X20DOD322

1 General information

The X20DOD322 module is equipped with eight outputs for 1-wire or 2-wire connections. The X20DOD322 is designed for source output wiring.

- 8 digital outputs
- Source connection
- 2-wire connections
- GND for signal supply
- Integrated output protection

2 Order data

Model number	Short description	Figure
	Digital outputs	
X20DOD322	X20 digital output module, 8 outputs, 24 VDC, 0.5 A, source, 2-wire connections	
	Required accessories	
	Bus modules	
X20BM11	X20 bus module, 24 VDC keyed, internal I/O supply continuous	
X20BM15	X20 bus module, with node number switch, 24 VDC keyed, internal I/O supply continuous	
	Terminal blocks	
X20TB1F	X20 terminal block, 16-pin, 24 VDC keyed	

Table 1: X20DOD322 - Order data

3 Technical data

Model number	X20DOD322
Short description	
I/O module	8 digital outputs 24 VDC for 1- or 2-wire connections
General information	
B&R ID code	0xC0E9
Status indicators	I/O function per channel, operating state, module status
Diagnostics	
Module run/error	Yes, using status LED and software
Outputs	Yes, using status LED and software (output error status)
Power consumption	
Bus	0.19 W
Internal I/O	0.8 W
Additional power dissipation caused by actuators (resistive) [W] [1]	+0.28 W

Table 2: X20DOD322 - Technical data

X20DOD322

| Model number	X20DOD322
Certifications	
CE	Yes
KC	Yes
EAC	Yes
UL	cULus E115267 Industrial control equipment
HazLoc	cCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5
ATEX	Zone 2, II 3G Ex nA nC IIA T5 Gc IP20, Ta (see X20 user's manual) FTZÚ 09 ATEX 0083X
DNV GL	Temperature: **B** (0 - 55°C) Humidity: **B** (up to 100%) Vibration: **B** (4 g) EMC: **B** (bridge and open deck)
LR	ENV1
KR	Yes
Digital outputs	
Variant	FET positive switching
Nominal voltage	24 VDC
Switching voltage	24 VDC -15 % / +20 %
Nominal output current	0.5 A
Total nominal current	4 A
Connection type	1- or 2-wire connections
Output circuit	Source
Output protection	Thermal cutoff if overcurrent or short circuit occurs (see value "Peak short circuit current") Internal inverse diode for switching inductive loads (see section "Switching inductive loads")
Diagnostic status	Output monitoring with 10 ms delay
Leakage current when switched off	5 µA
$R_{DS(on)}$	140 mΩ
Peak short-circuit current	<3 A
Switch-on in the event of overload shutdown or short-circuit shutdown	Approx. 10 ms (depends on the module temperature)
Switching delay [2]	
0 → 1	<300 µs
1 → 0	<300 µs
Switching frequency	
Resistive load [2]	Max. 500 Hz
Inductive load	See section "Switching inductive loads"
Braking voltage when switching off inductive loads	Typ. 45 VDC
Isolation voltage between channel and bus	500 V_{eff}
Electrical properties	
Electrical isolation	Channel isolated from bus Channel not isolated from channel
Operating conditions	
Mounting orientation	
Horizontal	Yes
Vertical	Yes
Installation elevation above sea level	
0 to 2000 m	No limitations
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m
Degree of protection per EN 60529	IP20
Ambient conditions	
Temperature	
Operation	
Horizontal mounting orientation	-25 to 60°C
Vertical mounting orientation	-25 to 50°C
Derating	-
Storage	-40 to 85°C
Transport	-40 to 85°C
Relative humidity	
Operation	5 to 95%, non-condensing
Storage	5 to 95%, non-condensing
Transport	5 to 95%, non-condensing
Mechanical properties	
Note	Order 1x X20TB1F terminal block separately Order 1x X20BM11 bus module separately
Spacing	12.5$^{+0.2}$ mm

