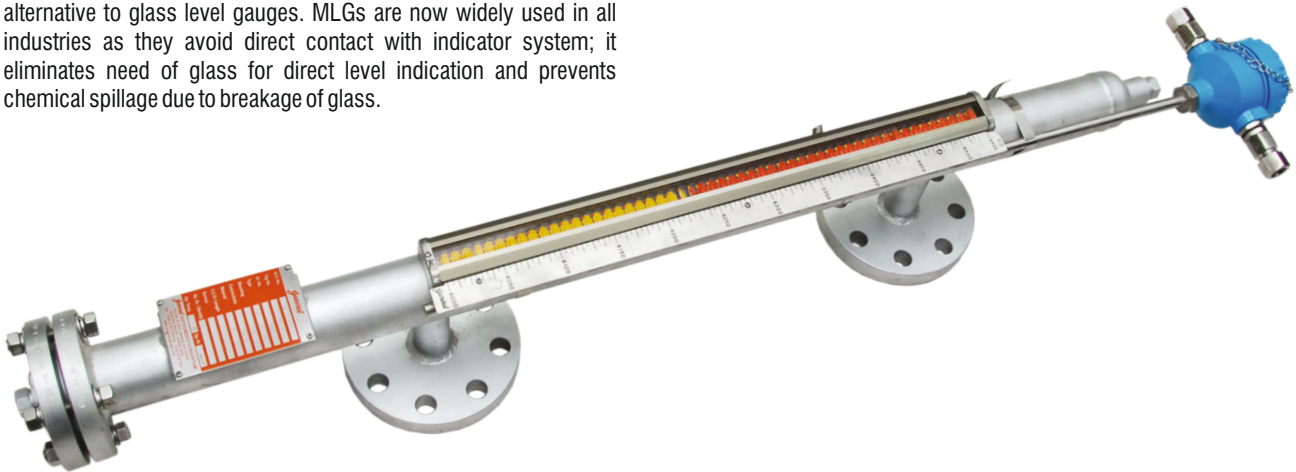


Magnetic Level Gauges provides clear, high clarity indication of liquid level. Magnetic Level Gauges are principally designed as an alternative to glass level gauges. MLGs are now widely used in all industries as they avoid direct contact with indicator system; it eliminates need of glass for direct level indication and prevents chemical spillage due to breakage of glass.



Features

- Magnetic level gauge applicable upto 100 kg and upto 300 deg cent
- Cryo applications upto -196 deg cent
- Jacketed design applicable
- For applicability in critical, acidic, cryo and high temperature zone
- IBR certified device available
- NACE, H2S service compatibility applicable
- Heat tracing available
- Level 1 radiographed body available
- Helium leak test proved design @ 10(-5) mbarlt/sec
- Viscous media (max upto 380 cst and upto 100 deg cent) besides other acidic, non acidic, steam water media
- CE applicability
- Device fully compatible for conductive and non conductive media
- Special float design to enable to meet low critical specific gravity
- Design applicability test with special media available
- Applicable for refinery, petrochemical, chemical, power, radioactive, fertilizer, food, pharma, metal industry applications
- Versions available with limit sensors at high - high, high, low and low - low conditions
- CCOE approved switches available, ATEX, FM certified available on demand
- Versions available with analog and digital (HART) and FIELDBUS transmitters fully integrated with the system for level gauge and transmitter
- CCOE approved and ATEX and FM versions applicable for HART and analog transmitters available

Concept and Principle of operation

General Instruments Consortium offers Magnetic Level Gauges in top-bottom, top and side mounted construction with two types of indicator systems i.e. Capsule Shuttle and Bicolour Rollers. Magnetic Level Gauge is consists of three major components: Float Chamber, Float and Indicator System.

Magnetic Level Gauges operates on the principle of magnetic field coupling to provide fluid level information. Float chamber is typically constructed having process connections that matches to the vessel connections. Float size and weight is determined by the process fluid, pressure, temperature and the specific gravity of the process fluid. Float contains magnets to provide 360 magnetic flux field.

