

Magnetic Level Gauge - MLG

It is magnetically coupled liquid level indicator, widely used in process industry for safe indication of level as an alternative to glass level gauges. They are precisely engineered to indicate liquid level accurately, reliably and continuously.

Salient Features

- Easy to install and rugged design with minimal maintenance
- Safe for corrosive, flammable, toxic, high pressure & temperature applications
- Non-invasive indication as process liquid not in contact with indicator
- Wide choice of materials
- Variety of chamber types to suit most installations
- 360° magnetic coupling

Optional

- IP66 or hermetically sealed protected indicators
- Float failure indication for process safety
- Choice of integrating adjustable magnetic switches & transmitter with gauge
- Dual/ bifurcated chamber design for radar transmission (redundant measurement)
- Jacketing or electrical heat tracing
- Insulation jacketing for high or low temperature
- NACE compliance

Process Capabilities

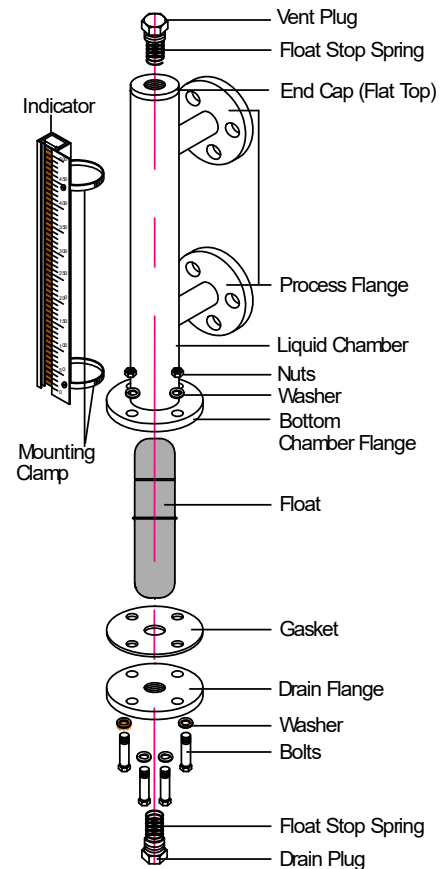
- Full vacuum to 250 kg/cm²
- Operating temperature: - 80 to 400 °C
- Min liquid specific gravity of 0.4 interface level measurement for liquids with 0.2 difference of SG



Construction & Working

It consists of a liquid chamber housing a float with an externally clamped non-invasive indicator. The liquid chamber is provided with two process connections for mounting, along with a vent at the top and a drain at the bottom. A scale runs parallel along the length of the indicator to indicate liquid level in desired unit.

The float contains a specially designed magnetic system to provide positive coupling with follower capsule or bicolor flappers fitted in the indicator. The float follows the rise & fall of liquid level and the follower capsule / bicolor flappers track the float position to provide level indication. Besides, supplementary devices like a magnetic switch and or transmitter can be clamped on the chamber to form a complete instrument package for level control & monitoring.



Techtrol Magnetic Level Gauges are available in following series-

'S' series - in SS, Hastalloy C, Inco alloy, PP, PVDF & PTFE Lined SS for corrosive applications (Standard)

'H' series - in SS & Alloys (High pressure)

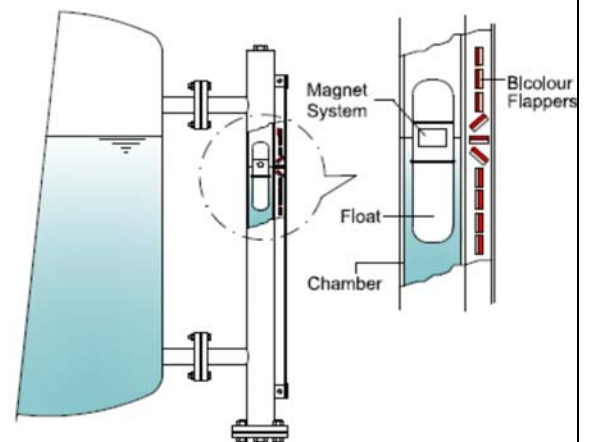
'T' series – Top Mounted in SS/PP or PTFE Lined SS

'Z' series - Oversized chamber in SS (Flashing)

'D' series- Dual chamber in SS (Redundant measurement)

'F' series - Bifurcated chamber in SS (Redundant measurement)

Exploded View of 'S' Series



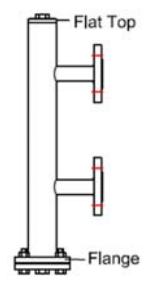
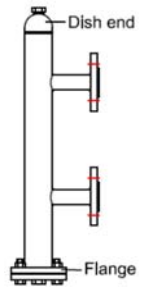
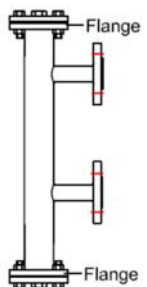
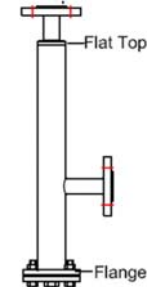
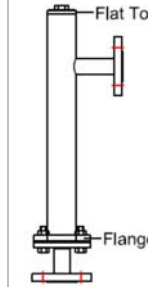

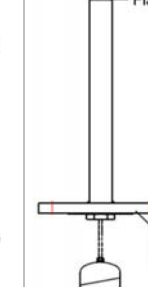
1. Liquid Chamber

The liquid chamber is robust and constructed from non-magnetic material to withstand the corrosive media under high pressure & temperature conditions. Refer following tables for various chamber materials and types.

1.2 Chamber Materials and Sizes

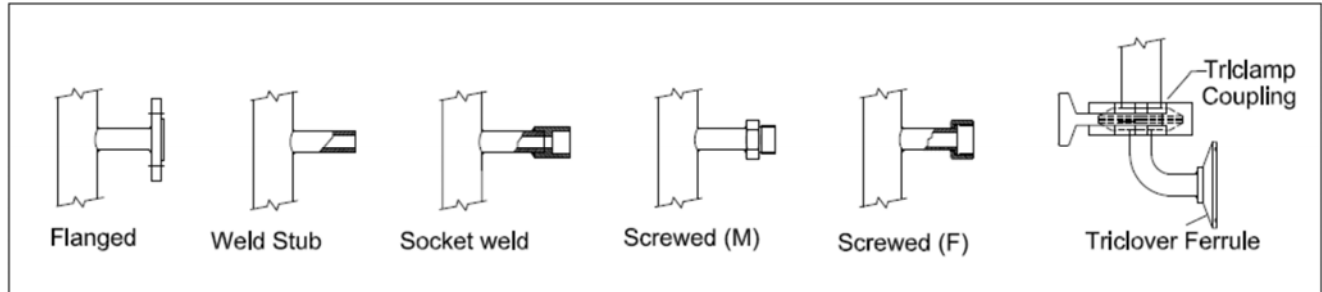
Chamber Material	Chamber Size	Max Temp & Test Pressure	Series
SS304/316/316 L	2" NB, Sch 10	400 °C, 10 kg/cm ² (optional upto 60 kg/cm ²)	S
Titanium, Hastalloy C, Inco alloy	2" NB, Sch 10	400 °C, 10 kg/cm ²	S
PP	2"NB (63 mm dia)	70 °C, 3 kg/cm ²	S, T
PVDF	2"NB (63 mm dia)	100 °C, 3 kg/cm ²	S
PTFE lined SS304/316	2" NB, Sch 10	120 °C, 3 kg/cm ²	S, T
SS304/316/316L	2.5" NB, Sch 80	400 °C, upto 250 kg/cm ²	H
SS304/316/316L	1-1/2"NB, Sch 40	250 °C, 3 kg/cm ²	T

1.3 Chamber Types and Process Connection Orientation (Mounting)

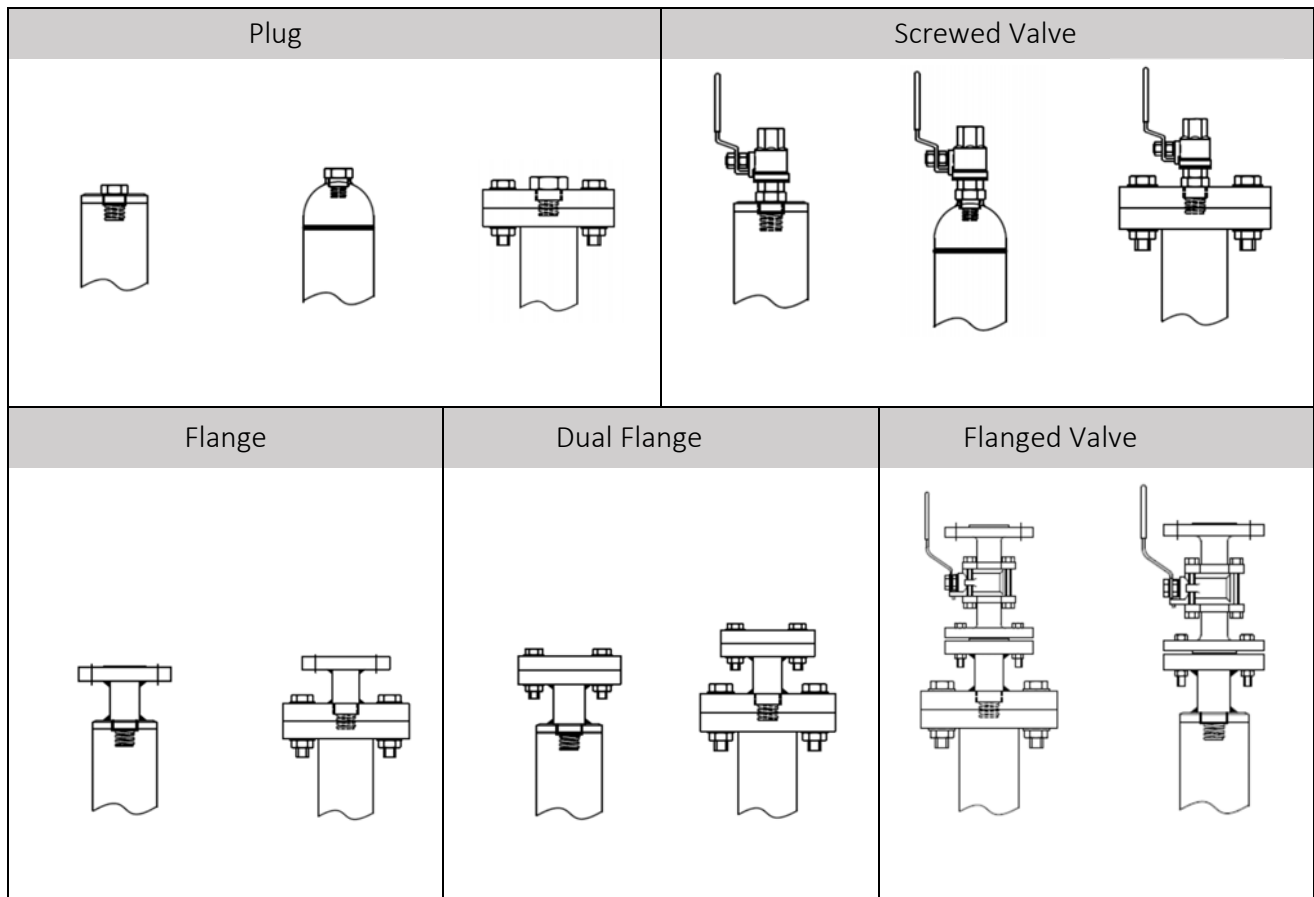
	A	B	C	D	E	F	G
Chamber Type	Flat Top x Flanged Bottom	Dish End Top x Flanged Bottom	Flanged Top x Flanged Bottom	Flat Top x Flanged Bottom	Flat Top x Flanged Bottom	Flat Top x Flanged Bottom	Flat Top
Pr. Conn. Orientation (Mounting)	Side- Side Mounting			Side- Top Mounting	Side- Bottom Mounting	Top – Bottom Mounting	Top Mounting
							
