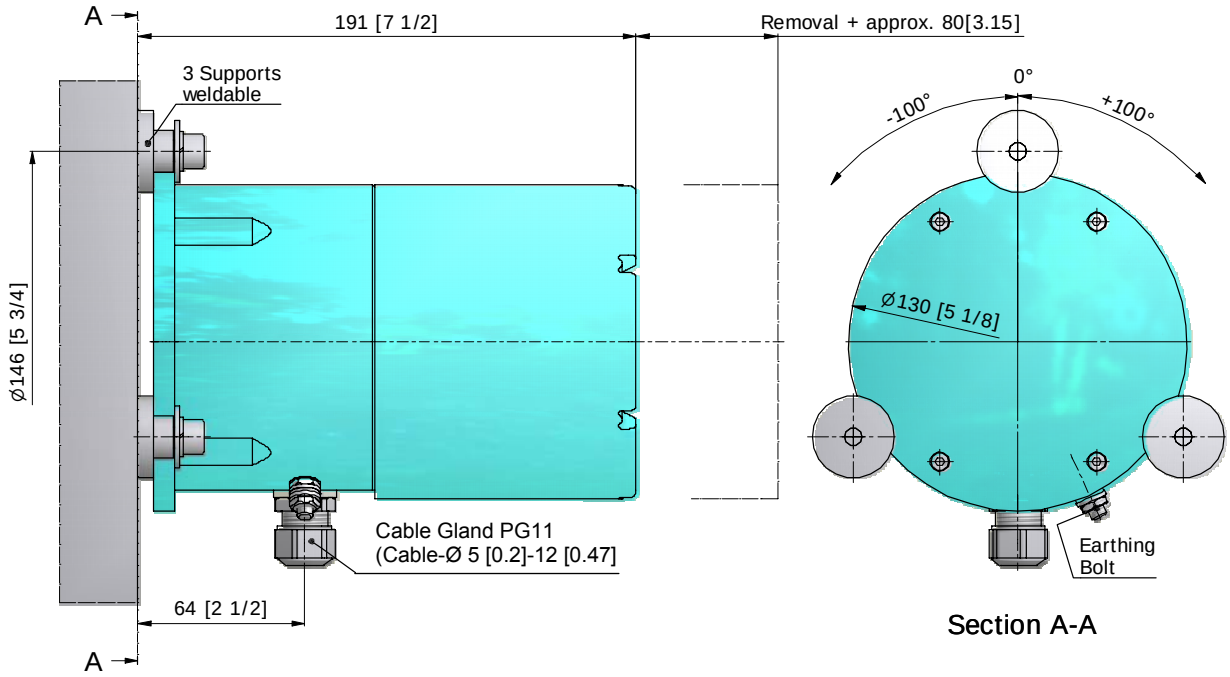
This data sheet is valid for MGAS from HW Release 01, SW Release 1.03.

Dimensions



Dimensions in mm [inch]

Application

The absolute measuring angle transmitter MGAs serves the direct acquisition of positioning units and other elements such as gates, flaps, valves, drawbridges, sluicegates, 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.

Short description

A gravity-actuated pendulum with electro-dynamic damping transmits the movement to be measured to a primary sensor. This optical sensor converts the movement into a digital electrical signal.

Signal processing within the unit takes place digitally with the aid of a microcontroller. The unit can be parameterized locally by means of an optional Control Unit or can be remotely parameterized by means of HART or fieldbus. With the aid of a linearisation curve, the possibility of position linearisation exists.
Flawless functioning of the angle transmitter is monitored by cyclic self-tests.