Magnetic Level Gauge - Flapper

Indicator system is consists of bicolour rollers equipped with magnets mounted on rail inside the housing. As the level starts rising or falling magnetic float also travels with liquid level in non magnetic chamber. The magnetic interaction between magnets in float and bicolour rollers causes each roller to rotate 180.





Assembly of magnetic flappers on magnetic level gauge.
Flappers are with 3.5mm thickness rolling at 180 deg change on the float sensing the level



Drain needle valve in forged Monel construction for 600# application with magnetic level gauge



Vent valve for 300# application magnetic level gauge in forged SS316L construction

Magnetic Level Gauge - Capsule Shuttle

Indicator system consists of capsule shuttle housed in the glass tube inside the housing. As the level starts rising or falling magnetic float also travels with liquid level in non magnetic chamber.

The magnetic interaction between magnets in float and capsule shuttle causes capsule to travel along with magnetic float



Technical Specifications: Table-1 Material of Construction

Liquid Chamber both in forged and pipe material	SS304, SS304L, SS316, SS316L, Monel, Titanium, Inconel 600, Hastelloy C, PolyPropylene, others on request, subject to Pressure and temperature condition
Sealing Gasket	CAF, PTFE, Grafoil
Fastners	SS
Scale	SS engraved in mm
Indicating system	Bicolor flapper in PBS plastic with 4 mm length and 0.25mm thickness with aligned magnets
Protection box for bicolor flapper and follower type	In mild steel, in aluminum and in SS316/304 based on requirements of atmospheric conditions
Indicating system	With capsule type with conductive media like water or oil, with magnet aligned to the float magnet for level indication
Float	SS316, SS316L, SS304, SS304L, PTFE, PVDF, PP, TITANIUM
Vent	Ball valve and globe or needle valve Forged versions of SS or other MOC depending upon media applications
Drain	Ball valve and globe or needle valve Forged versions of SS or other MOC depending upon media applications
Flange for process connection	SS316 or as per the liquid chamber requirements
Isolation valve	Auto ball check valve straight or offset construction, available on demand in SS construction or as per the MOC of liquid chamber
Switch enclosure	Die cast aluminium, SS304, SS316, SS316L
Cable gland	Brass, PBS plastic, SS316, SS304, 316L
Transmitter enclosure	Die cast aluminium , SS304 , SS316 , SS316L



GIC magnetic level gauge with exproof IIC level switch on 24 VDC or 230 VAC applicable for fertilizer application, for four contacts as low level , high level , low – low level and high high level at CCD of 4000mm

