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MEASUREMENT AND CONTROL

1100 Series Magnetic Level Indicators

The **1100 Series Magnetic Level Indicator (MLI)** is a proven method for streamlining liquid level measurement. Not only does the 1100 Series give exceptional visual indication, it also eliminates the need for armored sight glass instruments – simplifying piping systems and allowing for multiple measurements without unnecessary complications to the piping.

Industries and Applications

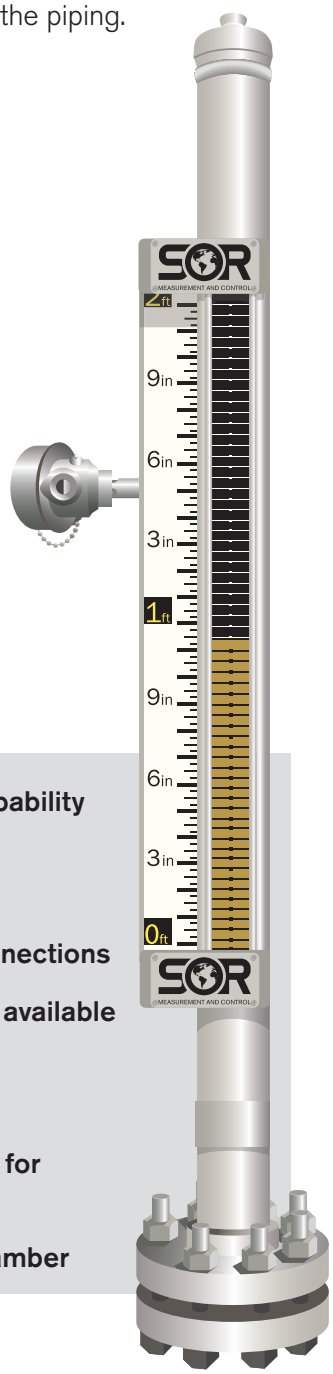
The 1100 Series Magnetic Level Indicator is accurate, reliable and suitable for most industrial and process applications.

Chemical and Petrochemical Industries
- Refined products
- Heat transfer fluids
- Solvents
- Acids and caustics

Oil and Gas Industries
- Offshore production
- Compressor packages
- Oil and water interface
- High and low pressure separators
- Gas condensate
- Glycol

Power Generation
- Boilers
- Feed water heaters
- Sight glass replacement

Other
- Pulp and paper
- Food and beverage
- Pharmaceutical
- Industrial chemicals
- Wastewater



Features and Benefits

- **Patented vista indicator with 200° viewing angle**
- **Forward viewing distance of 250 feet (76 meters) or more**
- **Chambers designed to ASME codes B31.1 and B31.3 guidelines (certified with CY & CZ option)**
- **ASME Section IX and AWS qualified welding process**
- **No pressurized floats**
- **High visibility reflective or custom scale**
- **Interface detection capability**
- **NACE, CRN and PED certifications available**
- **Extruded Process Connections**
- **Dimensional drawings available at quotation**
- **Quick delivery**
- **Dependable operation for years of service**
- **5 year warranty on chamber**

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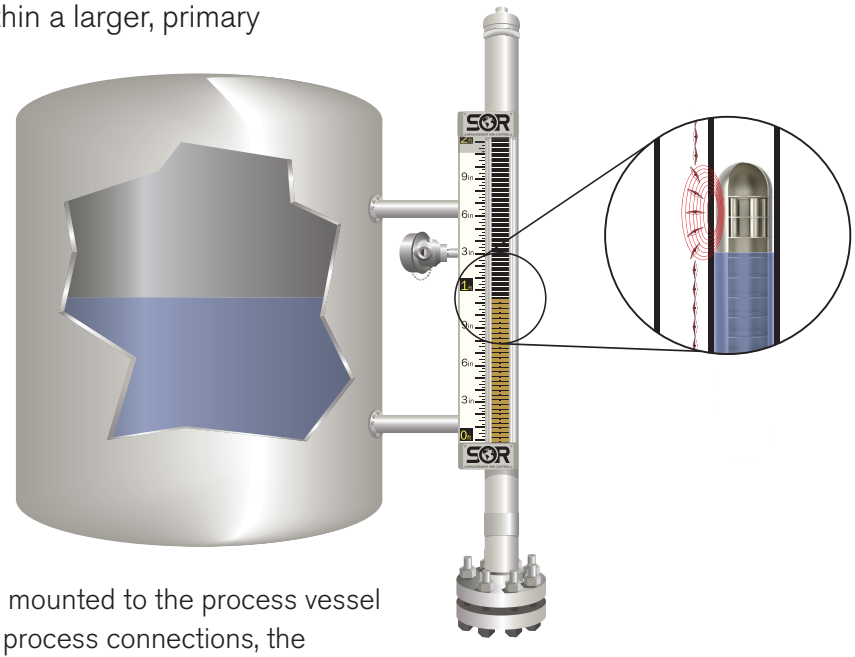
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Principles of Operation

The 1100 Series Magnetic Level Indicator provides visual indication of liquid level within a larger, primary process vessel.



- Once the MLI is mounted to the process vessel via the supplied process connections, the process liquid will flow freely up and down within the MLI chamber.
- A specially designed float is contained inside the 1100 Series chamber and moves along with the process level. The float contains powerful magnets that interact with the non-invasive indicator assembly mounted on the outside of the chamber. This magnetic coupling between the float and the indicator allows the process level to be shown via the use of rotating flags housed inside the indicator assembly.
- As the process level rises and falls, the flags change color and provide real time indication of the liquid level within the primary process vessel. The float also interacts with any attached switches or transmitters, supplying additional signal input to the control system.