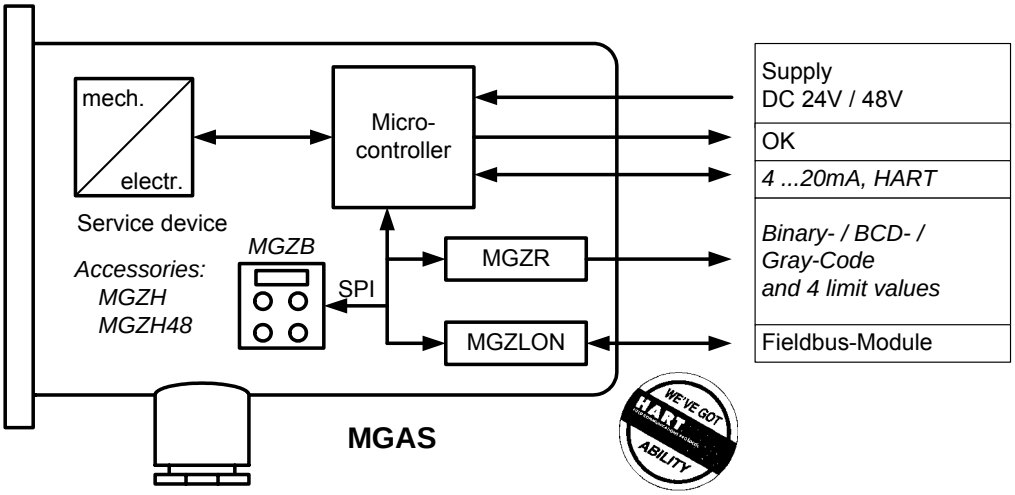
The following unit outputs are available depending on the design version:

- one current output 4...20 mA, HART-compatible
- one unit OK relay
- one 21 Bit wide digital output in BCD, Gray or Binary Code with sign (MGZR), where the 4 most significant bits can also be used as 4 independent limit values
- Fieldbus Interface (MGZLON)
- Control Board (MGZB)

The supply connections and signal outputs are protected against overvoltage.

The units can also be equipped with optional Heating (MGZH).

Block diagram



Design versions

When ordering, the measuring range and an output version are to be specified.

Measuring range version:

Type	Measuring range	Measuring principle	Order No.
MGAS	-100°...+100°	optical 13 Bit	00 65 891.001

Table 1: Measuring range version

Output versions:

Type	Output	Order No.
MG4A	Analogue Output, HART compatible	P.MG4A
MGDA	Digital and Analogue Output HART compatible, incl. MGZR	P.MGDA

Table 2: Output versions

Technical data

Type		MGAS [1)]
Measuring range (FS)	[°] [rotations]	-100...+100 0.556
Resolution	[Bit] [% FS] [°]	13 $2.20 \cdot 10^{-2}$ 0.044
Nonlinearity, hysteresis and repeatability	[± Bit] [≤ ±% FS] [≤ ±°]	1 LSB 0.022 0.044
Temperature influence T_{cal}=25°C [77°F]	[≤ ±ppm/°C]	0

Note: The optical angle transmitter MGAS is mechanically completely rotateable. The electrical working range is -105°...+105°. Placed in centre position, the cable gland is located exactly perpendicular below the unit (see dimensions figure).

1) There will be no undefined measured values outside the electrical working range.

Measuring range independent technical data

Environmental conditions

- Operating temperature range: -25...+60°C [-13°...+140°F] (without heating)
-40...+60°C [-40°...+140°F] (with heating)
- Protection class: IP67 (optional IP68 / submersible 35 m [115 ft], (see accessory MGZIP68)
- Standard cable connection: PG11, terminal capacity range 5...12 mm [$^{3}/_{16}$" ... $^{15}/_{32}$"]
- Installation position: horizontal, cable gland downwards
- max. inclination out of horizontal position: ±10° (see dimension)
- Housing material: AlSi1MgMn, AlMg4.5Mn
- Housing colour: blue/green (NCS–S-2555 BG60G)
- Coating composition: Powder-coating, layer thickness approx. 80 µm [3.15 mils]
- Weight: approx. 3.0 kg [6.6 lbs]
- Sample rate: 10 s^{-1}
- Vibration resistance (IEC 68-2-6): 100 ms^{-2} (10...500 Hz)
- Shock resistance (IEC 68-2-27): 200 ms^{-2} (12 ms)

Power consumption

- Supply voltage range: DC 19 V ... 58 V
- Polarity: Polarity reversal protection
- Power consumption: ≤ 7.5 W (without heating)
- Power consumption heating: approx. 19.2 W (supply voltage range: DC 24 V ±10 %),
approx. 17 W (supply voltage range: DC 48 V ±10 %)
the heating is thermostatically controlled
- Electrical isolation: AC 500 V, 50 Hz, 1 min.
(supply against current output, digital output, OK output and fieldbus Interface)
- Overvoltage protection: Medium protection, max. leakage current (8/20 µs): 5 kA

Current output

HART-compatible, assignment to a measured value and working range freely parameterizable.

