equipped with an X2X Link master interface.

- X2X Link Connection

| Short description | X20IF1091-1 |
|---|---|
| Communication module | 1x X2X Link master |
| **Interfaces** | **X20IF1091-1** |
| Interface IF1 | |
| Type | X2X Link master |
| Design | 4-pin multipoint connector |
| **General information** | **X20IF1091-1** |
| Status indicators | Module status, data transfer |
| Diagnostics | |
| Module status | Yes, with status LED |
| Data transfer | Yes, with status LED |
| Electrical isolation | |
| PLC - IF1 | Yes |
| Power consumption | 1.29 W |
| Certification | CE, C-UL-US (in development), GOST-R |
| **Operational conditions** | **X20IF1091-1** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20IF1091-1** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20IF1091-1** |
| Slot | In expandable bus controllers |
| Comment | Order 1x TB704 terminal block separately |

| Required accessories | | |
|---|---|---|
| 0TB704.9 | Accessory terminal block, 4-pin, screw clamp, 1.5 mm² | 📖 680 |
| 0TB704.91 | Accessory terminal block, 4-pin, cage clamp, 2.5 mm² | 📖 680 |

# Hub expansion module
# HB2880

The BC8083 POWERLINK bus controller and the HB8880 stand alone hub are equipped with a modular hub expansion. Depending on the bus base used, one or two additional slots are available. The HB2880 hub expansion module can be operated in these slots.

The HB2880 hub expansion module is equipped with an integrated 2x hub. The Ethernet connections are made using RJ45 connectors. The module and network status is indicated using LEDs.

• Hub expansion module
• 2x Fast Ethernet hub

| Short description | X20HB2880 |
|---|---|
| Hub | 2x Fast Ethernet hub for hub expansion |
| **Interfaces** | **X20HB2880** |
| Type | Ethernet |
| Standard (compliance) | ANSI/IEEE 802.3 |
| Signal | 10/100 Base-T |
| Port design | Shielded RJ45 ports |
| Transfer rate | 10 MBit/s or 100 MBit/s |
|  | Devices with 10/100 MBit/s auto-negotiation are operated at 100 MBit/s [1] |
| Cable length | Max. 100 m between two stations (segment length) |

1) If devices that use 10 MBit/s as well as 100 MBit/s are connected, then there is no communication between these devices. Devices with 10/100 MBit/s auto-negotiation are always operated with 100 MBit/s on the hub.

| General information | X20HB2880 |
|---|---|
| Status indicators | Module status, bus function |
| Diagnostics |  |
|   Module status | Yes, with status LED |
|   Bus function | Yes, with status LED |
| Electrical isolation |  |
|   Fieldbus supply | Yes |
| Power consumption | TBD |
| Certification | CE, C-UL-US (in development), GOST-R |
| **Operational conditions** | **X20HB2880** |
| Operating temperature |  |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level |  |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20HB2880** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20HB2880** |
| Slot | Hub expansion for BC8083 and HB8880 |

# Hub expansion module
# HB2885

The HB2885 hub expansion module can be operated on the BC8084 POWERLINK bus controller and on the HB8884 compact link selector. It is equipped with an integrated 2x hub. The Ethernet connections are made using RJ45 connectors. The module and network status is indicated using LEDs.

- Hub expansion module
- 2x Fast Ethernet hub
- Hot-swap capable

| Short description | X20HB2885 |
|---|---|
| Hub | 2x Fast Ethernet hub for hub expansion |
| **Interfaces** | **X20HB2885** |
| Type | Ethernet |
| Standard (compliance) | ANSI/IEEE 802.3 |
| Signal | 10/100 Base-T |
| Port design | Shielded RJ45 ports |
| Transfer rate | 10 MBit/s or 100 MBit/s |
| | Devices with 10/100 MBit/s auto-negotiation are operated at 100 MBit/s [1] |
| Cable length | Max. 100 m between two stations (segment length) |

1) If devices that use 10 MBit/s as well as 100 MBit/s are connected, then there is no communication between these devices. Devices with 10/100 MBit/s auto-negotiation are always operated with 100 MBit/s on the hub.

| General information | X20HB2885 |
|---|---|
| Status indicators | Module status, bus function |
| Diagnostics | |
|   Module status | Yes, with status LED |
|   Bus function | Yes, with status LED |
| Electrical isolation | |
|   Fieldbus supply | Yes |
| Power consumption | TBD |
| Certification | CE, C-UL-US (in development), GOST-R |
| **Operational conditions** | **X20HB2885** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20HB2885** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20HB2885** |
| Slot | Hub expansion for BC8084 and HB8884 |

# Interface module
# IF1020



- RS232 interface configurable as online interface

| Short description | X20IF1020 |
|---|---|
| Communication module | 1x RS232 |
| **Interfaces** | **X20IF1020** |
| Interface IF1 | |
|    Type | RS232 |
|    Design | 9-pin DSUB plug |
|    Maximum transfer rate | 115.2 kBit/s |
| **General information** | **X20IF1020** |
| Status indicators | Module status, data transfer |
| Diagnostics | |
|    Module status | Yes, with status LED |
|    Data transfer | Yes, with status LED |
| Electrical isolation | |
|    PLC - IF1 | Yes |
| Power consumption | 0.33 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20IF1020** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20IF1020** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20IF1020** |
| Slot | In X20 CPU |

| Optional accessories | |
|---|---|
| 0G0001.00-090 | Cable PC <-> PLC/PW, RS232, online cable |

# Interface module
# IF1030



- RS485/RS422 connection

| Short description | X20IF1030 |
|---|---|
| Communication module | 1x RS485/RS422 |
| **Interfaces** | **X20IF1030** |
| Interface IF1 | |
|     Type | RS485/RS422 |
|     Design | 9-pin DSUB socket |
|     Maximum transfer rate | 115.2 kBit/s |
| **General information** | **X20IF1030** |
| Status indicators | Module status, data transfer |
| Diagnostics | |
|     Module status | Yes, with status LED |
|     Data transfer | Yes, with status LED |
| Electrical isolation | |
|     PLC - IF1 | Yes |
| Power consumption | 0.4 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20IF1030** |
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20IF1030** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20IF1030** |
| Slot | In X20 CPU |

| Optional accessories | | |
|---|---|---|
| 0G1000.00-090 | Bus connector, RS485, for Profibus networks | 690 |

# Interface module
# IF1061



- Profibus DP master



| Short description | X20IF1061 |
|---|---|
| Communication module | 1x Profibus DP master |
| **Interfaces** | **X20IF1061** |
| Interface IF1 | |
|    Fieldbus | Profibus DP master |
|    Type | RS485 |
|    Design | 9-pin DSUB socket |
|    Maximum transfer rate | 12 MBit/s |
| **General information** | **X20IF1061** |
| Status indicators | Module status, bus status |
| Diagnostics | |
|    Module status | Yes, with status LED and software status |
|    Bus status | Yes, with status LED and software status |
| Electrical isolation | |
|    PLC - IF1 | Yes |
| Power consumption | 1.4 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20IF1061** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20IF1061** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20IF1061** |
| Slot | In X20 CPU |

| Optional accessories | | |
|---|---|---|
| 0G1000.00-090 | Bus connector, RS485, for Profibus networks | ▤ 690 |

# Interface module
# IF1063



- Profibus DP Slave connection



| Short description | X20IF1063 |
|---|---|
| Communication module | 1x Profibus DP slave |
| **Interfaces** | **X20IF1063** |
| Interface IF1 | |
|    Fieldbus | Profibus DP slave |
|    Type | RS485 |
|    Design | 9-pin DSUB socket |
|    Maximum transfer rate | 12 MBit/s |
| **General information** | **X20IF1063** |
| Status indicators | Module status, data transfer |
| Diagnostics | |
|    Module status | Yes, with status LED |
|    Data transfer | Yes, with status LED |
| Electrical isolation | |
|    PLC - IF1 | Yes |
| Power consumption | 0.87 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20IF1063** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20IF1063** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20IF1063** |
| Slot | In X20 CPU |

| Optional accessories | | |
|---|---|---|
| 0G1000.00-090 | Bus connector, RS485, for Profibus networks | 690 |

# Interface module
# IF1072

- CAN Bus Connection
- Integrated terminating resistor

**CAN**

| Short description | X20IF1072 |
|---|---|
| Communication module | 1x CAN bus |
| **Interfaces** | **X20IF1072** |
| Interface IF1 | |
|    Type | CAN bus |
|    Design | 5-pin multipoint connector |
|    Maximum transfer rate | 1 MBit/s |
| **General information** | **X20IF1072** |
| Status indicators | Module status, data transfer, terminating resistor |
| Diagnostics | |
|    Module status | Yes, with status LED |
|    Data transfer | Yes, with status LED |
|    Terminating resistor | Yes, with status LED |
| Electrical isolation | |
|    PLC - IF1 | Yes |
| Power consumption | 0.79 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20IF1072** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20IF1072** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20IF1072** |
| Slot | In X20 CPU |
| Comment | Order 1x TB2105 terminal block separately |

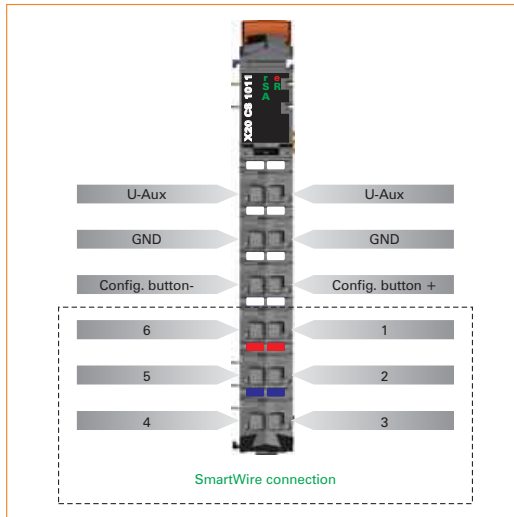| Required accessories | | |
|---|---|---|
| 0TB2105.9010 | Accessory terminal block, 5-pin, screw clamp, 1.5 mm² | 📄 681 |
| 0TB2105.9110 | Accessory terminal block, 5-pin, cage clamp, 2.5 mm² | 📄 681 |

# Interface module
# IF1082

- POWERLINK V1/V2 for real-time Ethernet communication
- Integrated hub for efficient cabling
- Configurable ring redundancy

ETHERNET
**POWERLINK**

| Short description | X20IF1082 |
|---|---|
| Communication module | 1x POWERLINK V1/V2 managing or controlled node |
| **Interfaces** | **X20IF1082** |
| Interface IF1 | |
|    Fieldbus | POWERLINK V1/V2 |
|    Type | 100 Base-T (ANSI/IEEE 802.3) |
|    Design | Internal 2x hub, 2x shielded RJ45 port |
|    Transfer rate | 100 MBit/s |
|    Cable length | Max. 100 m between two stations (segment length) |
| **General information** | **X20IF1082** |
| Status indicators | Module status, bus function |
| Diagnostics | |
|    Module status | Yes, with status LED and software status |
|    Bus function | Yes, with status LED and software status |
| Electrical isolation | |
|    PLC - IF1 | Yes |
| Power consumption | 2.0 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20IF1082** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20IF1082** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20IF1082** |
| Slot | In X20 CPU |

| Optional accessories | | |
|---|---|---|
| X20CA0E61.xxxx | POWERLINK connection cable - RJ45 to RJ45 | 📄 391 |
| X67CA0E41.xxxx | POWERLINK attachment cable - RJ45 to M12 | 📄 391 |

# Interface module
# IF1091



- X2X Link Connection

| Short description | X20IF1091 |
|---|---|
| Communication module | 1x X2X Link master |
| **Interfaces** | **X20IF1091** |
| Interface IF1 | |
|    Type | X2X Link master |
|    Design | 4-pin multipoint connector |
| **General information** | **X20IF1091** |
| Status indicators | Module status, data transfer |
| Diagnostics | |
|    Module status | Yes, with status LED |
|    Data transfer | Yes, with status LED |
| Electrical isolation | |
|    PLC - IF1 | Yes |
| Power consumption | 0.97 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20IF1091** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20IF1091** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20IF1091** |
| Slot | In X20 CPU |
| Comment | Order 1x TB704 terminal block separately |

| Required accessories | | |
|---|---|---|
| 0TB704.9 | Accessory terminal block, 4-pin, screw clamp, 1.5 mm² | 🗎 680 |
| 0TB704.91 | Accessory terminal block, 4-pin, cage clamp, 2.5 mm² | 🗎 680 |

# Interface module
# IF2772



- Dual CAN bus connection
- Integrated terminating resistors

| Short description | X20IF2772 |
|---|---|
| Communication module | 2x CAN bus |
| **Interfaces** | **X20IF2772** |
| Interfaces IF1 and IF2 | |
| Type | CAN bus |
| Design | 2x 5-pin multipoint connector |
| Maximum transfer rate | 1 MBit/s |
| **General information** | **X20IF2772** |
| Status indicators | Module status, data transfer, terminating resistor |
| Diagnostics | |
| Module status | Yes, with status LED |
| Data transfer | Yes, with status LED |
| Terminating resistor | Yes, with status LED |
| Electrical isolation | |
| PLC - IF1/IF2 | Yes |
| IF1 - IF2 | Yes |
| Power consumption | 1.2 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20IF2772** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20IF2772** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20IF2772** |
| Slot | In X20 CPU |
| Comment | Order 2x TB718 terminal blocks separately |

| Required accessories | | |
|---|---|---|
| 0TB2105.9010 | Accessory terminal block, 5-pin, screw clamp, 1.5 mm² | 📄 681 |
| 0TB2105.9110 | Accessory terminal block, 5-pin, cage clamp, 2.5 mm² | 📄 681 |

# Interface module
# IF2792



- X2X Link connection
- CAN bus connection
- Integrated terminating resistor

**CAN**

| Short description | X20IF2792 |
|---|---|
| Communication module | 1x X2X Link master, 1x CAN bus |
| **Interfaces** | **X20IF2792** |
| Interface IF1 | |
| Type | X2X Link master |
| Design | 4-pin multipoint connector |
| Interface IF2 | |
| Type | CAN bus |
| Design | 5-pin multipoint connector |
| Maximum transfer rate | 1 MBit/s |
| **General information** | **X20IF2792** |
| Status indicators | Module status, data transfer, terminating resistor |
| Diagnostics | |
| Module status | Yes, with status LED |
| Data transfer | Yes, with status LED |
| Terminating resistor | Yes, with status LED |
| Electrical isolation | |
| PLC - IF1/IF2 | Yes |
| IF1 - IF2 | Yes |
| Power consumption | 1.51 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20IF2792** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20IF2792** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20IF2792** |
| Slot | In X20 CPU |
| Comment | Order 1x TB704 and 1x TB2105 terminal blocks separately |

| Required accessories | | | |
|---|---|---|---|
| 0TB704.9 | Accessory terminal block, 4-pin, screw clamp, 1.5 mm$^2$ | | 680 |
| 0TB704.91 | Accessory terminal block, 4-pin, cage clamp, 2.5 mm$^2$ | | 680 |
| 0TB2105.9010 | Accessory terminal block, 5-pin, screw clamp, 1.5 mm$^2$ | | 681 |
| 0TB2105.9110 | Accessory terminal block, 5-pin, cage clamp, 2.5 mm$^2$ | | 681 |

# Interface module CS1011

- X2X SmartWire master for controlling up to 16 SmartWire slaves
- External 24 VDC feed protected against reverse polarity for supplying the slave application (e.g. Moeller xStart protection DILM)

| Short description | X20CS1011 |
|---|---|
| Communication module | 1 SmartWire master for controlling up to 16 slaves |
| **SmartWire master** | **X20CS1011** |
| Transfer rate | 19200 Bit/s |
| Data format | 1 start bit, 8 data bits, no parity bit, 1 stop bit |
| Bus level | 17 V (recessive), 0 V (dominant) |
| SWIRE terminal 2 | 0 V / 5 V (active), CMOS level |
| SWIRE terminal 6 (17 VDC) | |
| Section | 16.3 VDC to 16.8 VDC |
| Typical | 16.6 VDC |
| Load | Max. 400 mA for 16 SmartWire slaves |
| Short circuit protection | Yes |
| U-Aux (24 VDC aux supply) | |
| Input voltage | 24 VDC (-15% / +20%) |
| Reverse polarity protection | Yes |
| Connection | External via terminal block [1] |
| Fuse | Recommended pre-fusing max. 3 A slow-blow |
| SWIRE terminal 1 (24 VDC) | |
| Section | Supply like feed |
| Load | Maximum 3 A for supplying 16 SmartWire slave auxiliary |
| Short circuit protection | No |
| Bus extension | Maximum 4 m |
| Configuration button | |
| Internal | On the front of the X20CS1011 module |
| External | Connection via terminal block |

1) Using an external feed makes it possible to shut down via E-stop or switching relay

| General information | X20CS1011 |
|---|---|
| Status indicators | SmartWire bus function, external supply voltage, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| SmartWire operating state | Yes, with status LED and software status |
| U Aux | Yes, with status LED |
| Certification | CE, C-UL-US (in development), GOST-R |
| Electrical isolation | |
| SmartWire bus - X2X bus | Yes |
| SmartWire supply (17 VDC) - Bus supply (24 VDC) | No |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 1.0 W |
| Power output | |
| I/O internal | 6.8 W for supplying external slaves (equal to 16 slaves each with 0.425 W) |
| **Operational conditions** | **X20CS1011** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20CS1011 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CS1011** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order SmartWire connection cable X20CA4S00.00xx separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



SmartWire connection

## Connection example
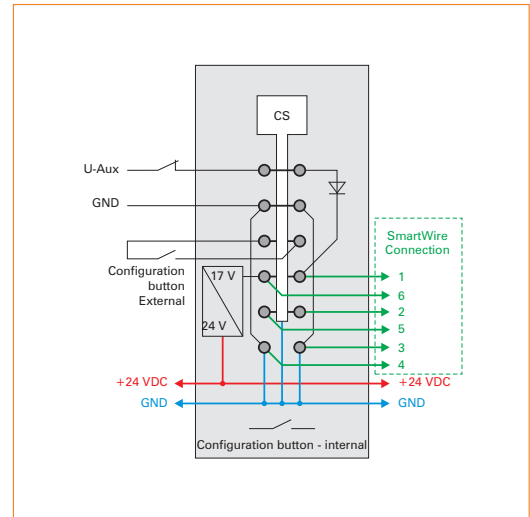


| Required accessories | | |
|---|---|---|
| X20CA4S00.0005 | SmartWire connection cable, X20TB12 on SmartWire plug, 0.5 m | |
| X20CA4S00.0015 | SmartWire connection cable, X20TB12 on SmartWire plug, 1.5 m | |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 88 |

# Interface module CS1020



- RS232 interface for serial, remote connection of complex devices to the X20 System

| Short description | X20CS1020 |
|---|---|
| Communication module | 1x RS232 |
| **Interfaces** | **X20CS1020** |
| Interface IF1 | |
| Type | RS232 |
| Design | Contact via 12-pin terminal block TB12 |
| Maximum transfer rate | 115.2 kBit/s |
| **General information** | **X20CS1020** |
| Status indicators | Data transfer, operating status, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Data transfer | Yes, with status LED |
| Electrical isolation | |
| IF1 - Bus | Yes |
| IF1 - I/O supply | No |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 1.44 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20CS1020** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20CS1020** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CS1020** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments
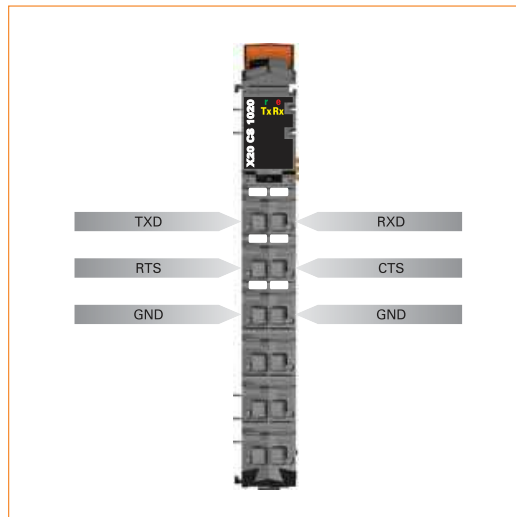


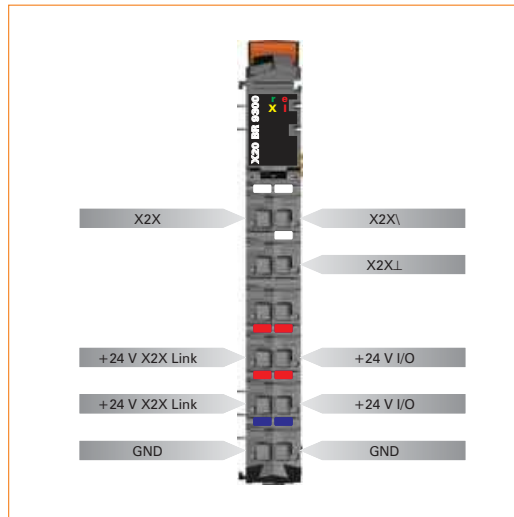| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 🖹 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🖹 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🖹 88 |

# Interface module
# CS1030

- RS485/RS422 interface for serial, remote connection of complex devices to the X20 System
- Integrated terminating resistor

| Short description | X20CS1030 |
|---|---|
| Communication module | 1x RS485/RS422 |
| **Interfaces** | **X20CS1030** |
| Interface IF1 | |
|     Type | RS485/RS422 |
|     Design | Contact via 12-pin terminal block TB12 |
|     Maximum transfer rate | 250 kBit/s |
| **General information** | **X20CS1030** |
| Status indicators | Data transfer, terminating resistor, operating status, module status |
| Diagnostics | |
|     Module run/error | Yes, with status LED and software status |
|     Data transfer | Yes, with status LED |
|     Terminating resistor | Yes, with status LED |
| Electrical isolation | |
|     IF1 - Bus | Yes |
|     IF1 - I/O supply | Yes |
| Power consumption | |
|     Bus | 0.01 W |
|     I/O internal | 1.44 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20CS1030** |
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20CS1030** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CS1030** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

**Pin assignments**



RS485 mode



RS422 mode
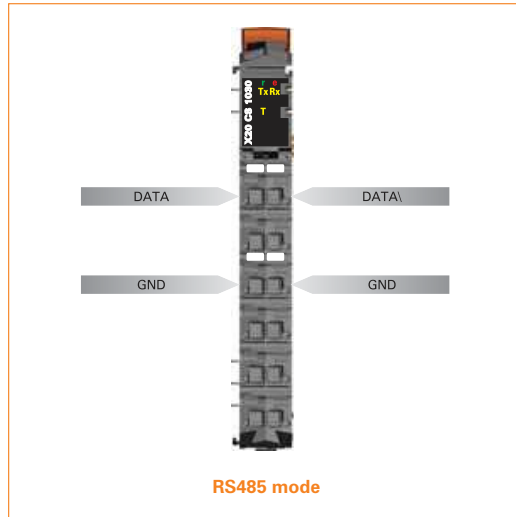
| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 📄 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📄 88 |

# Interface module
# CS1070



- CAN bus interface for serial, remote connection of complex devices to the X20 System
- Integrated terminating resistor



| Short description | X20CS1070 |
|---|---|
| Communication module | 1x CAN bus |
| **Interfaces** | **X20CS1070** |
| Interface IF1 | |
|    Type | CAN bus |
|    Design | Contact via 12-pin terminal block TB12 |
|    Maximum transfer rate | 1 MBit/s |
| **General information** | **X20CS1070** |
| Status indicators | Data transfer, terminating resistor, operating status, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Data transfer | Yes, with status LED |
|    Terminating resistor | Yes, with status LED |
| Electrical isolation | |
|    IF1 - Bus | Yes |
|    IF1 - I/O supply | Yes |
| Power consumption | |
|    Bus | 0.01 W |
|    I/O internal | 1.44 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20CS1070** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20CS1070** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CS1070** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | | | |
|---|---|---|---|
| CAN High | | CAN Low | |
| CAN Ground | | CAN Ground | |

| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 📄 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📄 88 |
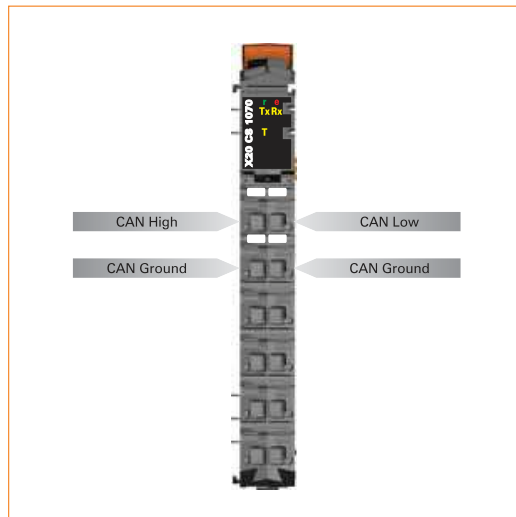
# Interface module
# CS2770

- 2 CAN bus interfaces for serial, remote connection of complex devices to the X20 System
- Integrated terminating resistors

**CAN**

| Short description | X20CS2770 |
|---|---|
| Communication module | 2x CAN bus |
| **Interfaces** | **X20CS2770** |
| Interface IF1 | |
|     Type | CAN bus |
|     Design | Contact via 12-pin terminal block TB12 |
|     Maximum transfer rate | 1 MBit/s |
| Interface IF2 | |
|     Type | CAN bus |
|     Design | Contact via 12-pin terminal block TB12 |
|     Maximum transfer rate | 1 MBit/s |
| **General information** | **X20CS2770** |
| Status indicators | Data transfer, terminating resistor, operating status, module status |
| Diagnostics | |
|     Module run/error | Yes, with status LED and software status |
|     Data transfer | Yes, with status LED |
|     Terminating resistor | Yes, with status LED |
| Electrical isolation | |
|     IF1/F2 - Bus | Yes |
|     IF1/F2 - I/O supply | Yes |
|     IF1 - IF2 | Yes |
| Power consumption | |
|     Bus | 0.01 W |
|     I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20CS2770** |
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20CS2770** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CS2770** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments
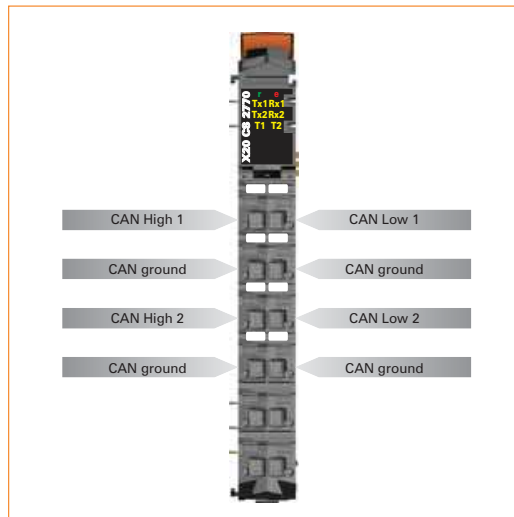


| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Bus receivers
# BR9300

The bus receiver BR9300 is used to connect the X20 system to the X2X link. The module is equipped with a feed for the X2X Link as well as the internal I/O supply.

The left and right locking plates are included in the delivery.

- X2X Link bus receiver
- Supply for X2X Link and internal I/O supply
- Electrical isolation of feed and X2X Link supply
- X2X Link supply redundancy possible by using several supply modules at the same time

| Short description | X20BR9300 |
|---|---|
| Bus receivers | X2X Link bus receiver with supply for I/O and bus |
| **X2X Link supply input** | **X20BR9300** |
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 0.7 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |
| **X2X Link supply output** | **X20BR9300** |
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

| Input I/O supply | X20BR9300 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |
| **Output I/O supply** | **X20BR9300** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General information** | **X20BR9300** |
| Status indicators | X2X bus function, overload, operating status, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    X2X bus function | Yes, with status LED |
|    Overload | Yes, with status LED and software status |
| Electrical isolation | |
|    X2X Link supply | Yes |
|    I/O supply | No |
| Power consumption [1] | |
|    Bus | 1.62 W |
|    I/O internal | 0.6 W |
| Certification | CE, C-UL-US, GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20BR9300 |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BR9300** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BR9300** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply bus module 1x X20BM01 separately |
| | Left and right X20 end plates included in delivery |

## Pin assignments
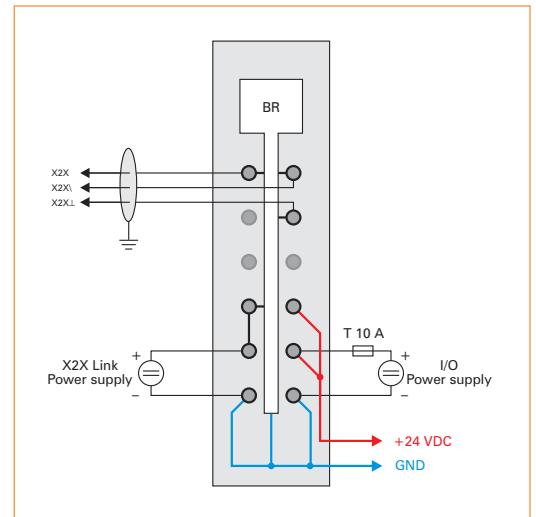


| | |
|---|---|
| X2X | X2X\ |
| | X2X⊥ |
| +24 V X2X Link | +24 V I/O |
| +24 V X2X Link | +24 V I/O |
| GND | GND |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM01 | X20 supply bus module, internal I/O supply is isolated to the left | ▤ 86 |

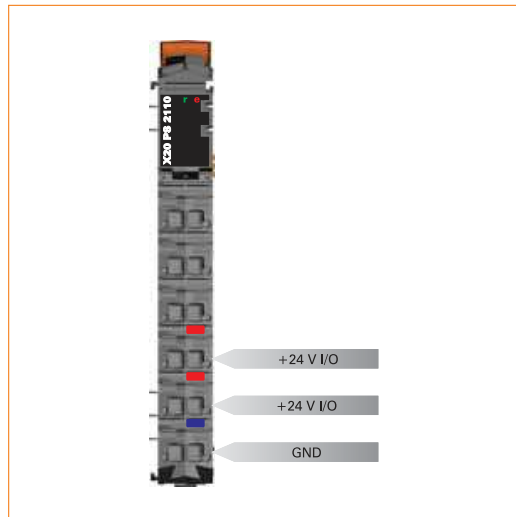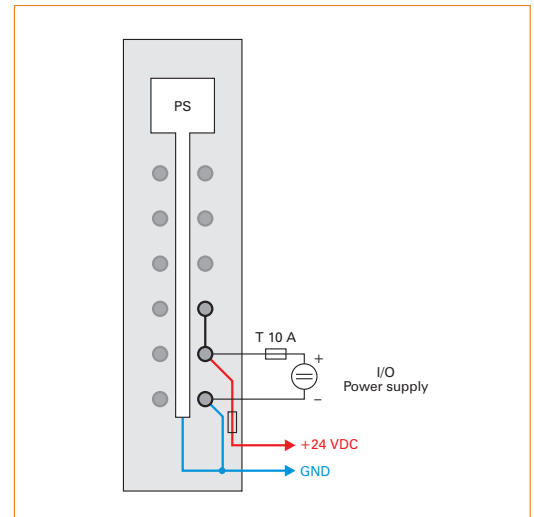| Optional accessories | |
|---|---|
| X67CA0X99.1000 | Cable for custom prefabrication, 100.0 m |

# Bus transmitters
# BT9100

The bus transmitter BT9100 provides for the seamless expansion of the X20 system. The stations can be up to 100 m away from each other.

- X2X Link bus transmitter
- For seamless expansion of the systems
- Up to 100 m segment lengths
- Feed for internal I/O power supply

Note:

If the feed is being used for internal I/O supply, this potential group cannot be supplied by any other module. An I/O module with bus module BM01 should be used to separate the potential group (see section "Supply feed via bus transmitter", on page ≣ 404).

| Short description | X20BT9100 |
|---|---|
| Bus transmitters | X2X Link bus transmitter with supply for I/O |
| **Input I/O supply** | **X20BT9100** |
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |
| **Output I/O supply** | **X20BT9100** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General information** | **X20BT9100** |
| Status indicators | X2X bus function, operating status, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   X2X bus function | Yes, with status LED |
| Power consumption [1] | |
|   Bus | 0.5 W |
|   I/O internal | |
|     as bus transmitter | 0.1 W |
|     additionally as supply module | 0.6 W |
| Certification | CE, C-UL-US, GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20BT9100 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BT9100** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BT9100** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



## Connection example



| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | ▤ 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

| Optional accessories | |
|---|---|
| X67CA0X99.1000 | Cable for custom prefabrication, 100.0 m |

# Bus transmitters
# BT9400

To make a connection from an X20 System to an X67 System, a bus transmitter is simply plugged into the end of the X20 block in order to connect the X2X Link cable. The BT9400 bus transmitter also provides the X2X supply voltage for the X67 System. The X67 system supply module that was previously required is no longer needed.

- X2X Link bus transmitter
- For seamless expansion of the systems
- Up to 100 m segment lengths
- Feed for internal I/O power supply
- Integrated X2X Link supply for the X67 System

Note:
If the feed is being used for internal I/O supply, this potential group cannot be supplied by any other module. An I/O module with bus module BM01 should be used to separate the potential group (see section "Supply feed via bus transmitter", on page ▤ 404).

| Short description | X20BT9400 |
|---|---|
| Bus transmitters | X2X Link bus transmitter with supply for I/O and integrated X67 System supply |
| **X67 X2X Link supply input** | **X20BT9400** |
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 0.5 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |
| **X67 X2X Link supply output** | **X20BT9400** |
| Number of X67 modules | |
|   Horizontal installation | Max. 8 |
|   Vertical installation | Max. 6 |
| Parallel connection with X67PS1300 | Yes [1] |

1) Only the PS1300 can be used for calculating the total number of X67 modules.

| Input I/O supply | X20BT9400 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |
| **Output I/O supply** | **X20BT9400** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General information** | **X20BT9400** |
| Status indicators | X2X bus function, operating status, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   X2X bus function | Yes, with status LED |
| Power consumption [1] | |
|   Bus | 0.5 W |
|   I/O internal | |
|     as bus transmitter | 0.1 W |
|     additionally as supply module | 0.6 W |
|   X67 X2X Link (internal) | 1.38 W |
| Certification | CE, C-UL-US (in development), GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20BT9400 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20BT9400** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20BT9400** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| X2X | X2X\ |
| X2X+ | X2X⊥ |
| +24 V X2X X67 | +24 V I/O |
| +24 V X2X X67 | +24 V I/O |
| GND | GND |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

| Optional accessories | |
|---|---|
| X67CA0X99.1000 | Cable for custom prefabrication, 100.0 m |

# Supply module
# PS2100

- 24 VDC supply module for internal I/O supply

| Short description | X20PS2100 |
|---|---|
| Power supply module | 24 VDC supply module for internal I/O supply |
| **Input I/O supply** | **X20PS2100** |
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |
| **Output I/O supply** | **X20PS2100** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General information** | **X20PS2100** |
| Status indicators | Operating status, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
| I/O supply | No |
| Power consumption [1] | |
| Bus | 0.2 W |
| I/O internal | 0.6 W |
| Certification | CE, C-UL-US, GOST-R, BG-PRÜFZERT [2] |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

2) Operating principle checked: Shutdown initiated by external safety switching device

| **Operational conditions** | **X20PS2100** |
|---|---|
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PS2100** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PS2100** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply bus module 1x X20BM01 separately |

## Pin assignments



+24 V I/O

+24 V I/O

GND

## Connection example



PS

T 10 A

I/O
supply

+24 VDC

GND

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM01 | X20 supply bus module, internal I/O supply is isolated to the left | 📄 86 |

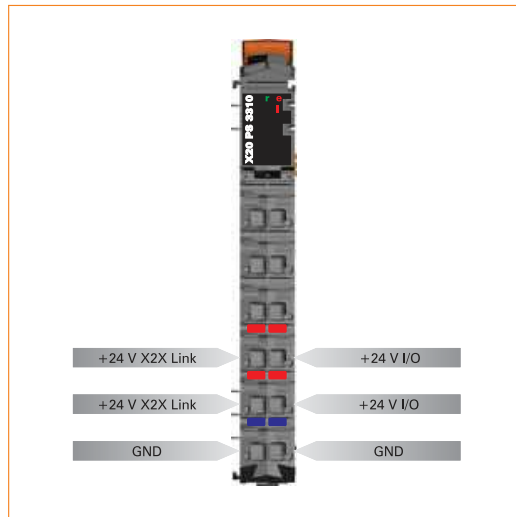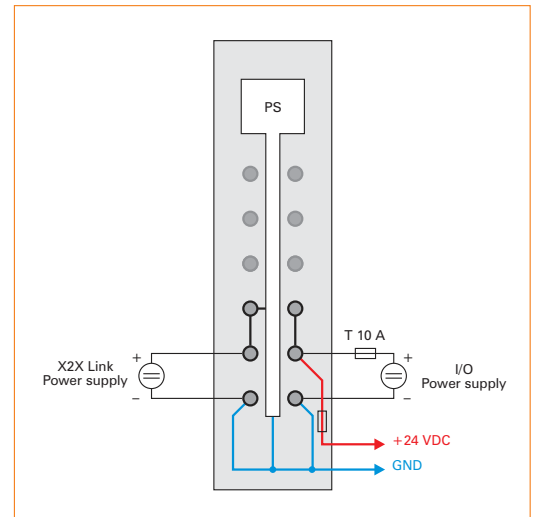# Supply module
# PS2110



- 24 VDC supply module for internal I/O supply
- Fuse for I/O supply integrated in module

| Short description | X20PS2110 |
|---|---|
| Power supply module | 24 VDC supply module for internal I/O supply |
| **Input I/O supply** | **X20PS2110** |
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Integrated T 6.3 A, exchangeable |
| **Output I/O supply** | **X20PS2110** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General information** | **X20PS2110** |
| Status indicators | Operating status, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
|   I/O supply | No |
| Power consumption [1] | |
|   Bus | 0.2 W |
|   I/O internal | 0.82 W |
| Certification | CE, C-UL-US, GOST-R, BG-PRÜFZERT [2] |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

2) Operating principle checked: Shutdown initiated by external safety switching device

| Operational conditions | X20PS2110 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PS2110** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PS2110** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply bus module 1x X20BM01 separately |

## Pin assignments



+24 V I/O

+24 V I/O

GND

## Connection example



PS

T 10 A

I/O
Power supply

+24 VDC

GND

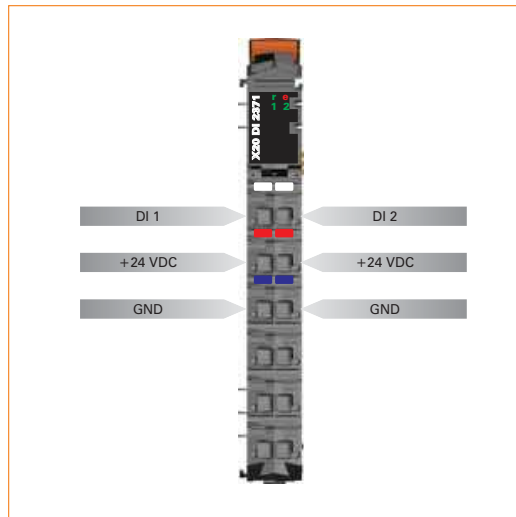| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM01 | X20 supply bus module, internal I/O supply is isolated to the left | 📄 86 |

# Supply module
# PS3300



- Supply for X2X Link and internal I/O supply
- Electrical isolation of feed and X2X Link supply
- Redundancy of X2X Link supply possible by operating multiple supply modules at the same time

| Short description | X20PS3300 |
|---|---|
| Power supply module | 24 VDC supply module for I/O and bus |
| **X2X Link supply input** | **X20PS3300** |
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 0.7 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |
| **X2X Link supply output** | **X20PS3300** |
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

| Input I/O supply | X20PS3300 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Recommended pre-fusing max. 10 A slow-blow |
| **Output I/O supply** | **X20PS3300** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General information** | **X20PS3300** |
| Status indicators | Overload, operating status, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Overload | Yes, with status LED and software status |
| Electrical isolation | |
|   X2X Link supply | Yes |
|   I/O supply | No |
| Power consumption [1] | |
|   Bus | 1.31 W |
|   I/O internal | 0.6 W |
| Certification | CE, C-UL-US, GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20PS3300 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PS3300** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PS3300** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply bus module 1x X20BM01 separately |

## Pin assignments



| | |
|---|---|
| +24 V X2X Link | +24 V I/O |
| +24 V X2X Link | +24 V I/O |
| GND | GND |

## Connection example



PS

X2X Link
Power supply

T 10 A

I/O
Power supply

+24 VDC

GND
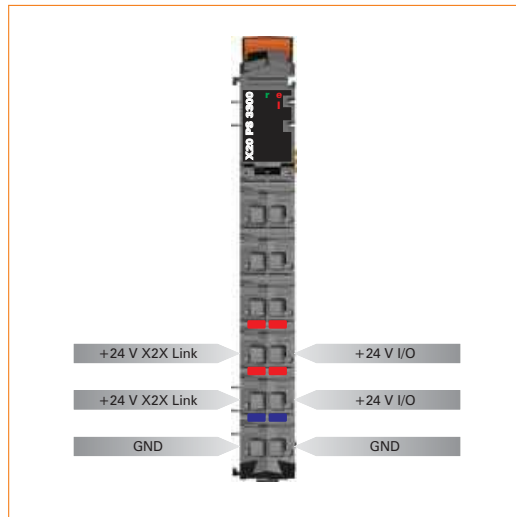
| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM01 | X20 supply bus module, internal I/O supply is isolated to the left | 📄 86 |

# Supply module
# PS3310



- Supply for X2X Link and internal I/O supply
- Electrical isolation of feed and X2X Link supply
- Redundancy of X2X Link supply possible by operating multiple supply modules at the same time
- Fuse for I/O supply integrated in module

| Short description | X20PS3310 |
|---|---|
| Power supply module | 24 VDC supply module for I/O and bus |
| **Input X2X bus supply** | **X20PS3310** |
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 0.7 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |
| **Output X2X bus supply** | **X20PS3310** |
| Rated output power | 7.0 W |
| Parallel operation | Yes [1] |
| Redundant operation | Yes |

1) In parallel operation, only 75% of the rated power can be assumed. Please ensure that all parallel operating power supplies are switched on and off simultaneously.

| Input I/O supply | X20PS3310 |
|---|---|
| Input voltage | 24 VDC (-15% / +20%) |
| Fuse | Integrated T 6.3 A, exchangeable |
| **Output I/O supply** | **X20PS3310** |
| Rated output voltage | 24 VDC |
| Permitted contact load | 10.0 A |
| **General information** | **X20PS3310** |
| Status indicators | Overload, operating status, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Overload | Yes, with status LED and software status |
| Electrical isolation | |
|   X2X bus supply | Yes |
|   I/O supply | No |
| Power consumption [1] | |
|   Bus | 1.31 W |
|   I/O internal | 0.82 W |
| Certification | CE, C-UL-US, GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20PS3310 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PS3310** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PS3310** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply bus module 1x X20BM01 separately |

## Pin assignments



| | |
|---|---|
| +24 V X2X Link | +24 V I/O |
| +24 V X2X Link | +24 V I/O |
| GND | GND |

## Connection example



PS

X2X Link
Power supply

T 10 A

I/O
Power supply

+24 VDC

GND

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM01 | X20 supply bus module, internal I/O supply is isolated to the left | 📄 86 |

# Digital input module
# DI2371



- 2 digital inputs
- Sink connection
- 3-wire connection
- 24 VDC and GND for sensor supply
- Software input filter can be configured for the entire module

| Short description | X20DI2371 |
|---|---|
| I/O module | Two 24 VDC digital inputs for 3-line connections |
| **Digital inputs** | **X20DI2371** |
| Rated voltage | 24 VDC |
| Input filter | |
|    Hardware | $\leq 100\ \mu s$ |
|    Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 3-line connections |
| Input circuit | Sink |
| Sensor supply | 0.5 A total current |
| **General information** | **X20DI2371** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.12 W |
|    I/O internal | 0.29 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI2371** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI2371** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI2371** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| +24 VDC | +24 VDC |
| GND | GND |

## Connection example
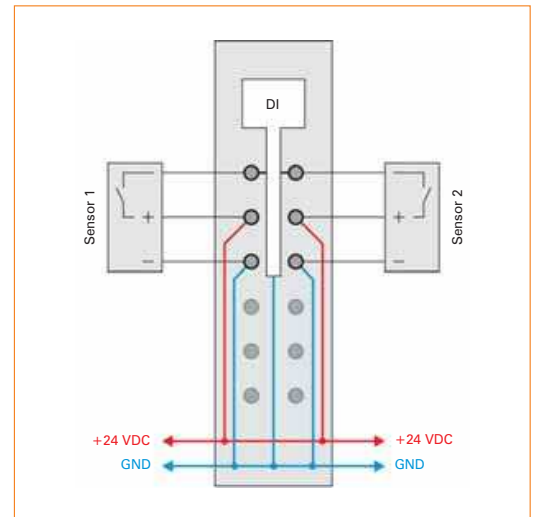


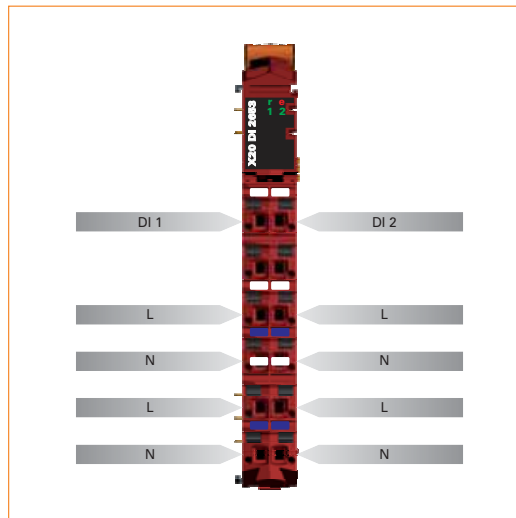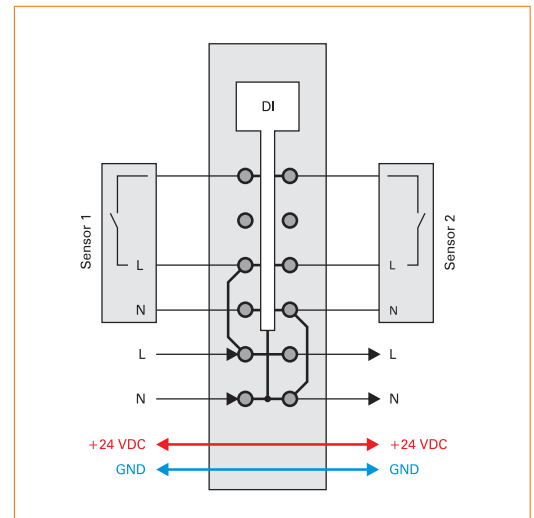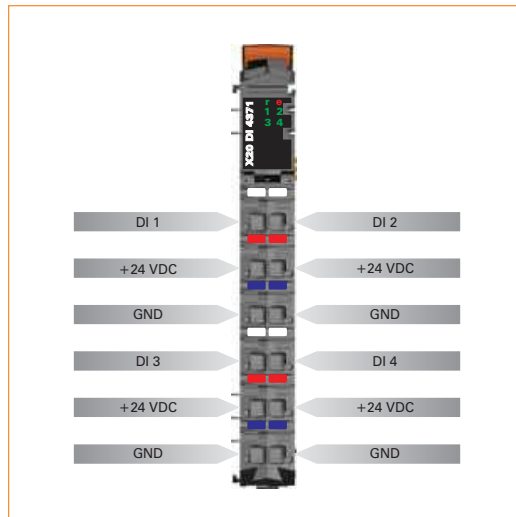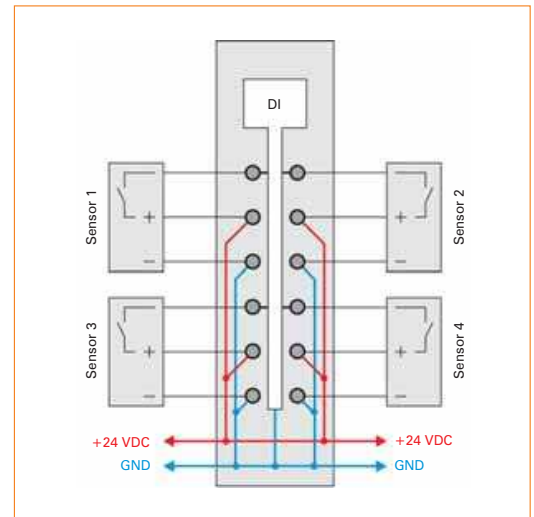| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 🗎 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

