

# JUPITER® 200

## Magnetostrictive Level Transmitter

Jupiter® is a product of Orion Instruments, a Magnetrol company

### DESCRIPTION

Jupiter® liquid level transmitters are 24 V DC, loop powered liquid level transmitters, utilizing the engineering principle of magnetostriction and the effect of a magnetic field on the magnetostrictive wire. Jupiter is available as a direct insertion transmitter or as an external mounted transmitter onto the Atlas® Magnetic Level Indicator. The unit can be designed for liquid level and/or liquid-liquid interface measurement.

The innovative enclosure is a first in the industry, orienting dual compartments (wiring and electronics) in the same plane and angled to maximize ease of wiring, configuration, set-up and data display.

The high safety level of the Jupiter is demonstrated by a Safe Failure Fraction of > 90%.

### FEATURES

- \* High precision and repeatable level measurement:
  - accuracy up to ± 0,4 mm (0.015")
  - repeatability of ± 0,13 mm (0.005").
- \* Easy bench configuration – no need for level simulation.
- \* Two – wire, intrinsically safe loop powered level transmitter.
- \* Dual compartment with separate housing for wiring and electronics.
- \* Two-line, 8 character LCD and 3 button keypad.
- \* Process temperature up to +455 °C (+850 °F) (external mount) / +260 °C (+500 °F) (direct insertion).
- \* Process pressure up to 26,2 bar (380 psig) – custom floats up to 115 bar (1700 psig).
- \* Probe lengths up to 5,70 m (19 ft).
- \* Float failure reporting.
- \* Suited for SIL 1/2 or SIL 2/3 loops (full FMEDA report by Exida available).



### APPLICATIONS

#### MEDIA:

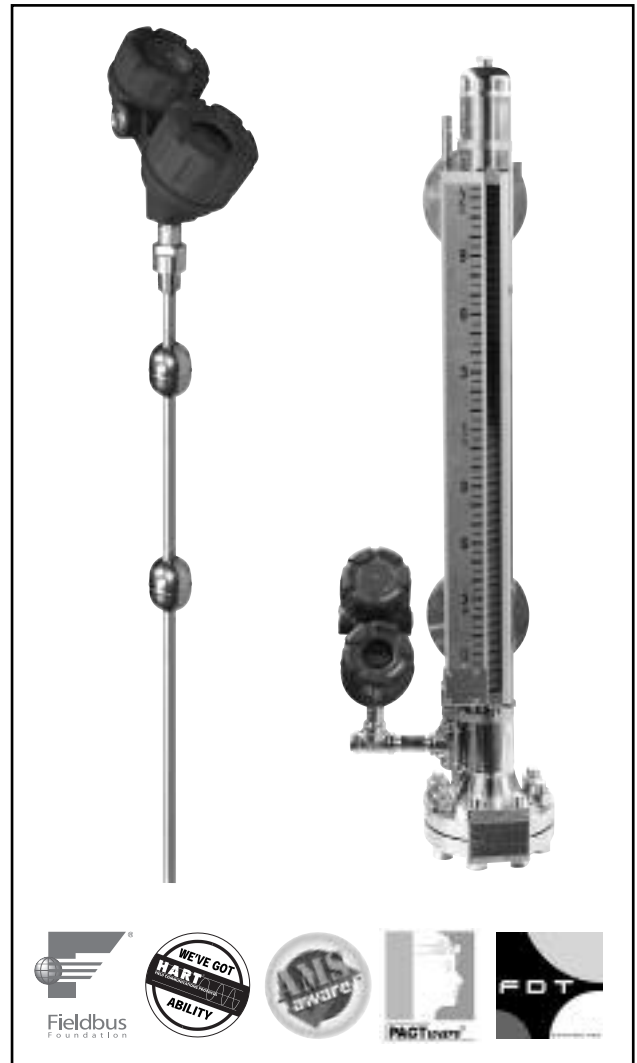
Clean liquids with min. S.G. down to 0,52 kg/dm<sup>3</sup> (direct insertion model).

Clean liquids and slurries (external mount model) - S.G. depends on MLI float.

**VESSELS:** Most process or storage vessels up to rated probe temperature and pressure.

**CONDITIONS:** All level measurement and control applications including process conditions exhibiting visible vapors, foam, surface agitation, bubbling or boiling, high fill/empty rates, low level.

