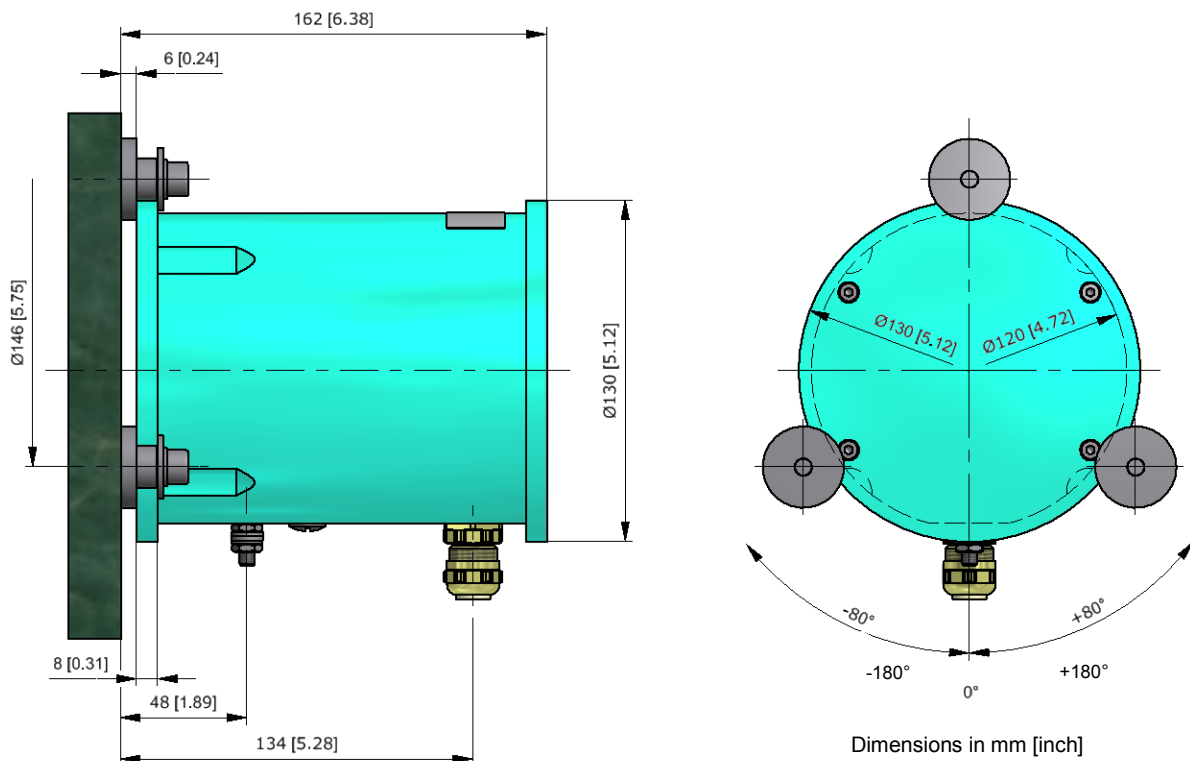


## Dimensional drawing



## Application

The RIVERT 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.

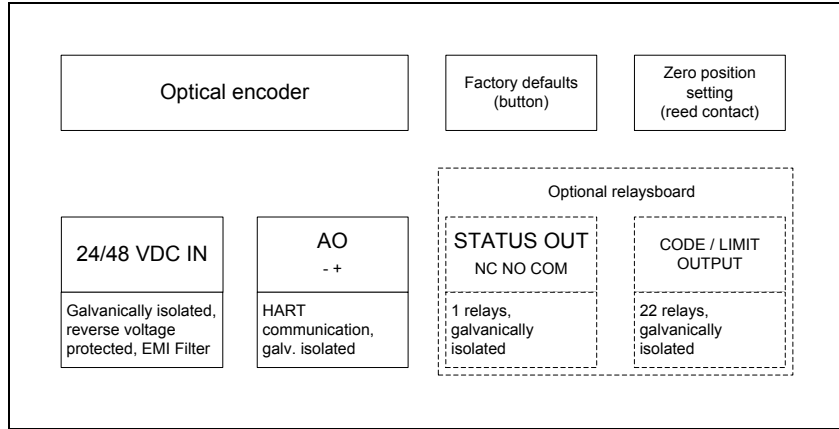
## Brief description

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.