# Digital input module
# DI2372



- 2 digital inputs
- source connection
- 3-wire connection
- 24 VDC and GND for sensor supply
- Software input filter can be configured for the entire module

| Short description | X20DI2372 |
|---|---|
| I/O module | Two 24 VDC digital inputs for 3-line connections |
| **Digital inputs** | **X20DI2372** |
| Rated voltage | 24 VDC |
| Input filter | |
| Hardware | ≤100 µs |
| Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 3-line connections |
| Input circuit | Source |
| Sensor supply | 0.5 A total current |
| **General information** | **X20DI2372** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.12 W |
| I/O internal | 0.29 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI2372** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI2372** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI2372** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| +24 VDC | +24 VDC |
| GND | GND |
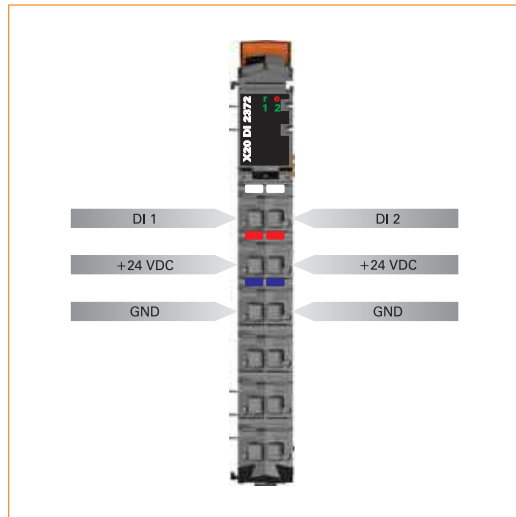
## Connection example
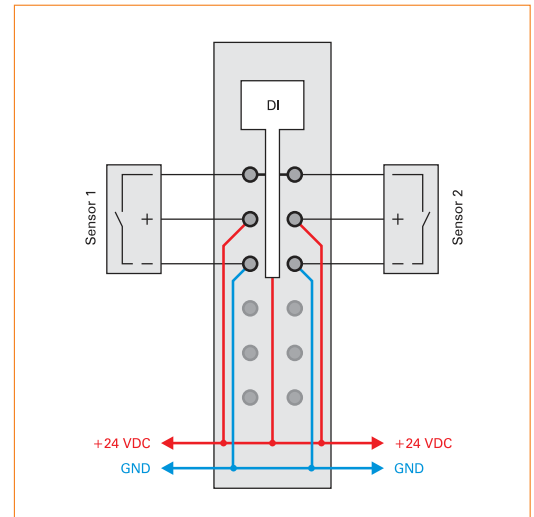


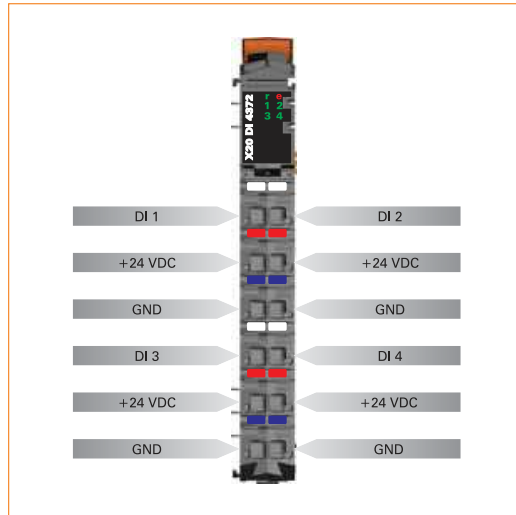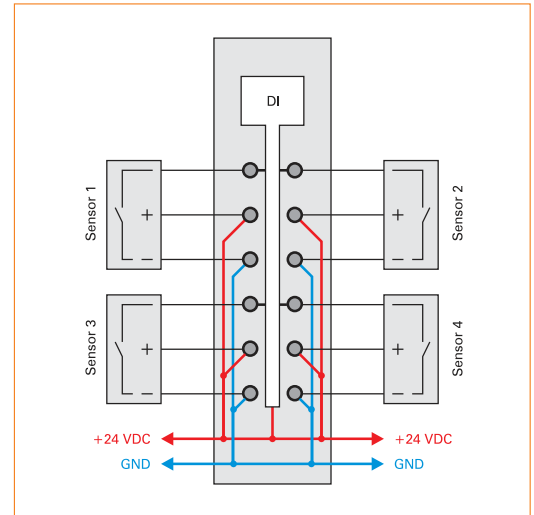| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 🕮 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🕮 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🕮 88 |

# Digital input module
# DI2377

- 2 digital inputs
- Sink connection
- 3-wire connection
- 2 counter inputs with 50 kHz counter frequency
- Gate measurement
- 24 VDC and GND for sensor supply
- Software input filter can be configured for the entire module

| Short description | X20DI2377 |
|---|---|
| I/O module | Two 24 VDC digital inputs for 3-line connections, special functions |
| **Digital inputs** | **X20DI2377** |
| Rated voltage | 24 VDC |
| Input filter | |
| Hardware | ≤10 $\mu s$ |
| Software | Default 0 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 3-line connections |
| Input circuit | Sink |
| Additional functions for inputs | 50 kHz event counting, gate measurement |
| Sensor supply | 0.5 A total current |
| **General information** | **X20DI2377** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.15 W |
| I/O internal | 0.82 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI2377** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI2377** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI2377** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| +24 VDC | +24 VDC |
| GND | GND |
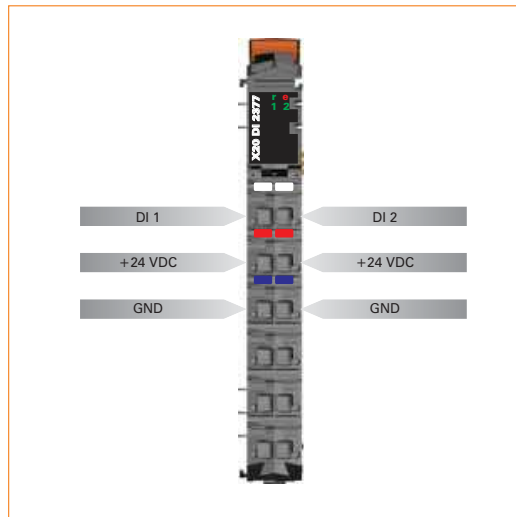
## Connection example
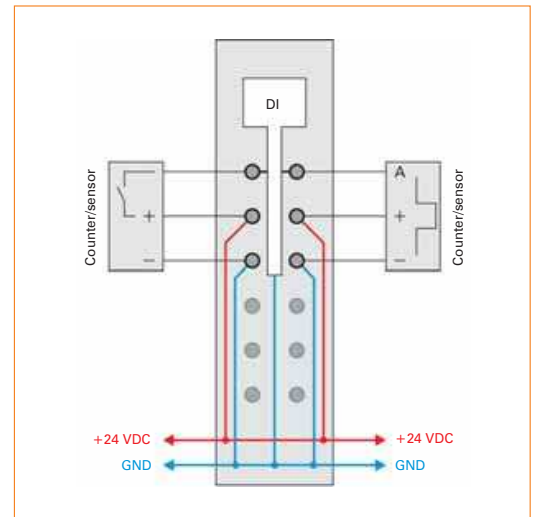


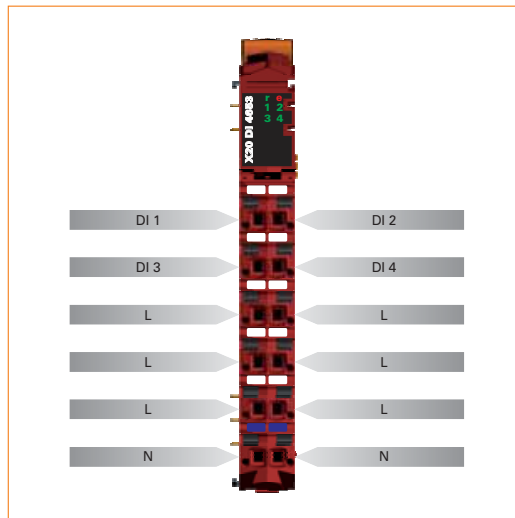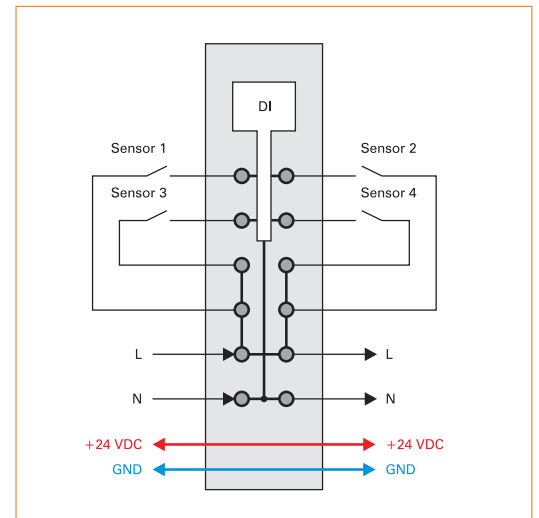| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | ▤ 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Digital input module
# DI2653



- 2 digital inputs
- 120/240 VAC inputs
- 50 Hz or 60 Hz
- 3-wire connection
- Special color
- 240 V coded

| Short description | X20DI2653 |
| --- | --- |
| I/O module | 2 digital inputs for 100 - 240 VAC, 3-line connections |
| **Digital inputs** | **X20DI2653** |
| Rated voltage | 100 - 240 VAC |
| Rated frequency | 47 - 63 Hz |
| Input filter | |
|   Hardware | |
|     0 → 1 | ≤40 ms |
|     1 → 0 | ≤30 ms |
|   Software | Default 1 ms. Can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 3-line connections |
| **General information** | **X20DI2653** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   I/O external supply | Yes, with software status (typical threshold 85 VAC) |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.14 W |
|   I/O internal | – |
|   I/O external | 0.55 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI2653** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI2653** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI2653** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB32 separately |
| | Order bus module 1x X20BM12 separately |

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| L | L |
| N | N |
| L | L |
| N | N |

## Connection example



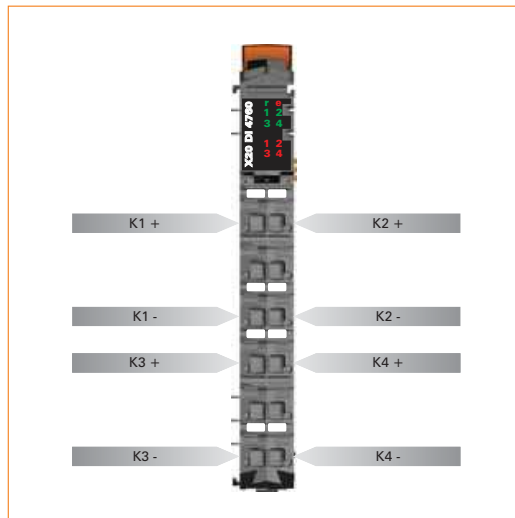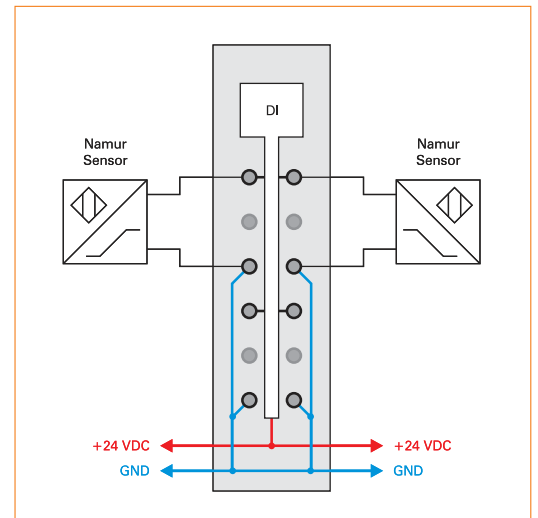| Required accessories | | |
|---|---|---|
| X20TB32 | X20 terminal block, 12-pin, 240 V coded | ▤ 95 |
| X20BM12 | X20 bus module, 240 V coded, internal I/O supply is interconnected | ▤ 89 |

# Digital input module
# DI4371

- 4 digital inputs
- Sink connection
- 3-wire connection
- 24 VDC and GND for sensor supply
- Software input filter can be configured for the entire module

| Short description | X20DI4371 |
|---|---|
| I/O module | Four 24 VDC digital inputs for 3-line connections |
| **Digital inputs** | **X20DI4371** |
| Rated voltage | 24 VDC |
| Input filter | |
|     Hardware | ≤100 µs |
|     Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 3-line connections |
| Input circuit | Sink |
| Sensor supply | 0.5 A total current |
| **General information** | **X20DI4371** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|     Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
|     Channel - Bus | Yes |
|     Channel - Channel | No |
| Power consumption | |
|     Bus | 0.14 W |
|     I/O internal | 0.59 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI4371** |
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI4371** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI4371** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| +24 VDC | +24 VDC |
| GND | GND |
| DI 3 | DI 4 |
| +24 VDC | +24 VDC |
| GND | GND |

## Connection example



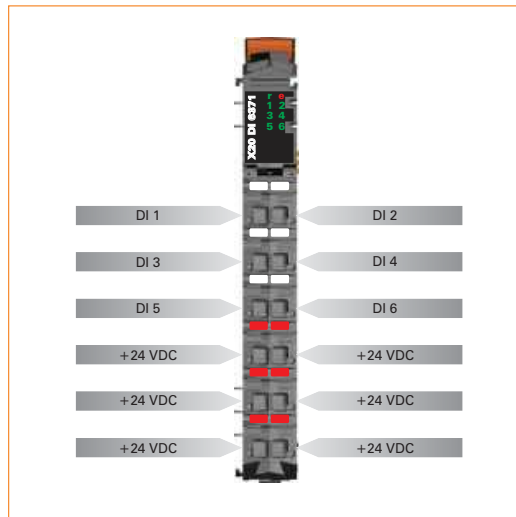| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗏 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗏 88 |

# Digital input module
# DI4372



- 4 digital inputs
- source connection
- 3-wire connection
- 24 VDC and GND for sensor supply
- Software input filter can be configured for the entire module

| Short description | X20DI4372 |
|---|---|
| I/O module | Four 24 VDC digital inputs for 3-line connections |
| **Digital inputs** | **X20DI4372** |
| Rated voltage | 24 VDC |
| Input filter | |
| Hardware | ≤100 μs |
| Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 3-line connections |
| Input circuit | Source |
| Sensor supply | 0.5 A total current |
| **General information** | **X20DI4372** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.14 W |
| I/O internal | 0.59 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI4372** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI4372** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI4372** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | | |
|---|---|---|
| DI 1 | | DI 2 |
| +24 VDC | | +24 VDC |
| GND | | GND |
| DI 3 | | DI 4 |
| +24 VDC | | +24 VDC |
| GND | | GND |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Digital input module
# DI4653

- 4 digital inputs
- 120/240 VAC inputs
- 50 Hz or 60 Hz
- 2-wire connection
- Special color
- 240 V coded

| Short description | X20DI4653 |
|---|---|
| I/O module | 4 digital inputs for 100 - 240 VAC, 2-line connections |
| **Digital inputs** | **X20DI4653** |
| Rated voltage | 100 - 240 VAC |
| Rated frequency | 47 - 63 Hz |
| Input filter | |
| Hardware | |
| 0 → 1 | ≤40 ms |
| 1 → 0 | ≤30 ms |
| Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 2-line connections |
| **General information** | **X20DI4653** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| I/O external supply | Yes, with software status (typical threshold 85 VAC) |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.17 W |
| I/O internal | – |
| I/O external | 0.91 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI4653** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI4653** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI4653** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB32 separately |
| | Order bus module 1x X20BM12 separately |

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| DI 3 | DI 4 |
| L | L |
| L | L |
| L | L |
| N | N |

## Connection example



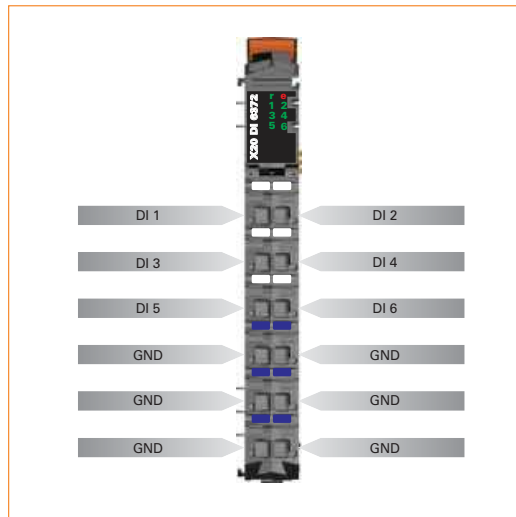| Required accessories | | |
|---|---|---|
| X20TB32 | X20 terminal block, 12-pin, 240 V coded | ≙ 95 |
| X20BM12 | X20 bus module, 240 V coded, internal I/O supply is interconnected | ≙ 89 |

# Digital input module
# DI4760



- 4 digital inputs
- Input module for NAMUR encoders
- Open connection and short-circuit detection
- Every input can be used as a counter input

| Short description | X20DI4760 |
|---|---|
| I/O module | 4 NAMUR inputs, special function |
| **NAMUR inputs** | **X20DI4760** |
| No load voltage | 8.05 V ± 0.33% |
| Input delay | |
| 1 input active | ≤310 $\mu$s |
| 2 inputs active | ≤450 $\mu$s |
| 3 inputs active | ≤570 $\mu$s |
| 4 inputs active | ≤735 $\mu$s |
| Input circuit | For NAMUR encoders according to EN 60947-5-6 |
| **Event counter** | **X20DI4760** |
| Amount | 4 |
| Counter size | 8-bit |
| Input frequency | |
| 1 input active | Max. 1600 Hz |
| 2 inputs active | Max. 1100 Hz |
| 3 inputs active | Max. 870 Hz |
| 4 inputs active | Max. 680 Hz |
| Evaluation | Every positive edge, cyclic counter |
| Signal form | Symmetric square wave pulse or corresponding minimum pulse duration [1] |

1) Minimum pulse duration: $t[s] \geq \dfrac{1}{2 \cdot f_{max}[Hz]}$

| General information | X20DI4760 |
|---|---|
| Status indicators | I/O function by channel, open line and short circuit detection by channel, operating status, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Open line | Yes, with status LED and software status |
| Short circuit | Yes, with status LED and software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI4760** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | Values derated when mounted vertically |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI4760** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI4760** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| K1 + | K2 + |
| K1 - | K2 - |
| K3 + | K4 + |
| K3 - | K4 - |

## Connection example



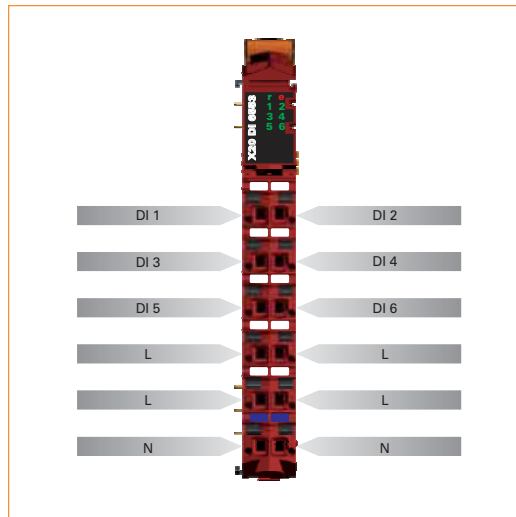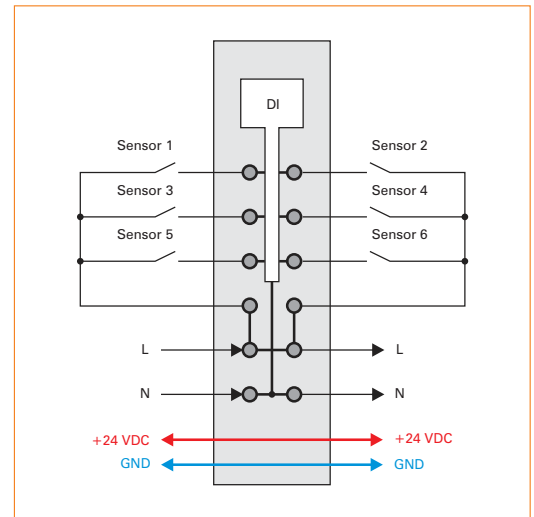| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🕮 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🕮 88 |

# Digital input module
# DI6371



- 6 digital inputs
- Sink connection
- 2-wire connection
- 24 VDC for sensor supply
- Software input filter can be configured for the entire module
- 1-line connection with 6-pin terminal block

| Short description | X20DI6371 |
|---|---|
| I/O module | Six 24 VDC digital inputs for 1 or 2-wire connections |
| **Digital inputs** | **X20DI6371** |
| Rated voltage | 24 VDC |
| Input filter | |
| Hardware | ≤100 µs |
| Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 1 or 2 line connection |
| Input circuit | Sink |
| **General information** | **X20DI6371** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.15 W |
| I/O internal | 0.88 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI6371** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI6371** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI6371** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The X20 6-pin terminal block can be used for universal 1-line wiring. Two-line wiring can be implemented using the 12-pin terminal block.*

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| DI 3 | DI 4 |
| DI 5 | DI 6 |
| +24 VDC | +24 VDC |
| +24 VDC | +24 VDC |
| +24 VDC | +24 VDC |

## Connection example
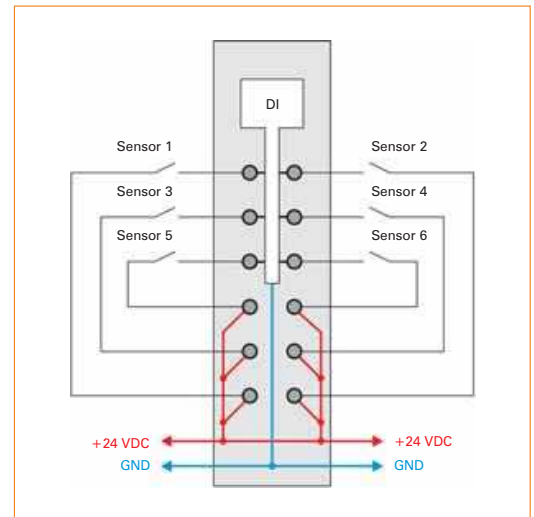


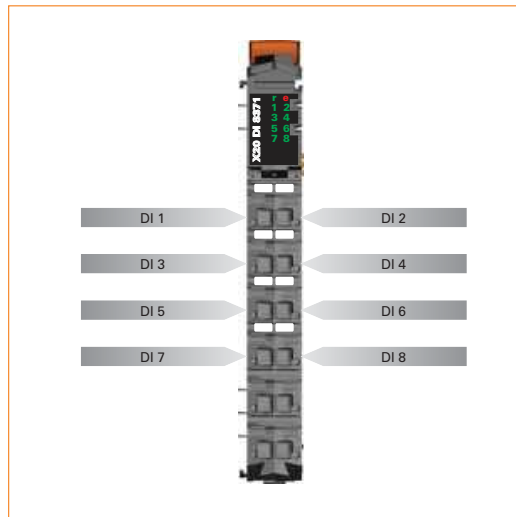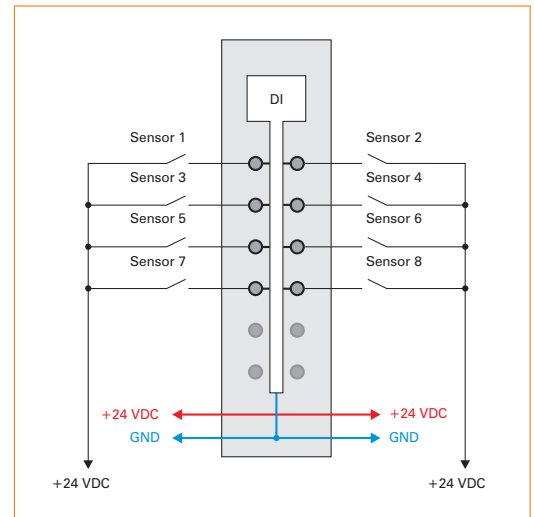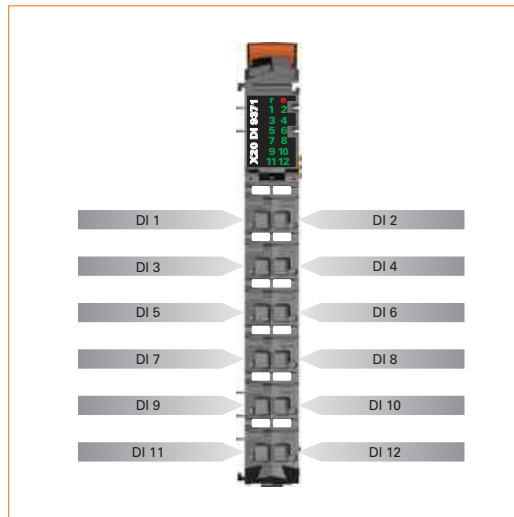| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | ▤ 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Digital input module
# DI6372



- 6 digital inputs
- source connection
- 2-wire connection
- 24 VDC for sensor supply
- Software input filter can be configured for the entire module
- 1-line connection with 6-pin terminal block

| Short description | X20DI6372 |
|---|---|
| I/O module | Six 24 VDC digital inputs for 1 or 2-wire connections |
| **Digital inputs** | **X20DI6372** |
| Rated voltage | 24 VDC |
| Input filter | |
| Hardware | ≤100 µs |
| Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 1 or 2 line connection |
| Input circuit | Source |
| **General information** | **X20DI6372** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.15 W |
| I/O internal | 0.88 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI6372** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI6372** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI6372** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The X20 6-pin terminal block can be used for universal 1-line wiring. Two-line wiring can be implemented using the 12-pin terminal block.*

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| DI 3 | DI 4 |
| DI 5 | DI 6 |
| GND | GND |
| GND | GND |
| GND | GND |

## Connection example
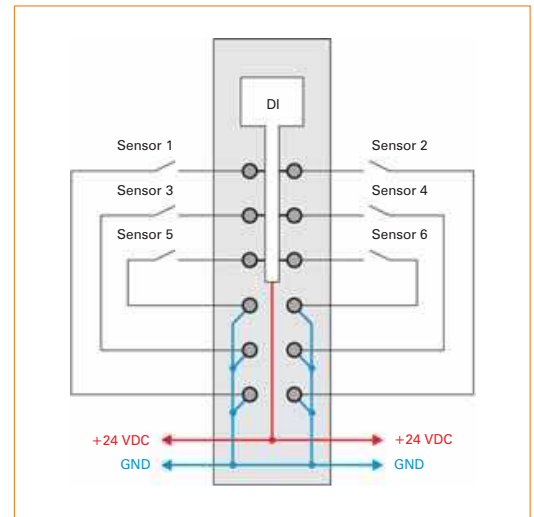


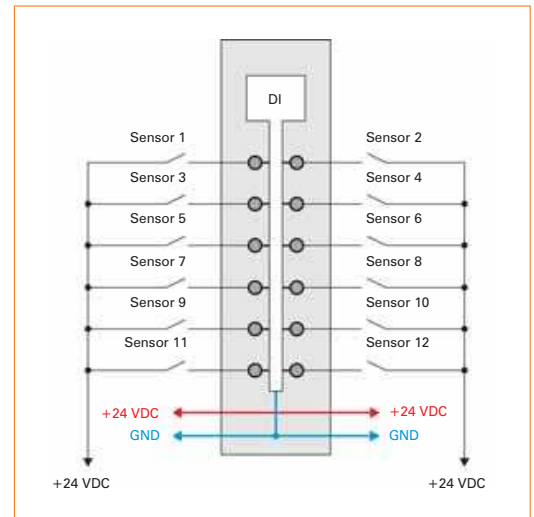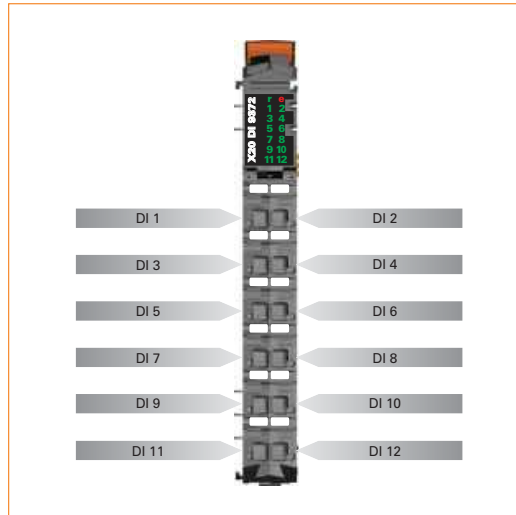| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | ▤ 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Digital input module
# DI6553

- 6 digital inputs
- 120 VAC inputs
- 50 Hz or 60 Hz
- 1-wire connection
- Special color
- 240 V coded

| Short description | X20DI6553 |
|---|---|
| I/O module | 6 digital inputs for 100 - 120 VAC, 1-line connections |
| **Digital inputs** | **X20DI6553** |
| Rated voltage | 100 - 120 VAC |
| Rated frequency | 47 - 63 Hz |
| Input filter | |
|   Hardware | |
|     0 → 1 | ≤15 ms |
|     1 → 0 | ≤30 ms |
|   Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 1-line connections |
| **General information** | **X20DI6553** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   I/O external supply | Yes, with software status (typical threshold 85 VAC) |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.21 W |
|   I/O internal | - |
|   I/O external | 0.68 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI6553** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI6553** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI6553** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB32 separately |
| | Order bus module 1x X20BM12 separately |

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| DI 3 | DI 4 |
| DI 5 | DI 6 |
| L | L |
| L | L |
| N | N |

## Connection example



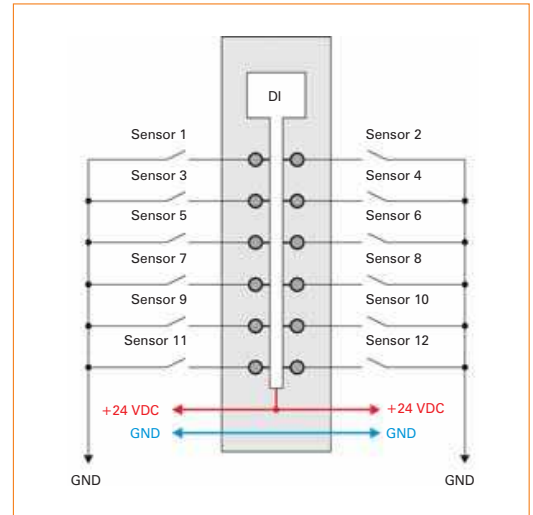| Required accessories | | |
|---|---|---|
| X20TB32 | X20 terminal block, 12-pin, 240 V coded | 📄 95 |
| X20BM12 | X20 bus module, 240 V coded, internal I/O supply is interconnected | 📄 89 |

# Digital input module
# DI8371

- 8 digital inputs
- Sink connection
- 1-wire connection
- Software input filter can be configured for the entire module

| Short description | X20DI8371 |
|---|---|
| I/O module | Eight 24 VDC digital inputs for 1-line connections |
| **Digital inputs** | **X20DI8371** |
| Rated voltage | 24 VDC |
| Input filter | |
|    Hardware | ≤100 $\mu$s |
|    Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 1-line connections |
| Input circuit | Sink |
| **General information** | **X20DI8371** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.18 W |
|    I/O internal | - |
|    I/O external | 1.2 W |
| Certification | CE, C-UL-US (in development), GOST-R |
| **Operational conditions** | **X20DI8371** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI8371** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI8371** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| DI 3 | DI 4 |
| DI 5 | DI 6 |
| DI 7 | DI 8 |

## Connection example



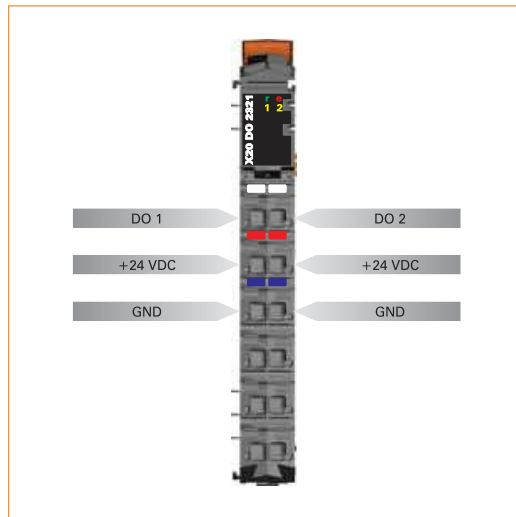| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🕮 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🕮 88 |

# Digital input module
# DI9371

- 12 digital inputs
- Sink connection
- 1-wire connection
- Software input filter can be configured for the entire module

| Short description | X20DI9371 |
|---|---|
| I/O module | Twelve 24 VDC digital inputs for 1-wire connections |
| **Digital inputs** | **X20DI9371** |
| Rated voltage | 24 VDC |
| Input filter | |
|    Hardware | ≤100 µs |
|    Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 1-line connections |
| Input circuit | Sink |
| Simultaneousness | |
|    With 24 V I/O supply | 100% |
|    With 28.8 V I/O supply | 75% |
| **General information** | **X20DI9371** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.18 W |
|    I/O internal | – |
|    I/O external | 1.75 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI9371** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI9371** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI9371** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| DI 3 | DI 4 |
| DI 5 | DI 6 |
| DI 7 | DI 8 |
| DI 9 | DI 10 |
| DI 11 | DI 12 |

## Connection example



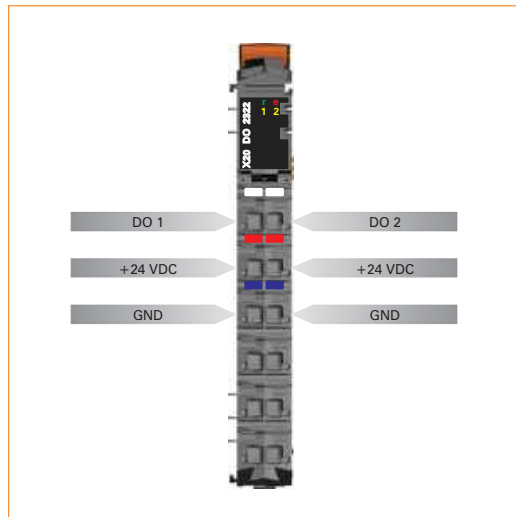| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

# Digital input module
# DI9372

- 12 digital inputs
- source connection
- 1-wire connection
- Software input filter can be configured for the entire module

| Short description | X20DI9372 |
|---|---|
| I/O module | Twelve 24 VDC digital inputs for 1-wire connections |
| **Digital inputs** | **X20DI9372** |
| Rated voltage | 24 VDC |
| Input filter | |
| Hardware | ≤100 $\mu$s |
| Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 1-line connections |
| Input circuit | Source |
| Simultaneousness | |
| With 24 V I/O supply | 100% |
| With 28.8 V I/O supply | 75% |
| **General information** | **X20DI9372** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.18 W |
| I/O internal | 1.75 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DI9372** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DI9372** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DI9372** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| DI 3 | DI 4 |
| DI 5 | DI 6 |
| DI 7 | DI 8 |
| DI 9 | DI 10 |
| DI 11 | DI 12 |

## Connection example



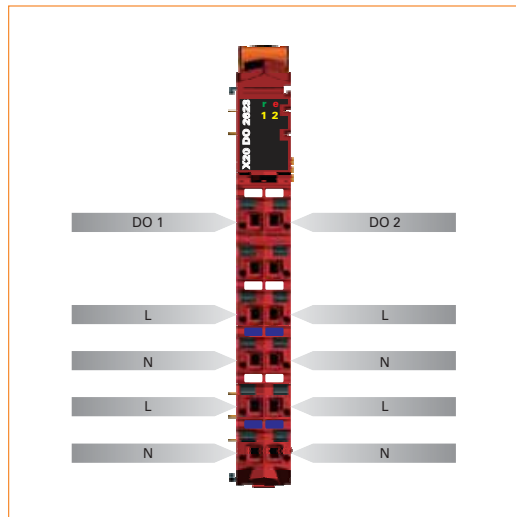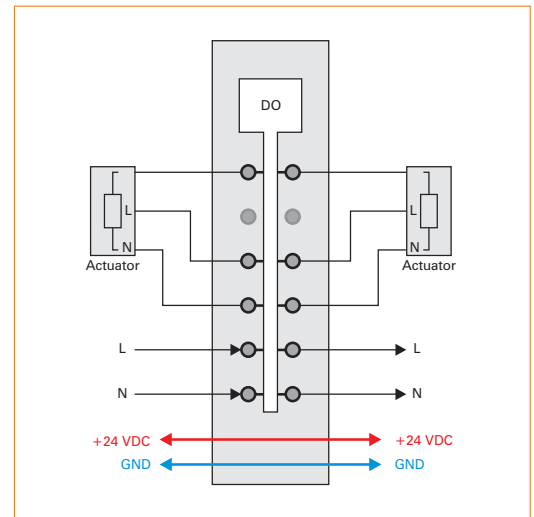| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ≙ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ≙ 88 |

# Digital output module
# DO2321

- 2 digital outputs
- Sink connection
- 3-wire connection
- 24 VDC and GND for actuator supply
- Integrated output protection

| Short description | X20DO2321 |
|---|---|
| I/O module | Two 24 VDC digital outputs for 3-line connections |
| **Digital outputs** | **X20DO2321** |
| Rated voltage | 24 VDC |
| Rated output current | 0.5 A |
| Total current | 1.0 A |
| Connection type | 3-line connections |
| Output circuit | Sink |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| Actuator supply | 0.5 A in total for output-independent actuator supply |
| **General information** | **X20DO2321** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.13 W |
| I/O internal | 0.3 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DO2321** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO2321** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO2321** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| +24 VDC | +24 VDC |
| GND | GND |

## Connection example
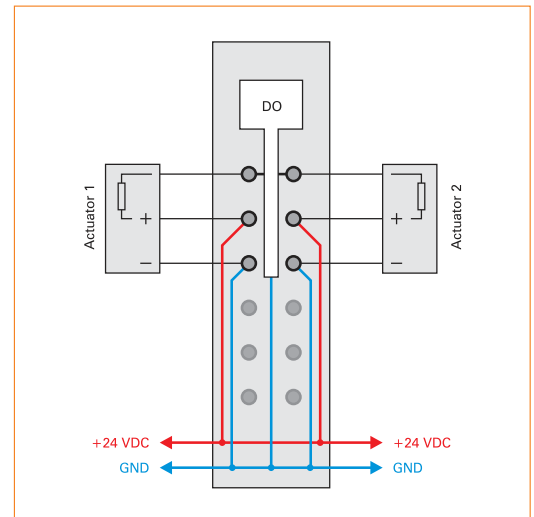


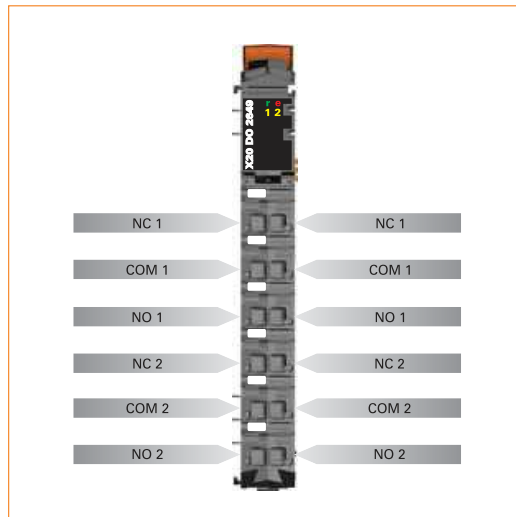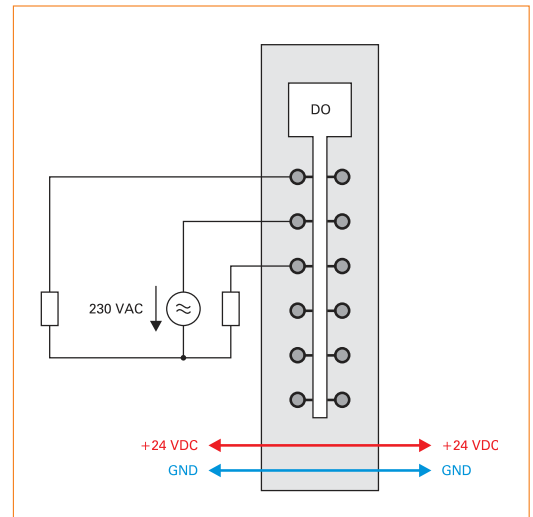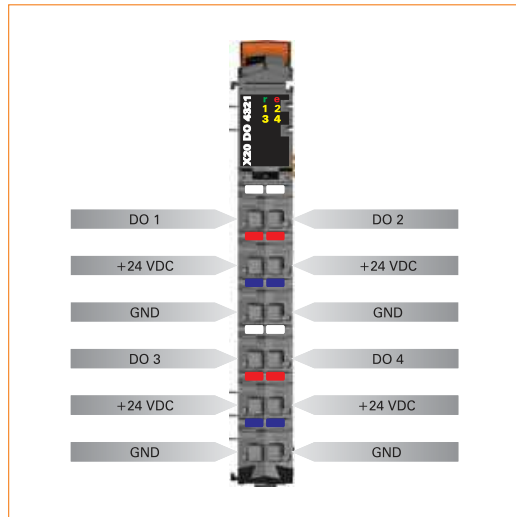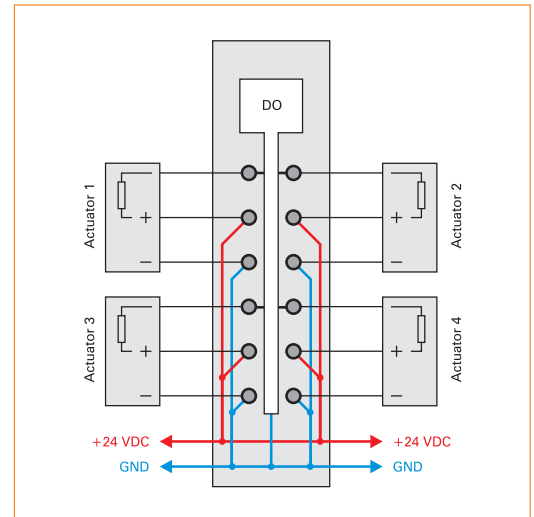| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 📄 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📄 88 |

# Digital output module
# DO2322



- 2 digital outputs
- source connection
- 3-wire connection
- 24 VDC and GND for actuator supply
- Integrated output protection

| Short description | X20DO2322 |
|---|---|
| I/O module | Two 24 VDC digital outputs for 3-line connections |
| **Digital outputs** | **X20DO2322** |
| Rated voltage | 24 VDC |
| Rated output current | 0.5 A |
| Total current | 1.0 A |
| Connection type | 3-line connections |
| Output circuit | Source |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| Actuator supply | 0.5 A in total for output-independent actuator supply |
| **General information** | **X20DO2322** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.13 W |
|    I/O internal | 0.33 W |
| Certification | CE, C-UL-US, GOST-R, BG-PRÜFZERT [1] |

1) Operating principle checked: Shutdown initiated by external safety switching device

| **Operational conditions** | **X20DO2322** |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO2322** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO2322** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

## Pin assignments



DO 1        DO 2

+24 VDC      +24 VDC

GND         GND

## Connection example
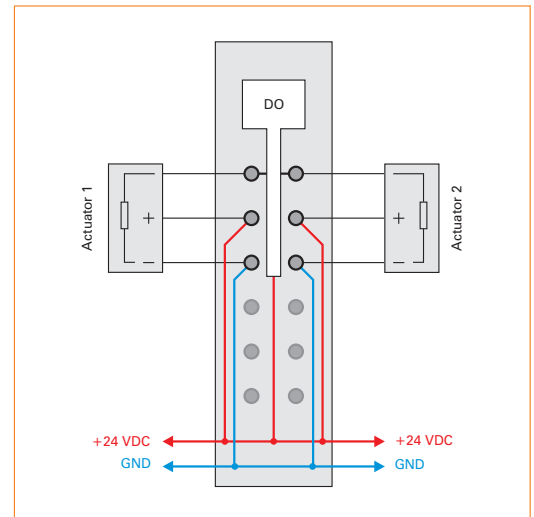


| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 🗎 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

