X20(c)DO9322

1 General information

The module is equipped with 12 outputs for 1-wire connections. The module is designed for source output wiring.

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

2 Coated modules

Coated modules are X20 modules with a protective coating for the electronics component. This coating protects X20c modules from condensation and corrosive gases.

The modules' electronics are fully compatible with the corresponding X20 modules.

For simplification purposes, only images and module IDs of uncoated modules are used in this data sheet.

The coating has been certified according to the following standards:

- Condensation: BMW GS 95011-4, 2x 1 cycle
- Corrosive gas: EN 60068-2-60, method 4, exposure 21 days







3 Order data

Model number	Short description
	Digital outputs
X20DO9322	X20 digital output module, 12 outputs, 24 VDC, 0.5 A, source, 1-wire connections
X20cDO9322	X20 digital output module, coated, 12 outputs, 24 VDC, 0.5 A, source, 1-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
X20cBM11	X20 bus module, coated, 24 VDC keyed, internal I/O supply continuous
	Terminal blocks
X20TB12	X20 terminal block, 12-pin, 24 VDC keyed

Table 1: X20DO9322, X20cDO9322 - Order data

4 Technical data

Short description 10 module 12 digital outputs 24 VDC for 1-wire connections	Model number	X20DO9322 X20cDO9322
Senter Information	Short description	
Senters Information	•	12 digital outputs 24 VDC for 1-wire connections
BBR ID code	General information	
Situte indicators Module trailveror Module fun/error Module fun/error Module fun/error Module fun/error Module fun/error Module fun/error Wes, using status LED and software (output error status) Power constamption Bus C.28 W Internal IVO Additional power dissipation caused by actuators (resistive) (IV) 11 Certifications CE Wes Wes UL Module 11587 UL MazLoc Module 11587 MazLoc Module 11587 Modul		0x1B9A
Diagnostics		
Module nurierror		To landion per ordinal, operating date, module dated
Outputs Power consumption Bus Internal I/O Additional power dissipation caused by actuators (resistive) Mily		Yes using status LED and software
Power consumption Bus Internal I/O Additional power dissipation caused by actuators (resistive) [M] Power dissipation caused by actuators (RC		<u>-</u>
Bus	•	res, using status LED and software (output error status)
Internal I/O	•	0.26 W
Additional power dissipation caused by actuators (resistive) MP) " Certifications		
(resistive) M 1		
Certifications Yes CE Yes KC Yes UL CUB CHUS F115287 Industrial control equipment for hazardous locations CSCASA, 244665 Process control equipment for hazardous locations CSCASA, 244665 Process control equipment for hazardous locations ATEX Zono 2, 11 35 c Fx An C ILB 75 Gc IP20, 7a (see X20 user's manual) F1ZU 09 ATEX 0083X DNV GL Temperature: 8 (0 - 55°C) Humidity. 8 (up to 100%) Vibration: 8 (4 g) LR ENV1 GOS1-R Design FET positive switching Normal voltage PYes Digital outputs FET positive switching Design FET positive switching Normal voltage 24 VDC Switching voltage 24 VDC Normal output current 0.5 A Total norminal current 6 A Connection type 1-wire connections Output protection Thermal cutoff if overcurrent or short circuit occurs (see value "Peak short circuit current") internal inverse clide for switching inductive locals (see section "Switching inductive locals") Diagnostic status Cutput montening with 10 ms cleay Leakage current when switched off Approx. 10 ms (depends on		+0.03
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Marco		Voc
U.L. GULUS ET15267 Industrial control equipment		
HazLoc HazLoc CCSAus 244695 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5 CREATE ATEX ATEX ATEX Process (SE) Explosion 2, Groups ABCD, T5 CREATE PROPERTIES (I) - 55°C) Hundling 8 (I) - 55°C) Hundling 9 (I)		
HazLoc CCSAus 244665 Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, 15 ATEX ATEX ATEX DNV GL DNV GL CCST-R COST-R COST-R Digital outputs CCST-R Digital outputs CCST-R Digital outputs FET positive switching Nominal voltage AVDC Switching voltage ACCST-R COST-R Digital outputs FET positive switching Nominal voltage AVDC AVDC Switching voltage ACCST-R COST-R COST-R Digital outputs FET positive switching Nominal voltage AVDC AVDC Switching voltage AVDC Switching inductive loads (see section "Switching inductive loads") Internal inverse diode for switching inductive loads (see section "Switching inductive loads") AVDC Switching on after overload or short circuit cutoff Approx. 10 ms (depends on the module temperature) Switching frequency Switching frequency AVDC AVDC Switching inductive loads" Typ. 50 VDC Switching inductive loads Typ. 50 VDC Switching off inductive loads Typ. 50 VDC Switching orientation Channel isolated from bus Channel isolated from bus Channel isolated from bus Channel on isolated from bus Chann	OL	