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Product Specifications

Process Capabilities

Pressure	Full vacuum to 4000 psi (275 bar)
Temperature	-320°F to 1000°F (-196°C to 538°C)
Minimum Specific Gravity (SG)	0.39
Minimum Interface SG Difference	0.20

Materials of Contruction

Chamber	304SS, 316/316LSS (Std), Hastelloy C, Titanium, Inconel 625 other materials such as 317SS, 321SS, 347SS are available upon request
Float	Titanium (Std), 316SS other materials available upon request
Studs/Nuts	Alloy Steel (A193-B7M/A194-2HM) (Std) 304SS (A193-B8-CL.2/A194-8)

Tagging

Standard	3 lines (62 characters & spaces per line) included for customer specified tagging information at no additional charge

Indicators

Glass (Model 111)	Max Temperature	1000°F (538°C)
	Viewing Angle	140°
Polycarbonate (Model 112)	Max Temperature	450°F (232°C)
	Viewing Angle	140°
vista (Model 113)	Material	UV protection infused polycarbonate
	Max Temperature	450°F (232°C)
	Viewing Angle	200°

Measuring Ranges

Standard	12 in. to 18 ft. (30.48 cm to 5.49 m) Standard measuring range varies by chamber configuration
Custom	Available upon request For larger ranges, multiple units can be stacked

Aux. Point Level Switch Specifications

SPDT, DPDT point level switches with high temperature housings available

Agency listed explosion proof enclosures with terminal blocks available

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Magnetic Level Indicators

How to Order

The SOR quick select model number tree on page 4 and 5 provides you with all of the options to configure and order a product for your application.

- You must select a designator for each component
- Reference tables, charts and additional information is provided throughout the catalog to help you make your selections, see pages noted in the tree

6 Chamber Style

Bottom Flanged, Side/Side	B
Top/Bottom Flanged, Side/Side	F
Top Flanged, Side/Side	T
Sealed, Side/Side	S
Top/Bottom Mount with Removeable Float	A
Top/Bottom Mount with Sealed Float	N

See page 6 for more details

5 Chamber Schedule

S10*	A
S40	B
S80	C

**only available with Titanium floats*

4 Chamber Size

2” NPS (50 DN)	20
2 1/2” NPS (65 DN)	25
3” NPS (80 DN)	30
4” NPS (100DN)	40

3 Chamber Material

316/316LSST	C
Hastelloy-C	H
316/316LSST with Carbon Steel Flanges	A

2 Flag Color

Yellow/Black	0
Red/White	1
Orange/Black	2

See page 6 for more details

1 Indicator

Glass	111
Polycarbonate	112
vista	113

See page 6 for more details

7 Process Connection Size

05	1/2” NPS (15 DN)
75	3/4” NPS (20 DN)
10	1” NPS (25 DN)
15	1 1/2” NPS (40 DN)
20	2” NPS (50 DN)
25	2 1/2” NPS (65 DN)
30	3” NPS (80 DN)

8 Process Connection Type

N	NPT(F)
S	Socketweld
F	Flanged

9 Flange Type

S50	150# RF Slip-On
S30	300# RF Slip-On
S60	600# RF Slip-On
S15	1500# RF Slip-On
S1R	1500# RTJ Slip-On
DS1	PN16 RF Slip-On
DS2	PN25 RF Slip-On
DS4	PN40 RF Slip-On
DS6	PN63 RF Slip-On
DS0	PN100 RF Slip-On
W50	150# RF Weld Neck
W30	300# RF Weld Neck
W60	600# RF Weld Neck
W15	1500# RF Weld Neck
W1R	1500# RTJ Weld Neck
DW1	PN16 RF Weld Neck
DW2	PN25 RF Weld Neck
DW4	PN40 RF Weld Neck
DW6	PN63 RF Weld Neck
DW0	PN100 RF Weld Neck

Example Model No.	113	0	C	-	20	A	-	F	75	N	-	S30

continued on page 5

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How to Order *(continued)*

15 Vent Size and Type

See page 8 for selection

P1, P2, P3, V1, V2, V3, V4, V5, V6, L1, L2, L3, T1, T2, T3, NN

14 Center-to-Center Dimension

Enter Center-to-Center dimensions in inches.
(Contact factory for min. dim. which varies based on chamber configuration.)

XXX

13 Specific Gravity

Enter your specific gravity. Truncate to 2 decimal points.
(Min. SG is 0.39)

X.XX

12 Pressure

Enter your maximum design pressure in PSI. Round up to the nearest whole number.

XXX

11 Temperature

Enter your maximum design temperature in °F. Round up to the nearest whole number.

XXX

10 Float Material

Titanium (Std)
process temps
600°F (316°C)
T

316SS
process temps
≤ 1000°F (316°C)
S

16 Drain Size and Type

See page 8 for selection

Q1, Q2, Q3, W1, W2, W3, W4, W5, W6, M1, M2, M3, U1, U2, U3, NN

17 Accessories

NC	NACE MR0175
C2	Hydro Test Cert
C3	Inspection Report
C4	Certificate of Compliance/Conformance
D1	Certificate of Origin
D2	Manufacturer's Certificate
C7	CRN
CV	QA Test Report
CY	ASME B31.1
CZ	ASME B31.3
UT	Ultrasonic Examination
MR	Mill Test Report
PD	PED 2014/68/EU
PT	Dye Penetrant Certificate
RT	Radiography Certificate

See page 9-12 for additional accessories

continued from page 4

Example Model No.

- T 250 - 342 - 0.70 - 96 - P1 Q1 - NC

Note: Consult the factory for assistance with any options you need that are not shown.

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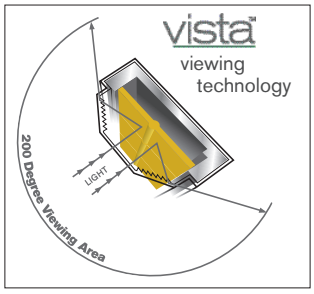
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Indicator (Step 1)

1130C-20A-F75N-S30-T250-342-0.70-96-P1Q1-NC

SOR offers three indicators models: the traditional glass indicator, an impact resistant polycarbonate and the cutting edge 113 vista design. All indicators are vacuum purged and nitrogen sealed. Select the indicator that best suits your needs.

