

X20AO4635

Data sheet
3.20 (June 2025)



Publishing information

B&R Industrial Automation GmbH

B&R Strasse 1

5142 Eggelsberg

Austria

Telephone: +43 7748 6586-0

Fax: +43 7748 6586-26

office@br-automation.com

Disclaimer

All information in this document is current as of its creation. The contents of this document are subject to change without notice. B&R Industrial Automation GmbH assumes unlimited liability in particular for technical or editorial errors in this document only (i) in the event of gross negligence or (ii) for culpably inflicted personal injury. Beyond that, liability is excluded to the extent permitted by law. Liability in cases in which the law stipulates mandatory unlimited liability (such as product liability) remains unaffected. Liability for indirect damage, consequential damage, business interruption, loss of profit or loss of information and data is excluded, in particular for damage that is directly or indirectly attributable to the delivery, performance and use of this material.

B&R Industrial Automation GmbH notes that the software and hardware designations and brand names of the respective companies used in this document are subject to general trademark, brand or patent protection.

Hardware and software from third-party suppliers referenced in this document is subject exclusively to the respective terms of use of these third-party providers. B&R Industrial Automation GmbH assumes no liability in this regard. Any recommendations made by B&R Industrial Automation GmbH are not contractual content, but merely non-binding information for which no liability is assumed. When using hardware and software from third-party suppliers, the relevant user documentation of these third-party suppliers must additionally be consulted and, in particular, the safety guidelines and technical specifications contained therein must be observed. The compatibility of the products from B&R Industrial Automation GmbH described in this document with hardware and software from third-party suppliers is not contractual content unless this has been separately agreed in individual cases; in this respect, warranty for such compatibility is excluded in any case, and it is the sole responsibility of the customer to verify this compatibility in advance.

1247782281322-3.20

1 General information

1.1 Other applicable documents

For additional and supplementary information, see the following documents.

Other applicable documents

Document name	Title
MAX20	X20 System user's manual

1.2 Order data


Order number	Short description	Figure
	Analog output modules	
X20AO4635	X20 analog output module, 4 outputs, ± 10 V or 0 to 20 mA, 16-bit converter resolution, low temperature drift	
	Required accessories	
	Bus modules	
X20BM11	X20 bus module, 24 VDC keyed, internal I/O power supply connected through	
X20BM15	X20 bus module, with node number switch, 24 VDC keyed, internal I/O power supply connected through	
	Terminal blocks	
X20TB12	X20 terminal block, 12-pin, 24 VDC keyed	

Table 1: X20AO4635 - Order data

1.3 Module description

The module is equipped with 4 outputs with 16-bit, including sign, digital converter resolution. The module has only a low temperature drift. It is possible to select between the current and voltage signal using different terminals.

Functions:

- [Analog outputs](#)

Analog outputs

The module is equipped with analog outputs with a configurable current and/or voltage signal.

2 Technical description

2.1 Technical data

Order number	X20AO4635
Short description	
I/O module	4 analog outputs ± 10 V or 0 to 20 mA, low temperature drift
General information	
B&R ID code	0xA7FE
Status indicators	I/O function per channel, operating state, module status
Diagnostics	
Module run/error	Yes, using LED status indicator and software
Channel type	Yes, using software
Power consumption	
Bus	0.01 W
Internal I/O	1.5 W
Additional power dissipation caused by actuators (resistive) [W]	-
Certifications	
CE	Yes
UKCA	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	Temperature: B (0 to 55°C) Humidity: B (up to 100%) Vibration: B (4 g) EMC: B (bridge and open deck)
CCS	Yes
LR	ENV1
KR	Yes
ABS	Yes
BV	EC33B Temperature: 5 - 55°C Vibration: 4 g EMC: Bridge and open deck
KC	Yes
Analog outputs	
Output	± 10 V or 0 to 20 mA, via different terminal connections
Digital converter resolution	
Voltage	± 15 -bit
Current	15-bit
Conversion time	50 μ s for all outputs
Settling time on output change over entire range	500 μ s
Switch on/off behavior	Internal enable relay for startup
Max. error ¹⁾	
Gain	$\pm 0.04\%$ ²⁾
Offset	$\pm 0.022\%$ ³⁾
Output protection	Short-circuit proof
Output format	
Voltage	INT 0x8000 - 0x7FFF / 1 LSB = 0x0001 = 305.176 μ V
Current	INT 0x0000 - 0x7FFF / 1 LSB = 0x0001 = 610.352 nA
Load per channel	
Voltage	Max. ± 10 mA, load ≥ 1 k Ω
Current	Max. load 500 Ω
Short-circuit proof	Current limiting ± 40 mA
Output filter	First-order low-pass filter / cutoff frequency 10 kHz
Error caused by load change	
Voltage	Max. 0.02%, from 10 M Ω \rightarrow 1 k Ω , resistive
Current	Max. 0.5%, from 1 Ω \rightarrow 500 Ω , resistive
Nonlinearity	<0.005%
Insulation voltage between channel and bus	500 V _{eff}

