X20AO2622

1 General information

The module is equipped with two outputs with 13-bit (including sign) digital converter resolution. It is possible to select between the current and voltage signal using different connection terminal points.

This module is designed for X20 6-pin terminal blocks. If needed (e.g. for logistical reasons), the 12-pin terminal block can also be used.

- 2 analog outputs
- Either current or voltage signal possible
- 13-bit digital converter resolution

2 Order data

Model number	Short description	Figure
	Analog outputs	
X20AO2622	X20 analog output module, 2 outputs, ±10 V / 0 to 20 mA / 4 to 20 mA, 13-bit resolution	
	Required accessories	
	Bus modules	
X20BM11	X20 bus module, 24 VDC keyed, internal I/O supply continuous	
	Terminal blocks	
X20TB06	X20 terminal block, 6-pin, 24 VDC keyed	
X20TB12	X20 terminal block, 12-pin, 24 VDC keyed	

Table 1: X20AO2622 - Order data

3 Technical data

Product ID	X20AO2622
Short description	
I/O module	2 analog outputs ±10 V or 0 to 20 mA / 4 to 20 mA [1]
General information	
B&R ID code	0x1BA2
Status indicators	I/O function per channel, operating state, module status
Diagnostics	
Module run/error	Yes, using status LED and software
Channel type	Yes, using software
Power consumption	
Bus	0.01 W
Internal I/O	1.1 W
Additional power dissipation caused by the actuators (resistive) [W]	-
Electrical isolation	
Channel - Bus	Yes
Channel - Channel	No
Certification	
CE	Yes
cULus	Yes
cCSAus HazLoc Class 1 Division 2	Yes
ATEX Zone 2	Yes
KC	Yes
GL	Yes
GOST-R	Yes
Analog outputs	
Output	±10 V or 0 to 20 mA / 4 to 20 mA, via different terminal connections [1]
Max. output current	10 mA at voltages >5 V 15 mA at voltages <5 V
Digital converter resolution	
Voltage	±12-bit
Current	12 Bit
Conversion time	200 µs for all outputs
Settling time for output changes over entire range	1 ms
Power on/off behavior	Internal enable relay for booting
Max. error at 25°C	
Voltage	
Gain	0.150% [2]
Offset	0.050% [3]
Current	
Gain	0.150% [2]
Offset	0.050% [3]
Output protection	Short circuit protection
Output format	
Voltage	INT 0x8001 - 0x7FFF / 1 LSB = 0x0010 = 4.882 mV
Current	INT 0x8001 - 0x7FFF / 1 LSB = 0x0010 = 9.766 µA
Load per channel	
Voltage	Max. ±10 mA, load ≥1 kΩ
Current	Load max. 600 Ω (Rev. ≥ J0); 500 Ω (Rev. < J0)
Short circuit protection	Current limiting ±40 mA
Output filter	1st-order low pass / cutoff frequency 10 kHz
Max. gain drift	
Voltage	0.020 %/°C [2]
Current	0.020 %/°C [2]
Max. offset drift	
Voltage	0.032 %/°C [3]
Current	0.032 %/°C [3]
Error caused by load change	
Voltage	Max. 0.11%, from 10 MΩ → 1 kΩ, resistive
Current	Max. 0.50%, from 1 Ω → 600 Ω, resistive
Non-linearity	<0.007% [4]
Isolation voltage between channel and bus	500 V_{eff}
Operating conditions	
Mounting orientation	
Horizontal	Yes
Vertical	Yes
Installation at elevations above sea level	
0 to 2000 m	No limitations
>2000 m	Reduction of ambient temperature by 0.5°C per 100 m
EN 60529 protection	IP20

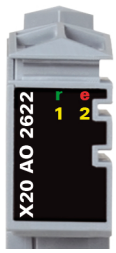Table 2: X20AO2622 - Technical data

Product ID	X20AO2622
Environmental conditions	
Temperature	
Operation	
Horizontal installation	-25 to 60°C
Vertical installation	-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 characteristics	
Note	Order 1x X20TB06 or X20TB12 terminal block separately Order 1x X20BM11 bus module separately
Spacing	12.5 $^{+0.2}$ mm

Table 2: X20AO2622 - Technical data

1) 4 to 20 mA: From upgrade version 1.0.2.0 or hardware revision "I0"
2) Based on the current output value.
3) Based on the entire output range.
4) Based on the output range.