The signal processing in the unit takes place digitally by a microcontroller. The device is parameterized with a HART® capable interface/software. With the aid of a linearization curve (max. 30 X-/Y-pair of values), the possibility of position linearization exists. Up to four limit values as well as the measured value as a digital code (binary, Gray, BCD) and the device status can be output (for doing this an optional relays board is needed). Flawless functioning of the transmitter is guaranteed with an internal watchdog function. The power supply and analog output connections are protected against overvoltage.

# Specifications

## Overview



## Product version / ordering information

Type	Description	Article no.
MGAH.360	RIVERT Angle Transmitter 360°	0067123.001
MGAH.360.DO	RIVERT Angle Transmitter 360°, with relays board	0067123.002
MGAH.360.7W.005	RIVERT Angle Transmitter 360° with pre-mounted cable 7-core, length 5 m	0067132.005
MGAH.360.7W.010	RIVERT Angle Transmitter 360° with pre-mounted cable 7-core, length 10 m	0067132.010
MGAH.360.7W.020	RIVERT Angle Transmitter 360° with pre-mounted cable 7-core, length 20 m	0067132.020
MGAH.360.7W.030	RIVERT Angle Transmitter 360° with pre-mounted cable 7-core, length 30 m	0067132.030
MGAH.360.DO.12W.005	RIVERT Angle Transmitter 360°, with relays board with pre-mounted cable 12-core, length 5 m	0067134.005
MGAH.360.DO.12W.010	RIVERT Angle Transmitter 360°, with relays board with pre-mounted cable 12-core, length 10 m	0067134.010
MGAH.360.DO.12W.020	RIVERT Angle Transmitter 360°, with relays board with pre-mounted cable 12-core, length 20 m	0067134.020
MGAH.360.DO.12W.030	RIVERT Angle Transmitter 360°, with relays board with pre-mounted cable 12-core, length 30 m	0067134.030
MGAH.360.DO.34W.005	RIVERT Angle Transmitter 360°, with relays board with pre-mounted cable 34-core, length 5 m	0067135.005
MGAH.360.DO.34W.010	RIVERT Angle Transmitter 360°, with relays board with pre-mounted cable 34-core, length 10 m	0067135.010
MGAH.360.DO.34W.020	RIVERT Angle Transmitter 360°, with relays board with pre-mounted cable 34-core, length 20 m	0067135.020
MGAH.360.DO.34W.030	RIVERT Angle Transmitter 360°, with relays board with pre-mounted cable 34-core, length 30 m	0067135.030

Table 1: Product version / ordering information

## Resolution and accuracy

Specification	Accuracy
Measurement range (FS)	-180 ... +180° / 1 rotation
Resolution	13 bit $2.44 \cdot 10^{-2}$ % FS 0.044°
Accuracy (nonlinearity, hysteresis and repeatability)	1 LSB $\leq 0.024$ % FS $\leq \pm 0.044^\circ$
Temperature influence	0 ppm/°C

**Table 2: Resolution and accuracy**

Note: In the center position of the measuring range the device connection is perpendicular below the unit (see dimensional drawing, 0° position).

## Mechanical

- Housing: Aluminum (EN AW AlSi1MgMn), varnished with blue green (NCS-S-2555 B60G) powder coating, thickness app. 60 µm / 2.36 mils
- Protection class: IP68, permanent immersion up to 3.5 bar / 35m water column (guaranteed with supplied cable glands and accessory cables)
- Dimensions: Height: 160 mm, baseplate diameter 130 mm / 5.12 "
- Weight (without cable): approx. 2.9 kg / 6.4 lb.
- Installation position: horizontal, unit connector downwards (zero position)
- Max. allowed inclination out of horizontal position:  $\pm 10^\circ$

## Power supply

- Supply voltage ranges: 19.2 ... 60 VDC.  
The device shall be supplied with a power supply with double or reinforced insulation, SELV, in line with an UL Listed fuse of 1.5 A.
- Polarity: Internally protected against inverse polarity
- Tightening torque of connectors: 5 mm / 0.20 " grid dimension: 0.56 – 0.79 Nm / 4.96 – 7.00 lbf in  
3.5 / 3.81 mm / 0.14 / 0.15 " grid dimension: 0.22 – 0.25 Nm / 1.95 – 2.21 lbf in
- Power consumption: < 7 W, typically 3 W (measuring mode without optional relays board)
- 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)