### Measures «LEVEL» and «INTERFACE»

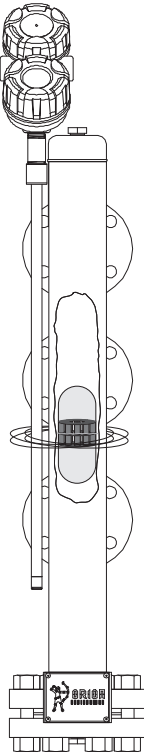


### AGENCY APPROVALS

Agency	Approvals
ATEX Ex	II 1 G EEx ia IIC T4, intrinsically safe II 1 G EEx ia IIC T4, FISCO – FF intrinsically safe II 1 / 2 G EEx d IIC T6, explosion proof
FM/CSA®	Non Incendive / Intrinsically safe / Explosion proof
LRS	Lloyds Register of Shipping (marine applications) (pending)
RosTECH/FSTS GOST-K/GGTN-K	Russian Authorisation Standards (pending)

① Consult factory for proper partnumbers

## TECHNOLOGY



The Enhanced Jupiter transmitter utilizes the engineering principle of magnetostriction and the effect of a magnetic field on the magnetostrictive wire as the basis for operation of the instrument. The primary components are the probe assembly containing the wire and the electronics assembly.

A low energy pulse which is generated by the electronics travels the length of the magnetostrictive wire. A return signal is generated from the precise location where the magnetic field of the float intersects the wire. A timer precisely measures the elapsed time between the generation of the pulse and the return of the mechanical or acoustic signal. This is detected by the acoustic sensor located below the electronics housing. The software is set up to measure the time-of-flight data and to display and convert to level and/or liquid-liquid interface measurement.

## PACTware® PC SOFTWARE PROGRAM

PACTware PC software and the new Field Device Tool (FDT) standard take level measurement to a new level of setup efficiency and user-friendliness. The powerful Jupiter® transmitter with its linear program is easy to use. PACTware builds on that ease of use by adding a graphical software interface. Simply connect your PC through the HART® loop and all functionality can be accessed quickly, conveniently, and safely.

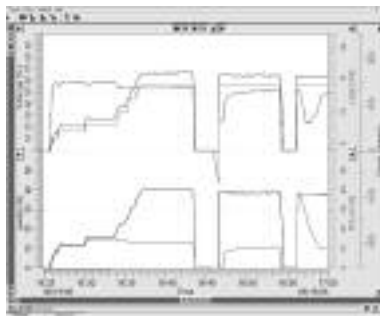
Refer to PACTware bulletins 59-101 and 59-601 for more information.



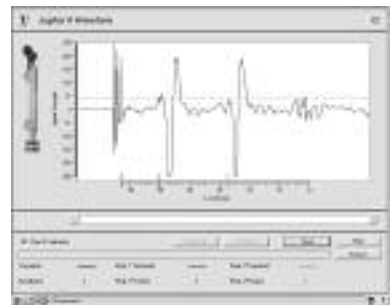
### ONLINE PARAMETERS



### PROCESS TREND



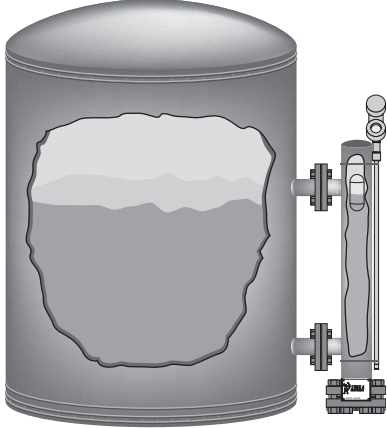
### WAVEFORM



## APPLICATIONS

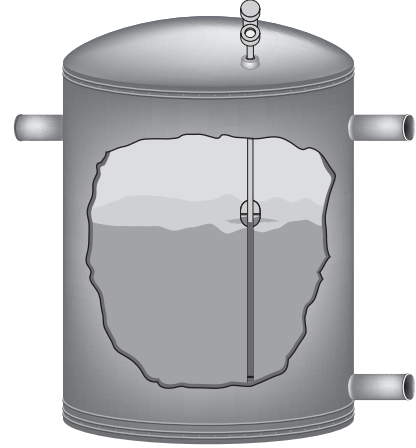
As direct insertion model: Jupiter can be mounted inside a bridle, stillwell, external cage or directly inside the vessel.  
As external mount model: Jupiter can be mounted on a new ordered Atlas® magnetic level indicator. (See sales bulletin 46-138.)