4 LED status indicators

For a description of the various operating modes, see the section "re LEDs" in chapter 2 "System characteristics" 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]
			Blinking	PREOPERATIONAL mode
			On	RUN mode
	e	Red	Off	No power to module or everything OK
			On	Error or reset status
	e + r	Red on / Green single flash		Invalid firmware
	1 - 2	Orange	Off	Value = 0
			On	Value ≠ 0

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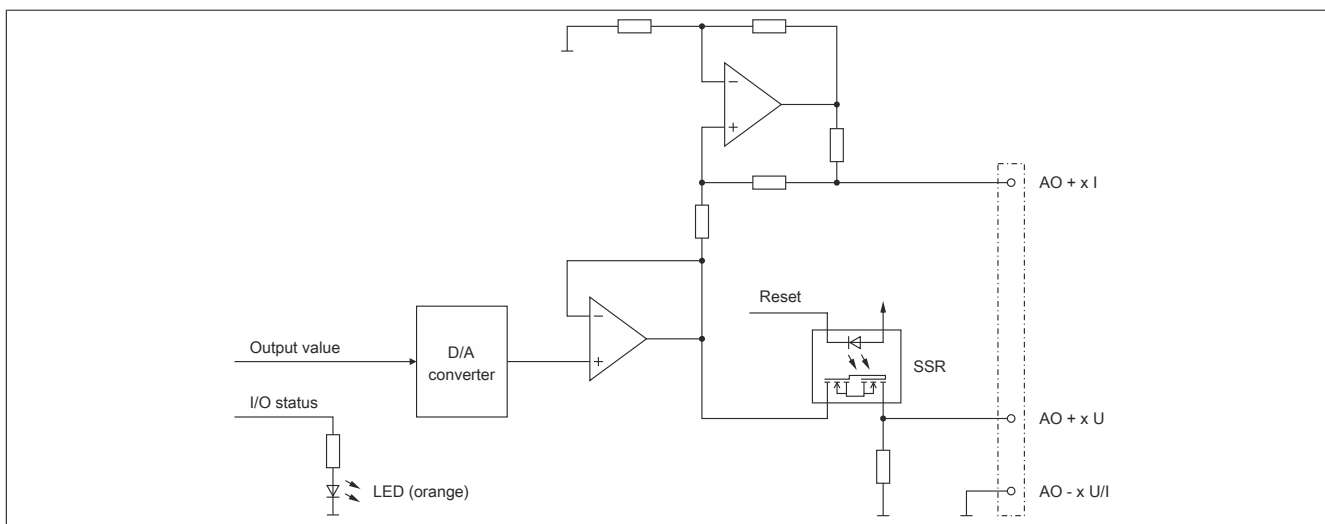
5 Pinout