- Signal type: Load-independent direct current 4...20 mA
- Signal range for measured value: 3.9...20.5 mA
- Current for failure information: 21.0 mA
- Current on Power-up: - during Power-up: 21 mA (OK-Relais: off)
  - Power-up finished: 21 mA (OK-Relais: on)
  - approx. 100 ms after Power-up: Current on accurate steady state value
- Total failure ≤ 0.02 % FS @ 25°C [77°F]
- Temperature dependency: ≤ ±50 ppm/°C [≤ ±28ppm/°F]
- Resolution: 16 Bit, related to the set working range
- Load impedance: 0...500 Ω
  Note: For communication via HART, a total load impedance of 230...1100 Ω is required.
- Digital communication: Communication for measured value output, parameterization, etc, via the current output, HART-compatible
- Electrical isolation: AC 500 V, 50 Hz, 1 min.
  (current output against 4-lead supply, OK output, digital output, and fieldbus Interface)
- Overvoltage protection: Medium protection, max. leakage current (8/20 µs): 5 kA

HART interface

For local and remote parameterization, measured value and status output and feedback documentation.

For detailed information on HART, see also configuration note "Digital Communication with HART" (24.260.006590x.001).

OK output (on all output versions)

Electrically isolated relay make contact, in working position on correct operation.

Switching voltage:	≤ AC 50 V, DC 75 V
Breaking and continuous current:	AC/DC 10 µA...0.5 A
Switching capacity:	≤ 30 W, 30 VA
Electrical isolation:	AC 500 V, 50 Hz, 1 min. (OK output against supply, current output, digital output and fieldbus Interface)

Digital and limit value outputs (available dependent on unit output version)

For technical data, see data sheet relay board MGZR (24.210.0065914.001).

Fieldbus interface (optional accessory)

For technical data, see data sheet fieldbus interface MGZLON (24.210.0065955.001).

Quality tests

CE Conformity in agreement with the EC EMC guidelines (89/336/EWG)

The unit fulfils the requirements for the CE marking in accordance with:

- EN 50081-1: 1992 (Basic specification emitted Interference, residential and commercial area)
- EN 50082-2: 1995 (Basic specification immunity to interference, industrial area)

(See also conformity declarations 24.281.0026000.001 and 24.281.0027000.001)

Additional EMC tests

- Surge ENV 50142, and EN 61000-4-5 (IEC 1000-4-5): Test level 4 (5 kV)

Dielectric tests according to IEC 255-5

- Impulse voltage: Test level 3 (2 kV)
- Insulation voltage: Test level 4 (AC 500 V, 50 Hz, 1 min.)
- Insulation resistance: Test level 4 (≥ 100 MΩ)

Climatic test

- Fulfils climatic test in accordance with IEC 68-2-38

Operation / Parameterization

Operation or parameterization of the unit can take place interactively with the following accessory:

- Control board MGZB for local operation:
  Operation and measured value display take place in a two-level operating matrix with the aid of 4 keys and an 8-digit LC display.
  (see also data sheet MGZB 24.210.0065912.001 or manual MGAx 24.730.006589x.001)

  This operating board can be used for all unit versions and can be retrofitted or only used temporarily.

- HART interface for local and remote parameterization, measured value and status output and feedback documentation:
  See also data sheet MGZM "HART/RS232 PC interface" 24.210.2221001.001 or
  Operating instructions MGZP "HART PC parameterization software" for MGxx 24.810.0065965.001.

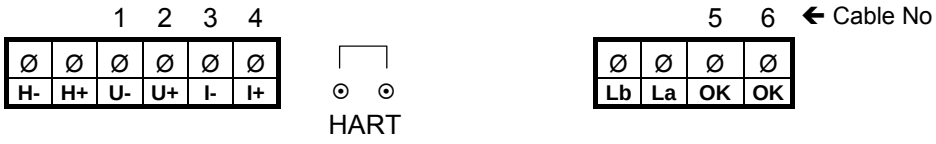
Data storage

All unit parameters are stored in a non-volatile memory (EEPROM).

