OBTOKOVÝ STAVOZNAK VECTOR™

COMMERCIAL GRADE

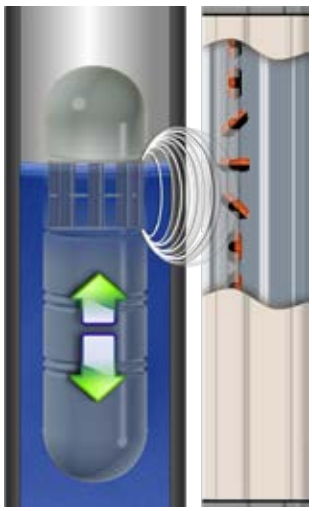
Designed as an alternative and upgrade to sight gauge devices, Magnetic Level Indicators (MLI) from Orion Instruments are manufactured to reliably and continuously provide accurate liquid level in a wide range of applications. Our MLI product line—manufactured globally at multiple facilities—requires minimum maintenance and eliminates vapor or liquid emission problems, which are common with sight glass. Orion Instruments specializes in precision-engineered excellence and offers highly-customized configurations and options for process environments, including those with extreme temperatures and pressures.

The Vector™ model is an economical, rugged and reliable MLI suitable for a variety of applications in industries including Oil/Gas, chemical, water/wastewater, etc. Vector includes many features and capabilities of our premium models, and conforms to the same global manufacturing standards.

APPLICATIONS

- **Feedwater heaters**
- **Oil/water separators**
- **Flash drums**
- **Surge tanks**
- **Gas chillers**
- **Deaerators**
- **Blowdown flash tanks**
- **Hot wells**
- **Vacuum tower bottoms**
- **Alkylation units**
- **Propane vessels**
- **Storage tanks**

PRINCIPLE OF OPERATION



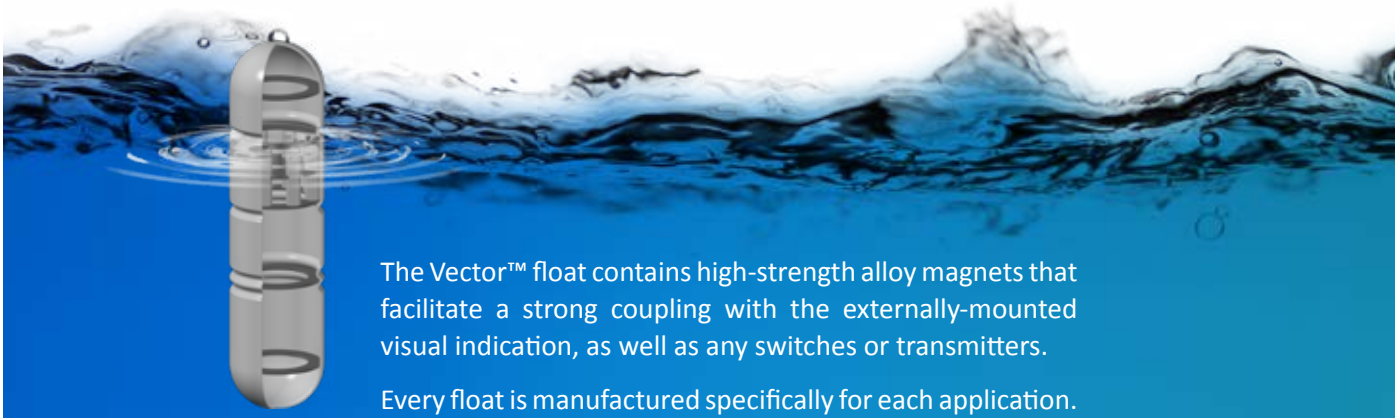
A float travels up and down in a chamber that is mounted to a vessel containing liquid. The float contains a magnetic assembly that interacts with an externally-mounted visual indicator. As the float follows the liquid surface or liquid-liquid interface, the magnetic field causes highly contrasting flags or rollers in the visual indicator to rotate. The result is a clearly defined representation of the liquid level in the vessel.