Each channel can be configured for either current or voltage signals. The type of signal is also determined by the connection terminals used.
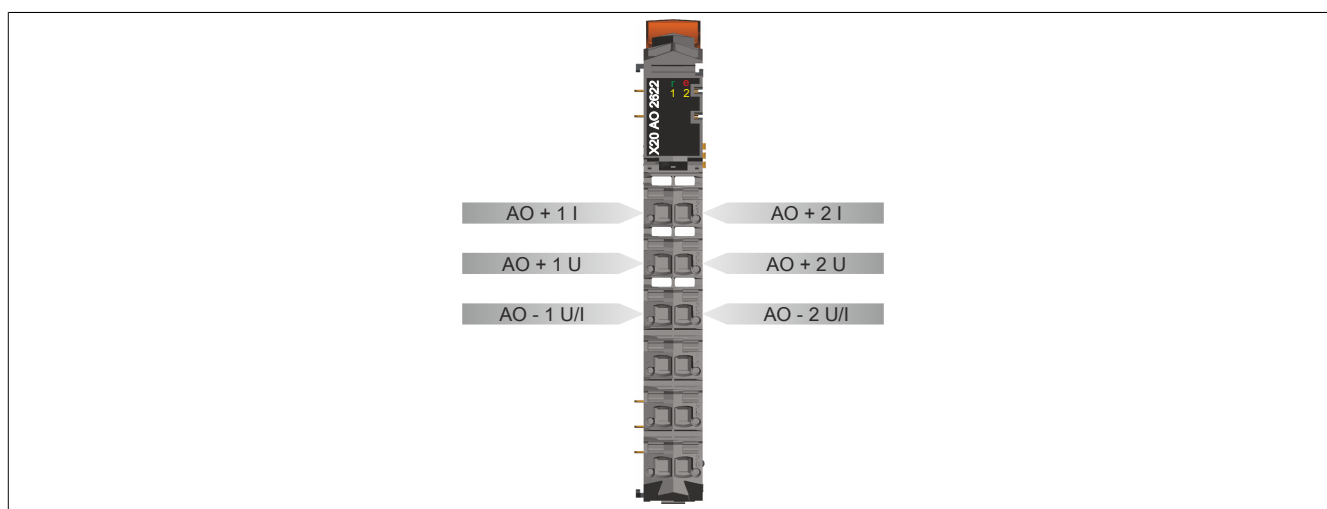
6 Connection example
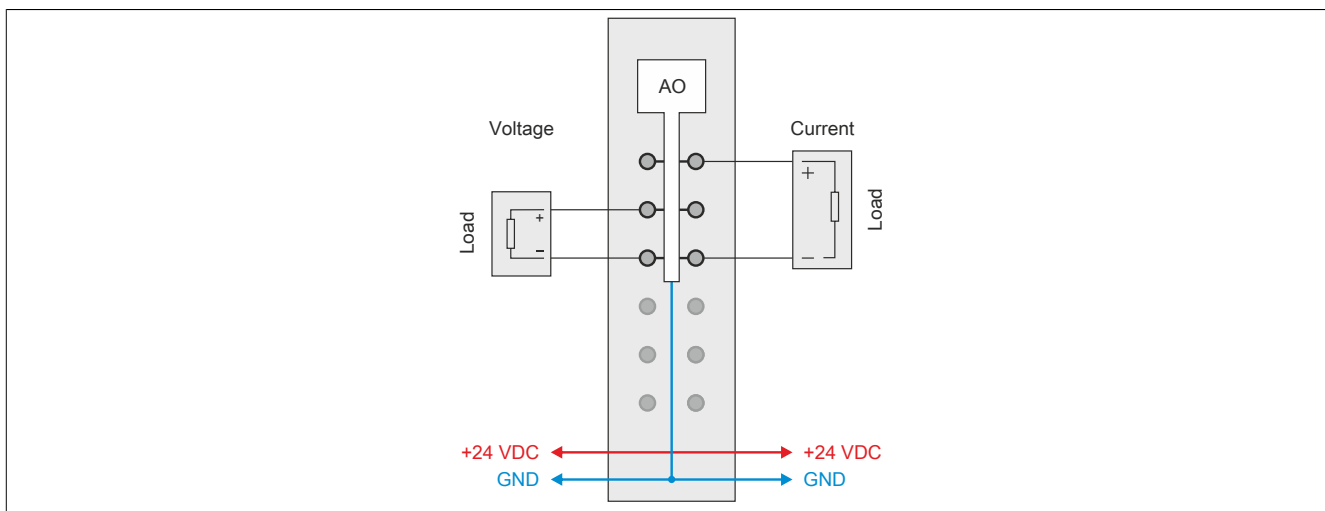
7 Output circuit diagram

8 Register description

8.1 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.

These general data points are listed in the "General data points" section of chapter 4 "X20 system modules" in the X20 system user's manual.

8.2 Function model 0 - Standard
and function model 1 - I/O with fast reaction

Register	Name	Data type	Read		Write	
			Cyclic	Non-cyclic	Cyclic	Non-cyclic
Configuration						
18	ConfigOutput01	USINT				●
Communication						
0	AnalogOutput01	INT			●	
2	AnalogOutput02	INT			●	

8.3 Function model 254 - Bus controller

Register	Offset[1]	Name	Data type	Read		Write	
				Cyclic	Non-cyclic	Cyclic	Non-cyclic
Configuration							
18	-	ConfigOutput01	USINT				●
Communication							
0	0	AnalogOutput01	INT			●	
2	2	AnalogOutput02	INT			●	

