



MA-400M

Mini-Bypass Magnetic Level Gauge

Description:

A measuring tube made from a non-magnetizable material has two lateral connecting sleeves, which are joined with the vessel to be monitored. Since in this reference vessel the same fluid level is found as that in the tank, a cylindrical float is located always at the height with the liquid level. The float is counterbalanced exactly to the density of the medium and it carries a specially designed disc shaped magnetic system that acts through the stainless steel wall of the measuring tube on an indicator bar which is sensitive to magnetic force. Due to the magnetic force of the float, its pre-magnetized rollers are turned by 180° in such a matter, that all rollers below the float turn their red and the remaining rollers above the float turn their white side to the front. Thus, the observer obtains a precise visual statement of the level in the container. Optionally, the reference tube can be equipped with bistable, magnetic sensitive limit contacts which emit a binary signal when the float has passed the level where the sliding contacts are mounted. Another alternative to the remote transmission of value is adding a reed contact chain FM-02N externally to the measuring tube that would convert the float movement into a stepped resistance or current signal. Instead of the reed contact chain, also a magnetostrictive sensor can be used which breaks up the level at a higher accuracy and provides a 4 to 20 mA power signal in 2-wire circuit.

Features

- / Low-cost design
- / For simple applications
- / Up to 5 meter measuring length
- / Up to +6 bar
- / Up to +150°C liquid temperature
- / Flange, thread and welded connections
- / Switching contacts and measuring transmitter
- / Electrical trace heating and insulation possible
- / Customized designs

Application:

The MA-400M series of mini-bypass magnetic level gauges has been long in use in large numbers in the entire industry, thus bypass float level technology has a proven record of accurately measuring level in field for over 30 years. Meanwhile, the technology of remote transmission, for example, by using magnetostrictive sensors has been perfected to such extent that it is no way inferior to other methods of level measurement and monitoring. Moreover, the advantage here is that the level can be identified at one glance directly at the measuring point. The electrical signals in the control room can be verified visually without much assembling work. The main fields of application include the level monitoring and level controlling in tanks, agitator- and open vessels with media such as acids, alkalis, fuels, oils etc.



FD-GL

Hydrostatic Level Measurement in Shipping and Offshore Applications



Features

- / Capacitive ceramic measuring cell
- / 4...20 mA output
- / 2-wire technology
- / Materials 1.4404 or CuNiFe
- / Excellent linearity
- / Negligible temperature errors
- / High long-term stability
- / Option: Pt100 for standard version

Description:

Hydrostatic level sensors measure the hydrostatic pressure of the fluid column that is present above the sensor and therefore the liquid level. A flush-mounted ceramic measuring cell at the bottom of a stainless steel or CuNiFe housing picks up this pressure in such manner that, out of this, the internal electronic element can generate a 4...20 mA signal that is proportional to the level. The installation costs for the suspension at the self-supporting cable and the reliable 2-wire technology design are kept perceivably low. The FD-GL level sensor meets the standard requirements of Lloyds' Register, the Germanischer Lloyd (German Lloyd) and of DNV (Det Norske Veritas), ABS and CCS. The device can optionally also be supplied with ATEX approval or integrated temperature measurement via PT100 in 3-wire-technology.

Application:

The FD-GL hydrostatic level probe has been developed for deployment in shipping and offshore industries. Thanks to its robust and reliable capacitive ceramic measuring cell and the optionally available sea-water resistant CuNiFe housing, the probe is well-suited for using it in ballast tanks. In addition, in the shipping industry it can be deployed, among other things, in fuel and oil tanks as well as in utility and sewage tanks. The built-in electronic element is triple encapsulated in order to prevent condensate entering into the electronic elements through the ventilation hose. The FD-GL hydrostatic level probe can be supplied as suspension type probe, screw-in probe or as flange probe with fixing flange as per DIN DN25 to DN80.



