

X20DO8322

Data sheet
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Version history

B&R makes every effort to keep documents as current as possible. The most current versions are available for download on the B&R website (www.br-automation.com).

1 General information

1.1 Other applicable documents

For additional and supplementary information, see the following documents.

Other applicable documents

| Document name | Title |
|---------------|---|
| MAX20 | X20 System user's manual |
| MAEMV | Installations / EMV guide |

1.2 Order data


| Order number | Short description | Figure |
|--------------|--|--|
| | Digital outputs |  |
| X20DO8322 | X20 digital output module, 8 outputs, 24 VDC, 0.5 A, source, 1-wire connections | |
| | Required accessories | |
| | Bus modules | |
| X20BM11 | X20 bus module, 24 VDC keyed, internal I/O power supply connected through | |
| X20BM15 | X20 bus module, with node number switch, 24 VDC keyed, internal I/O power supply connected through | |
| | Terminal blocks | |
| X20TB12 | X20 terminal block, 12-pin, 24 VDC keyed | |
| | | |
| | | |

Table 1: X20DO8322 - Order data

1.3 Module description

This module is equipped with 8 outputs for 1-wire connections. The outputs are designed for a source circuit.

Functions:

- [Digital outputs](#)

Monitoring status of the digital outputs

The output signal of the digital outputs is monitored for short circuit or overload, as is the state of the power supply.

2 Technical description

2.1 Technical data

| | |
|--|---|
| Order number | X20DO8322 |
| Short description | |
| I/O module | 8 digital outputs 24 VDC for 1-wire connections |
| General information | |
| B&R ID code | 0xA4AC |
| Status indicators | I/O function per channel, operating state, module status |
| Diagnostics | |
| Module run/error | Yes, using LED status indicator and software |
| Outputs | Yes, using LED status indicator and software (output error status) |
| Power consumption | |
| Bus | 0.26 W |
| Internal I/O | 0.8 W |
| Additional power dissipation caused by actuators (resistive) [W] ¹⁾ | +0.42 |
| Certifications | |
| CE | Yes |
| UKCA | Yes |
| ATEX | Zone 2, II 3G Ex nA nC IIA T5 Gc IP20, Ta (see X20 user's manual) FTZÚ 09 ATEX 0083X |
| UL | cULus E115267 Industrial control equipment |
| HazLoc | cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5 |
| DNV | Temperature: B (0 to 55°C) Humidity: B (up to 100%) Vibration: B (4 g) EMC: B (bridge and open deck) |
| CCS | Yes |
| LR | ENV1 |
| KR | Yes |
| ABS | Yes |
| BV | EC33B Temperature: 5 - 55°C Vibration: 4 g EMC: Bridge and open deck |
| KC | Yes |
| Digital outputs | |
| Variant | Current-sourcing FET |
| Nominal voltage | 24 VDC |
| Switching voltage | 24 VDC -15% / +20% |
| Nominal output current | 0.5 A |
| Total nominal current | 4 A |
| Connection type | 1-wire connections |
| Output circuit | Source |
| Output protection | Thermal shutdown in the event of overcurrent or short circuit (see value "Short-circuit peak current") Internal freewheeling diode for switching inductive loads (see section "Switching inductive loads") |
| Diagnostic status | Output monitoring with 10 ms delay |
| Leakage current when the output is switched off | 5 µA |
| R _{DS(on)} | 210 mΩ |
| Peak short-circuit current | <12 A |
| Switch-on in the event of overload shutdown or short-circuit shutdown | Approx. 10 ms (depends on the module temperature) |
| Switching delay | |
| 0 → 1 | <300 µs |
| 1 → 0 | <300 µs |
| Switching frequency | |
| Resistive load | Max. 500 Hz |
| Inductive load | See section "Switching inductive loads". |
| Braking voltage when switching off inductive loads | Typ. 50 VDC |
| Insulation voltage between channel and bus | 500 V _{eff} |