# Digital output module
# DO2623

- 2 digital outputs
- Outputs with integrated snubber circuit
- Outputs with 100 - 240 VAC
- L switching
- 50 Hz or 60 Hz
- 3-wire connection
- Integrated full-wave control
- Special color
- 240 V coding

| Short description | X20DO2623 |
|---|---|
| I/O module | 2 digital SSR outputs 100 - 240 VAC, 3-line connections |
| **Digital outputs** | **X20DO2623** |
| Design | SSR |
| Wiring | L switching |
| Rated voltage | 100 - 240 VAC |
| Rated frequency | 47 to 63 Hz |
| Rated output current | 1.0 A |
| Total current | 1.0 A |
| Surge current | 40 A (20 ms), 10 A (1 s) |
| Connection type | 3-line connections |
| Zero cross-over switches | Yes |
| **General information** | **X20DO2623** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Outputs | Yes, with status LED |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.35 W |
|   I/O internal | - |
|   I/O external | 0.38 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DO2623** |
| Operating temperature | |
|   Horizontal installation | 0℃ to +55℃ |
|   Vertical installation | 0℃ to +50℃ |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5℃ per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO2623** |
| Temperature | -25℃ to +70℃ |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO2623** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB32 separately |
| | Order bus module 1x X20BM12 separately |

## Pin assignments



DO 1

DO 2

L

L

N

N

L

L

N

N

## Connection example



DO

Actuator

Actuator

L

N

L

N

L

L

N

N

+24 VDC

+24 VDC

GND

GND

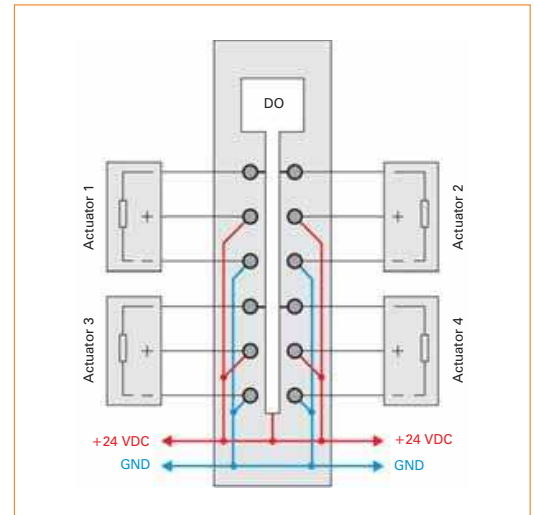| Required accessories | | |
|---|---|---|
| X20TB32 | X20 terminal block, 12-pin, 240 V coded | ▤ 95 |
| X20BM12 | X20 bus module, 240 V coded, internal I/O supply is interconnected | ▤ 89 |

# Digital output module
# DO2649

- 2 digital outputs
- Relay module for 230 VAC
- 2 change over contacts
- Outputs single channel isolated

| Short description | X20DO2649 |
|---|---|
| I/O module | 2 digital outputs 30 VDC / 230 VAC, outputs are single-channel isolated |
| **Digital outputs** | **X20DO2649** |
| Design | Relay / Change-over |
| | Channels are single-channel isolated |
| Rated voltage | 30 VDC / 230 VAC |
| Rated frequency | DC / 45 to 63 Hz |
| Rated output current | 5.0 A at 30 VDC / 5.0 A at 230 VAC |
| Total current | 10.0 A at 30 VDC / 10.0 A at 115 VAC |
| Switching capacity | |
|   Minimum | 10 mA / 5 VDC |
|   Maximum | 180 W / 1500 VA |
| Actuator supply | External |
| **General information** | **X20DO2649** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Outputs | Yes, with status LED |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | Yes |
| Power consumption | |
|   Bus | 0.45 W |
|   I/O internal | - |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DO2649** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO2649** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO2649** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| NC 1 | NC 1 |
| COM 1 | COM 1 |
| NO 1 | NO 1 |
| NC 2 | NC 2 |
| COM 2 | COM 2 |
| NO 2 | NO 2 |

## Connection example



DO

230 VAC

+24 VDC → ← +24 VDC
GND ← → GND

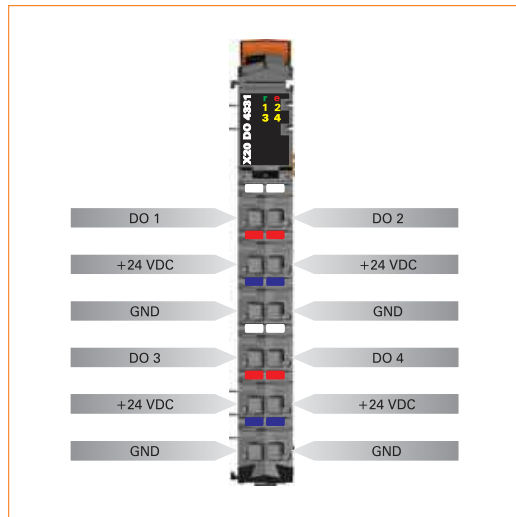| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🕮 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🕮 88 |

# Digital output module
# DO4321
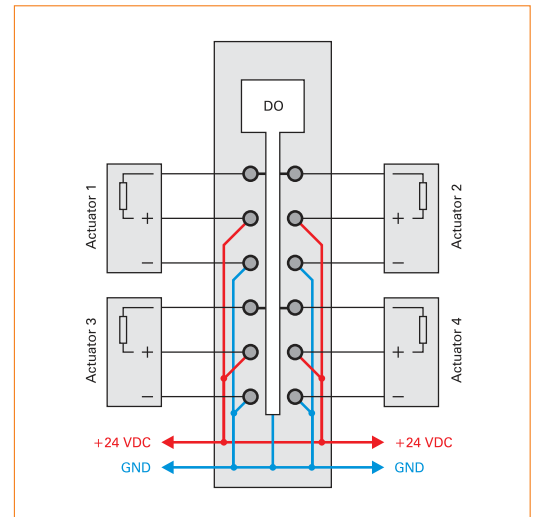
- 4 digital outputs
- Sink connection
- 3-wire connection
- 24 VDC and GND for actuator supply
- Integrated output protection

| Short description | X20DO4321 |
|---|---|
| I/O module | Four 24 VDC digital outputs for 3-line connections |
| **Digital outputs** | **X20DO4321** |
| Rated voltage | 24 VDC |
| Rated output current | 0.5 A |
| Total current | 2.0 A |
| Connection type | 3-line connections |
| Output circuit | Sink |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| Actuator supply | 0.5 A in total for output-independent actuator supply |
| **General information** | **X20DO4321** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.16 W |
| I/O internal | 0.49 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DO4321** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO4321** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO4321** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| +24 VDC | +24 VDC |
| GND | GND |
| DO 3 | DO 4 |
| +24 VDC | +24 VDC |
| GND | GND |

## Connection example



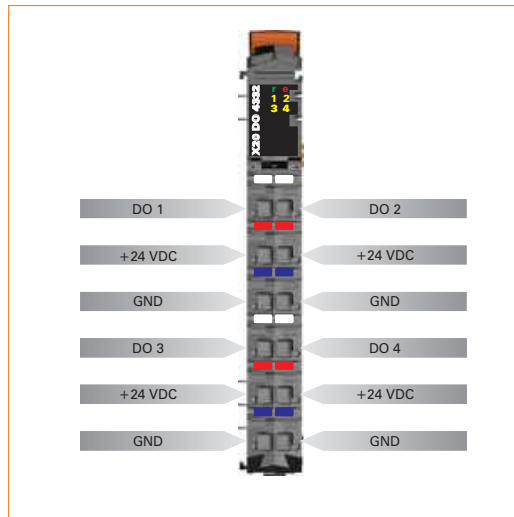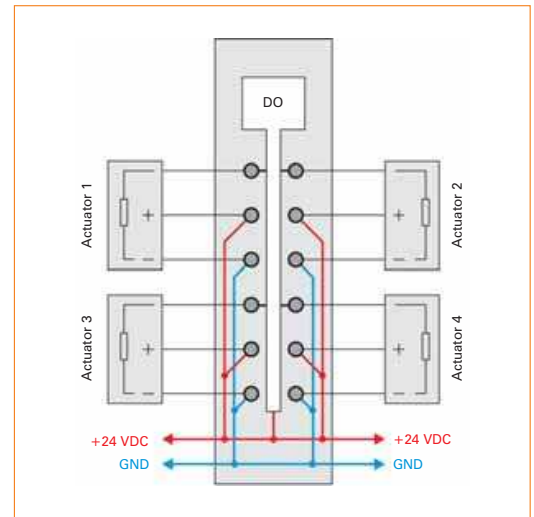| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🕮 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🕮 88 |

# Digital output module
# DO4322

- 4 digital outputs
- source connection
- 3-wire connection
- 24 VDC and GND for actuator supply
- Integrated output protection

| Short description | X20DO4322 |
|---|---|
| I/O module | Four 24 VDC digital outputs for 3-line connections |
| **Digital outputs** | **X20DO4322** |
| Rated voltage | 24 VDC |
| Rated output current | 0.5 A |
| Total current | 2.0 A |
| Connection type | 3-line connections |
| Output circuit | Source |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| Actuator supply | 0.5 A in total for output-independent actuator supply |
| **General information** | **X20DO4322** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.16 W |
|   I/O internal | 0.49 W |
| Certification | CE, C-UL-US, GOST-R, BG-PRÜFZERT [1] |

1) Operating principle checked: Shutdown initiated by external safety switching device

| **Operational conditions** | **X20DO4322** |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO4322** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO4322** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| +24 VDC | +24 VDC |
| GND | GND |
| DO 3 | DO 4 |
| +24 VDC | +24 VDC |
| GND | GND |
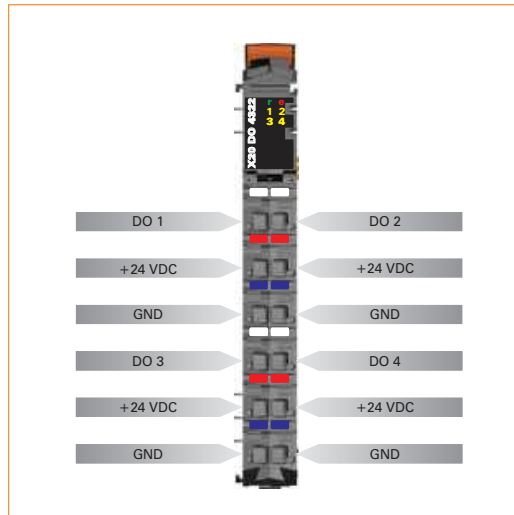
## Connection example



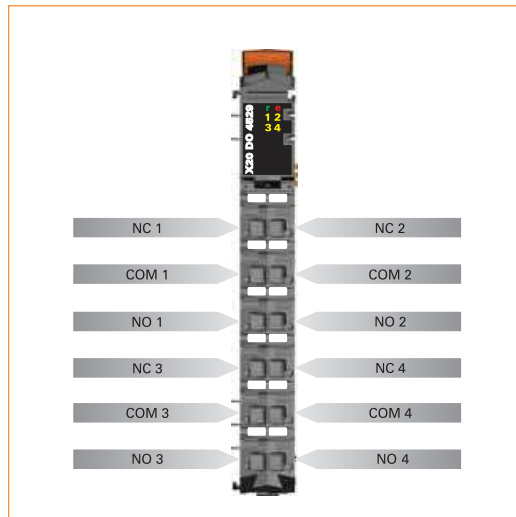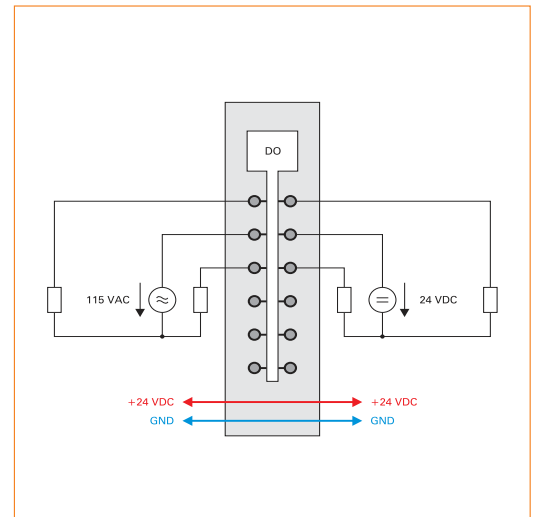| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🕮 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🕮 88 |

# Digital output module
# DO4331

- 4 digital outputs with 2 A
- Sink connection
- 3-wire connection
- 24 VDC and GND for actuator supply
- Integrated output protection

| Short description | X20DO4331 |
|---|---|
| I/O module | Four 24 VDC digital outputs for 3-line connections |
| **Digital outputs** | **X20DO4331** |
| Rated voltage | 24 VDC |
| Rated output current | 2.0 A |
| Total current | 8.0 A |
| Connection type | 3-line connections |
| Output circuit | Sink |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| Additional functions for outputs | To increase the output current, outputs can be switched in parallel |
| Actuator supply | 0.5 A in total for output-independent actuator supply |
| **General information** | **X20DO4331** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.16 W |
| I/O internal | 0.49 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DO4331** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO4331** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO4331** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| +24 VDC | +24 VDC |
| GND | GND |
| DO 3 | DO 4 |
| +24 VDC | +24 VDC |
| GND | GND |

## Connection example



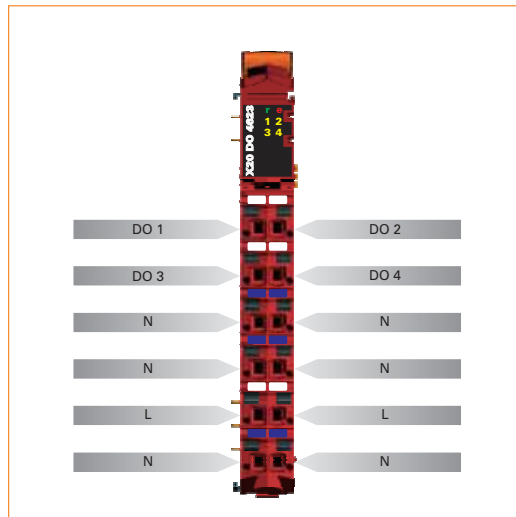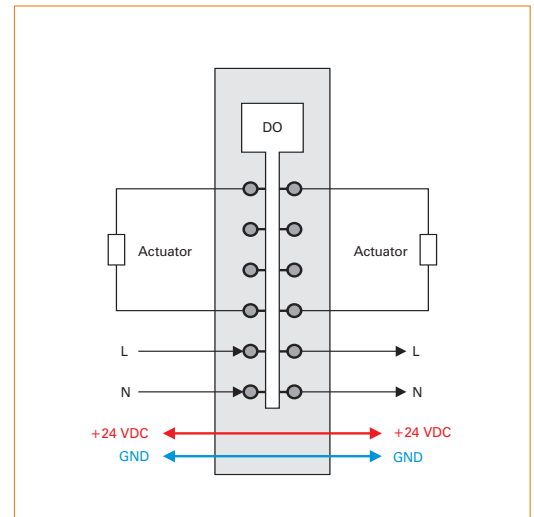| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 88 |

# Digital output module
# DO4332



- 4 digital outputs with 2 A
- source connection
- 3-wire connection
- 24 VDC and GND for actuator supply
- Integrated output protection

| Short description | X20DO4332 |
|---|---|
| I/O module | Four 24 VDC digital outputs for 3-line connections |
| **Digital outputs** | **X20DO4332** |
| Rated voltage | 24 VDC |
| Rated output current | 2.0 A |
| Total current | 4.0 A |
| Connection type | 3-line connections |
| Output circuit | Source |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| Additional functions for outputs | To increase the output current, outputs can be switched in parallel |
| Actuator supply | 0.5 A in total for output-independent actuator supply |
| **General information** | **X20DO4332** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.16 W |
|   I/O internal | 0.5 W |
| Certification | CE, C-UL-US, GOST-R, BG-PRÜFZERT [1] |

1) Operating principle checked: Shutdown initiated by external safety switching device

| **Operational conditions** | **X20DO4332** |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO4332** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO4332** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| +24 VDC | +24 VDC |
| GND | GND |
| DO 3 | DO 4 |
| +24 VDC | +24 VDC |
| GND | GND |

## Connection example



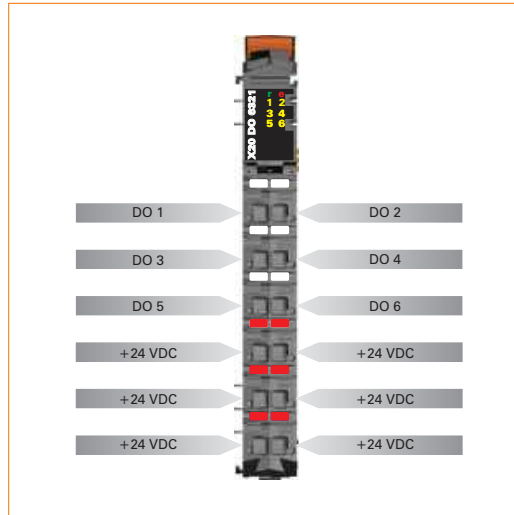| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📄 88 |

# Digital output module
# DO4529

- 4 digital outputs
- Relay module for 115 VAC
- 4 change over contacts
- Outputs single channel isolated

| Short description | X20DO4529 |
|---|---|
| I/O module | 4 digital outputs 30 VDC / 115 VAC, outputs are single-channel isolated |
| **Digital outputs** | **X20DO4529** |
| Design | Relay / Change-over |
| | Channels are single-channel isolated |
| Rated voltage | 30 VDC / 115 VAC |
| Rated frequency | DC / 45 to 63 Hz |
| Rated output current | 1.0 A at 30 VDC / 0.5 A at 115 VAC |
| Total current | 4.0 A at 30 VDC / 2.0 A at 115 VAC |
| Switching capacity | |
| Minimum | 0.01 mA / 10 mV DC |
| Maximum | 30 W / 62.5 VA |
| Actuator supply | External |
| **General information** | **X20DO4529** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Outputs | Yes, with status LED |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | Yes |
| Power consumption | |
| Bus | 0.8 W |
| I/O internal | - |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DO4529** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO4529** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO4529** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| NC 1 | NC 2 |
| COM 1 | COM 2 |
| NO 1 | NO 2 |
| NC 3 | NC 4 |
| COM 3 | COM 4 |
| NO 3 | NO 4 |

## Connection example



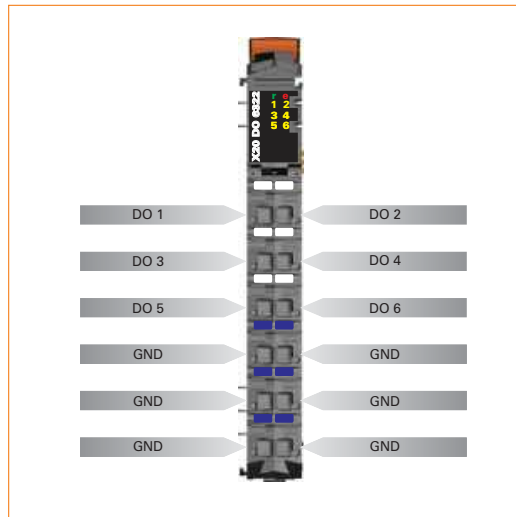| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 88 |

# Digital output module
# DO4623



- 4 digital outputs
- Outputs with integrated snubber circuit
- Outputs with 100 - 240 VAC
- L switching
- 50 Hz or 60 Hz
- 2-wire connection
- Integrated full-wave control
- Special color
- 240 V coding

| Short description | X20DO4623 |
|---|---|
| I/O module | 4 digital SSR outputs 100 - 240 VAC, 2-line connections |
| **Digital outputs** | **X20DO4623** |
| Design | SSR |
| Wiring | L switching |
| Rated voltage | 100 - 240 VAC |
| Rated frequency | 47 to 63 Hz |
| Rated output current | 0.5 A |
| Total current | 1.0 A |
| Surge current | 7 A (20 ms), 2 A (1 s) |
| Connection type | 2-line connections |
| Zero cross-over switches | Yes |
| **General information** | **X20DO4623** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Outputs | Yes, with status LED |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.52 W |
| I/O internal | - |
| I/O external | 0.38 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DO4623** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO4623** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO4623** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB32 separately |
| | Order bus module 1x X20BM12 separately |

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| DO 3 | DO 4 |
| N | N |
| N | N |
| L | L |
| N | N |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB32 | X20 terminal block, 12-pin, 240 V coded | 🕮 95 |
| X20BM12 | X20 bus module, 240 V coded, internal I/O supply is interconnected | 🕮 89 |

# Digital output module
# DO6321

- 6 digital outputs
- Sink connection
- 2-wire connection
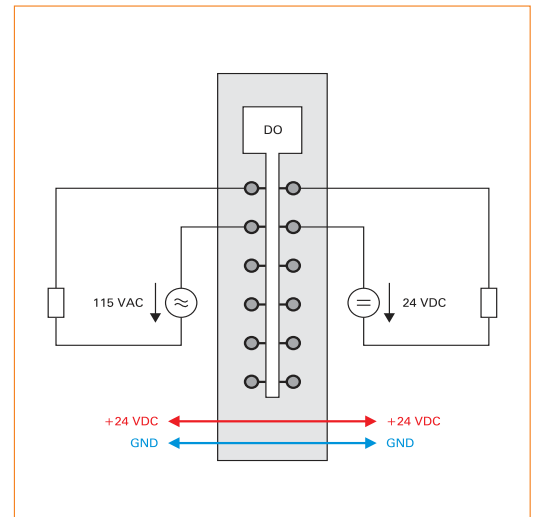- 24 VDC for signal supply
- Integrated output protection
- 1-line connection with 6-pin terminal block

| Short description | X20DO6321 |
|---|---|
| I/O module | Six 24 VDC digital outputs for 1 or 2-wire connections |
| **Digital outputs** | **X20DO6321** |
| Rated voltage | 24 VDC |
| Rated output current | 0.5 A |
| Total current | 3.0 A |
| Connection type | 1 or 2 line connection |
| Output circuit | Sink |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| **General information** | **X20DO6321** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.2 W |
|   I/O internal | 0.59 W |
| Certification | CE, C-UL-US, GOST-R, BG-PRÜFZERT [1] |
| 1) Operating principle checked: Shutdown initiated by external safety switching device | |
| **Operational conditions** | **X20DO6321** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO6321** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO6321** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The X20 6-pin terminal block can be used for universal 1-line wiring. Two-line wiring can be implemented using the 12-pin terminal block.*

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| DO 3 | DO 4 |
| DO 5 | DO 6 |
| +24 VDC | +24 VDC |
| +24 VDC | +24 VDC |
| +24 VDC | +24 VDC |

## Connection example



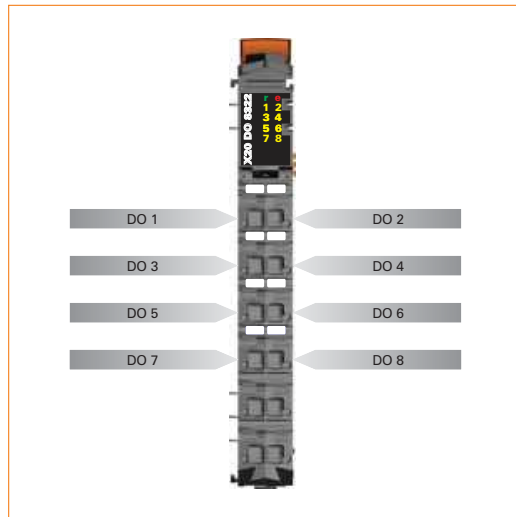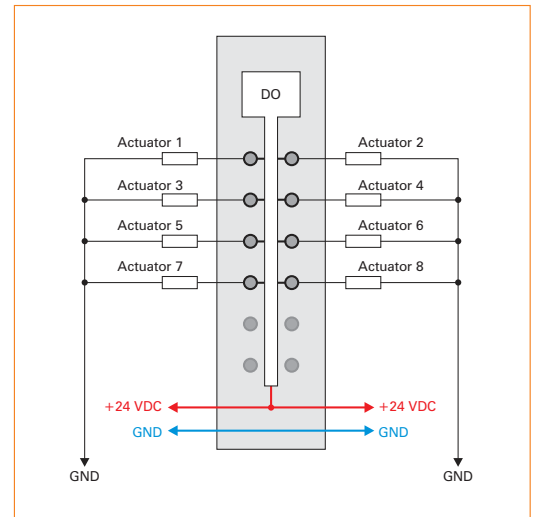| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 📄 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📄 88 |

# Digital output module
# DO6322



- 6 digital outputs
- Source connection
- 2-wire connection
- GND for signal supply
- Integrated output protection
- 1-line connection with 6-pin terminal block

| Short description | X20DO6322 |
|---|---|
| I/O module | Six 24 VDC digital outputs for 1 or 2-wire connections |
| **Digital outputs** | **X20DO6322** |
| Rated voltage | 24 VDC |
| Rated output current | 0.5 A |
| Total current | 3.0 A |
| Connection type | 1 or 2 line connection |
| Output circuit | Source |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| **General information** | **X20DO6322** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.18 W |
|    I/O internal | 0.71 W |
| Certification | CE, C-UL-US, GOST-R, BG-PRÜFZERT [1] |

1) Operating principle checked: Shutdown initiated by external safety switching device

| **Operational conditions** | **X20DO6322** |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO6322** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO6322** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The X20 6-pin terminal block can be used for universal 1-line wiring.*
*Two-line wiring can be implemented using the 12-pin terminal block.*

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| DO 3 | DO 4 |
| DO 5 | DO 6 |
| GND | GND |
| GND | GND |
| GND | GND |

## Connection example
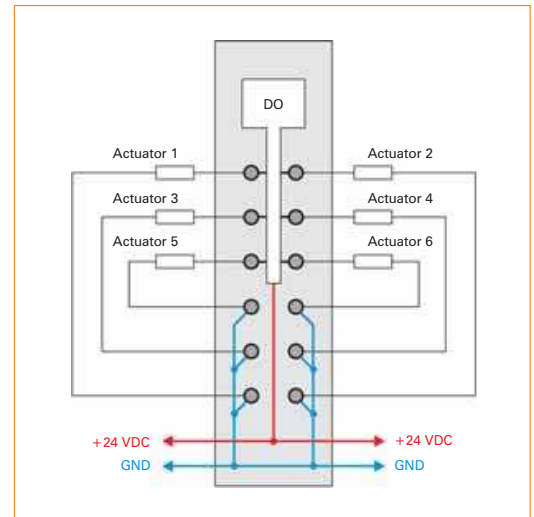


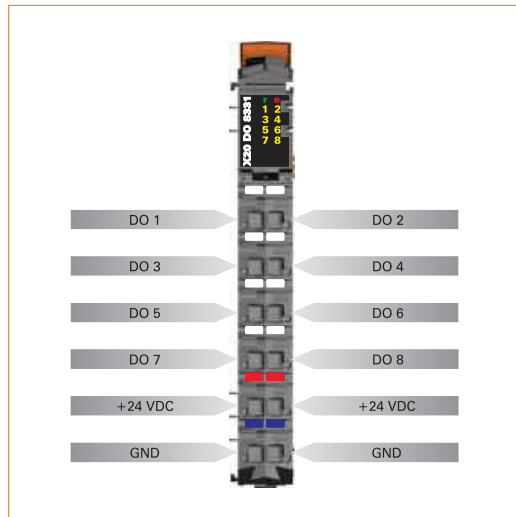| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 🗎 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

# Digital output module
# DO6529

- 6 digital outputs
- Relay module for 115 VAC
- 6 normally open contact
- Outputs single channel isolated

| Short description | X20DO6529 |
|---|---|
| I/O module | 6 digital outputs 30 VDC / 115 VAC, outputs are single-channel isolated |
| **Digital outputs** | **X20DO6529** |
| Design | Relay / N.O. |
| | Channels are single-channel isolated |
| Rated voltage | 30 VDC / 115 VAC |
| Rated frequency | DC / 45 to 63 Hz |
| Rated output current | 1.0 A at 30 VDC / 0.5 A at 115 VAC |
| Total current | 6.0 A at 30 VDC / 3.0 A at 115 VAC |
| Switching capacity | |
| Minimum | 0.01 mA / 10 mV DC |
| Maximum | 30 W / 62.5 VA |
| Actuator supply | External |
| **General information** | **X20DO6529** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Outputs | Yes, with status LED |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | Yes |
| Power consumption | |
| Bus | 1.1 W |
| I/O internal | - |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DO6529** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO6529** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO6529** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| NO 1 | NO 2 |
| COM 1 | COM 2 |
| NO 3 | NO 4 |
| COM 3 | COM 4 |
| NO 5 | NO 6 |
| COM 5 | COM 6 |
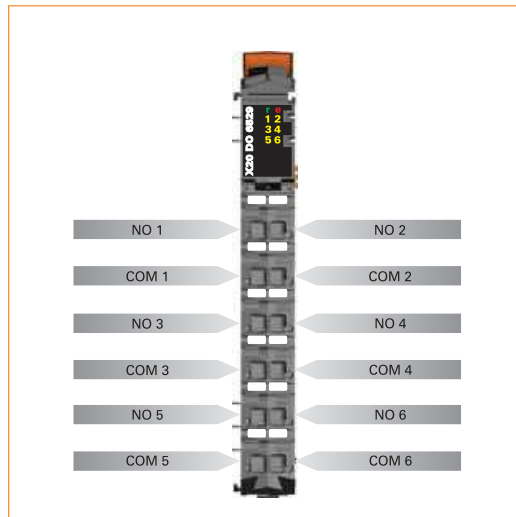
## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📖 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📖 88 |

# Digital output module
# DO8322

- 8 digital outputs
- Source connection
- 1-wire connection
- Integrated output protection

| Short description | X20DO8322 |
|---|---|
| I/O module | Eight 24 VDC digital outputs for 1-wire connections |
| **Digital outputs** | **X20DO8322** |
| Rated voltage | 24 VDC |
| Rated output current | 0.5 A |
| Total current | 4.0 A |
| Connection type | 1-line connections |
| Output circuit | Source |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| **General information** | **X20DO8322** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.26 W |
|    I/O internal | 0.8 W |
| Certification | CE, C-UL-US in preparation, GOST-R, BG-PRÜFZERT [1] |
| 1) Operating principle checked: Shutdown initiated by external safety switching device | |
| **Operational conditions** | **X20DO8322** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO8322** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO8322** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| DO 3 | DO 4 |
| DO 5 | DO 6 |
| DO 7 | DO 8 |

## Connection example



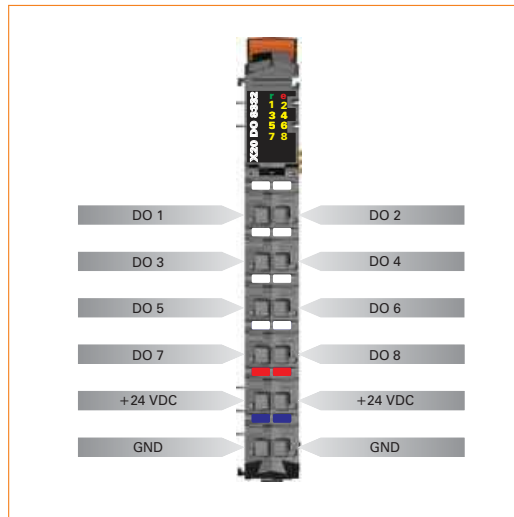| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📖 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📖 88 |

# Digital output module
# DO8331



- 8 digital outputs with 2 A
- Sink connection
- 1-wire connection
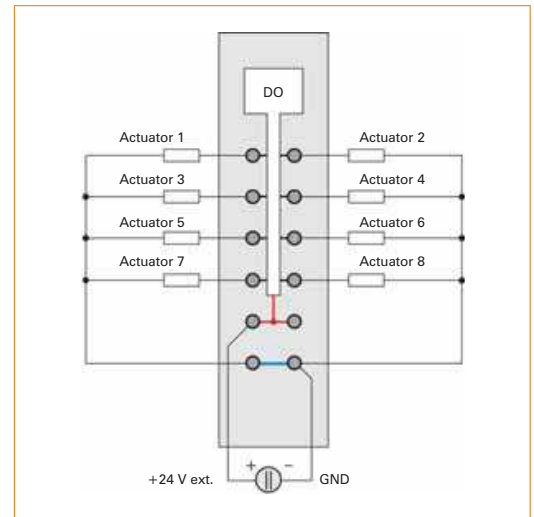- Power supply integrated in the module integrated
- Integrated output protection

| Short description | X20DO8331 |
| --- | --- |
| I/O module | Eight 24 VDC digital outputs for 1-wire connections |
| **Digital outputs** | **X20DO8331** |
| Rated voltage | 24 VDC |
| Rated output current | 2.0 A |
| Total current | 8.0 A |
| Connection type | 1-line connections |
| Output circuit | Sink |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances, reverse polarity protection for supply voltage |
| Additional functions for outputs | To increase the output current, outputs can be switched in parallel |
| **General information** | **X20DO8331** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Outputs | Yes, with status LED and software status (output error status) |
|   Supply voltage monitoring | Yes, with software status |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.22 W |
|   I/O internal | – |
|   I/O external | 0.9 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DO8331** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO8331** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO8331** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The output supply is fed directly to the module. An additional supply module is not needed. There is no connection between the module and the I/O supply potential on the bus module.*

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| DO 3 | DO 4 |
| DO 5 | DO 6 |
| DO 7 | DO 8 |
| +24 VDC | +24 VDC |
| GND | GND |

## Connection example



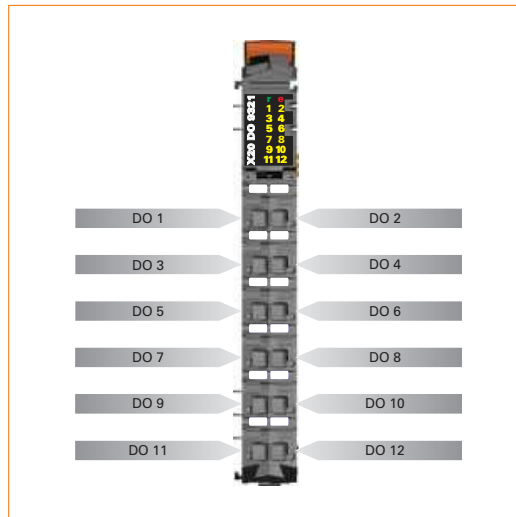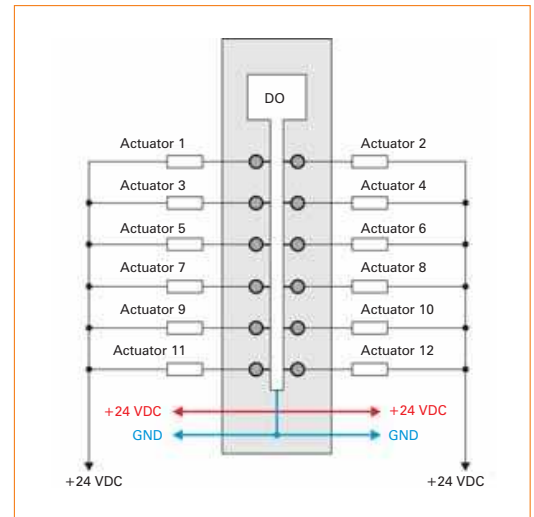| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Digital output module
# DO8332



- 8 digital outputs with 2 A
- source connection
- 1-wire connection
- Power supply integrated in the module integrated
- Integrated output protection

| Short description | X20DO8332 |
|---|---|
| I/O module | Eight 24 VDC digital outputs for 1-wire connections |
| **Digital outputs** | **X20DO8332** |
| Rated voltage | 24 VDC |
| Rated output current | 2.0 A |
| Total current | 8.0 A |
| Connection type | 1-line connections |
| Output circuit | Source |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances, reverse polarity protection for supply voltage |
| Additional functions for outputs | To increase the output current, outputs can be switched in parallel |
| **General information** | **X20DO8332** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Outputs | Yes, with status LED and software status (output error status) |
|    Supply voltage monitoring | Yes, with software status |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.22 W |
|    I/O internal | – |
|    I/O external | 0.92 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DO8332** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO8332** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO8332** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The output supply is fed directly to the module. An additional supply module is not needed. There is no connection between the module and the I/O supply potential on the bus module.*

## Pin assignments



DO 1     DO 2
DO 3     DO 4
DO 5     DO 6
DO 7     DO 8
+24 VDC     +24 VDC
GND     GND

## Connection example



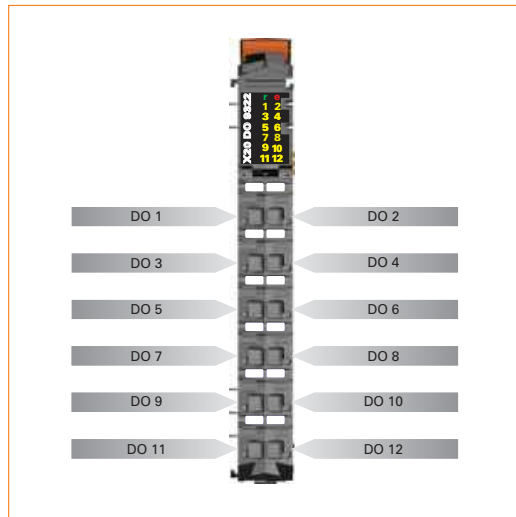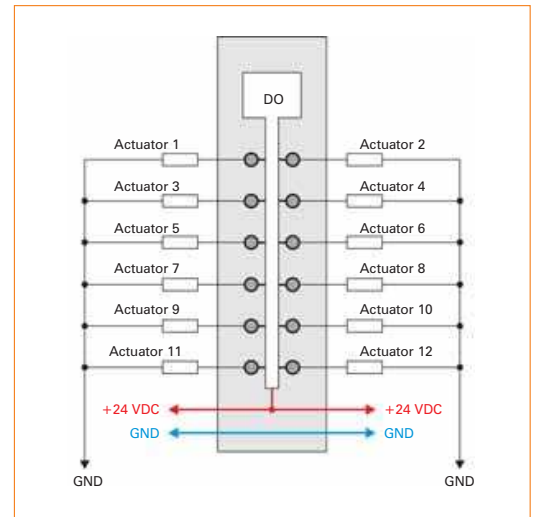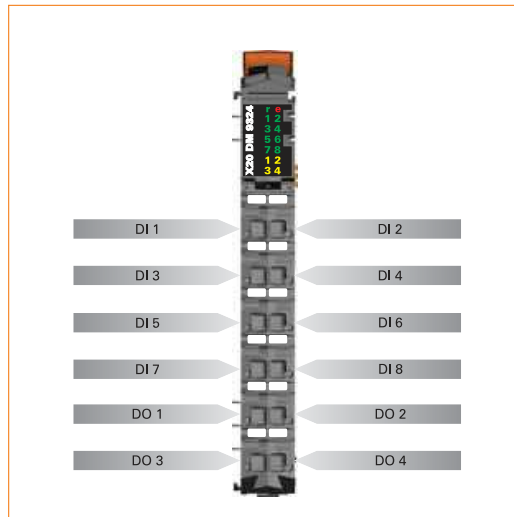| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

# Digital output module
# DO9321



- 12 digital outputs
- Sink connection
- 1-wire connection
- Integrated output protection

| Short description | X20DO9321 |
|---|---|
| I/O module | Twelve 24 VDC digital outputs for 1-wire connections |
| **Digital outputs** | **X20DO9321** |
| Rated voltage | 24 VDC |
| Rated output current | 0.5 A |
| Total current | 6.0 A |
| Connection type | 1-line connections |
| Output circuit | Sink |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| **General information** | **X20DO9321** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.26 W |
|   I/O internal | 0.99 W |
| Certification | CE, C-UL-US, GOST-R, BG-PRÜFZERT [1] |

1) Operating principle checked: Shutdown initiated by external safety switching device

| **Operational conditions** | **X20DO9321** |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO9321** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO9321** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| DO 3 | DO 4 |
| DO 5 | DO 6 |
| DO 7 | DO 8 |
| DO 9 | DO 10 |
| DO 11 | DO 12 |

## Connection example



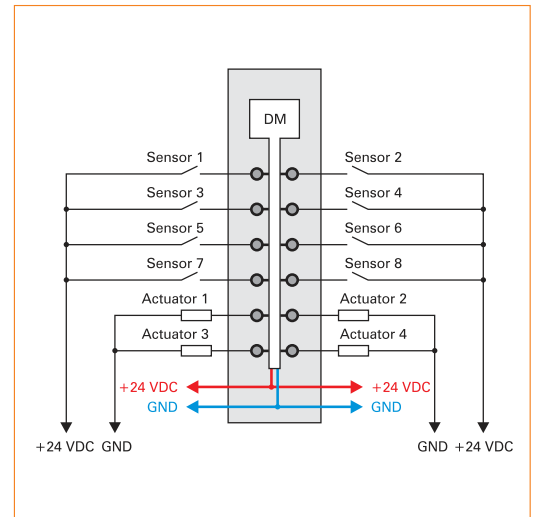| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📄 88 |

# Digital output module
# DO9322



- 12 digital outputs
- Source connection
- 1-wire connection
- Integrated output protection

| Short description | X20DO9322 |
|---|---|
| I/O module | Twelve 24 VDC digital outputs for 1-wire connections |
| **Digital outputs** | **X20DO9322** |
| Rated voltage | 24 VDC |
| Rated output current | 0.5 A |
| Total current | 6.0 A |
| Connection type | 1-line connections |
| Output circuit | Source |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| **General information** | **X20DO9322** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.26 W |
|   I/O internal | 1.15 W |
| Certification | CE, C-UL-US, GOST-R, BG-PRÜFZERT [1] |

1) Operating principle checked: Shutdown initiated by external safety switching device

| Operational conditions | X20DO9322 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DO9322** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DO9322** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | | | |
|---|---|---|---|
| DO 1 | | DO 2 | |
| DO 3 | | DO 4 | |
| DO 5 | | DO 6 | |
| DO 7 | | DO 8 | |
| DO 9 | | DO 10 | |
| DO 11 | | DO 12 | |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

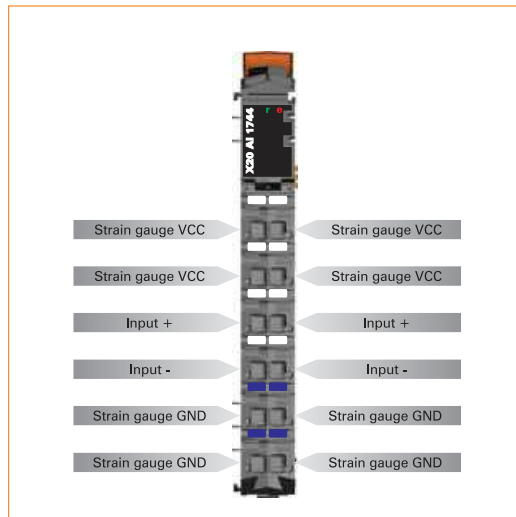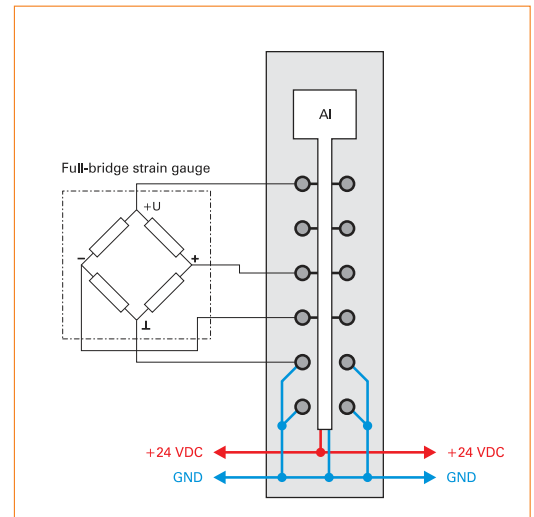# Digital mixed module
# DM9324



- 8 digital inputs,
  sink connection
- 4 digital outputs,
  source connection
- 1-wire connection
- Software input filter can be
  configured for the entire module
- Integrated output protection

| Short description | X20DM9324 |
|---|---|
| I/O module | Eight 24 VDC digital inputs for 1-wire connections, four 24 VDC digital outputs for 1-wire connections |
| Rated voltage | 24 VDC |
| **Digital inputs** | **X20DM9324** |
| Input filter | |
|    Hardware | ≤100 µs |
|    Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals |
| Connection type | 1-line connections |
| Input circuit | Sink |
| **Digital outputs** | **X20DM9324** |
| Rated output current | 0.5 A |
| Total current | 2.0 A |
| Connection type | 1-line connections |
| Output circuit | Source |
| Output protection | Thermal cutoff for overcurrent or short circuit, integrated protection for switching inductances |
| **General information** | **X20DM9324** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.21 W |
|    I/O internal | 0.5 W |
|    I/O external | 1.17 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DM9324** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DM9324** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DM9324** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DI 1 | DI 2 |
| DI 3 | DI 4 |
| DI 5 | DI 6 |
| DI 7 | DI 8 |
| DO 1 | DO 2 |
| DO 3 | DO 4 |

## Connection example



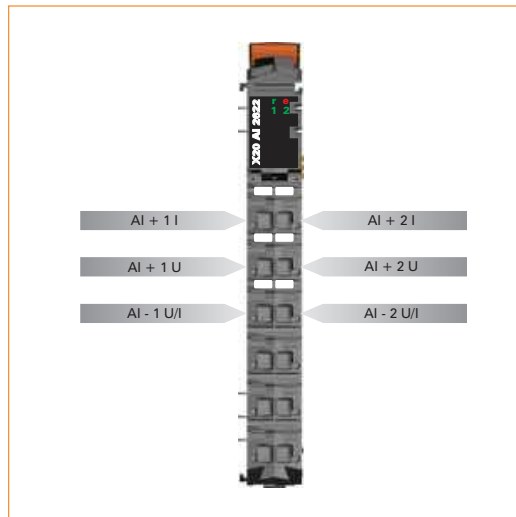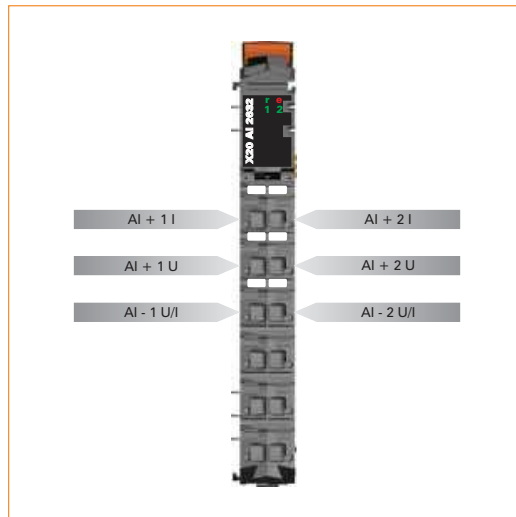| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📖 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📖 88 |

