CoriSENS Manual

Angular rate sensor for measuring angular velocity

ANALOG

EN 50155

CoriSENS available at Micro-Hybrid-Shop
Filter products simply by selecting the desired properties and request your quotation.

🛒 **microhybrid.com/shop**

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contact@microhybrid.com

Content

Abbreviation	Meaning
RMS	Root mean square
MEMS	Micro-electromechanical system
MTBF	Meantime between failures
GND	Ground
RF	Radio frequency

1. Technical parameters

| Physical parameter		Unit
Rotation axis	1 (z-axis)	
Measurement range [1]	± 12	°/s
Sensitivity (current)	0.67	mA/°/s
Sensitivity (voltage)	416.7	mV/°/s
Sensitivity error	± 2	%
Noise	0.2	% RMS of fullscale
Cut-off frequency of lowpass filter (-3dB)	4	Hz
Current output Zero signal	4 ... 20 12	mA mA
Voltage output Zero signal	0 ... 10 5	V V
Temperature offset error [2] (Delta T_{max} = 0.5 K/min)	± 3	%
Maximum error [2]	± 5	%
Burden (current output)	max. 500	Ω
Load (voltage output)	min. 2500	Ω
Housing	Die-cast aluminum	
Applied standard	DIN EN 50155	
Operating temperature range	-40 ... +85, Class OT4, H1	°C
Extended operating temperature at start-up	ST0	
IP-class [1]	IP42	
Vibration & shock test	DIN EN 61373:2011 Cat. 1, Class B	
Altitude class	DIN EN 50125 Class AX	
Humidity class	DIN EN 50125 Class TX	
Pollution degree	DIN IEC 61010-c ClassZPD4	

All specifications at +25 °C, unless otherwise defined.
[1] customizable
[2] depends on the settings of the offset-compensation

| Electrical parameter	Min.	Typ.	Max.	Unit
Supply voltage	77 16,8	110 24	137,5 30	V V
Supply current		20 (110 V) 60 (24 V)		mA
Consumption		max. 3		W
Insulation		> 200		MΩ

Self test
   Absolute maximum rating
   ST1 / ST2 High Level
   ST1 / ST2 Low Level
	
	17
	
		7,5
			
			28
			
				V
				V
				V

2. Funktional block diagram
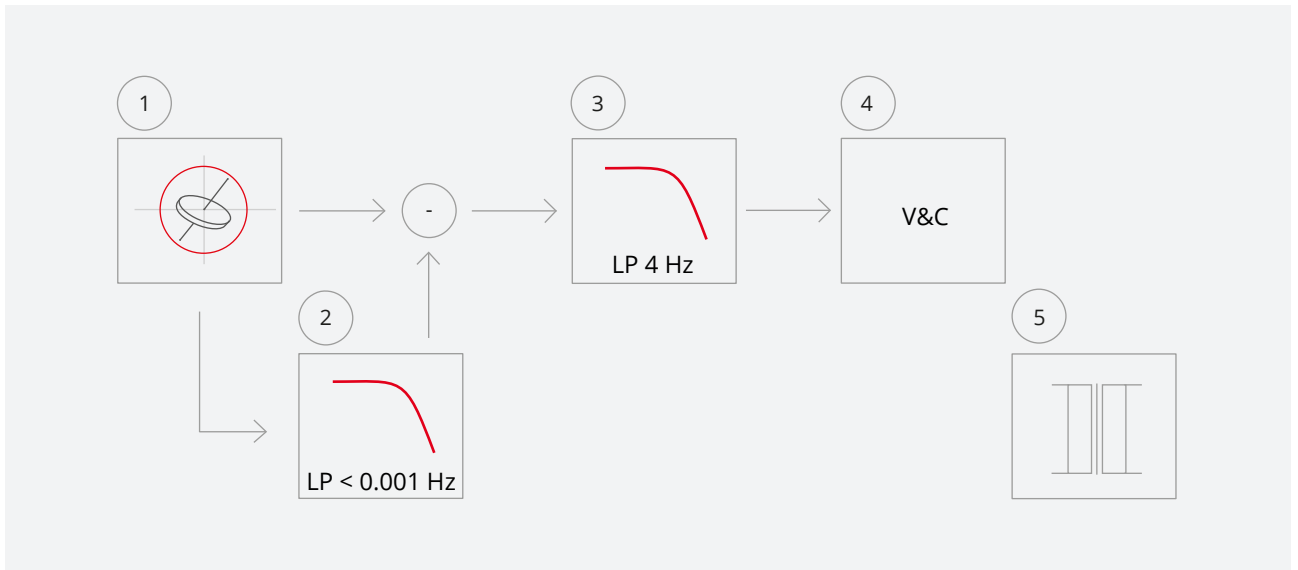
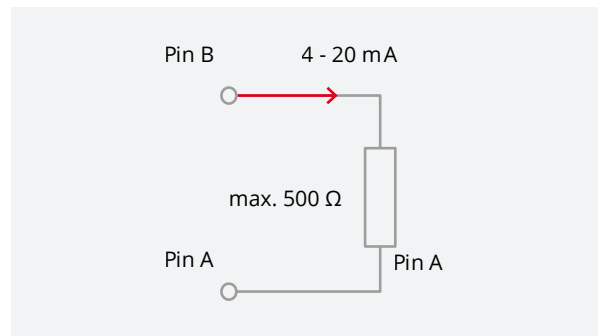|	
1	MEMS gyroscope
2	Low-pass filter < 0.001 Hz for gyro-offset compensation
3	Low-pass filter 4 Hz
4	Voltage and current output amplifier
5	Isolated power supply