### EXTERNALLY MOUNTED TO ATLAS CHAMBER



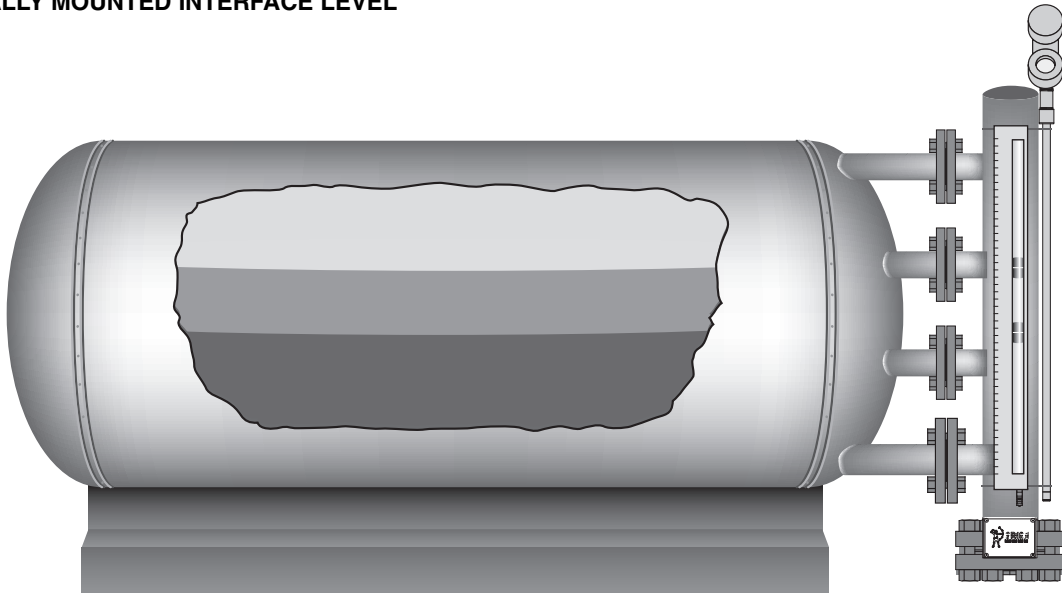
For applications with process temperatures up to +455 °C  
(+850 °F) with factory insulated MLI

### DIRECT INSERTION



For applications with process temperatures up to +260 °C  
(+500 °F)

### EXTERNALLY MOUNTED INTERFACE LEVEL



Jupiter displays overall level and interface level when equipped with two floats.  
Two-float option is also available with direct insertion model.

## SAFETY INTEGRITY LEVELS 1 & 2

Jupiter® is the only magnetostrictive transmitter to achieve SIL 2 classification as 1oo1 device per IEC 61508. The below table offers the possibility to compare on a one-to-one basis, the SIL performance of Jupiter with other level transmitters.

1oo1: One-out-of-one device means the suggested SIL class by the manufacturer is achieved by a single transmitter. The use of 2 transmitters to achieve a higher SIL classification is often stated as 1oo2 (one out of two) devices.

SFF: Safe Failure Fraction is the ratio between detected (safe and dangerous) and undetected (safe) instrument failures versus total failures by the instrument. The % of this ratio is preferably as high as possible.

PFDavg: Average probability of failure on demand. This value is preferably as low as possible.

For more complete information, ask for the Jupiter FMEDA report by Exida.

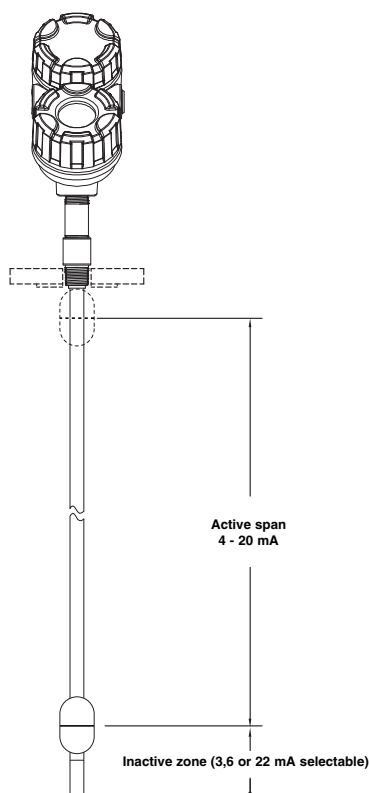
	Standard electronics		SIL enhanced electronics	
	FITS	Annual	FITS	Annual
SIL	1 as 1oo1		2 as 1oo1	
Intrument Type	B		B	
SFF	83,7 %		90,7 %	
PFDavg	9,60E-04		5,45E-04	
Fail Dangerous Undetected	218	1,91E-03	123	1,08E-03
Fail Dangerous Detected	698	6,11E-03	793	6,95E-03
Safe	421	3,69E-03	413	3,62E-03