Electrical Specifications:

Output signal /	4...20 mA, 2-wire
Supply voltage /	Standard 10...32 VDC Ex-Version 12...28 VDC
Permissible load /	$R_{\max} = [(U_B - U_{Bmin}) / 0.02] \Omega$
Current consumption /	max. 21 mA
Influencing factors /	
Supply voltage:	0.05% FSO / 10 V
Load:	0.05% FSO / k Ω
Long time stability /	$\leq +0.1\%$ FSO / year at reference conditions
Turn-on time /	700 ms
mean Response time /	< 200 ms
max. Response time /	380 ms
Measuring rate /	5/s
Thermal effects (offset and span) /	
Tolerance band in compensated range	$\leq +0.1\%$ FSO -20...+80°C
Electrical protection /	
Short-circuit:	permanent
Polarity reversal:	no damage, no function
EMC:	interference signal and interference proof as per: - EN 61326 - Germanischer Lloyd (GL) - Det Norske Veritas (DNV)
CE-Conformity /	EMC guideline 2014/30/EU
Option Ex-Protection /	Zone 0 : II 1G Ex ia IIB T4 Ga (ATEX II 1G Ex ia IIC T4 for option „mounting in st. steel pipe“)
Safety related technical maximum values /	$U_i = 28$ VDC, $I_i = 93$ mA, $P_i = 660$ mW, $C_i = 105$ nF, $L_i = 0$ μ H; 140 nF connections opp. housing
max. Ambient temperature for ATEX /	Zone 0 : -20...+60°C with $p_{atm.} = 0.8$ bar to 1.1 bar from Zone 1 : -25...+70°C
Connecting cables (factory-provided) /	capacitance signal line/shield also signal line/signal line 160 pF/m inductance signal line/shield also signal line/signal line 1 mikroH/m

Option Pt 100-Temperature Element:

(only with standard version)

Temperature range /	-25...125°C
Output signal /	3-wire
Resistance /	100 Ω at 0°C
Temperature coefficient /	3850 ppm/K
Supply I_s /	0.3...1.0 mA DC

Technical Specifications:

Accuracy /	standard: $\leq \pm 0.25\%$ FSO option: for $P_N \geq 0.6$ bar ¹ : $\leq \pm 0.1\%$ FSO ¹ Under the influence of disturbance burst according to EN 61000-4-4 (2004) +2 kV accuracy decreased to $\leq \pm 0.25\%$ FSO
Mechanical resistance /	vibration 4g (according to DNV-GL: Class B, curve 2 / basis DIN EN 60068-2-6)
Storage temperature /	-40...+125°C
Media temperature /	-25...+125°C (depending on cable sheath and seal)
Ex-Version /	for use in Zone 0: -20...60°C for use in Zone 1: -25...70°C
Weight /	min. 650 g (without cable)
Protection class /	IP 68
Materials /	
Housing:	st. steel 1.4404 or CuNi ₁₀ Fe ₁ Mn (seawater resistant)
Seals (wetted):	FKM (Viton), EPDM or FFKM (from T > -15°C), (other materials on request)
Dieaphragm:	standard: ceramic Al ₂ O ₃ 96% option: ceramic Al ₂ O ₃ 99.9%
Cable coating:	TPE-U (flame-resistant, halogen-free, increased resistance against oil and gasoline, resistant against salt and seawater, heavy oil)
Protection cap:	POM-C
Wetted Parts:	cable, housing, seals, diaphragm

