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, in- ternal I/O supply continuous |
| X20cBM11 | X20 bus module, coated, 24 VDC keyed, internal I/O supply con- |
| | tinuous |
| | 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 |
| | no function per channel, operating state, module status |
| Diagnostics | Vac using status LED and asthurse |
| 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 | Yes |
| КС | Yes - |
| Digital inputs | |
| Quantity | 2 |
| Nominal voltage | 24 VDC |
| Input characteristics per EN 61131-2 | Туре 1 |
| Input voltage | 24 VDC -15 % / +20 % |
| Input current at 24 VDC | Approx. 3.3 mA |
| Input circuit | Sink |
| Input filter | Unix |
| Hardware | <0 up |
| | ≤2 µs |
| Software | - |
| 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 |
| | Gray/Binary |
| Keying | |
| 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 |
| | 165 |
| Installation elevation above sea level | |
| 0.1.0000 | |
| 0 to 2000 m | No limitations |
| 0 to 2000 m >2000 m Degree of protection per EN 60529 | No limitations Reduction of ambient temperature by 0.5°C per 100 m IP20 |

Table 2: X20DC1198, X20cDC1198 - Technical data

| Model number | X20DC1198 | X20cDC1198 | | | |
|---------------------------------|--|--|--|--|--|
| Ambient conditions | | | | | |
| Temperature | | | | | |
| Operation | | | | | |
| Horizontal mounting orientation | -25 to | 9 60°C | | | |
| Vertical mounting orientation | -25 tc | 9 50°C | | | |
| Derating | | - | | | |
| Storage | -40 tc | 985°C | | | |
| Transport | -40 tc | -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%, non-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 |
| a contraction of the second se | | | Single flash | RESET mode |
| | | | Double flash | BOOT mode (during firmware update) ¹⁾ |
| 86 D1 C | | | Blinking | PREOPERATIONAL mode |
| 1 2 1 | | | On | RUN mode |
| 8 | е | Red | Off | No power to module or everything OK |
| | | | On | Error or reset status |
| X20 | D1 | Green | | Input status - Data signal |
| The subscription of the su | 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 | R | ead | 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 | Offset ¹⁾ | Name | Data type | R | ead | W | rite |
|---------------|----------------------|--------------------------------------|-----------|--------|---------|--------|---------|
| | | | | 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 | x | 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 | x | 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 cor | troller default setting |
|-----------------------|---------------|-------------------------|
| UDINT See the bit str | ucture. 65536 | |

Bit structure:

| Bit | Name | Value | Information |
|---------|----------------------------------|-------|--|
| 0 - 5 | SSI value valid bits | X | 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 | X | 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 |
| 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.

| 128 µs | 120 μ5 | |
|--------|--------|--|