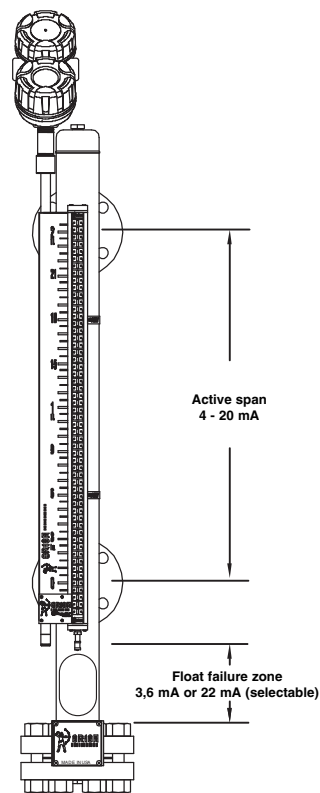
Ask for our SIL manual 41-299

## FLOAT FAILURE IDENTIFICATION

The Jupiter® 200 with SIL enhanced electronics is either using a probe with inactive zone or an extended MLI cage to identify a sinking or collapsed float as a float failure. Jupiter® 200 with SIL enhanced electronics are equipped with one float for measuring either the top level or the interface level.



Direct insertion



External mount

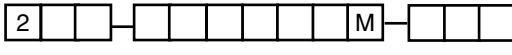
# SELECTION DATA

## A complete measuring system consists of:

1. Jupiter 200: transmitter and probe (MLI or cages as shown in this bulletin are not included).
2. OPTION: secondary float for interface applications (specify S.G. for lower liquid).
3. OPTION: ATLAS®. Magnetic level indicator for use with Jupiter 200, external mount model. Consult bulletin 46-138.
4. Free of charge: Magnetrol master C.D. with Jupiter 200 DTM (FACTware®). Order code: **090-BE59-200** (included in each order).

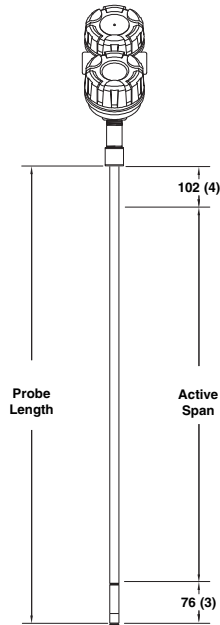
### Dimensions in mm (inches) – external mount Jupiter® 200

Specify probe length in cm increments

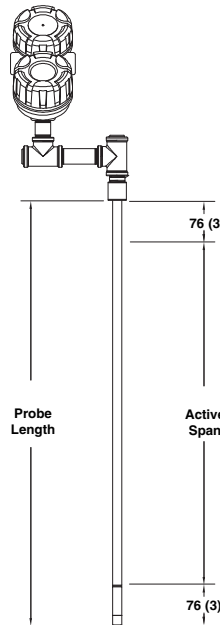


See page 7 & 9

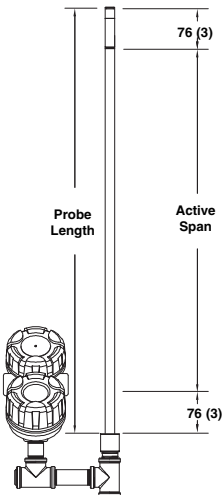
015 = min 15 cm (6")  
570 = max 570 cm (224")



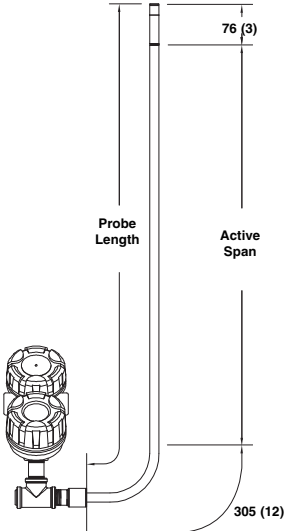
**External mount  
Top mount**



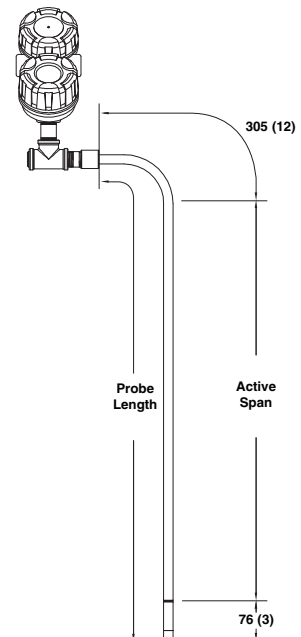
**External mount  
Top mount with offset**