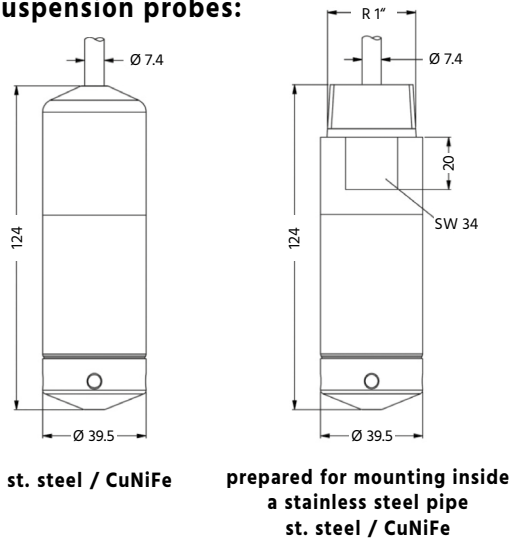


Order number	FD-GL.	1.	2.	1.	2.	4.	1.	2.	1.	1.	□□.	1.	A.	1.
FD-GL Hydrostatic Level Measurement														
Housing / 1 = stainless steel 1.4404 2 = copper nickel alloy (CuNi10Fe1Mn)														
Output / 1 = 4...20 mA, 2-wire 2 = 4...20 mA, 2-wire, Ex-Version 3 = 4...20 mA, 2-wire and PT100, 3-wire														
Measuring element / 1 = ceramic Al ₂ O ₃ 96% 2 = ceramic Al ₂ O ₃ 99,9%														
Mounting variation / 1 = suspension type probe with self-supporting cable 2 = suspension type probe with self-supporting cable and flange 3 = screw-in probe 4 = sensor-flange														
Measuring range / 1 = 0.40 mH ₂ O, 0.04 bar 2 = 0.6 mH ₂ O, 0.06 bar 3 = 1.0 mH ₂ O, 0.10 bar 4 = 1.6 mH ₂ O, 0.16 bar 5 = 2.5 mH ₂ O, 0.25 bar 6 = 4.0 mH ₂ O, 0.40 bar 7 = 6.0 mH ₂ O, 0.60 bar 8 = 10 mH ₂ O, 1.0 bar 9 = 16 mH ₂ O, 1.6 bar 10 = 25 mH ₂ O, 2.5 bar 11 = 40 mH ₂ O, 4.0 bar 12 = 60 mH ₂ O, 6.0 bar 13 = 100 mH ₂ O, 10.0 bar 14 = 160 mH ₂ O, 16.0 bar 15 = 200 mH ₂ O, 20.0 bar XX = other (please specify in detailed text)														
Measuring unit / 1 = in bar, relative 2 = in bar, absolute 3 = in mH ₂ O														
Seals / 1 = FKM 2 = EPDM 3 = FFKM (media temperature must be higher than -15°C)														
Electrical connection / 1 = cable with TPE-U coating 2 = other														
Accuracy / 1 = standard 0.25 % 2 = optional 0.10 % (only for ranges ≥ 0.6 bar)														
Cable length / □□ = please specify in meters														
Special design / 0 = standard 1 = prepared for mounting inside a st. steel pipe														
Flange / A = none B = DN25 - PN40 C = DN50 - PN40 D = DN80 - PN16														
Mounting bracket / 0 = none 1 = stainless steel 2 = out of CuNiFe														



Dimensions in mm:

Suspension probes:

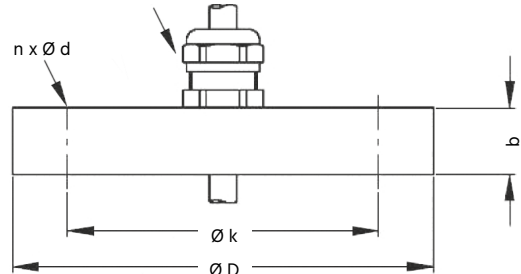


st. steel / CuNiFe

prepared for mounting inside
a stainless steel pipe
st. steel / CuNiFe

Mounting flange with cableglands for probe-mounting (DIN 2501 EN 1092-1):