# Analog input module
# AI1744



- 1 full-bridge strain gauge input
- Advanced filter functions
- Data output rate up to 7.5 kHz

| Short description | X20AI1744 |
|---|---|
| I/O module | 1 full-bridge strain gauge input |
| **Full-bridge strain gauge** | **X20AI1744** |
| Measurement area | ±2 to ±16 mV/V, set using software |
| Digital converter resolution | 24-bit |
| Data output rate | 2.5 - 7500 scans per second, can be set using software |
| Operating range / measurement sensor | 85 to 5000 Ω |
| Bridge voltage | 5.5 VDC / max. 65 mA |
| Short circuit, overload protection | Yes |
| Connection | 4-wire connection |
| **General information** | **X20AI1744** |
| Status indicators | Channel status, operating status, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Input | Yes, with status LED and software status |
| Wire break | Yes, with software status |
| Electrical isolation | |
| Bus - Analog input | Yes |
| Bus - Bridge supply voltage | Yes |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 1.25 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20AI1744** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20AI1744** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20AI1744** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| Strain gauge VCC | Strain gauge VCC |
| Strain gauge VCC | Strain gauge VCC |
| Input + | Input + |
| Input - | Input - |
| Strain gauge GND | Strain gauge GND |
| Strain gauge GND | Strain gauge GND |

## Connection example



Full-bridge strain gauge

AI

+U

+24 VDC     +24 VDC
GND     GND

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 88 |

# Analog input module
# AI2622



- 2 analog inputs
- Either current or voltage signal
- 13-bit digital converter resolution

| Short description | X20AI2622 | |
|---|---|---|
| I/O module | 2 analog inputs ± 10 V or 0 to 20 mA / 4 to 20 mA | |
| **Analog inputs** | **Voltage** | **Current** |
| Input | ±10 V or 0 to 20 mA/4 to 20 mA, using different connection terminal points | |
| Input type | Differential input | |
| Digital converter resolution | ±12-bit | 12-bit |
| Conversion time | 300 $\mu$s for all inputs | |
| Output format | UINT | |
| Input impedance in signal range | 20 MΩ | - |
| Load | - | < 400 Ω |
| Maximum error at 25°C | | |
|   Gain | 0.08% [1] | 0 to 20 mA = 0.08% [1] / 4 to 20 mA = 0.1% [1] |
|   Offset | 0.015% [2] | 0 to 20 mA = 0.03% [3] / 4 to 20 mA = 0.0375% [3] |
| Input protection | Protection against wiring with supply voltage | |

1) Based on the current measurement value.
2) Refers to the 20 V measurement range.
3) Refers to the 20 mA measurement range.

| General information | X20AI2622 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Inputs | Yes, with status LED and software status |
|   Channel type | Yes, with software status |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 0.8 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20AI2622 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20AI2622 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20AI2622 |
|---|---|
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

## Pin assignments



| | |
|---|---|
| AI + 1 I | AI + 2 I |
| AI + 1 U | AI + 2 U |
| AI - 1 U/I | AI - 2 U/I |

## Connection example



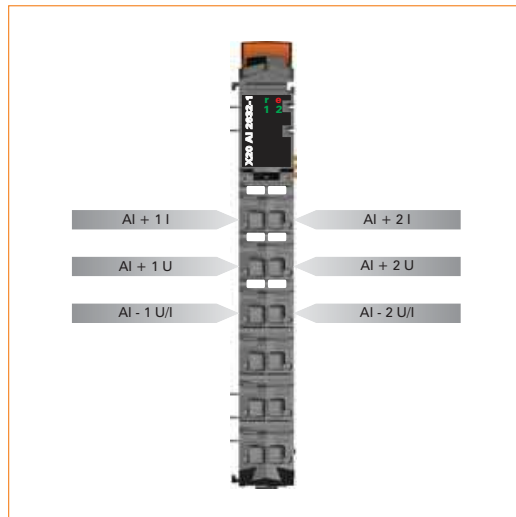| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 🗎 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

# Analog input module
# AI2632



- 2 analog inputs
- Either current or voltage signal
- 16-bit digital converter resolution
- Simultaneous input conversion
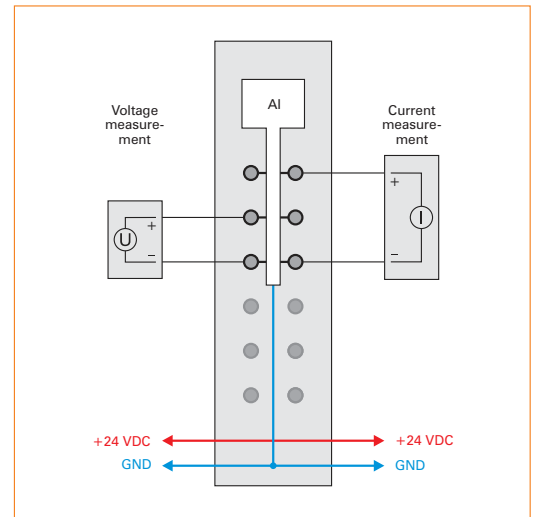- Very fast conversion time

| Short description | X20AI2632 | |
|---|---|---|
| I/O module | 2 analog inputs, ±10 V or 0 to 20 mA | |
| **Analog inputs** | **Voltage** | **Current** |
| Input | ±10 V or 0 to 20 mA, using different connection terminal points | |
| Input type | Differential input | |
| Digital converter resolution | ±15-bit | 15-bit |
| Conversion time | 50 µs for all inputs | |
| Output format | UINT | |
| Input impedance in signal range | 20 MΩ | - |
| Load | - | < 400 Ω |
| Maximum error at 25℃ | | |
|   Gain | 0.08% [1] | 0.08% [1] |
|   Offset | 0.01% [2] | 0.02% [3] |
| Input protection | Protection against wiring with supply voltage | |

[1] Based on the current measurement value.
[2] Refers to the 20 V measurement range.
[3] Refers to the 20 mA measurement range.

| General information | X20AI2632 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Inputs | Yes, with status LED and software status |
|   Channel type | Yes, with software status |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 1.2 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20AI2632 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0℃ to +55℃ |
|   Vertical installation | 0℃ to +50℃ |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5℃ per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20AI2632 |
|---|---|
| Temperature | -25℃ to +70℃ |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20AI2632 |
|---|---|
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

## Pin assignments



AI + 1 I

AI + 1 U

AI - 1 U/I

AI + 2 I

AI + 2 U

AI - 2 U/I

## Connection example



Voltage measure-ment

AI

Current measure-ment

U  +  −

I  +  −

+24 VDC

GND

+24 VDC

GND
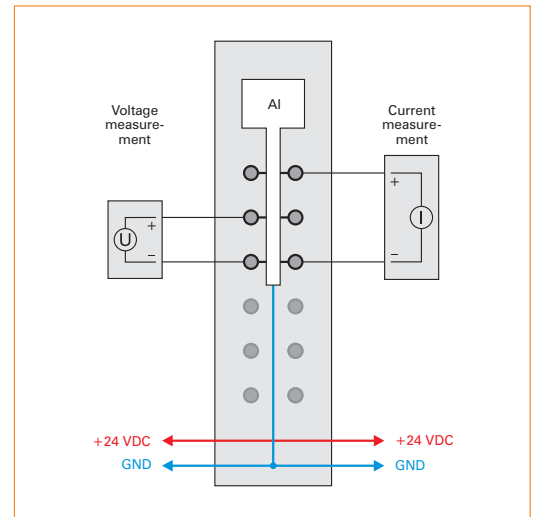
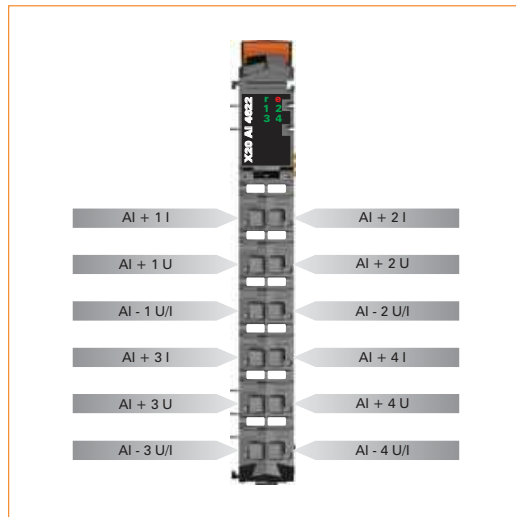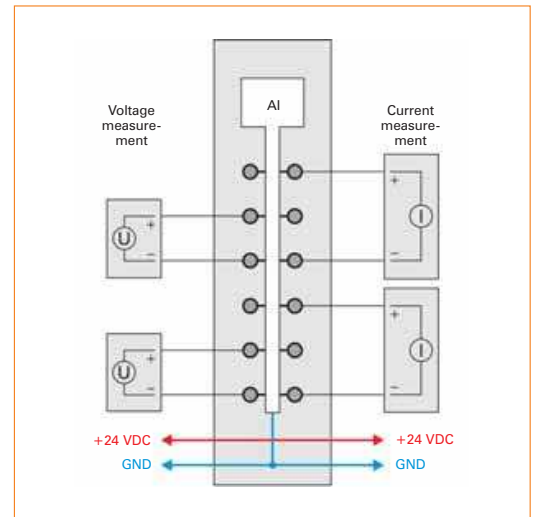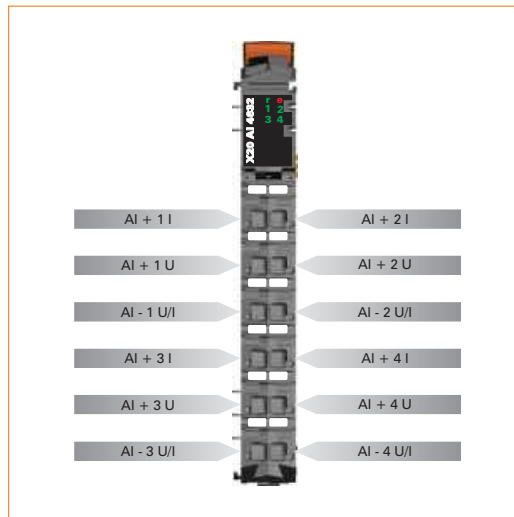| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 📄 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📄 88 |

# Analog input module
# AI2632-1



- 2 analog inputs
- Either current or voltage signal
- 16-bit digital converter resolution
- Simultaneous input conversion
- Very fast conversion time

| Short description | X20AI2632-1 | |
|---|---|---|
| I/O module | 2 analog inputs, ±11 V or 0 to 22 mA | |
| **Analog inputs** | **Voltage** | **Current** |
| Input | ±11 V or 0 to 22 mA, using different connection terminal points | |
| Input type | Differential input | |
| Digital converter resolution | ±15-bit | 15-bit |
| Conversion time | 50 µs for all inputs | |
| Output format | UINT | |
| Input impedance in signal range | 20 MΩ | - |
| Load | - | < 400 Ω |
| Maximum error at 25℃ | | |
|   Gain | 0.08% [1] | 0.08% [1] |
|   Offset | 0.01% [2] | 0.02% [3] |
| Input protection | Protection against wiring with supply voltage | |

[1] Based on the current measurement value.
[2] Refers to the 22 V measurement range.
[3] Refers to the 22 mA measurement range.

| General information | X20AI2632-1 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Inputs | Yes, with status LED and software status |
|   Channel type | Yes, with software status |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 1.2 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20AI2632-1 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0℃ to +55℃ |
|   Vertical installation | 0℃ to +50℃ |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5℃ per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20AI2632-1 |
|---|---|
| Temperature | -25℃ to +70℃ |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20AI2632-1 |
|---|---|
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

## Pin assignments



| | |
|---|---|
| AI + 1 I | AI + 2 I |
| AI + 1 U | AI + 2 U |
| AI - 1 U/I | AI - 2 U/I |

## Connection example



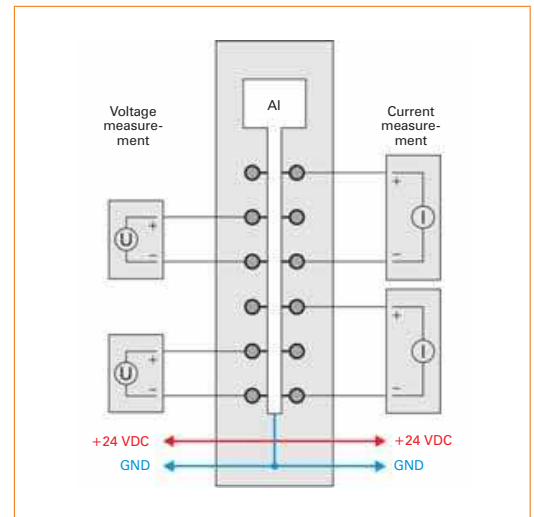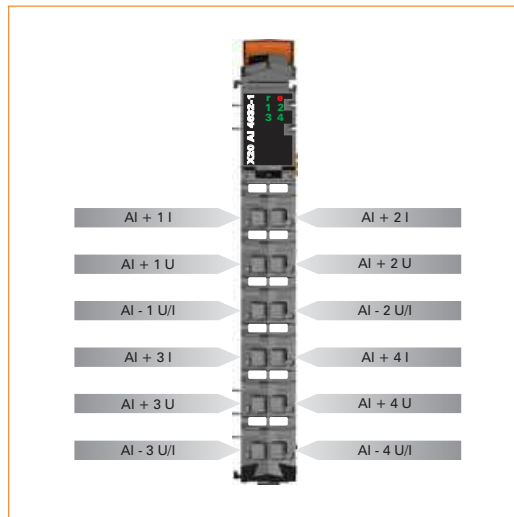| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 📄 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📄 88 |

# Analog input module
# AI4622

| Short description | X20AI4622 | |
|---|---|---|
| I/O module | 4 analog inputs ± 10 V or 0 to 20 mA / 4 to 20 mA | |
| **Analog inputs** | **Voltage** | **Current** |
| Input | ±10 V or 0 to 20 mA/4 to 20 mA, using different connection terminal points | |
| Input type | Differential input | |
| Digital converter resolution | ±12-bit | 12-bit |
| Conversion time | 400 $\mu$s for all inputs | |
| Output format | UINT | |
| Input impedance in signal range | 20 MΩ | - |
| Load | - | < 400 Ω |
| Maximum error at 25℃ | | |
|   Gain | 0.08% [1] | 0 to 20 mA = 0.08% [1] / 4 to 20 mA = 0.1% [1] |
|   Offset | 0.015% [2] | 0 to 20 mA = 0.03% [3] / 4 to 20 mA = 0.0375% [3] |
| Input protection | Protection against wiring with supply voltage | |

1) Based on the current measurement value.
2) Refers to the 20 V measurement range.
3) Refers to the 20 mA measurement range.

| General information | X20AI4622 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Inputs | Yes, with status LED and software status |
|   Channel type | Yes, with software status |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 1.1 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20AI4622 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0℃ to +55℃ |
|   Vertical installation | 0℃ to +50℃ |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5℃ per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20AI4622 |
|---|---|
| Temperature | -25℃ to +70℃ |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20AI4622 |
|---|---|
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

- 4 analog inputs
- Either current or voltage signal
- 13-bit digital converter resolution

## Pin assignments



| | |
|---|---|
| AI + 1 I | AI + 2 I |
| AI + 1 U | AI + 2 U |
| AI - 1 U/I | AI - 2 U/I |
| AI + 3 I | AI + 4 I |
| AI + 3 U | AI + 4 U |
| AI - 3 U/I | AI - 4 U/I |

## Connection example



Voltage measurement
AI
Current measurement

+24 VDC → ← +24 VDC
GND ← → GND

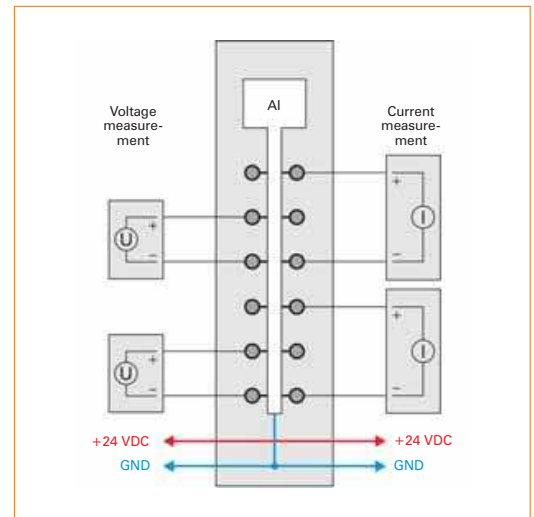| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🕮 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🕮 88 |

# Analog input module
# AI4632



- 4 analog inputs
- Either current or voltage signal
- 16-bit digital converter resolution
- Simultaneous conversion of the inputs
- Very fast conversion time

| Short description | X20AI4632 | |
|---|---|---|
| I/O module | 4 analog inputs, ±10 V or 0 to 20 mA | |
| **Analog inputs** | **Voltage** | **Current** |
| Input | ±10 V or 0 to 20 mA, using different connection terminal points | |
| Input type | Differential input | |
| Digital converter resolution | ±15-bit | 15-bit |
| Conversion time | 50 $\mu$s for all inputs | |
| Output format | UINT | |
| Input impedance in signal range | 20 MΩ | - |
| Load | - | < 400 Ω |
| Maximum error at 25℃ | | |
|   Gain | 0.08% [1] | 0.08% [1] |
|   Offset | 0.01% [2] | 0.02% [3] |
| Input protection | Protection against wiring with supply voltage | |

[1] Based on the current measurement value.

[2] Refers to the 20 V measurement range.

[3] Refers to the 20 mA measurement range.

| General information | X20AI4632 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Inputs | Yes, with status LED and software status |
|   Channel type | Yes, with software status |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20AI4632 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0℃ to +55℃ |
|   Vertical installation | 0℃ to +50℃ |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5℃ per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20AI4632 |
|---|---|
| Temperature | -25℃ to +70℃ |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20AI4632 |
|---|---|
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| AI + 1 I | AI + 2 I |
| AI + 1 U | AI + 2 U |
| AI - 1 U/I | AI - 2 U/I |
| AI + 3 I | AI + 4 I |
| AI + 3 U | AI + 4 U |
| AI - 3 U/I | AI - 4 U/I |

## Connection example



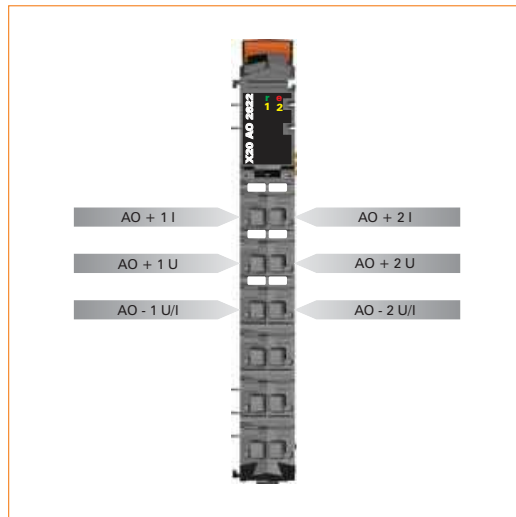| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

# Analog input module
# AI4632-1

- 4 analog inputs
- Either current or voltage signal
- 16-bit digital converter resolution
- Simultaneous conversion of the inputs
- Very fast conversion time

| Short description | X20AI4632-1 | |
|---|---|---|
| I/O module | 4 analog inputs, ±11 V or 0 to 22 mA | |
| **Analog inputs** | **Voltage** | **Current** |
| Input | ±11 V or 0 to 22 mA, using different connection terminal points | |
| Input type | Differential input | |
| Digital converter resolution | ±15-bit | 15-bit |
| Conversion time | 50 µs for all inputs | |
| Output format | UINT | |
| Input impedance in signal range | 20 MΩ | - |
| Load | - | < 400 Ω |
| Maximum error at 25℃ | | |
|   Gain | 0.08% [1] | 0.08% [1] |
|   Offset | 0.01% [2] | 0.02% [3] |
| Input protection | Protection against wiring with supply voltage | |

1) Based on the current measurement value.
2) Refers to the 22 V measurement range.
3) Refers to the 22 mA measurement range.

| General information | X20AI4632-1 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Inputs | Yes, with status LED and software status |
|   Channel type | Yes, with software status |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20AI4632-1 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0℃ to +55℃ |
|   Vertical installation | 0℃ to +50℃ |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5℃ per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20AI4632-1 |
|---|---|
| Temperature | -25℃ to +70℃ |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20AI4632-1 |
|---|---|
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| AI + 1 I | AI + 2 I |
| AI + 1 U | AI + 2 U |
| AI - 1 U/I | AI - 2 U/I |
| AI + 3 I | AI + 4 I |
| AI + 3 U | AI + 4 U |
| AI - 3 U/I | AI - 4 U/I |

## Connection example



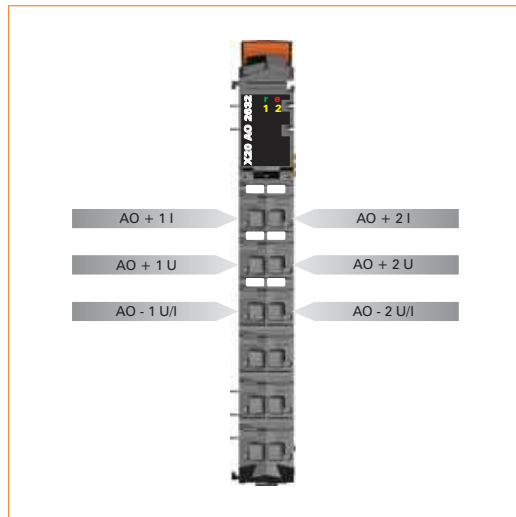| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🖺 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🖺 88 |

# Analog output module
# AO2622

- 2 analog outputs
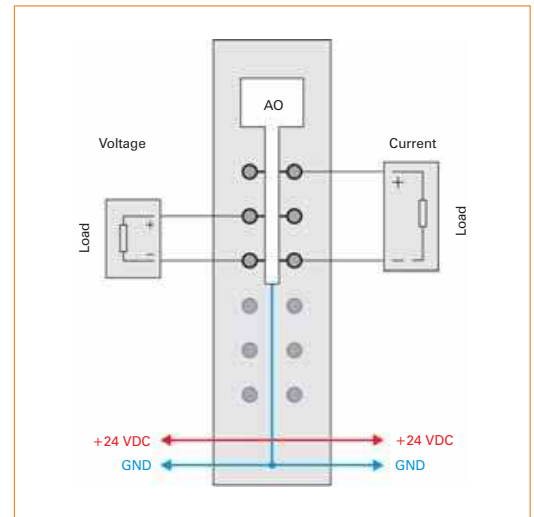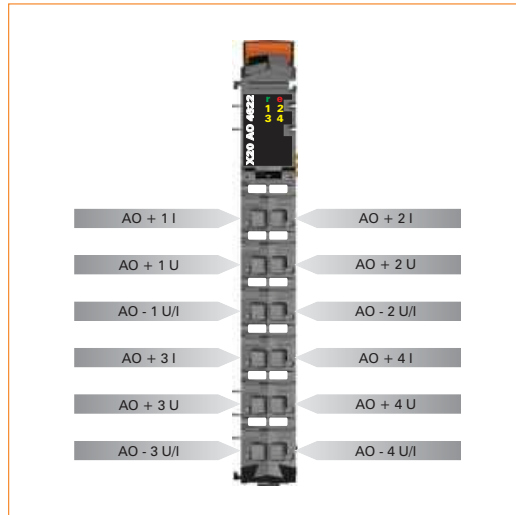- Either current or voltage signal
- 12-bit digital converter resolution

| Short description | X20AO2622 |
|---|---|
| I/O module | 2 analog outputs, ±10 V or 0 to 20 mA |
| **Analog outputs** | **X20AO2622** |
| Output | ±10 V or 0 to 20 mA, using different connection terminal points |
| Digital converter resolution | 12-bit |
| Conversion time | 200 $\mu$s for all outputs |
| Power on/off behavior | Internal enable relay for boot procedure and errors |
| Maximum error at 25°C | |
| Gain | 0.15%, based on the current output value |
| Offset | 0.05%, based on the entire output range |
| Output protection | Short circuit protection |
| **General information** | **X20AO2622** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Channel type | Yes, with software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 1.1 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20AO2622** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20AO2622** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20AO2622** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

## Pin assignments



| | |
|---|---|
| AO + 1 I | AO + 2 I |
| AO + 1 U | AO + 2 U |
| AO - 1 U/I | AO - 2 U/I |

## Connection example
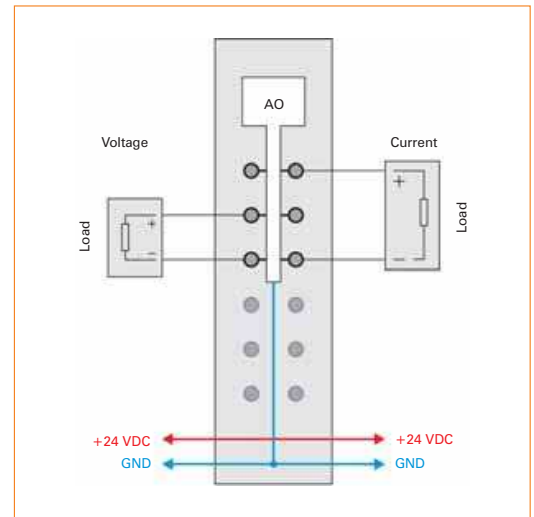


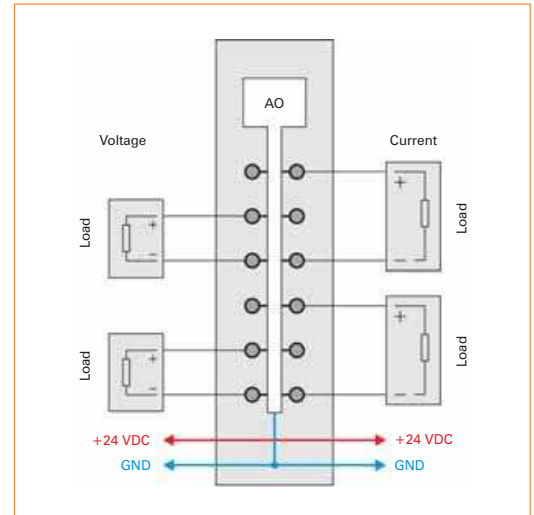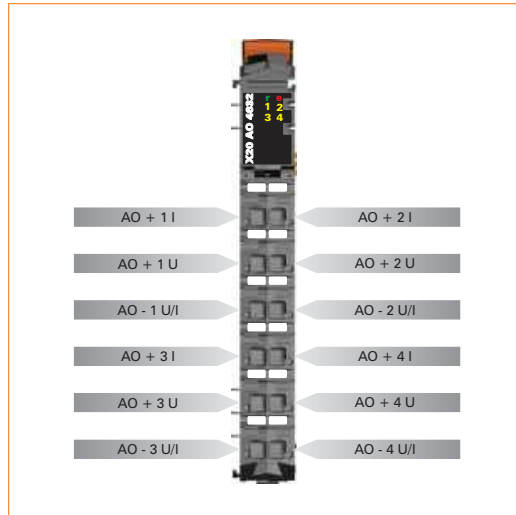| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 🔖 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🔖 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🔖 88 |

# Analog output module
# AO2632

- 2 analog outputs
- Either current or voltage signal
- 16-bit digital converter resolution

| Short description | X20AO2632 | |
|---|---|---|
| I/O module | 2 analog outputs, ±10 V or 0 to 20 mA | |
| **Analog outputs** | **X20AO2632** | |
| Output | ±10 V or 0 to 20 mA, using different connection terminal points | |
| Digital converter resolution | 16-bit | |
| Conversion time | 50 $\mu$s for all outputs | |
| Power on/off behavior | Internal enable relay for boot procedure and errors | |
| Maximum error at 25°C | | |
|    Gain | 0.045%, based on the current output value | |
|    Offset | 0.025%, based on the entire output range | |
| Output protection | Short circuit protection | |
| **General information** | **X20AO2632** | |
| Status indicators | I/O function per channel, operating state, module status | |
| Diagnostics | | |
|    Module run/error | Yes, with status LED and software status | |
|    Channel type | Yes, with software status | |
| Electrical isolation | | |
|    Channel - Bus | Yes | |
|    Channel - Channel | No | |
| Power consumption | Rev. <B0 | Rev. ≥B0 |
|    Bus | 0.01 W | 0.01 W |
|    I/O internal | 1.6 W | 1.2 W |
| Certification | CE, C-UL-US, GOST-R | |
| **Operational conditions** | **X20AO2632** | |
| Operating temperature | Rev. <B0 | Rev. ≥B0 |
|    Horizontal installation | 0°C to +50°C | 0°C to +55°C |
|    Vertical installation | 0°C to +45°C | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing | |
| Mounting orientation | Horizontal or vertical | |
| Installation at altitudes above sea level | | |
|    0 - 2000 m | No derating | |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m | |
| Protection type | IP20 | |
| **Storage and transport conditions** | **X20AO2632** | |
| Temperature | -25°C to +70°C | |
| Relative humidity | 5 to 95%, non-condensing | |
| **Mechanical characteristics** | **X20AO2632** | |
| Spacing | 12.5 $^{+0.2}$ mm | |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately | |
| | Order bus module 1x X20BM11 separately | |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

## Pin assignments



AO + 1 I

AO + 1 U

AO - 1 U/I

AO + 2 I

AO + 2 U

AO - 2 U/I

## Connection example



AO

Voltage

Current

Load

Load

+24 VDC

GND

+24 VDC

GND

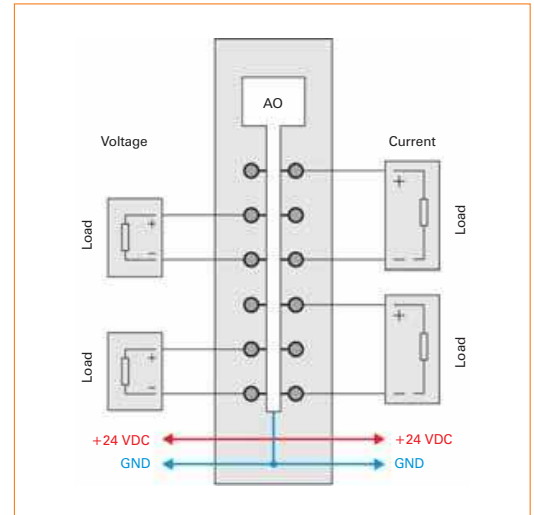| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 📄 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📄 88 |

# Analog output module
# AO4622



- 4 analog outputs
- Either current or voltage signal
- 12-bit digital converter resolution

| Short description | X20AO4622 |
|---|---|
| I/O module | 4 analog outputs, ±10 V or 0 to 20 mA |
| **Analog outputs** | **X20AO4622** |
| Output | ±10 V or 0 to 20 mA, using different connection terminal points |
| Digital converter resolution | 12-bit |
| Conversion time | 300 $\mu s$ for all outputs |
| Power on/off behavior | Internal enable relay for boot procedure and errors |
| Maximum error at 25℃ | |
|   Gain | 0.080%, based on the current output value |
|   Offset | 0.050%, based on the entire output range |
| Output protection | Short circuit protection |
| **General information** | **X20AO4622** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Channel type | Yes, with software status |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20AO4622** |
| Operating temperature [1] | |
|   Horizontal installation | 0℃ to +55℃ |
|   Vertical installation | 0℃ to +45℃ |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5℃ per 100 m |
| Protection type | IP20 |

1) See notes regarding derating and mixed operation in the module data sheet.

| Storage and transport conditions | X20AO4622 |
|---|---|
| Temperature | -25℃ to +70℃ |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20AO4622** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| AO + 1 I | AO + 2 I |
| AO + 1 U | AO + 2 U |
| AO - 1 U/I | AO - 2 U/I |
| AO + 3 I | AO + 4 I |
| AO + 3 U | AO + 4 U |
| AO - 3 U/I | AO - 4 U/I |

## Connection example



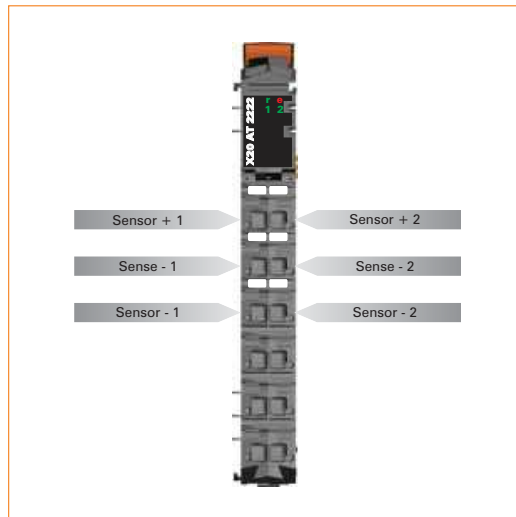| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Analog output module
# AO4632



- 4 analog outputs
- Either current or voltage signal
- 16-bit digital converter resolution

| Short description | X20AO4632 | |
|---|---|---|
| I/O module | 4 analog outputs, ±10 V or 0 to 20 mA | |
| **Analog outputs** | **X20AO4632** | |
| Output | ±10 V or 0 to 20 mA, using different connection terminal points | |
| Digital converter resolution | 16-bit | |
| Conversion time | 50 $\mu$s for all outputs | |
| Power on/off behavior | Internal enable relay for boot procedure and errors | |
| Maximum error at 25°C | | |
| Gain | 0.040%, based on the current output value | |
| Offset | 0.022%, based on the entire output range | |
| Output protection | Short circuit protection | |
| **General information** | **X20AO4632** | |
| Status indicators | I/O function per channel, operating state, module status | |
| Diagnostics | | |
| Module run/error | Yes, with status LED and software status | |
| Channel type | Yes, with software status | |
| Electrical isolation | | |
| Channel - Bus | Yes | |
| Channel - Channel | No | |
| Power consumption | Rev. <B0 | Rev. ≥B0 |
| Bus | 0.01 W | 0.01 W |
| I/O internal | 2.0 W | 1.5 W |
| Certification | CE, C-UL-US, GOST-R | |
| **Operational conditions** | **X20AO4632** | |
| Operating temperature | Rev. <B0 | Rev. ≥B0 [1] |
| Horizontal installation | 0°C to +45°C | 0°C to +55°C |
| Vertical installation | 0°C to +40°C | 0°C to +45°C |
| Relative humidity | 5 to 95%, non-condensing | |
| Mounting orientation | Horizontal or vertical | |
| Installation at altitudes above sea level | | |
| 0 - 2000 m | No derating | |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m | |
| Protection type | IP20 | |

1) See notes regarding derating and mixed operation in the module data sheet.

| Storage and transport conditions | X20AO4632 | |
|---|---|---|
| Temperature | -25°C to +70°C | |
| Relative humidity | 5 to 95%, non-condensing | |
| **Mechanical characteristics** | **X20AO4632** | |
| Spacing | 12.5 $^{+0.2}$ mm | |
| Comment | Order terminal block 1x X20TB12 separately | |
| | Order bus module 1x X20BM11 separately | |

## Pin assignments



| | |
|---|---|
| AO + 1 I | AO + 2 I |
| AO + 1 U | AO + 2 U |
| AO - 1 U/I | AO - 2 U/I |
| AO + 3 I | AO + 4 I |
| AO + 3 U | AO + 4 U |
| AO - 3 U/I | AO - 4 U/I |

## Connection example



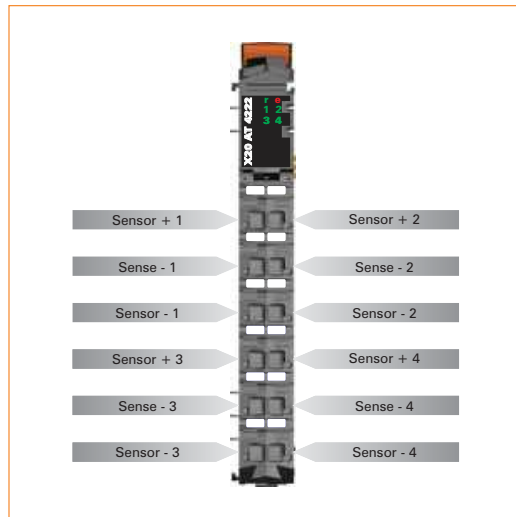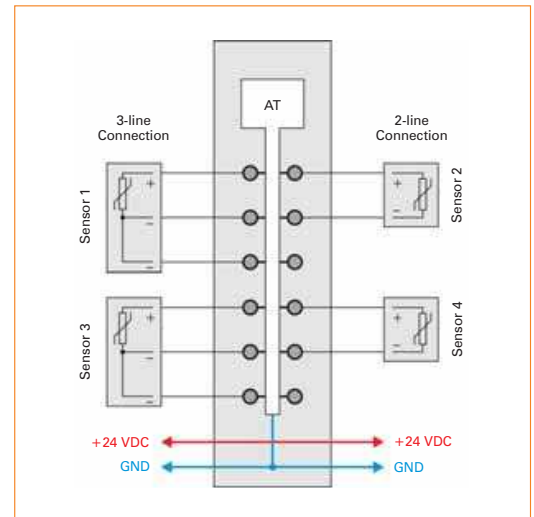| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Temperature module
# AT2222



- 2 inputs for resistance temperature measurement
- For PT100 and PT1000
- Sensor type can be be set for each channel
- Direct resistance measurement
- 2 or 3-line connection can be configured for each module
- Filter time can be configured

| Short description | X20AT2222 |
|---|---|
| I/O module | 2 inputs for PT100 or PT1000 resistance temperature measurement |
| **Temperature inputs resistance measurement** | **X20AT2222** |
| Input | Resistance measurement with constant current supply for 2 or 3-wire connections |
| Digital converter resolution | 16-bit |
| Filter time | Configurable between 1 ms and 66.7 ms |
| Conversion time | |
|   1 channel | 20 ms at 50 Hz filter |
|   2 channels | 80 ms at 50 Hz filter |
| Output format | INT or UINT for resistance measurement |
| Maximum error at 25°C | |
|   Gain | 0.037%, based on the current resistance value |
|   Offset | 0.0015%, based on the entire resistance range |
| Sensor | Can be set per channel |
|   PT100 | -200°C to +850°C |
|   PT1000 | -200°C to +850°C |
| Resistance measurement range | 0.1 Ω to 4500 Ω / 0.05 Ω to 2250 Ω |
| **General information** | **X20AT2222** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Inputs | Yes, with status LED and software status |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 1.1 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20AT2222** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20AT2222** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20AT2222** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

## Pin assignments



Sensor + 1      Sensor + 2

Sense - 1      Sense - 2

Sensor - 1      Sensor - 2

## Connection example
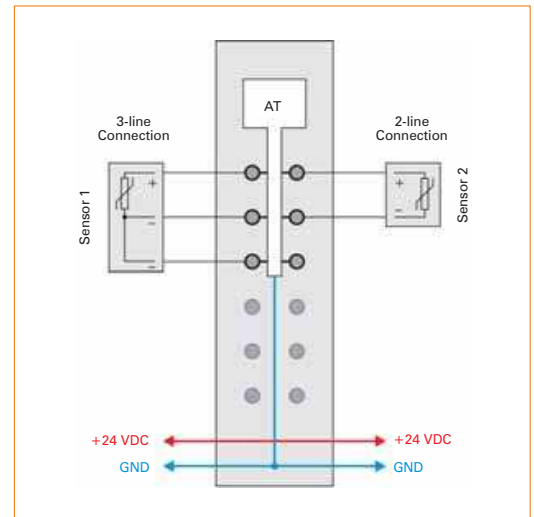


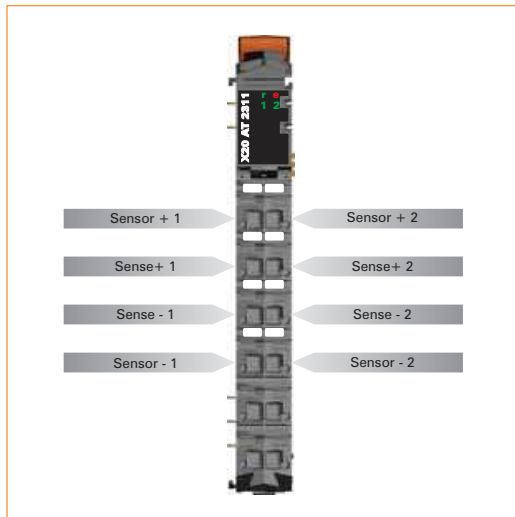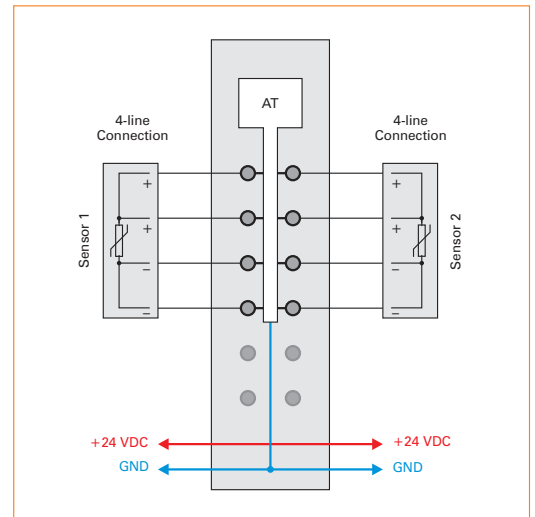| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 🖹 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🖹 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🖹 88 |

# Temperature module
# AT4222

- 4 inputs for resistance temperature measurement
- For PT100 and PT1000
- Sensor type can be be set for each channel
- Direct resistance measurement
- 2 or 3-line connection can be configured for each module
- Filter time can be configured

| Short description | X20AT4222 |
|---|---|
| I/O module | 4 inputs for PT100 or PT1000 resistance temperature measurement |
| **Temperature inputs resistance measurement** | **X20AT4222** |
| Input | Resistance measurement with constant current supply for 2 or 3-wire connections |
| Digital converter resolution | 16-bit |
| Filter time | Configurable between 1 ms and 66.7 ms |
| Conversion time | |
| 1 channel | 20 ms at 50 Hz filter |
| 2 - 4 channels | 40 ms per channel with 50 Hz filter |
| Output format | INT or UINT for resistance measurement |
| Maximum error at 25°C | |
| Gain | 0.037%, based on the current resistance value |
| Offset | 0.0015%, based on the entire resistance range |
| Sensor | Can be set per channel |
| PT100 | -200°C to +850°C |
| PT1000 | -200°C to +850°C |
| Resistance measurement range | 0.1 Ω to 4500 Ω / 0.05 Ω to 2250 Ω |
| **General information** | **X20AT4222** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Inputs | Yes, with status LED and software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 1.1 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20AT4222** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20AT4222** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20AT4222** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



Sensor + 1
Sense - 1
Sensor - 1
Sensor + 3
Sense - 3
Sensor - 3

Sensor + 2
Sense - 2
Sensor - 2
Sensor + 4
Sense - 4
Sensor - 4

## Connection example



3-line Connection

2-line Connection

AT

Sensor 1

Sensor 3

Sensor 2

Sensor 4

+24 VDC
GND

+24 VDC
GND

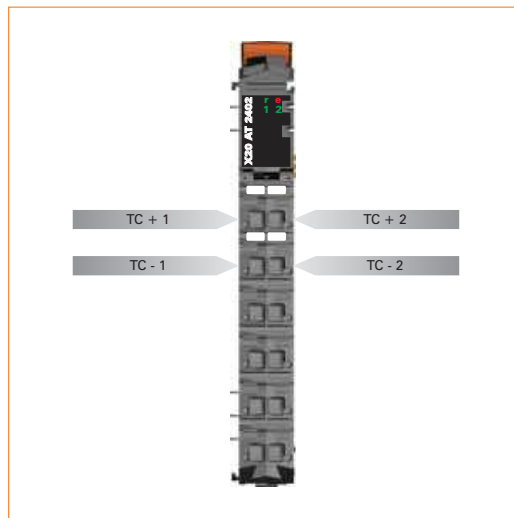| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🕮 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🕮 88 |

# Temperature module
# AT2311



- 2 inputs for resistance temperature measurement
- PT100 sensor
- Direct resistance measurement
- 4-line measurement
- Filter time can be configured

| Short description | X20AT2311 |
|---|---|
| I/O module | 2 inputs for PT100 resistance temperature measurement |
| **Temperature inputs resistance measurement** | **X20AT2311** |
| Input | Resistance measurement with constant current supply for 4 wire connection |
| Digital converter resolution | 24-bit |
| Filter time | Configurable between 1 ms and 400 ms |
| Conversion time | |
|    50 Hz filter | 20 ms for all inputs |
|    1000 Hz filter | 1 ms for all inputs |
| Output format | DINT or UDINT for resistance measurement |
| Maximum error at 25°C | |
|    Gain | 0.0059%, based on the current resistance value |
|    Offset | 0.0015%, based on the entire resistance range |
| Temperature measurement range | -200°C to +850°C |
| Resistance measurement range | 0.5 Ω to 390 Ω |
| **General information** | **X20AT2311** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Inputs | Yes, with status LED and software status |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | Yes |
| Power consumption | |
|    Bus | 0.35 W |
|    I/O internal | 0.85 W |
| Certification | CE, C-UL-US (in development), GOST-R |
| **Operational conditions** | **X20AT2311** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20AT2311** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20AT2311** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| Sensor + 1 | Sensor + 2 |
| Sense+ 1 | Sense+ 2 |
| Sense - 1 | Sense - 2 |
| Sensor - 1 | Sensor - 2 |

## Connection example



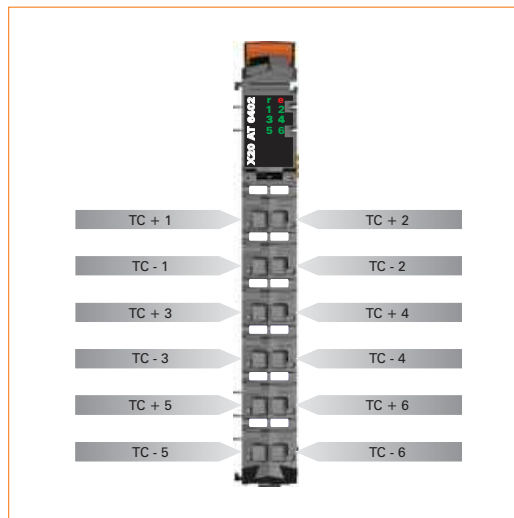| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🖹 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🖹 88 |

# Temperature module
# AT2402



- 2 inputs for thermocouples
- For sensor types J, K, N, S
- Additional direct raw value measurement
- Integrated terminal temperature compensation
- Filter time can be configured

| Short description | X20AT2402 |
|---|---|
| I/O module | 2 inputs for thermocouples |

| Thermocouple temperature inputs | X20AT2402 |
|---|---|
| Input | Thermocouple |
| Digital converter resolution | 16-bit |
| Filter time | Configurable between 1 ms and 66.7 ms |
| Conversion time | |
| 1 channel | 80.4 ms at 50 Hz filter |
| 2 channels | 120.6 ms at 50 Hz filter |
| Output format | UINT |
| Basic accuracy | |
| Type J | ±0.10% at 25°C [1] |
| Type K | ±0.11% at 25°C [1] |
| Type N (Rev. ≥D0) | ±0.11% at 25°C [1] |
| Type S | ±0.17% at 25°C [1] |
| Measurement area | |
| Sensor temperature | |
| FeCuNi: Type J | -210°C to +1200°C |
| NiCrNi: Type K | -270°C to +1372°C |
| NiCrSi: Type N (Rev. ≥D0) | -270°C to +1300°C |
| PtRhPt: Type S | -50°C to +1768°C |
| Terminal temperature | -25°C to +85°C |
| Raw value | ±65.534 mV |
| Terminal temperature compensation | Internal |