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

8.3.1 CAN I/O bus controller

The module occupies 1 analog logical slot on CAN-I/O.
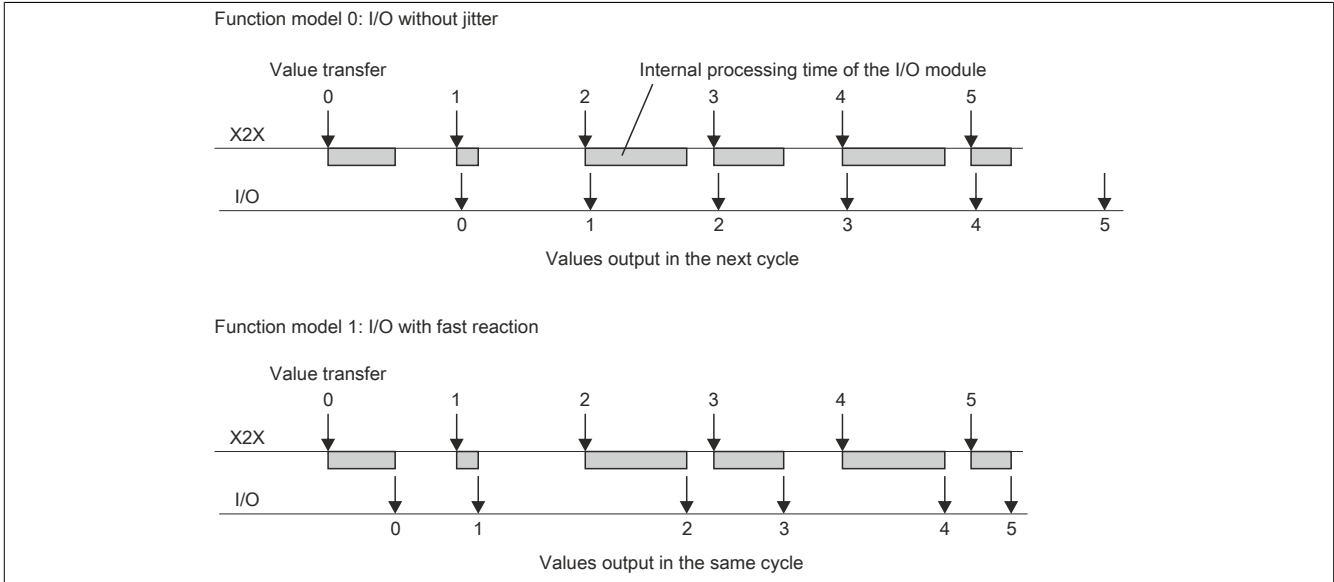
8.4 Function model comparison

Function model 0: I/O without jitter (standard)

Corrected values are output in the next cycle if the minimum cycle is ≥300 µs in order to reduce jitter to a minimum.

Function model 1: I/O with fast reaction

Corrected values are output in the same cycle if the minimum cycle is ≥300 µs (optimized reactions).

Comparison of the two function models

8.5 Analog outputs

Each channel can be configured for either current or voltage signals. The type of signal is also determined by the connection terminals used.

8.5.1 Output values of the analog outputs

Name:
AnalogOutput01 to AnalogOutput02

These registers provide the standardized output values. Once a permitted value is received the module outputs the respective current or voltage.

Data type	Value	Information
INT	-32768 to 32767	Voltage signal -10 to 10 VDC
	0 to 32767	Current signal 0 to 20 mA
	0 to 32767	Current signal 4 to 20 mA[1]

1) From upgrade version 1.0.2.0 or hardware revision "I0"

8.5.2 Setting the channel type

Name:
ConfigOutput01

This register can be used to set the channel type of the outputs.

Each channel is capable of handling either current or voltage signals. The type of signal is determined by the connection terminals used. Since current and voltage require different adjustment values, it is also necessary to configure the desired type of output signal. The following output signals can be set:

- ±10 V voltage signal (default)
- 0 to 20 mA current signal
- 4 to 20 mA current signal

Data type	Value
USINT	See bit structure.

Bit structure:

Bit	Name	Value	Information
0	Channel 1	0	Voltage signal
		1	Current signal, measurement range corresponding to bit 4
1	Channel 2	0	Voltage signal
		1	Current signal, measurement range corresponding to bit 5
2 - 3	Reserved	0	
4	Channel 1: Current measurement range	0	0 to 20 mA current signal
		1	4 to 20 mA current signal
5	Channel 2: Current measurement range	0	0 to 20 mA current signal
		1	4 to 20 mA current signal
6 - 7	Reserved	0	

8.6 Minimum cycle time

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

Minimum cycle time
250 µs

8.7 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
300 µs