Technical Specifications: Table-2 Technical data

Application for temperature	Upto 300deg cent
Application for pressure	Upto 100 bar g
Float dimension	58X80mm, 52X120mm, 52X140mm, 52X160mm, 52X180mm, 48X200mm, 45X250mm
Liquid chamber dimension in a single stretch	Max upto 5000mm X 79mm other versions available as per applications, min at 540mm X 115mm
Process connection	½" - 10" in ANSI, DIN std flange rating till PN 250 and till ANSI 1500#, socket and butt weld connection, Screwed connection, NPT F and BSP M, weld neck connection
Float specific gravity	0.4...1.2 designed against applicability at 70% controllability factor for the complete CCD
Shell test applicable, pressure	Max upto 150 kg at 30deg cent
Shell test applicable, temperature	Max 300 deg cent depending on selected MOC
Cryo applicability applicable	Max upto 50 kg and upto -100 deg cent with special version of non frost in chamber
Sealing gasket	Max upto 1.5 mm applicable for -100 deg cent to upto 300 deg cent against suitable MOC
Magnetic level Gauge accuracy	0.5% applicable with special versions, versions with 1 to 3% also available
Vent / drain	½" plugged / ½" needle valve / ½" ball valve / 1/2" globe valve and also available in ¾" and 1"
Process connection	15 to 50 mm flanged / upto 25mm screwed / socket weld and others on request
Cable gland	Double compression, metal cable normal glands, ½" NPT F, ¾" ET, M20, PG 13.5, PG 16
Switch	SPDT, 230 VAC, 5 A or 24VDC, 0.5 A
No of cable entries	Max four
Switch enclosure	IP65, IP66, IP67
Switch enclosure	EExia IIC T6, EExd IIA/IIB, EExd IIC
Switch accuracy	Max upto 1%
Switch hysteresis	Max upto 0.5% to 1%
Switch repeatability	Max upto 1%
Switch certifications	CCOE, FM, ATEX, CE (versions applicability on request)
Analog transmitter output	4-20 m A
Analog transmitter principle	Reed switch
Analog transmitter power supply	230 VAC, 5 A or 24VDC, 0.5 A
Analog transmitter out put in split range	Split range of 4...12 m A and 12...20 m A , others on request
Analog transmitter internal resistance	200M ohms
Transmitter accuracy	0.3%
Transmitter repeatability	0.15%
Transmitter certifications	CCOE, FM, ATEX, CE (versions applicability on request)
Transmitter enclosure	EExia IIC T6, EExd IIA/IIB, EExd IIC and IP65
HART transmitter principle	Reed switch, LVDT
HART transmitter accuracy	0.1%
HART transmitter output in split range	Adjustable as per HART software
HART programmable software	With serial interface adapter with HART interface to calibrate
HART transmitter feature	SIL2 certified
HART transmitter feature	Slave circuitry operation with MASTER as an additional option on request
HART output	4 to 20 m A, other on request
HART transmitter internal resistance	440 ohms
HART transmitter enclosure	EExia IIC T6, EExd IIA/IIB, EExd IIC and IP65
HART transmitter certifications	CCOE, FM, ATEX, CE (versions applicability on request)
FIELDBUS transmitter principle	Reed switch, LVDT
FIELDBUS transmitter accuracy	0.1%
FIELDBUS transmitter output in split range	Adjustable as per FIELDBUS asset management software
FIELDBUS programmable software	With serial interface adapter with FIELDBUS communication protocol interface to calibrate
FIELDBUS transmitter feature	SIL2 certified
FIELDBUS transmitter feature	MASTER-SLAVE
FIELDBUS output	As per the FIELDBUS protocol @1 to 5V
FIELDBUS transmitter internal resistance	410 ohms
FIELDBUS transmitter enclosure	EExia IIC T6, EExd IIA/IIB, EExd IIC and IP65
FIELDBUS transmitter certifications	CCOE, ATEX, CE (versions applicability on request)



Low CCD of 350 mm with special specific gravity float of 0.4 being tested with kerosene for refinery application.



Hydrotest and helium leak test for magnetic level gauge



Special Hastelloy and monel floats with SS316L for specific gravity of 0.4 tested with kerosene media for critical application first

Special calculations on float specific gravity with reference to media density and the CCD of the chamber

Pressure range at 700 mmwc to 25 bar; temperature range at -10 deg cent till 250 deg cent, finish at 125 Ra - 250 Ra inside chamber; velocity at 3 m/sec