1) Refers to the measurement range without consideration of the reference junction measurement error

| General information | X20AT2402 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Inputs | Yes, with status LED and software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 0.72 W |
| Certification | CE, C-UL-US, GOST-R |

*The module is designed for X20 6-pin terminal blocks. However, the 12-pin terminal block can also be used.*

| Operational conditions | X20AT2402 |
|---|---|
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| Storage and transport conditions | X20AT2402 |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mechanical characteristics | X20AT2402 |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



TC + 1
TC - 1
TC + 2
TC - 2

## Connection example
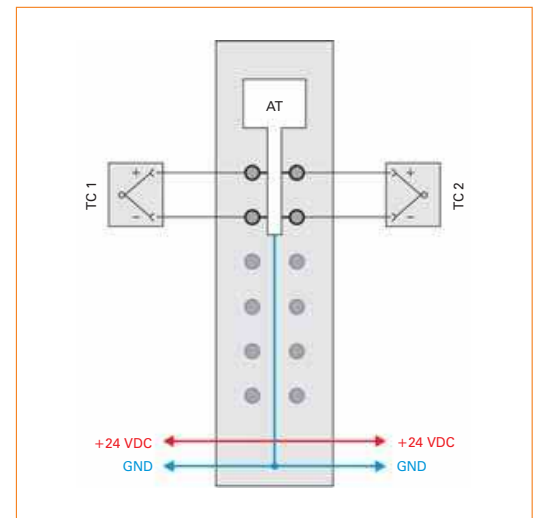


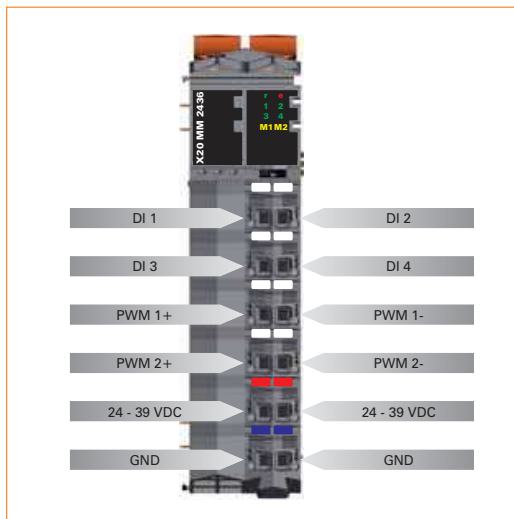| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | ▤ 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Temperature module
# AT6402

- 6 inputs for thermocouples
- For sensor types J, K, N, S
- Additional direct raw value measurement
- Integrated terminal temperature compensation
- Filter time can be configured

| Short description | X20AT6402 |
|---|---|
| I/O module | 6 inputs for thermocouples |

| Thermocouple temperature inputs | X20AT6402 |
|---|---|
| Input | Thermocouple |
| Digital converter resolution | 16-bit |
| Filter time | Configurable between 1 ms and 66.7 ms |
| Conversion time | |
|   1 channel | 80.4 ms at 50 Hz filter |
|   n channels | (n + 1) x 40.2 ms at 50 Hz filter |
| Output format | UINT |
| Basic accuracy | |
|   Type J | ±0.10% at 25°C [1] |
|   Type K | ±0.11% at 25°C [1] |
|   Type N (Rev. ≥D0) | ±0.11% at 25°C [1] |
|   Type S | ±0.17% at 25°C [1] |
| Measurement area | |
|   Sensor temperature | |
|     FeCuNi: Type J | -210°C to +1200°C |
|     NiCrNi: Type K | -270°C to +1372°C |
|     NiCrSi: Type N (Rev. ≥D0) | -270°C to +1300°C |
|     PtRhPt: Type S | -50°C to +1768°C |
|   Terminal temperature | -25°C to +85°C |
|   Raw value | ±65.534 mV |
| Terminal temperature compensation | Internal |

1) Refers to the measurement range without consideration of the reference junction measurement error

| General information | X20AT6402 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Inputs | Yes, with status LED and software status |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 0.91 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20AT6402 |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20AT6402** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20AT6402** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



## Connection example
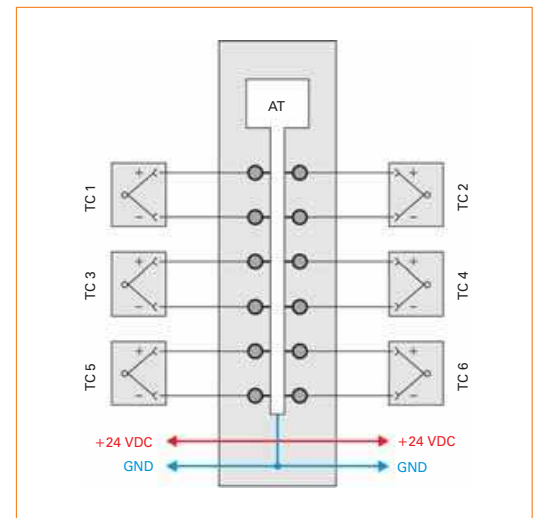


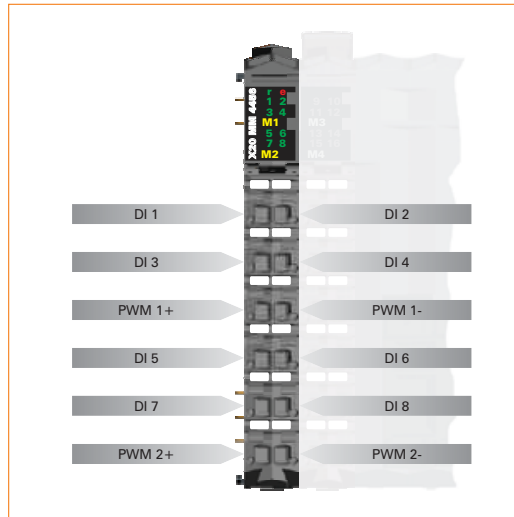| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🖺 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🖺 88 |

# PWM motor bridge
# MM2436

The MM2436 PWM module can be used in many different ways. One use is the control of DC motors in the middle power range. The module can drive two single-phase brush-type DC motors. The module is designed for a rated voltage of 24 VDC to 39 VDC ±25% at a rated current of 3 A (maximum current 3.5 A for 2 s).
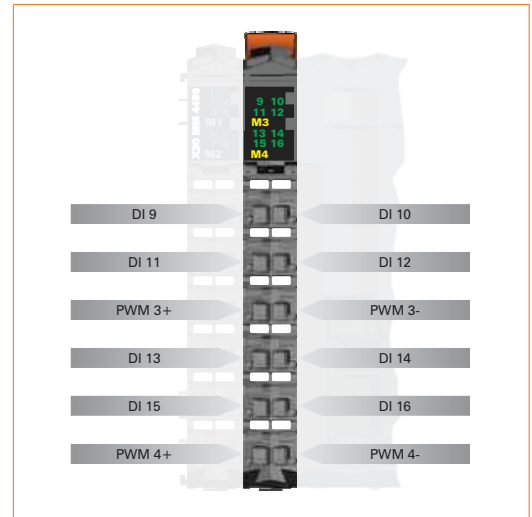
- Controlling motors, valves and resistive loads
- Two outputs for constant current or PWM
- Adjustable dither
- Four inputs for digital input signals or for two AB encoders
- Power feed integrated in the module

| Short description | X20MM2436 |
|---|---|
| I/O module | 2-channel PWM motor bridge, 2 AB incremental encoders |
| **Digital inputs** | **X20MM2436** |
| Number of channels | 4 |
| Rated voltage | 24 VDC |
| Input filter | |
|    Hardware | < 5 µs |
|    Software | - |
| Connection type | 1-line connections |
| Input circuit | Sink |
| Additional functions for inputs | 2x AB incremental encoder |
| **AB incremental encoders** | **X20MM2436** |
| Amount | 2 |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 16-bit |
| Input frequency (max.) | 50 kHz |
| Evaluation | 4x |
| **PWM output** | **X20MM2436** |
| Amount | 2 |
| Rated voltage | 24 VDC - 39 VDC (±25%) |
| Rated current | 3.0 A |
| Maximum current | 3.5 A (2 s) |
| PWM frequency | 15 Hz - 50 kHz |
| Output protection | No reverse polarity protection for supply voltage |
| **General information** | **X20MM2436** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Output | Yes, with status LED and software status |
|    I/O supply | Yes, with software status |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.01 W |
|    I/O internal | - |
|    I/O external | |
|      24 VDC | 2.45 W |
|      48 VDC | 3.15 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20MM2436** |
| Operating temperature | |
|    Horizontal installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20MM2436 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20MM2436** |
| Spacing | 25 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM31 separately |

## Pin assignments



## Connection example
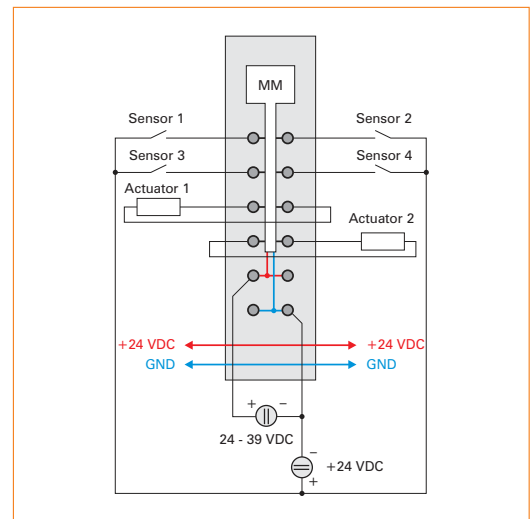


| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📖 94 |
| X20BM31 | X20 bus module for double-width modules, internal I/O supply is interconnected | 📖 92 |

# PWM motor bridge
# MM4456

The MM4456 PWM module can be used in many different ways. One use is the control of DC motors in various power classes. The module can drive four single-phase brush-type DC motors. The module is designed for a rated voltage of 24 VDC to 48 VDC ±25% at a rated current of 6 A (maximum current 10 A for 2 s).

- Controlling motors, valves and resistive loads
- Four outputs for constant current or PWM
- Adjustable dither
- 16 inputs for digital input signals or for four AB encoders
- Power feed integrated in the module

| Short description | X20MM4456 |
|---|---|
| I/O module | 4-channel PWM motor bridges, 16 digital inputs, special functions |
| **Digital inputs** | **X20MM4456** |
| Number of channels | 16 |
| Rated voltage | 24 VDC |
| Input filter | |
|   Hardware | < 5 $\mu$s |
|   Software | - |
| Connection type | 1-line connections |
| Input circuit | Sink |
| Additional functions for inputs | 4x ABR incremental encoder |
| **ABR incremental encoder** | **X20MM4456** |
| Amount | 4 |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 16-bit |
| Input frequency (max.) | 50 kHz |
| Evaluation | 4x |
| **PWM output** | **X20MM4456** |
| Amount | 4 |
| Rated voltage | 24 VDC - 48 VDC (±25%) |
| Rated current | 6.0 A |
| Maximum current | 10 A (2 s) |
| PWM frequency | 15 Hz - 50 kHz |
| Output protection | No reverse polarity protection for supply voltage |
| **General information** | **X20MM4456** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Output | Yes, with status LED and software status |
|   I/O supply | Yes, with software status |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 2.0 W |
|   I/O external | |
|     24 VDC | 0.01 W |
|     48 VDC | 0.01 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20MM4456** |
| Operating temperature | |
|   Horizontal installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20MM4456** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20MM4456** |
| Spacing | 87.5 $^{+0.2}$ mm |
| Comment | Order terminal block 2x X20TB12 separately |
| | Order terminal block 1x 0TB3103-7020 separately |

## Pin assignments for DI 1 - 8 / PWM 1 + 2



| | |
|---|---|
| DI 1 | DI 2 |
| DI 3 | DI 4 |
| PWM 1+ | PWM 1- |
| DI 5 | DI 6 |
| DI 7 | DI 8 |
| PWM 2+ | PWM 2- |

## Pin assignments for DI 9 - 16 / PWM 3 + 4



| | |
|---|---|
| DI 9 | DI 10 |
| DI 11 | DI 12 |
| PWM 3+ | PWM 3- |
| DI 13 | DI 14 |
| DI 15 | DI 16 |
| PWM 4+ | PWM 4- |

## Pin assignments for module supply



| | |
|---|---|
| 24 - 48 VDC | 1 |
| Shield | 2 |
| GND | 3 |

## Connection example for X1 terminal block
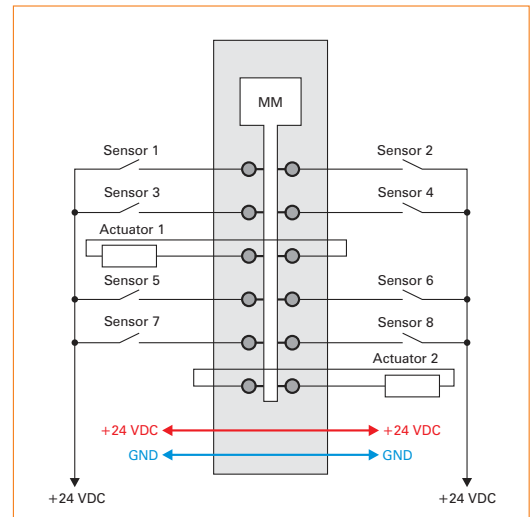


| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| 0TB3103-7020 | Accessory terminal block, 3-pin, screw clamp 6 mm² | ▤ 678 |

# Stepper motor module
# SM1426

The stepper motor module SM1426 is used for controlling a stepper motor with a rated voltage of 24 VDC at a motor rated current of 1 A (maximum current 1.2 A for 2 s).

The module can resolve each full step into up to 256 microsteps. The module always carries out the maximum number of microsteps possible at a particular step frequency. On the one hand this increases the positioning precision, and on the other it makes operation much smoother. This considerably reduces the resonance effects common to stepper motors.

- Stepper motor control for motors with 24 VDC and 1 A (max. 1.2 A for 2 s)
- 256 microsteps per step
- Four inputs for limit switches or ABR incremental encoder
- Holding, boost and continuous current can be defined independent of one another
- Automatic motor detection
- Stall detection

| Short description | X20SM1426 |
|---|---|
| I/O module | 1 full bridge for controlling stepper motors |
| **Digital inputs** | **X20SM1426** |
| Number of channels | 4 |
| Rated voltage | 24 VDC |
| Input filter | |
|    Hardware | $< 5\,\mu s$ |
|    Software | - |
| Connection type | 1-line connections |
| Input circuit | Sink |
| Additional functions for inputs | 1x ABR incremental encoder |
| **ABR incremental encoder** | **X20SM1426** |
| Amount | 1 |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 16-bit |
| Input frequency (max.) | 50 kHz |
| Evaluation | 4x |
| **Motor bridge - power element** | **X20SM1426** |
| Amount | 1 |
| Rated voltage | 24 VDC |
| Rated current | 1.0 A |
| Maximum current | 1.2 A (2 s) |
| Controller frequency | 38.4 kHz |
| Step resolution | Max. 256 microsteps per step |
| **General information** | **X20SM1426** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Output | Yes, with status LED and software status |
|    I/O supply | Yes, with software status |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.01 W |
|    I/O internal | 1.8 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20SM1426** |
| Operating temperature | |
|    Horizontal installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20SM1426 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20SM1426** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments
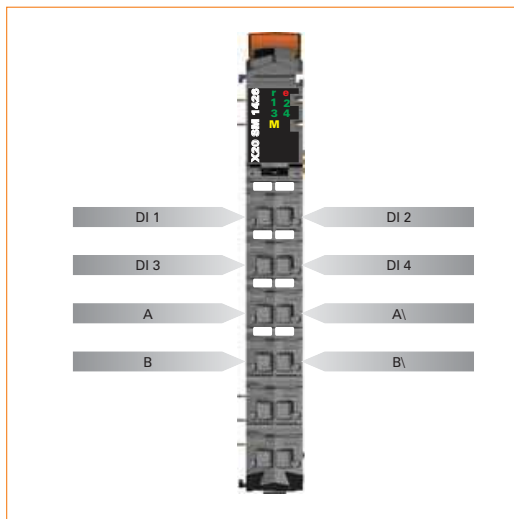


## Connection example
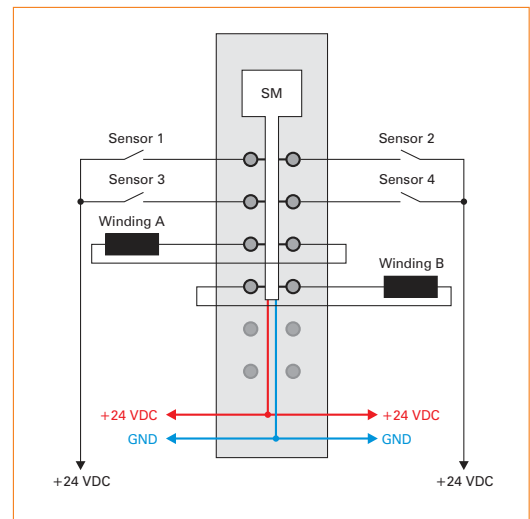


| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

# Stepper motor module
# SM1436

The stepper motor module SM1436 is used for controlling a stepper motor with a rated voltage of 24 VDC to 39 VDC ±25% at a motor rated current of 3 A (maximum current 3.5 A for 2 s). The module supply is fed directly to the module. An additional supply module is not needed.

The module can resolve each full step into up to 256 microsteps. The module always carries out the maximum number of microsteps possible at a particular step frequency. On the one hand this increases the positioning precision, and on the other it makes operation much smoother. This considerably reduces the resonance effects common to stepper motors.

- Stepper motor control for motors with 24 VDC to 39 VDC ±25% and 3 A (max. 3.5 for 2 s)
- 256 microsteps per step
- Four inputs for limit switches or ABR incremental encoder
- Holding, boost and continuous current can be defined independent of one another
- Automatic motor detection
- Stall detection
- Power feed integrated in the module

| Short description | X20SM1436 |
|---|---|
| I/O module | 1 full bridge for controlling stepper motors |
| **Digital inputs** | **X20SM1436** |
| Number of channels | 4 |
| Rated voltage | 24 VDC |
| Input filter | |
|    Hardware | < 5 $\mu$s |
|    Software | - |
| Connection type | 1-line connections |
| Input circuit | Sink |
| Additional functions for inputs | 1x ABR incremental encoder |
| **ABR incremental encoder** | **X20SM1436** |
| Amount | 1 |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 16-bit |
| Input frequency (max.) | 50 kHz |
| Evaluation | 4x |
| **Motor bridge - power element** | **X20SM1436** |
| Amount | 1 |
| Rated voltage | 24 VDC - 39 VDC (±25%) |
| Rated current | 3.0 A |
| Maximum current | 3.5 A (2 s) |
| Controller frequency | 38.4 kHz |
| Step resolution | Max. 256 microsteps per step |
| Output protection | No reverse polarity protection for supply voltage |
| **General information** | **X20SM1436** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Output | Yes, with status LED and software status |
|    I/O supply | Yes, with software status |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.01 W |
|    I/O internal | - |
|    I/O external | |
|      24 VDC | 2.45 W |
|      48 VDC | 3.15 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20SM1436** |
| Operating temperature | |
|    Horizontal installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20SM1436 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20SM1436** |
| Spacing | 25 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM31 separately |

## Pin assignments
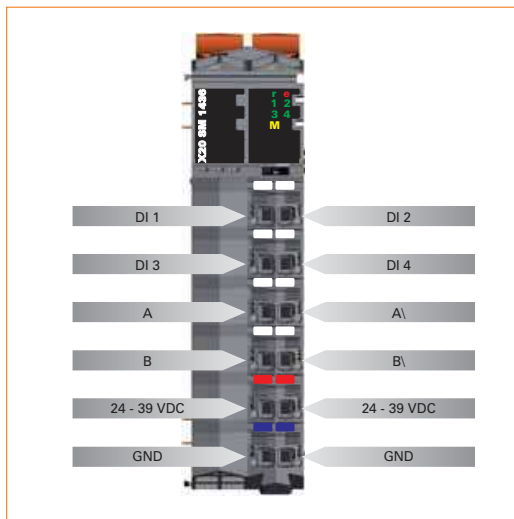


## Connection example
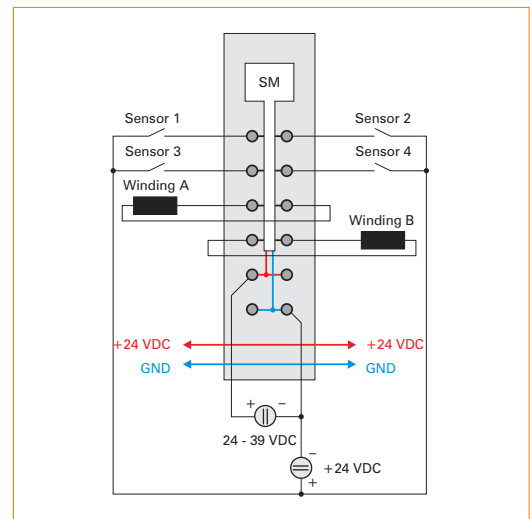


| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM31 | X20 bus module for double-width modules, internal I/O supply is interconnected | 📄 92 |

# Multi-measurement transformer / synchronization module CM0985

Analog voltage inputs
(generator mains network)

Analog voltage inputs
(bus bar)

Analog current inputs
(generator mains
network)

Analog voltage inputs
(synchronization mains
network 1)

Digital outputs

Analog voltage inputs
(synchronization mains
network 2)
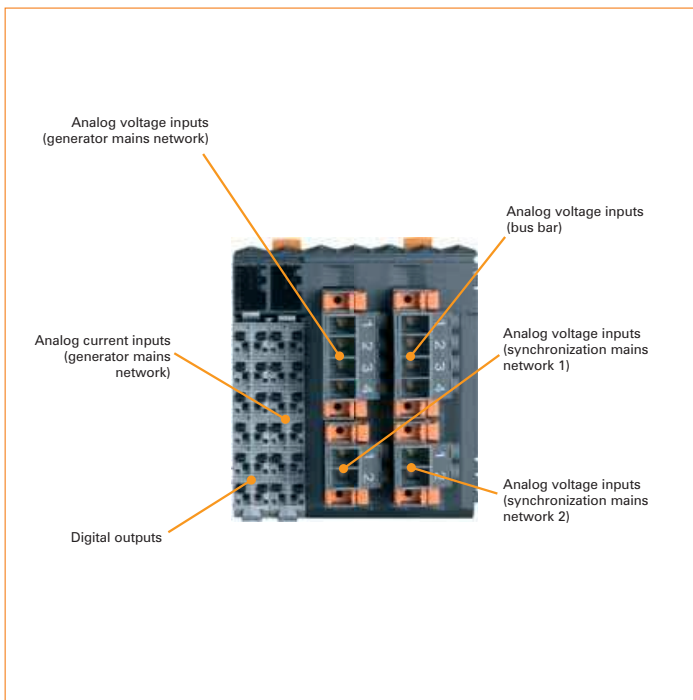
## Energy measurement and network synchronization

The CM0985 has a compact size and combines a power measurement module that has special features with a synchronization unit that is able to meet all demands.

- Energy measurement for 120 VAC to 480 VAC
- Simultaneous measurement of two AC networks plus two additional voltages
- For multifunctional measurement tasks
- Intelligent mains network synchronization unit

In the measurement unit, the three current inputs are suitable for both X:1 A and also X:5 A current transformers. The excellent overcurrent resistance as well as the high resolution of the measurement unit round off the features. For the voltage inputs, the value range can be configured between 480 VAC and 120 VAC.

The area of use includes 4-wire AC networks with a phase conductor voltage up to 480 VAC and 3-wire systems, whereas L2 can be grounded (V-connection). The module can also handle an Aron measuring circuit.

The resulting measurement values range from pure phase current and phase conductor/line voltage to active current, reactive current and apparent power components, mains frequency, power factor and much more. Additionally, peak values and work counters are saved on the module in nonvolatile memory. Depending on the configuration, a digital output with scalable rating can also be used as pulse encoder for an external energy counter.

The synchronization unit not only takes the phase position and phase voltage into consideration, built-in intelligence also takes the change speed and other parameters into consideration and allows them to influence the decision for switching the synchronization output. Monitoring of a generator is possible with a large number of additional conditions. A total of four voltage inputs provide the needed flexibility.

Monitoring functions extend the features of the module. Thermal overload protection is included, which uses the thermal capacity of the motor/generators to allow short overloads and still provides full protection. Unbalanced load monitoring, which is used to protect three-phase producers and three-phase networks from an unbalanced load, can be adjusted to the characteristics of different generator types using parameters while taking its special thermal time constants into consideration.
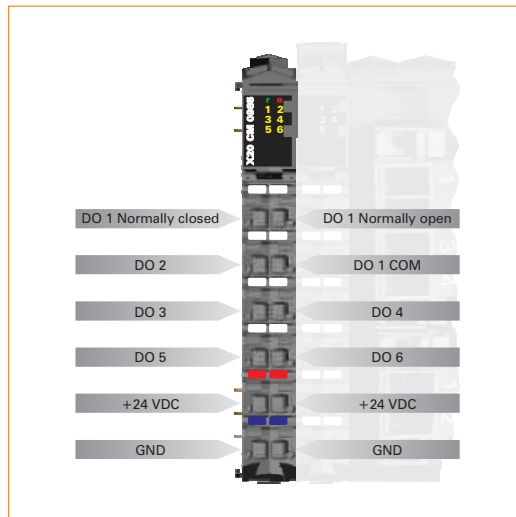
| Short description | X20CM0985 |
|---|---|
| I/O module | X20 energy measurement and mains network synchronization module |
| **Digital outputs** | **X20CM0985** |
| Channels | 5 |
| Rated voltage | 24 VDC |
| Rated output current | 0.1 A |
| Total current | 0.5 A |
| Connection type | 1-line connections |
| Output circuit | Source |
| Output protection | Overload protection, short circuit protection |
| **Relay outputs** | **X20CM0985** |
| Channels | 1 |
| Relay contacts | Max. 230 VAC / 0.5 A |
| Surge withstand capability of contacts | 500 V |
| **Analog inputs - voltage** | **X20CM0985** |
| Channels | 8 |
| Input | ±120 VAC +10% / ±480 VAC +10% (can be configured) |
| Digital converter resolution | 16-bit |
| Output format | UINT |
| Input impedance | Approx. 3 MΩ |
| Input filter | |
|    Limit frequency | 10 kHz |
|    Attenuation | 60 dB |
| Basic accuracy | 0.5% [1] |
| 1) Refers to the measurement range limit | |
| **Analog inputs - current** | **X20CM0985** |
| Channels | 3 |
| Input | ±1 A / ±5 A (can be configured) |
| Digital converter resolution | 16-bit |
| Output format | UINT |
| Input filter | |
|    Limit frequency | 10 kHz |
|    Attenuation | 60 dB |
| Basic accuracy | 0.5% [1] |
| Thermal over-current | 15 x $I_{Rated}$ for 0.2 s |
| Monitored over-current | 4 x $I_{Rated}$ |
| 1) Refers to the measurement range limit | |
| **General information** | **X20CM0985** |
| Status indicators | Channel status, operating status, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Digital outputs | Yes, with status LED and software status |
|    Analog inputs | Yes, with status LED (measurement range of analog inputs) |
| Electrical isolation | |
|    Bus inputs/outputs | Yes |
|    Digital - Analog | Yes |
|    Bus - I/O supply | Yes |
| Power consumption | |
|    Bus | 1.4 W |
|    I/O internal | 4 W |
| Certification | CE, C-UL-US, GOST-R |

# Multi-measurement transformer / synchronization module CM0985

| Operational conditions | X20CM0985 |
|---|---|
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20CM0985** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CM0985** |
| Spacing | 87.5 $^{+0.2}$ mm |
| Comment | Order terminal block 2x X20TB12 separately |
| | Order screw clamps 2x TB3102 and 2x TB3104 separately |

## Digital outputs - Pin assignments



| | |
|---|---|
| DO 1 Normally closed | DO 1 Normally open |
| DO 2 | DO 1 COM |
| DO 3 | DO 4 |
| DO 5 | DO 6 |
| +24 VDC | +24 VDC |
| GND | GND |

## Analog current inputs - Pin assignments



| | |
|---|---|
| AI + 1 L1 (1 A) | AI + 1 L1 (5 A) |
| AI - 1 L1 (1 A) | AI - 1 L1 (5 A) |
| AI + 2 L2 (1 A) | AI + 2 L2 (5 A) |
| AI - 2 L2 (1 A) | AI - 2 L2 (5 A) |
| AI + 3 L3 (1 A) | AI + 3 L3 (5 A) |
| AI - 3 L3 (1 A) | AI - 3 L3 (5 A) |
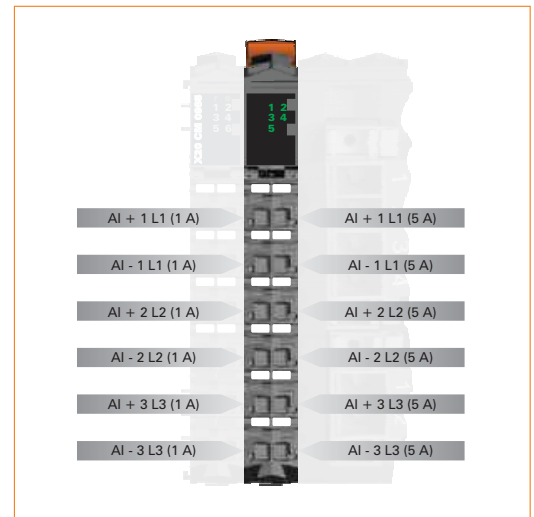
## Tension clamps X3 and X5 - Pin assignments



L1
L2
L3
N

**Generator / bus bar**
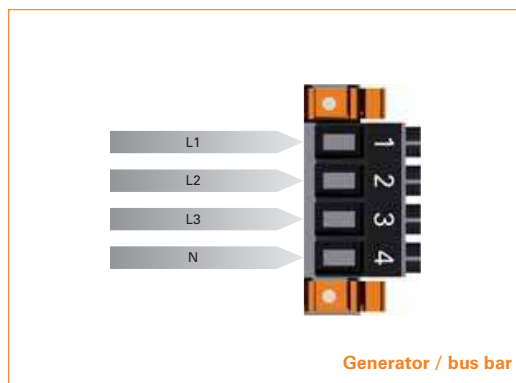
## Tension clamps X4 and X6 - Pin assignments



L1
L2

**Sync1 / Sync2**
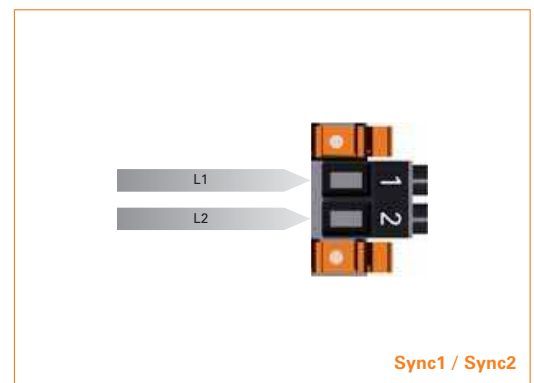
| Required accessories | | |
|---|---|---|
| 0TB3102-7011 | Accessory terminal block, 2-pin, A coded, screw clamp, 6 mm² | 676 |
| 0TB3102-7012 | Accessory terminal block, 2-pin, B coded, screw clamp, 6 mm² | 676 |
| 0TB3104-7011 | Accessory terminal block, 4-pin, A coded, screw clamp, 6 mm² | 679 |
| 0TB3104-7012 | Accessory terminal block, 4-pin, B coded, screw clamp, 6 mm² | 679 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |

# Combination module
# CM1201

The CM1201 can be used to configure and carry out simple movements. For this purpose, the module has an AB encoder input and a total of eight digital channels. Four of them are inputs, and the other four can be set as either inputs or outputs. Various output bit patterns can be set easily in the module itself.

The CM1201 is perfectly suited for easy to create drive control tasks for program and event controlled motor movements. Feed movements using drives with two speeds and forward/reverse movement are created easily and efficiently.

- Command dependent digital output patterns
- Counter dependent output switch
- Event controlled abort criteria
- 4 digital inputs
- 4 digital channels, can be configured as inputs or outputs

| Short description | X20CM1201 |
|---|---|
| I/O module | 1 AB incremental encoder, 24 V, 4 digital inputs, 4 channels can be configured as inputs or outputs |
| **AB incremental encoders** | **X20CM1201** |
| Amount | 1 |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 32-bit |
| Input frequency (max.) | 100 kHz |
| Evaluation | 4x |
| Encoder supply | Module-internal, max. 600 mA |
| **Digital inputs** | **X20CM1201** |
| Amount | 4 + 4 additional channels, can be configured as input or output |
| Rated voltage | 24 VDC |
| Input filter | |
|   Hardware | ≤2 μs |
|   Software | - |
| Connection type | 1-line connections |
| Input circuit | Sink |
| **Digital outputs** | **X20CM1201** |
| Amount | Up to 4, configuration as input or output takes place using software |
| Rated voltage | 24 VDC |
| Rated output current | 0.1 A |
| Total current | 0.4 A |
| Connection type | 1-line connections |
| Output circuit | Sink or source |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| Actuator supply | Module-internal, max. 600 mA |
| **General information** | **X20CM1201** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Outputs | Yes, with status LED and software status (output status) |
| Electrical isolation | |
|   Channel - Bus | Yes |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20CM1201** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20CM1201 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CM1201** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments
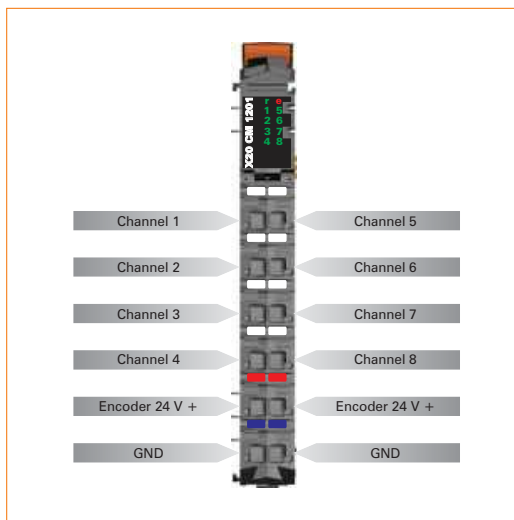


## Connection example
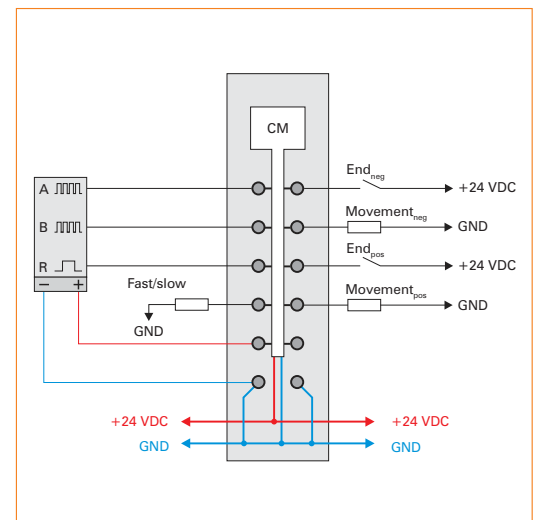


| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🕮 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🕮 88 |

# Universal mixed module
# CM8281

- Digital and analog channels
- Selectable current and voltage for AI and AO
- Counter functions

| Short description | X20CM8281 | |
|---|---|---|
| I/O module | 4 digital inputs, 2 digital outputs, 1 analog input, 1 analog output, special functions | |
| **Digital inputs** | **X20CM8281** | |
| Number of channels | 4 | |
| Rated voltage | 24 VDC | |
| Input filter | | |
|   Hardware | ≤2 µs | |
|   Software | Default 1 ms, can be configured between 0 and 25 ms in 0.2 ms intervals | |
| Connection type | 1-line connections | |
| Input circuit | Sink | |
| Additional functions for inputs | 20 kHz event counting, gate measurement | |
| **Digital outputs** | **X20CM8281** | |
| Number of channels | 2 | |
| Rated voltage | 24 VDC | |
| Rated output current | 0.5 A | |
| Total current | 1.0 A | |
| Connection type | 1-line connections | |
| Output circuit | Source | |
| Output protection | Thermal cutoff for overcurrent or short circuit, integrated protection for switching inductances, reverse polarity protection | |

| Analog inputs | Voltage | Current |
|---|---|---|
| Number of channels | 1 | |
| Input | ±10 V or 0 to 20 mA/4 to 20 mA, using different connection terminal points | |
| Input type | Single ended | |
| Digital converter resolution | ±12-bit | 12-bit |
| Conversion time | 400 µs, conversion runs asynch. to X2X Link cycle | |
| Output format | UINT | |
| Input impedance in signal range | >1 MΩ | - |
| Load | - | <300 Ω |
| Maximum error at 25°C | | |
|   Gain | 0.03% [1] | 0 to 20 mA = 0.065% [1] / 4 to 20 mA = 0.0813% [1] |
|   Offset | 0.01% [2] | 0 to 20 mA = 0.02% [3] / 4 to 20 mA = 0.025% [3] |
| Input protection | Protection against wiring with supply voltage | |

1) Based on the current measurement value.

2) Based on the 20 V measurement range.

3) Based on the 20 mA measurement range.

| Analog outputs | X20CM8281 | |
|---|---|---|
| Number of channels | 1 | |
| Output | ±10 V or 0 to 20 mA, using different connection terminal points | |
| Digital converter resolution | 12-bit | |
| Conversion time | 300 µs, conversion runs asynchronous to the X2X Link cycle | |
| Power on/off behavior | Internal enable relay for boot procedure and errors | |
| Maximum error at 25°C | | |
|   Gain | 0.04% [1] | 0.05% [1] |
|   Offset | 0.0225% [2] | 0.0125% [2] |
| Output protection | Short circuit protection | |

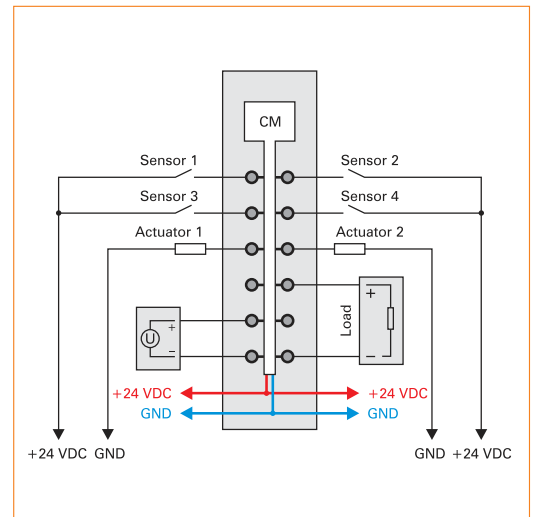1) Based on the current output value.

2) Based on the entire output range.

| General information | X20CM8281 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Digital outputs | Yes, with status LED and software status (output error status) |
|    Analog inputs | Yes, with status LED and software status |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.01 W |
|    I/O internal | 1.75 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20CM8281 |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |

| Storage and transport conditions | X20CM8281 |
|---|---|
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |

| Mechanical characteristics | X20CM8281 |
|---|---|
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

# Universal mixed module
# CM8281

## Pin assignments
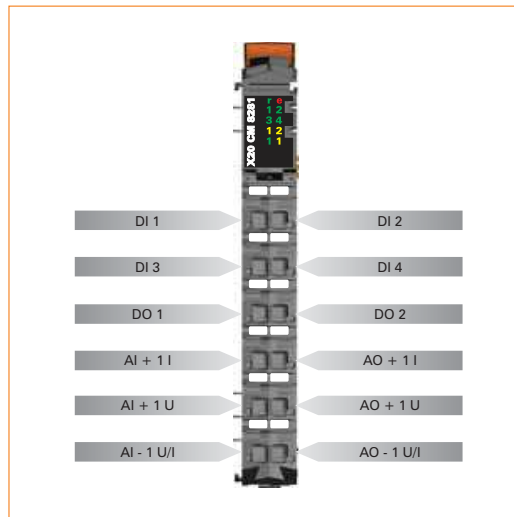
| | |
|---|---|
| DI 1 | DI 2 |
| DI 3 | DI 4 |
| DO 1 | DO 2 |
| AI + 1 I | AO + 1 I |
| AI + 1 U | AO + 1 U |
| AI - 1 U/I | AO - 1 U/I |

## Connection example



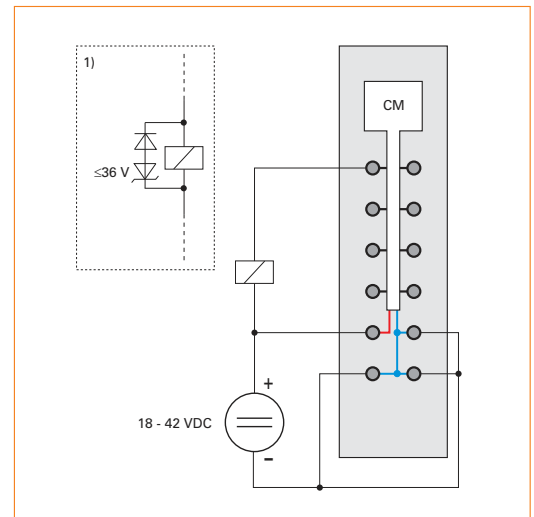| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 88 |

# PWM module with current monitoring
# CM8323

- 8 digital outputs
- Current trace
- Switching time detection
- Pulse width modulation

| Short description | X20CM8323 |
|---|---|
| I/O module | 8 digital outputs for switching electromechanical loads, current trace, switching time detection, pulse width modulation |
| **Digital outputs** | **X20CM8323** |
| Rated voltage | 24 VDC |
| Rated output current | 0.6 A |
| Starting current | Max. 2.0 A |
| Total current | 4.8 A |
| Connection type | 1-line connections |
| Output circuit | Sink |
| Output protection | Thermal cutoff for overcurrent or short circuit, integrated protection for switching inductances |
| Braking Voltage when Switching Off | 39 VDC |
| **General information** | **X20CM8323** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Outputs | Yes, with status LED and software status (output error status) |
| Electrical isolation | |
|    Channel - Bus | Yes |
|    Channel - Module supply | No |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.01 W |
|    I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20CM8323** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20CM8323** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CM8323** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| DO 1 | DO 2 |
| DO 3 | DO 4 |
| DO 5 | DO 6 |
| DO 7 | DO 8 |
| COM | GND |
| GND | GND |
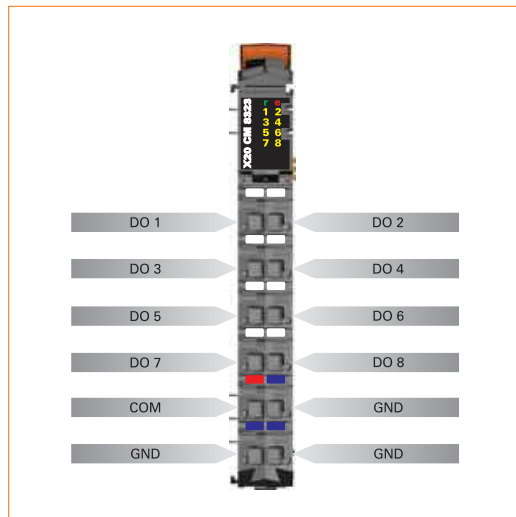
## Connection example



1) If larger inductances or more current are used; the "transil-diode combination" must be placed externally on the relay/valve.

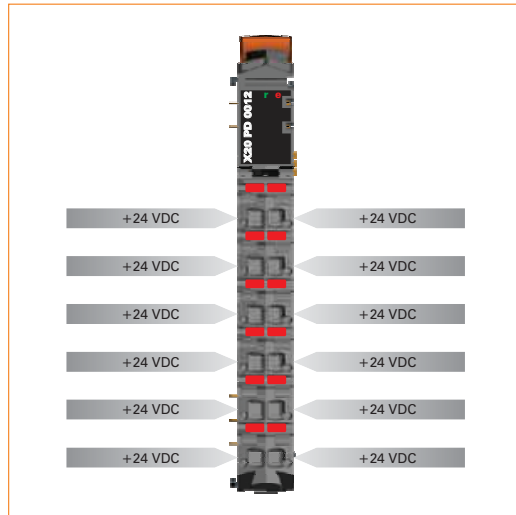| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📄 88 |

# Potential distributor module
# PD0011

The PD0011 potential distributor module provides 12 ground connections (from the internal I/O supply) at the terminals, which opens up additional wiring possibilities for sensors and actuators. The module is equipped with an exchangeable microfuse between the GND potential on the terminal block and the X20 System I/O supply. The function of the fuse is monitored.

