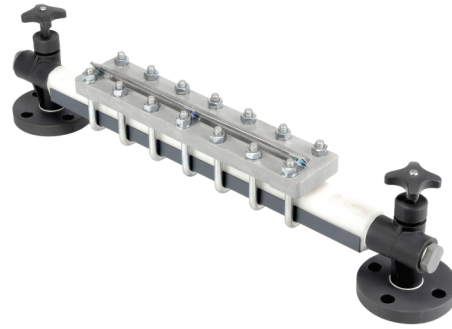




Transparent



Reflex

Reflex Level Gauge

Working Principle & Operation :

The liquid level indication in reflex level gauge is based on light refraction and reflection laws. The liquid level inside the level gauge is distinguished by the different brightness of the reflex glass in the liquid or in the gas / vapor space.

Reflex Glass : Tempered Borosilicate Glass with the side of the glass which is exposed to the Process media has a moulded prismatic grooves set at 90 degree angle, while the other side is smooth. The mechanical strength is attained through thermal pre-stressing (tempering) creates a high resistance to sudden temperature changes. Reflex Glass in accordance to DIN 7081, BS 3463.

When there is liquid in contact with the glass, the incident light is refracted to the inside of the gauge and absorbed, making the liquid filled area appear dark whereas in gas/vapor space, the incident light is totally reflected against the glass grooves and the glass appears bright.

Reflex level gauges are ideal for clean liquid level indication application involving process media like water, diesel, hydrocarbon liquids, thermic fluids, water-steam etc.

Reflex level gauges offer great advantages in terms of low maintenance costs as well as easy level reading.

Although it cannot be used in certain cases, as when interface level between two liquids has to be read, when observation and liquid colour is required or when the liquid to be measured is high pressure water steam or acidic media which can corrode the glass.

Type	Media	Working Conditions	
		Max Pressure	Max Temperature
LE-R1	Liquid Media (Non-Corrosive)	100 Bar(g) / ANSI 600#	400 C °
	Saturated Steam or Hot Water	22 Bar(g)	219 C °
LE-R2	Liquid Media (Non-Corrosive)	160 Bar(g) / ANSI 900#	400 C °
	Saturated Steam or Hot Water	35 bar(g)	244 C °

Transparent Level Gauge

Working Principle & Operation :

The liquid level indication in transparent level gauge can be easily observed by directly looking through the glasses as the process media is contained within two glasses whose surfaces are smooth polished.

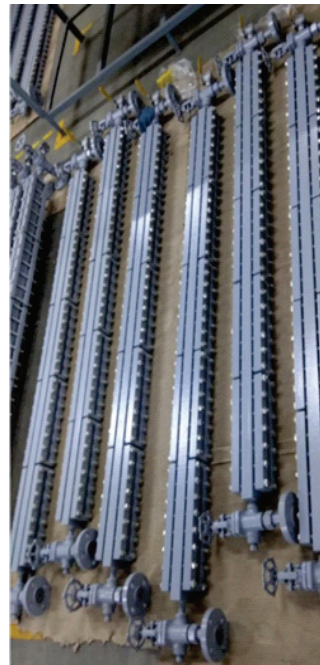
Transparent Glass: Tempered Borosilicate Glass have both side smooth faces. The surface on both sides are finely ground and polished to ensure optimal transparency. The mechanical strength is attained through thermal pre-stressing (tempering) creates a high resistance to sudden temperature changes.

Transparent Glass in accordance to DIN 7081, BS 3463.

Since the level can be seen straight through the gauge, it is easy to view the fluid such as colour and interface level reading, whereas this would not be possible with a reflex level gauge.

These level gauges are also particularly suited to be used with aggressive media or high pressure water steam, since protective mica shields can be installed between the medium and the glass. In order to improve visibility, an illumination can be mounted on the back side of the transparent level gauge.

Type	Media	Working Conditions	
		Max Pressure	Max Temperature
LE-T1	Liquid Media (Non-Corrosive)	51 Bar(g) / ANSI 300#	400 °C
	Saturated Steam or Hot Water	12 Bar(g)	191 °C
LE-T2	Liquid Media (Non-Corrosive)	100 Bar(g) / ANSI 600#	400 °C
	Saturated Steam or Hot Water	20 Bar(g)	214 °C
LE-T3	Liquid Media (Non-Corrosive)	160 Bar(g) / ANSI 900#	400 °C
	Saturated Steam or Hot Water	55 Bar(g)	271 °C



Note : On visible glass lengths in excess of 320 mm, multiple gauge covers are stacked along the length of the liquid chamber body. When single chamber is used with multiple covers as described, there are small spaces over which the view of the level is blocked by the top and bottom edges of the individual gauge covers.