Table 2: X20DO8322 - Technical data


| | |
|--|--|
| Order number | X20DO8322 |
| Electrical properties | |
| Electrical isolation | Channel isolated from bus Channel not isolated from channel and I/O power supply |
| Operating conditions | |
| Mounting orientation | |
| Horizontal | Yes |
| Vertical | Yes |
| Installation elevation above sea level | |
| 0 to 2000 m | No limitation |
| >2000 m | Reduction of ambient temperature by 0.5°C per 100 m |
| Degree of protection per EN 60529 | IP20 |
| Ambient conditions | |
| Temperature | |
| Operation | |
| Horizontal mounting orientation | -25 to 60°C |
| Vertical mounting orientation | -25 to 50°C |
| Derating | - |
| Storage | -40 to 85°C |
| Transport | -40 to 85°C |
| Relative humidity | |
| Operation | 5 to 95%, non-condensing |
| Storage | 5 to 95%, non-condensing |
| Transport | 5 to 95%, non-condensing |
| Mechanical properties | |
| Note | Order 1x terminal block X20TB12 separately. Order 1x bus module X20BM11 separately. |
| Pitch | 12.5 ^{+0.2} mm |

Table 2: X20DO8322 - Technical data

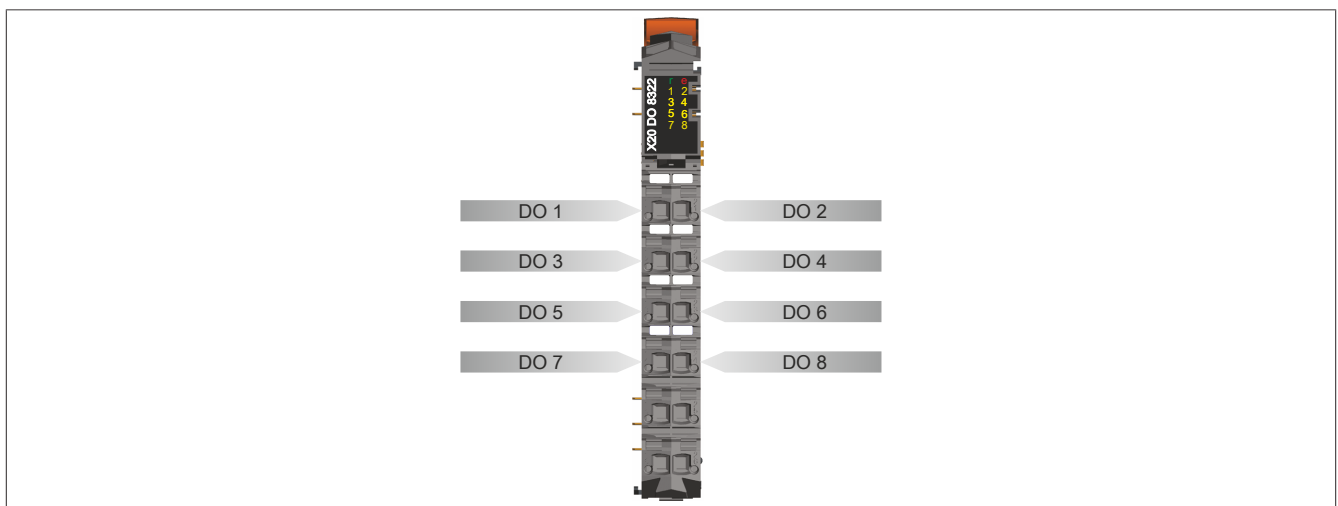
- 1) Number of outputs x $R_{DS(on)}$ x Nominal output current². For a calculation example, see section "Mechanical and electrical configuration" in the X20 system user's manual.