## Indicators / controls (internal)

- LEDs on the mainboard:
 

CPU status (C):	Green flashes at 1 Hz = measurement running
System status (S):	Green flashes at 0.5 Hz = measurement OK
	Orange flashes at 0.5 Hz = measurement warning
	Red flashes at 0.5 Hz = measurement error

- LEDs on the opt. relays board: Status output (S): Green = OK (relay energized)  
Digital outputs (DO18 ... DO21, sign): green = relay energized
- Reset button (R): Restart of the device.
- Factory defaults button (F): Reset to the factory default settings (activate for at least 5 seconds, refer to the user manual).
- Zero setting reed contact (Z): Set installation offset (activate for at least 10 seconds, refer to the user manual).
- Rotary switch (MODE): Position 0: Normal operating mode (refer to the user manual)  
1: Normal operating mode with parameters write protected (refer to user manual)  
2: HART® armed mode (refer to the user manual)  
F: Software (firmware) update (refer to the user manual)
- Buzzer: Feedbacks: 1 x beep = position 0  
3 x beep = invalid position (refer to the user manual)

## Outputs

- AO: Analog output 4 ... 20 mA (3.5...24mA for error currents), load  $\leq 800 \text{ Ohm}^1$ , resolution 16 bits, accuracy @ 25 °C  $\pm 0.05 \% \text{ FS}$ , linearity 0.01 % FS, temperature coefficient max. 50 ppm/°C  
Protected by overvoltage arrester diodes (TVS, 90 VDC), galvanic isolation 500 VAC, HART® communication

On the optional relays board:

- STATUS OUT: Status relay, switch-over contact,  
contact load 1 A at 125 VDC or 150 VAC nominal  
UL contact ratings: 30 VDC / 1 A  
65 VDC / 0.46 A  
150 VAC / 0.46 A  
galvanic isolation 500 VAC  
Expected life, mech.: typ.  $10^9$  switching operations  
Expected life, electr. at 12 V/10 mA: typ.  $50 \times 10^6$  switching operations  
at 6 V/100 mA: typ.  $10 \times 10^6$  switching operations  
at 30 V/1 A: typ.  $10 \times 10^3$  switching operations
- CODE OUTPUT: 22 relay outputs, closing contact, common root,  
contact load 1 A at 125 VDC or 150 VAC nominal  
UL contact ratings: 30 VDC / 1 A  
65 VDC / 0.46 A  
150 VAC / 0.46 A  
galvanic isolation 500 VAC  
Expected life: refer to STATUS OUT  
Max. allowed current on common root contact: 2 A

## Data interfaces

- HART®: via analog output (AO)
- USB: only for software update (refer to the user manual)

<sup>1</sup> Up to 24 mA output current possible if load  $\leq 500 \text{ Ohm}$

## Environmental conditions

- Operating temperature range: -40 ... +60 °C / -40 ... +140 °F
- 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)
- Pollution degree: class III (device may only be opened in a controlled environment)

## 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 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

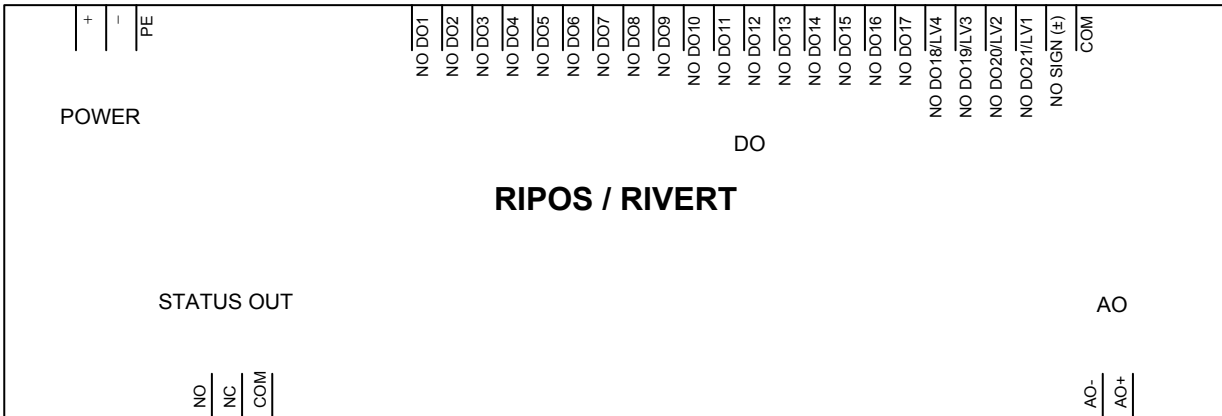
(See also Declaration of Conformity 24.281.0067122.001)