Table 2: X20AO4635 - Technical data


Order number	X20AO4635
Signal	
0 to 20 mA	
Max. gain drift	$\pm 0.01\%/^{\circ}\text{C}^{2)}$
Max. offset drift	$\pm 0.012\%/^{\circ}\text{C}^{3)}$
$\pm 10\text{ V}$	
Max. gain drift	$\pm 0.0025\%/^{\circ}\text{C}^{2)}$
Max. offset drift	$\pm 0.001\%/^{\circ}\text{C}^{3)}$
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 limitation
>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 55°C
Vertical mounting orientation	-25 to 50°C
Derating	See section "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 terminal block X20TB12 separately. Order 1x bus module X20BM11 separately.
Pitch	$12.5^{+0.2}\text{ mm}$

Table 2: X20AO4635 - Technical data

- 1) At 25°C
- 2) Based on the current output value.
- 3) Based on the entire output range.

2.2 LED status indicators

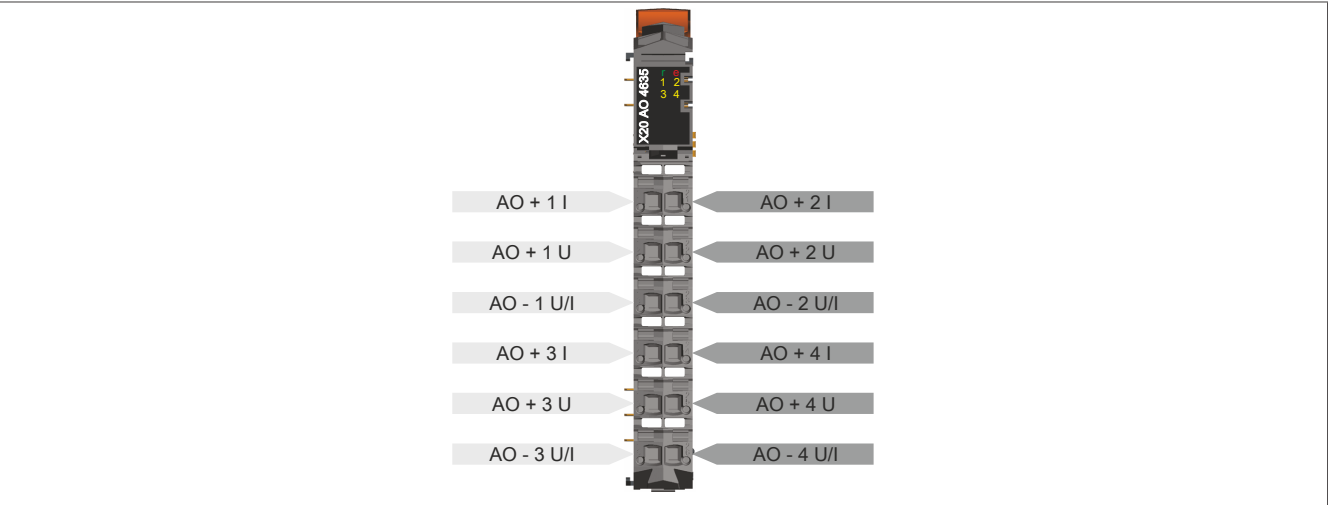
For a description of the various operating modes, see section "Additional information - Diagnostic LEDs" in the X20 system user's manual.