3. Output characteristic

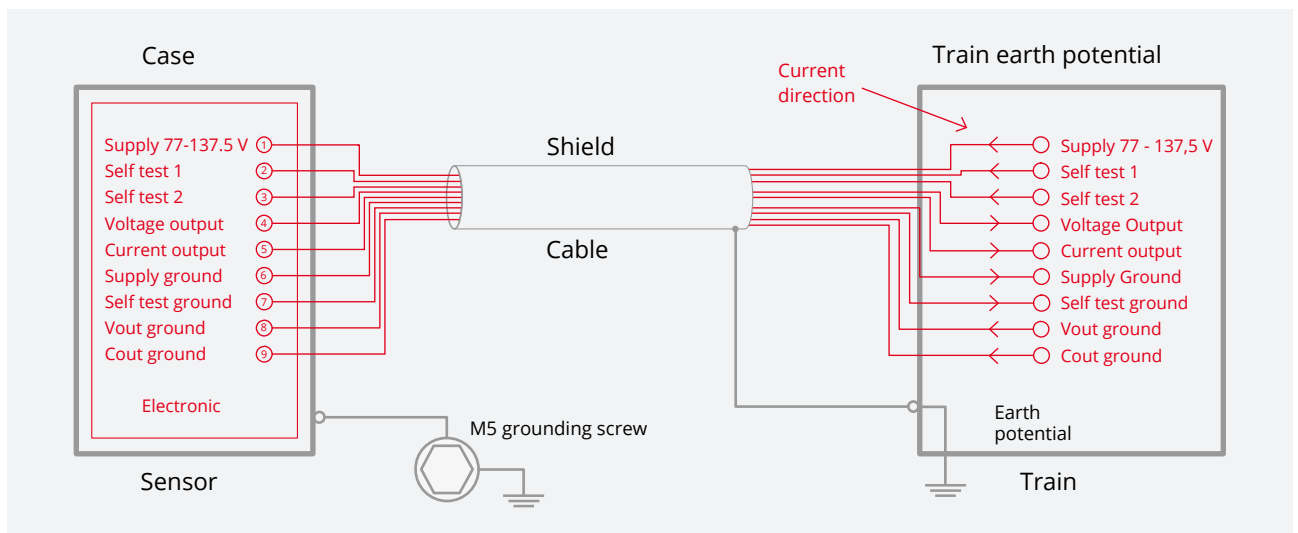| Curve detector				Unit
Angular rate	-12	0	12	°/s
Output current	4	12	20	mA
Output voltage	0	5	10	V
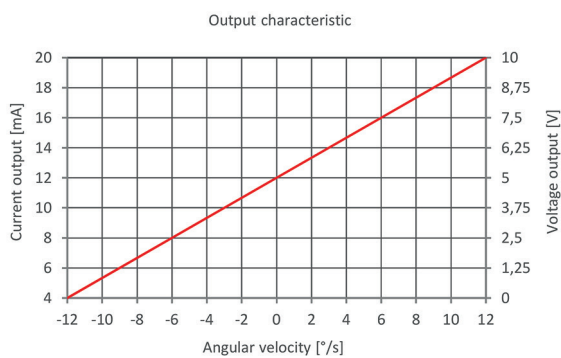
4. Current output connection