Process control equipment for hazardous locations Class I, Division 2, Groups ABCD, T5 Ge P20, Ta (see X20 user's manual) FTZ10 pa ATEX NOSE)	Hazloc	
Total normatical status Total normatical	TIGELOG	
ATEX		
PP20, Ta (see X20 user's manual) FF210 9 ATEX 0083X DNV GL		
DNV GL DNV GL DNV GL DNV GL DNV GL DNV GL CTEMPOPATURE 18 (0.15°C) Humidity 18 (up to 100%) Vibration: 18 (4 g) EMC: 8 (Bridge and open deck) LR GOST-R FET positive switching Nominal voltage Design Nominal voltage Svitching volt	ATEX	Zone 2, II 3G Ex nA nC IIA T5 Gc
DNV GL		
Humidity: B (μp to 100%) y beatons b (4 g) EMC: B (Bridge and open deck) LR GOST-R FOST-R		
LR	DNV GL	
LR EMC: B (Birdge and open deck) GOST-R Yes Digital outputs Design FET positive switching Nominal voltage 24 VDC Switching voltage 24 VDC -15 % / +20 % Nominal output current 0.5 A Total nominal current 6.A Connection type 1-wire connections Output protection Thernal 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 Rosson/Bash ort circuit current 4 2 A Switching on after overload or short circuit cutoff Approx. 10 ms (depends on the module temperature) Switching of elay ³ 3 0 → 1 4 3 4 3 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4		
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Design FET positive switching Nominal voltage 24 VDC Switching voltage 24 VDC -15 % / +20 % Nominal output current 0.5 A Total nominal current 6 A Connection type 1-wire connections Output circuit Source Output protection Thermal cutoff if overcurrent or short circuit coccurs (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 Rosson! 210 mΩ Peak short circuit current <12 A Switching on after overload or short circuit cutoff Approx. 10 ms (depends on the module temperature) Switching delay ²⁾ 300 μs 0 → 1 <300 μs Switching frequency Resistive load ³⁾ Max. 500 Hz Resistive load ³⁾ Max. 500 Hz Max. 500 Hz Inductive load See section "Switching inductive loads" See section "Switching inductive loads" Isolation voltage between channel and bus 500 V _{ef} Electrical isolator <td></td> <td>Yes</td>		Yes
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Switching voltage 24 VDC -15 % / +20 % Nominal output current 0.5 A Total nominal current 6 A Connection type 1-wire connections Output protection 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 _{OS(son)} 210 mΩ Peak short circuit current < 12 A		
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Braking voltage when switching off inductive loads Isolation voltage between channel and bus Electrical characteristics Electrical isolation Channel isolated from bus Channel not isolated from channel Operating conditions Mounting orientation Horizontal Yes Vertical Installation elevation above sea level 0 to 2000 m No limitations	Inductive load	See section "Switching inductive loads"
Electrical characteristics Electrical isolation Channel isolated from bus Channel not isolated from channel Operating conditions Mounting orientation Horizontal Vestical Vertical Installation elevation above sea level 0 to 2000 m No limitations	Braking voltage when switching off inductive loads	
Electrical characteristics Electrical isolation Channel isolated from bus Channel not isolated from channel Operating conditions Mounting orientation Horizontal Vestical Vertical Installation elevation above sea level 0 to 2000 m No limitations	Isolation voltage between channel and bus	500 V _{eff}
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Channel not isolated from channel Operating conditions Mounting orientation Horizontal Yes Vertical Yes Installation elevation above sea level 0 to 2000 m No limitations		Channel isolated from bus
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Mounting orientation Horizontal Yes Vertical Yes Installation elevation above sea level 0 to 2000 m No limitations	Operating conditions	
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Vertical Yes Installation elevation above sea level No limitations		Yes
Installation elevation above sea level 0 to 2000 m No limitations		
0 to 2000 m No limitations		
		No limitations
1. Loud of the control of the contro		
Degree of protection per EN 60529 IP20		

Table 2: X20DO9322, X20cDO9322 - Technical data

Model number	X20DO9322	X20cDO9322		
Environmental conditions				
Temperature				
Operation				
Horizontal mounting orientation	-25 to	60°C		
Vertical mounting orientation	-25 to	50°C		
Derating	See section	n "Derating"		
Storage	-40 to	85°C		
Transport	-40 to	85°C		
Relative humidity				
Operation	5 to 95%, non-condensing	Up to 100%, condensing		
Storage	5 to 95%, no	n-condensing		
Transport	5 to 95%, no	n-condensing		
Mechanical properties				
Note	Order 1x X20TB12 terminal block separately	Order 1x X20TB12 terminal block separately		
	Order 1x X20BM11 bus module separately	Order 1x X20cBM11 bus module separately		
Spacing	12.5*0.2 mm			

