X20(c)DC1198

1 General information

This module is equipped with one input for SSI absolute encoders with 5 V encoder signal.

- 1 SSI absolute encoder 5 V
- · 2 additional inputs
- · 5 VDC, 24 VDC and GND for encoder supply

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







2.1 -40°C starting temperature

The starting temperature describes the minimum permissible ambient temperature when the power is switched off at the time the coated module is switched on. This is permitted to be as low as -40°C. During operation, the conditions as specified in the technical data continue to apply.

Information:

It is important to absolutely ensure that there is no forced cooling by air currents in a closed control cabinet, for example using a fan or ventilation slots.

3 Order data

Model number	Short description
	Counter functions
X20DC1198	X20 digital counter module, 1 SSI absolute encoder, 5 V, 1 Mbit/s, 32-bit
X20cDC1198	X20 digital counter module, coated, 1 SSI absolute encoders, 5 V, 1 Mbit/s, 32-bit
	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: X20DC1198, X20cDC1198 - Order data

4 Technical data

Model number	X20DC1198 X20cDC1198
Short description	
I/O module	1 SSI absolute encoder 5 V
General information	
B&R ID code	0x1BB0 0xE501
Status indicators	I/O function per channel, operating state, module status
Diagnostics	
Module run/error	Yes, using status LED and software
Power consumption	
Bus	0.01 W
Internal I/O	1.5 W
Additional power dissipation caused by actuators	-
(resistive) [W]	
Type of signal lines	Shielded cables must be used for all signal lines
Certifications	
CE	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 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
EAC	
KC	Yes
	Yes -
Digital inputs	
Quantity	2
Nominal voltage	24 VDC
Input characteristics per EN 61131-2	Type 1
Input voltage	24 VDC -15 % / +20 %
Input current at 24 VDC	Approx. 3.3 mA
Input circuit	Sink
Input filter	
Hardware	≤2 µs
Software	<u>-</u>
Connection type	3-wire connections
Input resistance	7.19 kΩ
Switching threshold	
Low	<5 VDC
High	>15 VDC
Isolation voltage between channel and bus	500 V _{eff}
SSI absolute encoder	
Encoder inputs	5 V, symmetrical
Counter size	32-bit
Max. transfer rate	1 Mbit/s
Keying	Gray/Binary
Isolation voltage between encoder and bus	500 V _{eff}
Overload characteristics of encoder power supply	Short circuit protection, overload protection
Transfer rate	125 kbit/s / 250 kbit/s / 500 kbit/s / 1 Mbit/s
Encoder power supply	
5 VDC	±5%, module-internal, max. 300 mA
24 VDC	Module-internal, max. 300 mA
Electrical properties	
Electrical isolation	Bus isolated from encoder and channel Channel not isolated from channel and encoder
Operating conditions	
Mounting orientation	
Horizontal	Yes
Vertical	Yes
	169
Installation elevation above sea level	No limitati
0 to 2000 m	No limitations
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m IP20
Degree of protection per EN 60529	

Table 2: X20DC1198, X20cDC1198 - Technical data

Model number	X20DC1198	X20cDC1198	
Ambient conditions			
Temperature			
Operation			
Horizontal mounting orientation	-25 to	60°C	
Vertical mounting orientation	-25 to	50°C	
Derating	-	•	
Storage	ge -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%, nor	n-condensing	
Transport	5 to 95%, nor	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	
Pitch	12.5+0	.2 mm	

Table 2: X20DC1198, X20cDC1198 - Technical data

5 LED status indicators

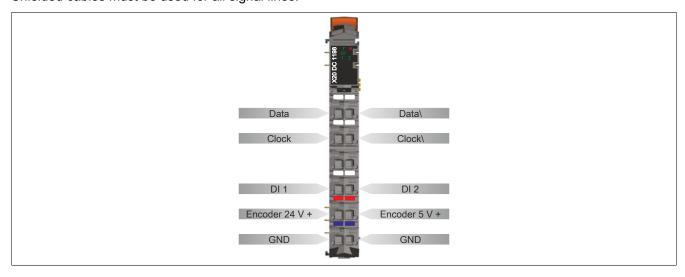
For a description of the various operating modes, see section "Additional information - Diagnostic LEDs" of the X20 system user's manual.