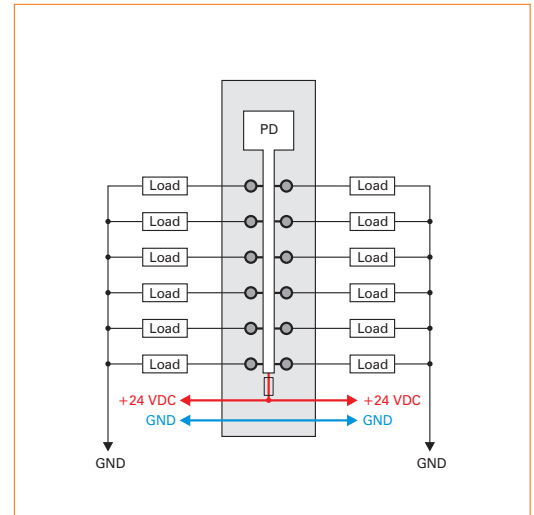- Integrated exchangeable microfuse
- Monitoring of the fuse
- Potential for routing as needed

Note:
The wired load must be supplied with 24 VDC.

| Short description | X20PD0011 |
|---|---|
| Potential distributor module | 12x ground on the terminal points |
| **Output I/O supply** | **X20PD0011** |
| Rated output voltage | Ground from the internal I/O supply |
| Fuse | Integrated T 6.3 A, exchangeable |
| Permitted contact load | 10.0 A |
| **General information** | **X20PD0011** |
| Status indicators | Operating status, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Fuse monitoring | Yes, with status LED and software status |
| Power consumption [1] | |
| Bus | 0.12 W |
| I/O internal | - |
| I/O external | 1.0 W |
| Certification | CE, C-UL-US (in development), GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20PD0011 |
|---|---|
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PD0011** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PD0011** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| GND | GND |
| GND | GND |
| GND | GND |
| GND | GND |
| GND | GND |
| GND | GND |
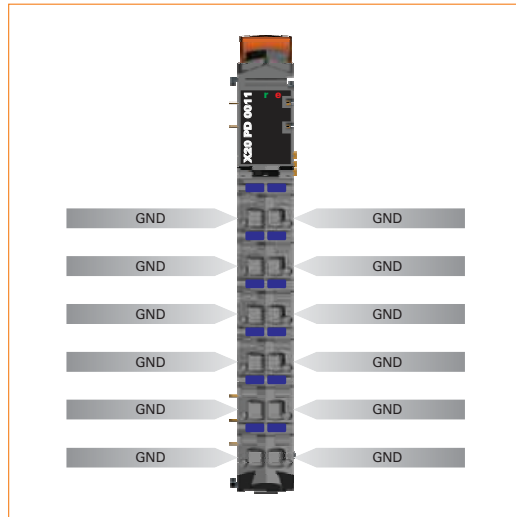
## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 88 |

# Potential distributor module
# PD0012

The PD0012 potential distributor module provides twelve 24 VDC connections (from the internal I/O supply) at the terminals, which opens up additional wiring possibilities for sensors and actuators. The module is equipped with an exchangeable microfuse between the 24 VDC potential on the terminal block and the X20 System I/O supply. The function of the fuse is monitored.

- Integrated exchangeable microfuse
- Monitoring of the fuse
- Potential for routing as needed

| Short description | X20PD0012 |
|---|---|
| Potential distributor module | 12x 24 VDC on the terminals |
| **Output I/O supply** | **X20PD0012** |
| Rated output voltage | 24 VDC from the internal I/O supply |
| Fuse | Integrated T 6.3 A, exchangeable |
| Permitted contact load | 10.0 A |
| **General information** | **X20PD0012** |
| Status indicators | Operating status, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Fuse monitoring | Yes, with status LED and software status |
| Power consumption [1] | |
|   Bus | 0.12 W |
|   I/O internal | 1.0 W |
| Certification | CE, C-UL-US (in development), GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20PD0012 |
|---|---|
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PD0012** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PD0012** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| +24 VDC | +24 VDC |
| +24 VDC | +24 VDC |
| +24 VDC | +24 VDC |
| +24 VDC | +24 VDC |
| +24 VDC | +24 VDC |
| +24 VDC | +24 VDC |

## Connection example



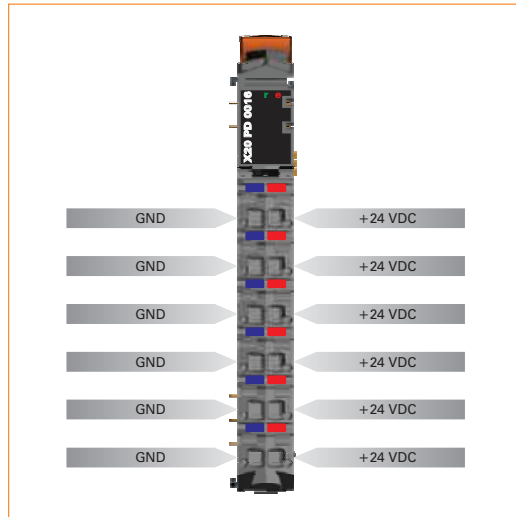| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Potential distributor module PD0016

The PD0016 potential distributor module provides 5x 24 VDC and 5x ground connections (from an external supply) at the terminals. There is no connection to the internal I/O supply, so this module only serves to distribute an external supply for the load and electronics supply. The externally fed 24 VDC supply is provided on the terminal points through an exchangeable microfuse. The 24 VDC feed and the function of the fuse are monitored.

- Integrated exchangeable microfuse
- Monitoring of the fuse
- Potential for routing as needed
- Distribution of the load and eletronics supply
- Isolation from the internal I/O supply

| Short description | X20PD0016 |
|---|---|
| Potential distributor module | 5 x 24 VDC on the terminal points, 5 x ground on the terminal points |
| **Input supply** | **X20PD0016** |
| Nominal input voltage | 24 VDC (-15% / +20%) external, external ground |
| Fuse | Integrated T 6.3 A, exchangeable |
| **output supply.** | **X20PD0016** |
| Rated output voltage | 24 VDC, ground |
| Permitted contact load | 10.0 A |
| **General information** | **X20PD0016** |
| Status indicators | Operating status, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Fuse monitoring | Yes, with status LED and software status |
| Power consumption [1] | |
| Bus | 0.12 W |
| I/O internal | - |
| I/O external | 1.15 W |
| Certification | CE, C-UL-US (in development), GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20PD0016 |
|---|---|
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PD0016** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PD0016** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| GND | +24 VDC |
|-----|---------|
| GND | +24 VDC |
| GND | +24 VDC |
| GND | +24 VDC |
| GND | +24 VDC |
| GND | +24 VDC |

## Connection example
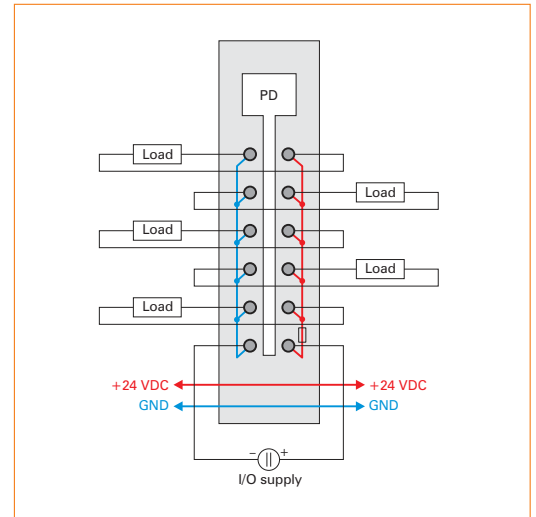


| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Potential distributor module
# PD2113

The PD2113 potential distributor module with feed can provide 6x 24 VDC and 6x ground connections from the internal I/O supply on the terminals. This module can also be used instead of a special feed module for the internal I/O supply. The internal 24 VDC supply is protected through an exchangeable microfuse to the terminal points. The 24 VDC feed and the function of the fuse are monitored.

- Integrated exchangeable microfuse
- Monitoring of the fuse
- Potential for routing as needed
- Can be used as feed module for the I/O supply

Note:
Because the 6x 24 VDC terminals are connected together and the fuse is between the terminal points and the internal I/O supply, the terminal potentials do not have short-circuit protection if an external feed is used. Therefore the respective 24 VDC terminal points must be protected with an external fuse if an external feed is used. A BM01 bus module should be used in this situation.

| Short description | X20PD2113 |
|---|---|
| Potential distributor module with feed | 6x 24 VDC on the terminals, 6x ground on the terminals |
| **Input supply with feed** | **X20PD2113** |
| Nominal input voltage | 24 VDC (-15% / +20%) external, external ground |
| Fuse | Integrated T 6.3 A, exchangeable |
| **Output I/O supply** | **X20PD2113** |
| Rated output voltage | 24 VDC, ground |
| Permitted contact load | 10.0 A |
| Fuse | Integrated T 6.3 A, exchangeable |
| **General information** | **X20PD2113** |
| Status indicators | Operating status, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Fuse monitoring | Yes, with status LED and software status |
| Power consumption [1] | |
|    Bus | 0.12 W |
|    I/O internal | - |
|    I/O external | 1.15 W |
| Certification | CE, C-UL-US (in development), GOST-R |

1) The specified values are maximum values. The exact calculation is also available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20PD2113 |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PD2113** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PD2113** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM01 or X20BM11 separately |

## Pin assignments



| | |
|---|---|
| GND | +24 VDC |
| GND | +24 VDC |
| GND | +24 VDC |
| GND | +24 VDC |
| GND | +24 VDC |
| GND | +24 VDC |
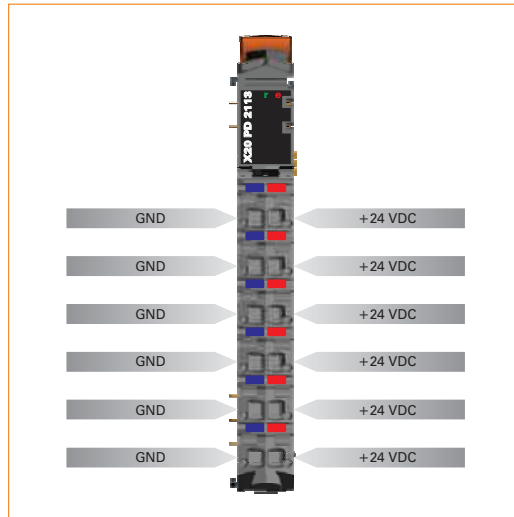
## Connection example with external supply
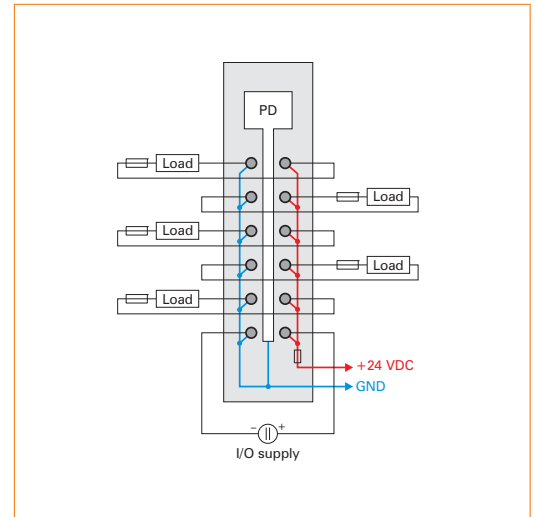


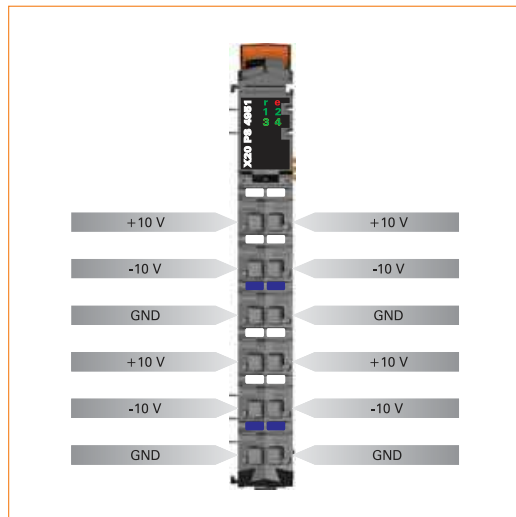| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM01 | X20 supply bus module, internal I/O supply is isolated to the left | 🗎 86 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

# Potentiometer supply module
# PS4951

To connect a potentiometer, you need a module with the right power supply. The potentiometer supply module PS4851 can be used to supply four potentiometers with ±10 V. The values are evaluated using standard analog input modules.

- Open connection and short-circuit detection
- Simple implementation of potentiometer inputs
- 4x supply

| Short description | X20PS4951 |
|---|---|
| System module | Supply of four potentiometers with ±10 V |
| **Potentiometer supply** | **X20PS4951** |
| Number of supplies | 4 |
| Voltage | ±10 V |
| Potentiometer resistance | 1 kΩ to 10 kΩ |
| Load | Max. 20 mA per supply channel |
| Short circuit protection | Yes |
| Basic accuracy | |
| +10 V | ±0.12% at 25℃ |
| -10 V | ±0.21% at 25℃ |
| **General information** | **X20PS4951** |
| Status indicators | Potentiometer supply monitoring by channel, operating status, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Overload | Yes, with status LED and software status |
| Wire break | Yes, with status LED and software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 1.8 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20PS4951** |
| Operating temperature | |
| Horizontal installation | 0℃ to +55℃ |
| Vertical installation | Values derated when mounted vertically |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5℃ per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PS4951** |
| Temperature | -25℃ to +70℃ |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PS4951** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| +10 V | +10 V |
| -10 V | -10 V |
| GND | GND |
| +10 V | +10 V |
| -10 V | -10 V |
| GND | GND |

## Connection example
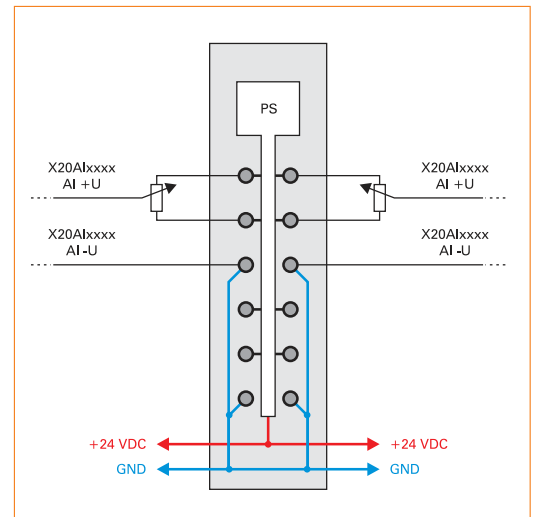


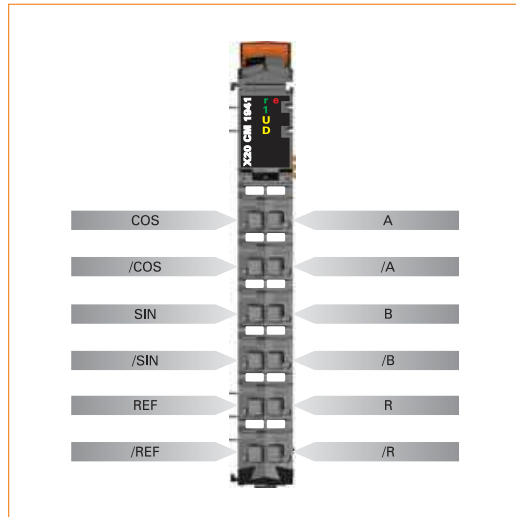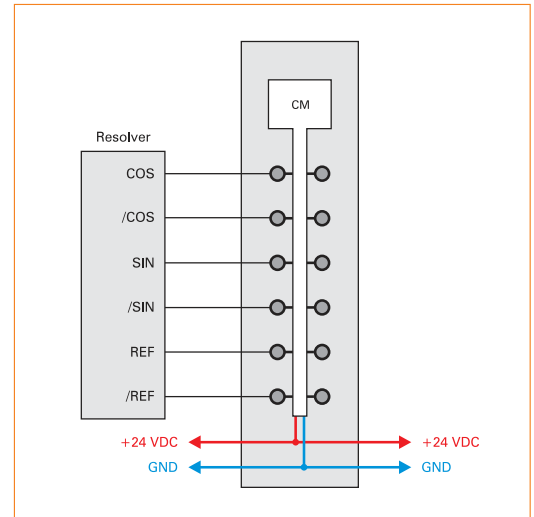| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Resolver interface with ABR output CM1941

- Resolver input (differential), with angular position and cyclic counter
- 14-bit resolution for the angular position
- ABR output (configurable)

| Short description | X20CM1941 |
|---|---|
| I/O module | 1 resolver input, 1 ABR output |
| **Resolver input** | **X20CM1941** |
| Resolver gear ratio | 0.5 (±10%) |
| Frequency (reference output) | 10 kHz |
| Type | Differential |
| Angular position resolution | 14-bit |
| Short circuit protection (reference output) | Yes |
| **ABR output** | **X20CM1941** |
| Encoder signal | RS422 |
| Type | ABR differential |
| ABR output (up to Firmware version 4) | Configurable |
|   8-bit | Max. 2343 revolutions |
|   9-bit | Max. 1171 revolutions |
|   10-bit | Max. 585 revolutions |
| ABR output (starting at Firmware version 5) | |
|   8-bit ... 12-bit | 3500 revolutions |
| Short circuit protection (reference output) | Yes |
| **General information** | **X20CM1941** |
| Status indicators | Input, output, operating status, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Resolver input (OK, wire break) | Yes, with status LED and software status |
|   Resolver input (counter direction) | Yes, with status LED and software status |
| Electrical isolation | |
|   Input/output bus | Yes |
|   Input/output - module supply | No |
|   Channel - Channel | No |
| Power consumption | |
|   Bus | 0.01 W |
|   I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20CM1941** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20CM1941** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20CM1941** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| COS | A |
| /COS | /A |
| SIN | B |
| /SIN | /B |
| REF | R |
| /REF | /R |

## Connection example



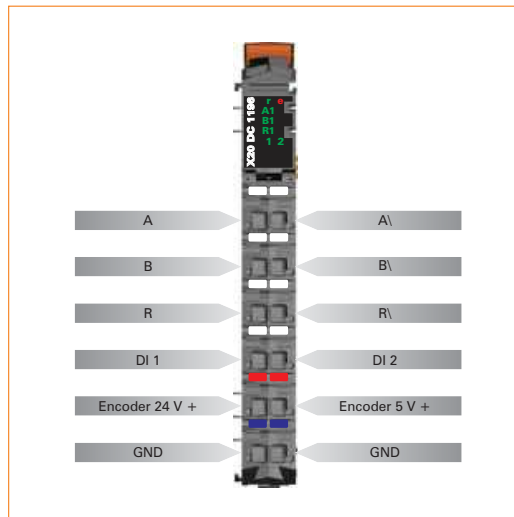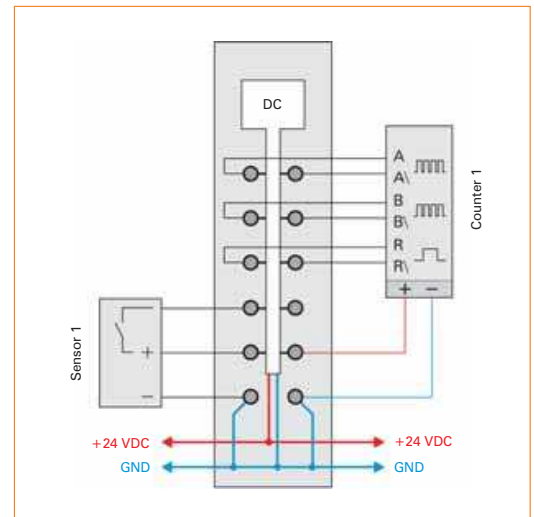| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 88 |

# Counter module
# DC1196



- One 5 V ABR incremental encoder
- 2 additional inputs e.g. for reference enable switch
- 5 VDC, 24 VDC and GND for Encoder supply

| Short description | X20DC1196 |
|---|---|
| I/O module | One 5 V ABR incremental encoder |
| **ABR incremental encoder** | **X20DC1196** |
| Encoder inputs | 5 V, symmetrical |
| Counter size | 16/32-bit |
| Input frequency (max.) | 250 kHz |
| Evaluation | 4x |
| Encoder supply | |
| 5 V | Module-internal, max. 300 mA |
| 24 V | Module-internal, max. 300 mA |
| **Digital inputs** | **X20DC1196** |
| Amount | 2 |
| Rated voltage | 24 VDC |
| Input filter | |
| Hardware | ≤2 µs |
| Software | – |
| Connection type | 3-line connections |
| Input circuit | Sink |
| Additional functions | Reference enable switch |
| **General information** | **X20DC1196** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
| Encoder - Bus | Yes |
| Channel - Bus | Yes |
| Channel - Encoder | No |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DC1196** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DC1196** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DC1196** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| A | A\ |
| B | B\ |
| R | R\ |
| DI 1 | DI 2 |
| Encoder 24 V + | Encoder 5 V + |
| GND | GND |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

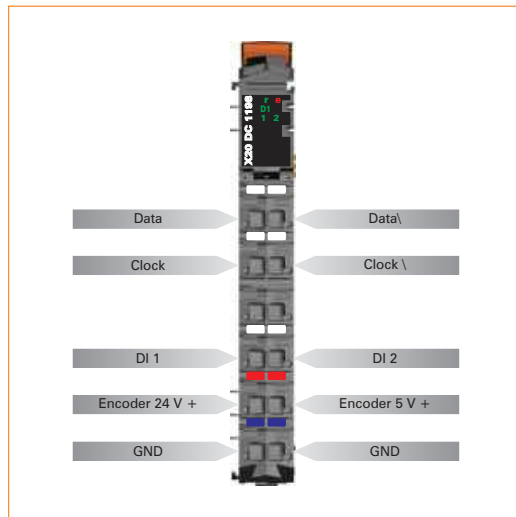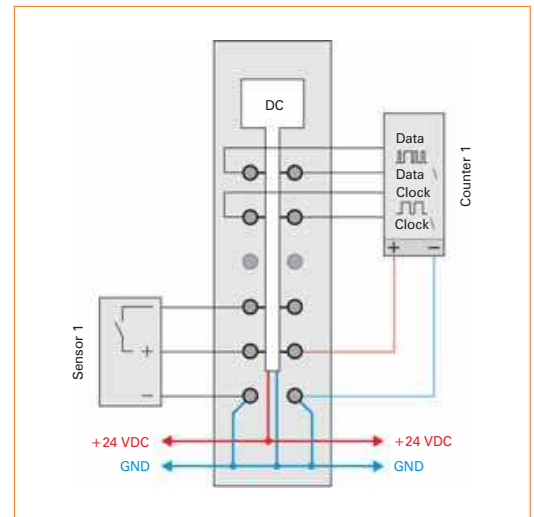# Counter module
# DC1198

- 1 5 V SSI absolute encoders
- 2 additional inputs
- 5 VDC, 24 VDC and GND for encoder supply

| Short description | X20DC1198 |
|---|---|
| I/O module | 1 5 V SSI absolute encoders |
| **SSI absolute encoder** | **X20DC1198** |
| Encoder inputs | 5 V, symmetrical |
| Counter size | 32-bit |
| Maximum transfer rate | 1 MBit/s |
| Encoder supply | |
| 5 V | Module-internal, max. 300 mA |
| 24 V | Module-internal, max. 300 mA |
| **Digital inputs** | **X20DC1198** |
| Amount | 2 |
| Rated voltage | 24 VDC |
| Input filter | |
| Hardware | ≤2 $\mu$s |
| Software | – |
| Connection type | 3-line connections |
| Input circuit | Sink |
| **General information** | **X20DC1198** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
| Encoder - Bus | Yes |
| Channel - Bus | Yes |
| Channel - Encoder | No |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DC1198** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DC1198** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DC1198** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| Data | Data\ |
| Clock | Clock \ |
| DI 1 | DI 2 |
| Encoder 24 V + | Encoder 5 V + |
| GND | GND |

## Connection example



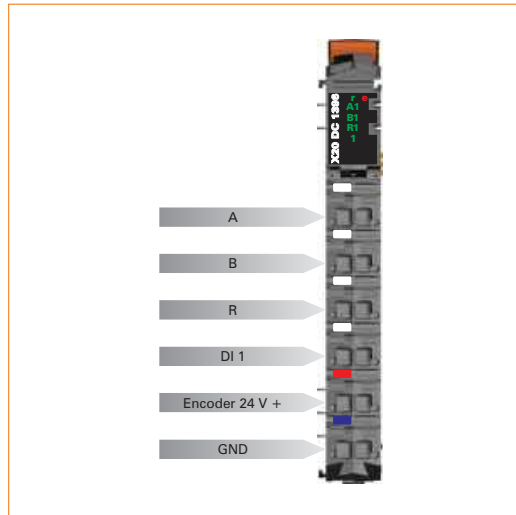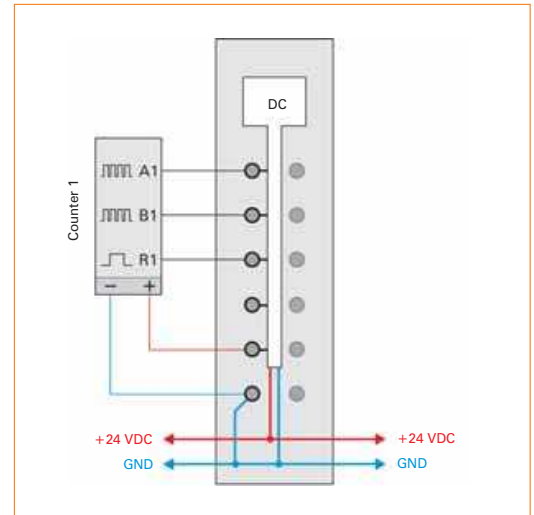| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🖹 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🖹 88 |

# Counter module
## DC1396

- One 24 V ABR incremental encoder
- 1 additional input, e.g. for reference enable switch
- 24 VDC and GND for encoder supply

| Short description | X20DC1396 |
|---|---|
| I/O module | One 24 V ABR incremental encoder |
| **ABR incremental encoder** | **X20DC1396** |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 16/32-bit |
| Input frequency (max.) | 100 kHz |
| Evaluation | 4x |
| Encoder supply | Module-internal, max. 600 mA |
| **Reference enable switch** | **X20DC1396** |
| Amount | 1 |
| Rated voltage | 24 VDC |
| Input filter | |
|     Hardware | ≤2 µs |
|     Software | – |
| Connection type | 3-line connections |
| Input circuit | Sink |
| **General information** | **X20DC1396** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|     Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
|     Encoder - Bus | Yes |
|     Reference enable switch - Bus | Yes |
|     Reference enable switch - Encoder | No |
| Power consumption | |
|     Bus | 0.01 W |
|     I/O internal | 1.4 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DC1396** |
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DC1396** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DC1396** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| A | |
| B | |
| R | |
| DI 1 | |
| Encoder 24 V + | |
| GND | |

## Connection example



Counter 1

DC

A1
B1
R1
– +

+24 VDC → +24 VDC
GND → GND

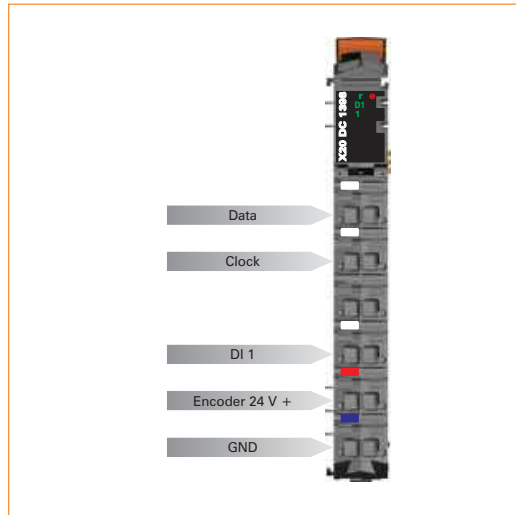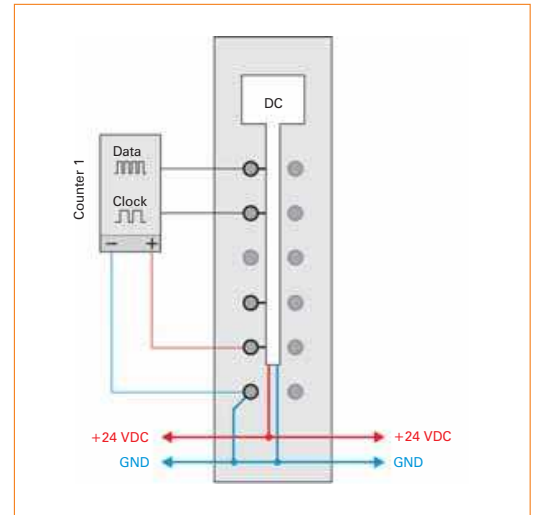| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Counter module
# DC1398



- 1 24 V SSI absolute encoders
- 1 additional input
- 24 VDC and GND for encoder supply

| Short description | X20DC1398 |
|---|---|
| I/O module | 1 24 V SSI absolute encoders |
| **SSI absolute encoder** | **X20DC1398** |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 32-bit |
| Maximum transfer rate | 125 kBit/s |
| Encoder supply | Module-internal, max. 600 mA |
| **Digital inputs** | **X20DC1398** |
| Amount | 1 |
| Rated voltage | 24 VDC |
| Input filter | |
|    Hardware | $\leq 2\ \mu s$ |
|    Software | – |
| Connection type | 3-line connections |
| Input circuit | Sink |
| **General information** | **X20DC1398** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
|    Encoder - Bus | Yes |
|    Channel - Bus | Yes |
|    Channel - Encoder | No |
| Power consumption | |
|    Bus | 0.01 W |
|    I/O internal | 1.3 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DC1398** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DC1398** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DC1398** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



Data

Clock

DI 1

Encoder 24 V +

GND

## Connection example



Counter 1

Data

Clock

DC

+24 VDC

GND

+24 VDC

GND

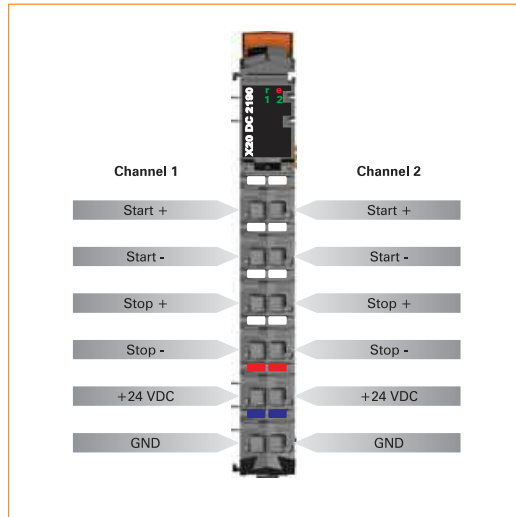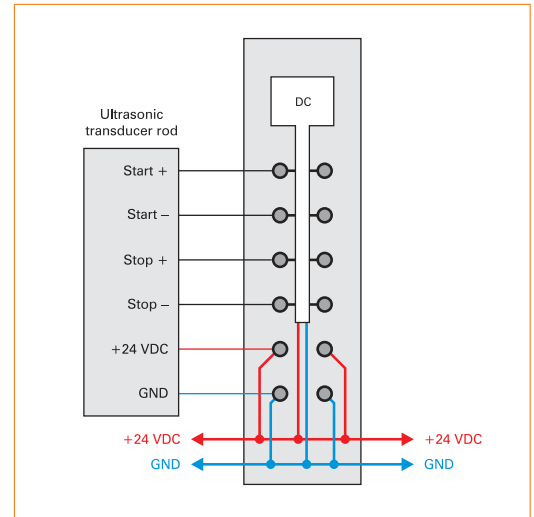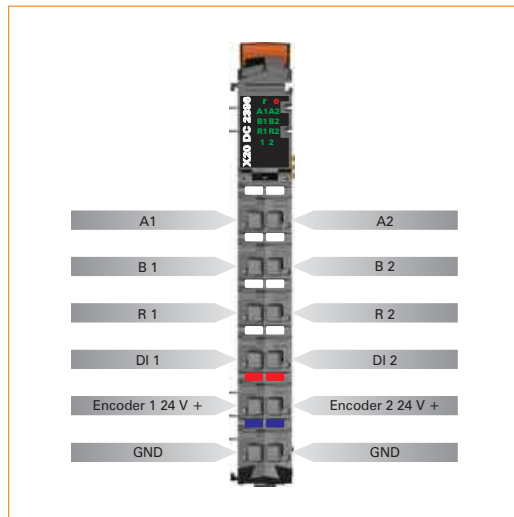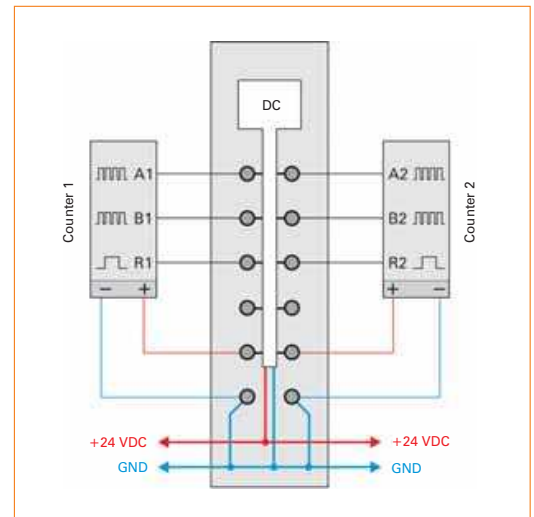| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 88 |

# Counter module
# DC2190



- Ultrasonic transducer module
- Path measurement (resolution at least 10 $\mu$m)
- Speed measurement (resolution at least 100 $\mu$m/s)
- 1, 2, 3 and 4 magnetic bar measurements possible
- DPI/IP protocol supported

| Short description | X20DC2190 |
|---|---|
| I/O module | Ultrasonic transducer module, 2 transducer rods, 4 path evaluation, speed measurement |
| **Channels for path and speed measurements** | **X20DC2190** |
| Number of channels | 2 |
| Supported encoder types | Start/Stop interface |
| | EP start/stop - interface |
| | DPI/IP interface |
| Encoder supply | 24 VDC internal supply, with configurable overvoltage/undervoltage monitoring |
| | (±10%, ±15%, ±20%, ±25%) |
| Input and output level | RS422 differential level |
| Multi-magnet measurement | Yes, in combinations per rod, max. 4 magnets total |
| Outputs | 1.6 $\mu$s durational initialization pulse |
| Inputs | |
| Path measurement | Resolution = 0.01 mm, measurement range= ±5.2 m |
| Speed measurement | Resolution = 0.1 mm/s, measurement range = ±3.2 m/s |
| Accuracy | ±50 ppm ±5 ppm/year |
| **General information** | **X20DC2190** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
| Channel - Bus | Yes |
| Channel - Channel | No |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 1.1 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DC2190** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DC2190** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DC2190** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



**Channel 1**

| | |
|---|---|
| Start + | |
| Start - | |
| Stop + | |
| Stop - | |
| +24 VDC | |
| GND | |

**Channel 2**

| | |
|---|---|
| Start + | |
| Start - | |
| Stop + | |
| Stop - | |
| +24 VDC | |
| GND | |

## Connection example



Ultrasonic transducer rod

DC

Start +
Start −
Stop +
Stop −
+24 VDC
GND

+24 VDC          +24 VDC
GND              GND

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 88 |

# Counter module
# DC2396

- Two 24 V ABR incremental encoders
- 2 additional inputs, e.g. for Reference enable switch
- 24 VDC and GND for encoder supply

| Short description | X20DC2396 |
|---|---|
| I/O module | Two 24 V ABR incremental encoders |
| **ABR incremental encoder** | **X20DC2396** |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 16/32-bit |
| Input frequency (max.) | 100 kHz |
| Evaluation | 4x |
| Encoder supply | Module-internal, max. 600 mA |
| **Reference enable switch** | **X20DC2396** |
| Amount | 2 |
| Rated voltage | 24 VDC |
| Input filter | |
| Hardware | ≤2 $\mu$s |
| Software | – |
| Connection type | 3-line connections |
| Input circuit | Sink |
| **General information** | **X20DC2396** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
| Encoder - Bus | Yes |
| Reference enable switch - Bus | Yes |
| Reference enable switch - Encoder | No |
| Encoder - Encoder | No |
| Reference switch - Reference switch | No |
| Power consumption | |
| Bus | 0.01 W |
| I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DC2396** |
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DC2396** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DC2396** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| A1 | A2 |
| B 1 | B 2 |
| R 1 | R 2 |
| DI 1 | DI 2 |
| Encoder 1 24 V + | Encoder 2 24 V + |
| GND | GND |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ≙ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ≙ 88 |

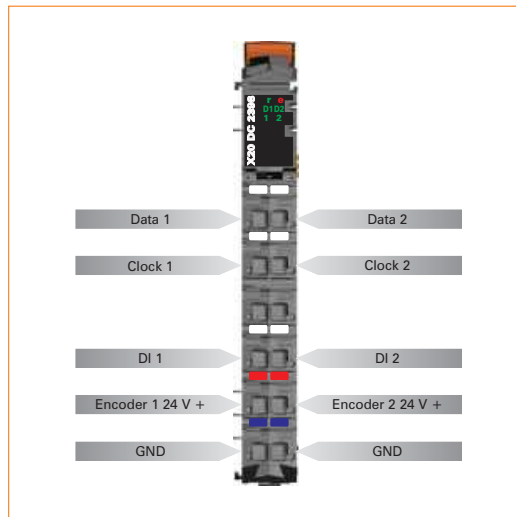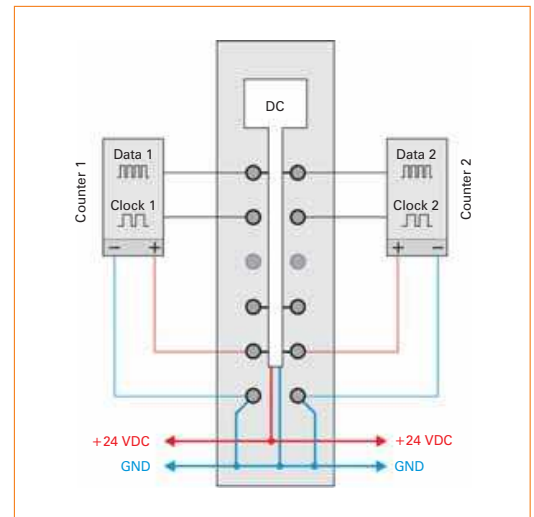# Counter module
# DC2398



- 2 24 V SSI absolute encoders
- 2 additional inputs
- 24 VDC and GND for encoder supply

| Short description | X20DC2398 |
|---|---|
| I/O module | 2 24 V SSI absolute encoders |
| **SSI absolute encoder** | **X20DC2398** |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 32-bit |
| Maximum transfer rate | 125 kBit/s |
| Encoder supply | Module-internal, max. 600 mA |
| **Digital inputs** | **X20DC2398** |
| Amount | 2 |
| Rated voltage | 24 VDC |
| Input filter | |
|    Hardware | ≤2 µs |
|    Software | – |
| Connection type | 3-line connections |
| Input circuit | Sink |
| **General information** | **X20DC2398** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
| Electrical isolation | |
|    Encoder - Bus | Yes |
|    Channel - Bus | Yes |
|    Channel - Encoder | No |
|    Encoder - Encoder | No |
|    Channel - Channel | No |
| Power consumption | |
|    Bus | 0.01 W |
|    I/O internal | 1.4 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DC2398** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DC2398** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DC2398** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



| | |
|---|---|
| Data 1 | Data 2 |
| Clock 1 | Clock 2 |
| DI 1 | DI 2 |
| Encoder 1 24 V + | Encoder 2 24 V + |
| GND | GND |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | ▤ 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | ▤ 88 |

# Counter module
# DC2395

The DC2395 module is a multifunctional counter module. It can be connected to an SSI encoder, an ABR encoder, two AB encoders, or four event counters.
Two outputs are available for pulse width modulation. The functions can also be mixed.

- 24 VDC encoder inputs
- SSI, ABR, AB or event counters for inputs
- Pulse width modulation for outputs
- 24 VDC and GND for encoder supply

| Short description | X20DC2395 |
| --- | --- |
| I/O module | 1 SSI absolute encoders, 24 V, 1 ABR incremental encoders, 24 V, 2 AB incremental encoders, 24 V, 4x event counters or 2x pulse width modulation, time measurement, relative time stamp |
| **SSI absolute encoder** | **X20DC2395** |
| Amount | 1 |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 32-bit |
| Maximum transfer rate | 125 kBit/s |
| Encoder supply | Module-internal, max. 600 mA |
| **Incremental encoder** | **X20DC2395** |
| Amount | 2 |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 16/32-bit |
| Input frequency (max.) | 100 kHz |
| Evaluation | 4x |
| Encoder supply | Module-internal, max. 600 mA |
| **Event counter** | **X20DC2395** |
| Amount | 4 |
| Rated voltage | 24 VDC |
| Counter size | 16-bit |
| Input frequency (max.) | 100 kHz |
| Evaluation | Each edge, cyclic counter |
| Signal form | Square wave pulse |
| **Time measurement** | **X20DC2395** |
| Possible measurements | Gate time, period duration, edge offset for various channels |
| Measurements per module | Up to 9 |
| Measurements per channel | Up to 2 |
| Counter size | 16-bit |
| Internal counter frequency | 8 MHz, 4 MHz, 2 MHz, 1 MHz, 500 kHz, 250 kHz, 125 kHz, 62.5 kHz |
| Signal form | Square wave pulse |
| Measurement type | Continuous or triggered |
| **Digital outputs** | **X20DC2395** |
| Amount | 2 |
| Rated voltage | 24 VDC |
| Rated output current | 0.1 A |
| Total current | 0.2 A |
| Output circuit | Sink or source |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| Pulse width modulation[1] | |
| Period duration | 41.6 $\mu$s to 1.36 s |
| Factor for period duration | n/48000 s, n = 2 to 65535 |
| Pulse length | 0 to 100% |
| Resolution for pulse length | 0.1% |
| Actuator supply | Module-internal, max. 600 mA |

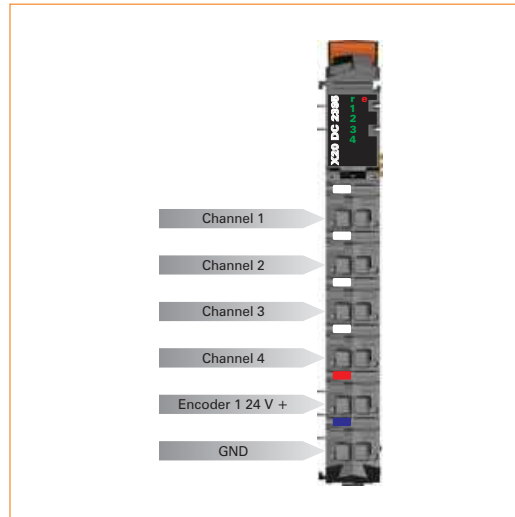1) Dead time when switching between push and pull: Max 1.5 $\mu$s

| General information | X20DC2395 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Outputs | Yes, with status LED and software status (output status) |
| Electrical isolation | |
|    Encoder - Bus | Yes |
|    Output - Bus | Yes |
|    Output - Encoder | No |
|    Encoder - Encoder | No |
|    Output - Output | No |
| Power consumption | |
|    Bus | 0.01 W |
|    I/O internal | 1.4 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DC2395** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DC2395** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DC2395** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

Note:     This module is a multi-function module. Some bus controllers only support the default function model described below. This is indicated in the documentation for the individual bus controllers.
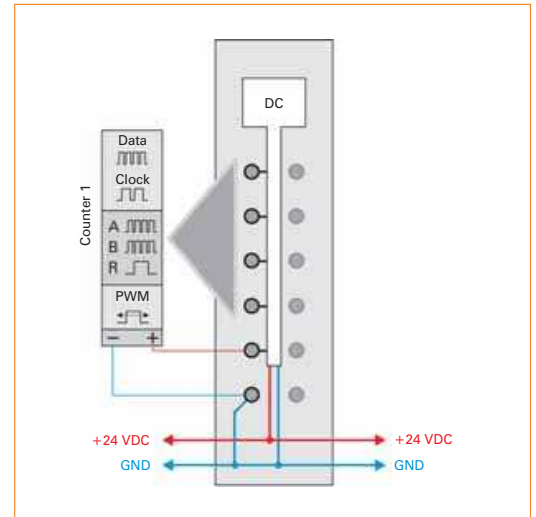
Default function model:
- 2x event counter (24 V)
- 2x PWM output (24 V)

# Counter module
# DC2395

## Pin assignments



Channel 1
Channel 2
Channel 3
Channel 4
Encoder 1 24 V +
GND

## Connection example



DC

Data
Clock
A
B
R
PWM
− +

Counter 1

+24 VDC
GND

+24 VDC
GND

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🕮 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🕮 88 |

# Counter module
# DC4395

The DC4395 module is a multifunctional counter module. It can be connected to two SSI encoders, two ABR encoders, four AB encoders, or eight event counters.

Four outputs are available for pulse width modulation. The functions can also be mixed.

- 24 VDC encoder inputs
- SSI, ABR, AB or event counters for inputs
- Pulse width modulation for outputs
- 24 VDC and GND for encoder supply

| Short description | X20DC4395 |
| --- | --- |
| I/O module | 2 SSI absolute encoders, 24 V, 2 ABR incremental encoders, 24 V, 4 AB incremental encoders, 24 V, 8x event counters or 4x pulse width modulation, time measurement, relative time stamp |
| **SSI absolute encoder** | **X20DC4395** |
| Amount | 2 |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 32-bit |
| Maximum transfer rate | 125 kBit/s |
| Encoder supply | Module-internal, max. 600 mA |
| **Incremental encoder** | **X20DC4395** |
| Amount | 4 |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 16/32-bit |
| Input frequency (max.) | 100 kHz |
| Evaluation | 4x |
| Encoder supply | Module-internal, max. 600 mA |
| **Event counter** | **X20DC4395** |
| Amount | 8 |
| Rated voltage | 24 VDC |
| Counter size | 16-bit |
| Input frequency (max.) | 100 kHz |
| Evaluation | Each edge, cyclic counter |
| Signal form | Square wave pulse |
| **Time measurement** | **X20DC4395** |
| Possible measurements | Gate time, period duration, edge offset for various channels |
| Measurements per module | Up to 9 |
| Measurements per channel | Up to 2 |
| Counter size | 16-bit |
| Internal counter frequency | 8 MHz, 4 MHz, 2 MHz, 1 MHz, 500 kHz, 250 kHz, 125 kHz, 62.5 kHz |
| Signal form | Square wave pulse |
| Measurement type | Continuous or triggered |
| **Digital outputs** | **X20DC4395** |
| Amount | 4 |
| Rated voltage | 24 VDC |
| Rated output current | 0.1 A |
| Total current | 0.4 A |
| Output circuit | Sink or source |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| Pulse width modulation[1] | |
|     Period duration | 41.6 $\mu$s to 1.36 s |
|     Factor for period duration | n/48000 s, n = 2 to 65535 |
|     Pulse length | 0 to 100% |
|     Resolution for pulse length | 0.1% |
| Actuator supply | Module-internal, max. 600 mA |

1) Dead time when switching between push and pull: Max 1.5 $\mu$s

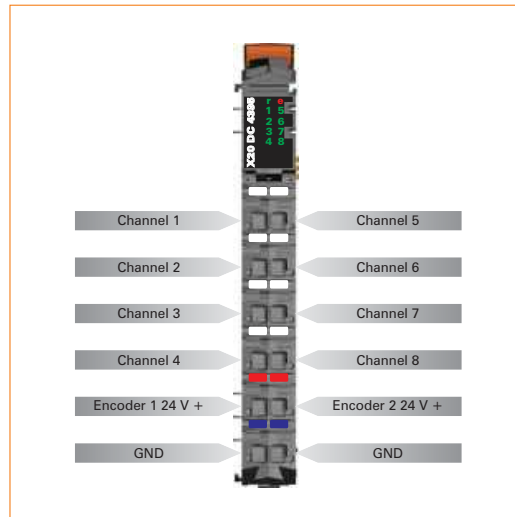| General information | X20DC4395 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED and software status |
|    Outputs | Yes, with status LED and software status (output status) |
| Electrical isolation | |
|    Encoder - Bus | Yes |
|    Output - Bus | Yes |
|    Output - Encoder | No |
|    Encoder - Encoder | No |
|    Output - Output | No |
| Power consumption | |
|    Bus | 0.01 W |
|    I/O internal | 1.5 W |
| Certification | CE, C-UL-US, GOST-R |
| **Operational conditions** | **X20DC4395** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DC4395** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DC4395** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

Note:      This module is a multi-function module. Some bus controllers only support the default function model described below. This is indicated in the documentation for the individual bus controllers.
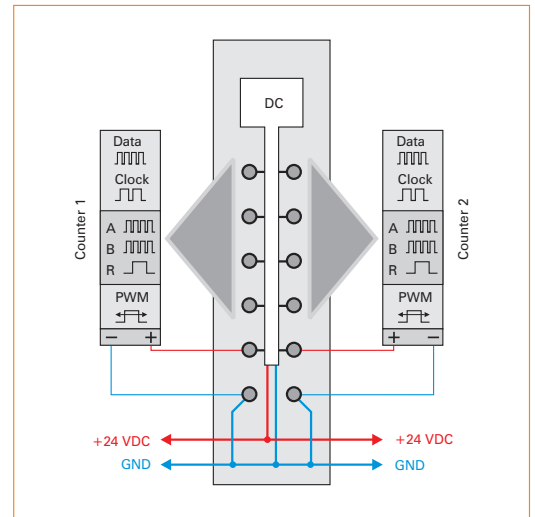
            Default function model:
- 1x ABR incremental encoder (24 V)
- 1x SSI absolute encoder (24 V)
- 1x event counter (24 V)
- 2x PWM output (24 V)

# Counter module
# DC4395

## Pin assignments



| | |
|---|---|
| Channel 1 | Channel 5 |
| Channel 2 | Channel 6 |
| Channel 3 | Channel 7 |
| Channel 4 | Channel 8 |
| Encoder 1 24 V + | Encoder 2 24 V + |
| GND | GND |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

# Counter module
# DS1119



The DS1119 is a multifunctional digital signal processor module. It's flexibility allows it to be implemented for a wide range of tasks involving the creation or processing of digital signals. For example, two main uses include encoder emulation and controlling stepper output stages with pulse and direction signals. When used for encoder emulation, frequency inverters or servo axes with the speed follow function can follow a real or virtual master axis.