Table 2: X20DO9322, X20cDO9322 - Technical data

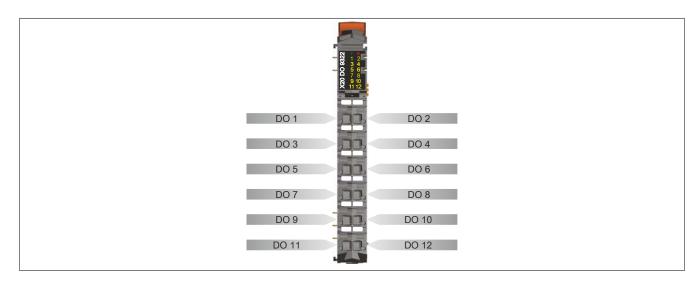
- 1) Number of outputs x R_{DS(on)} x Nominal output current². For a calculation example, see section "Mechanical and electrical configuration" of the X20 system user's manual.
- 2) @≤1 kΩ

5 Status LEDs

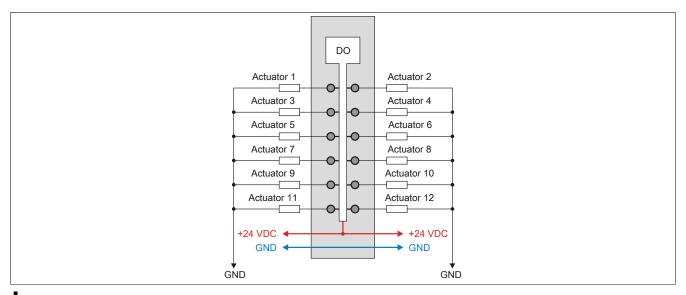
For a description of the various operating modes, see section "Additional information - Diagnostic LEDs" of the X20 system user's manual.

Figure	LED	Color	Status	Description
r Green Off		Off	Module supply not connected	
			Single flash	RESET mode
			Blinking	PREOPERATIONAL mode
N O			On	RUN mode
E 1 2	e Red Off		Off	Module supply not connected or everything OK
00 5 6E			Single flash	Warning/Error on an I/O channel. Level monitoring for digital outputs has been triggered.
S 9 10	e + r	Red on / Green	single flash	Invalid firmware
X 11 12	1 - 12	Orange		Output status of the corresponding digital output

6 Pinout



7 Connection example

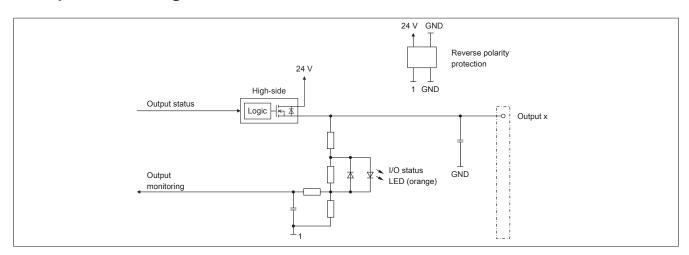


Caution!

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.

8 Output circuit diagram



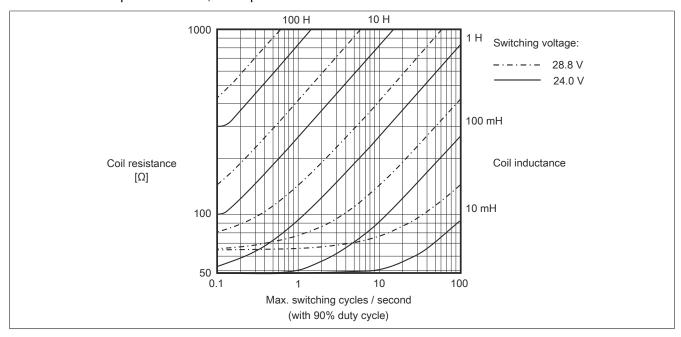
9 Derating

There is no derating when operated below 55°C.

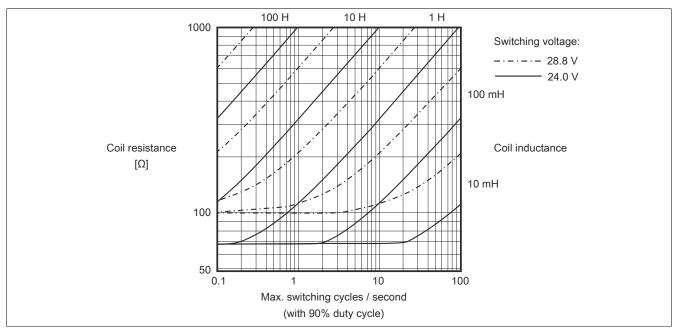
When operated at temperatures above 55°C, the maximal total current per channel is limited to 0,35 A

10 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!