FEATURES

- Rugged, industrial-grade construction
- Field-adjustable visual indicator for convenient viewing
- Continuous measuring range up to 538 cm (212")
- Compatible with electronic point switches and continuous level transmitters
- Media specific gravity as low as 0.55
- Shatter-resistant viewing window
- Single magnet per flag to enhance float coupling effect and self-alignment

SPECIFICATIONS | VECTOR™ MAGNETIC LEVEL INDICATOR

Materials of construction – Chamber	316/316L stainless steel, 304/304L stainless steel
	Carbon steel process connections and fittings available
– Rail & window	Aluminum rail with acrylic window
– Float	316 stainless steel and titanium - *varies depending on process conditions*
Construction grade	Industrial PED or non-PED
Approvals	Industrial PED units: ATEX II 1 G c T6 (non-electrical equipment)
Certified material test report (CMTR)	Available upon request
Pressure class ratings	ASME 150# & 300#
Process connection sizes	½" ¾" 1" 1½" 2"
Process connection types	Flanged, threaded nipple, butt weld nipple
Measuring range	30 to 538 cm (12 to 212 inches)
Temperature range	-40 to +260 °C (-40 to +500 °F)
Pressure range	Full vacuum to 51 bar (740 psi)
	All chambers are hydrostatically tested at 1.5× design pressure
Specific gravity	Min 0.55
Visual indicators	Magnetically actuated flag assembly in contrasting orange/black, yellow/black,
	red/white, red/silver or orange/white colors; plastic rollers option in red/white
Maximum viewing distance	Approximately 30 m (100 ft)
Measuring scale	Feet/inches, meters/millimeters, meters/centimeters, running inches, %
Switch options	Model OES electric cam operated snap action switch (refer to bulletin OES-100)
	Model ORS electric reed switch (refer to bulletin ORS-300)
Transmitter options	Model JM4 magnetostrictive transmitter (refer to bulletin ORI-150)
High temperature insulation	Fiberglass material

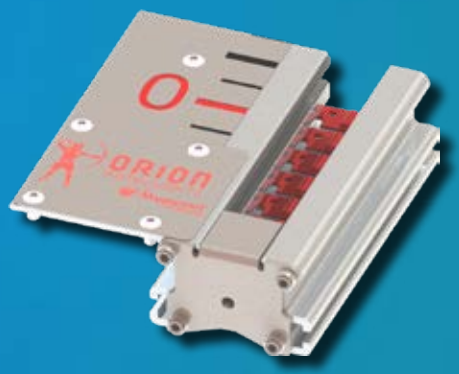


The Vector™ float contains high-strength alloy magnets that facilitate a strong coupling with the externally-mounted visual indication, as well as any switches or transmitters.

Every float is manufactured specifically for each application. Process pressure, temperature, and media specific gravity are all factored into the custom design.

The Vector™ high-visibility visual indicator is constructed with quality materials and engineered for reliable performance.

Each flag contains an alloy magnet that maximizes coupling with the float. The flags are mechanically limited to a half-rotation, which eliminates the possibility of over-rotation common with other magnetic level indicators.



Model:	4																								
Digit:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

1 PRODUCT NAME

4	**Vector**™ Magnetic Level Indicator

2 UNIT OF MEASUREMENT

E	English (in.)	M	Metric (cm)

3 MOUNTING CONFIGURATION & CHAMBER CONSTRUCTION

	Connection orientation	Chamber top	Chamber bottom
A	Side / Side	Welded end plate	Threaded plug (NPT)
B	Side / Side	Threaded plug (NPT)	Welded end plate
1	Side / Side	Welded end plate	Flange
2	Side / Side	Flange	Welded end plate

4 CHAMBER/FLANGE RATING

A	150# CHAMBER & PROCESS FLANGES
B	300# CHAMBER & PROCESS FLANGES
H	150# CHAMBER FLANGES PN16 PROCESS FLANGES
J	300# CHAMBER FLANGES PN25 PROCESS FLANGES
K	300# CHAMBER FLANGES PN40 PROCESS FLANGES

5 MATERIAL OF CONSTRUCTION

A	316/316L stainless steel chamber
B	316/316L stainless steel chamber with carbon steel fittings & flanges
C	304/304L stainless steel chamber
D	304/304L stainless steel chamber with carbon steel fittings & flanges

6 CONSTRUCTION GRADE

J	Industrial PED
1	Industrial non-PED
8	Industrial Grade (extruded outlet), Non-PED

7 CHAMBER FLANGE TYPE

N	No chamber flange (digit 3 = A or B)
A	RF slip-on flange (digit 3 = 1 or 2) ASME 16.5