Material	Max Temperature	Viewing Angle	Designator
Glass	1000°F (538°C)	140°	111
Polycarbonate	450°F (232°C)*	140°	112
UV Protection Infused Polycarbonate	450°F (232°C)*	200°	113



* Higher temperature possible with insulation pad, consult factory.

Flags (Step 2)

113**0**C-20A-F75N-S30-T250-342-0.70-96-P1Q1-NC

SOR offers three color combinations for different max temperatures.

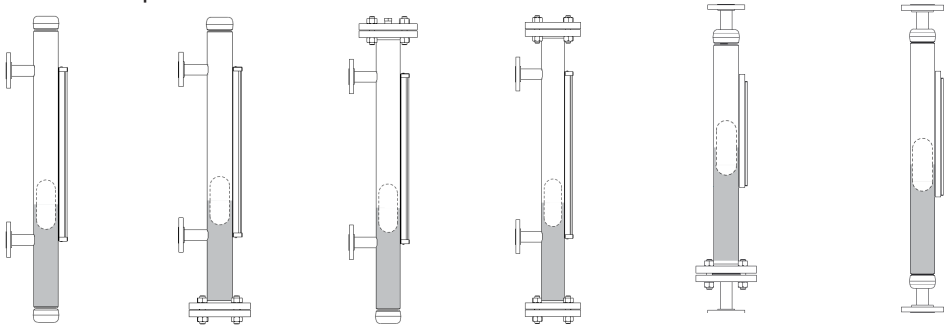
Color*	Max Temperature	Designator
Yellow/Black	600°F (315°C)	0
Red/White	1000°F (538°C)	1
Orange/Black	650°F (343°C)	2

* Custom flag colors available upon request.

Chamber Style (Step 6)

1130C-20A-**F**75N-S30-T250-342-0.70-96-P1Q1-NC

- Mounting style indicates the location of the MLI's process connections
- Chamber top and chamber bottom dictates if the chamber is servicable



Designator	S	B	T	F	A	N
Mounting Style	Side/Side	Side/Side	Side/Side	Side/Side	Top/Bottom	Top/Bottom
Chamber Top	Sealed End Cap	Sealed End Cap	Flanged	Flanged	Sealed End Cap with Process Flange	Sealed End Cap with Process Flange
Chamber Bottom		Flanged	Sealed End Cap		Flanged for Float Access with Process Flange	

Custom configurations are available. Consult factory for additional details.

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Flange Type (Step 9)

1130C-20A-F75N-**S30**-T250-342-0.70-96-P1Q1-NC

If the chamber configuration is sealed (S option) and the process connection type is socket weld (S option) or NPT (N option), please select the corresponding designator from the table to the right.

Note: Not available with A or N chamber configurations.

Socketweld	SCW
NPT	NPT

Otherwise, select a flange type and rating from the table below. This selection will determine the flange type and rating for flanges on top and bottom of the chamber as well as process connections.

Note: Weld neck flanges must be selected for (CY/CZ) ASME B31.1 and B31.3.

Flange Type	Design Standard	Class Rating	Designator
Slip-on	ANSI B16.5	150# RF	S50
		300# RF	S30
		600# RF	S60
		1500# RF*	S15
		1500# RTJ*	S1R
	EN 1092-1	PN16 RF	DS1
		PN25 RF	DS2
		PN40 RF	DS4
		PN63 RF	DS6
		PN 100 RTJ	DS0

Flange Type	Design Standard	Class Rating	Designator
Weld Neck	ANSI B16.5	150# RF	W50
		300# RF	W30
		600# RF	W60
		1500# RF*	W15
		1500# RTJ*	W1R
	EN 1092-1	PN16 RF	DW1
		PN25 RF	DW2
		PN40 RF	DW4
		PN63 RF	DW6
		PN 100 RTJ	DW0

***Options may change specifications and dimensions. Contact factory for additional details.

When applicable, extruded process connections will be the SOR standard. If extruded connections are prohibited or non-extruded branches are requested, the TE accessory designator may be selected. Extruded connections are available in the chart below. If these conditions are not met, then the user will be forced to select the TE option. Welded or seamless chambers can be extruded.

Pipe Size	Schedule	3Branch Size	Flange Type	Chamber Connection
2	10	1	Weld Neck or Slip-On	B,F,S,T
2	10	1.5		
2	10	2		
2.5	40	1.5		
2.5	40	2		
2.5	40	2.5		
3	10	1		
3	10	1.5		
3	10	2		
3	10	2.5		
3	10	3		

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Vent and Drain Connection (Step 15 & 16)

1130C-20A-F75N-S30-T250-342-0.70-96-**P1Q1**-NC

SOR offers a wide selection of vent and drain options for customizing the magnetic level indicator. Vent and drain material will match chamber material. Contact factory for additional options.