Series	S, H or F	H	S, H, Z, D or F	S (metallic)	S (metallic)	S (metallic)	T

1.4 Types of Process Connection

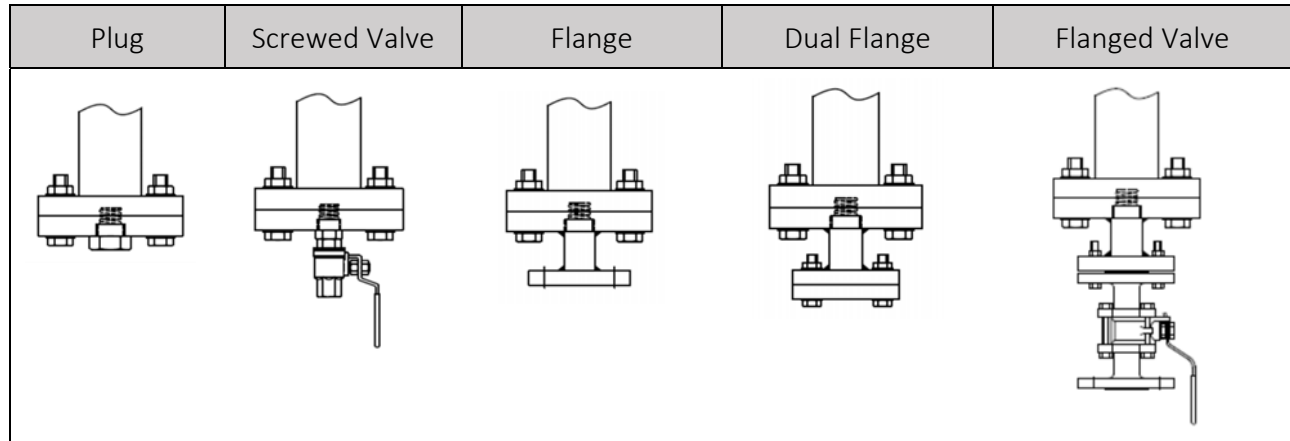
The following process connections are available with our liquid chamber.



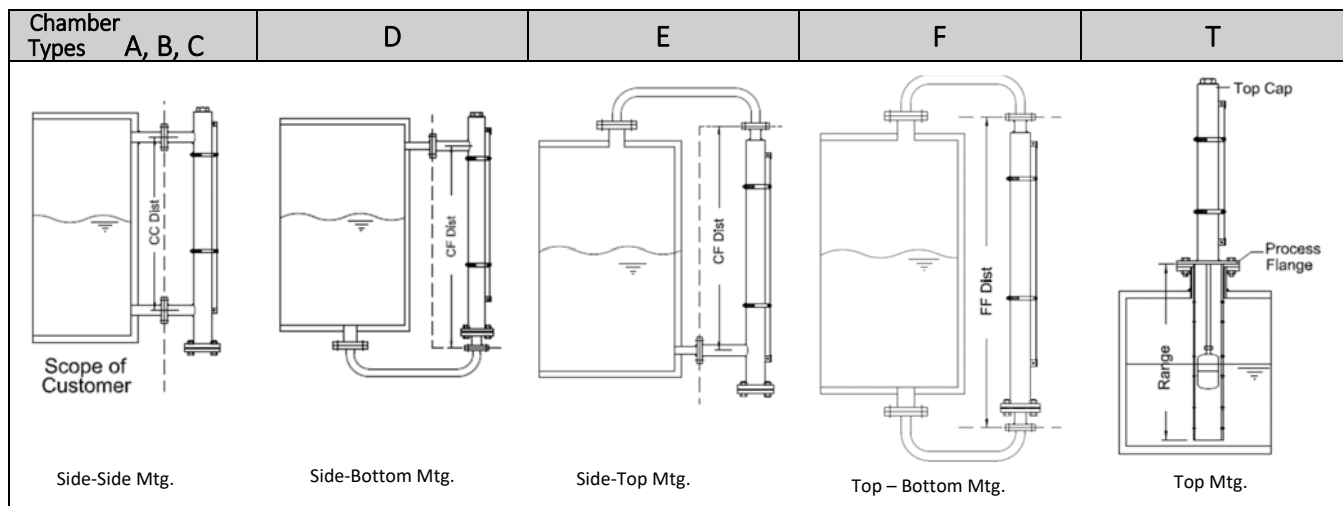
1.5 Vent - is provided for venting air trapped inside the gauge. Vent arrangement is available in the form of plug, valve or flange on the chamber top as shown hereunder.



1.6 Drain – is provided for draining the liquid during maintenance or process. Drain arrangement is available in the form of plug, valve or flange at chamber bottom as shown here under.



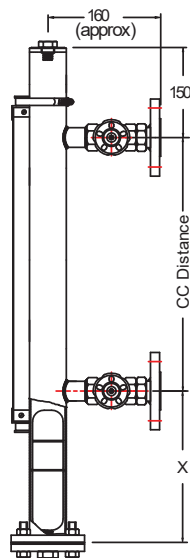
1.7 Installation- Chamber Types & Process Conn. Orientation (Mounting)



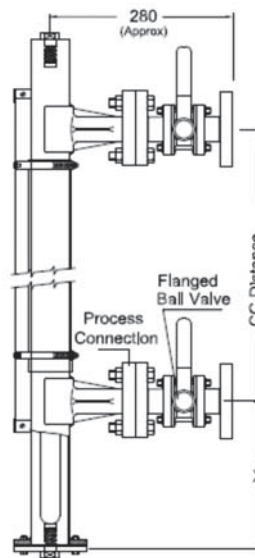
1.8 Shutoff / Isolation Valves

Are provided to isolate the level gauge from the process liquid during repairs/ maintenance and also for removal/ replacement of damaged/punctured float. They are fitted between the chamber and process connections.

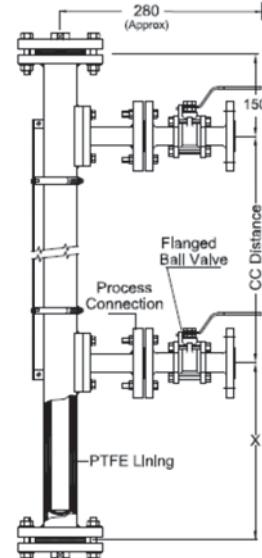
Magnetic gauges in 'S' series with SS304/316/316L MOCs are provided with 3/4" ball valves fitted between chamber and process flange, whereas those in 'H' series are fitted with flanged ball/globe valves. Level gauge in PP, PVDF and PTFE line MOC will be provided with flanged ball valve.



Metallic



PP/ PVDF



SS PTFE lined

2. Float

All the floats are engineered to specific operating conditions, to provide several years of reliable service. It is sized and weighed to the specific gravity of process liquid to be measured.

It is of cylindrical shape, made from nonmagnetic materials. It contains a unique magnetic system, which generates uniform & strong 360° magnetic flux to interlock it with the follower capsule/flapper of the indicator to ensure positive coupling.

Option of hermetically sealed float with no vent is available. Floats are available in various material as listed below.



PP
Standard

SS
Standard

SS316 - 2"
High Pressure

SS316 - 2-1/2"
High Pressure

MOC	Application
SS304, 316 or 316 L	Non-corrosive services
PP	Corrosive
PVDF	Corrosive
PTFE lined SS304 or 316	Corrosive
Titanium, Hastalloy C, Inco alloy	High pressure, corrosive & low SG liquids

3. Indicator

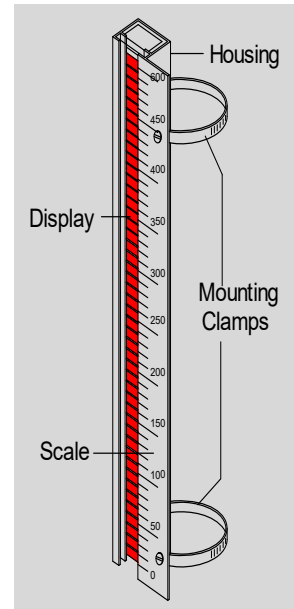
It displays indication in the form of follower capsule, rotating flappers/ rollers by tracking the float movement within the liquid chamber. Aluminum housing contains the display elements and is provided with mounting clamps to fit it on the chamber.

Standard Indicator is employed for non-critical applications.

IP66 Indicator - is provided to prevent ingress of water during washout or condensation at low temperature.

Hermetically sealed indicator (IP68) - is provided for applications of low temperature and corrosive services. The display elements are placed in transparent tube and filled with inert gas to prevent flapper from corrosion due to oxidation & condensation. Thus improving the overall visibility and response.

The indicator display elements come in three options.



3.1 Follower Capsule

It contains a magnetic system for positive coupling with the float, moving inside the chamber. The red capsule, marked with white ring moves freely inside the polycarbonate tube and denotes the corresponding level indication against the calibrated scale.