A further important feature is the time stamp function, which is integrated in the module. It can be used, for example, to create ramp curves for the counter in the encoder emulation virtually independent of bus cycle times. Only the target counter value and the time that it should be reached must be entered. The module generates the appropriate counter values, precisely in microsecond resolution and independently of the bus clock.
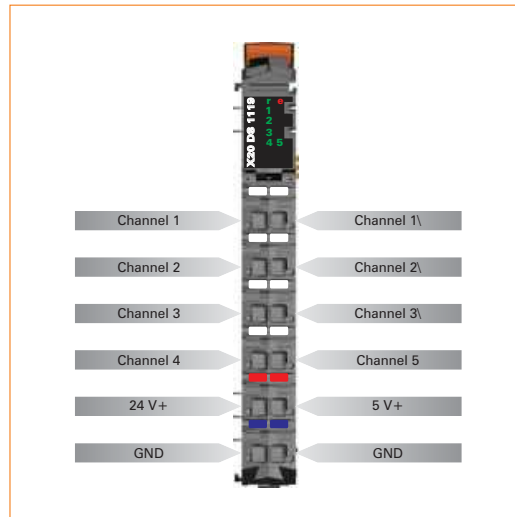
- 3 digital 5 V channels, can be configured as input or output
- 2 digital 24 V input channels
- Up to 2 event counters
- 1 universal counter pair, can be configured as A/B counter or as up/down counter
- Linear movement generator (A/B; direction/frequency) with one reference pulse
- SSI absolute encoder

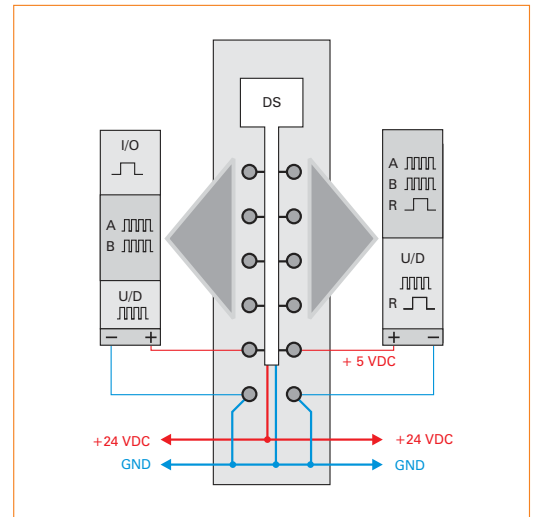| Short description | X20DS1119 |
|---|---|
| I/O module | 3 digital 5 V (symmetric) channels that can be configured as inputs or outputs, 2 digital 24 V (asymmetric) input channels, max. 2 event counters, 1 universal counter pair that can be configured as A/B counter or up/down counter, linear movement generator (A/B; dir./freq.) with one reference pulse, SSI absolute encoder |
| **Digital inputs 5 VDC** | **X20DS1119** |
| Amount | Up to 3, configuration as input or output takes place using software |
| Rated voltage | 5 VDC differential signal, EiA RS-485 standard |
| Input frequency | 250 kHz |
| Additional functions for inputs | AB counter, SSI absolute encoder, event counter, up/down counter |
| **Digital inputs 24 VDC** | **X20DS1119** |
| Amount | 2 |
| Rated voltage | 24 VDC |
| Input frequency | 100 kHz |
| Input circuit | Sink |
| Additional functions for inputs | Reference enable input for A/B, event counting, latch function |
| **Digital outputs 5 VDC** | **X20DS1119** |
| Amount | Up to 3, configuration as input or output takes place using software |
| Type | 5 VDC differential signal, EiA RS-485 standard |
| Output circuit | Sink and/or source |
| Output protection | Short circuit protection |
| **Universal counter pair** | **X20DS1119** |
| Amount | 1 |
| Operating mode | 2x event counter, up/down counter, A/B counter |
| Encoder inputs | 5 V, symmetrical |
| Counter size | 16/32-bit |
| Input frequency (max.) | 250 kHz |
| Evaluation | |
|   AB counter | 4x |
|   Up/down counter, event counter | 2x |
| Encoder supply | |
|   5 VDC | Module-internal, max. 300 mA |
|   24 VDC | Module-internal, max. 300 mA |
| **SSI absolute encoder** | **X20DS1119** |
| Amount | 1 |
| Encoder inputs | 5 V, symmetrical |
| Counter size | 16/32-bit |
| Maximum transfer rate | 1 MBit/s |
| Encoder supply | |
|   5 VDC | Module-internal, max. 300 mA |
|   24 VDC | Module-internal, max. 300 mA |
| **Linear movement generator** | **X20DS1119** |
| Amount | 1 |
| Encoder outputs | 5 V, symmetric (A/B; direction/frequency) |
| Counter size | 16/32-bit |

| General information | X20DS1119 |
|---|---|
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Inputs/outputs | Yes, with status LED |
| Electrical isolation | |
|   Encoder - Bus | Yes |
|   Output - Bus | Yes |
|   Output - Encoder | No |
|   Encoder - Encoder | No |
|   Output - Output | No |
| Power consumption | |
|   Bus | Typ. 0.01 W |
|   I/O internal | Typ. 1.5 W |
| Certification | CE, C-UL-US (in development), GOST-R |
| **Operational conditions** | **X20DS1119** |
| Operating temperature | |
|   Horizontal installation | 0°C to +55°C |
|   Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|   0 - 2000 m | No derating |
|   >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20DS1119** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20DS1119** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

# Counter module
# DS1119

## Pin assignments



| | |
|---|---|
| Channel 1 | Channel 1\ |
| Channel 2 | Channel 2\ |
| Channel 3 | Channel 3\ |
| Channel 4 | Channel 5 |
| 24 V+ | 5 V+ |
| GND | GND |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 🗎 88 |

# Counter module
# DS1319

The DS1319 is a multifunctional digital signal processor module. It's flexibility allows it to be implemented for a wide range of tasks involving the creation or processing of digital signals. For example, two main uses include encoder emulation and controlling stepper output stages with pulse and direction signals. When used for encoder emulation, frequency inverters or servo axes with the speed follow function can follow a real or virtual master axis.
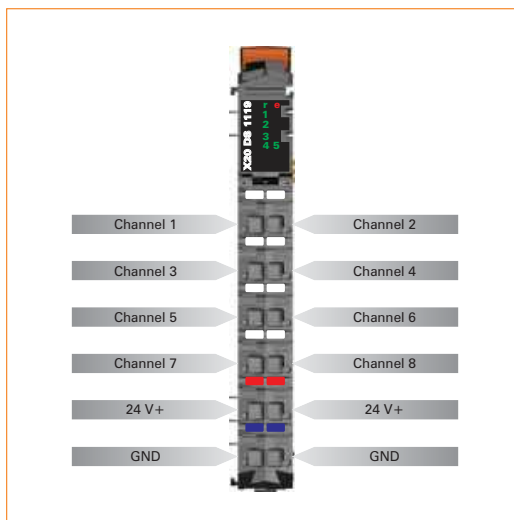
A further important feature is the time stamp function, which is integrated in the module. It can be used, for example, to create ramp curves for the counter in the encoder emulation virtually independent of bus cycle times. Only the target counter value and the time that it should be reached must be entered. The module generates the appropriate counter values, precisely in microsecond resolution and independently of the bus clock.

- 4 digital input channels
- 4 digital channels, can be configured as inputs or outputs
- Up to 2 event counters
- 1 universal counter pair, can be configured as A/B counter or as up/down counter
- Linear movement generator (A/B; direction/frequency) with up to two reference pulses
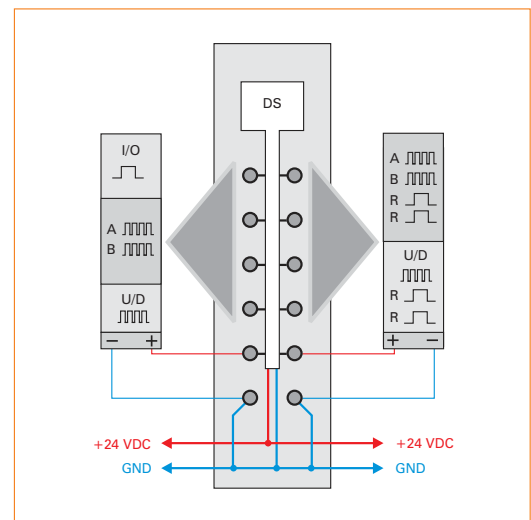- SSI absolute encoder

| Short description | X20DS1319 |
|---|---|
| I/O module | 4 digital input channels, 4 digital channels that can be configured as input or output, |
| | max. 2 event counters, 1 universal counter pair that can be configured as A/B encoder or up/down counter, |
| | linear movement generator (A/B; direction/frequency) with up to two reference pulses, SSI absolute encoder |
| **Digital inputs** | **X20DS1319** |
| Amount | 8 |
| Rated voltage | 24 VDC |
| Input frequency | 100 kHz |
| Input circuit | Sink |
| Additional functions for inputs | AB counter, SSI abs. encoder, event counter, up/down counter, ref. enable for A/B counter, latch function |
| **Digital outputs** | **X20DS1319** |
| Amount | 4 |
| Rated voltage | 24 VDC |
| Rated output current | 0.1 A |
| Total current | 0.4 A |
| Output circuit | Sink and/or source |
| Output protection | Thermal cutoff for overcurrent and short circuit, integrated protection for switching inductances |
| **Universal counter pair** | **X20DS1319** |
| Amount | 1 |
| Operating mode | 2x event counter, up/down counter, A/B counter |
| Encoder inputs | 24 V, asymmetrical |
| Counter size | 16/32-bit |
| Input frequency (max.) | 100 kHz |
| Evaluation | |
|   AB counter | 4x |
|   Up/down counter, event counter | 2x |
| Signal form | Square wave pulse |
| Encoder supply | Module-internal, max. 600 mA |
| **SSI absolute encoder** | **X20DS1319** |
| Amount | 1 |
| Rated voltage | 24 V, asymmetrical |
| Counter size | 16/32-bit |
| Maximum transfer rate | 125 kBit/s |
| Encoder supply | Module-internal, max. 600 mA |
| **Linear movement generator** | **X20DS1319** |
| Amount | 1 |
| Encoder outputs | 24 V, asymmetric (A/B; direction/frequency) |
| Counter size | 16/32-bit |
| **General information** | **X20DS1319** |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
|   Module run/error | Yes, with status LED and software status |
|   Inputs/outputs | Yes, with status LED |
| Electrical isolation | |
|   Encoder - Bus | Yes |
|   Output - Bus | Yes |
|   Output - Encoder | No |
|   Encoder - Encoder | No |
|   Output - Output | No |
| Power consumption | |
|   Bus | Typ. 0.01 W |
|   I/O internal | Typ. 1.5 W |
| Certification | CE, C-UL-US, GOST-R |

| Operational conditions | X20DS1319 |
|---|---|
| Operating temperature | |
| Horizontal installation | 0°C to +55°C |
| Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
| 0 - 2000 m | No derating |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| Storage and transport conditions | X20DS1319 |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mechanical characteristics | X20DS1319 |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order bus module 1x X20BM11 separately |

## Pin assignments



Channel 1 — Channel 2
Channel 3 — Channel 4
Channel 5 — Channel 6
Channel 7 — Channel 8
24 V+ — 24 V+
GND — GND

## Connection example



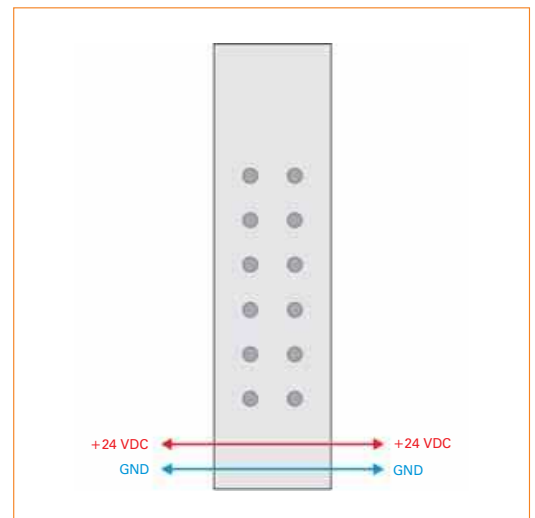| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 📄 94 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 📄 88 |

# Dummy module
# ZF0000

- Place holder for later system expansion
- Used as a terminal holder
- Module with no electrical function

| Short description | X20ZF0000 |
|---|---|
| Accessories | Non-functional dummy module |
| **Operational conditions** | **X20ZF0000** |
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20ZF0000** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20ZF0000** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB06 or X20TB12 separately |
| | Order bus module 1x X20BM11 or supply bus module 1x X20BM01 separately |

## Pin assignments



## Connection example



+24 VDC → ← +24 VDC
GND ← → GND

| Required accessories | | |
|---|---|---|
| X20TB06 | X20 terminal block, 6-pin, 24 V coded | 94 |
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |
| X20BM01 | X20 supply bus module, internal I/O supply is isolated to the left | 86 |
| X20BM11 | X20 bus module, 24 V coded, internal I/O supply is interconnected | 88 |

# Hub base module
# HB8880



LED status indicator

Slot for
hub expansion module

Ethernet connection with
2x RJ45 connectors for simple
wiring

Terminal block for
hub supply

The X20 hub HB8880 is a device that can be used universally in standard Ethernet networks or POWERLINK networks. It is suitable for 100 MBit/s (Fast Ethernet) networks.

The Ethernet connections are made using RJ45 connectors. The expanded bus modules allow up to two hub expansion modules to be mounted next to the hub base module. Each expansion module is equipped with two RJ45 connections. Together with the main device, this means that up to six hub ports are available.

- 2/4/6x Fast Ethernet Hub
- Modular design
- Easily expandable



| Short description | X20HB8880 |
|---|---|
| Hub | Modular X20 hub with up to two slots for hub expansion modules |
| **Interface** | **X20HB8880** |
| Type | Ethernet |
| Signal | 100 Base-TX |
| Port design | Shielded RJ45 ports |
| Transfer rate | 100 MBit/s |
| | Auto-MDI/MDIX |
| Cable length | Max. 100 m between two stations (segment length) |
| **General information** | **X20HB8880** |
| Status indicators | Module status, bus function |
| Diagnostics | |
|    Module status | Yes, with status LED |
|    Bus function | Yes, with status LED |
| Electrical isolation | |
|    Fieldbus supply | Yes |
| Power consumption | 2.0 W |
| Certification | CE, C-UL-US (in development), GOST-R |

| Operational conditions | X20HB8880 |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0°C to +55°C |
|    Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20HB8880** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20HB8880** |
| Grid size [1] | |
|    X20BB80 | 37.5 $^{+0.2}$ mm |
|    X20BB81 | 62.5 $^{+0.2}$ mm |
|    X20BB82 | 87.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS8002 separately |
| | Order 1x X20BB8x bus base separately |

1) The spacing is based on the width of the X20BB8x bus base. Up to two X20HB2880 hub expansion modules and one X20PS8002 supply module are also always required for the hub.

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20PS8002 | X20 supply module for stand alone hub and compact link selector | 🗎 384 |
| X20BB80 | X20 bus base, for X20 base module (BC, HB,etc.) and X20 supply module, X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included | 🗎 170 |
| X20BB81 | X20 bus base with 1 expansion slot, for X20 base module (BC, HB, etc.) and one X20 auxiliary module (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 184 |
| X20BB82 | X20 bus base with 2 expansion slots, for X20 base module (BC, HB, etc.) and two X20 auxiliary modules (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 185 |

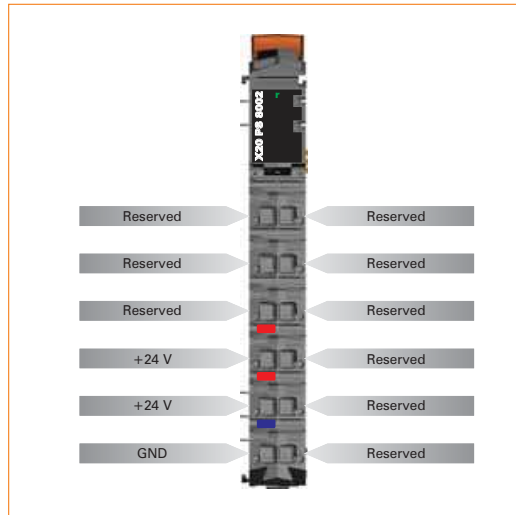| Optional accessories | | |
|---|---|---|
| X20HB2880 | X20 hub expansion module, 2x hub connection, status indicator LEDs, 2x RJ45 connection | 🗎 187 |

# Supply module
# PS8002

The PS8002 supply module is used to supply X20 stand-alone devices. These include e.g. the HB8884 X20 POWER-LINK compact link selector and the HB8880 X20 stand-alone hub.
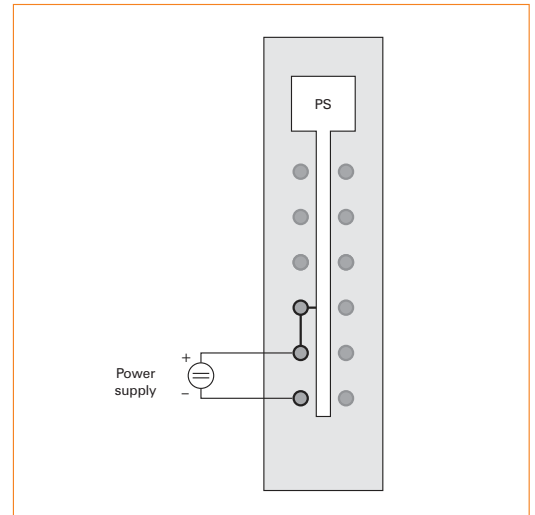
- Supply for X20 stand alone devices
- No electrical isolation between the module supply and the device supply

| Short description | X20PS8002 |
|---|---|
| Power supply module | 24 VDC supply module for X20 stand alone devices |
| **Input supply** | **X20PS8002** |
| Input voltage | 24 VDC (-15% / +20%) |
| Input current | Max. 0.7 A |
| Reverse polarity protection | Yes |
| Fuse | Integrated, cannot be exchanged |
| **Output supply** | **X20PS8002** |
| Rated output power | |
|    Horizontal installation | 7.0 W at 45℃ and 5.0 W at 55℃ |
|    Vertical installation | 7.0 W at 40℃ and 5.0 W at 50℃ |
| **General information** | **X20PS8002** |
| Status indicators | Operating status, module status |
| Diagnostics | |
|    Module run/error | Yes, with status LED |
|    Overload | Yes, with status LED |
| Electrical isolation | |
|    Module supply - device supply | No |
| Power consumption [1] | 1.34 W |
| Certification | CE, C-UL-US (in development), GOST-R |

1) The specified values are maximum values. The exact calculation is available for download as a data sheet with the other module documentation on the B&R homepage.

| Operational conditions | X20PS8002 |
|---|---|
| Operating temperature | |
|    Horizontal installation | 0℃ to +55℃ |
|    Vertical installation | 0℃ to +50℃ |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|    0 - 2000 m | No derating |
|    >2000 m | Reduction of ambient temperature by 0.5℃ per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20PS8002** |
| Temperature | -25℃ to +70℃ |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20PS8002** |
| Spacing | 12.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |

## Pin assignments



| | |
|---|---|
| Reserved | Reserved |
| Reserved | Reserved |
| Reserved | Reserved |
| +24 V | Reserved |
| +24 V | Reserved |
| GND | Reserved |

## Connection example



| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 94 |

# POWERLINK compact link selector
# HB8884

POWERLINK is a standard protocol for Fast Ethernet with true real-time properties. The Ethernet POWERLINK Standardization Group (EPSG, www.ethernet-powerlink. org) ensures that the standard remains open and is continually developed.

Using POWERLINK, systems with redundant cabling can be implemented. Unlike ring redundancy, cable looping, which can sometimes be problematic, is not required for cable redundancy. This allows the creation of all types of tree structures. When using a device with the link selector function, data is always transferred via the highest quality network lines. The link selector function is integrated in the HB8884 compact link selector. This makes it easy to connect any POWERLINK V2 device to a redundant POWERLINK V2 network (see sections "POWERLINK cable redundancy system", on page ⧉ 57 and "X20 redundancy system", on page ⧉ 57).

- Connecting POWERLINK V2 devices to the POWERLINK cable redundancy system
- Integrated compact link selector function



LED status indicator

Node number switches

Slot for
hub expansion module

Terminal block for
Compact Link Selector
supply

POWERLINK connection with
2x RJ45 for easy wiring



ETHERNET
**POWERLINK**

| Short description | X20HB8884 |
|---|---|
| POWERLINK compact link selector | Connecting POWERLINK V2 devices to a redundant POWERLINK V2 network |
| **Fieldbus** | **X20HB8884** |
| Type | POWERLINK V2 100 Base-T (ANSI/IEE 802.3) |
| Design | Internal 2x hub, 2x shielded RJ45 port |
| Cable length | Max. 100 m between two stations (segment length) |
| Transfer rate | 100 MBit/s |
| **General information** | **X20HB8884** |
| Status indicators | Module status, bus function |
| Diagnostics | |
| Module status | Yes, with status LED |
| Bus function | Yes, with status LED |
| Electrical isolation | |
| Fieldbus supply | Yes |
| Power consumption of the bus | 2.0 W |
| Certification | CE, C-UL-US (in development), GOST-R |

| Operational conditions | X20HB8884 |
|---|---|
| Operating temperature | |
|     Horizontal installation | 0°C to +55°C |
|     Vertical installation | 0°C to +50°C |
| Relative humidity | 5 to 95%, non-condensing |
| Mounting orientation | Horizontal or vertical |
| Installation at altitudes above sea level | |
|     0 - 2000 m | No derating |
|     >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Protection type | IP20 |
| **Storage and transport conditions** | **X20HB8884** |
| Temperature | -25°C to +70°C |
| Relative humidity | 5 to 95%, non-condensing |
| **Mechanical characteristics** | **X20HB8884** |
| Grid size [1] | |
|     X20BB81 | 62.5 $^{+0.2}$ mm |
|     X20BB82 | 87.5 $^{+0.2}$ mm |
| Comment | Order terminal block 1x X20TB12 separately |
| | Order supply module 1x X20PS8002 separately |
| | Order 1x X20HB2880 or 2x X20HB2885 hub expansion module separately |
| | Order 1x X20BB81 or X20BB82 bus base separately |

1) The spacing is based on the width of the X20BB81 or X20BB82 bus base. One X20HB2880 hub expansion module or two X20HB2885 hub expansion modules and an X20PS8002 supply module are also always required for the compact link selector.

| Required accessories | | |
|---|---|---|
| X20TB12 | X20 terminal block, 12-pin, 24 V coded | 🗎 94 |
| X20PS8002 | X20 supply module for stand alone hub and compact link selector | 🗎 384 |
| X20HB2880 | X20 hub expansion module, 2x hub connection, status indicator LEDs, 2x RJ45 connection | 🗎 187 |
| X20HB2885 | X20 hub expansion module, integrated active 2x hub, status indicator LEDs, 2x RJ45 connection | 🗎 188 |
| X20BB81 | X20 bus base with 1 expansion slot, for X20 base module (BC, HB, etc.) and one X20 auxiliary module (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 184 |
| X20BB82 | X20 bus base with 2 expansion slots, for X20 base module (BC, HB, etc.) and two X20 auxiliary modules (IF, HB, etc.) and X20 supply module, X20 end plates (left and right), X20AC0SL1/X20AC0SR1 included | 🗎 185 |

# Accessories



X20 AC 0AX1

X20 AC 0SC1

X20 AC 0SH1

## Cover holder, terminal locking clip



| Model number | Short description |
|---|---|
| X20AC0SC1 | X20 terminal locking clip and cover holder for plain text cover. |
| X20AC0SC1.0100 | X20 terminal locking clip and cover holder for plain text cover, 100 pcs. package |

## Plain text cover



| Model number | Short description |
|---|---|
| X20AC0SH1 | X20 plain text cover |
| X20AC0SH1.0100 | X20 plain text insert, 100 pcs. package |
| X20AC0LB1.0100 | X20 legend strips for X20 plain text cover, paper, white, perforated, 96 strips on A4 sheets, 100 sheets per package |

## Additional locking clip



| Model number | Short description |
|---|---|
| X20AC0AX1 | X20 additional locking clip |
| X20AC0AX1.0100 | X20 additional locking clip, 100 pcs. package |

## Locking plate

| Model number | Short description |
| --- | --- |
| X20AC0SL1 | X20 locking plate (left) |
| X20AC0SR1 | X20 locking plate (right) |
| X20AC0SL1.0010 | X20 locking plate (left), 10 pcs. package |
| X20AC0SR1.0010 | X20 locking plate (right), 10 pcs. package |

## Cable shielding plate

| Model number | Short description |
| --- | --- |
| X20AC0SG1.0010 | X20 cable shield grounding plate, 10 pcs. package |
| X20AC0SG1.0100 | X20 cable shield grounding plate, 100 pcs. package |

## Terminal labeling

| Model number | Short description |
| --- | --- |
| X20AC0M01 | Blank X20 label tabs, white, set for 16 modules |
| X20AC0M02 | Blank X20 label tabs, red, set for 16 modules |
| X20AC0M03 | Blank X20 label tabs, blue, set for 16 modules |
| X20AC0M04 | Blank X20 label tabs, orange, set for 16 modules |
| | |
| X20AC0M11 | Printed X20 label tabs, white, set for 16 modules. Text: Module (module 1 - 16), Terminal (1 - 192) |
| X20AC0M12 | Printed X20 label tabs, red, set for 16 modules. Text: +24V |
| X20AC0M13 | Printed X20 label tabs, blue, set for 16 modules. Text: GND |
| X20AC0M14 | Printed X20 label tabs, orange, set for 16 modules. Text: Module (module 1 - 16), Terminal (1 - 192) |
| | |
| X20AC0M01.0010 | Blank X20 label tabs, white, set for 16 modules, 10 pcs. package |
| X20AC0M02.0010 | Blank X20 label tabs, red, set for 16 modules, 10 pcs. package |
| X20AC0M03.0010 | Blank X20 label tabs, blue, set for 16 modules, 10 pcs. package |
| X20AC0M04.0010 | Blank X20 label tabs, orange, set for 16 modules, 10 pcs. package |
| | |
| X20AC0M11.0010 | Printed X20 label tabs, white, set for 16 modules, 10 pcs. / package. Text: Module (module 1 - 16), Terminal (1 - 192) |
| X20AC0M12.0010 | Printed X20 label tabs, red, set for 16 modules, 10 pcs. / package. Text: +24V |
| X20AC0M13.0010 | Printed X20 label tabs, blue, set for 16 modules, 10 pcs. / package. Text: GND |
| X20AC0M14.0010 | Printed X20 label tabs, orange, set for 16 modules, 10 pcs. / package. Text: Module (module 1 - 16), Terminal (1 - 192) |
| | |
| X20AC0M21 | Large blank X20 label tabs, white, set for 48 modules |
| X20AC0M21.0010 | Large blank X20 label tabs, white, set for 48 modules, 10 pcs. package |

# Accessories

## Labeling tool

| Model number | Short description |
|---|---|
| X20AC0MT1 | X20 labeling tool for the X20 label tabs |

## X2X Link cable

| Model number | Short description |
|---|---|
| X67CA0X99.1000 | Cable for custom prefabrication, 100.0 m |

## Ethernet POWERLINK cable RJ45 to RJ45

| Length | Connection cable | |
| --- | --- | --- |
| | Model number | Short description |
| 0.2 m | X20CA0E61.0002 | POWERLINK connection cable RJ45 to RJ45, 0.2 m |
| 1.0 m | X20CA0E61.0010 | POWERLINK connection cable RJ45 to RJ45, 1.0 m |
| 2.0 m | X20CA0E61.0020 | POWERLINK connection cable RJ45 to RJ45, 2.0 m |
| 5.0 m | X20CA0E61.0050 | POWERLINK connection cable RJ45 to RJ45, 5.0 m |
| 10.0 m | X20CA0E61.0100 | POWERLINK connection cable RJ45 to RJ45, 10.0 m |
| 15.0 m | X20CA0E61.0150 | POWERLINK connection cable RJ45 to RJ45, 15.0 m |
| 50.0 m | X20CA0E61.0500 | POWERLINK connection cable RJ45 to RJ45, 50.0 m |

## Ethernet POWERLINK cable RJ45 to M12

| Length | Attachment cable | |
| --- | --- | --- |
| | Model number | Short description |
| 5 m | X67CA0E41.0050 | POWERLINK attachment cable RJ45 to M12, 5.0 m |
| 15 m | X67CA0E41.0150 | POWERLINK attachment cable RJ45 to M12, 15.0 m |
| 50 m | X67CA0E41.0500 | POWERLINK attachment cable RJ45 to M12, 50.0 m |

*For detailed information and support: www.br-automation.com*

# Mechanical and electrical configuration

**Dimensions**

The dimensions are in 2D with the ECAD macros for CAD support . STEP data is provided for 3D representation.
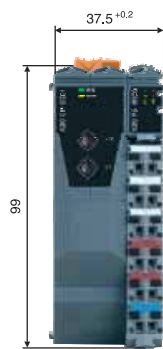
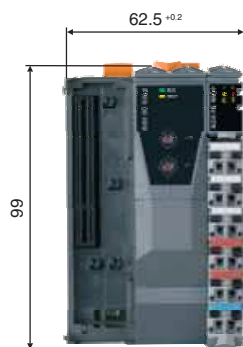*The STEP data can be downloaded from the B&R website (www.br-automation. com) under Services.*



150 $^{+0.2}$          85          99
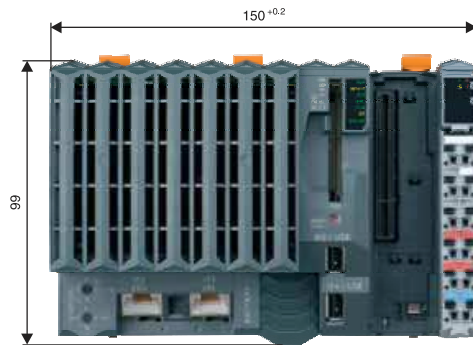
**X20 CPUs with one slot for interface modules**



200 $^{+0.2}$          85          99
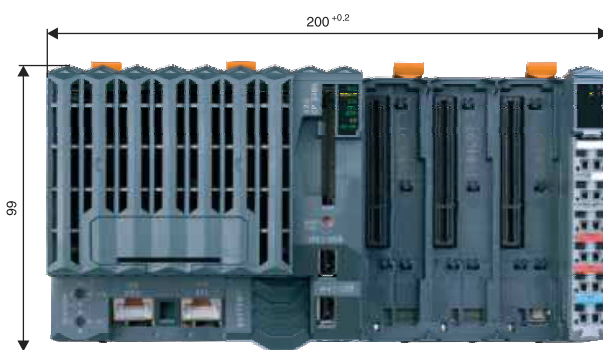
**X20 CPUs with three slots for interface modules**

**Compact CPUs and bus controllers**

37.5 +0.2   75   99



**Fieldbus CPUs and expandable bus controller with one additional slot**

62.5 +0.2   75   99

# Mechanical and electrical configuration



87.5<sup>+0,2</sup>
75
99
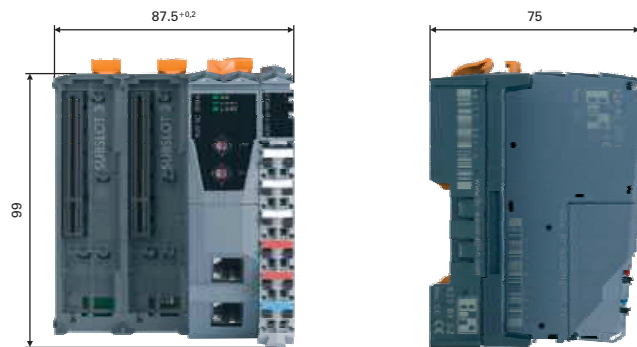
Fieldbus CPUs and expandable bus controller with two additional slots



12.5<sup>+0,2</sup>
75
99
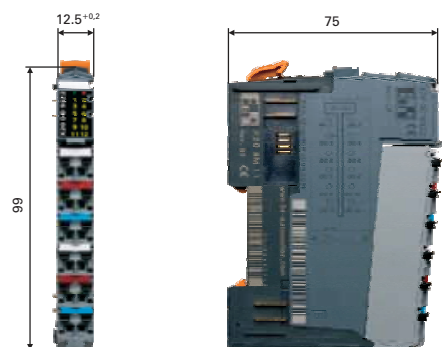
I/O modules

## Construction support

**Macros for ECAD systems**
The electronics in a machine must be designed in a manner which optimally utilizes the materials and space available. Graphic ECAD systems have established themselves as the right tool for the job. Every module in the X20 System comes with preset electronic descriptions of the mechanical dimensions, electrical signals and module functions. These macros are loaded directly to well-established ECAD systems. The wiring plans are automatically applied by the configuration and programming system, Automation Studio. Design and changes are immediately reflected at all levels of development. This saves time for the more important tasks and prevents errors right from the start. The accelerated development, programming, maintenance and documentation involved with the X20 System mean lower costs, enhanced quality and increased sales by earlier entry into the market.

**Printing support**
System printers and standard identification labels are supported by the appropriate printer software. Printing manually, from table calculations, or directly from ECAD software – all methods are supported. The software and printer systems are from the company Weidmüller.

# Mechanical and electrical configuration

## Installation

A mounting rail conforming to the EN60715 standard (TH35-7.5) is required to mount the PLC. The mounting rail is fastened to the back wall of the switching cabinet.

The entire system including all individual modules is hung in the desired location on the mounting rail with the unlocking mechanisms open and locked in place by closing the unlocking mechanisms. Finally, the prewired terminal blocks are connected to the modules.

**Note:** Mounting orientations other than horizontal and vertical are not possible.

## Horizontal installation



$$b = n^{\,1)} \cdot 12.5^{\,+0.2}$$

10     10     35     99     35     40.2

1) n ... Number of modules
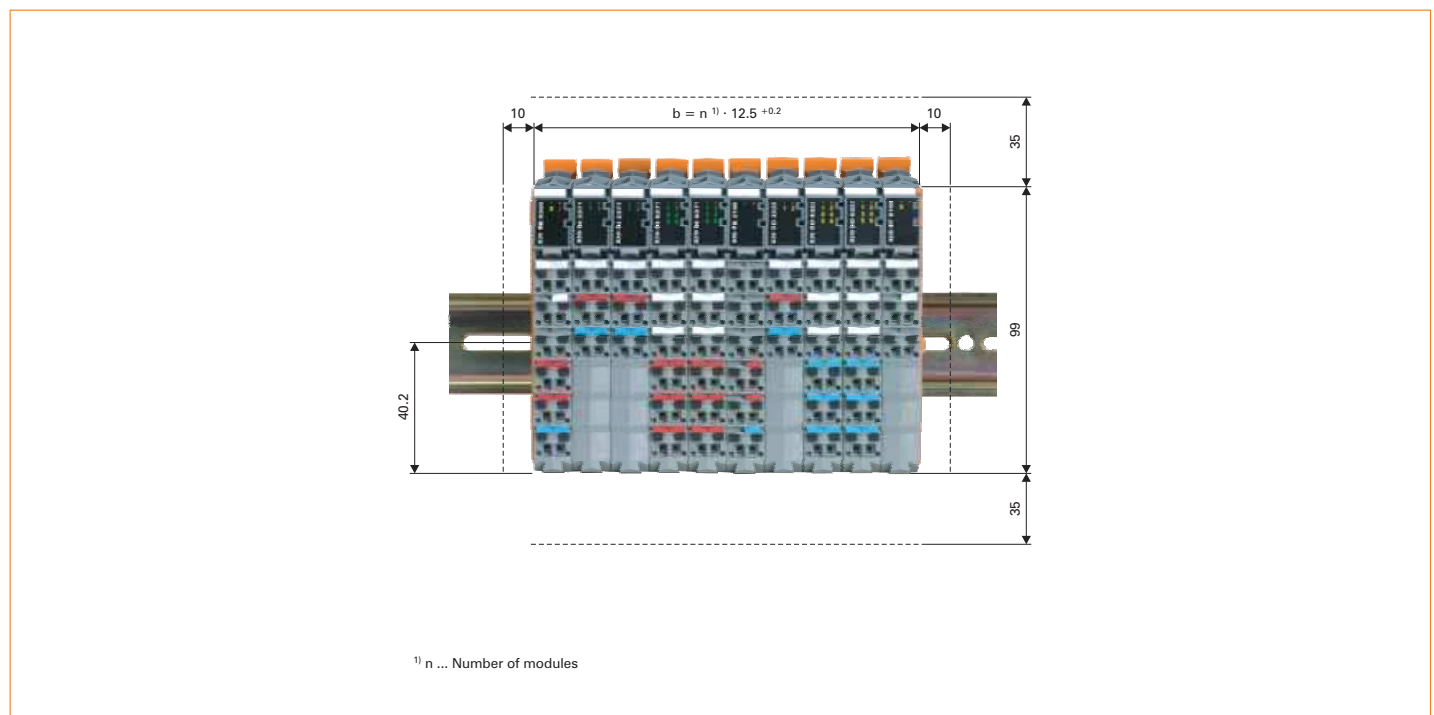
For optimal cooling and air circulation, there must be at least 35 mm free space above the modules. To the left and right of the X20 System, there must be at least 10 mm of free space. Underneath the module, 35 mm space must be left free for the input, output and supply cables.

**Vertical installation**
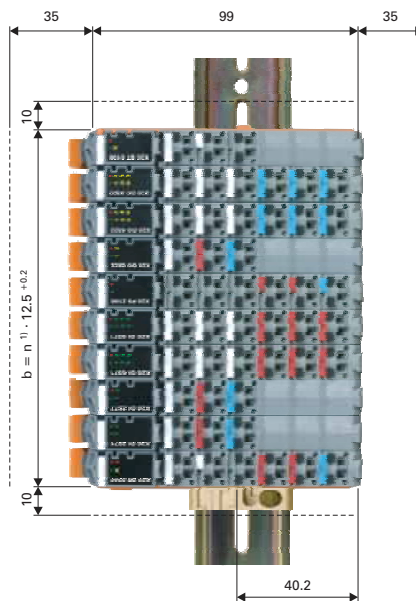


$^{1)}$ n ... Number of modules

For optimal cooling and air circulation, there must be at least 35 mm free space to the left of the modules. Above and below the X20 System, there must be at least 10 mm of free space. To the right of the module, 35 mm space must be left free for the input, output and supply cables.

The modules must be arranged so that the controller is on the lower end of the system. The temperature range is limited to 0 - 50°C when installing modules vertically.

**Note**:   The controller must be secured against slipping. An end bracket or ground terminal can be used for securing.

# Mechanical and electrical configuration



## Stress relief using cable ties

The X20 System terminal blocks have slots for the cable ties. If needed, a cable tie can be fed through these slots to reduce the stress on the cable.

Cable tie dimensions: Width ≤ 4.0 mm
Thickness ≤ 1.2 mm



**Slots through which the cable ties are fed**

## Shielding

In principle, the shield must be grounded in all shielded cables:
- Analog signals (In/Out)
- Interface modules
- Counter modules
- X2X Link cable

In general, the following guidelines apply for shielding:
- The X20 mounting rail must always be mounted to a conductive backplane
- Shielded cables must be grounded on both sides

**Direct shielding connection**
The shield is twisted and connected to the bus module's ground connection using a cable lug
(2.8 x 0.5 mm). The cable is additionally secured to the terminal block using a cable tie (stress relief).
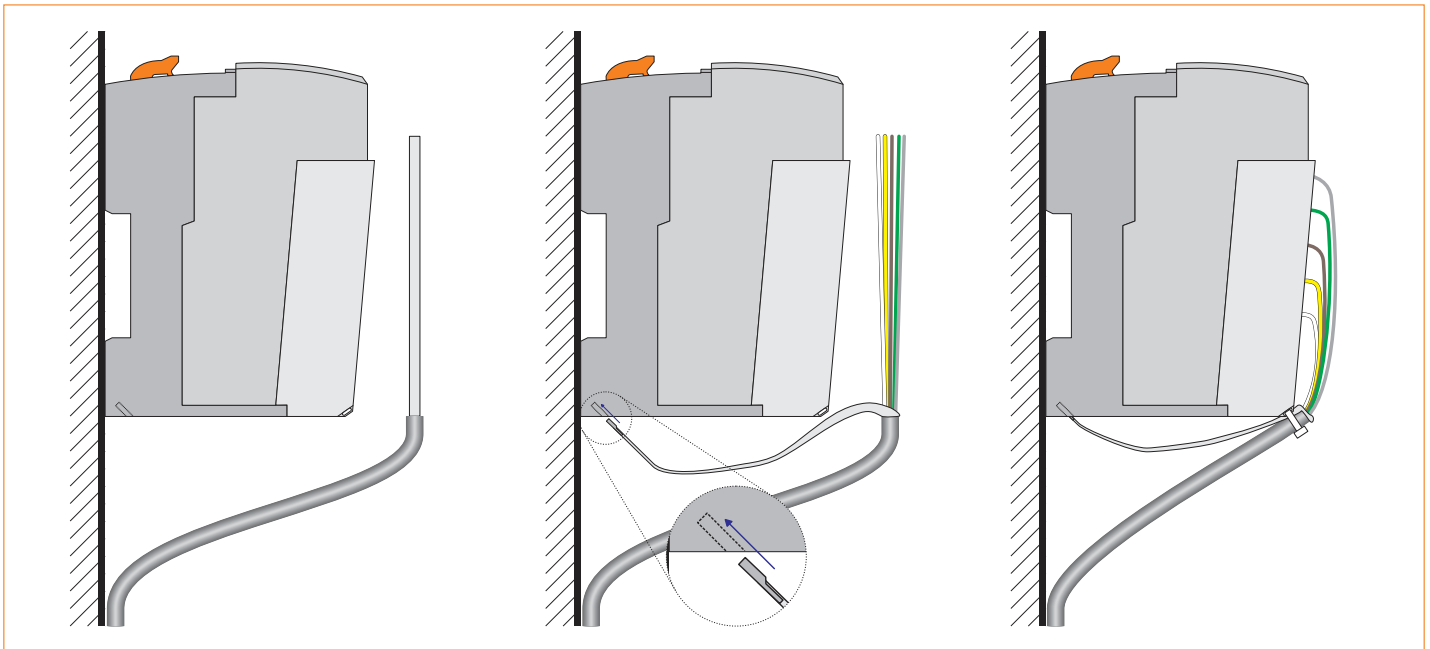


**Note**:    The ground connection should be made as short, and with as little resistance,
as possible.

# Mechanical and electrical Configuration

**X20 cable shielding plate**
The X20 cable shielding plate (available starting in the 3rd quarter 2007, model number X20AC0SG1) is latched to the terminal block and connected to the bus module's ground connection using a cable lug. Cable ties are used to press the shield against the grounding plate.
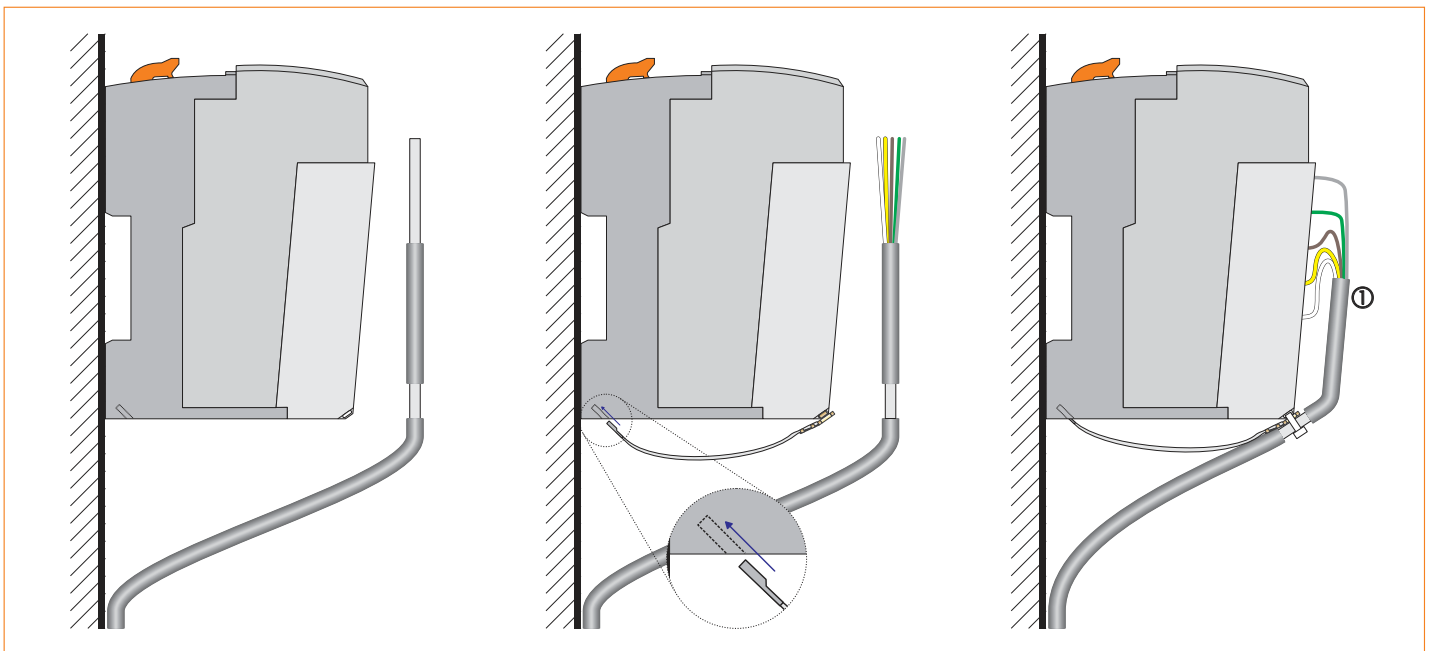


To reduce the EMC emissions most effectively, the cable shield must reach as high as possible after the cable tie (see ① in the diagram above).