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
	1 - 4	Orange	Off	Value = 0
			On	Value $\neq 0$

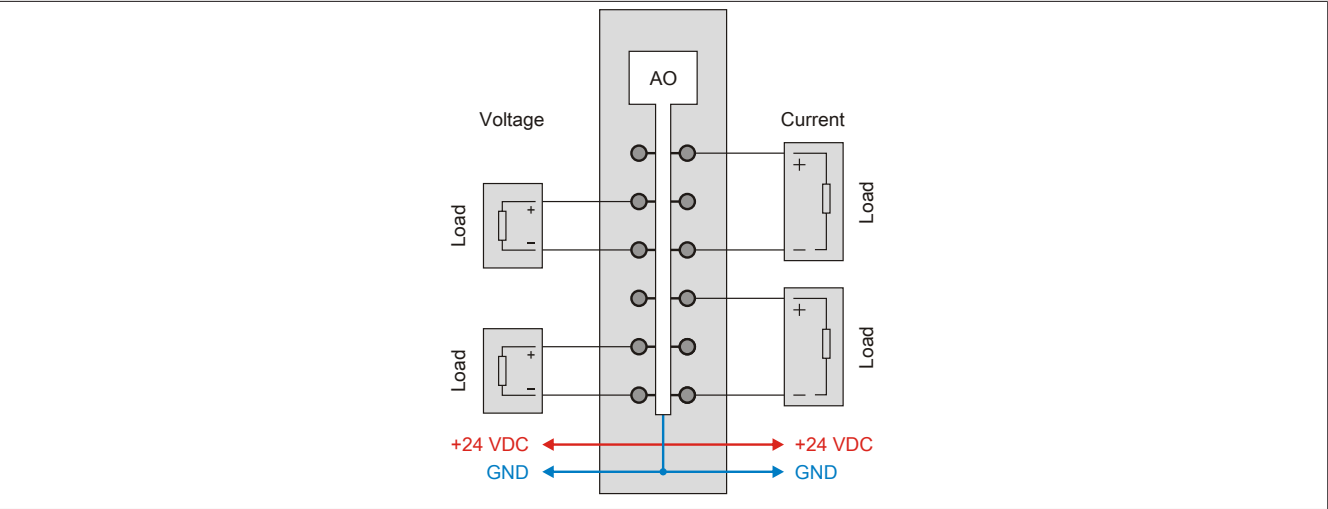
- 1) Depending on the configuration, a firmware update can take up to several minutes.

2.3 Pinout

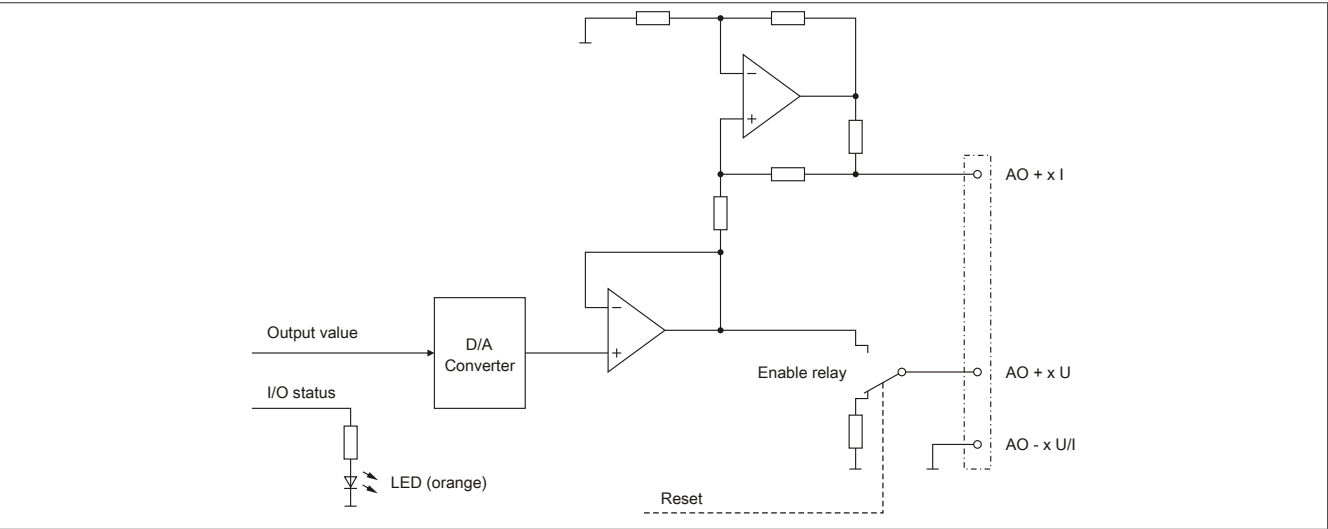
The individual channels can be configured for either current or voltage signals. The type of signal is also determined by the terminals used.