3.2 Bicolor Flappers

3.3 Bicolor Rollers

The bicolored flapper/rollers, white & red on its either side contain magnetic system for positive coupling with the float, moving inside the chamber.

Each flappers/ roller rotates 180 degree from white to contrasting red color. Thus the column formed in red color indicates liquid level in the tank.

Indicator Types



3.3 Indicator Codes

Table -1 Indicator Types

ID No	Housing	Indication	Indicator Type	Max. Temp °C	Size (mm)
A	AL	PP Capsule	Standard	150	17 dia.
E	Al	Plastic Flapper	Standard	150	14 width
G	Al	Plastic Flapper	IP66	150	14 width
P	SS316	SS316 Flapper	IP66	250	14 width
Q	SS316	SS316 Flapper	Hermetically sealed	250	14 width
T	Al	Ceramic Roller	IP66	400	22 width

3.4 Calibrated Scales

As a standard, Aluminum scale is provided with graduations and mm marking with screen printing (least count of 10 mm). Optionally SS316 scale with laser printing/ chemical etching is also available with scale graduations as listed in table below. Customized imperial, metric or volumetric units are available as on demand.

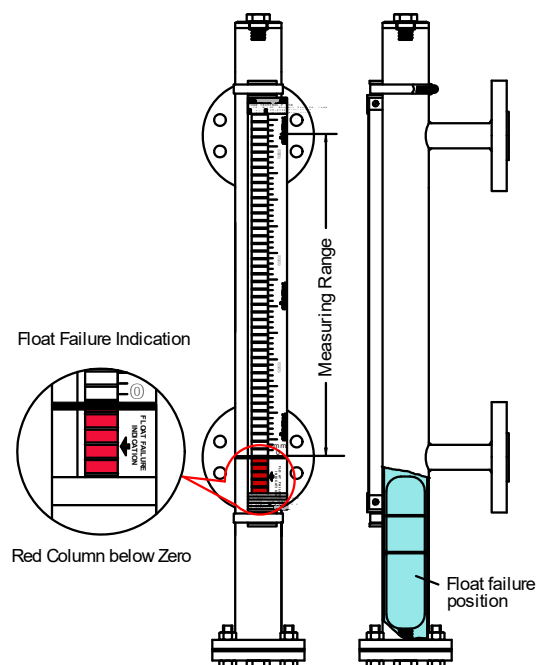
Table- 2

ID. No.	Scale MOC	Graduation in Unit	Least Count
A	Aluminum	mm	10 mm
B	Aluminum	cm	1 cm
C	Aluminum	Inch	0.5"
D	Aluminum	%	1 %
I	SS316	mm	10 mm
J	SS316	cm	1 cm
K	SS316	Inch	0.5"
L	SS316	%	1 %

Scale width = 30mm

3.5 Float Failure Indication

- Essential for process safety. It is provided with side mounted type Magnetic Level Gauge.
- Indicated by red column formed by flappers/ rollers at the bottom, below zero marking on the scale as a float failure indication.
- Option of float failure indication in blue or yellow color is available with SS flappers.

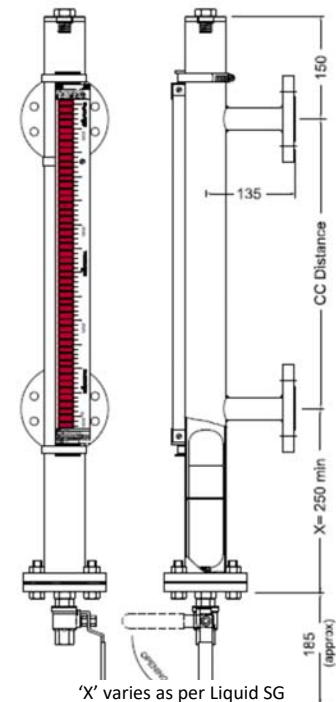


Specifications

'S' Series

Standard - Metallic MOCs

CC Distance	: 300 to 3000 mm (follower capsule); 300 to 5000 mm (flapper/ roller indicator)
Chamber Size x MOC	: 2" NB Sch. 10 x SS304/ 316/ 316L or Hastalloy C or Inco alloy Optional -2" NB Sch. 80 (SS)
Chamber Type	: Flat top-flanged bottom, flanged top- flanged bottom
Float Size x MOC	: Standard- Ø50 x SS316; Ø45 x SS316 (with Sch. 80 chamber) Options - SS316L, Titanium, Hastalloy C for corrosive, low SG & high pressure.
Liquid SG	: ≥ 0.8 (std.), low SG upto 0.4 (optional)
Interface Level	: 0.2 difference between upper & lower liquid SG
Indicator & Scale	: Follower capsule, bicolor flapper/roller (refer page no. 8.)
Float Failure Indication:	Provided with flapper in red color. FFI in blue & yellow color available on request with SS flapper, Roller in red color (optional), Refer page 8
Process Connection	: Standard-1" NB ASME flange 150#, 300# (DIN optional)
Size & Type	Options- ¾", 1" BSP/NPT(M/F) or socket weld or weld stub or ¾", 1", 1½", 2", 2½" or 3" NB ASME flange (DIN optional)/ triclover ferrule
Process Flange Face	: RF, FF, SWRF, WNRF, RTJ, WNRTJ, SWRTJ
Pr. Conn. Orientation	: Side-side (Standard), Side-bottom, side-top, top- bottom
Shutoff Valves (Option):	¾" ball valve
Vent/ Drain Size &Type:	Standard - ½" NPT x plug Options- ½" NPT ball valve, ¾" NPT x plug. ½" / ¾" NPT or SW x ball/ globe/ gate valve ½" NB RF flange; ¾" / 1" NB x flanged ball/ globe/gate valve or flange/dual flange RF/ WNRF/ RTJ/ WNRTJ/ SWRTJ
Gasket	: CNAF, PTFE, spiral wound SS304/316 graphite, SS316L octagonal gasket (RTJ Flg)
Bolts x Nuts for Chamber Flange	: Standard- SS304 x SS304; Options- A193 Gr. B7 x A194 Gr. 2H A193 Gr. B8 x A194 Gr. 8 (SS304) A193 B8M x A194 Gr 8M (SS316)
Max. Temp Range	: -10 to 400 °C (-40°C on request)
Max. Test Pressure	: Std-10 kg/cm ² , (upto 60 kg/cm ² on request)



Supplementary Devices (Optional)

- Magnetic Switch: Bi-stable reed /micro switch (refer page 18-19 and max. temp)
- Transmitter : Reed chain type or magnetostrictive transmitter (refer page 20-22 and max. temp)

Special Features (Optional)

Jacketing : for heating & cooling (refer page. 23)
 Electrical Heat Tracing with Insulation Jacket: for high temp (refer page 23)
 Insulation Jacket : for high temp upto 400 °C & low temp (upto -80 °C)
 (refer page 24)

Approval : ATEX (non-electrical) approval available (refer page 24 for details)

Standard - PP or PVDF MOC

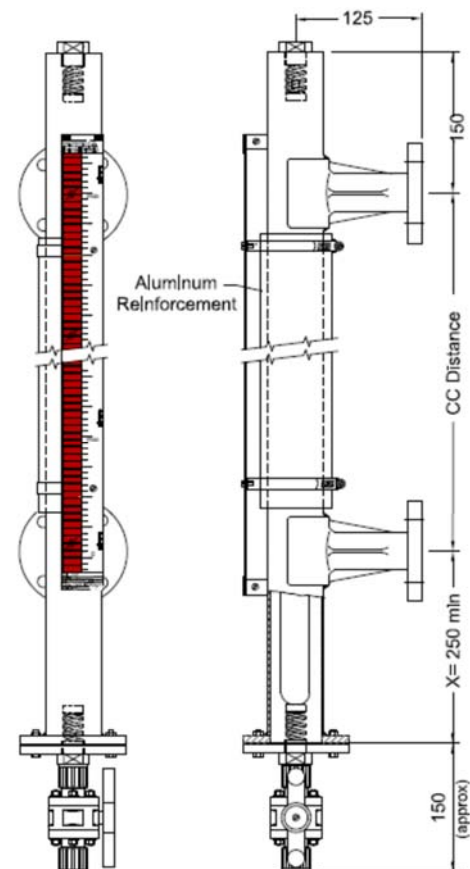
CC Distance : 300 to 3000 mm (capsule indicator); 300 to 4000 mm (bicolor flapper/ roller indicator)
 Chamber Size & MOC : 2" (Ø 63) x PP or PVDF with Aluminum reinforcement with epoxy powder coated
 Chamber Type : Flat top-flanged bottom, flanged top- flanged bottom
 Float Size & MOC : Ø50 x PP or PVDF
 Liquid SG : ≥ 0.8 (low SG upto 0.7)
 Indicator & Scale : Follower capsule, bicolor flapper (refer page no 8)
 Float Failure Indication : Provided with flapper (Refer page 8)
 (optional).
 Process Connection : Standard- 1" NB ASME flange 150# (DIN flange optional)
 Size & Type : Options- ¾", 1½" or 2" NB ASME flange 150#
 Process Flange Face : FF
 Pr. Conn. Orientation : Side-side
 Shut off Valves (Option): Flanged ball valve
 Vent/ Drain Size x Type : Standard - ½" BSP x plug;
 : Options - ½" BSP Ball valve;
 ½" NB x flange;
 ¾", 1" NB x flange ball valve,
 FF flange or dual flanges
 (MOC: PP or PVDF)

Gasket : PTFE
 Bolts x Nuts for : Standard- SS304 x SS304;
 Chamber Flange : Options- A193 Gr. B7 x A194 Gr. 2H
 A193 Gr. B8 x A194 Gr. 8 (SS304)
 A193 B8M x A194 Gr 8M (SS316)

Max Temp Range : -10 to 70 °C (PP), 100 °C (PVDF)
 Max Test Pressure : 3 kg/cm²

Supplementary Devices (Optional)