- Burden: max. 500 Ω
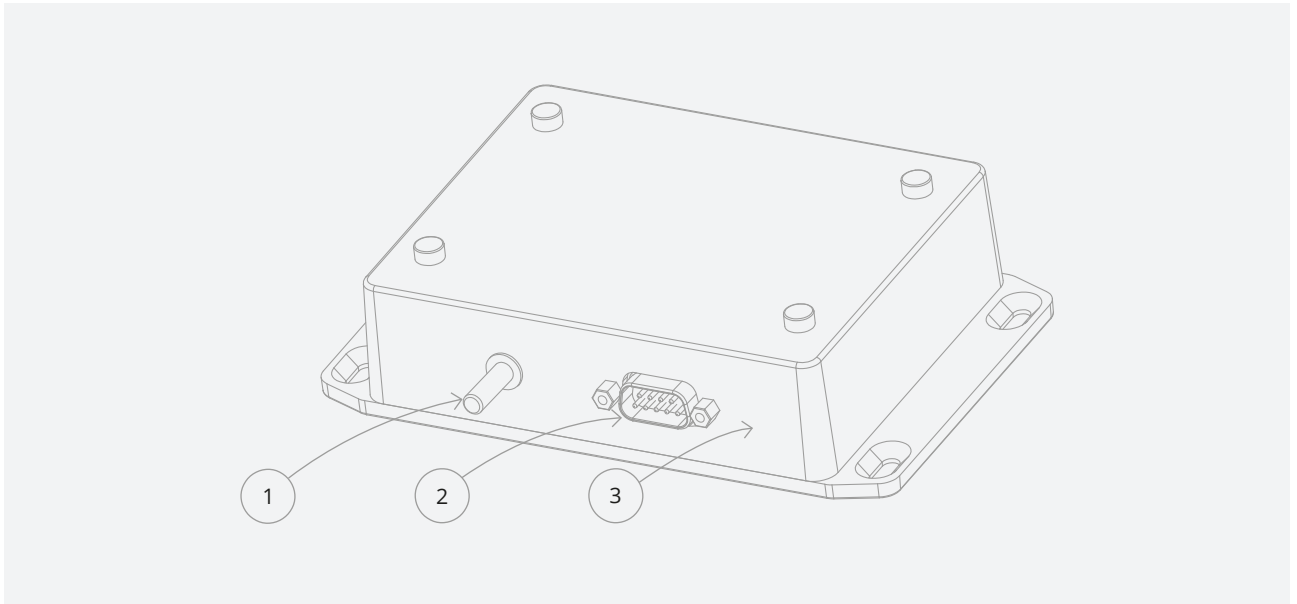- Connect a resistor to the signal output and signal ground of the current output.

Pin B   4 - 20 mA

max. 500 Ω

Pin A   Pin A

5. Shielding concept

- Connect the housing to train earth potential.