**External mount  
Bottom mount with offset**

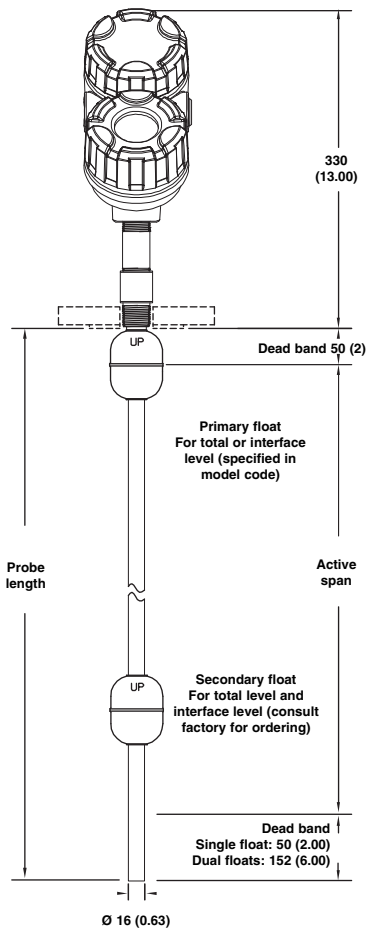


**External mount  
Bottom mount - high temp.**

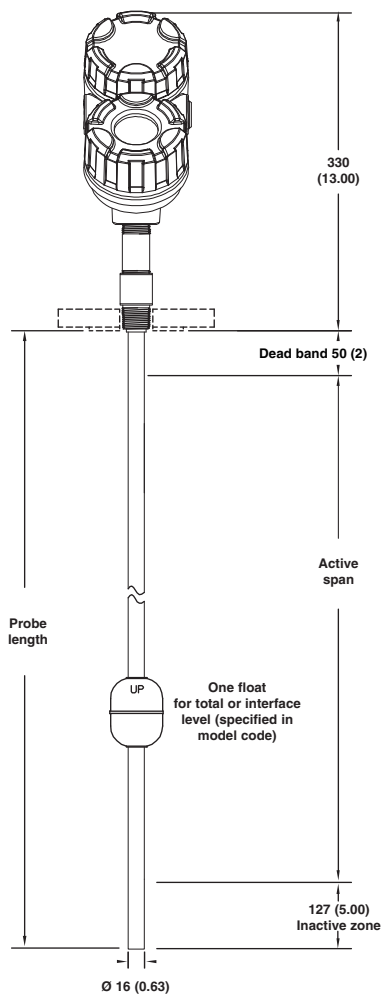


**External mount  
Top mount - high temp.**

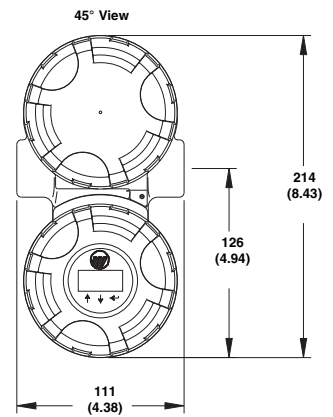
# DIMENSIONS in mm (inches)