Figure	LED	Color	Status	Description
	r	Green	Off	No power to module
-			Single flash	RESET mode
			Double flash	BOOT mode (during firmware update) ¹⁾
86 1			Blinking	PREOPERATIONAL mode
2 D1 25			On	RUN mode
2 6	е	Red	Off	No power to module or everything OK
			On	Error or reset status
X20	D1	Green		Input status - Data signal
1	1 - 2	Green		Input state of the corresponding digital input

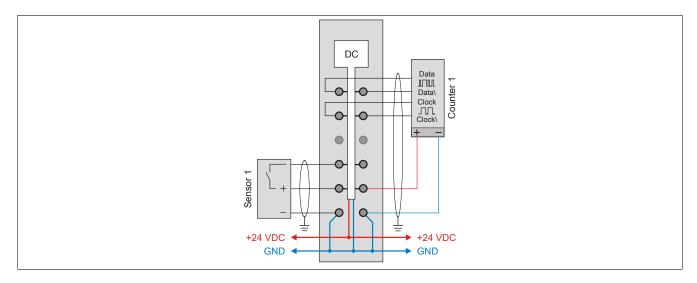
¹⁾ Depending on the configuration, a firmware update can take up to several minutes.

6 Pinout

Shielded cables must be used for all signal lines.

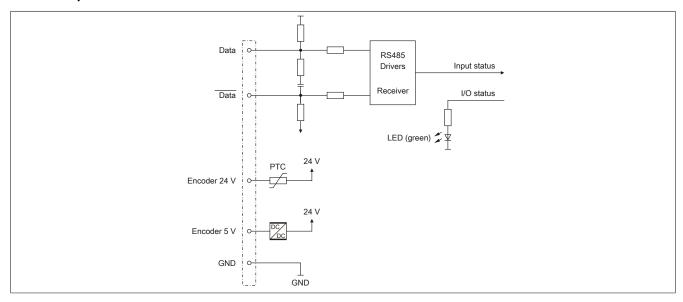


7 Connection example

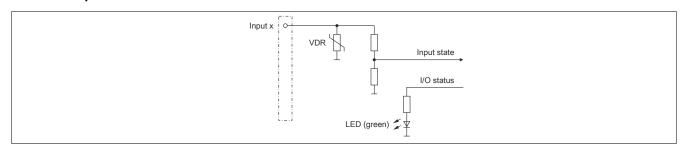


8 Input circuit diagram

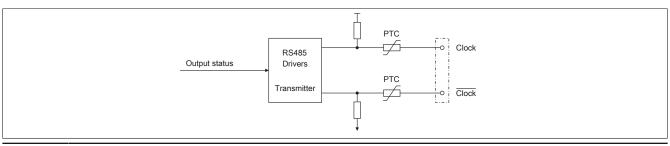
Counter input



Standard inputs



9 Output circuit diagram



10 Register description

10.1 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.

10.2 Function model 0 - Standard

Register	Name	Data type	Read W		Wr	ite
			Cyclic	Acyclic	Cyclic	Acyclic
Configuratio	n					
7176	ConfigOutput14	UINT				•
7172	ConfigAdvanced	UDINT				•
Communicat	ion					
7184	Encoder01	UDINT	•			
264	Input state of digital inputs 1 to 2	USINT	•			
	DigitalInput01	Bit 4				
	DigitalInput02	Bit 5				
40	Status of encoder supplies	USINT	•			
	PowerSupply01	Bit 0				
	PowerSupply02	Bit 1				

10.3 Function model 254 - Bus controller

Register	Offset1)) Name	Data type	Read		Write	
				Cyclic	Acyclic	Cyclic	Acyclic
Configuration							
7176	-	ConfigOutput14	UINT				•
7172	-	ConfigAdvanced	UDINT				•
Communicatio	n						,
7184	0	Encoder01	UDINT	•			
264	4	Input state of digital inputs 1 to 2	USINT	•			
		DigitalInput01	Bit 4				
		DigitalInput02	Bit 5				
40	5	Status of encoder supplies	USINT	•			
		PowerSupply01	Bit 0				
		PowerSupply02	Bit 1				

¹⁾ The offset specifies the position of the register within the CAN object.