		CENTER TO CENTER DISTANCE																
DENSITY OF LIQUID		350	400	450	500	550	600	700	800	900	1000	1100	1200	1300	1400	1500	1600	1700
	1500	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1	1	1
	1450	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1	1	1
	1400	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1	1	1	1	1	0.9	0.9	0.9
	1350	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1	1	1	1	1	0.9	0.9	0.9
	1300	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8
	1250	1	1	1	1	1	1	1	1	1	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8
	1200	1	1	1	1	1	1	1	1	1	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
	1150	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7
	1100	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7
	1050	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	1000	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.65	0.65	0.65
	950	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6
	900	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.65	0.65	0.65	0.65	0.65	0.5	0.5	0.5
	850	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.45	0.45	0.45
	800	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4
	750	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.45	0.45	0.45	0.45	0.45	0.35	0.35	0.35
	700	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.4	0.4	0.4	0.4	0.4	0.35	0.35	0.35
	650	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.35	0.35	0.35	0.35	0.35	0.3	0.3	0.3
	600	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.35	0.35	0.35	0.35	0.35	0.3	0.3	0.3
	550	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.25	0.25	0.25
	500	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.3	0.3	0.3	0.3	0.3	0.25	0.25	0.25

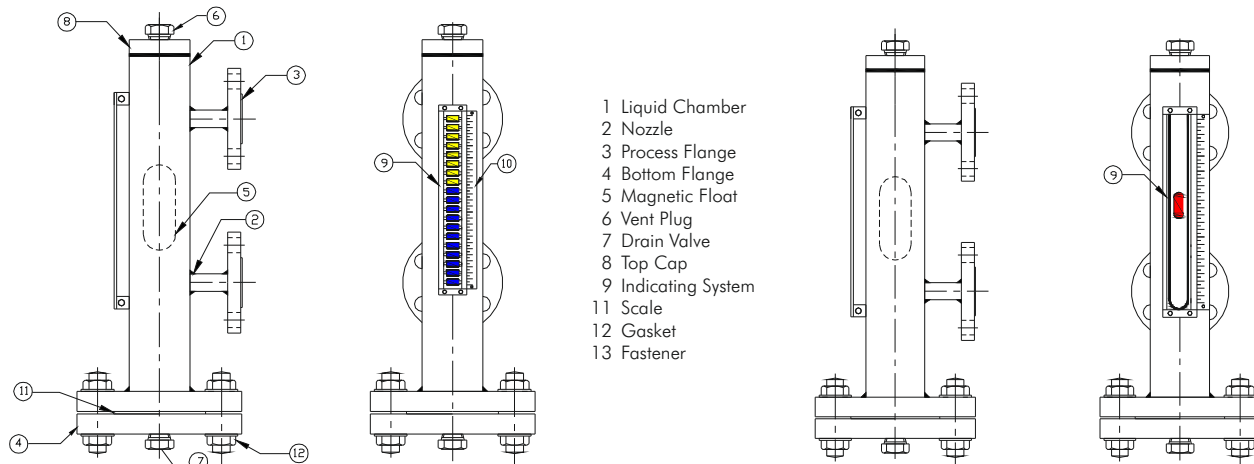
Special calculations on float specific gravity with reference to media density and the CCD of the chamber

Pressure range at 700 mmwc to 25 bar, temperature range at -10 deg cent till 250 deg cent, finish at 125 Ra - 250 Ra inside chamber, velocity at 3 m/sec

CENTER TO CENTER DISTANCE																	
DENSITY OF LIQUID	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200	3300	3400
	1500	1	1	1	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7
	1450	1	1	1	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7
	1400	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7
	1350	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7
	1300	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.65	0.65	0.65	0.65
	1250	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6
	1200	0.8	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.5	0.5	0.5
	1150	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.65	0.65	0.65	0.65	0.65	0.45	0.45	0.45	0.45
	1100	0.7	0.7	0.7	0.65	0.65	0.65	0.65	0.6	0.6	0.6	0.6	0.6	0.4	0.4	0.4	0.4
	1050	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5	0.35	0.35	0.35	0.35
	1000	0.65	0.65	0.65	0.5	0.5	0.5	0.5	0.45	0.45	0.45	0.45	0.45	0.35	0.35	0.35	0.35
	950	0.6	0.6	0.6	0.45	0.45	0.45	0.45	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3
	900	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.35	0.35	0.35	0.35	0.35	0.3	0.3	0.3	0.3
	850	0.45	0.45	0.45	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.25	0.25	0.25	0.25
	800	0.4	0.4	0.4	0.35	0.35	0.35	0.35	0.3	0.3	0.3	0.3	0.3	0.25	0.25	0.25	0.25
	750	0.35	0.35	0.35	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2
	700	0.35	0.35	0.35	0.3	0.3	0.3	0.3	0.25	0.25	0.25	0.25	0.25	0.2	0.2	0.2	0.2
	650	0.3	0.3	0.3	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.15	0.15	0.15	0.15
	600	0.3	0.3	0.3	0.25	0.25	0.25	0.25	0.2	0.2	0.2	0.2	0.2	0.15	0.15	0.15	0.15
	550	0.25	0.25	0.25	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.15	0.15	0.15	0.15
	500	0.25	0.25	0.25	0.2	0.2	0.2	0.2	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15