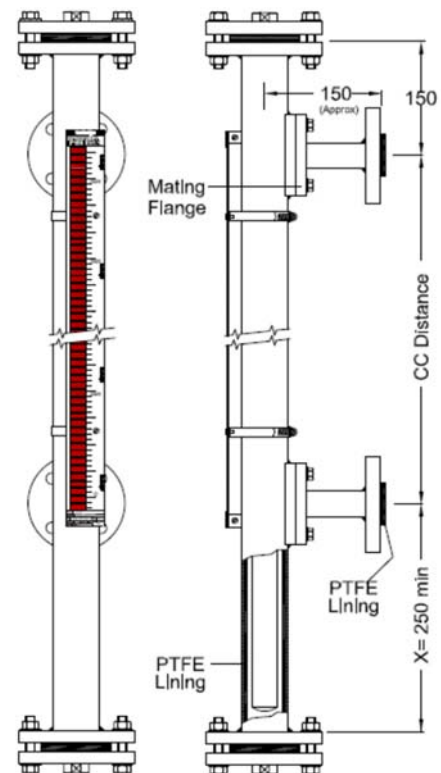
- Magnetic Switch : Bi-stable reed /micro switch
(refer page 18-19 and max. temp)
- Transmitter : Reed chain type transmitter or
magnetostrictive transmitter
(refer page 20-22 and max. temp)



'X' varies as per Liquid SG

Standard - PTFE lined SS MOC

CC Distance	: 300 to 3000 mm (capsule indicator); 300 to 4000 mm (bicolor flapper/ roller indicator)
Chamber Size &MOC	: 2"NB Sch 10 x SS304/316 with PTFE lining
Chamber Type	: Flanged top- flanged bottom
Float Size & MOC	: Ø45 x PVDF (Std); SS316 with ECTFE (Hallar) ctd. (option)
Liquid SG	: ≥ 0.8 (low SG upto 0.7)
Indicator & Scale	: Follower capsule, bicolor flapper (refer page no 8)
Float Failure Indication	: Provided with flapper (Refer page 8) (optional).
Process Connection	: Standard - 1" NB ASME flange 150# (DIN optional)
Size & Type	: Option- 1½" or 2" NB flange ASME 150# (DIN optional)
Process Flange Face	: RF
Pr. Conn. Orientation	: Side-side
Shutoff Valves (Option)	: Flanged ball valve (SS304/316 PTFE lined)
Vent/Drain Size x Type	: Standard - ½" BSP x plug (PTFE MOC) Options- ¾", 1" NB x flanged ball valve (PTFE lined SS) or RF flange or dual flanges (PTFE lined SS)
Gasket	: PTFE
Bolts x Nuts for Chamber Flange	: Standard- SS304 x SS304; Options- A193 Gr. B7 x A194 Gr. 2H A193 Gr. B8 x A194 Gr. 8 (SS304) A193 Gr. B8M x A194 Gr 8M (SS316)
Max Temperature	: -10 to 120 °C
Max Test Pressure	: 3 kg/cm ²
Supplementary Devices (Optional)	
• Magnetic Switch	: Bi-stable reed /micro switch (refer page 18-19 and max. temp)
• Transmitter	: Reed chain type transmitter or magnetostrictive transmitter (Refer page 20-22 and max. temp)



'X' varies as per Liquid SG

'H' Series

High Temp & Pressure - Metallic MOC

CC Distance	: 300 to 3000 mm (bicolor flapper/roller)
Chamber Size &MOC	: 2½" NB, Sch 80 x SS304/316/316L
Chamber Type	: Dish end top - flanged bottom,
Float Size x MOC	: Ø55 x Titanium
Liquid SG	: ≥ 0.8 (low SG upto 0.4)
Interface Level	: 0.2 difference between upper & lower SG
Indicator & Scale	: Bicolor flapper/ roller (refer page no 8)
Float Failure Indication	: Provided with flapper / roller (Refer page 8) (optional)
Process Connection	: 1", 1½", 2" NB ASME flange (DIN flange optional) 600#, 900#, 1500#
Size & Type	
Process Flange Face	: RF, SWRF, WNRF, RTJ, WNRTJ, SWRTJ
Pr. Conn. Orientation	: Side-side
Shutoff Valves (Option)	: Flanged ball/ globe valve
Vent /Drain Size x Type	: Standard - ½" NPT x plug : Options- ¾" NPT x plug, ½" or ¾" NPT/ SW globe/ gate valve; ¾"/1" NB flange or dual Flanges RF, SWRF, WNRF, RTJ, WNRTJ, SWRTJ
Gasket	: SS304/316 spiral wound graphite SS316L octagonal gasket (RTJ Flg.)
Bolts x Nuts for Chamber Flange	: A193 Gr. B7 x A 194 Gr. 2H
Max. Temperature	: -10 to 400 °C (-40°C on request)
Max. Test Pressure	: upto 250 kg/cm ² at amb. temp (high pressure on request)

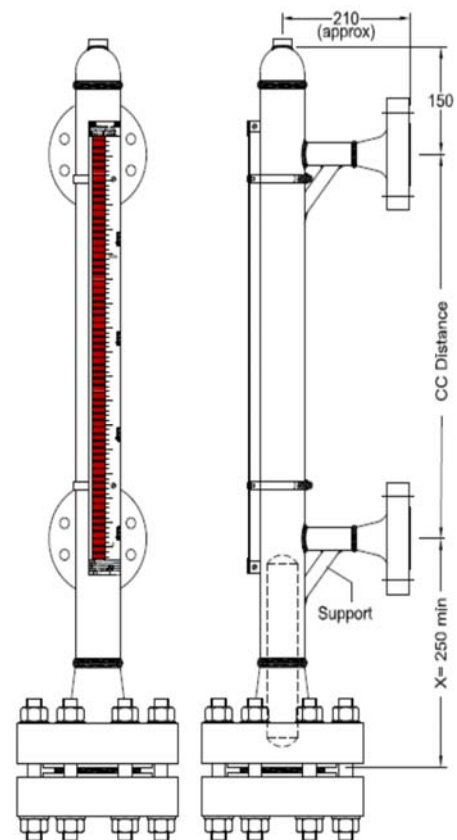
Special Features (Optional)

- Jacketing : For heating & cooling (refer page. 23)
- Electrical Heat Tracing with Insulation Jacket: for high temp (ref. page 23)
- Insulation Jacket : For high temp upto 400 °C & low temp (upto -80 °C) (refer page 24)

Supplementary Devices (Optional)

- Magnetic Switch : Bi-stable reed /micro switch (refer page 18-19 and max. temperature)
- Transmitter : Reed chain type transmitter or magnetostrictive transmitter (refer page 20-22 and max. temperature)

Approval : ATEX (non-electrical) approval available (refer page 24 for details)



'X' varies as per Liquid SG

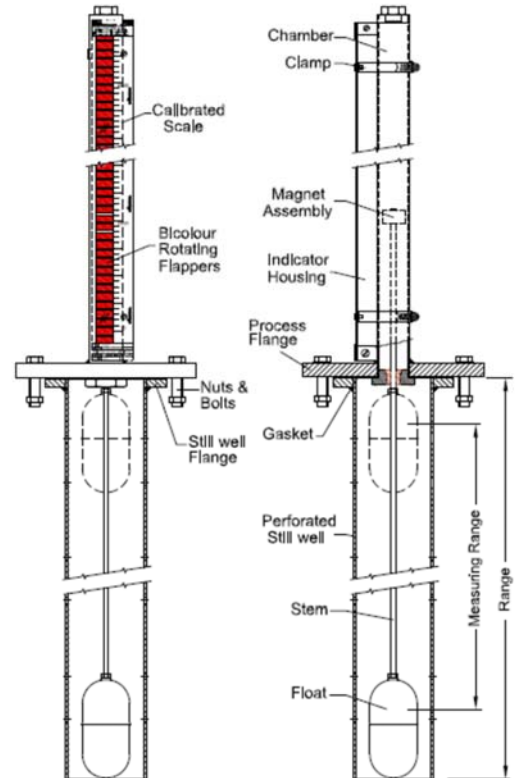
'T' Series

Top Mounted

Top mounting installation is adopted for underground tanks/ sumps.

It consists of a non-magnetic float fitted to a stem and other side of it holds the magnetic system. According to rise & fall of liquid level the magnetic system moves inside the top chamber and gets magnetically coupled with the indicator to show level inside the tank.

Range	: 500 to 3000 mm (capsule or bicolor flapper/ roller)
Chamber Size x MOC	: 1½" Sch 40 x SS304/316/316L, 1 ½" NB (PP); 2" NB PTFE lining SS304/316
Chamber Type	: Flat top (SS, PP); flanged top (PTFE lining SS)
Float Size & MOC	: Ø75 x SS316/316L, Titanium, or Ø75 x ECTFE ctd. SS316 : Ø73 x PP
Liquid SG	: ≥ 0.8 (Low SG upto 0.6)
Indicator & Scale	: Follower capsule, bicolor flapper/ Roller (refer page no 8)
Float Failure Indication	: Not provided
Process Flange	: 4" NB ASME 150# or 300 # flange, flange face FF (PP), RF (metallic)
Vent	: Standard - ½" NPT x plug (SS); ½" BSP x plug (PP/PTFE) Option- ½" NPT x ball valve (SS) or ½" BSP x ball valve (PP); 1" NB flanged ball valve (PTFE lining SS)
Gasket	: CNAF, PTFE, SS spiral wound graphite
Bolts x Nuts for Chamber Flange	: Standard- SS304 x SS304; Options- A193 Gr. B7 x A194 Gr.2H A193 Gr. B8 x A194 Gr. 8 (SS304) A193 B8M x A194 Gr 8M (SS316)
Max Temp Range	: -10 to 70 °C (PP), 100°C (PTFE lining SS), upto 300 °C (metallic)
Max. Test Pressure	: Standard - 3 kg/cm ² Option- high pressure upto 10 kg/cm ²



Accessories (Optional)

Stillwell MOC	: CS, SS304, SS316, PP or PVDF
Stillwell Size	: 3"NB perforated pipe with 4" NB ASME 150# or 300# flange

Supplementary Devices (Optional)

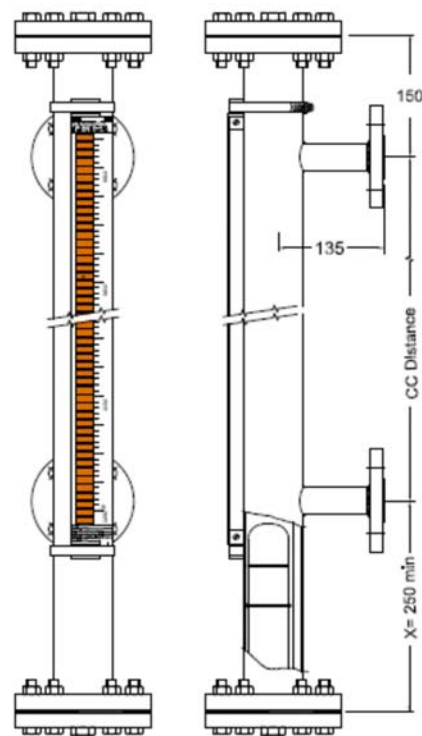
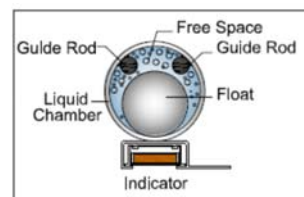
Magnetic Switch	: Bi-stable reed /micro switch (Refer page 18-19 and maximum temperature)
Transmitter	: Reed chain type transmitter or magnetostrictive transmitter (Refer page 20-22 and its maximum temperature)

'Z' Series

Oversized Chamber in SS for Flashing Liquids

It is designed with oversized chamber for applications, where liquids are flashing/ boiling. The vapors formed cannot escape easily due to the limited space between the float and chamber wall. It causes the float to accelerate rapidly in upward direction to the top side of chamber and float may get damaged due to de-pressurization. Level gauge is designed with large chamber (3" Sch 80) with two internal guide rods to provide space to escape for vapor build under the float. The rods also restrict the float movement to one side of the chamber, ensuring proper magnetic coupling with external indicator.