8 PROCESS CONNECTION TYPE

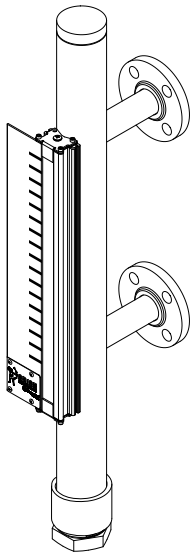
A	RF slip-on flange
B	RF ASME weld neck flange up to 1½"
M	Threaded NPT-M (male), up to 1½" (Available only when digit 6 is J)
P	Plain end nipple
R	Pipe nipple butt weld end, up to 1½"
1	RF SO flange HG/T 20592-2009 Series A (Available only when digit 20 is 9)
2	RF WN flange HG/T 20592-2009 Series A (Available only when digit 20 is 9)
3	RF PL flange GB/T 9119-2010 Series 1 (Available only when digit 20 is 9)
4	RF PL flange JB/T 81-2015 Series 1 (Available only when digit 20 is 9)
8	RF weld neck flange EN 1092-1 Type II - B1

9 PROCESS CONNECTION SIZE

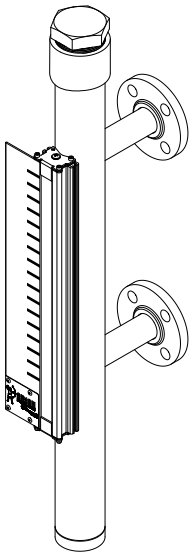
A	½" (Available only when digit 6 is J or 1 and digit 20 is NOT 7)
B	¾" (Available only when digit 6 is J or 1 and digit 20 is NOT 7)
C	1"
D	1½"
E	2" (machined to 1" size)

1	DN 15
2	DN 20
3	DN 25
4	DN 40

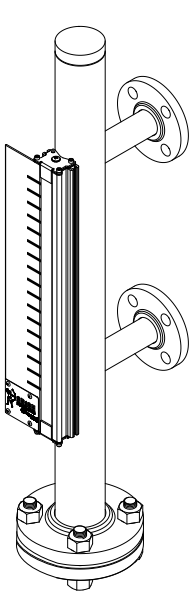
3 MOUNTING CONFIGURATION & CHAMBER CONSTRUCTION



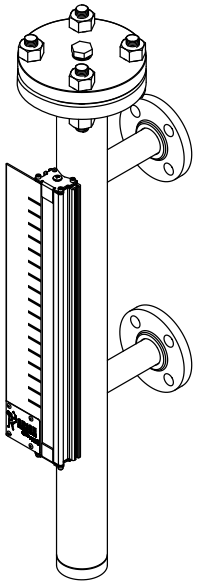
Option **A**



Option **B**

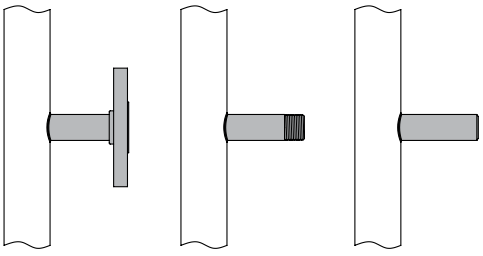


Option **1**



Option **2**

8 PROCESS CONNECTION TYPE



Flange
Option **A**

Threaded NPT-M
Option **M**

Butt weld
Option **R**

Model: 4 ▨

Digit: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

10 GASKET STYLE FOR CHAMBER FLANGE (IF APPLICABLE)

N	None (digit 3 = A or B)
A	Flexible graphite/fiber (digit 3 = 1 or 2)

11 CHAMBER BOLTING MATERIAL

N	None (digit 3 = A or B)
M	Alloy steel A-193 Gr. B7 / A-194 Gr. 2H (digit 3 = 1 or 2 and digit 5 = B or D)
C	316 SST A-193 Gr.B8M CLASS 2 / A-194 Gr.8M
S	A-193 Gr B7 / A-194 Gr 2H (+210 °C (+390 °F) is max. temp for zinc-plated bolting)