		Size	Designator
VENT	with NPT Plug	1/2" NPS (15 DN)	P1
		3/4" NPS (20 DN)	P2
		1" NPS (25 DN)	P3
	with NPT Gate Valve	1/2" NPS (15 DN)	V1
		3/4" NPS (20 DN)	V2
		1" NPS (25 DN)	V3
	with SW Gate Valve	1/2" NPS (15 DN)	V4
		3/4" NPS (20 DN)	V5
		1" NPS (25 DN)	V6
	with NPT Ball Valve	1/2" NPS (15 DN)	L1
		3/4" NPS (20 DN)	L2
		1" NPS (25 DN)	L3
	Flanged[1]	1/2" NPS (15 DN)	T1
		3/4" NPS (20 DN)	T2
		1" NPS (25 DN)	T3
	No Vent	-	NN

		Size	Designator
DRAIN	with NPT Plug	1/2" NPS (15 DN)	Q1
		3/4" NPS (20 DN)	Q2
		1" NPS (25 DN)	Q3
	with NPT Gate Valve	1/2" NPS (15 DN)	W1
		3/4" NPS (20 DN)	W2
		1" NPS (25 DN)	W3
	with SW Gate Valve	1/2" NPS (15 DN)	W4
		3/4" NPS (20 DN)	W5
		1" NPS (25 DN)	W6
	with NPT Ball Valve	1/2" NPS (15 DN)	M1
		3/4" NPS (20 DN)	M2
		1" NPS (25 DN)	M3
	Flanged[1]	1/2" NPS (15 DN)	U1
		3/4" NPS (20 DN)	U2
		1" NPS (25 DN)	U3
	No Drain	-	NN

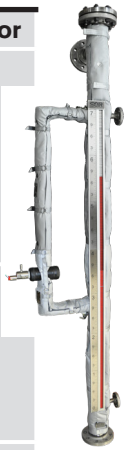
[1] Flange style and rating is determined by the "Flange Type" designator (Step 9). Consult factory for a different flange style.
[2] Required for A and N chamber configurations.

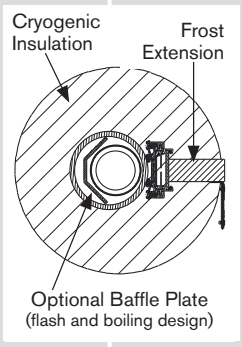
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Temperature Accessories

Accessory	Description		Designator
Standard High Temp Insulation Blanket	Insulation is recommended when indicators are to be used under extreme temperature conditions. Factory installed, removable, high-temperature insulation blankets are available for two temperature ranges and two configurations. 1. For temperatures up to 500°F (260°C), a 2" thick (compressed to 1") #6 Cer-Wool HP enclosed in 3201-2-SS silicone coated fiberglass cloth. 2. For temperatures above 500°F (260°C), fiberglass material rated to 1100°F (593°C) is included on the contact surface of the blanket.	Chamber Only	BL
		Chamber & Flanges	BA
Cryogenic Insulation Blanket & Frost Extension	Cryogenic insulation is recommended when process temperatures need to be maintained between 32°F (0°C) and -300°F (-184°C). Cryogenic Insulation will help ensure the process media doesn't undergo a state change while maintaining critical process temperatures. SOR Cryogenic insulation is constructed from a 2" layer of closed-cell polyisocyanurate foam insulation. All joints are sealed and taped with fiberglass tape. In addition, a waterproofing membrane is installed over the insulation providing an additional layer of protection. Stucco embossed aluminum cladding is custom cut to fit over the membrane and the pieces are riveted and sealed together to ensure complete weatherproofing of the unit. To prevent frost on the indicator, an acrylic frost extension is added to the unit. This assures visibility of the level gauge by preventing accumulation of frost/ice crystals on the indicator.	Cryogenic Insulation and Frost Extension	BC*
Heat Tracing	Heat tracing is used for freeze protection or to maintain the process temperature in bypass chamber. A wide variety of heat tracing options are available. Heat tracing is engineered to customer specifications and can be provided with controllers.	Steam Heat Tracing	ST
		Electrical Heat Tracing	TR







Note: Options may change specifications and dimensions. Contact factory for additional details.
*BC accessory can only be configured with polycarbonate or glass indicator options (111 or 112 respectively)

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Construction Modifications/Accessories

Accessory	Description	Designator
Custom Etched 316SS Scale	Scale can be marked to your specific requirements including units, percentange, font and dimensions. Standard scale is running inches.	CS
Flashing Boiling Protection[1]	If a process can flash or boil, your level gauge needs to be protected from float damage. This is accomplished using an oversized chamber with a baffle plate that keeps the float aligned with the indicator. The flashed gasses will escape around the float, preventing high velocity damage. *See diagram on page 8.*	FB
Float Failure Detection[2]	Provides a visual indication of a failed/collapsed float by extending the indicator 6" below the lower process connection. Flipper colors are inverted for this section of indicator. Custom colors available upon request.	FF
Interface Detection	Interface float design for specific gravity differentials ≥ 0.20. Please provide upper and lower specific gravity values at time of order or inquiry.	ID
Special Length Indicator[2]	Provides an indicator length shorter than the center-to-center. Length must be specified at time of quotation.	SL
304SS Studs & Nuts[3]	A193 Gr. B8 Class 2 / A194 Gr. 8 studs and nuts.	SN
Seamless Pipe	Standard pipe is welded. Changes pipe to seamless	SM
Stainless Steel Indicator Rails	Standard indicator rails are aluminum. Changes indicator rails to be stainless steel.	SR
Non-Extruded Branches[4]	Standard process connections are extruded. Changes connection to non-extruded branches.	TE

[1] Options may change specifications and dimensions. Consult factory for additional details.
[2] Option not available for A or N chamber configurations.
[3] Option not available for N chamber configurations.
[4] Option not available for branch connections smaller than 1 NPS. See page 8 for more information.

Inspection & Testing Certifications

If inspection or testing options are selected, a completed Application Data Sheet is required at time of order or inquiry.

See Application Data Sheet PART 2 on page 17 for more information and options.

Accessory	Designator
Hydrostatic Pressure Test Certificate	C2
Inspection Report	C3
Certificate of Compliance/Conformance	C4
Certificate of Origin	D1
Manufacturer's Certificate	D2
QA Test Report	C7
Canadian Registration Number (CRN)[1]	CV
Certificate of Conformance (power plant piping ASME B31.1)[2]	CY
Certificate of Conformance (plant piping ASME B31.3)[2,3]	CZ
Factory Acceptance Testing	FA
Mill Test Report	MR
PED 2014/68/EU[2,5]	PD
Compliance to NACE Certification MR0175/ISO 15156	NC
Positive Material Identification	PM
Dye Penetration Examination	PT
Radiographic Examination	RT
Ultrasonic Examination	UT

[1] CY or CZ option required for CRN.
[2] If CY, CZ or PD option is selected, *see Examination and Testing Requirements on page 11*. Consult factory for assistance.
[3] Fluid category must be provided. Different processes require different quality inspection procedures.
[4] Design pressure must be less than 4003 psi (276 bar)
[5] Material certifications (MR) and Hydrostatic Test (C2) are requird for PED.