10.3.1 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).

10.3.2 CAN I/O bus controller

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

10.4 SSI encoder configuration registers

10.4.1 Standard configuration

Name:

ConfigOutput14

This configuration register sets the encoding, clock rate and number of bits. Default = 0. This must be set once using an acyclic write command.

Data type	Values	Bus controller default setting
UINT	See the bit structure.	0

Bit structure:

Bit	Name	Value	Information
0 - 5	SSI value valid bits	х	Bus controller default setting: 0
6 - 7	Clock rate	00	1 MHz (bus controller default setting)
		01	500 kHz
		10	250 kHz
		11	125 kHz
8 - 13	SSI number of bits	х	Number of bits including leading zeros. Bus controller default setting: 0
14	Reserved	0	
15	Keying	0	Binary encoding (bus controller default setting)
		1	Gray coding

10.4.2 Extended configuration

Name:

ConfigAdvanced

This configuration register is used to set the encoding, clock rate, number of bits and monostable multivibrator settings. This must be set once using an acyclic write command.

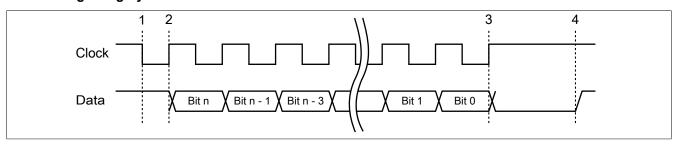
It only differs from "ConfigOutput14" on page 6 by data length and additional monostable multivibrator testing.

Data type	Values	Bus controller default setting
UDINT	See the bit structure.	65536

Bit structure:

Bit	Name	Value	Information
0 - 5	SSI value valid bits	х	Bus controller default setting: 0
6 - 7	Clock rate	00	1 MHz (bus controller default setting)
		01	500 kHz
		10	250 kHz
		11	125 kHz
8 - 13	SSI number of bits	Х	Number of bits including leading zeros.
			Bus controller default setting: 0
14	Reserved	0	
15	Keying	0	Binary encoding (bus controller default setting)
		1	Gray coding
16 - 17	Monostable multivibrator testing	00	Check OFF, no additional clock bit
		01	Check set to high level (bus controller default setting)
		10	Check set to Low level
		11	Level is clocked but ignored
18 - 31	Reserved	0	Reserved

Transferring using Synchronous Serial Interface



Processing the measured value

- 1) Start bit ... The measured value is saved.
- 2) Output of the first data bit
- 3) All data bits are transferred; the monostable multivibrator time starts to run.
- 4) The monostable multivibrator returns to its initial state; a new transfer can be started.

10.5 SSI encoder communication registers

10.5.1 SSI position values

Name:

Encoder01

The SSI encoder value is displayed as a 32-bit position value. The SSI position value is generated synchronously with the X2X cycle.

Data type	Value	Filter
UDINT	0 to 4,294,967,295	SSI position

10.5.2 Input state of digital inputs 1 to 2

Name:

DigitalInput01 to DigitalInput02

This register is used to indicate the input state of digital inputs 1 to 2.

Data type	Values
USINT	See the bit structure.

Bit structure:

	Bit	Name	Value	Information
	4	DigitalInput01	0 or 1	Input state - Digital input 1
Ī	5	DigitalInput02	0 or 1	Input state - Digital input 2

10.5.3 Status of encoder supplies

Name:

PowerSupply01 to PowerSupply02

This register shows the status of the integrated encoder supplies. A faulty encoder power supply is displayed as a warning.

Data type	Value
USINT	See bit structure.

Bit structure:

Bit	Name	Value	Information
0	PowerSupply01	0	24 VDC encoder power supply OK
		1	24 VDC encoder power supply faulty
1	PowerSupply02	0	5 VDC encoder power supply OK
		1	5 VDC encoder power supply faulty
2 - 7	Reserved	-	

10.6 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	
	128 μs

10.7 Maximum cycle time

The maximum cycle time specifies the time up to which the bus cycle can be increased without internal counter overflows causing module malfunctions.

Minimum cycle time	
16 ms	

10.8 Minimum I/O update time

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

Minimum I/O update time	
128 μs	