Table 2: X20DOD322 - Technical data

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

4 Status LEDs

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

| Figure	LED	Color	Status	Description
	S	Green	Off	Module supply not connected
			Single flash	RESET mode
			Blinking	PREOPERATIONAL mode
			On	RUN mode
		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.
		Red on / Green single flash		Invalid firmware
	1 - 8	Orange		Output status of the corresponding digital output

5 Pinout
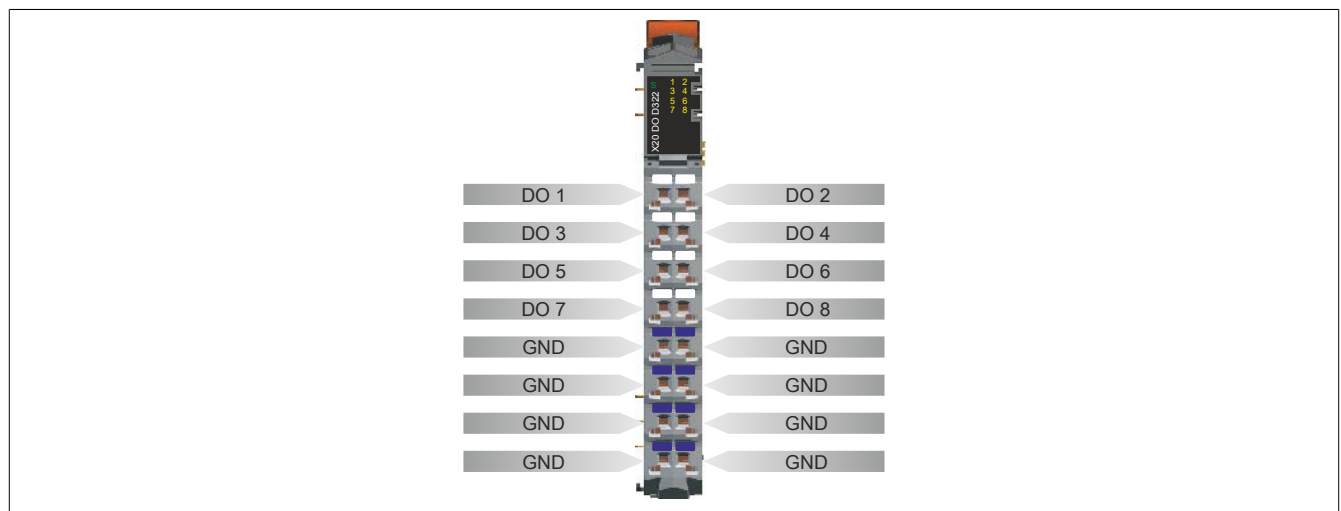
6 Connection example
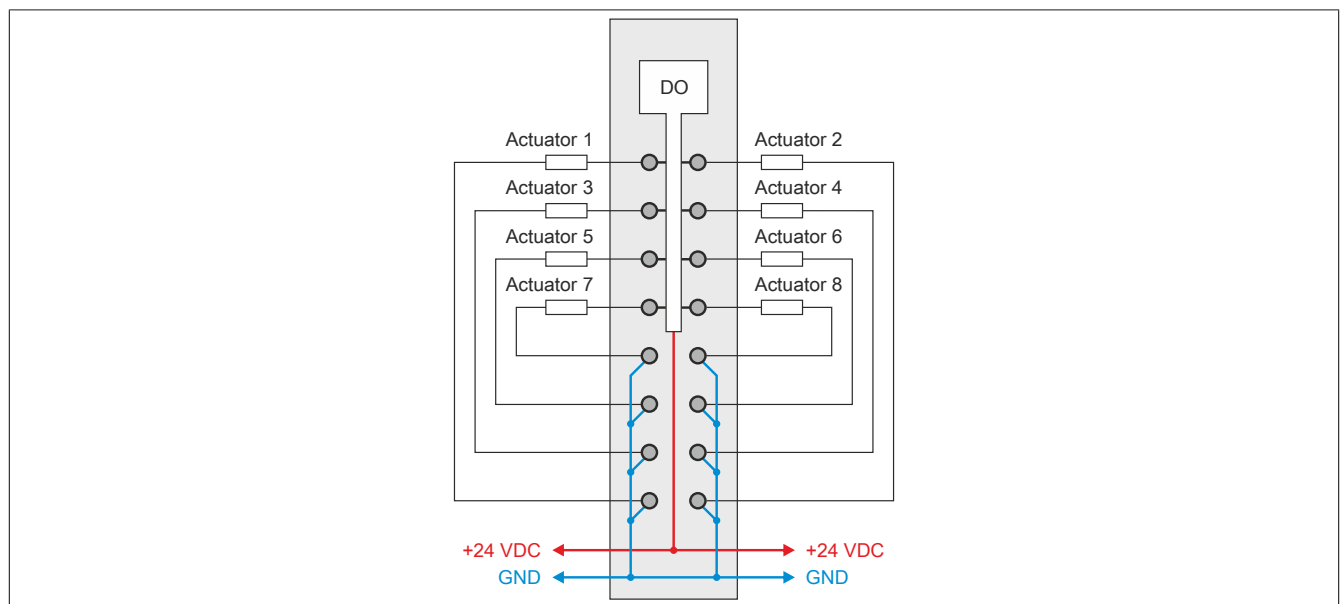
Caution!

If the module is operated outside of specifications, the output current can increase above the maximum permissible nominal current. This applies to individual channels and also to the summation current for the module.
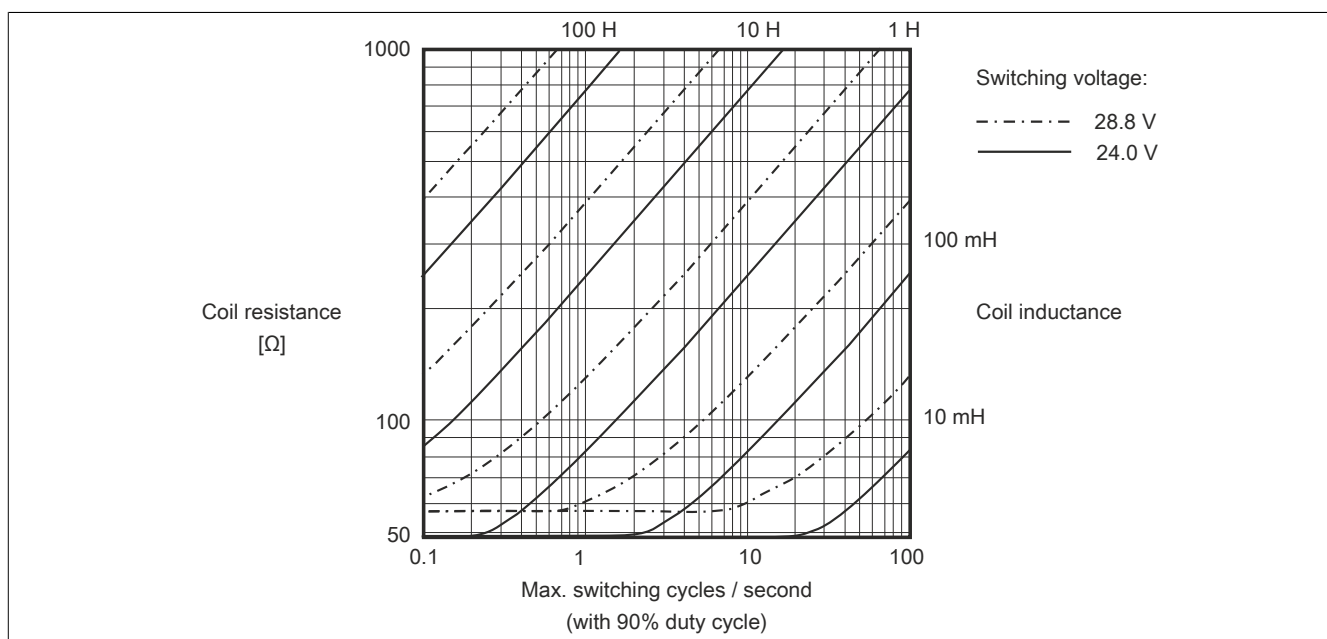
Therefore sufficient cable cross sections or external safety measures must be used.