12-13 VENT SIZE & TYPE

NN	None
11	½" NPT with hex plug
21	¾" NPT with hex plug

14-15 DRAIN SIZE & TYPE

NN	None
11	½" NPT with hex plug
21	¾" NPT with hex plug

16 CHAMBER MODIFICATION FOR MOUNTING OF OPTIONAL SWITCHES AND/OR TRANSMITTER

VECTOR can be combined with various externally mounted accessories, including switches and transmitters. In these cases minor changes to the chamber and float design may be required.
For digit 16, match up the MLI product with the appropriate transmitter, switch or combination of both.
For OES/ORS switch, refer to the switch selection data for temperature limitations and insulation options. Match up the switch model code digit 7 with the MLI model codes 16 and 17.
For OCT transmitter, refer to digit 17 for temperature limitations and match up the OCT model code with the MLI model codes 16 and 17.
For Jupiter transmitter, refer to digit 17 for temperature limitations and possible mounting configurations. Match up the Jupiter model code with the MLI model codes 16 and 17.
If SIL enhanced Jupiter transmitter is required then use MLI model with float diagnostics indicator, refer to digit 18.
All transmitters and switches must be ordered separately.

N	No switch or transmitter added

Switch only (no transmitter)	
Y	OES or ORS switch(es) clamp mounted to chamber

OCT reed chain transmitter (no switches)	
8	Top mount
9	Bottom mount

Jupiter magnetostrictive transmitter only (no switches)	
1	Top mount without offset ① ②
2	Top mount offset, with or without high temperature bend
3	Bottom mount offset, with or without high temperature bend

Jupiter magnetostrictive transmitter with at least one OES or ORS switch	
Mounting of Jupiter	clamp mounted to chamber
Top mount without offset ①	A ②
Top mount offset, with or without high temperature bend	B
Bottom mount offset, with or without high temperature bend	C

① Available only in combination with digit 3 = 1 and digit 13 = N or 1

② Jupiter: max. 79 to 454 °C (175 to 850 °F) with insulation

17 INSULATION OPTIONS

N	None	Indicator: ≤ 121 °C (250 °F) Jupiter transmitter: max. 79 °C (175 °F) OCT transmitter: max. 93 °C (200 °F)

Insulation Pad/Blanket			
E	Indicator only	digit 16 = N, Y	121 °C (250 °F) < T ≤ 260 °C (500 °F)
R	Indicator and transmitter	digit 16 = 2, 3, 8, 9	121 °C (250 °F) < T ≤ 260 °C (500 °F)
U	Transmitter	digit 16 = 1, 2, 3, A, B, C	79 °C (175 °F) < T ≤ 260 °C (500 °F)
		digit 16 = 8, 9	93 °C (200 °F) < T ≤ 260 °C (500 °F)

18 MEASUREMENT TYPE & INDICATION STYLE

Total level

1	Orange (RAL 3024—standard for China) / black plastic flags
2	Yellow / black plastic flags
3	Red / white plastic flags (standard)
4	Red / silver metal flags
5	Orange (RAL 3024—standard for China) / white plastic flags
R	Red / white plastic rollers (Not available with ORS or OES switches) Digits 21 & 22 must be UB, UE, VA or WH

19 MEASURING SCALE

N	No scale
1	Feet / inches
3	Running inches
4	Percent (markings in increments of 5 %)
7	Meters / Millimeters
8	Meters / Centimeters

20 CHAMBER CODE

Code listed is valid for metallic construction (refer to digit 5). Consult factory for plastic construction.

1	2" Sch 10
9	48 × 2 mm

21-22 FLOAT CODE

Codes listed are valid for metallic construction (refer to digit 5). Consult factory for plastic construction.

Total level measurement

Float types 2 and B (digit 21) cover full 150 # rating of carbon steel and 316/316L SST flanges up to 260 °C (500 °F).
Float type D (digit 21) covers full 300 # rating.
Pressure rating of float type D: max. 60 bar @ 40 °C (863 psi @ 100 °F)

Chamber rating	150 #, PN 16, PN 25 ①		300 #, PN 25, PN 40
Float material	316 SST	Ti ②	Ti ②
Oper. S.G.	Code ③	Code ③	Code ③
0.55 – 0.64	—	BE	—
0.65 – 0.74	—	BE	DE
0.75 – 0.84	2C	BB	DC
0.84 – 0.94	2B	BB	DB
0.95 – 1.04	2B	BB	DB

