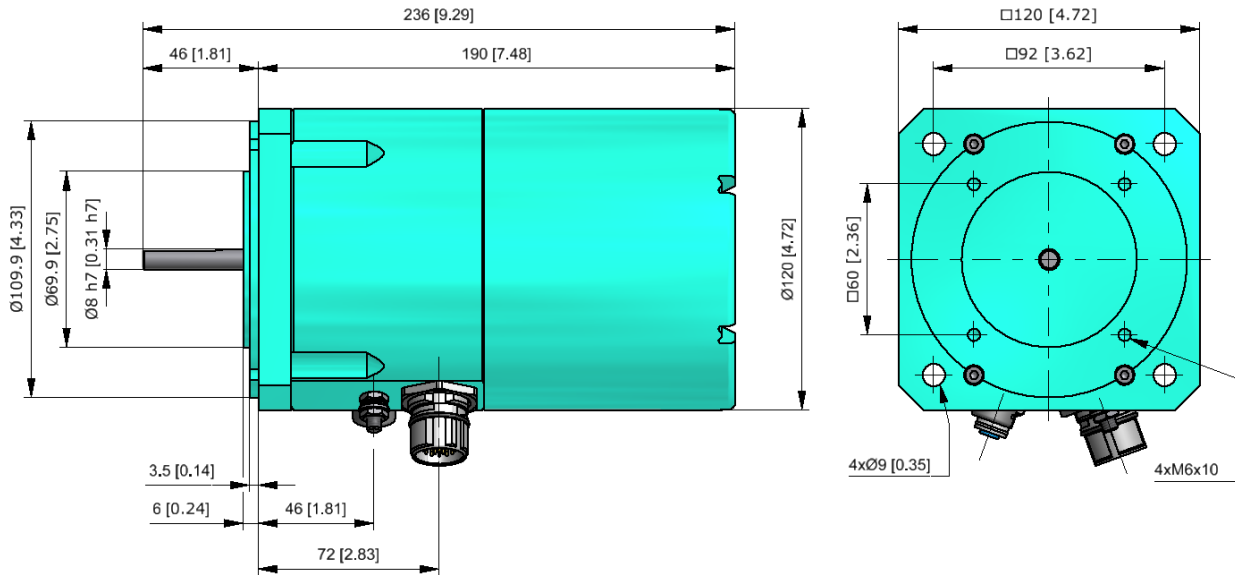


## Dimensional drawing



Dimensions in mm [inch]

## Application

The RIPOS smart absolute transmitter accurately measures shaft positions i.e. the total number of rotations (0...4096 rotations) including the precise angle (0...360°). The compact and robust construction as well as the simple installation enable a wide number of applications, for example for the position measurement of flaps, slides, valves, turbines, travelling and slewing cranes, winches, sluices, rudders, etc.

## Brief description

The rotation and angle to be measured is transferred to the input shaft by means of toothed wheel, transfer chain, lever, universal joint, etc. and converted into a digital electrical signal by a high resolution optical encoder.

Encoder values are processed by an internal microcontroller. The unit can be parameterized remotely by means of a built-in web interface. With the aid of a linearization curve, the possibility of position linearization exists. Up to four limit values can be defined (built-in digital output relays). Flawless functioning of the encoder is guaranteed with a watchdog.

The power supply connections and signal outputs are protected against overvoltage. The unit can also be equipped with an internal heating.

## Specifications

### Overview

Internal heating (option)		Encoder		Factory reset (reed contact)	
24-48 VDC IN	LAN1 Ethernet 10/100BaseT	STATUS OUT NC NO COM	DO 1-4 NO COM	AO ⊥ - +	RS485 COM1
Galvanically isolated, reverse voltage protection, EMI filter	Galvanically isolated	Galvanically isolated	Galvanically isolated	Galvanically isolated	Galvanically isolated, termination, DC pull-up

### Product version / ordering information

Type	Description	Article no.
MGRT	RIPOS smart Rotary Transmitter	00 65 906.002
MGRT.H24	RIPOS smart Rotary Transmitter Heating24 (with Heating 24 VDC)	00 65 906.003
MGRT.H48	RIPOS smart Rotary Transmitter Heating48 (with Heating 48 VDC)	00 65 906.004