CC Distance	: 500 to 4000 mm
Chamber Size & MOC	: 3" Sch 80 x SS316, SS316L
Chamber Type	: Flanged top- flanged bottom
Float Size & MOC	: \varnothing 50 x SS316/316L, Titanium
Liquid SG	: \geq 0.8 (low SG upto 0.6)
Indicator & Scale	: Bicolor flapper/ roller (Ref. page no 8)
Float Failure Indication	: Provided with bicolor flapper (Ref. pg. 8) (optional)
Guide Rods	: SS316
Process Connection	: Std.-1" NB ASME flange 150#, 300#, 600#
Size & Type	Options- 1½", 2" NB flanged ASME 150#, 300#, 600#
Process Flange Face	: RF, RTJ, WNRF, SWRF, WNRTJ, SWRTJ
Pr. Conn. Orientation	: Side-side
Shut off Valve	: Without
Gasket	: SS316 spiral wound graphite
Bolts x Nuts for Chamber Flange	: Standard- SS304 x SS304; Options- A193 Gr. B7 x A194 Gr. 2H A193 Gr. B8 x A194 Gr. 8 (SS304) A193 Gr. B8M x A194 Gr. 8M (SS316)
Vent /Drain Size x Type:	Std. - ½" NPT x plug Options - ½" NPT ball or globe valve
Max Temp Range	: -10 to 400 °C (-40°C on request)
Max Test Pressure	: 10 kg/cm ² (upto 60 kg/cm ² on request)



'X' varies as per Liquid SG

Supplementary Devices (Optional)

Magnetic Switch	: Bi-stable reed /micro switch (Refer page 18-19 and max temp)
Transmitter	: Reed chain type transmitter or magnetostrictive transmitter (Refer page 20-22 and max temp)

Approval : ATEX (non-electrical) approval available (refer page 24 for details)

'D' Series

Dual Chamber in SS for Redundant Level Measurement

It consists of two separate chambers connected together with pipe. A primary chamber is used as magnetic level gauge and fitted with process connection. The other chamber (secondary) is used as a bridle chamber for mounting guided or non-contact type radar. As a Techtrol standard, primary chamber is magnetic level gauge.

CC Dist /Range : 1000 to 4000 mm

MLG Chamber

Chamber MOC : SS304/ 316/ 316L

Chamber Type : Flat top-flanged bottom,
Flanged top- flanged bottom

Chamber Size : 2" NB or 2.5" NB

Float Size & MOC : Ø50 or Ø55 SS316/316L or Titanium

Liquid SG : ≥0.8 (low SG up to 0.4)

Indicator & Scale : Bicolor flapper/ roller (Refer pg. 8)

Float Failure Indication: Provided with bicolor flapper/ roller (optional). Refer page 8.

Process Connection : Std.- 1" NB flange ASME 150#, 300#, 600#

Size & Type Options- 1½", 2" NB ASME flange

Process Flange Face : RF, WNRF, SWRF, RTJ, WNRTJ, SWRTJ

Pr. Conn. Orientation: Side-side

Shut off Valve : Without

Gasket : SS304/316 spiral wound graphite

Bolts x Nuts for : Standard- SS304 x SS304;

Chamber Flange Options- A193 Gr. B7 x A194 Gr. 2H
A193 Gr. B8 x A194 Gr. 8 (SS304)
A193 B8M x A194 Gr 8M (SS316)

Vent/Drain Size x Type: Standard- ½" NPT plug x plug
Options - ½" NPT ball or globe valve

Radar Chamber

Chamber Size : 2" or 3" for Radar

Chamber Type : Flanged top - dish end bottom

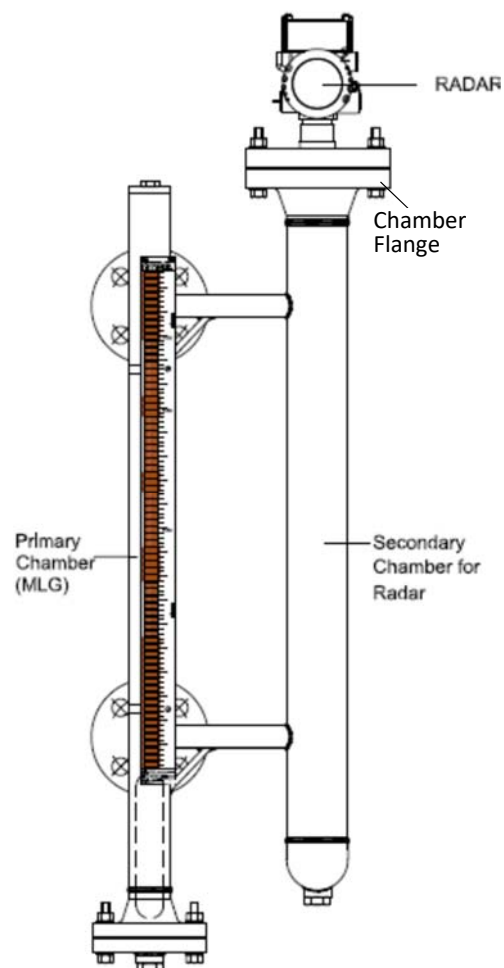
Chamber Flange : 2" or 3" NB ASME 150# or 300#, 600#

Drain : ½" NPT plug

Gasket : SS304/316 spiral wound graphite

Max. Temp : -10 upto 250 °C (40°C on request)

Max. Test Pressure : upto 10 kg/cm² (upto 60 kg/cm² on request)

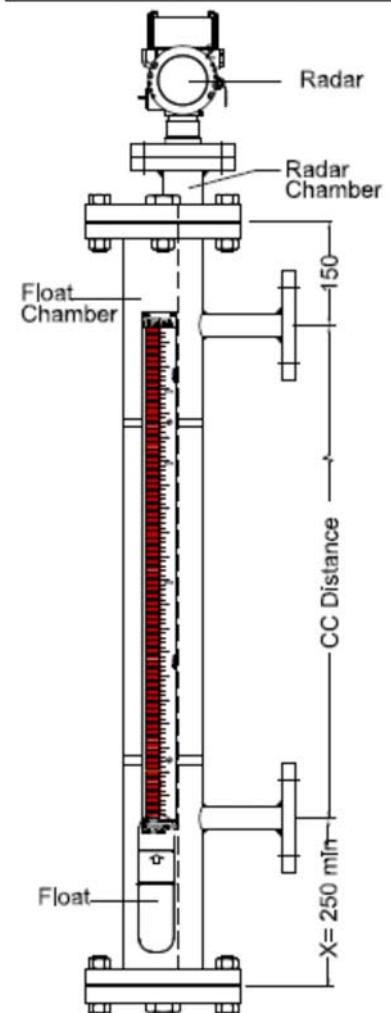
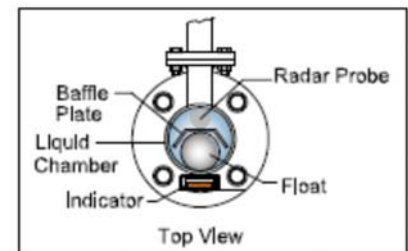


'F' Series

Bifurcated Chamber in SS (Redundant Level Measurement)

It is a single chamber design bifurcated with special baffle plate inside the chamber. Guided radar is mounted integrally off center within the chamber to work without interference of float of magnetic level gauge to suit for installation in limited space.

CC Distance / Range	: 500 to 2000 mm
Chamber MOC	: SS 316 /316L
Chamber Size	: 4"NB, Sch 40 bifurcated chamber
Chamber Type	: Flanged top- flanged bottom
Float Size & MOC	: Ø50 x SS316/316L or titanium
Liquid SG	: 0.8 (Low SG upto 0.5)
Indicator & Scale	: Bicolor flapper/ roller (refer page no 8)
Float Failure Indication	: Provided (optional)
Process Connection	: Std - 1" NB ASME flange 150#, 300#, 600#
Size & Type	Options - 1½" or 2" NB ASME flange
Pr. Conn. Orientation	: Side-Side
Shut off Valve	: Without
Baffle Plate	: SS316/316L
Vent/Drain Size x Type	: Standard - ½" NPT plug x plug : Options - ½" NPT x ball / globe valve
Gasket	: SS304/316 spiral wound graphite
Bolts x Nuts for Chamber Flange	: Standard- SS304 x SS304; Options- A193 Gr. B7 x A194 Gr. 2H A193 Gr. B8 x A194 Gr. 8 (SS304) A193 B8M x A194 Gr 8M (SS316)
Max. Temp Range	: - 10 to 400 °C (-40 on request)
Max. Test Pressure	: 10 kg/cm ² (upto 60 kg/cm ² on request)



'X' varies as per Liquid SG

5. Supplementary Devices

Magnetic switches (bi-stable) and transmitter (reed chain or magnetostrictive) are attached to a magnetic level gauge as supplementary devices. Provides economical & reliable solution for level control & remote monitoring without adding separate switches or transmitter on vessel.

Salient Features

- Non-invasive level detection & measurement
- Magnetic switches adjustable over entire range
- Bi-stable switching action
- Flameproof Enclosures for Hazardous Area
- Choice of Reed Type or Magnetostrictive X'mitter
- Option of 4-20mA + HART, RS-485 O/P with X'mitter

They are clamped externally on the gauge through mounting clamp without disturbing process. It can be also retrofitted after gauge installation and may be taken out for service at any time without interruption in process.