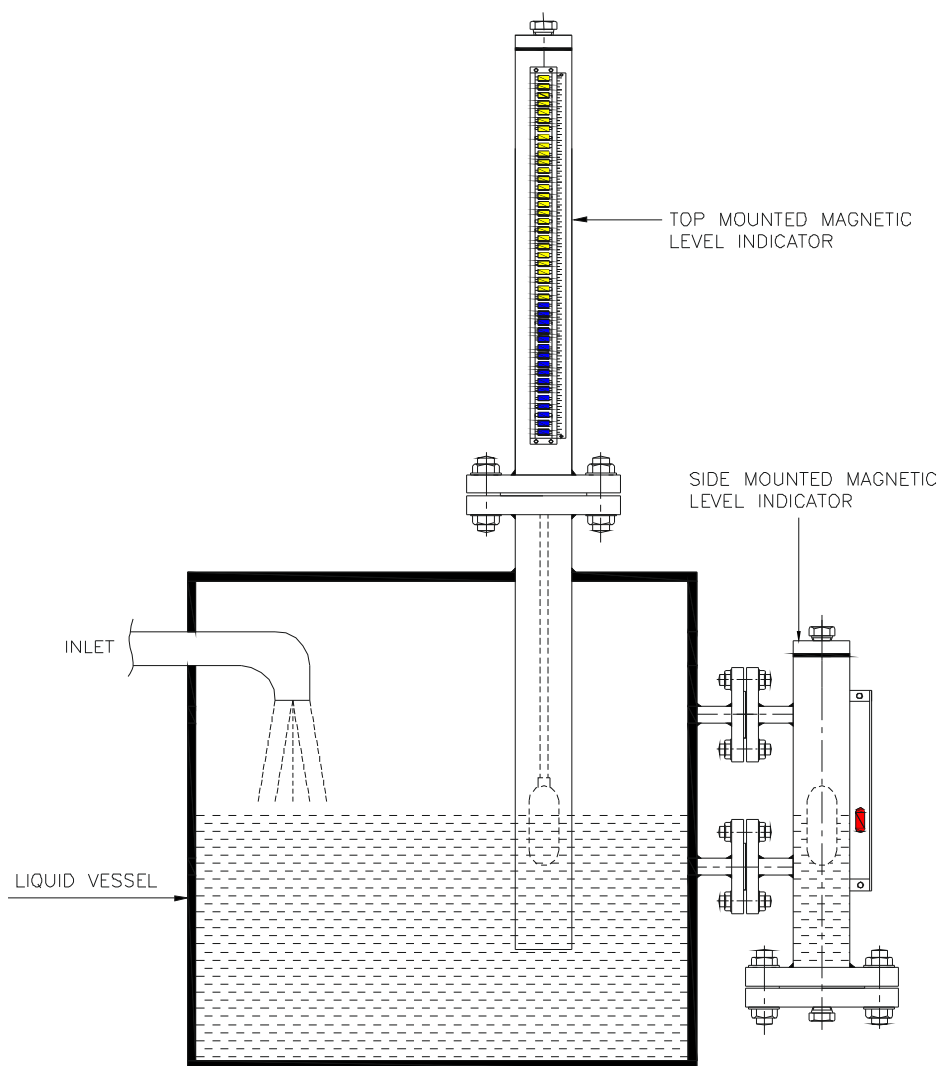
CENTER TO CENTER DISTANCE																	
DENSITY OF LIQUID	3500	3600	3700	3800	3900	4000	4100	4200	4300	4400	4500	4600	4700	4800	4900	5000	
	1500	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.55	0.55	0.55	0.5	0.5	0.5	0.5	
	1450	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.55	0.55	0.55	0.5	0.5	0.5	0.5	
	1400	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.55	0.55	0.55	0.5	0.5	0.5	0.5	
	1350	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.55	0.55	0.55	0.5	0.5	0.5	0.5	
	1300	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.55	0.55	0.55	0.5	0.5	0.5	0.5	
	1250	0.6	0.6	0.6	0.6	0.6	0.6	0.55	0.55	0.55	0.55	0.55	0.5	0.5	0.5	0.5	
	1200	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
	1150	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	
	1100	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	
	1050	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	
	1000	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	
	950	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
	900	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	
	850	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
	800	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	
	750	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
	700	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
	650	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	
	600	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	
	550	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	
	500	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	

