

RIVERT smart Absolute Angle Transmitter

Measuring range $-180^{\circ} \dots +180^{\circ}$

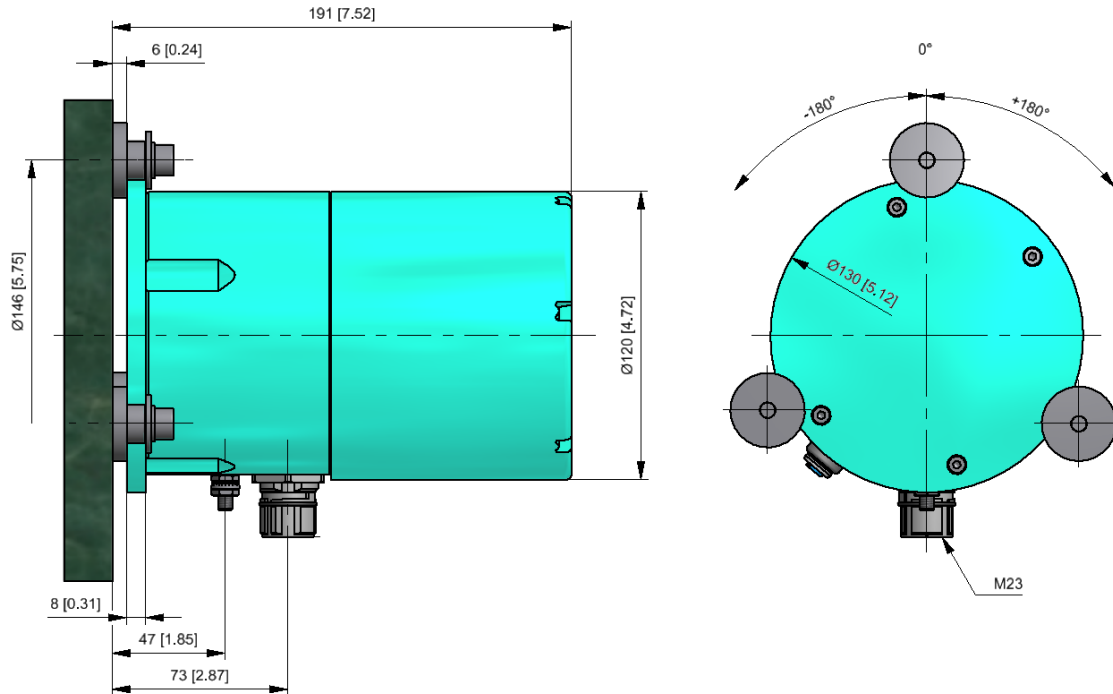
Type:

MGAT

Item no.:

refer to table 1

Dimensional drawing



Dimensions in mm [inch]

Application

The RIVERT smart absolute transmitter accurately measures angles of positioning units and other elements such as gates, flaps, valves, drawbridges, sluiceways, etc. which have horizontal axis.

This clamp-on unit is made of a compact, robust and maintenance-free construction. The extremely simple mounting by weldable split taper sockets directly onto the moving object enables a wide range of applications.

Brief description

A gravity-actuated pendulum with electro-dynamic damping converts the angle into a digital electrical signal by a high resolution optical encoder. This optical sensor converts the movement into a digital electrical signal.

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 transmitter is guaranteed with an internal watchdog function.

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 NC 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.
MGAT	RIVERT smart Angle Transmitter	00 65 891.002
MGAT.H24	RIVERT smart Angle Transmitter Heating24 (with Heating 24 VDC)	00 65 891.003
MGAT.H48	RIVERT smart Angle Transmitter Heating48 (with Heating 48 VDC)	00 65 891.004

Table 1: Ordering information

Accuracy

Specification	Accuracy ¹
Measurement range (FS)	-180..+180° / 1 rotation
Resolution	13 bit 2.44·10 ⁻² % FS 0.044 °
Nonlinearity, hysteresis and repeatability	1 LSB ≤ 0.024 % FS ≤ ±0.044 °
Temperature influence	≤ ±0 ppm/°C

Table 2: Accuracy

Note: The angle transmitter MGAT is mechanically completely rotatable. Placed in center position, the M23 connector is located perpendicular below the unit (see dimensions figure, 0° position).