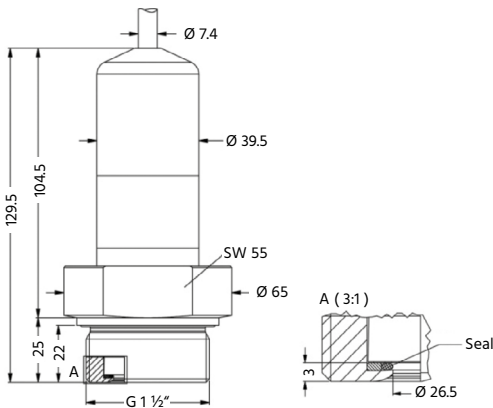
Cable gland M16x1,5 with seals
(for cables Ø 4...11 mm)



Flange	Dimensions				
	ØD	Øk	b	n	Ød
DN25 / PN40	115	85	18	4	14
DN50 / PN40	165	125	20	4	18
DN80 / PN16	200	160	20	8	18

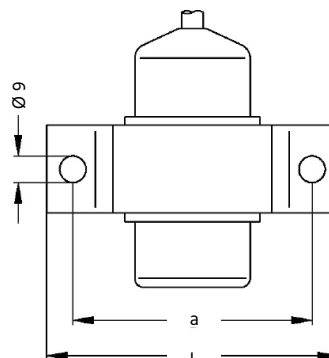
DN80/PN16 possible for NP ranges ≤ 16 bar

Screw-in probe:



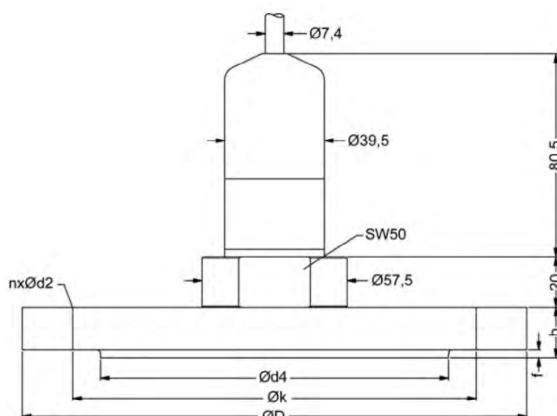
st. steel / CuNiFe

Mounting clamp:



Material clamp	Dimensions	
	a	L
CuNiFe	82	100
St. steel	100	130

Flange-probes (DIN 2501 EN 1092-1):



Flange	Dimensions						
	ØD	Øk	Ød4	b	f	n	Ød2
DN25 / PN40	115	85	68	18	2	4	14
DN50 / PN40	165	125	102	20	3	4	18
DN80 / PN16	200	160	138	20	3	8	18

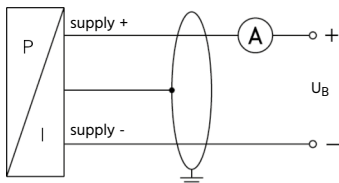


Measuring Ranges:

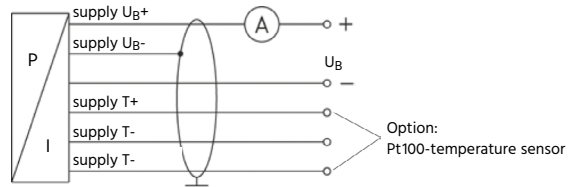
Ranges and Overload															
Nominal pressure [bar]	0.04	0.06	0.1	0.16	0.25	0.4	0.6	1	1.6	2.5	4	6	10	16	20
Height of fluid [mH ₂ O]	0.4	0.6	1	1.6	2.5	4	6	10	16	25	40	60	100	160	200
perm. Overpressure [bar]	2	2	4	4	6	6	8	8	15	25	25	35	35	45	45
perm. Vacuum [bar]	-0.2		-0.3		-0.5				-1.0						

Electrical Connection:

Wiring diagram: 2-wire-system (current)



Wiring diagram: 2-wire-system (current) with Pt 100



Electrical connection	Cable colors (DIN 47100)
supply UB +	white
supply UB -	brown
Option Pt 100 sensor, 3-wire	
supply T+ (for Pt100)	yellow
supply T - (for Pt100)	grey
supply T - (for Pt100)	pink
Weight	yellow / green (shield)