Table 1: Ordering information

### Accuracy

Specification	Accuracy <sup>1</sup>
Measurement range (FS)	1474560° / 4096 rotations
Resolution	24 bit 5.96 · 10 <sup>-6</sup> % FS 0.088 °
Nonlinearity, hysteresis and repeatability	1 LSB ≤ ±5.96 · 10 <sup>-6</sup> % FS ≤ ±0.088 °
Temperature influence	≤ ±0 ppm/°C

Table 2: Accuracy

### Mechanical

- Housing: Aluminum (AlSi1MgMn, AlMg4.5Mn), varnished with NCS-S-2555 BG60G powder coating, thickness app. 80µm / 3.15mils
  - Protection class: IP67 (connectors mounted or covered with protection cap)
  - Dimensions: Height 196 mm / 7.72 ", baseplate: 120 x 120 mm / 4.72 x 4.72 "
  - Weight: approx. 3.0 kg / 6.6 lb.
  - Installation position: As required / no limitation
  - Radial load on drive shaft: ≤ 120 N / 27 lbf
  - Axial load on drive shaft: ≤ 10 N / 2.25 lbf
- Attention:** avoid excessive vibrations and/or shock!

<sup>1</sup> The accuracy refers to the raw value for the optical encoder, without compensation of angle offset

With direct axis-axis coupling preferably use flexible shaft couplings, refer to accessories!

- Driving torque: ≤ 1 Ncm / 1.42 oz. in
- Shaft speed: ≤ 6000 min<sup>-1</sup>

**Power supply**

- Supply voltage ranges: The device shall be supplied with a power supply with double or reinforced insulation, SELV, in line with an UL Listed fuse of 2.5 A
  - MGAT: 19.2 ... 60 VDC
  - MGAT.H24: 24 VDC +/-10%
    - Attention:** consider voltage drop with cable lengths > 60 m, voltage across device shall not be lower than 19.2 VDC!
  - MGAT.H48: 48 VDC +/-10%
- Polarity: Internally protected against inverse polarity
- Tightening torque of connectors: M12D: 0.5 Nm / 4.5 lbf in  
M23: 2 Nm / 18 lbf in
- Power consumption: without heating: < 12 W, typically 7 W (measuring mode)  
with heating: < 32 W, typically 27 W (measuring mode)  
The heating is supervised with a thermostat switch
- Galvanic isolation: 500 VAC
- Overvoltage protection: Protected by overvoltage arrester diodes (TVS, 90 VDC)
- Installation category: IV, used at the origin of installation (i.e. outside of buildings)

**Controls (internal)**

- Reed switch      Factory reset: Reset to factory settings (refer to manual)

**Outputs**

- STATUS OUT: Status relay, switch-over contact, contact load 0.5 A / 60 VDC nominal, galvanic isolation 500 V  
Expected life, mechanical: Min. 10<sup>8</sup> (at 180cpm)  
Expected life, electrical: Min. 10<sup>5</sup> (2A 30 VDC resistive),  
5x10<sup>5</sup> (1A 30 VDC resistive, at 20cpm)
- AO      Analogue output 4 ... 20 mA (3.5..24mA for error currents), load ≤ 800 Ohm<sup>2</sup>, resolution 16 bits, accuracy @ 25°C ± 0.02 % FS, linearity 0.01 % FS, temperature coefficient max. 70 ppm/°C  
Protected by overvoltage arrester diodes (TVS, 90 VDC), galvanic isolation 500 VAC
- DO 1 ... 4      Relay outputs, switch-on contact, contact load 0.5 A / 60 VDC nominal, galvanic isolation 500 VAC  
Expected life: refer to STATUS OUT

**Data interfaces**

- LAN1      Ethernet port for remote access, IEEE802.3 10/100BaseT compatible (HTTP, FTP, Modbus TCP Slave, IEC 60870-5-104), galvanic isolation 500 VAC  
Max. allowed cable lengths (refer to TIA-EIA-568-B.2): 100 m

<sup>2</sup> Up to 24 mA output current possible if load ≤ 500 Ohm

- COM1 RS-485 interface (Modbus RTU Slave or Master), galvanic isolation 500 VAC

**Environmental conditions**

- Operating temperature range: -20 ... +60 °C / -4 ...+140 °F (without heating)  
-40 ... +60 °C / -40 ...+140 °F (with heating)
- Storage temperature range: -40 ... +85 °C / -40 ...+185 °F
- Relative humidity (internal): 5-95 % @ 25 °C, non-condensing, decreasing linearly to 40 % relative humidity at 40 °C
- Installation site: Protected from direct sunlight, excessive vibrations and mechanical shock; max. altitude 5000 m
- Vibration immunity (IEC 68-2-6) 20 ms<sup>-2</sup> (10...500 Hz)
- Shock immunity (IEC 68-2-27) 200 ms<sup>-2</sup> (12 ms)