Used only when Digit 20 = 9

Chamber rating	150 #, PN 16, PN 25 ①		300 #, PN 25, PN 40
Float material	304 SST	Ti ②	Ti ②
Oper. S.G.	Code ③	Code ③	Code ③
0.75 – 0.89	UE	—	
0.75 – 1.04	—	VA (Digit 16 ≠ A, B, C or Y)	WH (Digit 16 ≠ A, B, C or Y)
0.75 – 1.04	—	VB (Digit 16 = A, B, C or Y)	YH (Digit 16 = A, B, C or Y)
0.90 – 1.04	UB (Digit 16 ≠ A, B, C or Y)	—	—
0.90 – 1.04	UD (Digit 16 = A, B, C or Y)	—	—

Interface level measurement

99	Special float

① Float types 2 and B (digit 21) do not cover full PN 25 rating of flanges in some cases; check the application data (pressure/temperature) with the float graphs before selecting one of these floats.

② Titanium float is factory default

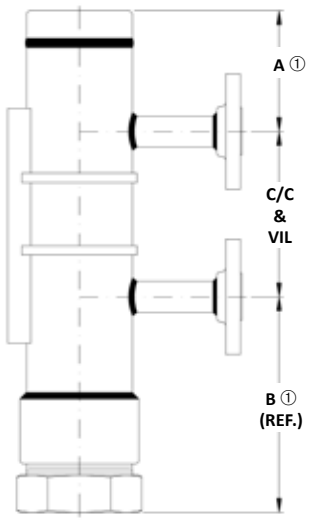
③ Code 99 is used for special float. Depending on the application, a factory-assigned code different from those listed is possible.

23-25 CENTER-TO-CENTER & VISUAL INDICATION LENGTH

X X X	Specify in **INCHES** (maximum = 212) when model code 2 is **E** Specify in **CENTIMETERS** (maximum = 538) when model code 2 is **M**

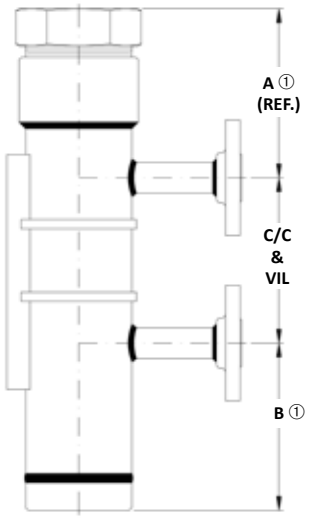
Example #1: Center-to-Center is 84 inches. Enter as 084. (model digit 2 must be "E")
Example #2: Center-to-Center is 124 centimeters. Enter as 124. (model digit 2 must be "M")
Example #3: Center-to-Center is 124.25 inches. Enter as 124 inches and X the model for 124.25 inches. Consult factory for assistance.
Example #4: Center-to-Center is 724 millimeters. Enter as 072 centimeters and X the model for 724 millimeters.
Consult factory for assistance.

DIMENSIONS in mm (inches) – only for PED construction (digit 6 = J)



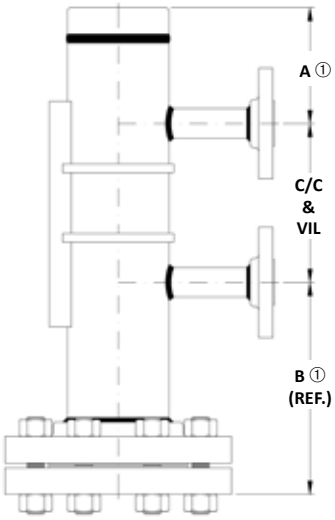
Digit 3 = A

Digit 16	Dim. 'A'
N, 3	120 (4.72)
1	180 (7.09)
2	210 (8.27)



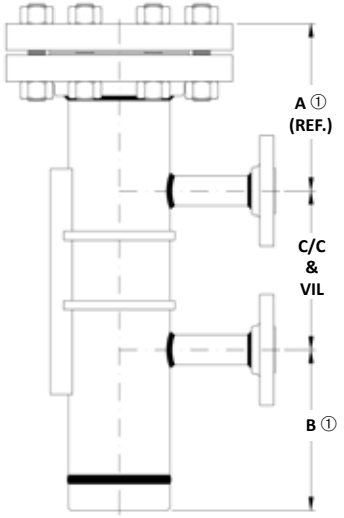
Digit 3 = B

Digit 16	Dim. 'A'
N, 3	170 (6.69)
2	270 (10.63)