**Shielding with grounding terminals**
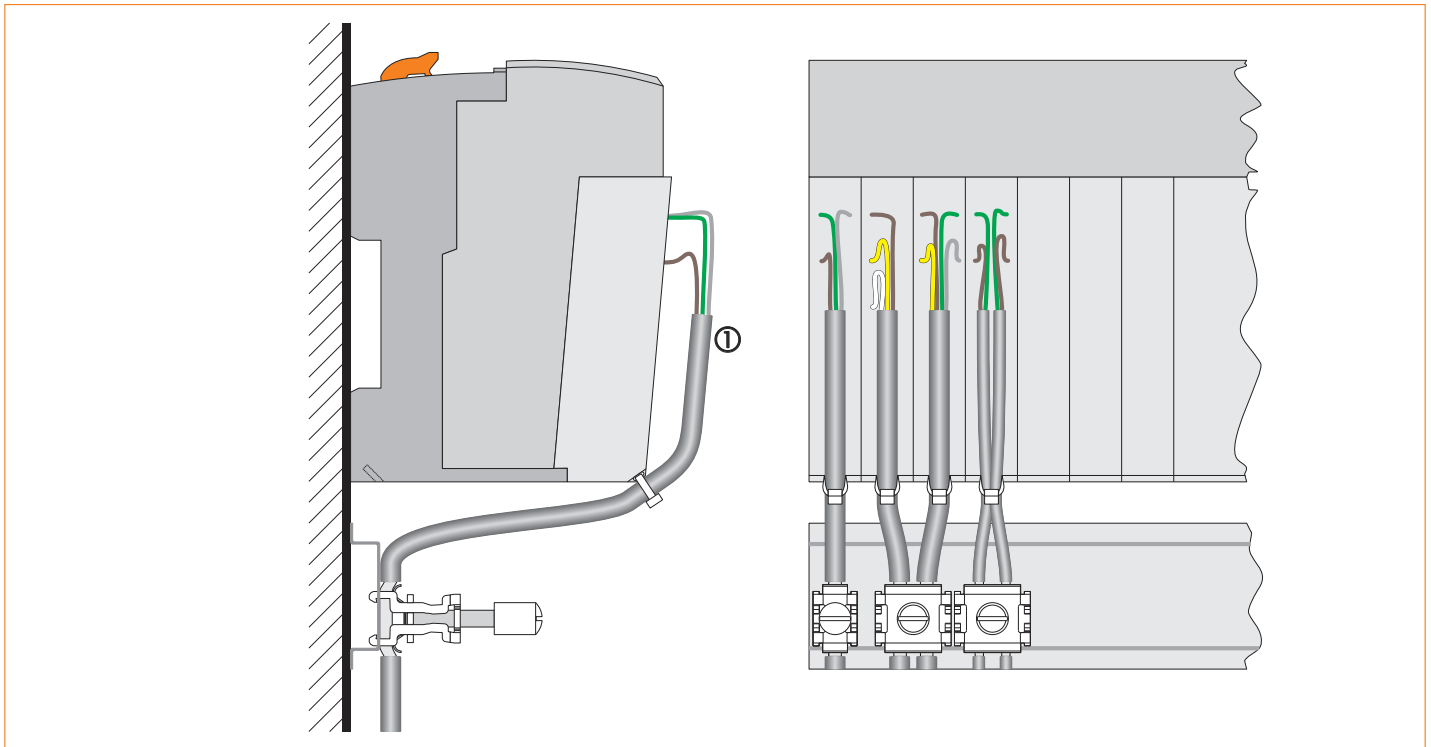


Grounding terminals from other manufacturers (such as GOGATEC) can be used to achieve shielding right on the mounting rail or on special bus bars directly below the controller.

- B&R recommends **always** using a grounding terminal via the mounting rail to connect the X2X Link cable shield directly with the conductive and grounded backplane. This will generally exceed the specified EMC minimal requirements.
- The shielded cables from other modules can be grouped and clamped together. This may also be necessary due to space limitations. A different number of cables can be grounded together with a single terminal depending on the grounding terminals being used.

To reduce the EMC emissions most effectively, the cable shield must reach as high as possible after the cable tie (see ① in the diagram above).

# Mechanical and electrical configuration



Bus supply contacts

Bus data contacts

I/O supply contacts

X20 BM 11    X20 BM 01

## The power supply design

**Bus module rack replacement**

The bus module is the backbone of the X20 System regarding the bus supply and bus data and also the I/O supply for the electronics modules. Each bus module is an active bus station, even without electronics module. There are two variations of the bus module:

• Interconnected I/O supply
• Supply module with the I/O supply isolated to the left
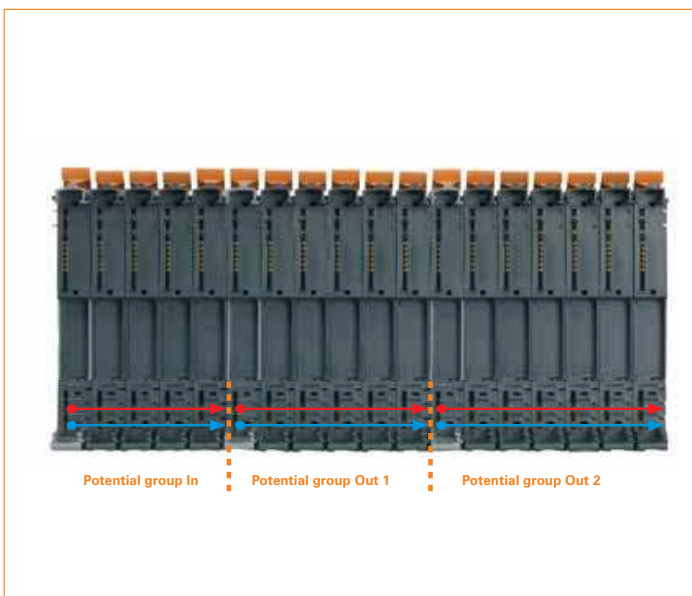
## X20 System infrastructure

Different potential groups can be implemented with the appropriate arrangement of supply bus modules, (e.g. for input groups or different E-stop circuits on the outputs. The I/O supply is fed from supply modules.



Potential group In    Potential group Out 1    Potential group Out 2

## Bus supply

The X2X Link supply must be connected in specific locations because the decentralized X2X Link backplane and the I/O electronics are completely electrically isolated. To start, the bus receiver takes on this task. Another supply must be connected after approximately 30 [1] modules. A supply module must be used for the X2X Link. On the same module, a separate feed for the I/O supply can also be connected.

## Potential groups

The I/O supply is connected via the bus modules. The feed is connected via corresponding supply modules. This makes it possible to implement simple potential groups (e.g. for input groups or different output groups). For isolation, the corresponding bus module is also necessary, which provides isolation of the internal I/O supply.

## Output modules with supply

Generally, a supply module is also necessary for current output modules with many channels such as the 8 channel output module with 2 amp outputs. This is not the case with the X20 System. With this module, the supply feed is directly on the module, thereby saving supply modules and construction width.

## Bus receiver with supply

The BR9300 bus receiver for the X20 System is equipped with a feed for the X2X Link as well as the internal I/O supply. This way, no additional supply module is needed.

## Supply module for internal I/O supply

The first I/O modules of an X20 System are supplied by the bus receiver. The internal I/O supply is refreshed via the PS2100 supply module.

## Supply module for internal I/O supply and bus supply

The X2X Link is fed by the BR9300 bus receiver. After approx. 30 [1] modules, an additional supply must be connected. The PS3300 supply module is used for this purpose. This module is equipped with a feed for the X2X link as well as the internal I/O supply.

## Bus transmitter with supply

The BT9100 bus transmitter has an integrated I/O supply feed. This saves a supply module for the last potential group.

1) For an exact calculation, see section "Power output table" (≅ 411).

# Mechanical and electrical configuration

## Safe cut-off

The total separation of the power supply from the communication and I/O makes it possible to safely turn off all outputs in the power circuit with an E-stop switching device without communication being disturbed. The X20 System has been certified and approved for this behavior by the German occupational safety and health commission (Berufsgenossenschaft - BG) in accordance to the following standards:

• DIN EN 954-1 up to Category 4
• DIN EN ISO 13849-1 up to Category 4, Performance level "e"
• DIN EN 62061 up to SILCL 3

The safety level achieved is determined by the safety level of the external safety switching device. The modules and revisions approved for this operating principle must be taken into consideration.

## X20 System protection

The X20 system is protected according to the power supply design.
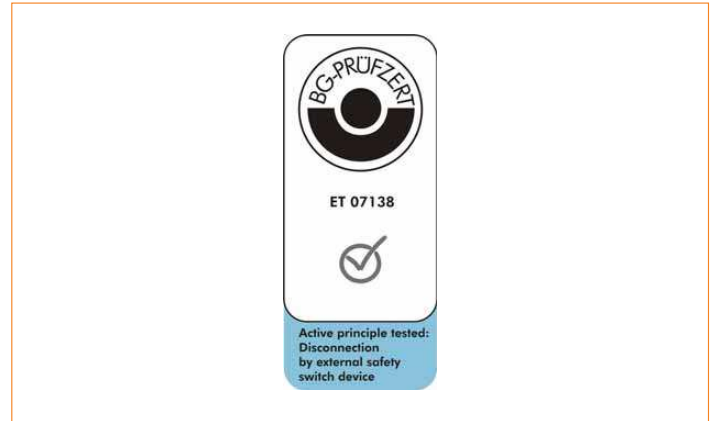
### Potential groups

Different potential groups can be implemented using the BM01 bus module, and with the appropriate arrangement of supply bus modules, (e.g. for input groups or different power circuits on the outputs).

### Supply feed via bus transmitter

The BT9100 bus transmitter has an integrated internal I/O supply feed. This saves a supply module for the last potential group.
Keep in mind: this potential group is separated from the rest of the potential groups by an I/O module with the BM01 bus module.
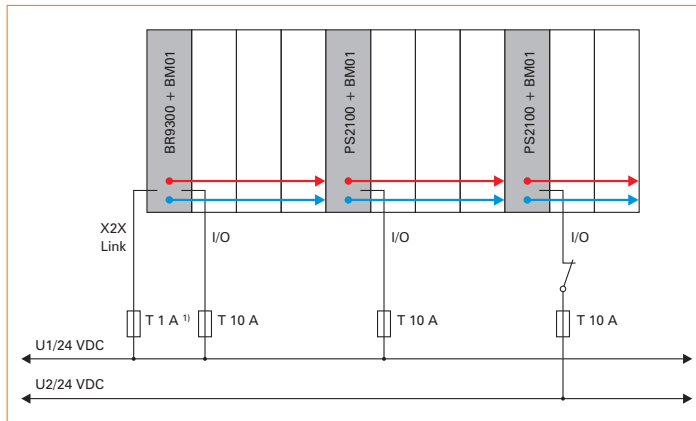
1) Recommended for line protection.
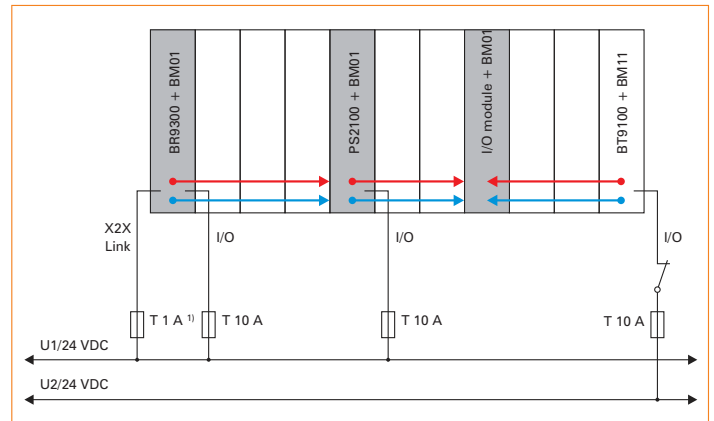
1) Recommended for line protection.

## Expanded and redundant X2X Link supply

The remote backplane X2X Link is supplied separately from the I/O. This ensures that if there is a power outage on the I/O side (e.g. E-stop) the remote backplane will not be affected. After approx. 30 modules, a supply module for the X2X Link must be added.

To provide increased supply protection, it is possible to make the X2X Link supply redundant. To do this, at least one extra X2X supply module than would be needed to provide the required X2X Link performance must be used. This guarantees the function of the remote backplane even when one X2X Link supply goes down.

For proper calculation, note the following point:
• To determine the required X2X Link performance, calculate using 75% of the supply module's rated power, during parallel operation.

**Note**: If the X2X Link supply is not redundant or if the X2X Link supply of an X20 block is shut off completely, this should happen simultaneously for all supply modules.

**Example of expanded X2X Link supply**
Potential groups can be formed by the use of different types of supplies for the supply modules.

**Example of redundant X2X Link supply**
Multiple PS3300 supply modules can be set up in parallel. Potential groups can be formed by the use of different types of supplies.
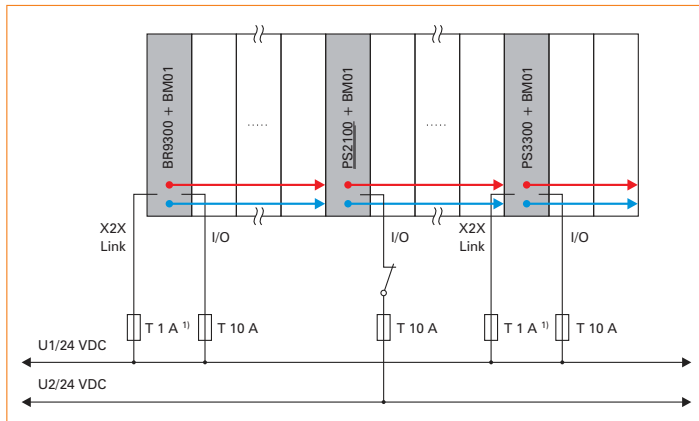


1) Recommended for line protection.

The PS3300 supply module supplies both the X2X Link and I/O, the PS2100 supply module only supplies the I/O.
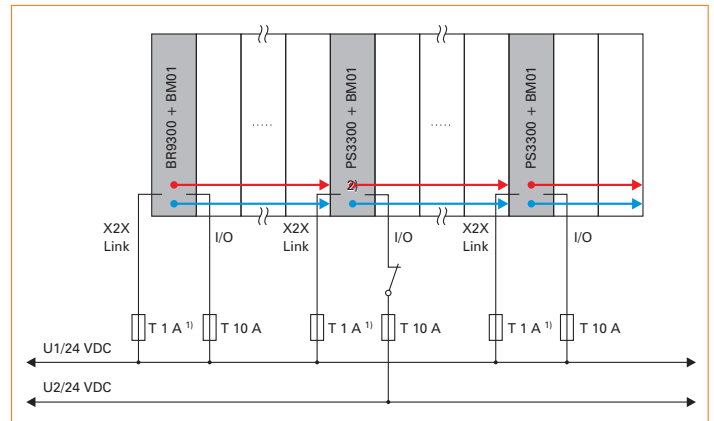


1) Recommended for line protection.
2) With split supplies, the two reference potentials (GND_1 and GND_2) are combined via the terminal block of the PS3300.

The PS3300 supply module supplies both X2X Link and the I/O.

# Mechanical and electrical configuration

## Combining X2X Link-based systems

### General information
The X2X Link provides a complete backplane, which is used for communicating between bus modules and over the X2X Link cable. Systems based on X2X Link can be combined with one another as needed.

### Overview of pin connections
The following connection overviews illustrate combinations of different systems that are based on X2X Link. The model numbers indicate which standard cables available from B&R can be used to connect with one another.

### Combining X20, X67 and Compact I/O systems



X2X Link
Attachment cable
X67CA0X21.xxxx
X67CA0X31.xxxx

X2X Link
Connection cable
X67CA0X01.xxxx
X67CA0X11.xxxx

X2X Link
Open cable
X67CA0X41.xxxx
X67CA0X51.xxxx

X2X Link
Attachment cable
X67CA0X21.xxxx
X67CA0X31.xxxx

X2X Link
Open cable
X67CA0X41.xxxx
X67CA0X51.xxxx

X2X Link
Attachment cable
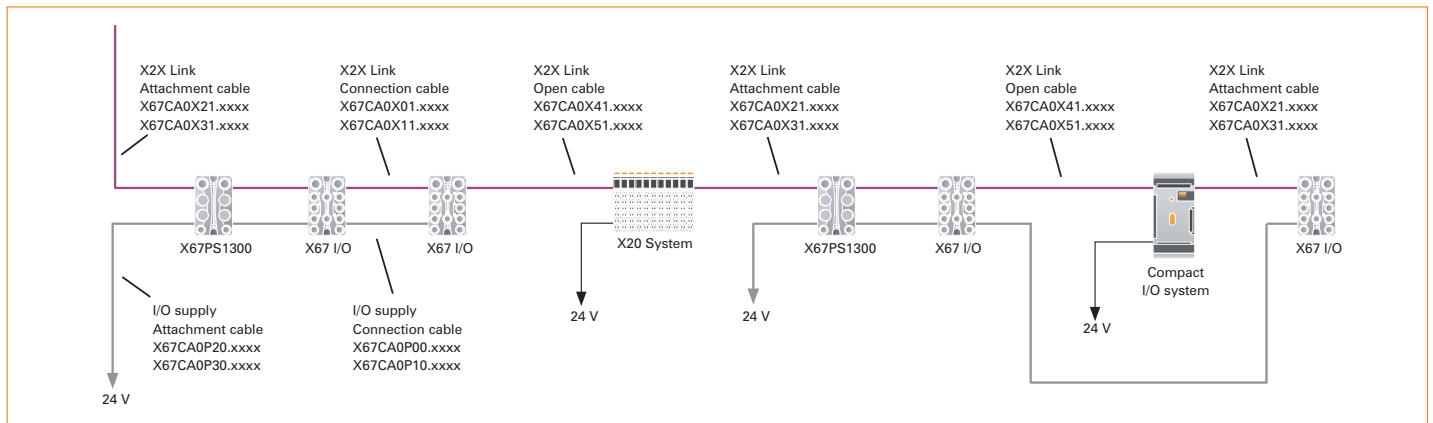X67CA0X21.xxxx
X67CA0X31.xxxx

X67PS1300    X67 I/O    X67 I/O    X20 System    X67PS1300    X67 I/O    Compact I/O system    X67 I/O

I/O supply
Attachment cable
X67CA0P20.xxxx
X67CA0P30.xxxx

I/O supply
Connection cable
X67CA0P00.xxxx
X67CA0P10.xxxx

24 V    24 V    24 V    24 V

### Combining X20, X67 and valve manifold connections



X2X Link
Attachment cable
X67CA0X21.xxxx
X67CA0X31.xxxx

X2X Link
Connection cable
X67CA0X01.xxxx
X67CA0X11.xxxx

X2X Link
Open cable
X67CA0X41.xxxx
X67CA0X51.xxxx

X2X Link
Attachment cable
X67CA0X21.xxxx
X67CA0X31.xxxx

X2X Link
Open cable
X67CA0X41.xxxx
X67CA0X51.xxxx

X67PS1300    X67 I/O    IP67 XV    X20 System    X67PS1300    X67 I/O    IP20 XV

I/O supply
Attachment cable
X67CA0P20.xxxx
X67CA0P30.xxxx

I/O supply
Connection cable
X67CA0P00.xxxx
X67CA0P10.xxxx

I/O supply
Open cable
X67CA0P40.xxxx
X67CA0P50.xxxx
With 7XVxxx.xx-21

24 V    24 V    24 V

## X20 System - Connection examples

Connection examples can be found under the module description:
• Bus receiver BR9300:        📄 208
• Bus transmitter BT9100:    📄 210

## Connection example for the Compact I/O system



| | |
|---|---|
| X2X+ (optional) [1] | |
| X2X+ (optional) [1] | |
| In: X2X | White |
| In: X2X⊥ | Black |
| In: X2X\ | Blue |
| Shield | |
| Out: X2X | White |
| Out: X2X⊥ | Black |
| Out: X2X\ | Blue |
| Shield | |
| +24 VDC Supply | |
| Supply ⊥ | |
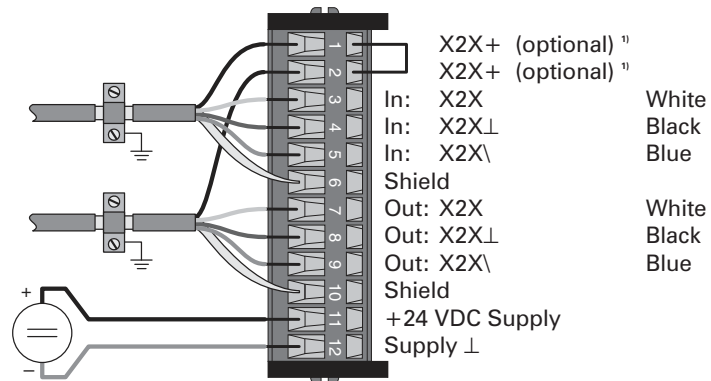
1) Used to forward the X2X Link supply when using IP67 modules.

| Signal | Cable type | Model number |
|---|---|---|
| X2X Link In | Open cable [1] | X67CA0X41.xxxx |
| | | X67CA0X51.xxxx |
| X2X Link Out | Attachment cable [1] | X67CA0X21.xxxx |
| | | X67CA0X31.xxxx |
| X2X Link In/Out | Cable for custom prefabrication, 100 m | X67CA0X99.1000 |

1) Bridge for X2X+ together with X67 modules.

# Mechanical and electrical configuration

**Valve - Connection examples**

**Connection example with 7XVxxx.xx-11/-12**
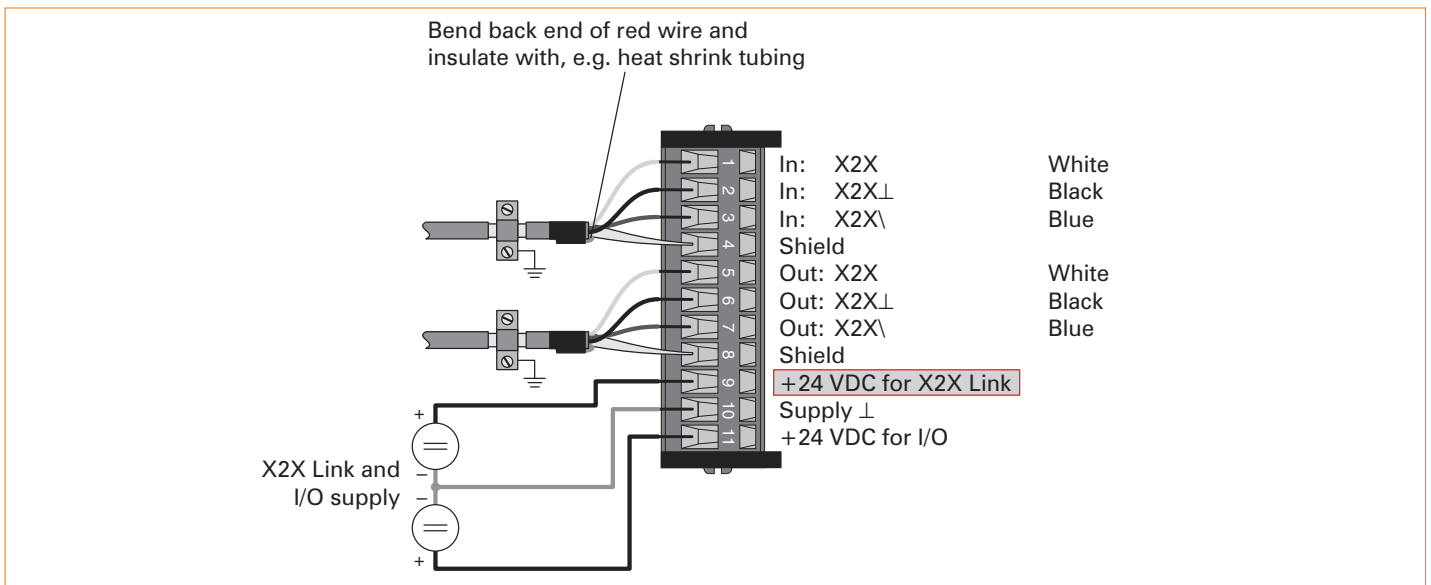


| Signal | Cable type | Model number |
|---|---|---|
| X2X Link In | Open cable [1] | X67CA0X41.xxxx |
| | | X67CA0X51.xxxx |
| X2X Link Out | Attachment cable [1] | X67CA0X21.xxxx |
| | | X67CA0X31.xxxx |
| X2X Link In/Out | Cable for custom prefabrication, 100 m | X67CA0X99.1000 |

1) In connection with X67 modules.

**Connection example with 7XVxxx.xx-21**
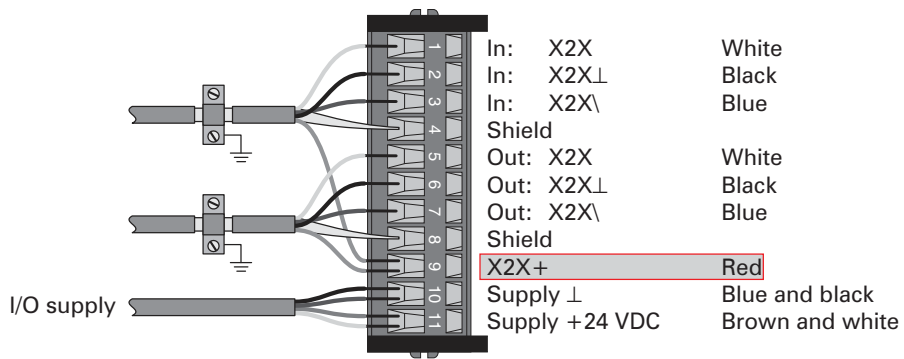
| | | |
|---|---|---|
| In: | X2X | White |
| In: | X2X⊥ | Black |
| In: | X2X\ | Blue |
| Shield | | |
| Out: | X2X | White |
| Out: | X2X⊥ | Black |
| Out: | X2X\ | Blue |
| Shield | | |
| X2X+ | | Red |
| Supply ⊥ | | Blue and black |
| Supply +24 VDC | | Brown and white |

I/O supply

| Signal | Cable type | Model number |
|---|---|---|
| X2X Link In | Open cable [1] | X67CA0X41.xxxx |
| | | X67CA0X51.xxxx |
| X2X Link Out | Attachment cable [1] | X67CA0X21.xxxx |
| | | X67CA0X31.xxxx |
| X2X Link In/Out | Cable for custom prefabrication, 100 m | X67CA0X99.1000 |
| I/O supply | Open cable [1] | X67CA0P40.xxxx |
| | | X67CA0P50.xxxx |

1) In connection with X67 modules.

# Mechanical and electrical configuration

**Connection example with 7XVxxx.xx-51/-62**
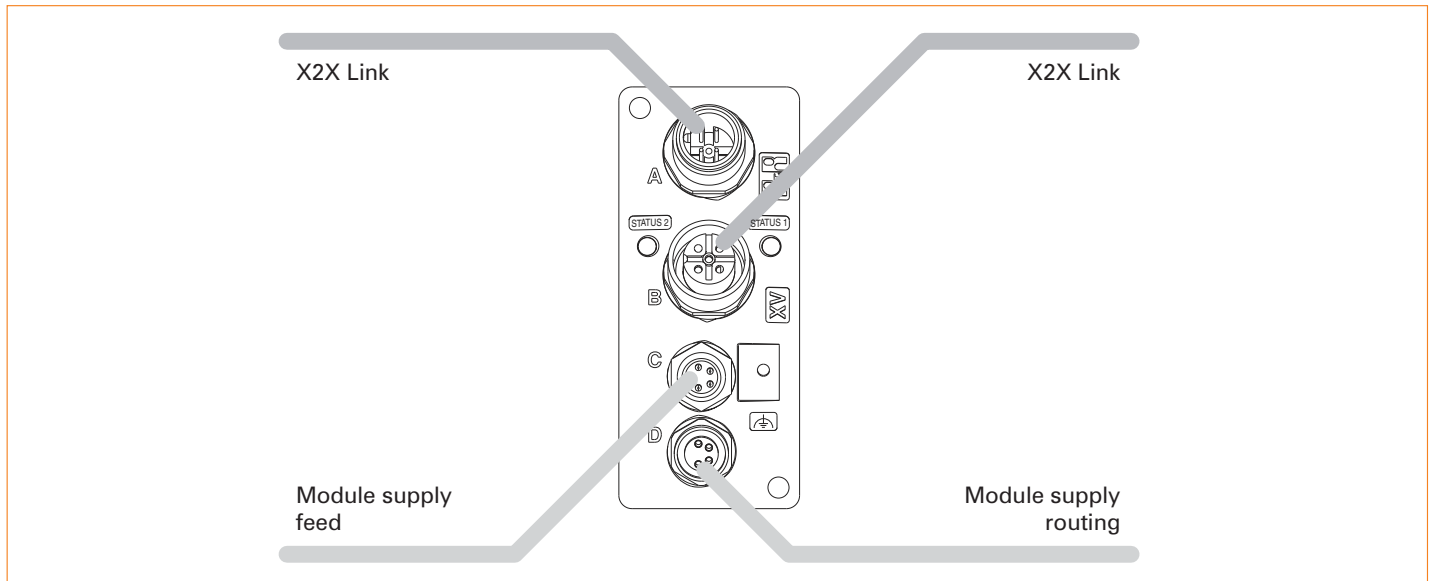


| Signal | Cable type | Model number |
|--------|-----------|--------------|
| X2X Link | Connection cable [1] | X67CA0X01.xxxx |
| | | X67CA0X11.xxxx |
| I/O supply | Connection cable [1] | X67CA0P00.xxxx |
| | | X67CA0P10.xxxx |

1) In connection with X67 modules.

## Power output table

The "Bus power" and "Internal I/O power" columns specify values for the power provided by the module or the power required by the module. This allows a power output table to be calculated quickly and easily for a particular hardware configuration.

The values in the "Bus power" column refer to the power table for the X2X Link. The power supplied by the X20 CPU, the bus receiver or the supply module is labeled with "+". The power required by modules is shown with a "-" sign. To calculate the power balance, the positive and negative power values should be added together. The sum may not be less than zero.

The values in the "Internal I/O power" column refer to the internal power requirements of the I/O modules using the 24 VDC I/O supply.

| Product ID | Model number | Bus power [W] [1] | Internal I/O power [W] |
|---|---|---|---|
| AI1744 | X20AI1744 | -0.01 | -1.25 |
| AI2622 | X20AI2622 | -0.01 | -0.8 |
| AI2632 | X20AI2632 | -0.01 | -1.2 |
| AI2632-1 | X20AI2632-1 | -0.01 | -1.2 |
| AI4622 | X20AI4622 | -0.01 | -1.1 |
| AI4632 | X20AI4632 | -0.01 | -1.5 |
| AI4632-1 | X20AI4632-1 | -0.01 | -1.5 |
| AO2622 | X20AO2622 | -0.01 | -1.1 |
| AO2632 | X20AO2632 | -0.01 | -1.2 |
| AO4622 | X20AO4622 | -0.01 | -1.5 |
| AO4632 | X20AO4632 | -0.01 | -1.5 |
| AT2222 | X20AT2222 | -0.01 | -1.1 |
| AT2311 | X20AT2311 | -0.35 | -0.85 |
| AT2402 | X20AT2402 | -0.01 | -0.72 |
| AT4222 | X20AT4222 | -0.01 | -1.1 |
| AT6402 | X20AT6402 | -0.01 | -0.91 |
| BB22 | X20BB22 | -0.32 | - |
| BB27 | X20BB27 | -0.53 | - |
| BB32 | X20BB32 | -0.35 | - |
| BB37 | X20BB37 | -0.56 | - |
| BB80 | X20BB80 | - | - |
| BB81 | X20BB81 | - | - |
| BB82 | X20BB82 | - | - |
| BC0043 | X20BC0043 | -1.5 | - |
| BC0053 | X20BC0053 | -1.5 | - |
| BC0063 | X20BC0063 | -2.3 | - |
| BC0073 | X20BC0073 | -1.5 | - |
| BC0083 | X20BC0083 | -2.0 | - |
| BC0087 | X20BC0087 | -2.0 | - |
| BC0088 | X20BC0088 | -2.0 | - |
| BC1083 | X20BC1083 | -2.0 | - |
| BC8083 | X20BC8083 | -2.0 | - |
| BC8084 | X20BC8084 | -2.0 | - |
| BM01 | X20BM01 | -0.13 | - |
| BM05 | X20BM05 | -0.13 | - |
| BM11 | X20BM11 | -0.13 | - |
| BM12 | X20BM12 | -0.13 | - |
| BM15 | X20BM15 | -0.13 | - |
| BR9300 | X20BR9300 | +7.0 | +240.0 [2] |
| BT9100 | X20BT9100 | -0.5 | -0.1 [4] / +240 [2] [5] |
| BT9400 | X20BT9400 | -0.5 | -0.1 [4] / +240 [2] [5] |
| CM0985 | X20CM0985 | -1.4 | -4.0 |
| CM1201 | X20CM1201 | -0.01 | -1.5 |

# Mechanical and electrical configuration

| Product ID | Model number | Bus power [W] [1] | Internal I/O power [W] |
|---|---|---|---|
| CM1941 | X20CM1941 | -0.01 | -1.5 |
| CM8281 | X20CM8281 | -0.01 | -1.75 |
| CM8323 | X20CM8323 | -0.01 | -1.5 |
| CP0201 | X20CP0201 | -2.2 | - |
| CP0291 | X20CP0291 | -2.7 | - |
| CP0292 | X20CP0292 | -3.0 | - |
| CP1483 | X20CP1483 | +7.0 | +240.0 [2] |
| CP1484 | X20CP1484 | +7.0 | +240.0 [2] |
| CP1485 | X20CP1485 | +7.0 | +240.0 [2] |
| CP1486 | X20CP1486 | +7.0 | +240.0 [2] |
| CP3484 | X20CP3484 | +7.0 | +240.0 [2] |
| CP3485 | X20CP3485 | +7.0 | +240.0 [2] |
| CP3486 | X20CP3486 | +7.0 | +240.0 [2] |
| CS1011 | X20CS1011 | -0.01 | -1.0 |
| CS1020 | X20CS1020 | -0.01 | -1.44 |
| CS1030 | X20CS1030 | -0.01 | -1.44 |
| CS1070 | X20CS1070 | -0.01 | -1.44 |
| CS2770 | X20CS2770 | -0.01 | -1.5 |
| DC1196 | X20DC1196 | -0.01 | -1.5 |
| DC1198 | X20DC1198 | -0.01 | -1.5 |
| DC1396 | X20DC1396 | -0.01 | -1.4 |
| DC1398 | X20DC1398 | -0.01 | -1.3 |
| DC2190 | X20DC2190 | -0.01 | -1.1 |
| DC2395 | X20DC2395 | -0.01 | -1.4 |
| DC2396 | X20DC2396 | -0.01 | -1.5 |
| DC2398 | X20DC2398 | -0.01 | -1.4 |
| DC4395 | X20DC4395 | -0.01 | -1.5 |
| DI2371 | X20DI2371 | -0.12 | -0.29 |
| DI2372 | X20DI2372 | -0.12 | -0.29 |
| DI2377 | X20DI2377 | -0.15 | -0.82 |
| DI2653 [3] | X20DI2653 | -0.14 | - |
| DI4371 | X20DI4371 | -0.14 | -0.59 |
| DI4372 | X20DI4372 | -0.14 | -0.59 |
| DI4653 [3] | X20DI4653 | -0.17 | - |
| DI4760 | X20DI4760 | -0.01 | -1.5 |
| DI6371 | X20DI6371 | -0.15 | -0.88 |
| DI6372 | X20DI6372 | -0.15 | -0.88 |
| DI6553 [3] | X20DI6553 | -0.21 | - |
| DI8371 [3] | X20DI8371 | -0.18 | - |
| DI9371 [3] | X20DI9371 | -0.18 | - |
| DI9372 | X20DI9372 | -0.18 | -1.75 |
| DM9324 [3] | X20DM9324 | -0.21 | -0.5 |
| DO2321 | X20DO2321 | -0.13 | -0.3 |
| DO2322 | X20DO2322 | -0.13 | -0.33 |
| DO2623 [3] | X20DO2623 | -0.35 | - |
| DO2649 | X20DO2649 | -0.45 | - |
| DO4321 | X20DO4321 | -0.16 | -0.49 |
| DO4322 | X20DO4322 | -0.16 | -0.49 |
| DO4331 | X20DO4331 | -0.16 | -0.49 |
| DO4332 | X20DO4332 | -0.16 | -0.5 |
| DO4529 | X20DO4529 | -0.8 | - |
| DO4623 [3] | X20DO4623 | -0.52 | - |
| DO6321 | X20DO6321 | -0.2 | -0.59 |
| DO6322 | X20DO6322 | -0.18 | -0.71 |

| Product ID | Model number | Bus power [W] [1] | Internal I/O power [W] |
|---|---|---|---|
| DO6529 | X20DO6529 | -1.1 | - |
| DO8322 | X20DO8322 | -0.26 | -0.8 |
| DO8331 [3] | X20DO8331 | -0.22 | - |
| DO8332 [3] | X20DO8332 | -0.22 | - |
| DO9321 | X20DO9321 | -0.26 | -0.99 |
| DO9322 | X20DO9322 | -0.26 | -1.15 |
| DS1119 | X20DS1119 | -0.01 | -1.5 |
| DS1319 | X20DS1319 | -0.01 | -1.5 |
| HB2880 | X20HB2880 | TBD | - |
| HB2885 | X20HB2885 | TBD | - |
| IF1020 | X20IF1020 | -0.33 | - |
| IF1030 | X20IF1030 | -0.4 | - |
| IF1061 | X20IF1061 | -1.4 | - |
| IF1063 | X20IF1063 | -0.87 | - |
| IF1072 | X20IF1072 | -0.79 | - |
| IF1074 | X20IF1074 | -0.69 | - |
| IF1082 | X20IF1082 | -2.0 | - |
| IF1091 | X20IF1091 | -0.97 | - |
| IF1091-1 | X20IF1091-1 | -1.29 | - |
| IF2772 | X20IF2772 | -1.2 | - |
| IF2792 | X20IF2792 | -1.51 | - |
| MM2436 [3] | X20MM2436 | -0.01 | - |
| MM4456 [3] | X20MM4456 | -0.01 | -2.0 |
| PD0011 [3] | X20PD0011 | -0.12 | - |
| PD0012 | X20PD0012 | -0.12 | -1.0 |
| PD0016 [3] | X20PD0016 | -0.12 | - |
| PD2113 [3] | X20PD2113 | -0.12 | - |
| PS2100 | X20PS2100 | -0.2 | +240.0 [2] |
| PS2110 | X20PS2110 | -0.2 | +240.0 [2] |
| PS3300 | X20PS3300 | +7.0 | +240.0 [2] |
| PS3310 | X20PS3310 | +7.0 | +240.0 [2] |
| PS4951 | X20PS4951 | -0.01 | -1.80 |
| PS9400 | X20PS9400 | +7.0 | +240.0 [2] |
| PS9402 | X20PS9402 | +7.0 | +240.0 [2] |
| PS9500 | X20PS9500 | +7.0 | +240.0 [2] |
| PS9502 | X20PS9502 | +7.0 | +240.0 [2] |
| SM1426 | X20SM1426 | -0.01 | -1.8 |
| SM1436 [3] | X20SM1436 | -0.01 | - |
| XC0201 | X20XC0201 | -2.0 | - |
| XC0202 | X20XC0202 | -2.2 | - |
| XC0292 | X20XC0292 | -2.8 | - |

For modules with 0.01 W power requirement, the embedded parameter chip can only be read if the I/O supply is also present.

The embedded parameter chip is described in the section "Embedded parameter chip", on page ≅ 53.

2) Rated power at 24 VDC and 10.0 A.

3) The module's power consumption can be found on the technical data sheet.

4) When used as bus transmitter.

5) When used as bus transmitter and I/O supply module.

Note: Please observe the example calculations on the following pages.

# Mechanical and electrical configuration

### Example 1
Calculation of the power output table for the bus and 24 VDC I/O supply with the following hardware configuration:

| Module | Bus power [W] | Internal I/O power [W] | External I/O power [W] | Sensor/actuator supply [W] [1] |
|---|---|---|---|---|
| DI4371 | 0.14 | 0.59 | - | 12 |
| DI2371 | 0.12 | 0.29 | - | 12 |
| DO4322 | 0.16 | 0.49 | 48 [2] | 12 |
| DO4322 | 0.16 | 0.49 | 48 [2] | 12 |
| BT9100 | 0.5 | 0.1 | - | - |
| **Subtotal** | | **1.96** | **96** | **48** |
| **Sum** | **1.08** | **145.96 (= 1.96 + 96 + 48)** | | |

1) Rated power at 24 VDC and 0.5 A.

2) Rated power at 24 VDC and 100% simultaneousness.

The total power to be supplied by the 24 VDC I/O supply is 145.96 W. One supply module is already integrated in the BR9300 bus receiver. The power comparison indicates that the power provided by the supply module is sufficient.

| | Bus power [W] | 24 VDC I/O supply power [W] |
|---|---|---|
| BR9300 | +7.0 | +240.0 [1] |
| Power required by I/O modules | -1.08 | -145.96 |
| Power required by all bus modules | -0.78 | - |
| **Residual power** | **+5.14** | **+94.04** |

1) Rated power at 24 VDC and 10.0 A.

## Example 2

In this example, the I/O modules are separated into three potential groups:

- Potential group 1:    Digital input modules
- Potential group 2:    Digital output modules
- Potential group 3:    Analog input modules and temperature modules

Calculation of the power output table for the bus and 24 VDC I/O supply for each potential group with the following hardware configuration:

| Potential group 1 | | | | |
|---|---|---|---|---|
| Module | Bus power [W] | Internal I/O power [W] | External I/O power [W] | Sensor/actuator supply [W] [1] |
| DI6371 | 0.15 | 0.88 | - | - |
| DI6371 | 0.15 | 0.88 | - | - |
| DI2377 | 0.15 | 0.82 | - | 12 |
| Subtotal | | 2.58 | - | 12 |
| Sum | 0.45 | 14.58 (= 2.58 + 12) | | |

1) Rated power at 24 VDC and 0.5 A.

| Potential group 2 | | | | |
|---|---|---|---|---|
| Module | Bus power [W] | Internal I/O power [W] | External I/O power [W] [1] | Sensor/actuator supply [W] [2] |
| DO2322 | 0.13 | 0.33 | 24 | 12 |
| DO6322 | 0.18 | 0.71 | 72 | - |
| DO8332 | 0.22 | - | - [3] | - |
| Subtotal | | 1.04 | 96 | 12 |
| Sum | 0.53 | 109.04 (= 1.04 + 96 + 12) | | |

1) Rated power at 24 VDC and 100% simultaneousness.

2) Rated power at 24 VDC and 0.5 A.

3) The power supply is integrated in the module.

| Potential group 3 | | | | |
|---|---|---|---|---|
| Module | Bus power [W] | Internal I/O power [W] | External I/O power [W] | Sensor/actuator supply [W] |
| AI4622 | 0.01 | 1.1 | - | - |
| AI4622 | 0.01 | 1.1 | - | - |
| AT4222 | 0.01 | 1.1 | - | - |
| AT2402 | 0.01 | 0.72 | - | - |
| BT9100 | 0.5 | 0.1 | - | - |
| Subtotal | | 4.12 | - | - |
| Sum | 0.54 | 4.12 | | |

# Mechanical and electrical configuration

Next, a power comparison must be made between the power required by the I/O modules and the power delivered by the supply modules.

Potential group 1 is supplied by the supply module integrated in the BR9300 bus receiver. The total power to be supplied by all the bus modules is 3.34 W. The total power to be supplied by the 24 VDC I/O supply for potential group 1 is 14.3 W.

The power comparison indicates that the power provided by the supply module integrated in the BR9300 is sufficient.

| Potential group 1 | Bus power [W] | 24 VDC I/O supply power [W] |
|---|---|---|
| BR9300 | +7.0 | +240.0 [1] |
| Power required by I/O modules | -1.22 [2] | -14.58 [3] |
| Power required by all bus modules | -1.82 | - |
| **Residual power** | **+3.96** | **+225.42** |

1) Rated power at 24 VDC and 10.0 A.

2) Bus power to be supplied for all I/O modules.

3) 24 VDC I/O supply to be provided for potential group 1.

In potential groups 2 and 3, the 24 VDC I/O supply is fed via the PS2100 supply module. A supply module is required for each potential group.

The power comparison indicates that the power provided by the PS2100 is sufficient.

| Potential group 2 | 24 VDC I/O supply power [W] |
|---|---|
| PS2100 | +240.0 [1] |
| Power required by I/O modules | -109.04 |
| **Residual power** | **+130.96** |

1) Rated power at 24 VDC and 10.0 A.

| Potential group 3 | 24 VDC I/O supply power [W] |
|---|---|
| PS2100 | +240.0 [1] |
| Power required by I/O modules | -4.12 |
| **Residual power** | **+235.88** |

1) Rated power at 24 VDC and 10.0 A.