Construction and dimensional cross sectional overview

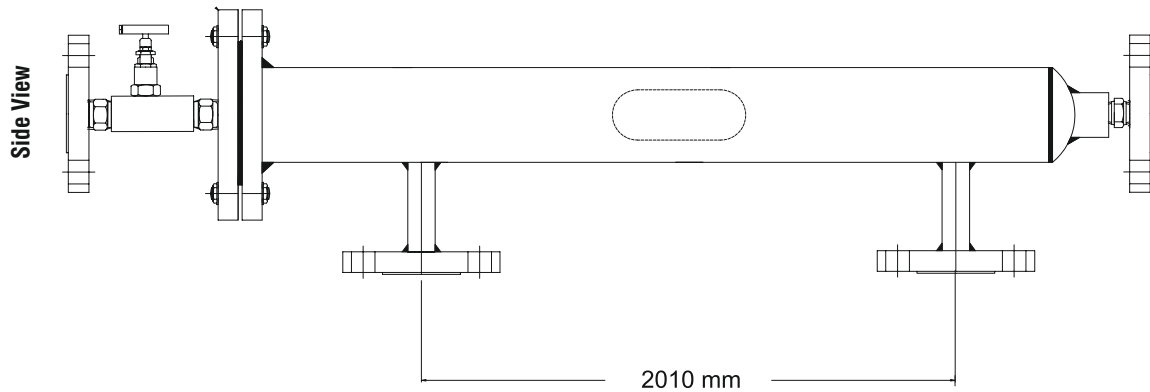


Flapper Type

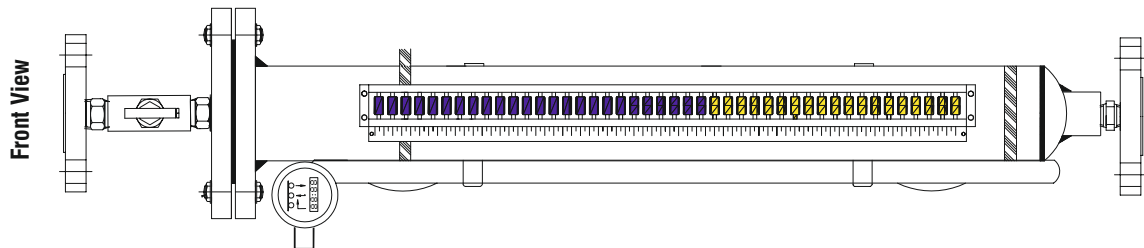
Capsule Shuttle Type



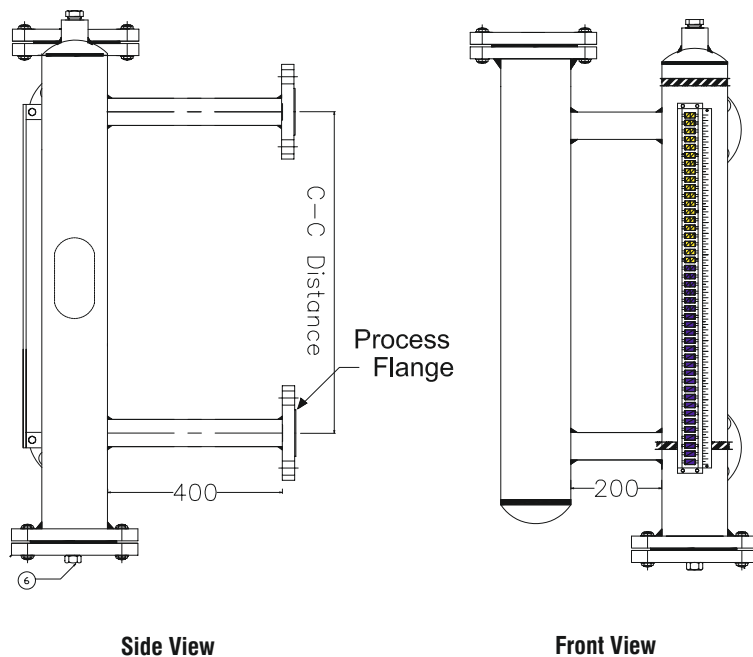
G A drawing for mounting and assembly



With SS316+PTFE lining liquid chamber and vent and drain in Polypropylene for chemical plant application



With HART transmitter mounted on a 900# application gauge at CCD of 4000 mm with magnetostrictive principle for chemical plant application.



GIC Magnetic level gauge with chamber connection for guided waver radar transmitter for petrochemicals application.

Ordering Information

MLG-SF-1000-50F150-S4S4C-CPP-AL-NA-Z

MLG - [] - [] - [] - [] - [] - [] - [] - [] - [] - [] - Z

Mounting Orientation

T	Top Mounted
S	Side Mounted

Type of Level Gauge

C	Capsule Shuttle
F	Bicolor Rotating Flappers

Centre to Centre Distance

1000	Indicate the required Centre to Centre Distance in mm