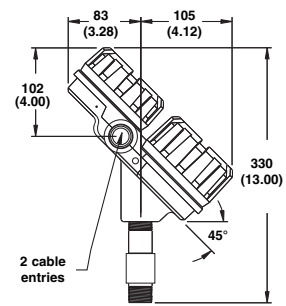
Standard electronics



SIL enhanced electronics

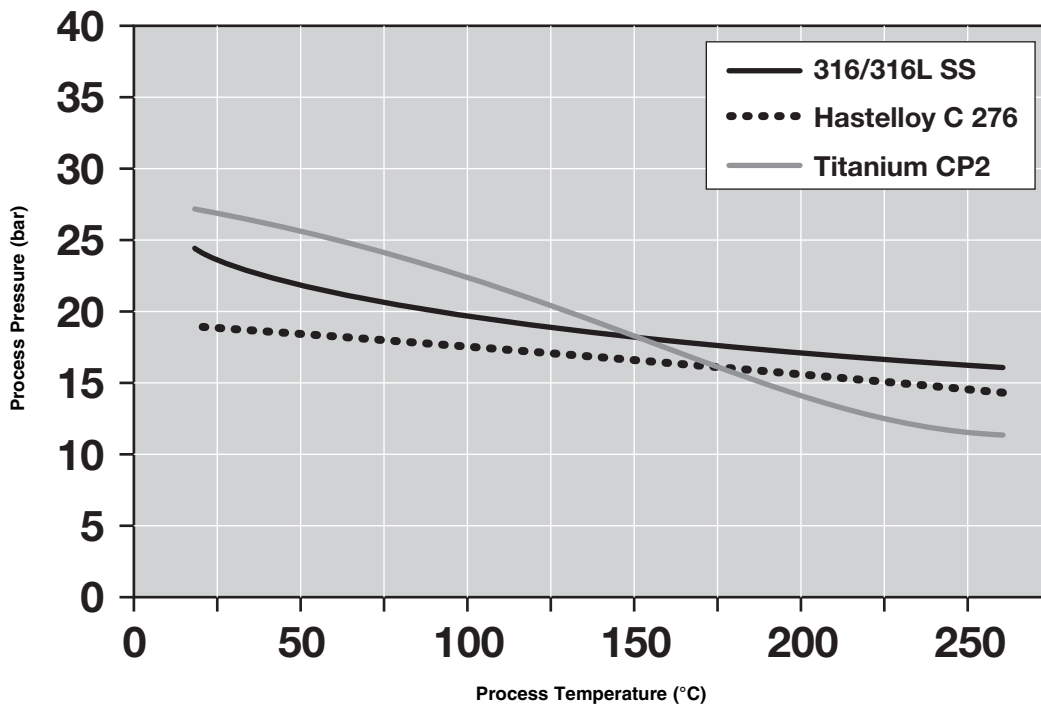


Jupiter Housing, (45° View)



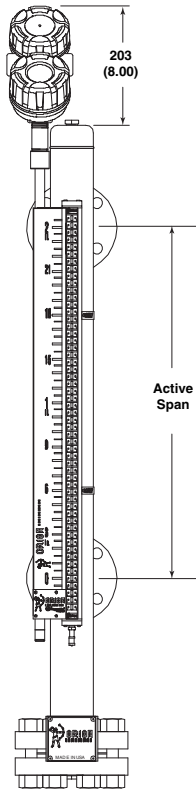
Jupiter Housing

## PRESSURE/TEMPERATURE

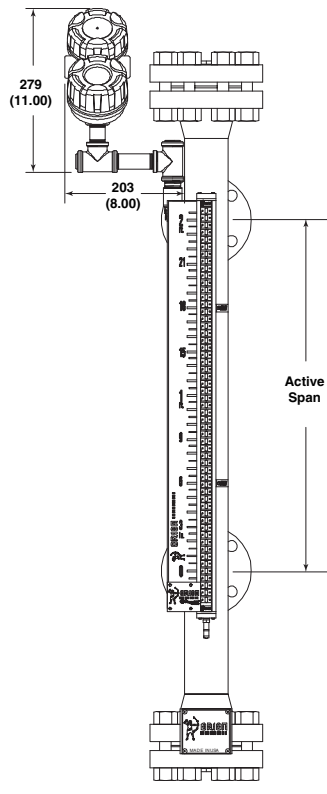




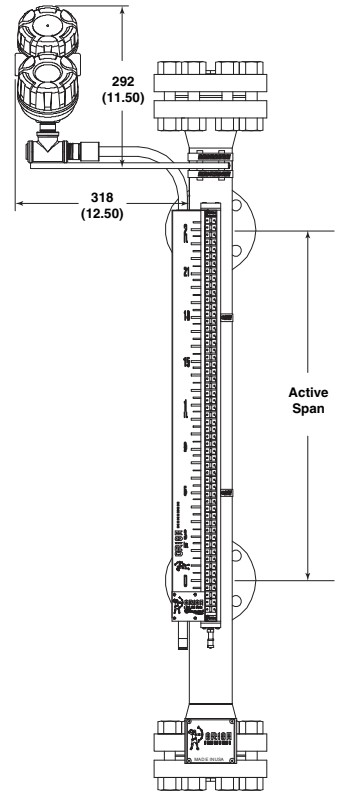
DIMENSIONS in mm (inches)