See page 11 for additional details.

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EXAMINATION AND TESTING REQUIREMENTS

Specify either a CY, CZ or PD option in the accessory section of the model number for a certificate of conformance.

Designator	Certificate of Conformance to
CY	ASME B31.1 Power Piping
CZ	ASME B31.3 Process Piping
PD	Pressure Equipment Directive 2014/68/EU

Notes

1. If certification to B31.3 is required, SOR Inc. must know the fluid category per the chart below. Read the ASME B31.3 Fluid Category Section at the bottom of this page to determine the applicable category. If fluid category is not provided normal category is assumed.

2. All units being certified to PED will also require (MR) Material Certificates and Hydro Static Test (C2) Certificate.

Units Covered	Visual Examination[1]	Radiographic (X-Ray) RT	Magnetic Particle MT	Dye Penetrant PT	Hydrotest
Standard Inspection					
All Chambers	100%	0%	0%	0%	1.5 x pressure for 3 minutes
CY Option (ASME B31.1)					
Below 750°F Below 1025 psi	100%	-	-	-	1.5 x pressure for 10 minutes
Below 350°F All pressures	100%	-	-	-	
350°F - 750°F Above 1025 psi	100%	All butt welds ≥2”	-	-	
Above 750°F All pressures	100%	All butt welds ≥2”	Butt welds ≥2” all other welds	Butt welds ≥2” all other welds	
CZ Option (ASME B31.3)					
Normal Fluid	5%	5%[2]	-	-	1.5 x pressure for 10 minutes
Category D	Engineering/ QA Choice	-	-	-	
Category M	100%	20% of all welds[3]	-	-	
High Pressure	100%	100% of girth/ branch welds	-	-	

Notes

1. In process visual inspection: inspecting pipe bevel prior to welding, check fit-up, check after-tack weld, and check during weld passes. After completion visual inspection: welding and grinding is checked.
2. In process examination may be substituted on a weld-for-weld basis.
3. In process examination supplemented by appropriate NDE (MT or PT) may be substituted on a weld-for-weld basis.

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ASME B31.3 Fluid Category

Normal A fluid service not subject to the following four categories.

Category D A fluid service in which all of the following apply:
1. The fluid handled is non-flammable, non-toxic, and not damaging to human skin.
2. The design gage pressure does not exceed 150 psi.
3. The design temperature is between -20°F and 366°F.

Category M A fluid service in which the potential for personnel exposure is judged to be significant and in which a single exposure to a very small quantity of a toxic fluid, caused by leakage, can produce serious irreversible harm to persons on breathing or bodily contact, even when prompt restorative measures are taken.

High Pressure Pressure in excess of that allowed by the ASME B16.5 Class 2500 rating for the specified temperature and material group or any piping so designated by the customer.

Pressure Equipment Directive (PED) – Directive 2014/68/EU

If PED is required, SOR inc must know the following to determine EPR Category of the unit.

1. Design Pressure.
2. Design Temperature Range.
3. Process Fluid Group.
4. Design Code. Unless otherwise required by the Customer, ASME Section VIII will be the default design code.

Notes

- All units being certified to PED will also require Material Certificates (MR) and Hydrostatic Test (C2)
- For B31.3 construction and PED compliance, in-process weld inspection will be performed to meet B31.3 requirements.
- If the X-Ray is requested, this will be done in addition to the in-process weld inspection. Since this X-Ray would be a customer requirement and not a design code requirement, SOR can use any approved Vendor for this NDE. For B31.3 Category M PT (in addition to in-process weld inspection) will be substituted in lieu of X-ray inspection. MT may be substituted when the unit's construction is Carbon Steel.

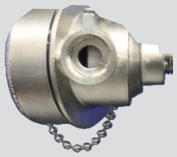
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One of the greatest advantages of a magnetic level indicator is the extensive list of auxiliary equipment that can be coupled with it to provide an entire level measurement solution. Contact your local SOR representative to learn more.

See Application Data Sheet PART 3 on page 18 to specify Auxiliary products.

Point Level Switch



- Movable magnetically coupled point level switches offer versatility as well as function. The switches strap to the outside of the MLI chamber and sense the magnetic float inside.
- No quantity restrictions. Limited only by chamber length.
- Explosion proof conduit boxes available on request.
- Higher temperatures can be achieved with insulation pads.

SPDT	Standard	High Temperature
Max Power	25 Watts	25 Watts
Temperature Rating	*See Process vs Ambient Temperature chart at the bottom of this page.*	
Dead Band	½" (12.7 mm)	¾" (19 mm)

DPDT	Standard	High Temperature
Max Power	25 Watts	25 Watts
Temperature Rating	*See Process vs Ambient Temperature chart at the bottom of this page.*	
Dead Band	¾" (19 mm)	1" (25.4 mm)

Description	Designator	Quantity (1-4)
SPDT General Purpose w/Flying Leads	J	X
SPDT with Explosion Proof Housing & Terminal Block	K	X
DPDT General Purpose w/Flying Leads	L	X
DPDT with Explosion Proof Housing & Terminal Block	M	X

815DT Differential Pressure Transmitter



- The 815DT smart differential pressure transmitter is a feature rich device with the versatility to meet the needs of any application.
- Stainless steel construction makes it a rugged, compact instrument ideally suited for hazardous locations and hostile environments.
- With a variety of industry standard outputs, the 815DT is an economic solution to provide continuous output.