5.1 Magnetic Switches (Bi-stable)

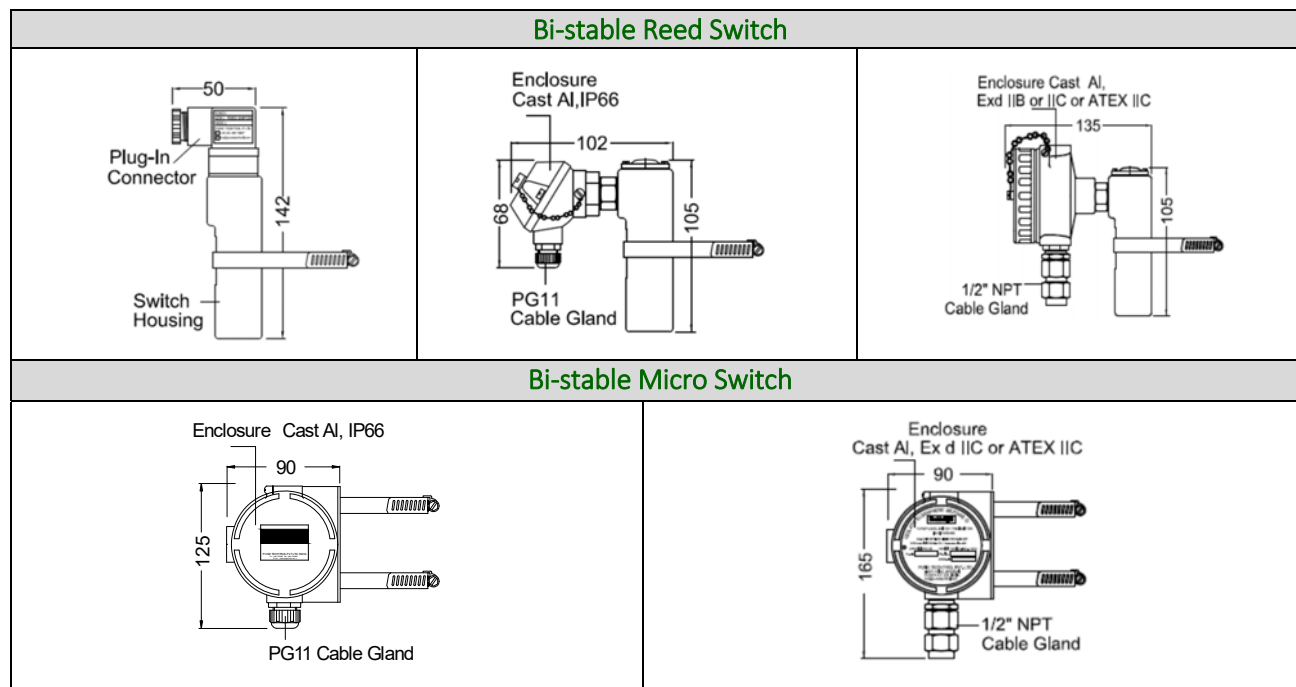
They are mounted on the liquid chamber at required position to sense high or low level for control action. Magnetic switches are available in bi-stable switching action.

Bi-stable switch actuation – Reed/ micro switch is actuated, when it comes within the magnetic field of the float, during its travel in one direction, due to change in liquid level. The switch remains actuated till float travels in same direction. Switch will de-actuate only after it again comes in magnetic field of float, while traveling in opposite direction.

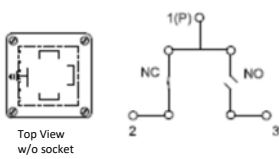
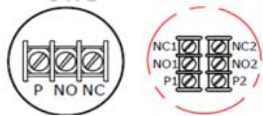

Potential free output contacts of the switches can be connected directly to PLC or DCS system. However bi-stable reed switches are of low powered (60VA). Its contact rating can be enhanced by using Techtrol Controller, its relay contacts can be used to drive higher loads.



Schematic Diagram

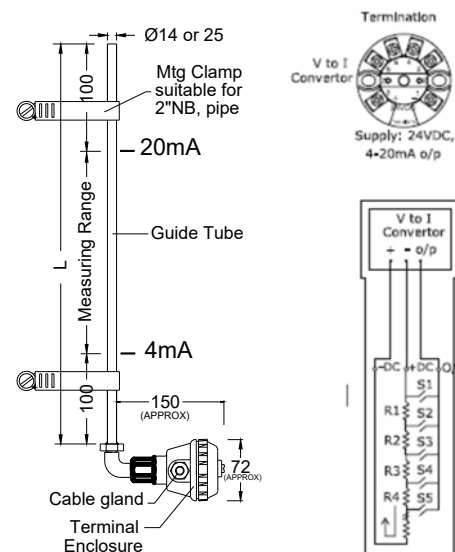


Specifications

Switch Action	Bi-stable		
Switch Type	Reed Switch - Hermetically sealed x (1 SPDT/ 2 SPDT)		Micro Switch x 1 SPDT / 2 SPDT
Switch Capacity	60 VA		1150 VA (5A, 230 VAC)
Max. Sw. Voltage	230 VAC/ DC		230 VAC/ DC
Max. Sw. Current	1 A		5 A
Switch Housing	Cast Al.		NA
Terminal Enclosure	DIN (Plug) Connector (1 SPDT)	Cast Al. WP IP66 or Cast Al. Exd IIB or IIC, T6, IP66 Cast Al. ATEX Exd IIC, T6 IP66	Cast Al. WP IP66 or Cast Al. Ex d IIC, T6, IP66 or Cast Al. ATEX IIC, T6, Ip66
Conduit Conn.	PG 11	PG 11, polyamide or 1/2" NPT double compression, brass, cable gland	
Max. Temp	200 °C	350°C	300 °C
Intrinsically safe (Optional)	Ex ib, Gr IIB T6 with zener barrier 24 VDC/110 mA		NA
Termination	 <p>Top View w/o socket Reed Switch -1SPDT x DIN (Plug) Conn.</p>	 <p>Reed Switch SPDT Reed Switch DPDT Cast Al. terminal enclosure</p>	 <p>Micro Switch SPDT Micro Switch DPDT Cast Al. terminal enclosure</p>

5.2 Reed Chain Type Transmitter

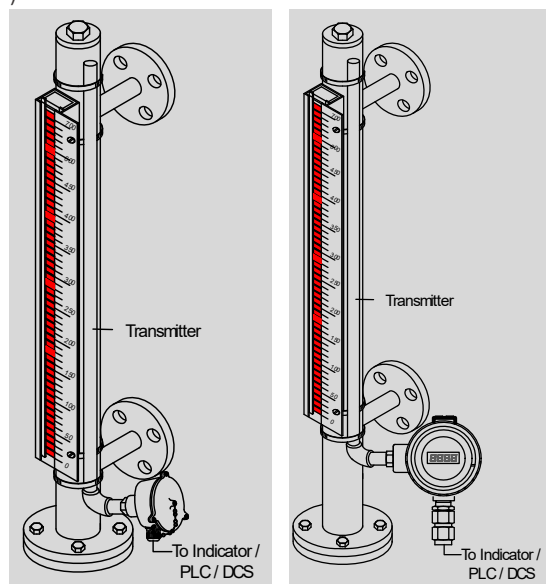
Transmitter is mounted externally on the chamber through clamps such that its enclosure is oriented at bottom side of the chamber. It provides 4-20 mA current o/p corresponding to CC distance / range of level gauge. It consists of PCB strip of closely spaced reed switches and a chain of series resistors fitted inside the guide tube and a transmitter card is housed in an enclosure. The float moves inside the chamber, due to rise or fall of liquid level and actuates the reed switches according to its position and change in voltage is fed to the (v to I) transmitter card to convert it into the linear analog signal output of 4-20 mA. This output signal can be configured with Techtrol Indicator Controllers (TLIC/ TUIC/TLPI) or connected to PLC/ DCS system.



Transmitter (Reed Type)

Specifications

- Enclosure : Cast Al. WP IP66 or Ex d IIB or IIC, T6, IP66 or ATEX Ex d IIC, T6, IP66
- Cable Gland : PG 11, Nylon (WP) or ½" NPT DC, brass (Exd)
- Guide tube MOC : SS316
- Resolution : ±12 mm (standard), ± 6 mm (high)
- Supply : 24 VDC ± 10%
- Output : 1) 4-20mA (2 wire), 2) 1- 5VDC (3 wire),
3) 4-20mA with HART (2wire),
4) RS-485 Modbus Protocol
Baud Rate: 9600, 19200, 38400
Slave ID: 1 to 7; Data 0 to 4095
- Max. Load : 400 Ohms (with current o/p)
- Max. Temp : 150 °C- standard, (high temp - 250°C)
- Amb Temp : 0 to 60 °C
- Intrinsic Safety : Intrinsically safe to Ex ib Gr IIB T6
- Approval (Optional): With Zener Barrier 24VDC/110mA
- Zener Barrier:**
- Input Supply : 24 VDC
- Output : 24 VDC / 110 mA
- Enclosure : ABS (Size: 40 x 115 x 90 D mm); DIN rail mounting



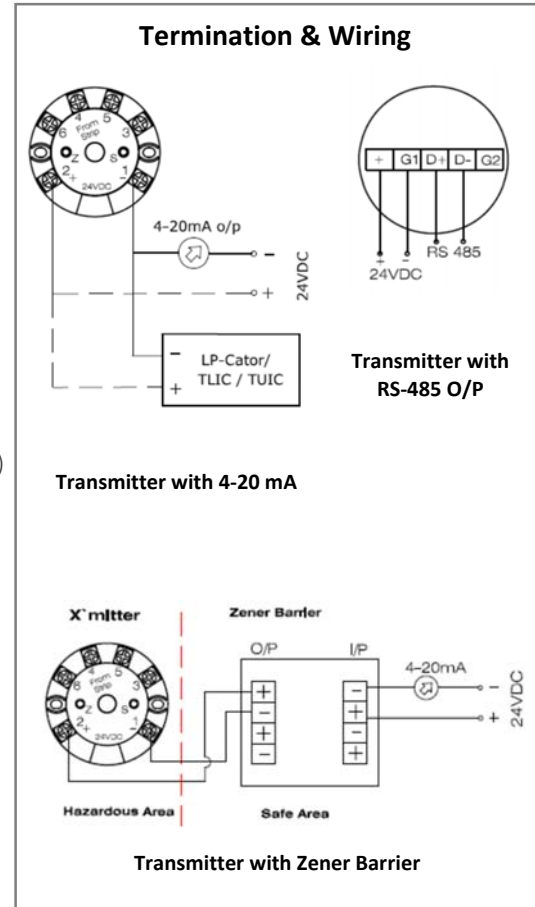
**Reed Transmitter
(Without Display)**

**Reed Transmitter
With Integral Display**



Integral Display (Optional)