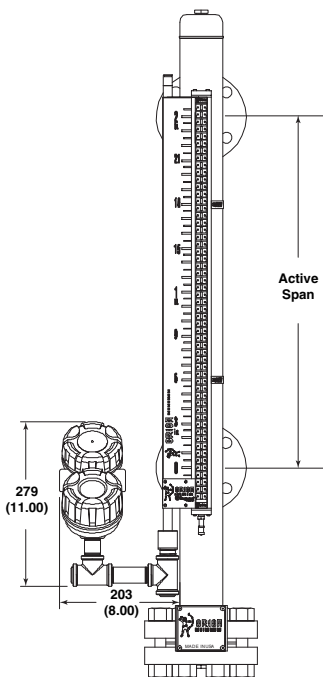
Top mount



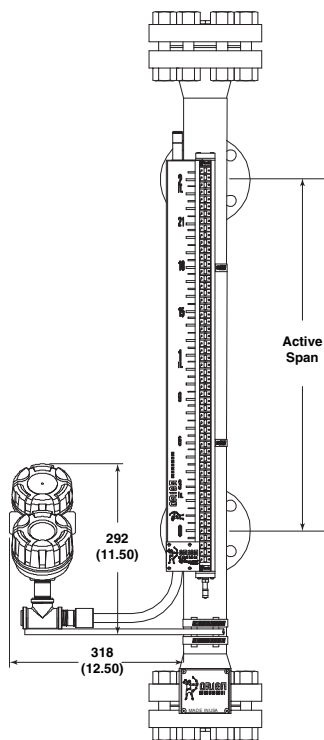
Top mount offset



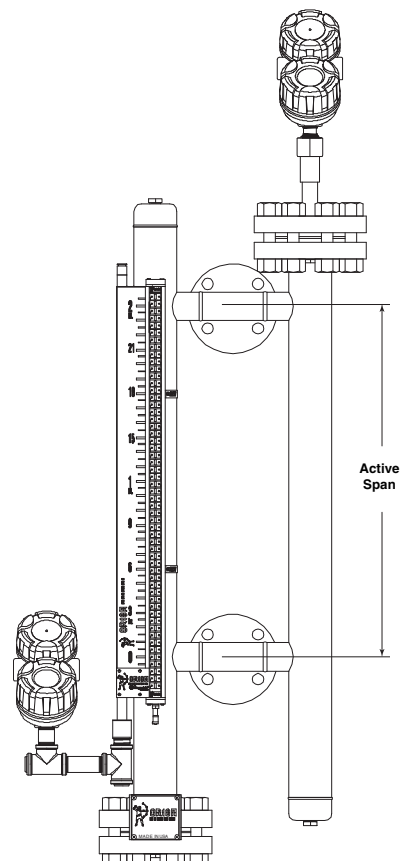
Top mount offset  
High Temperature Bend



Bottom mount offset



Bottom mount offset  
High Temperature Bend



Bottom mount offset  
and secondary transmitter - Gemini



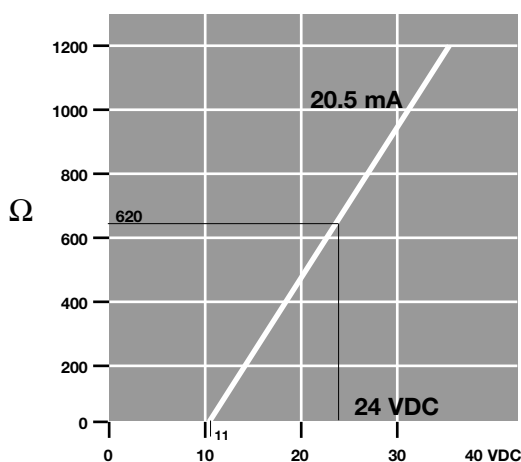
# TRANSMITTER SPECIFICATIONS

## FUNCTIONAL/PHYSICAL

Description		Specification
Power (at terminals)		General Purpose / ATEX Intrinsically Safe: 12 to 28,4 V DC ATEX Explosion Proof: 12 to 32 V DC Foundation Fieldbus (FISCO ATEX Exi): 9 to 17,5 V DC
Power consumption		0,7 W
Signal Output		4-20 mA with HART®, 3,8 mA to 20,5 mA useable (meets NAMUR NE 43) or Foundation Fieldbus H1 (ITK Ver. 4)
Probe Length		15 to 570 cm (6 to 224"). Consult factory for longer lengths
Resolution		Analog: 0,01 mA Display: 0,1 units
Loop Resistance (see table below)		620 Ω @ 20,5 mA - 24 V DC
Damping		Adjustable 0-25 s
Diagnostic Alarm		Selectable 3,6 mA, 22 mA or hold
User Interface		HART® communicator, AMS® or PACT <i>ware</i> ®, Foundation Fieldbus and/or 3-button keypad
Display		2-line x 8-character LCD. Displays level (cm/inches), mA and % of level.
Menu Language		English and Spanish
Housing Material		IP 66/Aluminium A356T6 (< 0.20 % copper) or stainless steel
Approvals		ATEX II 1 G EEx ia IIC T4, intrinsically safe ATEX II 1 G EEx ia IIC T4, FISCO - FF intrinsically safe ATEX II 1 / 2 G EEx d IIC T6, explosion proof FM and CSA, Non incendive, intrinsically safe (FISCO) and explosion proof LRS – Lloyds Register of Shipping (marine applications) – pending GOST-K/GGTN-K – RosTECH/FSTS – Russian Authorisation Standards – pending
SIL <sup>①</sup> (Safety Integrity Level)	Standard electronics	Functional safety to SIL 1 / SIL 2 in accordance to 61508 – SFF of 83,7 % – full FMEDA reports and declaration sheets available at request
	Enhanced electronics	Functional safety to SIL 2 / SIL 3 in accordance to 61508 – SFF of 90,7 % – full FMEDA reports and declaration sheets available at request
Electrical Data		U <sub>i</sub> = 28,4 V, I <sub>i</sub> = 94 mA, P <sub>i</sub> = 0,67 W U <sub>i</sub> = 17,5 V, I <sub>i</sub> = 380 mA, P <sub>i</sub> = 5,32 W (Foundation Fieldbus)
Equivalent Data		C <sub>i</sub> = 2,2 nF, L <sub>i</sub> = 3 μH C <sub>i</sub> = 0,71 nF, L <sub>i</sub> = 3 μH (Foundation Fieldbus)
Environmental protection		EN 60654-1
Drop protection		EN 50178
Surging protection		EN 61326 (1000V)
Net and Gross Weight	Cast aluminium	2,70 kg net; 3,20 kg gross – amplifier only
	Stainless steel	5,70 kg net; 6,20 kg gross – amplifier only
Foundation Fieldbus specifications	ITK Version	4.61
	H1 Device Class	Link Master (LAS) – selectable ON/OFF
	H1 Profile Class	31PS, 32L
	Function Blocks	1 x RB(s), 2 x AI (s) and 1 x TB (c)
	Quiescent current draw	15 mA
	Execution time	15 ms
CFF files		Downloads available from Host system supplier or <a href="http://www.fieldbus.org">www.fieldbus.org</a>