Case

Current direction

Train earth potential

Shield

Supply 77-137.5 V ①   Supply 77 - 137,5 V
Self test 1 ②   Self test 1
Self test 2 ③   Self test 2
Voltage output ④   Voltage Output
Current output ⑤   Current output
Supply ground ⑥   Supply Ground
Self test ground ⑦   Self test ground
Vout ground ⑧   Vout ground
Cout ground ⑨   Cout ground

Cable

Electronic

M5 grounding screw

Earth potential

Sensor   Train

6. Connector and housing

1	M5 screw for grounding
2	D-Sub connector
3	Housing
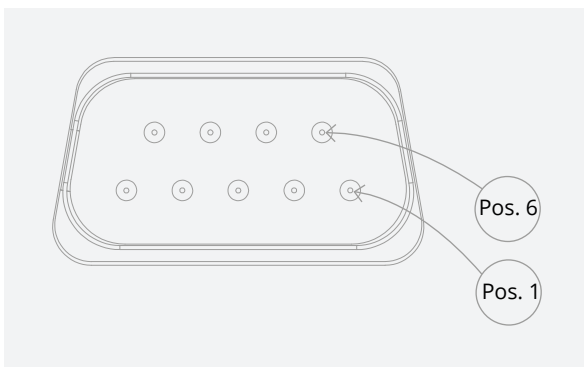
Pinout (front view)

Pin	Signal
1	Supply voltage
2	Self test 1
3	Self test 2
4	Voltage output
5	Current output
6	Supply ground
7	Self test ground
8	Voltage output ground
9	Current output ground