Specifications :

Material of Constructon : Standard available in Carbon Steel, Austenitic Stainless Steel, Special grade alloys (like Duplex, Super Duplex, Monel, Inconel, Hastelloy etc.) can be availed on request.

Process Isolaton Valves : All our Glass level gauges are default provided with Offset Isolation valves with safety ball check feature which helps prevent loss of fluid in event of accidental glass breakage.

Vent/Drain : Vent/Drain can be provided with Plugs as standard. On request, can be equipped with Flanges, Valves etc.

Glass : Reflex and Transparent gauge glasses are available in 9 different sizes

Size	Dimensions		
	Length (mm)	Width (mm)	Thickness (mm)
1	115	34	17
2	140	34	17
3	165	34	17
4	190	34	17
5	220	34	17
6	250	34	17
7	280	34	17
8	320	34	17
9	340	34	17

Gasket : Our Ingraf graphite gaskets are extremely suitable for high temperature and high pressure application. These gaskets are compatible to service media like Saturated steam, All non-oxidising liquids, Hydrocarbon, Cryogenic services, Dyes and chemicals, Acids (except hydrofluoric) & alkalies, Fuel and lube oil etc.

Shields : Shields are used to protect the glass from chemical attack. Two shields Mica and PCTFE are available.

Mica : Mica shields are used to protect the glass from corrosion in high pressure steam (over 35 Bar) and other chemical applications.

PCTFE : PCTFE shields are primarily used in Hydrofluoric Acid service. Note that the PCTFE shield also serves as the sealing gasket and hence no additional sealing gasket is required.

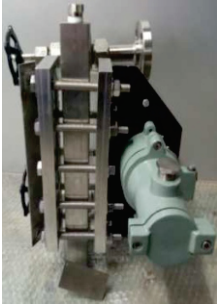
NACE : On request, material can be provided with compliance to NACE requirements.

IBR : Our Glass level gauges can be provided with IBR (Indian Boiler Regulations) for Carbon steel material only. Please select the IBR option (if required) in Model code selection.

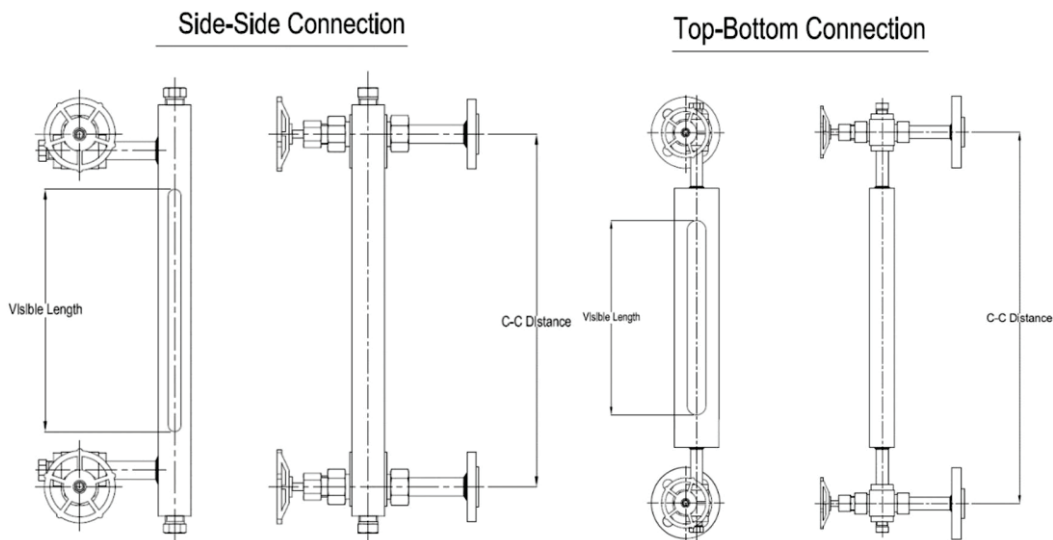
Non-Frost Extensions : For low temperature applications where frost has a tendency to build up on the gauge, our Non-Frost extensions consists of a transparent acrylic makes direct contact with the gauge glass and extends beyond the cover so that frost build-up does not obscure reading of the liquid level.