11 Register description

11.1 General data points

In addition to the registers listed in the register description, the module also has other more general data points. These registers are not specific to the module but contain general information such as serial number and hardware version.

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

11.2 Function model 0 - Standard

Register	Fixed offset	Name	Data type	type Read		W	rite
				Cyclic	Acyclic	Cyclic	Acyclic
	1	DigitalOutput	UINT			•	
2	0	Switching state of digital outputs 1 to 8	USINT			•	
		DigitalOutput01	Bit 0]			
		DigitalOutput08	Bit 7				
3	1	Switching state of digital outputs 9 to 12	USINT			•	
		DigitalOutput09	Bit 0				
		DigitalOutput12	Bit 3				
	1	StatusInput01	UINT	•			
30	1	Status of digital outputs 1 to 8	USINT	•			
		StatusDigitalOutput01	Bit 0				
		StatusDigitalOutput08	Bit 7				
31	2	Status of digital outputs 9 to 12	USINT	•			
		StatusDigitalOutput09	Bit 0				
		StatusDigitalOutput12	Bit 3				

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.

11.3 Function model 254 - Bus Controller

Register	Offset1)	Name	Data type	Re	ead	Wi	rite
				Cyclic	Acyclic	Cyclic	Acyclic
2	0	Switching state of digital outputs 1 to 8	USINT			•	
		DigitalOutput01	Bit 0				
		DigitalOutput08	Bit 7				
3	1	Switching state of digital outputs 9 to 12	USINT			•	
		DigitalOutput09	Bit 0				
		DigitalOutput12	Bit 3				
30	-	Status of digital outputs 1 to 8	USINT		•		
		StatusDigitalOutput01	Bit 0				
		StatusDigitalOutput08	Bit 7				
31	-	Status of digital outputs 9 to 12	USINT		•		
		StatusDigitalOutput09	Bit 0				
		StatusDigitalOutput12	Bit 3				

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

11.3.1 Using the module on the bus controller

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

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

11.3.2 CAN I/O bus controller

The module occupies 2 digital logical slots on CAN I/O.

11.4 Digital outputs

The output status is transferred to the output channels with a fixed offset ($<60 \mu s$) in relation to the network cycle (SyncOut).

11.4.1 Switching state of digital outputs 1 to 12

Name:

DigitalOutput

DigitalOutput01 to DigitalOutput12

The switching state of digital outputs 1 to 12 are stored in this register.

Function model 0 - Standard only:

The "Packed outputs" setting in the Automation Studio I/O configuration is used to determine whether all of these registers' bits should be set up individually as data points in the Automation Studio I/O mapping ("DigitalOutput01" through "DigitalOutput12") or whether these registers should be displayed as an individual UINT data point ("DigitalOutput").

Data type	Value	Value	
UINT	0 to 4095	Packed outputs = on	
USINT	See bit structure	Packed outputs = off or function model <> 0 - Standard	

Bit structure:

Register 2, Offset 0:

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

Register 3, Offset 1:

Bit	Name	Value	Information
0	DigitalOutput09	0	Digital output 09 reset
		1	Digital output 09 set
3	DigitalOutput12	0	Digital output 12 reset
		1	Digital output 12 set

11.5 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.

11.5.1 Status of digital outputs 1 to 12

Name:

StatusInput01

StatusDigitalOutput01 to StatusDigitalOutput12

The status of digital outputs 1 to 12 is mapped in this register.

Function model 0 - Standard only:

The "packed outputs" setting in the Automation Studio I/O configuration is used to determine whether all of these registers' bits should be set up individually as data points in the Automation Studio I/O mapping ("StatusDigitalOutput01" through "StatusDigitalOutput12") or whether these registers should be displayed as an individual UINT data point ("StatusDigitalOutput").

Data type	Value	Value	
UINT	0 to 4095	Packed outputs = on	
USINT	See bit structure	Packed outputs = off or function model <> 0 - Standard	

Bit structure:

Register 30, (Offset 1):

Bit	Name	Value	Description
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
7	StatusDigitalOutput08	0	Channel 08: No error
		1	Channel 08: For error description, see channel 01

Register 31, (Offset 2):

Bit	Name	Value	Information
0	StatusDigitalOutput09	0	Channel 09: No error
		1	Channel 09:
			Short circuit or overload Channel switched on and missing I/O power supply Channel switched off and external voltage applied on channel
3	StatusDigitalOutput12	0	Channel 12: No error
		1	Channel 12: For error description, see channel 01

11.6 Minimum cycle time

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

Minimum cycle time
100 µs

11.7 Minimum I/O update time

The minimum I/O update time defines how far the bus cycle can be reduced while still allowing an I/O update to take place in each cycle.

	Minimum I/O update time
ĺ	Equal to the minimum cycle time