2.4 Connection example



2.5 Output circuit diagram



2.6 Derating

To ensure proper operation, the following items must be taken into consideration:

- The following derating listings must be taken into consideration
- For mixed operation with one current output, the average of both derating curves should be used
- For mixed operation with 2 or 3 current outputs, the derating for the current outputs should be used

Horizontal installation

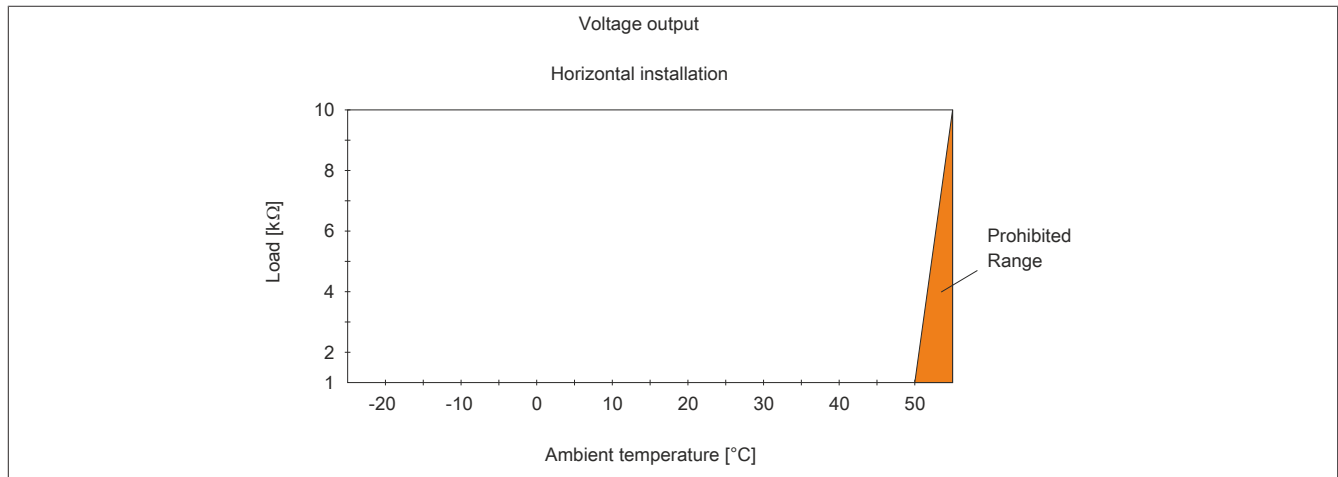
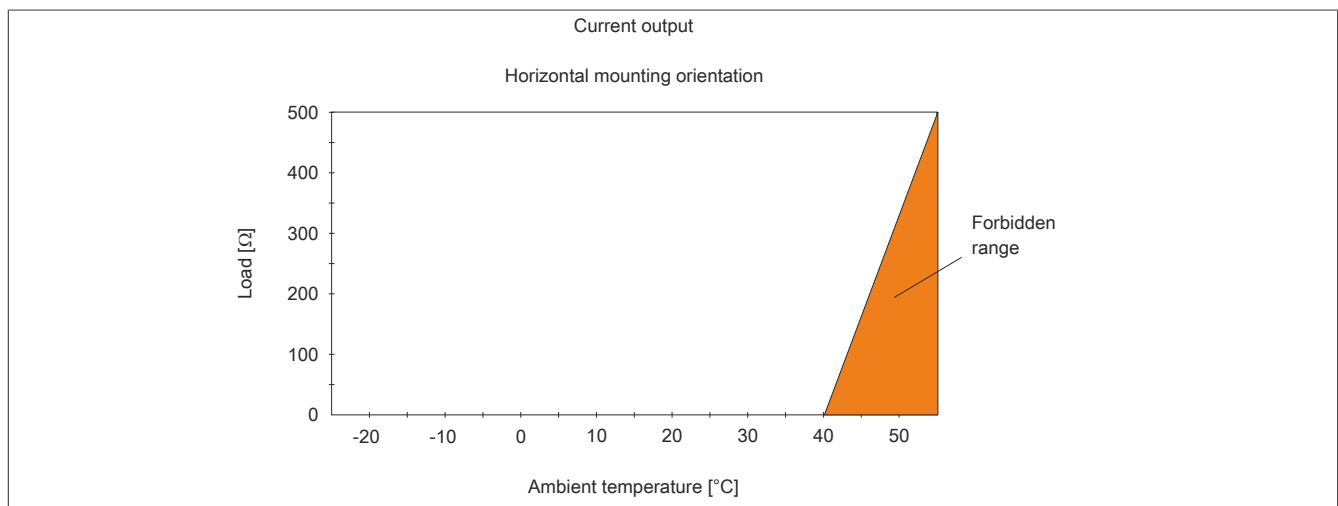