**Quality tests**

The device meets the requirements for CE certification according to:

- EN 61000-6-2:2005 Generic standards - Immunity for industrial environments
- EN 61000-6-3:2007 Generic standards - Emission standard for residential and commercial environments
- EN 61010-1:2010 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
- EN 60950-1:2006 +A11:2009 +A1:2010 +A12:2011 Information technology equipment - Safety - Part 1: General requirements and EN 60950-22:2006: Information technology equipment - Safety - Part 22: Equipment installed outdoors
- EN 60068-2-14:2009 Climatic environmental conditions, change of temperature (see also EN 60068-2-33)
- EN 60068-2-30:2005, variant 1 Climatic environmental conditions, damp heat, cyclic
- EN 60068-2-6:2008 Immunity against vibration (sinusoidal)
- EN 60068-2-27:2009 Immunity against shock
- EN 60529:1991 +A1:2000 +A2:2013 IEC 60529:1989 +A1:1999 +A2:2013 Degrees of protection provided by enclosures (IP code)
- RoHS Restriction of the use of certain hazardous substances in electrical and electronic equipment
- WEEE Directive on electronic waste

(See also Declaration of Conformity 24.281.0065906.002)

The device meets the requirements for UL certification according to:

- QUYX Process Control Equipment, Electrical – Component  
Online certificate: [QUYX.E326219 - Process Control Equipment, Electrical](#)
- QUYX7 Process Control Equipment, Electrical Certified for Canada  
Online certificate: [QUYX7.E326219 - Process Control Equipment, Electrical Certified for Canada](#)

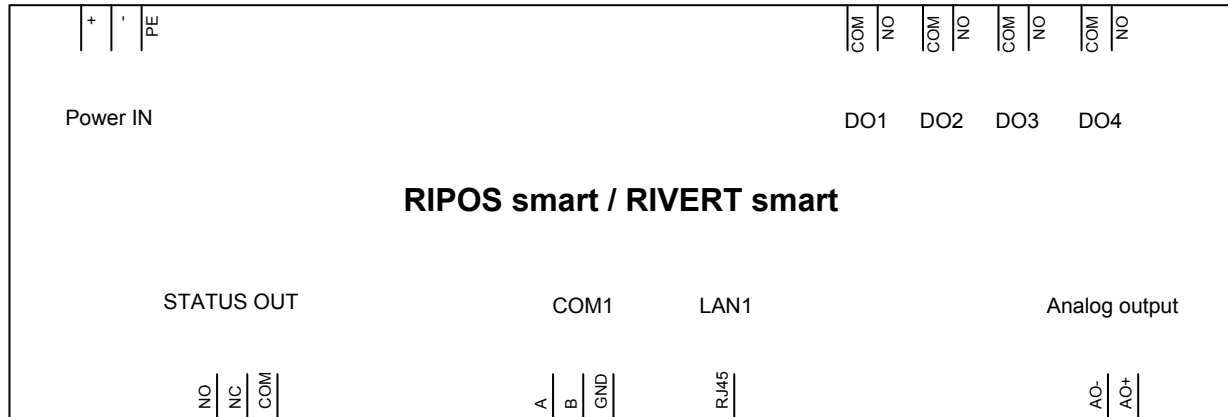
**Operation / configuration**

The device is controlled via web interface only; the user-friendly standard parameter configuration involves only a few steps.

	<p align="center"><b>Hardware Data Sheet</b></p>	DG DKap Stamm-Bez. Var Ind F Sp
		<p><b>24.210.0065906.002.08.4.4</b></p>

### Electrical connections

Power/signal and Ethernet connection is made with M12 and M23 connectors, respectively (protection class IP 67).