Output Signal 4-20mA, HART 7 Communication Protocol, Modbus RTU (RS-485) Serial Communications, 1-5VDC (Low Power) Mode of Operation

Accuracy ±0.10%

Turndown 5:1

Approvals FM and ATEX in U.S., Canada and Europe

Refer to SOR Pressure Transmitters Catalog (CAT1806) for full specifications.

Guided Wave Radar Level Transmitter



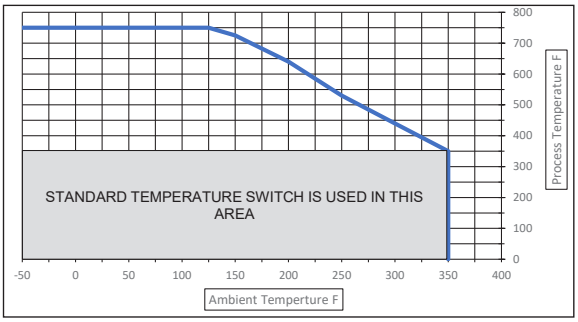
Guided wave radar (GWR) is designed to measure liquid level and liquid interface level using microwave pulses. GWR does not experience errors caused by changing temperature, pressure or specific gravity, making it less susceptible to measurement errors. Without any moving parts, GWR is often the preferred technology for design and maintenance engineers all over the world.

Bypass or Bridle Chamber

Bypass or bridle chambers allow for other auxiliary instrumentation, such as a Guided Wave Radar Level Transmitter, to be combined with the MLI. SOR has exceptional bridle manufacturing capabilities and can offer a wide selection of options and configurations. Bridles are built to your required specifications.

Note: Options may change specifications and dimensions. Contact factory for additional details.

Process vs Ambient Temperature Point Level Switch



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Auxiliary Product	Description
Magnetostrictive Transmitter	Magnetostrictive transmitters offer an inexpensive option to provide a continuous output to a PLC or DCS. The magnetostrictive transmitter mounts to the outside of the MLI chamber and is activated by the magnetic field of the MLI float. The SOR MLI float operates flawlessly with nearly every magnetostrictive transmitter on the market. SOR will either specify a transmitter for your application or integrate your preferred model. (only for use with SOR 1100 Series MLI)

Select a designator for each component and submit this Magnetostrictive Transmitter model number along with the 1100 Series Magnetic Level Indicator model number.

1 Model
LPC — Magnetostrictive Transmitter**

2 Output
M — Modbus
3 — 4-20 mA and HART®
6 — 4-20 mA and HART® w/SIL2

3 Housing
D — Epoxy Coated Aluminum Single Compartment with Display
E — Epoxy Coated Aluminum Dual Compartment with Display
Requires 90° bend option for electronics mounting
L — Stainless Steel Single Compartment with Display

4 Mounting Orientation
3 — 90° Bend - Housing Top Left*
4 — 90° Bend - Housing Top Right*
5 — 90° Bend - Housing Bottom Left*
6 — 90° Bend - Housing Bottom Right*
*Above selection required for MLI with Top and Bottom Flanged Chamber
7 — Top Mount (Housing Top Right)
Not usable on MLI with Top Flanged Chamber
8 — Bottom Mount (Housing Bottom Left)
Not usable on MLI with Bottom Flanged Chamber
See page 13 for more details

5 Probe Size
Y — 10 mm OD Pipe

6 Materials of Construction
1 — 316L SS

7 Agency
B — INMETRO
C — CEC (FMC)
E — ATEX
F — NEC (FM)
I — IEC
N — NEPSI
P — CCOE
T — CML/TIIS
X — None
See page 13 for more details

8 Approval Type
F — Explosion Proof / Flameproof
I — Intrinsically Safe
X — None

9 Gas Group
A — Group A (includes Group A, B, C and D)
Not available with Agency C - CEC (FMC) and Approval Type F - Explosion Proof/Flameproof
B — Group B (includes Group B, C and D)
C — Group C (includes Group C and D)
D — Group D
3 — Group IIC
Requires Approval Type I - Intrinsically Safe
4 — Group IIB + H2
Requires Approval Type F - Explosion Proof/Flameproof.
X — None

10 Unit of Measure
M — Metric - Millimeters
U — US Customary - Inches

11 Probe Length
XXXXX — 305 mm (00305) to 3658 mm (03658)
(Add 102 mm to desired measuring range for mounting. Leading zeroes required. No decimal spaces.)
XXXXX — 12" (01200) to 144" (14400)
(Add 4" to desired measuring range for mounting. Leading zeroes required. No decimal spaces.)
Consult factory for lengths over 144".

1	2	3	4	5	6	7	8	9	10	11	
LPC				Y	1	X	X	0	X						S

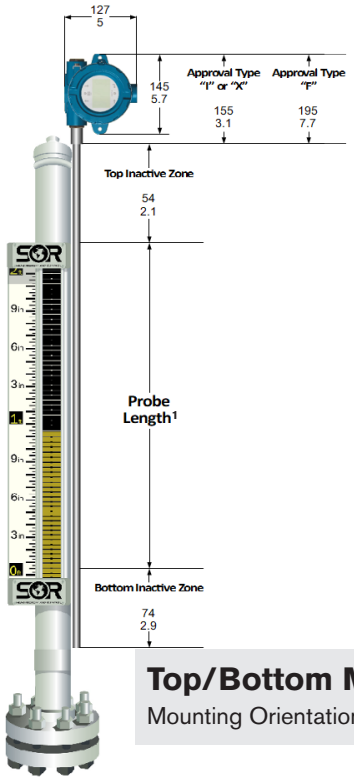
Example Model No. LPC 3 D 3 Y 1 X X 0 X F F A U 07200 S