7 Output circuit diagram
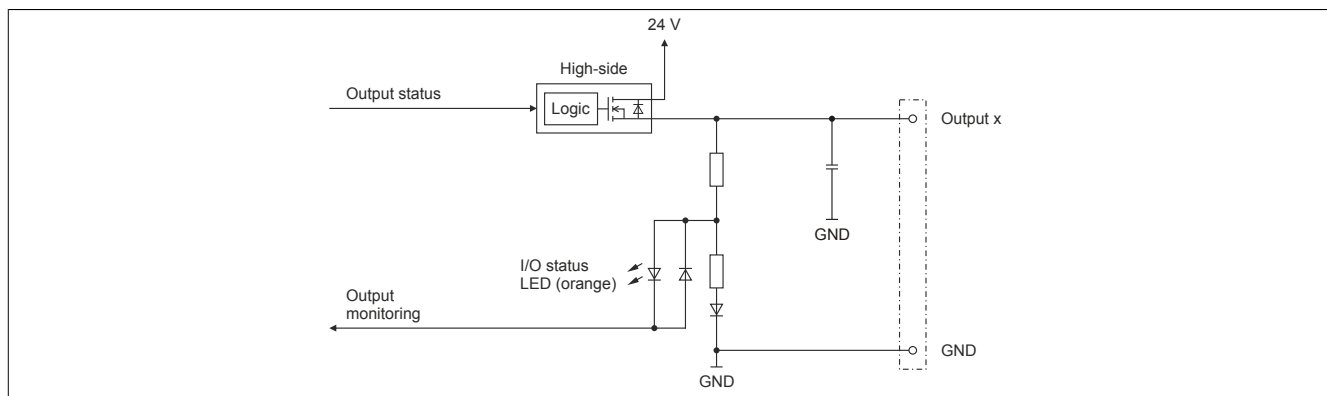
8 Switching inductive loads

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

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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!

9 Register description

9.1 General data points

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

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

9.2 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	StatusDigitalOutput	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.

9.3 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.

9.3.1 Using the module on the bus controller

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

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

9.3.2 CAN I/O bus controller

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

9.4 Digital outputs

The output status is transferred to the output channels with a fixed offset (<60 µs) based on the network cycle (SyncOut).

9.4.1 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.

Only function model 0 - Standard:

Setting "Packed outputs" in the Automation Studio I/O configuration determines whether all bits of this register should be applied individually as data points in the Automation Studio I/O assignment ("DigitalOutput01" to "DigitalOutput0x") or whether this register should be displayed as a single USINT data point ("DigitalOutput").

Data type	Value	Information
USINT	0 to 255	Packed outputs = On
	See the bit structure.	Packed outputs = Off or function model ≠ 0 - Standard.

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

9.5 Monitoring status of the digital 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. A change in the monitoring status generates an error message.

9.5.1 Status of digital outputs 1 to 8

Name:
StatusDigitalOutput
StatusDigitalOutput01 to StatusDigitalOutput08

The status of digital outputs 1 to 8 is mapped in this register.

Only function model 0 - Standard:

Setting "Packed outputs" in the Automation Studio I/O configuration determines whether all bits of this register should be applied individually as data points in the Automation Studio I/O assignment ("StatusDigitalOutput01" to "StatusDigitalOutput0x") or whether this register should be displayed as a single USINT data point ("StatusDigitalOutput").

Data type	Value	Information
USINT	0 to 255	Packed outputs = On
	See the bit structure.	Packed outputs = Off or function model ≠ 0 - Standard.

Bit structure:

Bit	Name	Value	Information
0	StatusDigitalOutput01	0	Channel 01: No error
		1	Channel 01: • Short circuit or overload • Channel switched on and missing I/O power supply • Channel switched off and external voltage applied on channel
...		...	
8	StatusDigitalOutput08	0	Channel 08: No error
		1	Channel 08: For an error description, see channel 01.

9.6 Minimum cycle time

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

Minimum cycle time
100 µs

9.7 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