7. Mechanical dimensions

- Weight: ~ 0.7 kg
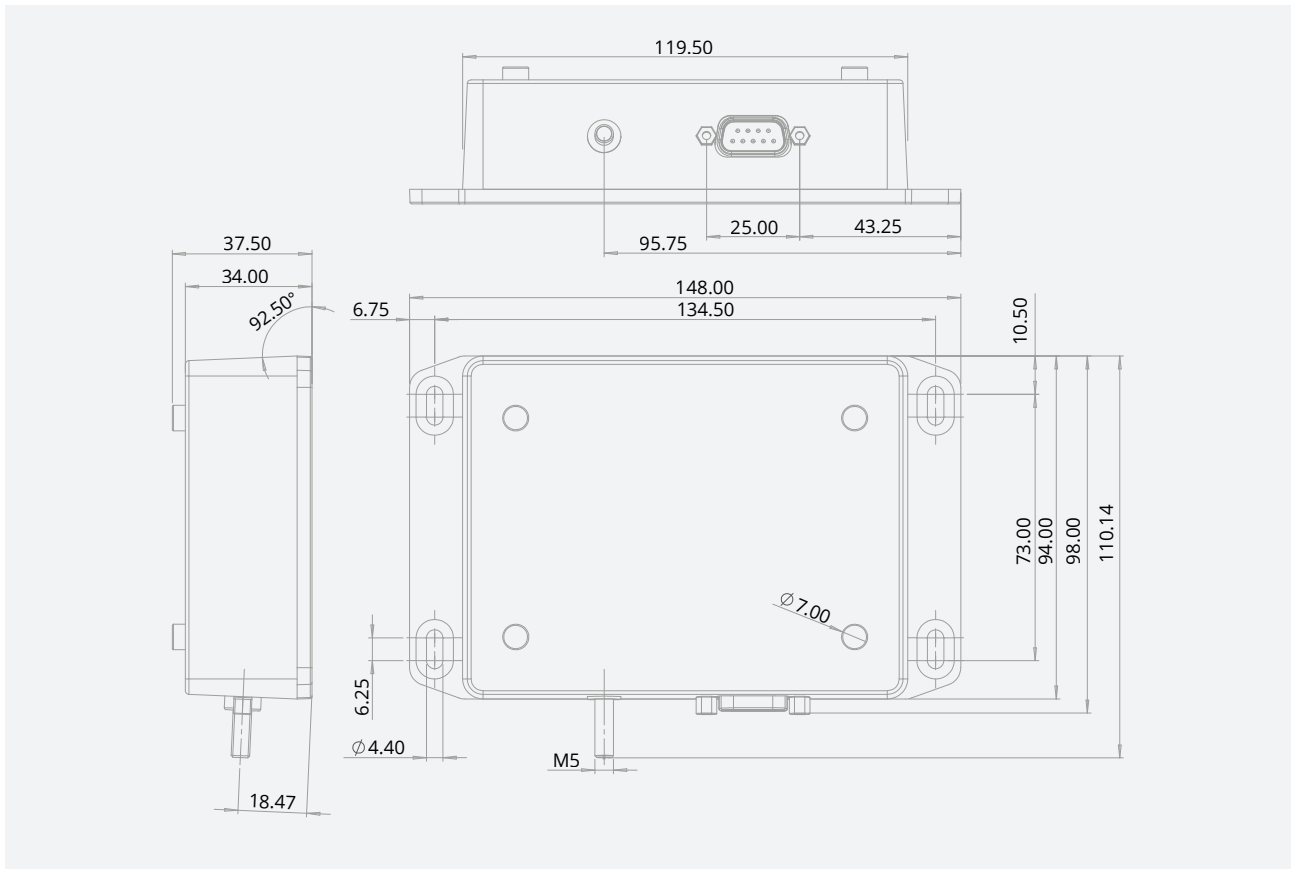
Dimensions in mm

8. Labeling

Rotation indicator: Ax
Measurement range: ±12°/s
Supplier name: Micro-Hybrid Electronic GmbH
Supplier ref.: XXXX.XX-X.XX

Hardware version: [X] 2 3 4
Serial number: NNNN
Manufacturing date: WW/YY

+Ax
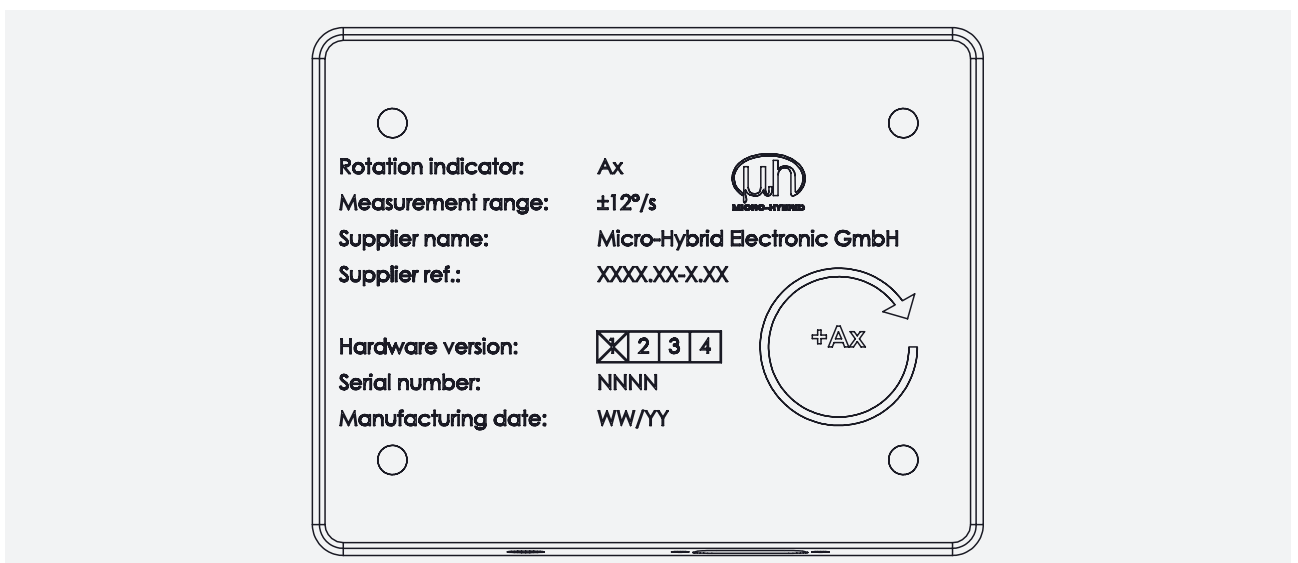
9. RAMS properties

MTBF [1]	2270000	h
Failure rate λ[2]	404	FIT

[1] MTBF = 1/λ
[2] Failure rate calculated as the total sum of the failure rates of each component, with respect to operating temperature conditions.