- 1) Enclosure : Cast Al WP IP65 or Ex d IIB T6, IP65
x 1/2" NPT DC cable gland
Indication Range: 0 to 9999
Display : LCD
Programming : through keypad
Supply : 24 VDC \pm 10 %
Output : 4-20 mA
Load : 150 Ohms @ 24 VDC
Amb Temp : 0 to 55 °C
- 2) Enclosure : Cast Al. WP IP66 or
Cast Al. ATEX Ex d IIC, T6, IP66 (CCOE optional)
Cable Gland : 1/2" NPT DC cable gland, brass
Indication : 6 digits (Level value) (unit %)
Display : 2 lines, 8 characters Alphanumeric LCD
Programming : Local Operator Interface (with buttons)
Supply : 24 VDC \pm 10 %
Output : 4-20mA with HART
Load : 500 Ohms @ 24 VDC
(including HART resistance of 250 Ohms)
Intrinsic Safety : ATEX Intrinsically safety to Ex ia IIC T4
Approval (Option)
Amb Temp : 0 to 55 °C



5.3 Magnetostrictive Transmitter

- Range : 500 to 5000 mm
Indication Range: 5 digit
Display : LCD
Programming : though 3 Buttons
Supply : 24 VDC \pm 10%
Output : 4-20 mA or 4-20mA + HART (2 wire)
Accuracy : \pm 1 mm
Enclosure : Cast Al. WP IP66 x M20 cable gland
Max. Temp : 150 °C



Techtrol Display Instruments – for local or remote indication

- LP- Cator : Loop Powered Indicator for local indication of liquid level
- TLIC : Techtrol Level Indicator Controller for remote level indication on seven segment LEDs and control through relay output (microcontroller based, programmable)
- TUIC : Techtrol Universal Indicator Controller for remote level & volume indication on LCD and control through relay output (microcontroller based, programmable)

Transmitter Model Identification

MGT-					
1. Transmitter Type					
Reed Chain Type	R				
Magnetostrictive	M				
Others	O				
2. Enclosure x Conduit Connection					
Cast Al. IP66 x PG11 Cable Gland	J				
Cast Al. IP66 x ½" NPT DC Cable Gland	K				
Cast Al. Ex d Gr IIB, T6, IP66 x ½" NPT DC Cable Gland	E				
Cast Al. Ex d Gr IIC, T6, IP66 x ½" NPT DC Cable Gland	F				
Cast Al. ATEX Ex d IIC, T6, IP66 x ½" NPT DC Cable Gland	S				
Cast Al. IP65 x ½" NPT DC Cable Gland (<i>Integral Display, 4-20mA o/p</i>)	I				
Cast Al. Ex d IIB,T6,IP65 x ½" NPT DC Gland (<i>Integral Display, 4-20mA o/p</i>)	H				
Others	O				
3. Resolution					
±12 mm (<i>Standard</i>)		S			
±6 mm (<i>High</i>)		H			
±1 mm (<i>Magnetostrictive</i>)		M			
Others		O			
4. Output					
4-20 mA (2 wire)				1	
4-20 mA with HART (2 wire)				2	
1 - 5 VDC				3	
RS-485 MODBUS RTU Serial Communication (<i>IP66 enclosure only</i>)				4	
Others				O	
5. Intrinsic Safety Approval					
Without					W
Ex ib IIB T6 with Zener Barrier (<i>with 4-20mA O/P</i>)					S
ATEX Ex ia IIC T6 (<i>with 4-20mA+ HART O/P</i>)					A
Others					O
6. Display Type					
Without					W
With Integral Display (<i>Magnetostrictive; Refer Table 3 below for Reed Transmitter</i>)					I
Loop Powered Indicator (LP-Cator)					L
Level Indicator Controller (TLIC)					C
Universal Indicator Controller (TUIC)					U
Others					O

Table 3 – Combination of Reed Chain Type Transmitter Output x Integral Display x Intrinsically Safe x Enclosure Types

Combinations ↓	Enclosure →				
	I (IP65)	J/K (IP66)	E/H (Ex d IIB)	F (Ex d IIC)	S (ATEX IIC)
4-20 mA	-	Provided	Provided	Provided	Provided
4-20mA + HART	-	Provided	Provided	Provided	Provided
4-20mA + Intrinsic Safety	-	Provided	Provided	-	-
4-20mA + HART + Intrinsic Safety	-	Provided	-	-	Provided
4-20mA + Integral Display	Provided	-	Provided	-	-
4-20mA + HART + Integral Display	-	Provided	-	-	Provided
4-20mA + Intrinsic Safety + Integral Display	-	Provided	-	-	Provided
4-20mA + HART + Intrinsic Safety + Integral Display	-	Provided	-	-	Provided

6. Special Features

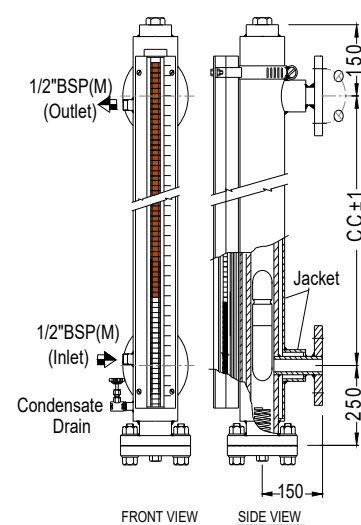
6.1 Jacketing for Heating / Cooling

It is employed to ensure uniform cooling or heating of the process liquid to maintain viscosity and prevent it from solidification. Jacketing is provided around the gauge chamber with the provision of inlet and outlet through which steam is passed for heating and refrigerant like Freon, Propane or Ammonia is passed for cooling the process liquid as may be required.

Specifications

Chamber MOC : SS304/316
 Chamber Size : 2" Sch. 10
 Jacketed Chamber : SS304/316 x 2 1/2" Sch. 10
 Inlet & Outlet : 1/2" BSP (F) or flanged
 Max Temp : 400 °C

For other specifications, refer **MLG-S series**

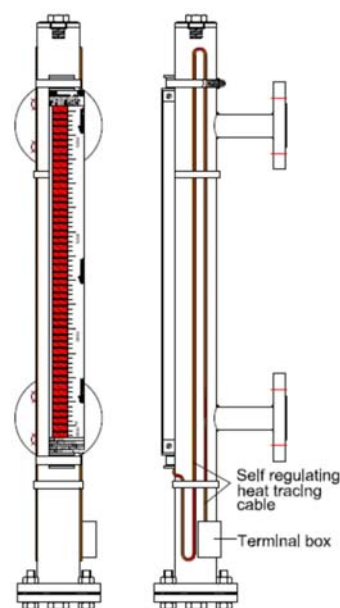


6.2 Heat Tracing with Insulation Jacket

It is used to maintain the temperature of process liquid and viscosity. Electrical heat tracing wire is factory installed over the chamber with its power connector taken out in junction box. It is configured with thermostatic switch to automate the temperature. It can be provided with insulation jacket to prevent heat loss.

Specifications

Chamber Size x MOC : 2" Sch 10 x SS304/316
 Insulation Type : Rockwool with fiber cloth jacket
 Supply : 12 to 277 VAC
 Temp. Control : Through thermostat,



Terminal Enclosure : Cast Al. WP IP65 or Ex d Gr IIB
Temp Range : 10 to 150 °C

For other specifications, refer MLG-S series

Note: Set points of magnetic switches are not adjustable and should be informed during order placement.

6.3 Insulation Jacketing for High/ Low Temp

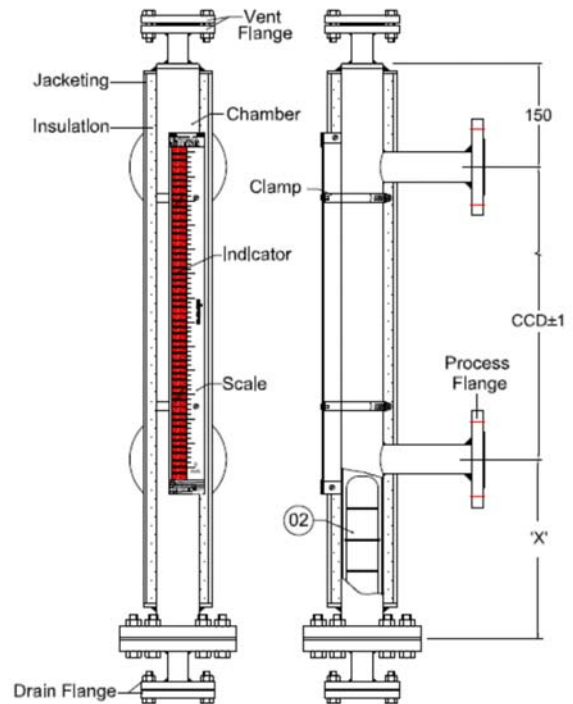
Insulation jacketing is provided to maintain temp of liquid for high or low temperature applications to prevent radiant heat loss, saves energy and for personal safety. Jacketing is done over the liquid chamber with provision of opening for gauge process connection, indicator, switches & transmitter.

Insulation Type :

1. K-Flex with Aluminum Jacket for low temp upto - 80°C
2. Rockwool with fiber cloth jacket for high temp upto 400 °C

For other specifications, refer MLG-S series

Note: Set points of magnetic switches are not adjustable and should be informed during order placement.