## Operation / configuration

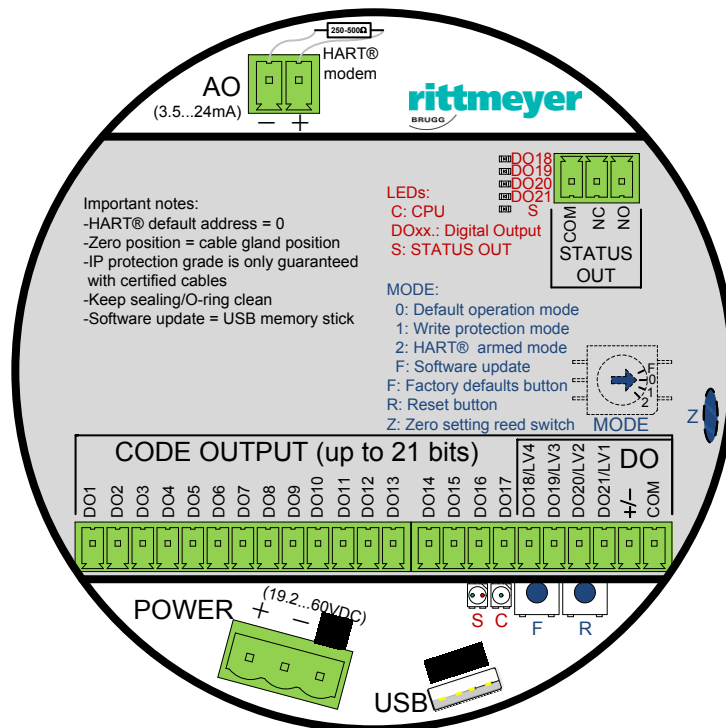
The device is configured over the HART® interface. For details refer to the Software Data Sheet 24.220.006712x.001.

### Electrical connections

Power supply and signal connections are realized by means of plug-in terminals. Power and signals must be connected in a protected environment; no moisture may be fed in into the housing. A ground screw terminal M6 is placed near the device connection. The earth connection with low impedance must be with a strand wire of at least 4 mm<sup>2</sup>. Depending on the environment overvoltage protection solutions must be provided externally (see accessories).



### Mainboard overview with mounted relaysboard



## Connections mainboard

Pin order POWER (power supply):

Pin	Signal	Wire numbers for pre-installed cables		
		7-pole	12-pole	34-pole
1	Power+	1	1	1
2	Power-	2	2	2
3	PE	3	3	3

Pin order AO (analog output):

Pin	Signal	Wire numbers for pre-installed cables		
		7-pole	12-pole	34-pole
1	AO-	4	4	4
2	AO+	5	5	5

## Connections relaysboard

Pin order STATUS OUT:

Pin	Signal	Wire numbers for pre-installed cables		
		7-pole	12-pole	34-pole
1	STATUS NO (closing contact)	6	6	6
2	STATUS NC (opening contact)	-	7	7
3	STATUS COM (common contact)	7	8	8

Pin order CODE OUTPUT / DO:

Pin	Signal	used as	Wire numbers for pre-installed cables		
			7-pole	7-pole	7-pole
1	NO DO1	Code Output Bit 0	-	-	11
2	NO DO2	Code Output Bit 1	-	-	12
3	NO DO3	Code Output Bit 2	-	-	13
4	NO DO4	Code Output Bit 3	-	-	14
5	NO DO5	Code Output Bit 4	-	-	15
6	NO DO6	Code Output Bit 5	-	-	16
7	NO DO7	Code Output Bit 6	-	-	17
8	NO DO8	Code Output Bit 7	-	-	18
9	NO DO9	Code Output Bit 8	-	-	19
10	NO DO10	Code Output Bit 9	-	-	20
11	NO DO11	Code Output Bit 10	-	-	21
12	NO DO12	Code Output Bit 11	-	-	22
13	NO DO13	Code Output Bit 12	-	-	23
14	NO DO14	Code Output Bit 13	-	-	24
15	NO DO15	Code Output Bit 14	-	-	25
16	NO DO16	Code Output Bit 15	-	-	26
17	NO DO17	Code Output Bit 16	-	-	27
18	NO DO18	Code Output Bit 17, Limit Value LV4	-	12	28
19	NO DO19	Code Output Bit 18, Limit Value LV3	-	11	29
20	NO DO20	Code Output Bit 19, Limit Value LV2	-	10	30
21	NO DO21	Code Output Bit 20, Limit Value LV1	-	9	31
22	NO SIGN	Code Output sign (open: sign = positive)	-	-	32
23	COM	Common root contact of digital outputs	-	8	10

## Note:

- On pre-installed 7-pole cables the wires 6, 7 are not connected!
- On pre-installed 34-pole cables the wires 9, 33, 34 are not connected!

## 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.
- 1 additional EMC cable gland (incl. reductions) for alternative cable diameters
- 1 resistor 470 ohms (for HART® configuration)
- 1 Documentation CDROM
- 1 Quick Start Guide
- 1 mounting guide for EMC cable glands



## Accessories

### Cables

#### Ordering information

	<b>Order number</b>
• 7-core, shielded, cable Ø 6.7 mm, 0.5 mm <sup>2</sup> , 81 g/m, R=0.039 Ω/m	04 60 707
• 12-core, shielded, cable Ø 8.7 mm, 0.5 mm <sup>2</sup> , 150 g/m, R=0.039 Ω/m	04 60 712
• 34-core, shielded, cable Ø 13.2 mm, 0.5 mm <sup>2</sup> , 385 g/m, R=0.039 Ω/m	04 60 734

#### Cable specifications (refer to corresponding data sheet)

• Conductor:	Cu-flex (cl. 5)
• Jacket:	PUR
• Jacket color:	Orange (~RAL 2004)
• Shielding:	Cu-braiding tinned, coverage approx. 90 %
• Special properties:	Halogen-free, flexible, weather resistant
• Temperature range (placed):	-40 °C to +80 °C / -40 °F to 176 °F
• Nominal voltage:	300/500 V / 50 Hz
• Test voltage:	1500 V / 50 Hz
• min. bending radius:	15 x cable diameter
• max. tensile strength:	20 N/mm <sup>2</sup> / 4.5 lbf/mm <sup>2</sup>

### Configuration

	<b>Type</b>	<b>Order number</b>
• HART® / USB PC-Interface	MGZMUSB	22 21 005
• HART® / Bluetooth PC-Interface	MGZMBT	22 21 006
• SIMATIC PDM, Software Media Package V8.2 SP1 (only available for Windows 7 Professional/Ultimate/Enterprise SP1 (32/64-bit) or Windows Server 2008 R2 SP1 Standard Edition (64 bit))		22 05 350
• SIMATIC PDM, License Single Point V8.2		22 05 351

### Electrical

	<b>Type</b>	<b>Order number</b>
• Relays board for RIVERT/RIPOS	MGZH.RB	00 67 127.002
• Replacement connectors for RIVERT/RIPOS		00 67 129.001
• 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 analog signal	PT1x2-24DC-SET	22 50 215

## Mechanical

	Type	Order number
• Adapter plate when replacing an old RIVERT type GSI.R or GVI.xxx	MGZAP	00 65 996.001
• Cable connector NPT ½ " for conduits, with cable gland M12		00 66 590.003
• Cable connector NPT ½ " for conduits, with cable gland M16		00 66 590.004
• Cable connector NPT ½ " for conduits, with cable gland M20		00 66 590.005

For additional accessories please contact a Rittmeyer AG representative.