2.2 Status LEDs

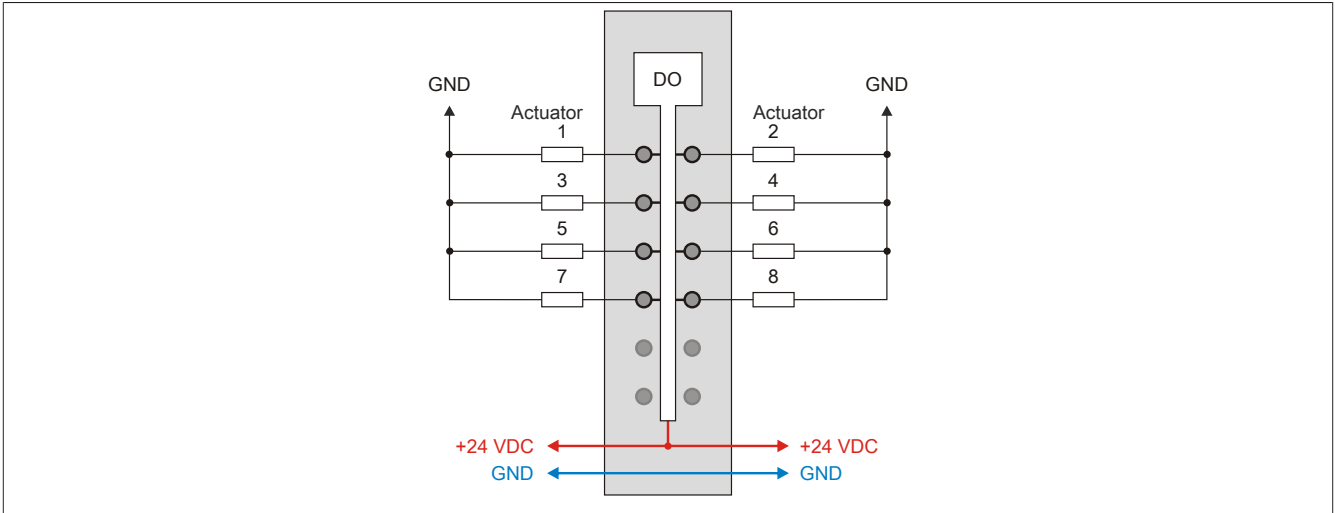
For a description of the various operating modes, see section "Additional information - Diagnostic LEDs" in the X20 System user's manual.

| Figure | LED | Color | Status | Description | |
|---|-------|-------|-----------------------------|---|---|
|  | r | Green | Off | Module supply not connected | |
| | | | Single flash | RESET mode | |
| | | | Blinking | PREOPERATIONAL mode | |
| | | | On | RUN mode | |
| | e | Red | Off | Module supply not connected or everything OK | |
| | | | Single flash | Warning/Error on an I/O channel. Level monitoring for digital outputs has been triggered. | |
| | e + r | | Red on / Green single flash | Invalid firmware | |
| | 1 - 8 | | Orange | | Output status of the corresponding digital output |