** Magnetostrictive transmitter is manufactured by TEMPOSONICS. SOR is an TEMPOSONICS VAR partner for MLI applications.

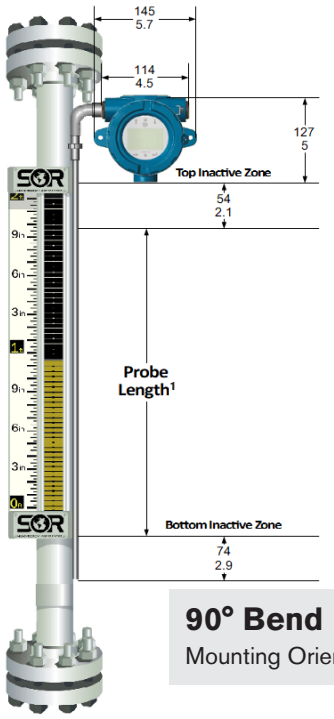
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Magnetostrictive Transmitter - Mounting Orientation and Dimentions



Top/Bottom Mount
Mounting Orientation Options 7, 8



90° Bend Mount
Mounting Orientation Options 3, 4, 5, 6

[1] Probe length will be desired measuring range plus 4" for mounting

Magnetostrictive Transmitter - Agency Approvals

Approved	Safety Method	Approval
CEC (FMC)	Intrinsically Safe	Class I, Division 1, Groups A-D T4
		Class I, Zone 0/1, Ex ia IIC T4
		Ta = -50 to 71°C; IP65
	Explosion Proof	Class I, Division 1, Groups B-D T6…T3
		Ex db IIB+H2 T6…T3 Ga/Gb
		Ta = -40 to 71°C; IP65
ATEX	Intrinsically Safe	Ⓔx II 1/2 G Ex ia IIC T4
		Ta = -50 to 71°C; IP65
	Flameproof	Ⓔx II 1/2 G Ex db IIB+H2 T6…T3 Ga/Gb
		Ta = -40 to 71°C; IP65
NEC (FM)	Intrinsically Safe	Class I, Division 1, Groups A-D T4
		Class I, Zone 0/1, AEx ia IIC T4
		Ta = -50 to 71°C; IP65
	Explosion Proof	Class I, Division 1, Groups A-D T6…T3
		Class I, Zone 0/1, AEx db IIB+H2 T6…T3 Ga/Gb
		Ta = -40 to 71°C; IP65
IEC INMETRO NEPSI CCOE CML/TIIS	Intrinsically Safe	Ex ia IIC T4 Ga/Gb
		Ta = -50 to 71°C; IP65
	Flameproof	Ex db IIB+H2 T6…T3 Ga/Gb
		Ta = -40 to 71°C; IP65



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Magnetic Level Indicators

Application Data Sheet

Link to online fillable three page
PDF **Application Data Sheet** (Form 1610)

PART 1: Magnetic Level Indicator

Date	Quantity

Company Name _____ Contact _____

Phone _____ E-mail _____

Special Tag #s (3 lines with 62 character/spaces per line available) _____

_____

_____

Process Conditions

Fluid Upper/Lower _____ Specific Gravity Upper/Lower _____

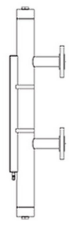
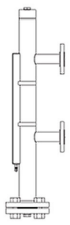
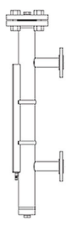
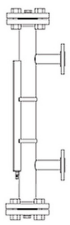
Operating Pressure _____ Design Pressure _____

Operating Temperature _____ Design Temperature _____

Area Classification _____ Design Standard _____

Chamber/Indicator Design

Chamber Type (select one)

❑ 	❑ 	❑ 	❑ 	❑ 	❑ 
Top - Sealed **Bottom** - Sealed	**Top** - Sealed **Bottom** - Flanged	**Top** - Flanged **Bottom** - Sealed	**Top** - Flanged **Bottom** - Flanged	**Top** - Sealed End Cap w Process Flange **Bottom** - Flanged w Float Access	**Top** - Sealed End Cap w Process Flange **Bottom** - Sealed End Cap w Process Flange

Chamber Material (316/L SS Std.) _____

Chamber Size ❑ 2" ❑ 2.5" ❑ 3" ❑ 4"

Chamber Schedule ❑ S10 ❑ S40 ❑ S80

Indicator Material ❑ vista polycarbonate
❑ Flat polycarbonate ❑ Glass

Flag Color ❑ yellow/black (Std.)
❑ orange/black ❑ red/white

Studs/Nuts ❑ Alloy Steel (A193-B7/A194-2H)
❑ 304 SS (A193Gr B8 Cl2/A194Gr 8)

Process Connection Type/Rating _____

Process Connection Size _____

Vent/Drain Connection Size/Type _____

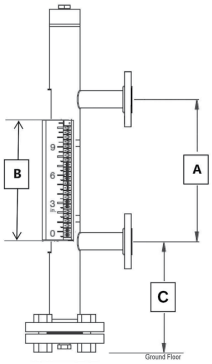
Float Material (Titanium Std.) _____

Dimensions (xxx.xxx)

A. Center to Center..... ____

B. Measuring Range..... ____

C. Ground Clearance.... ____



Scale Marking *(select one)*

❑ English ❑ Metric

❑ Percentage

❑ Custom _____

Attach any sketches and special instructions.