7. ATEX (Non-electrical) Approval

Measuring Range : 300 to 3000 mm
Gauge Series : S, H, Z, D and F Series
Chamber MOC : SS304/ 316/ 316L x 2" or 2-1/2"
Chamber Type : Flat top- flanged bottom or dish end top- flanged bottom or
: Flanged top –flanged bottom (side-side mtg.)
Float Size x MOC : Ø50 x SS316/316L (float dia according to series)
Liquid SG : ≥ 0.8 (Low SG upto 0.6)
Indicator & Scale : SS bicolor flapper/ roller (refer page no 8 & 9)
Process Connection : Flange
Vent & Drain : ½" NPT plug x ball / globe valve
Gasket : SS spiral wound
Max Temperature : 350°C
Max. Test Pressure : Vacuum to 10 kg/cm² (upto 200 kg /cm² on request)
Approval - ATEX as per Ex h IIC T6... T1 Ga as per 2014/68/EU (Non- Electrical)

8. Testing & Documentation

available on request

- Hydro testing
- PMI (Positive Material Identification) certificate
- D. P. Test
- Radiography
- Ultrasonic
- PWHT
- Third Party Inspection
- Material Certification as per 3.1 (EN10204)
- NACE MRO103, NACE MRO175
- Other testing available on request

9. Approvals & Certificates

available on request

- CE 1282 as per 2014/68/EU
- ATEX as per Ex h IIC T6... T1 Ga as per 2014/68/EU (Non- Electrical)
- ATEX Ex d as per 2014/68/EU (Electrical)
- PED as per 2014/68/EU
- CCOE/ PESO (Enclosures)
- IBR 1950
- Marine

10. Applications

Feed Water Heaters, Industrial Boilers, Distillation Receiver, Oil/ Water Separators, Flash Drums, Surge Tanks, Gas Chillers, Deaerators, Blow down Flash Tanks, Hot Wells, Alkylation Units, Storage Tanks, Acids, Alkalis Dosing Tanks, Diesel Day Tanks.

11. Typical Services

- Oil (Lube, Diesel), Water, Steam Condensate, Brine, Liquid Sulphur, Acids & Alkalis, 98% H₂SO₄, Spent Acid and Interface Liquids
- Refined Petrochemicals-Propane, Butane, Gasoline, Ethylene etc.
- Solvents-Acetone, Phenol Toluene, Xylene, Naphtha, IPA, Alcohol
- Gas Condensate
- Heat Transfer Fluids- Downtherm, Therminol, Thermic Fluid, Glycol
- Refrigerants
- Alcohols, Ammonia

12. Industries

Oil Production & Refineries, Petrochemical Plants, Chemical Plants, Gas Plants, Power Plants, Water & Waste Water Treatment Plant, Food & Beverages, Pharmaceuticals, Pulp & Paper, Liquor Production,

13. Model Identification

MLG -	S	N	A	S	2	A	B	W	2	A	2	A	C	E	W	A	W	W	W	W
1. Series																				
'S' Series (Standard)	S																			
'H' Series (High Temp/ Pressure)	H																			
'T' Series (Top Mounted)	T																			
'Z' Series (Oversized Chamber)	Z																			
'D' Series (Dual Chamber- Redundant Measurement)	D																			
'F' Series (Bifurcated Chamber - Redundant Measurement)	F																			
2. Chamber MOC																				
SS304	N																			
SS316	S																			
SS316L	L																			
PTFE lined SS304 (corrosive appl ⁿ ; 'S', T series)	T																			
PTFE lined SS316 (corrosive appl ⁿ ; 'S', T series)	F																			
Hastalloy C (S series)	H																			
Inco Alloy (S series)	I																			
PP (corrosive applications; S, T series)	P																			
PVDF (corrosive applications; S series)	V																			
Others	O																			
3. Chamber Types x Process Conn. Orientation (Mounting)																				
Flat Top, Flanged Bottom x Side-Side Mtg.	A																			
Dish End Top, Flanged Bottom x Side -Side Mtg. (H Series)	B																			
Flanged Top, Flanged Bottom x Side-Side Mtg.	C																			
Flat Top, Flanged Bottom x Side-Top Mtg.	D																			
Flat Top, Flanged Bottom x Side-Bottom Mtg.	E																			
Flat Top, Flanged Bottom x Top-Bottom Mtg.	F																			
Flat Top x Top Mtg. (T series)	G																			
Others	O																			
4. Float MOC																				
SS316	S																			
SS316L	L																			
SS316 with ECTFE coating (S, T series)	C																			
PP (S, T Series)	P																			
PVDF (S Series)	V																			
Titanium	T																			
Hastalloy C	H																			
Others	O																			
5. Process Connection Size																				
¾"	1																			
1"	2																			
1 ½" (Flange conn.)	3																			
2" (Flange conn.)	4																			
2 ½" (Flange conn.)	5																			
3" (Flange conn.)	6																			
4" (Flange conn; T series)	7																			
Others	O																			
6. Process Connection Type																				
ASME Flange 150#	A																			
ASME Flange 300#	B																			
ASME Flange 600#	C																			
ASME Flange 900#	D																			

Without	W
Counter Flange with Nuts, Bolts & Gasket	F
CS Perforated Stillwell + Nuts & Bolts (<i>T' series</i>)	C
SS304 Perforated Stillwell + Nuts & Bolts (<i>T' series</i>)	N
SS316 Perforated Stillwell + Nuts & Bolts (<i>T' series</i>)	S
PP Perforated Stillwell + Nuts & Bolts (<i>T' series</i>)	P
PVDF perforated Stillwell + Nuts & Bolts (<i>T' series</i>)	V
Others	O
17. Approval	
Without	W
ATEX (Non- Electrical)	A
18. Supplementary Devices	
Without	W
Magnetic Switch (<i>Refer page 20</i>)	S
Transmitter (<i>Refer page 23</i>)	T
Magnetic Switch and Transmitter	C
Others	O

Ordering Information:

- 1) Model number of level gauge x liquid & its sp. gr, operating temperature & pressure and CC/CF/FF distance/ measuring range.
- 2) Model number of magnetic switch if required (refer page 20)
- 3) Model number of transmitter if required (refer page 23)



'S' series
(SS MOC)



'S' series
(PP MOC)



'S' series
PVDF MOC



'S' series
PTFE lined SS



'H' series
High Pressure



'T' series
Top Mounted



'D' series
Dual Chamber



Steam
Jacketting



Insulation
Jacket



Heat Tracing +
Insulation Jacket

IBR Approved Magnetic Level Gauge - MLGB

Installation	: Side-Side
Range	: 400 to 2000 mm
Chamber Type	: Flat top + flanged bottom or flanged top + flanged bottom
Pr. Conn. Orientation	: side-side mounting
Chamber Size x MOC	: 2" NB x SS316, SS316L
Float Size x MOC	: Ø50 x SS316, SS316L, Titanium
Liquid SG	: 0.8
Indicator Model	: SS316 housing, SS316 Flapper IP66 or Hermetically sealed
Float Failure Indication	: Provided (optional)
Process Connection	: 1" NB ASME flange 300#
Vent	: ½" NPT x plug or globe valve
Drain	: ½" NPT x Plug or globe valve
Gasket	: SS316 spiral wound graphite
Bolts & Nuts	: A193 Gr. B7/ A194 Gr. 2H
Max. Temp	: upto 300 °C
Optg. Pressure	: upto 25 kg/cm ²
Max. Test Pressure	: upto 50 kg/cm ² (high pressure on demand)

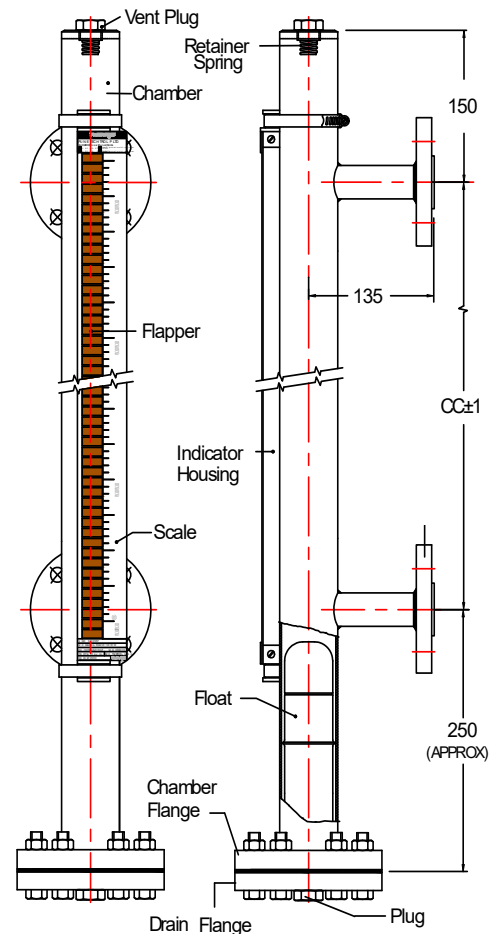


Table -1 Indicator Types

ID No	Housing	Indication	Indicator Type	Max. Temp °C	Size (mm)
P	SS316	SS316 Flapper	IP66	250	14 width
Q			Hermetically sealed		

Applications

Feed Water Heaters, Steam Drum, Deaerators, Blowdown Tanks, Flash Drum, Hot Wells, Surge Tanks, Storage Tanks.

Model Identification

MLGB -															
1. Chamber x Float MOC															
SS316 x SS316	1														
SS316 x Titanium	2														
SS316L x SS316L	3														
SS316L x Titanium	4														
Others	O														
2. Chamber Type x Process Conn. Orientation (Mounting)															
Flat Top , Flanged Bottom x Side-Side Mtg.	A														
Flanged Top , Flanged Bottom x Side-Side Mtg.	C														

3. Process Connection Size x Type x Flange Face									
1" NB ASME 300 # RF Flange	1								
Others	O								
4. Vent Size x Type									
½" NPT x Plug	1								
½" NPT x Globe Valve	2								
Others	O								
5. Drain Size x Type									
½" NPT x Plug	1								
½" NPT x Globe Valve	2								
Others	O								
6. Gasket									
SS316 spiral wound graphite		S							
Others		O							
7. Indicator I									
SS316 Housing, SS316 Flapper, IP66 Indicator			I						
SS316 Housing, SS316 Flapper, Hermetically Sealed Indicator			G						
Others			O						
8. Float Failure Indication									
Not provided							W		
Provided (flapper/roller indication in red as failure indication)							R		
Provided (flapper/roller indication in blue as failure indication)							B		
Others							O		
9. Calibrated Scale									
Aluminum Scale in mm (LC= 10 mm)							A		
SS316 Scale in mm (LC= 10 mm)							I		
Others							O		
10. Accessories									
Without								W	
Counter Flange with Nut Bolts & Gasket								F	
Others								O	
11. Supplementary Devices									
Without									W
Magnetic Switch									S
Transmitter									T
Magnetic Switch + Transmitter									C
Others									O

Ordering Information

Model Number x CC Distance x Operating Temperature & Pressure

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