Illuminator : To improve visibility in dark areas, an illuminator can be mounted on the back side of the transparent level gauge. LED Bulb Housing suitable in Gas Group: IIA, IIB, & IIC, Zone 1 & 2, IP66, T6, Exd type. Approval: CIMFR, BIS & PESO.

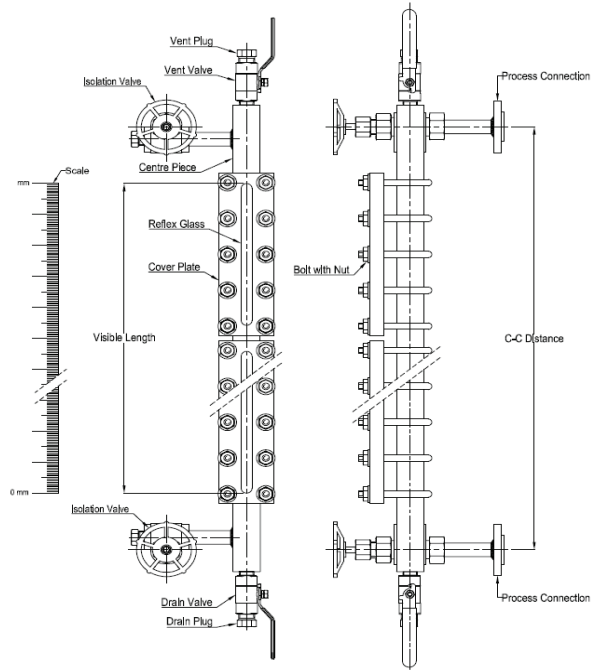


Orientatin Connecon : Top-Botom, Side-Side (Side-Side is a close-hook up connection to ovide larger visible length to given C-C distance compared to Top-Botom connectn)



Coatng : Stainless Steel level gauges are unpainted while Produced all Carbon steel level gauges (by default) are Powder coated as per our manufacturing standard and provides protection in general environments. Other coatings can also be provided as per customer request & specifications.

External Heating System : The medium may be heated or cooled using either a square or small diameter tube attached to the outside of the chamber. Connection are $\frac{1}{4}$ " NPT female.



No. of Sectins x Glass Size	Visible Length (mm)	Min C-C Distance with Side-Side connectin (mm)	Min C-C Distance with Top-Botom conneecon (mm)
1 x 1	95	115	295
1 x 2	120	140	320
1 x 3	145	165	345
1 x 4	170	190	370
1 x 5	200	220	400
1 x 6	230	250	430
1 x 7	260	280	460
1 x 8	300	320	500
1 x 9	320	340	520
2 x 4	380	400	580
2 x 5	440	460	640
2 x 6	500	520	700
2 x 7	560	580	760
2 x 8	640	660	840
2 x 9	680	700	880
3 x 6	770	790	970
3 x 7	860	880	1060
3 x 8	980	1000	1180
3 x 9	1040	1060	1240
4 x 7	1160	1180	1360
4 x 8	1320	1340	1520
4 x 9	1400	1420	1600
5 x 7	1460	1480	1660
5 x 8	1660	1680	1860
5 x 9	1760	1780	1960
6 x 8	2000	2020	2200
6 x 9	2120	2140	2320