Electrical connections

Connection of the signal and supply lines takes place via screw terminals for a cable cross-section of up to 1 mm^2 (18 AWG).
As standard, a cable connection PG11 with a terminal capacity for cable diameters of 5...12 mm [$^3/_{16}$"...$^{15}/_{32}$"] is available for the cable entry (see under accessories for PG16 size).

Apart from the screw terminals, two test probes with integrated 240 Ω load impedance are available for the temporary HART connection (in normal operation, short-circuited with a jumper) (from HW Release 02).



Whereby the connections (function dependent on unit output version) have the following significance:

- **H+, H-:** Connections for optional heating MGZH
- **U+, U-:** Supply connections DC 24 V / 48 V ±20%
- **I+, I-:** Current output 4...20 mA, HART-compatible

- **HART:** Test probes with integrated 240 Ω load impedance, bridged with short-circuit jumper

- **La, Lb:** Fieldbus connections
- **OK, OK:** Make contact of OK relay

All connections are protected against overvoltage and polarity reversal.

For ground connection, there is an M6 grounding screw on the outside of the unit and a tab connector on the inside of the unit.

Unit Dehumidification

A dehumidifying tablet with indicator is used for dehumidifying the inside of the unit.
Depending on application conditions, the dehumidifyer should be checked at least yearly and renewed as necessary.
A dehumidifying set (comprising 10 tablets with instructions) is delivered with the unit.

Supplied accessories

Complete installation set for all possible accessory boards comprising mechanical fixing material, plug connector and tab connector 4.8mm 0.8mm [$^3/_{16}$" $^1/_{32}$"], possibly already installed depending on design version.
Delivered for mounting:
3 pcs. weldable split taper sockets with cylindrical screws M8x16, flat washers and spring washers for mounting as well as a welding device.

Electrical accessories

	Type	Order number
• Operating and display board for MGxx (incl. lid with inspection window)	MGZB	P.MGZB
• HART/RS232 PC Interface	MGZM	22 21 001
• HART PC Parameterization Software for MGxx	MGZP	S.MGZP
• Signal separator 4-20 mA HART-compatible 24 V	LWTINH.024	10 31 001
• Signal separator 4-20 mA HART-compatible 48 V	LWTINH.048	10 31 004
• Relay board for MGxx (for Code output and limit values)	MGZR	00 65 914.001
• Heating for MGxx, DC 24 V / 19.2 W	MGZH	00 65 978.001
• Heating for MGxx, DC 24 V / 17 W	MGZH48	00 65 978.002
• Fieldbus Interface for MGxx	MGZLON	00 65 955.001

Mechanical accessories

	Type	Order number
• Protection class IP68, incl. assembly of connection cable	MGZIP68	P. MGZIP68
• Cable gland PG 16, terminal capacity Ø 11...15 mm [$^{7}/_{16}$" ... $^{19}/_{32}$"]	-	02 39 116
• Dehumidifyer set for MGxx (10 tablets, packed)	-	00 65 961.001
• Silicone grease, tube at 70 g (2.5 oz) (for O-rings)	-	60 01 223

Connector cables

With the following numbers of cores of connector cable type WILBAFLEX all unit design versions can be covered:

Order No	Type	Cable diameter	Cross-sectional area	Weight	Resistance
04 60 707	7-core, screened	Ø 6.7mm [0.26"]	0.5mm^2 [20 AWG]	81 g/m	0.039 Ω/m
04 60 712	12-core, screened	Ø 8.7mm [(Ø 0.34"]	0.5mm^2 [20 AWG]	150 g/m	0.039 Ω/m
04 60 734	34-core, screened	Ø 13.2mm [Ø 0.52"]	0.5mm^2 [20 AWG]	385 g/m	0.039 Ω/m

Cable specifications

Conductor:	Cu-flex (cl. 5)
Cores/jacket:	PUR/PUR
Jacket colour:	Orange (~RAL 2004)
Shielding:	Cu-braiding tinned, coverage approx. 90%
Special properties:	Halogen-free, flexible, weather resistance
Temperature range (stagnant):	-25° C to +80° C [-13° F to 176° F]
Nominal voltage:	300/500 V / 50 Hz
Test voltage:	1500 V / 50 Hz
min. bending radius:	15x cable Ø
max. tensile strength:	20 N/mm^2 [4.5 lbf/mm^2]

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