Figure 1: Derating the load with a voltage output and horizontal mounting



Vertical installation

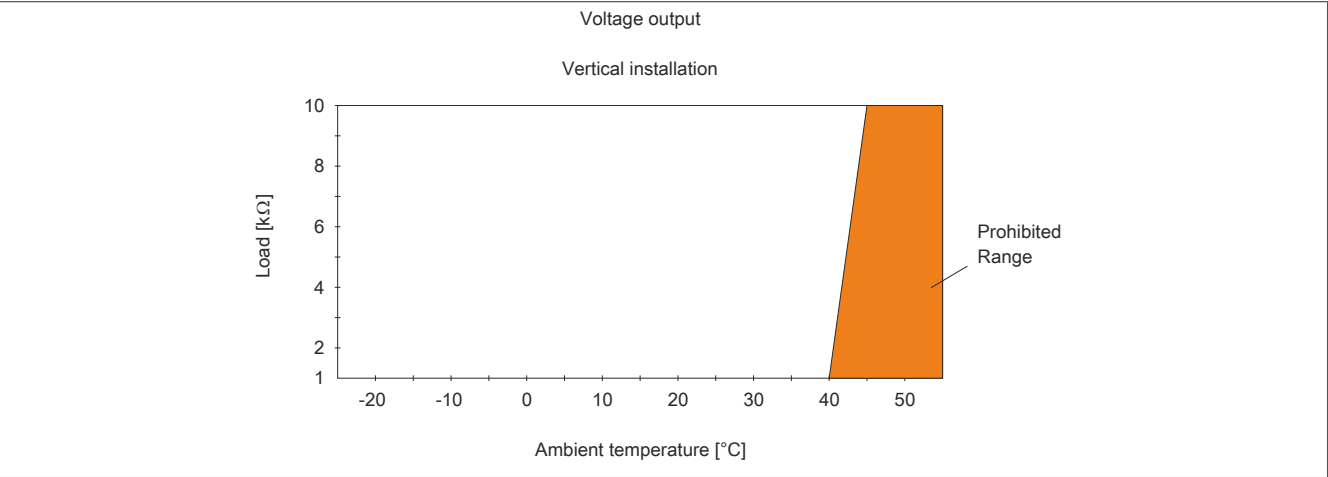
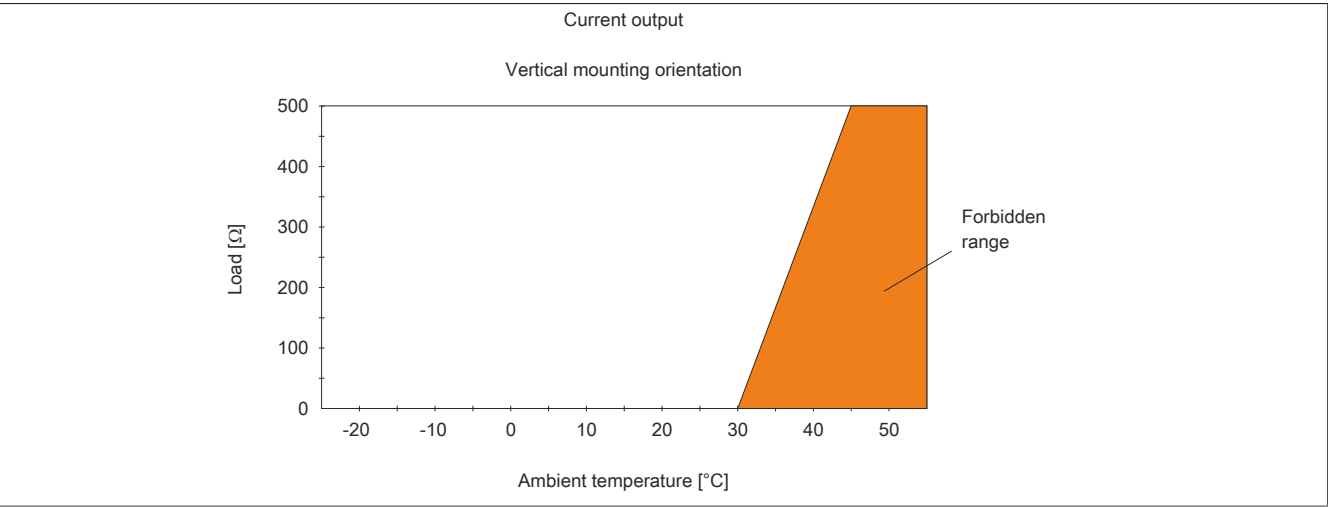