2.3 Pinout



2.4 Connection example

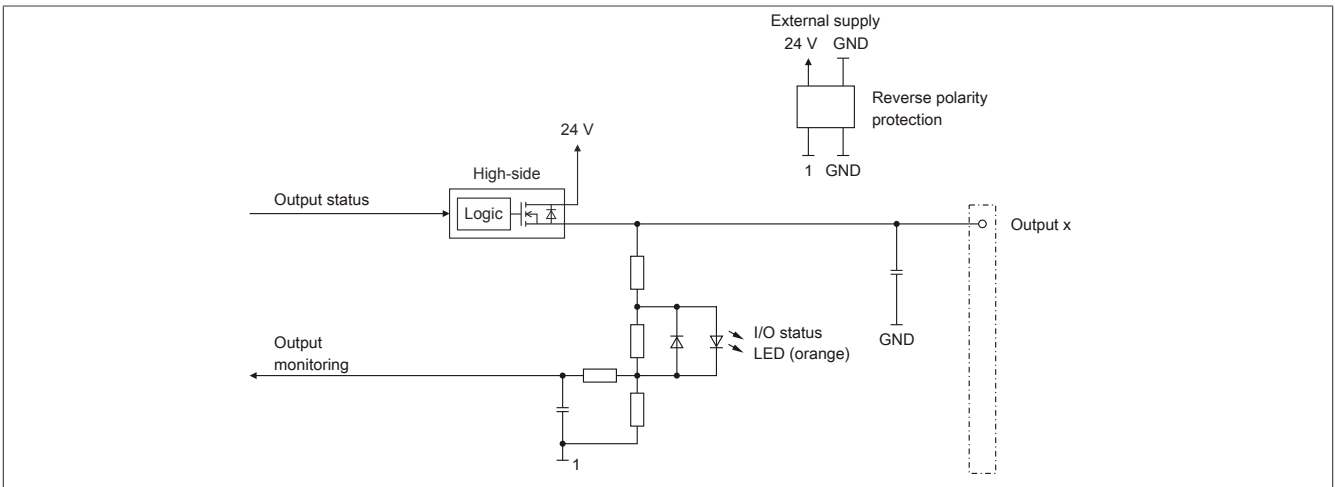


Caution!

If the module is operated outside specifications, the output current may rise above the maximum permissible nominal current. This applies both to individual channels and to the summation current of the module.

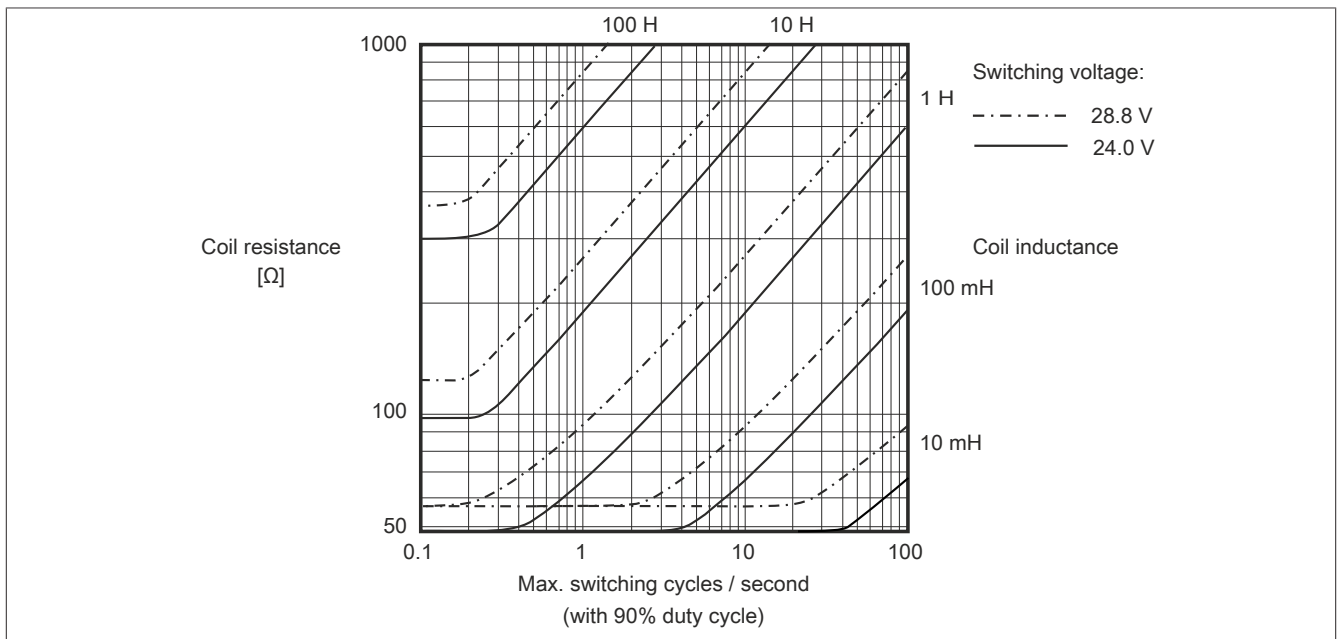
Appropriate cable cross-sections or external safety measures must therefore be provided.