10. Handling instructions

10.1. Assembly

CoriSENS is supposed to be mounted flatly on the car body of a vehicle. The ground plate of the sensor is designed as a flange with four long holes for M4 countersunk screws.

Mounting on given M4 thread rods	Mounting with M4 bolts
Align the device by putting the four given M4 thread rods through the corresponding long holes.	Place the device aligned along the four tapped holes in the mounting area.
Tighten each rod with a matching flat washer and nut with a torque of max. 2.3 Nm (based upon strength category 8.8).	Use four M4 bolts and matching flat washers to tighten the device in the supposed place with a torque of max. 2.3 Nm (based upon strength category 8.8).
Take grounding cable and attach it to the grounding rivet.	
Take the connector coming from the train's side and plug it to the connector of the device. Fasten the D-Sub connector with the two lateral screws.	
Check for proper connection by softly pulling on the back end of the plug. The plug must not loosen.	

10.2. Maintenance

The device is developed in a way that no maintenance actions are required during its lifetime.

10.3. Disassembly

1. Disconnect the plug from the sensor's socket by loosening the lateral screws of the D-Sub connector

2. Unscrew nut of grounding rivet and remove grounding cable.

3. Loosen either the four bolts or the nuts with which the device has been attached and lift off the sensor.

4. Secure the cable from train side in a safe position in order to prevent it from possible damages.

# 11. Troubleshooting

11.1. Self test function

The sensor includes a self test (ST) feature. Self test is activated by appliying a high level to ST1 (pin2) or ST2 (pin3) related to self test GND (pin7).
Applying high to pin ST1 sets the output to the end value of the right rotation. Applying high to pin ST2 sets the output to the end value of the left rotation.
The self test function is available at the current and voltage output simultaneously.

It is recommended to use both test signals only in succession and both no longer than 2 seconds.
Do not use the self test during the power-on time in the first 20 seconds.
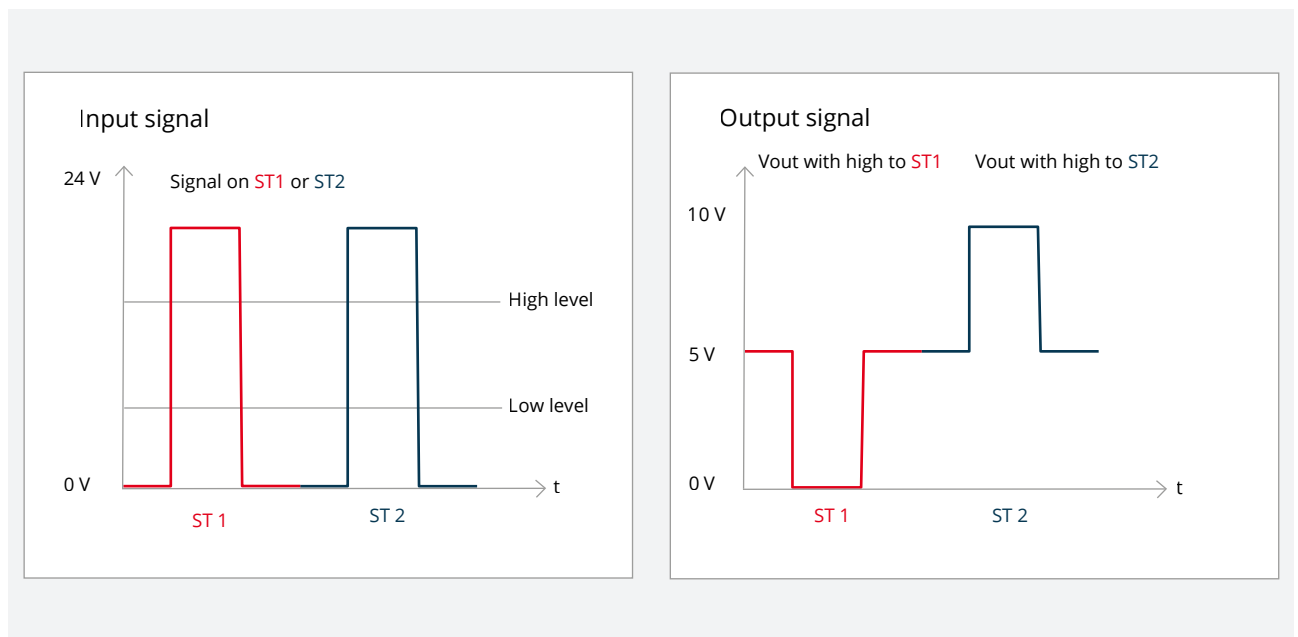
11.2. In case of malfunction