Figure 2: Derating the load with a voltage output and vertical mounting



3 Function description

3.1 Analog outputs

The module is equipped with 4 analog outputs.

The individual channels are designed for current and voltage signals. The differentiation is made by different terminal connections; because of different adjustment values for current and voltage, the output signal must be selected. The following output signals can be set:

- ± 10 V voltage signal
- 0 to 20 mA current signal

**Information:**

The register is described in "[Setting the channel type](#)" on page 12.

4 Commissioning

4.1 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" in the X20 user's manual (version 3.50 or later).

4.1.1 CAN I/O bus controller

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

5 Register description

5.1 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" in the X20 System user's manual.

5.2 Function model 0 - Standard

Register	Name	Data type	Read		Write	
			Cyclic	Non-cyclic	Cyclic	Non-cyclic
Configuration						
0	ConfigOutput01 (channel type)	UINT				•
Communication						
2	AnalogOutput01	INT			•	
4	AnalogOutput02	INT			•	
6	AnalogOutput03	INT			•	
8	AnalogOutput04	INT			•	

5.3 Function model 254 - Bus controller

Register	Offset ¹⁾	Name	Data type	Read		Write	
				Cyclic	Non-cyclic	Cyclic	Non-cyclic
Configuration							
0	-	ConfigOutput01 (channel type)	UINT				•
Communication							
2	0	AnalogOutput01	INT			•	
4	2	AnalogOutput02	INT			•	
6	4	AnalogOutput03	INT			•	
8	6	AnalogOutput04	INT			•	

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

5.4 Analog outputs

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

5.4.1 Output values of the analog outputs

Name:

AnalogOutput01 to AnalogOutput04

The normalized output values are specified via these registers. After a permissible value is transferred, the module outputs the corresponding current or voltage.



Information:

The value "0" disables the channel status LED.

Data type	Value	
INT	-32767 to 32767	Voltage
	0 to 32767	Current

5.4.2 Setting the channel type

Name:

ConfigOutput01

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

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

Bit structure:

Bit	Description	Value	Information
0 - 7	Reserved	0	
8	Channel 1	0	Voltage signal (bus controller default setting)
		1	Current signal
...		...	
11	Channel 4	0	Voltage signal (bus controller default setting)
		1	Current signal
12 - 15	Reserved	0	

5.5 Minimum cycle time

The minimum cycle time specifies 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
200 µs

5.6 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
200 µs