2.5 Output circuit diagram

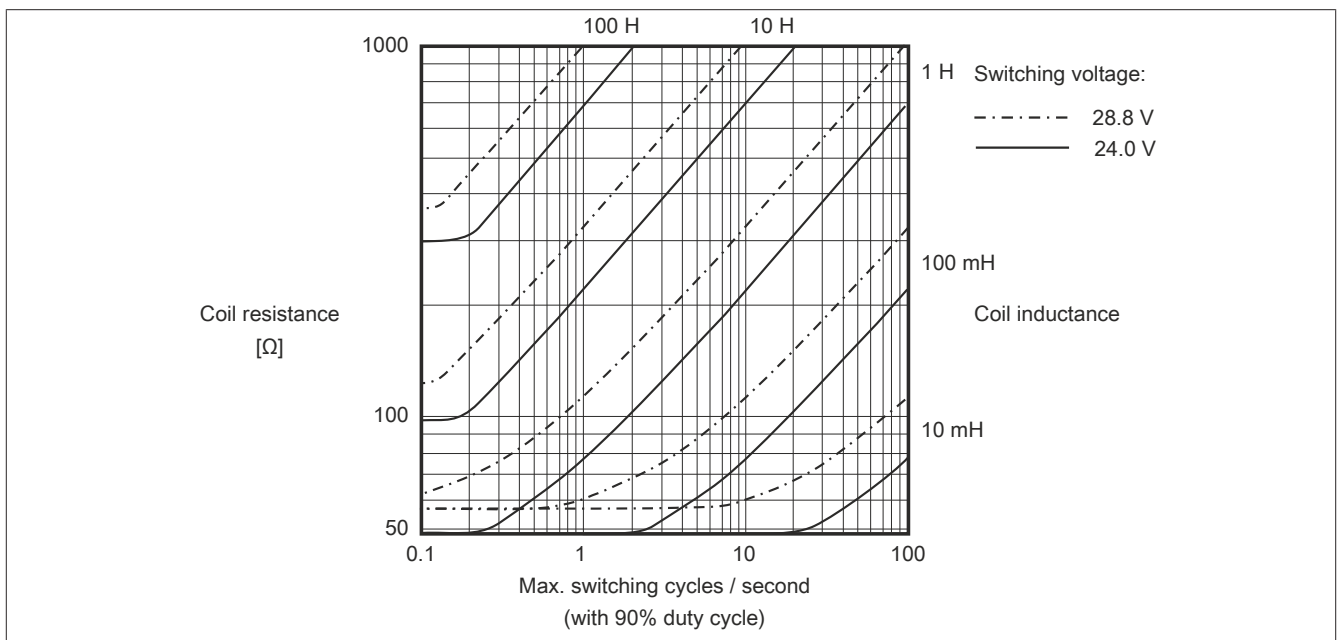


2.6 Switching inductive loads

Environmental temperature: 55°C, all outputs with the same load



Environmental temperature: 60°C, all outputs with the same load



Information:

If the maximum number of operating cycles per second is exceeded, an external inverse diode must be used.

Operating conditions outside of the area in the diagram are not permitted!

3 Function description

3.1 Digital outputs

The module is equipped with 8 digital outputs.

The output state is transferred to the output channels with a fixed offset (<60 µs) in relation to the network cycle (SyncOut).

Packed outputs (only function model 0 - Standard)

Setting "Packed outputs" in the Automation Studio I/O configuration can be used to determine whether all bits of the register should be applied as individual data points in the Automation Studio I/O mapping (e.g. "DigitalOutput01 to DigitalOutputxx") or whether the register should be displayed as a single USINT data point (e.g. "DigitalOutput").



Information:

The register is described in "[Switching state of digital outputs 1 to 8](#)" on page 11.

3.1.1 Monitoring status of the outputs

On the module, the output states of the outputs are compared to the target states. The control of the output driver is used for the target state.

A change in the output state resets monitoring for that output. The status of each individual channel can be read out. A change in the monitoring status is actively transmitted as an error message.

| Supervision status | Description |
|--------------------|---|
| 0 | Digital output channel: No error |
| 1 | Digital output channel: <ul style="list-style-type: none"> • Short circuit or overload • Channel switched on and missing I/O power supply • Channel switched off and external voltage applied to channel |



Information:

The register is described in "[Status of digital outputs 1 to 8](#)" on page 11.