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 191 mm / 7.5 ", baseplate diameter 130 mm / 5.12 "
- Weight: approx. 3.0 kg / 6.6 lb.
- Installation position: horizontal, connectors downwards
- Max. allowed inclination out of horizontal position: ±10°

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

Power supply

- Supply voltage ranges:
 - MGAT: 19.2 ... 60 VDC
 - MGAT.H24: 24 VDC +/-10%
 - 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. 10⁸ (at 180cpm)
Expected life, electrical: Min. 10⁵ (2A 30 VDC resistive),
5x10⁵ (1A 30 VDC resistive, at 20cpm)
- AO Analogue output 4 ... 20 mA (3.5..24mA for error currents), load ≤ 800 Ohm², 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-over 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
- COM1 RS-485 interface (Modbus RTU Slave or Master), galvanic isolation 500 VAC

² Up to 24 mA output current possible if load ≤ 500 Ohm

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⁻² (10...500 Hz)
- Shock immunity (IEC 68-2-27) 200 ms⁻² (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 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 Degrees of protection provided by enclosures (IP code)
IEC 60529:1989 +A1:1999 +A2:2013
- RoHS Restriction of the use of certain hazardous substances in electrical and electronic equipment
- WEEE Directive on electronic waste

(See also Declaration of Conformity 24.281.0065891.002)

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

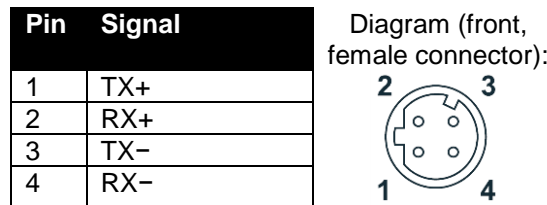
The device is controlled via web interface only; the user-friendly standard parameter configuration involves only a few steps.

Electrical connections

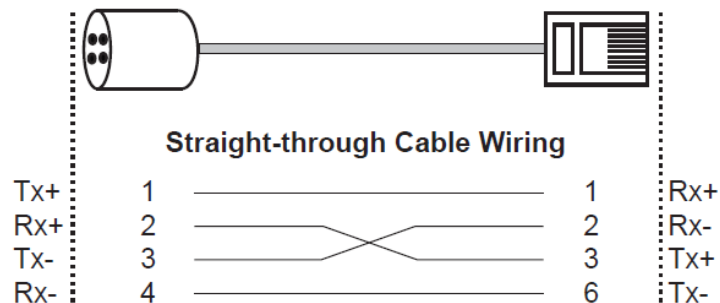
Power/signal and Ethernet connection is made with M12 and M23 connectors, respectively (protection class IP 67).

Connector M12, Ethernet connection

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



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 mm².

Supplied accessories

- 3 x weldable split taper sockets with cylindrical screws M8x16, flat washers and spring washers for mounting as well as a welding device.
- Documentation-CDROM
- Quick Start Guide

Accessories

Connector / cables

Ordering information

	Type	Order number
• M12D cable, 4-core twisted pair shielded:	○ Length 10 m	MGZC12.010 00 67 797.010
	○ Length 30 m	MGZC12.030 00 67 797.030
	○ Length 60 m	MGZC12.060 00 67 797.060
	○ Length 90 m	MGZC12.090 00 67 797.090
• RJ45-Quickon plug male for cable assembly	MGZRJ45	00 67 796.001
• M23 plug female for cable assembly	MGZM23	00 67 798.001
• M23 cable, 19-core twisted pair shielded:	○ Length 10 m	MGZC23.010 00 67 799.010
	○ Length 30 m	MGZC23.030 00 67 799.030
	○ Length 60 m	MGZC23.060 00 67 799.060
	○ Length 90 m	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 mm² / 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 mm², wire colors red, blue, green-yellow
8 x 2 x 0.22 mm², 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
6	Power+	Red
7	RS-485 G	White-green
8	RS-485 A	Grey-pink
9	AO-	Black
10	AO+	Purple
11	STATUS NC	White-yellow
12	PE	Green-yellow
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

	Type	Order number
• Junction box IP66 (~NEMA 6) with terminals	NLAD.KL8	00 65 190.100
• Junction box IP66 (~NEMA 6) with 1 OVP (supply 24 VDC) and 1 OVP (AO)	NLAD.MGX24	00 65 190.108
• Junction box IP66 (~NEMA 6) with 1 OVP (supply 48 VDC) and 1 OVP (AO)	NLAD.MGX48	00 65 190.109
• OVP complete for 24 VDC supply	PT2-PES-24AC-SET	22 50 203
• OVP complete for 48 VDC supply	PT2-PES-60AC-SET	22 50 202
• OVP complete for analogue signal	PT1x2-24DC-SET	22 50 215
• OVP complete for RS-485 signal	PT3-HF-12DC-SET	22 50 220
• OVP complete for Ethernet signal	DT-LAN-CAT.6+	22 03 305

Mechanical

	Type	Order number
• Adapter plate when replacing an old RIVERT type GSI.R or GVI.xxx	MGZAP	00 65 996.001

For additional accessories please contact a Rittmeyer AG representative.



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