How to Order						Example				
Basic Model						LE				
Type										
R	Reflex	T	Transparent			X				
Body & Cover Plate Material										
1	Carbon Steel x Carbon Steel	4	AISI 316 SS x Carbon Steel	7	AISI 316L SS x AISI 316L SS	X				
2	AISI 304 SS x Carbon Steel	5	AISI 316 SS x AISI 316 SS	8	Duplex F51 x Duplex F51					
3	AISI 304 SS x AISI 304 SS	6	AISI 316L SS x Carbon Steel	C	Customized Design (Non - Standard)					
Reflex / Transparent Series as per Pressure & Temperature										
R1	LE-R1	R2	LE-R2	T1	LE-T1	T2	LE-T2	T3	LE-T3	XX
Gasket										
G	Graphite	PC	PCTFE (Hydrofluoric Acid Service)			X OR XX				
Process Connection {Flanges supplied as per ANSI B 16.5' surface finish 3.2 µm to 6.3 µm (125 µin to 250 µin)}										
4NM	½" NPT (M)	B09	½"150 # RF	B18	¾" 900# RF	B35	1½" 600# RF			
4NF	½" NPT (F)	B10	½" 300# RF	B21	1" 150# RF	B36	1½" 900# RF			
5NM	¾" NPT (M)	B11	½" 600# RF	B22	1" 300# RF	B39	2" 150# RF			XXX
5NF	¾" NPT (F)	B12	½" 900# RF	B23	1" 600# RF	B40	2" 300# RF			
6NM	1"NPT (M)	B15	¾" 150# RF	B24	1" 900# RF	B41	2" 600# RF			
6NF	1"NPT (F)	B16	¾" 300# RF	B33	1½" 150# RF	B42	2" 900# RF			
		B17	¾" 600# RF	B34	1½" 300# RF					
Top Side Vent (Except Needle Valve, all other options available with IBR)										
1	Plug - ½" NPT (M)	B09	½"150 # RF	B21	1" 150# RF	B39	2" 150# RF			
2	Plug - ¾" NPT (M)	B10	½" 300# RF	B22	1" 300# RF	B40	2" 300# RF			
4	Needle Valve - ½" NPT (F)	B11	½" 600# RF	B23	1" 600# RF	B41	2" 600# RF			X
5	Ball Valve - ½" NPT (F)	B12	½" 900# RF	B24	1" 900# RF	B42	2" 900# RF			OR
6	Needle Valve - ¾" NPT (F)	B15	¾" 150# RF	B33	1½" 150# RF					XXX
7	Ball Valve - ¾" NPT (F)	B16	¾" 300# RF	B34	1½" 300# RF					
8	Gate Valve - ½" NPT (F)	B17	¾" 600# RF	B35	1½" 600# RF					
9	Gate Valve - ¾" NPT (F)	B18	¾" 900# RF	B36	1½" 900# RF					
A	Globe Valve - ½" NPT (F)									
B	Globe Valve - ¾" NPT (F)									
Bottom Side Drain (Except Needle Valve, all other options available with IBR)										
1	Plug - ½" NPT (M)	B09	½"150 # RF	B21	1" 150# RF	B39	2" 150# RF			
2	Plug - ¾" NPT (M)	B10	½" 300# RF	B22	1" 300# RF	B40	2" 300# RF			
4	Needle Valve - ½" NPT (F)	B11	½" 600# RF	B23	1" 600# RF	B41	2" 600# RF			X
5	Ball Valve - ½" NPT (F)	B12	½" 900# RF	B24	1" 900# RF	B42	2" 900# RF			OR
6	Needle Valve - ¾" NPT (F)	B15	¾" 150# RF	B33	1½" 150# RF					XXX
7	Ball Valve - ¾" NPT (F)	B16	¾" 300# RF	B34	1½" 300# RF					
8	Gate Valve - ½" NPT (F)	B17	¾" 600# RF	B35	1½" 600# RF					
9	Gate Valve - ¾" NPT (F)	B18	¾" 900# RF	B36	1½" 900# RF					
A	Globe Valve - ½" NPT (F)									
B	Globe Valve - ¾" NPT (F)									
Graduation Scale										
0	No Scale	A	Aluminium	P	Acrylic or Polycarbonate	S	AISI 304 SS	L	AISI 316 SS	X
Center To Center Distance										
Please specify in mm (e.g. Write 800 for 800 mm Center to Center Distance)(This gauge will be supplied from 300 mm to 3000 mm)						800 mm				
Options (* Available for Type "T" only)										
AA	Offset Valve- Screwed Bonnet with Auto Ball Check			PV	IBR (Option with Carbon Steel gauges only)					
AB	Offset Valve - Bolted Bonnet with Auto Ball Check			PM	PMI (On Exposed wetted parts)					
AC	Non-Frost Extension*			LP	Liquid Penetrant test on weld joints					
AD	Illuminator (Suitable in Gas Group IIA, IIB & IIC, Zone 1 & 2, IP 66, T6, Exd type)*			SX	Tag plate in SS					XX
AF	Mica Shield*			GH	Material Test Certificate (For wetted parts only)					
AG	PCTFE Shield*			GO	Hydro Test Certificate					
AH	Top-Bottom Connection			IG	IGC Test (For wetted parts only)					
AI	Side-Side Connection									
TF	NACE (Please specify compliance Standard, NACE MR 0175, ISO 15156)									
Ordering Example: LE . X . X . XX . X OR XX . XXX . X OR XXX . X OR XXX . X . 800 mm . XX										
Ordering Information : Specify model no., Liquid, Specific Gravity, Operating Pressure & Operating Temperature.										
Note 1 : Visible length shall be less by 100 mm to 150 mm than Center to Center Distance.										
Note : Specifications and dimensions given in this product catalogue represents the state of engineering at the time of printing. Modifications may take place and materials specified may be replaced by others without prior notice.										