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Process Connection

Code	Size	Code	Code	Rating
15	1/2"	F	150	150#RF
20	3/4"			
25	1"		300	300#RF
40	1 1/2"			
50	2"		600	600#RF
65	2 1/2"			
80	3"		900	900#RF
100	4"			

MOC of Liquid Chamber

S4	SS 304
S4L	SS 304L
S6	SS 316
S6L	SS 316L
P	PP
M	Monel
T	Titanium
I	Inconel 600
H	Hastelloy C

MOC of Float

S4	SS 304
S4L	SS 304L
S6	SS 316
S6L	SS 316L
P	PP
M	Monel
T	Titanium
I	Inconel 600
H	Hastelloy C

Special Features

W5	Limit Switch with Die Cast Aluminium Enclosure Weatherproof to IP – 65
EA	Limit Switch with Die Cast Aluminium Enclosure Explosion proof suitable for Group IIA, IIB
EC	Limit Switch with Die Cast Aluminium Enclosure Explosion proof suitable for Group IIC
NA	Not Applicable

Calibrated Scale engraved in mm

AL	Aluminium
SS	SS

Drain

P	1/2" Plugged
N	1/2" Needle Valve
B	1/2" Ball Valve
NA	For Top Mounting

Vent

P	1/2" Plugged
N	1/2" Needle Valve
B	1/2" Ball Valve

Gasket

C	C.A.F.
P	P.T.F.E.
G	Graphoil

Fasteners

C	CS Plated
S4	SS