4 Commissioning

4.1 Using the module on the bus controller

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

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

4.1.1 CAN I/O bus controller

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

5 Register description

5.1 General data points

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

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

5.2 Function model 0 - Standard

| Register | Fixed offset | Name | Data type | Read | | Write | |
|----------|--------------|-----------------------|-----------|--------|---------|--------|---------|
| | | | | Cyclic | Acyclic | Cyclic | Acyclic |
| 2 | 0 | DigitalOutput | USINT | | | • | |
| | | DigitalOutput01 | Bit 0 | | | | |
| | | ... | ... | | | | |
| | | DigitalOutput08 | Bit 7 | | | | |
| 30 | 1 | StatusInput01 | USINT | • | | | |
| | | StatusDigitalOutput01 | Bit 0 | | | | |
| | | ... | ... | | | | |
| | | StatusDigitalOutput08 | Bit 7 | | | | |

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

Acyclic access continues to be based on the register numbers.

5.3 Function model 254 - Bus Controller

| Register | Offset ¹⁾ | Name | Data type | Read | | Write | |
|----------|----------------------|---|-----------|--------|---------|--------|---------|
| | | | | Cyclic | Acyclic | Cyclic | Acyclic |
| 2 | 0 | Switching state of digital outputs 1 to 8 | USINT | | | • | |
| | | DigitalOutput01 | Bit 0 | | | | |
| | | ... | ... | | | | |
| | | DigitalOutput08 | Bit 7 | | | | |
| 30 | - | Status of digital outputs 1 to 8 | USINT | | • | | |
| | | StatusDigitalOutput01 | Bit 0 | | | | |
| | | ... | ... | | | | |
| | | StatusDigitalOutput08 | Bit 7 | | | | |

1) The offset specifies where the register is within the CAN object.

5.4 Digital outputs

5.4.1 Switching state of digital outputs 1 to 8

Name:

DigitalOutput

DigitalOutput01 to DigitalOutput08

The switching state of digital outputs 1 to 8 are stored in this register.

| Data type | Values | Information ¹⁾ |
|-----------|------------------------|---|
| USINT | 0 to 255 | Packed outputs = On Data point: "DigitalOutput" |
| | See the bit structure. | Packed outputs = Off or function model ≠ 0 - Standard. Data points: "DigitalOutput01" to "DigitalOutput08" |

1) See "Digital outputs" on page 8.

Bit structure:

| Bit | Name | Value | Information |
|-----|-----------------|-------|-------------------------|
| 0 | DigitalOutput01 | 0 | Digital output 01 reset |
| | | 1 | Digital output 01 set |
| ... | | ... | |
| 7 | DigitalOutput08 | 0 | Digital output 08 reset |
| | | 1 | Digital output 08 set |

5.5 Monitoring status of the digital outputs

On the module, the output states of the outputs are compared to the target states.

5.5.1 Status of digital outputs 1 to 8

Name:

StatusInput01

StatusDigitalOutput01 to StatusDigitalOutput08

This register is used to indicate the status of digital outputs 1 to 8.

| Data type | Values | Information ¹⁾ |
|-----------|------------------------|---|
| USINT | 0 to 255 | Packed outputs = On Data point: "StatusInput01" |
| | See the bit structure. | Packed outputs = Off or function model ≠ 0 - Standard. Data points: "StatusDigitalOutput01" to "StatusDigitalOutput0x" |

1) See "Digital outputs" on page 8.

Bit structure:

| Bit | Name | Value | Information |
|-----|-----------------------|-------|---|
| 0 | StatusDigitalOutput01 | 0 | Channel 01: No error |
| | | 1 | Channel 01: <ul style="list-style-type: none"> Short circuit or overload Channel switched on and missing I/O power supply Channel switched off and external voltage applied to channel |
| ... | | ... | |
| 8 | StatusDigitalOutput08 | 0 | Channel 08: No error |
| | | 1 | Channel 08: For an error description, see channel 01. |

5.6 Minimum cycle time

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

| Minimum cycle time |
|--------------------|
| 100 μ s |

5.7 Minimum I/O update time

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

| Minimum I/O update time |
|---------------------------------|
| Equal to the minimum cycle time |