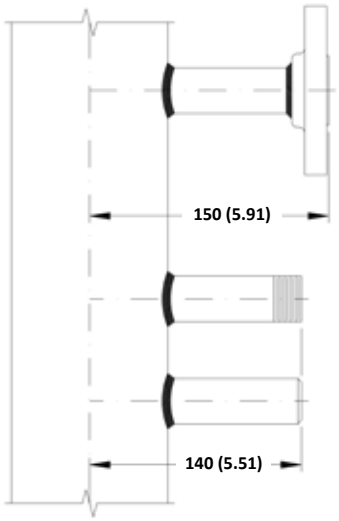
Digit 3 = 1

Digit 16	Dim. 'A'
N, 3	120 (4.72)
1	180 (7.09)
2	210 (8.27)



Digit 3 = 2

Digit 16	Dim. 'A'
N, 3	150 (5.91)
2	250 (9.84)



Digit 8 = A

Digit 8 = M

Digit 8 = P or R

Dim. 'B'		
Digit 22	Digit 16 = N, 1, 2	Digit 16 = 3
A	245 (9.65)	330 (12.99)
B	290 (11.42)	330 (12.99)
C	330 (12.99)	
D	375 (14.76)	
E	415 (16.34)	

① Dimension varies if an interface float is used.

ACCESSORIES

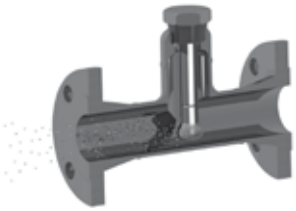
Electric point level switches

Model: OES
10 A DPDT snap action switch

Model: ORS
1 A SPDT reed switch

Magnetic particle trap

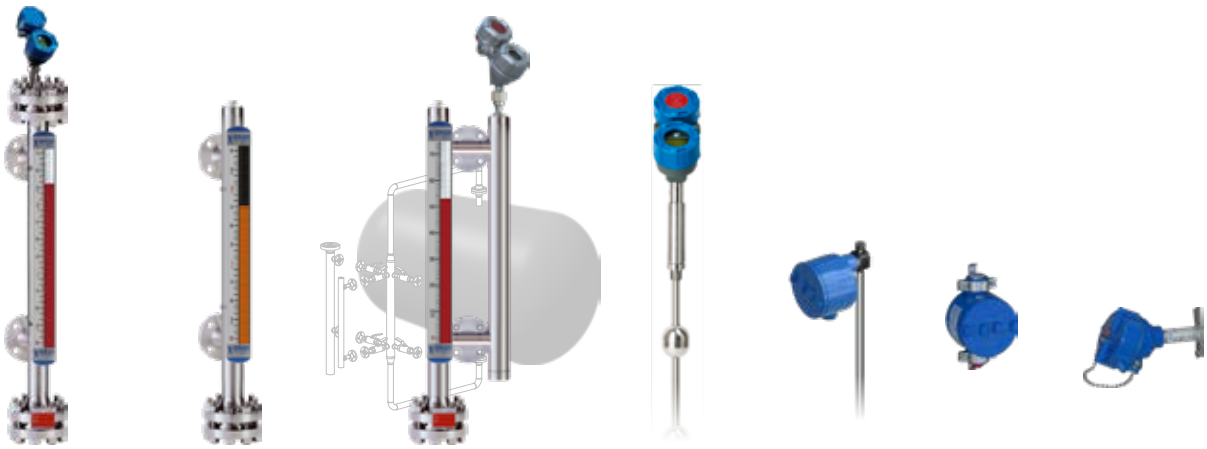
Ideal for process media containing ferrous particles. These particles can enter the MLI chamber and coat the magnetic float rendering it inoperable. The trap will collect these particles so that they can be periodically removed.



Continuous level transmitters

Model: Jupiter
Magnetostrictive transmitter

Other instrumentation technologies from Orion Instruments include the extensive MLI product line, magnetostrictive and other various switches and transmitters.



BULLETIN: ORI-140.4
EFFECTIVE: March 2021
SUPERSEDES: July 2020