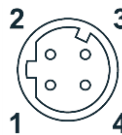


### Connector M12, Ethernet connection

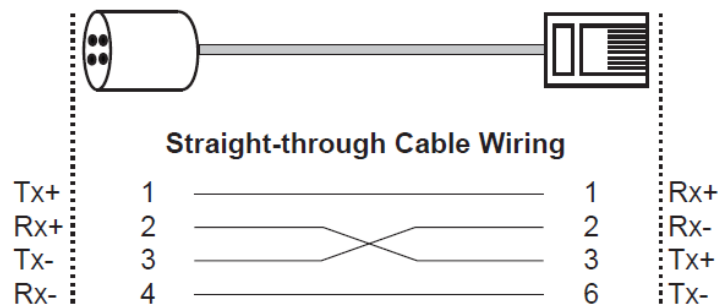
Pin order M12 (4 pins, D-coding):

Pin	Signal
1	TX+
2	RX+
3	TX-
4	RX-

Diagram (front, female connector):



Straight-through cable wiring to standard RJ45 connector:



**Attention:** use OVP (overvoltage protection devices) for longer Ethernet cable lengths and/or outdoor use, the max. allowed cable length of 100 m (refer to TIA-EIA-568-B.2) applies to the total length of the cable between two active devices / incl. both sides of the OVP!

### Connector M23, power and signal connections

Pin order M23 (19 pins):

Pin	Signal	Pin	Signal	Pin	Signal
1	DO4 NO	8	RS-485 A	15	DO3 COM
2	DO4 COM	9	AO-	16	RS-485 B
3	DO2 NO	10	AO+	17	STATUS COM
4	DO2 COM	11	STATUS NC	18	STATUS NO
5	DO3 NO	12	PE	19	Power-
6	Power+	13	DO1 COM		
7	RS-485 G	14	DO1 NO		

Diagram (front, male connector):



**Attention:** consider voltage drop with cable lengths > 60 m, voltage across device shall not be lower than 19.2 VDC!

For earth connections an M6 grounding screw is located near the connectors and must be a properly connector with a low impedance wire of at least 4 mm<sup>2</sup>.

## Supplied accessories

- Documentation-CDROM
- Quick Start Guide

## Accessories

### Connector / cables

#### Ordering information

	Type	Order number
<ul style="list-style-type: none"> <li>• M12D cable, 4-core twisted pair shielded:                             <ul style="list-style-type: none"> <li>○ Length 10 m</li> <li>○ Length 30 m</li> <li>○ Length 60 m</li> <li>○ Length 90 m</li> </ul> </li> </ul>	MGZC12.010	00 67 797.010
	MGZC12.030	00 67 797.030
	MGZC12.060	00 67 797.060
	MGZC12.090	00 67 797.090
<ul style="list-style-type: none"> <li>• RJ45-Quickon plug male for cable assembly</li> </ul>	MGZRJ45	00 67 796.001
<ul style="list-style-type: none"> <li>• M23 plug female for cable assembly</li> </ul>	MGZM23	00 67 798.001
<ul style="list-style-type: none"> <li>• M23 cable, 19-core twisted pair shielded:                             <ul style="list-style-type: none"> <li>○ Length 10 m</li> <li>○ Length 30 m</li> <li>○ Length 60 m</li> <li>○ Length 90 m</li> </ul> </li> </ul>	MGZC23.010	00 67 799.010
	MGZC23.030	00 67 799.030
	MGZC23.060	00 67 799.060
	MGZC23.090	00 67 799.090

### Cable specifications

- M12 – RJ45 cable specifications:
  - Conductor: Cu-flex (Industrial Ethernet Cat 5e)
  - Jacket: PUR
  - Jacket color: Light green
  - Shielding: Cu-braiding tinned, coverage approx. 80%
  - Special properties: Halogen-free, flexible, weather resistance
  - Temperature range: -40 °C to +70 °C [-40 °F to 158 °F]
  - Nominal voltage: 30 V
  - min. bending radius: 7 x cable Ø
  - max. tensile strength: 100 N [22.5 lbf]
  - Cable setup: 4 x 0,205 mm<sup>2</sup> / AWG 24, twisted to a quad, colors refer to following table:

- M12 - RJ45 plug wiring:

RJ45 plug [Pin]	Signal name	Color
1	Rx+	Yellow
2	Rx-	Orange
3	Tx+	White
6	Tx-	Blue

- M23 cable specifications:
  - Conductor: Cu-flex (cl. 5)
  - Jacket: PUR
  - Jacket color: Black matt (~RAL 9005)
  - Shielding: Cu-braiding tinned, coverage approx. 90%
  - Special properties: Halogen-free, flexible, weather resistance
  - Temperature range (stagnant): -40° C to +80° C [-40° F to 176° F]
  - Nominal voltage: 300/500 V / 50 Hz
  - Test voltage: 1500 V / 50 Hz
  - Outer Ø: 10.1mm +/- 0.20mm
  - min. bending radius: 15 x cable Ø
  - max. tensile strength: 540 N [121 lbf]
  - Cable setup: 3 x 1.00 mm<sup>2</sup>, wire colors red, blue, green-yellow  
8 x 2 x 0.22 mm<sup>2</sup>, wire colors refer to following table:

- M23 cable wiring:

M23 plug [Pin]	Signal name	Color
1	DO4 NO	White
2	DO4 COM	Brown
3	DO2 NO	Green
4	DO2 COM	Yellow
5	DO3 NO	Gray
<b>6</b>	<b>Power+</b>	<b>Red</b>
7	RS-485 G	White-green
8	RS-485 A	Grey-pink
9	AO-	Black
10	AO+	Purple
11	STATUS NC	White-yellow
<b>12</b>	<b>PE</b>	<b>Green-yellow</b>
13	DO1 COM	Blue
14	DO1 NO	Red
15	DO3 COM	Pink
16	RS-485 B	Red-blue



M23 plug [Pin]	Signal name	Color
17	STATUS COM	Brown-green
18	STATUS NO	Yellow-brown
19	Power-	Blue

**Electrical**

<ul style="list-style-type: none"> <li>Junction box IP66 (~NEMA 6) with terminals</li> <li>Junction box IP66 (~NEMA 6) with 1 OVP (supply 24 VDC) and 1 OVP (AO)</li> <li>Junction box IP66 (~NEMA 6) with 1 OVP (supply 48 VDC) and 1 OVP (AO)</li> <li>OVP complete for 24 VDC supply</li> <li>OVP complete for 48 VDC supply</li> <li>OVP complete for analogue signal</li> <li>OVP complete for RS-485 signal</li> <li>OVP complete for Ethernet signal</li> </ul>	<p><b>Type</b></p> <p>NLAD.KL8</p> <p>NLAD.MGX24</p> <p>NLAD.MGX48</p> <p>PT2-PES-24AC-SET</p> <p>PT2-PES-60AC-SET</p> <p>PT1x2-24DC-SET</p> <p>PT3-HF-12DC-SET</p> <p>DT-LAN-CAT.6+</p>	<p><b>Order number</b></p> <p>00 65 190.100</p> <p>00 65 190.108</p> <p>00 65 190.109</p> <p>22 50 203</p> <p>22 50 202</p> <p>22 50 215</p> <p>22 50 220</p> <p>22 03 305</p>
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**Mechanical**

<ul style="list-style-type: none"> <li>Mounting bracket complete</li> <li>Chain wheel complete c = 300 mm [11.81"], z = 12</li> <li>Cross chain steel 1.4401, welded</li> <li>Deflection pulley complete, c = 300 mm [11.81"]</li> <li>Console complete for pulley</li> <li>Floater, coated with zinc, D = 300 mm [11.81"]</li> <li>Floater, coated with zinc, D = 300 mm [11.81"], with heating</li> <li>Floater leg 500 mm [19.7"]</li> <li>Floater leg 1000 mm [39.4"]</li> <li>Counter weight 3 kg [6.6 lbs.], D = 40 mm [1.57"]</li> </ul>	<p><b>Type</b></p> <p>MGZBW</p> <p>MGZKR12</p> <p>MGZKK12</p> <p>MGZUR12</p> <p>MGZKO</p> <p>MGZS</p> <p>MGZSH</p> <p>MGZSF.1</p> <p>MGZSF.2</p> <p>MGZGG</p>	<p><b>Order number</b></p> <p>00 65 966.001</p> <p>00 65 989.002</p> <p>42 01 010</p> <p>00 65 990.002</p> <p>00 65 983.001</p> <p>00 65 976.001</p> <p>00 65 982.001</p> <p>00 65 981.001</p> <p>00 65 981.002</p> <p>00 65 977.001</p>
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For details refer to the datasheet HW Level- and Position Measurement E24.210.0065976.001

- Flexible shaft couplings, for example, from:
  - Wachendorff ([http://www.wachendorff-automation.de/drehgeber\\_zubehoer\\_kupplungen.html](http://www.wachendorff-automation.de/drehgeber_zubehoer_kupplungen.html))
  - Huco (<http://www.huco.com/products.asp?cat=59>)
- Rittmeyer 15 m cable drum with spring complete MGZFKT 00 67 050.001
- RIPOS with Rope Length Transmitter FSG: Refer to Projecting measuring site E24.260.0067110.xxx

For additional accessories please contact a Rittmeyer AG representative.