Accessories *(mark as required add notes if necessary)*

Insulation Blanket
- Chamber only ❑ _____
- Complete unit ❑ _____
- Cryogenic insulation ❑ _____

Steam Heat Tracing ❑ _____

Electrical Heat Tracing ❑ _____

Flashing/Boiling Protection ❑ _____

Inspection & Testing Certs ❑ _____
(see App Data Sheet Part 2)

Auxiliary Products ❑ _____
(see App Data Sheet Part 3)

Special (*specify in notes*) ❑ _____

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PART 2: Inspection and Testing Certifications

❑ **PMI Report**	❑ **SOR Standard** Alloy verification of wetted parts using x-ray fluorescence (XRF) technology to positively identify the part material used post manufacturing. ❑ Customer specified alternate requirements _____
❑ **Hydrostatic Pressure Test**	❑ **SOR Standard** Process conforms to ASME Section V and is conducted per serial number. If valves are used, hydro testing will be done with valve open and ports plugged. ❑ Customer specified alternate requirements _____
❑ **Visual Inspection Report**	❑ **SOR Standard** Visual weld inspection by certified weld inspector per sales order line item. ❑ Customer specified alternate requirements _____
❑ **Factory Acceptance Test**	❑ **SOR Standard** Summary of testing schedule completed per sales order line item. ❑ Customer specified alternate requirements _____
❑ **Inspection Test Plan**	❑ **SOR Standard** Summary of all the testing processes that will be conducted per sales order line item. ❑ Customer specified alternate requirements _____
❑ **Mill Test Report**	❑ **SOR Standard** Certifies that the listed serial numbers were manufactured using the materials on the associated Certified Material Test Reports (CMTR). ❑ Customer specified alternate requirements _____
❑ **Dye Penetrant Examination**	❑ **SOR Standard** Certifies that the listed serial numbers were examined by visible liquid penetrant in accordance with ASME Section V, Article 6. ❑ Customer specified alternate requirements _____
❑ **NACE Compliance**	❑ **SOR Standard** SOR shall provide certification of compliance that the pressure boundary components of the listed serial numbers were manufactured to meet NACE MR0175/ ISO15156. ❑ Customer specified alternate requirements _____
❑ **Ferrite Test**	❑ **SOR Standard** Certifies the Ferrite Number (FN) of 20% of the welds per serial number is documented on associated weld map drawings. ❑ Customer specified alternate requirements _____
❑ **Radiographic Examination (X-Ray)**	❑ **SOR Standard** Certifies the 3rd party radiographic examination of 5% of welds per sales order line item by sample size in accordance with ASME Section V. ❑ Customer specified alternate requirements _____
❑ **Heat Treat**	❑ **SOR Standard** Certifies heat treatment was conducted to ASTM standards per sales order line item. ❑ Customer specified alternate requirements _____
❑ **Mag Particle Examination**	❑ **SOR Standard** Certifies that the listed serial numbers were examined by visible mag particle in accordance with ASME Section V. ❑ Customer specified alternate requirements _____
❑ **Ultrasonic Examination**	❑ **SOR Standard** Certifies that the listed serial numbers were examined by 3rd party ultrasonic examination in accordance with ASME Section V. ❑ Customer specified alternate requirements _____
❑ **ASME B31.1**	❑ Pressure _____ psi ❑ Temperature _____°F
❑ **ASME B31.3**	Fluid Class: ❑ Normal ❑ Category D ❑ Category M ❑ High Pressure
❑ **PED 2014/68/EU**	Fluid Group: ❑ 1 ❑ 2 Design Pressure _____ psi Max Temperature _____ °F Minimum Temperature _____ °F
Additional comments:	_____ _____

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PART 3: Auxiliary Products

Auxiliary Products

Point Level Switch

Qty_____

Location_____

Type
- ❑ SPDT
- ❑ DPDT

Rating
- ❑ General Purpose
- ❑ Explosion Proof (includes terminal block)
  Class I, Div 1 Groups B, C, D; Class II Div 1 Groups E, F, G

Magnetostrictive Transmitter

Output(s)_____

Accuracy_____

Supply Voltage_____

Agency

Certifying Body_____

Protection Type_____

Gas Group_____

Mounting Orientation
- ❑ Top Mount
- ❑ Bottom Mount
- ❑ 90° Bend, Housing on:
  - ❑ Top OR ❑ Bottom
  - AND
  - ❑ Left OR ❑ Right

Guided Wave Radar Bridle*

Material (316/L SS Standard)_____

Instrument Connection Size_____

Instrument Connection Type/Rating_____

Drain Connection Size_____

Drain Connection Type/Rating_____

*If additional connections or non-GWR instrumentation is required, please sketch the bridle in the provided space and list all additional requirements. Consult factory for assistance.

Other

Sketch Bridle Here

Other Auxiliary Equipment

Examples: Differential Pressure Transmitter, Reed Chain Transmitter, etc.

Device Type_____ Manufacturer_____

Part Number_____ Specifications_____

Notes

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1000 Series Magnetic Level Indicators

PED Chamber Application Data Sheet

Link to online fillable one page PDF
PED Chamber Application Data Sheet (Form 1900)

This form must be completed prior to engineering order review.

❑ 1000 Series Engineered Bypass Chambers
❑ 1100 Series Magnetic Level Incidator

Name _____ Date _____
SOR Representative _____ Order No. _____
End User/Install Location _____ Item No. _____

Process Information

Intended Application _____ Design Temperature _____°C
Design Pressure _____ bar Operating Temperature _____°C
Operating Pressure _____ bar Minimum Temperature _____°C
Process Media 1 _____ SG _____ Fluid Group ❑ 1 ❑ 2
Process Media 2 _____ SG _____ Fluid Group ❑ 1 ❑ 2
Process Media 3 _____ SG _____ Fluid Group ❑ 1 ❑ 2
Design Code _____ (unless specified ASME Section VII will be default)

Chamber Information

Model No. _____
Chamber Material _____
Trim Material _____
Required Testing _____

Technology ❑ Float ❑ Displacer ❑ Other _____

Contruction Code
❑ B31.1 ❑ B31.3 ❑ BPVD Sec VIII

Hazard Category
❑ SEP ❑ I ❑ II ❑ III ❑ IV

Accessories _____

All PED chambers will include material certificates and hydrostatic test certifications.

Additional Information

Provide any additional details that impact the installation, operation, maintenance and overall safety of this product and its intended use.

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Form 1900 (02.24) ©SOR Inc.

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