Except using the self-test feature the customer has no possibility to detect any malfunction other than getting either implausible or no output signal at all.

In cases of any errors it is therefore always necessary to return the defective device to the supplier's facilities in order to investigate the cause. Therefore follow the disassembly instructions in section 10.3 and return the device to the address mentioned below together with a brief description of the observed error.

Shipping address and contact information:

Company	Micro-Hybrid Electronic GmbH
Street and No.	Heinrich-Hertz-Straße 8
Post code	07629
City	Hermsdorf
Country	Germany
Telephone	+49 36601 5920
E-Mail for support	contact@microhybrid.com

12. Rules of operation

For a regular operation of the curve detector the following rules are mandatory:
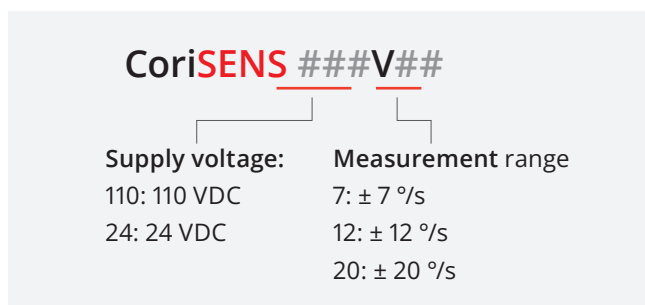
- Do not rotate the device in the first 20 seconds after power on.

- Do not use the self-test in the first 20 seconds after power on.

- The maximum duration of a rotation at maximum angular rate is 20 seconds.

- The ambient temperature must not change faster than 0.5 K/min to assure an operation within the failure tolerances.

These rules can be adapted to meet customer requirements.

13. Applied standards

Applied standards according to DIN EN 50155	
DIN EN 55011	Conducted emission
DIN EN 55011	Radiated emission electromagnetic field
DIN EN 61000-4-3	Immunity to electromagnetic field
DIN EN 61000-4-4	Immunity to electrical fast transient/burst
DIN EN 61000-4-5	Immunity to electrical slow transient/surge
DIN EN 61000-4-6	Immunity to conducted RF voltage
DIN EN 50155	Overvoltage at power supplies
DIN EN 61373	Shock and vibration tests
IEC60068-2-1 (Bd)	Dry heat test
IEC60068-2-30 (Db)	Damp heat, cyclic (2 x 24h cycle)
IEC60068-2-1 (Ad)	Cold test
DIN EN 45545	Fire protection on railway vehicles
Other standards	
RoHS, REACH	Compliant

14. Product key

CoriSENS ###V##

Supply voltage:
110: 110 VDC
24: 24 VDC

Measurement range
7: ± 7 °/s
12: ± 12 °/s
20: ± 20 °/s

Further options on request.

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