① Not applicable for Foundation Fieldbus units.

## POWER CONSUMPTION



## PERFORMANCE

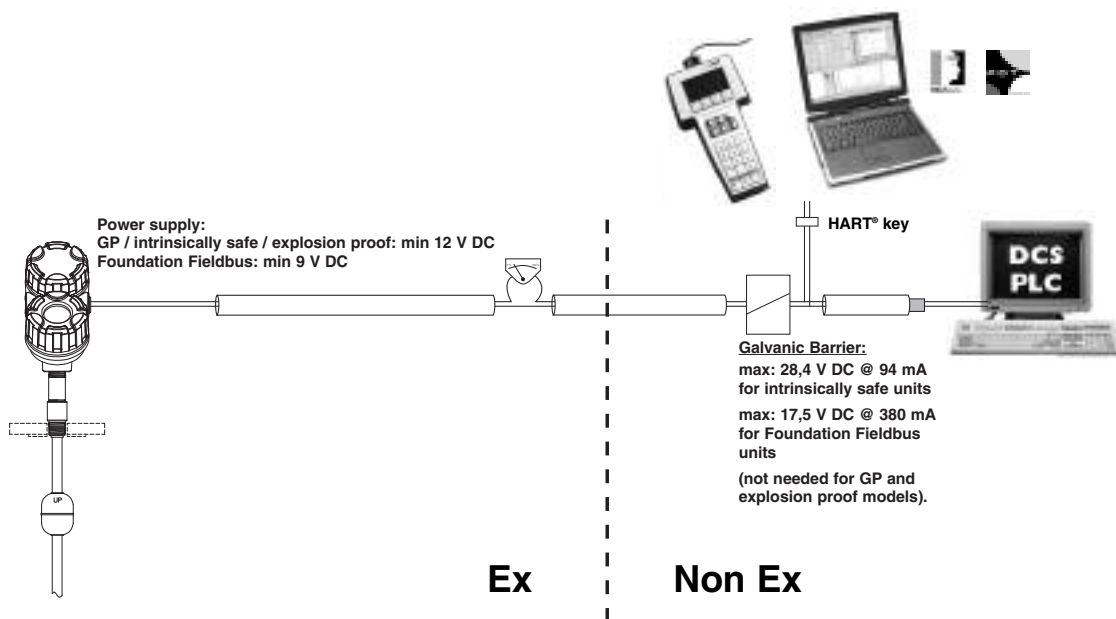
<i>Description</i>	<i>Specification</i>
Accuracy	± 0,4 mm (0.015")
Repeatability	± 0,005 % of full span or 0,13 mm (0.005") – whichever is greater
Linearity	± 0,020 % of full span or 0,79 mm (0.031") – whichever is greater
Max fill / drain rate	9 m/min (30 ft/min)
Response Time	< 0,1 second
Warm-up Time	< 5 seconds
Ambient Temp.	-20 °C to +70 °C (-5 °F to +160 °F)
Humidity	0-99 %, non-condensing
Electromagnetic Compatibility	Meets CE requirements (EN-61000-6-4, EN 61000-6-2)

## PROBE SPECIFICATIONS

<i>Description</i>		<i>Specification</i>
Materials	Probe	316/316L (1.4401/1.4404) standard or electropolished finish Hastelloy C <sup>®</sup> (2.4819) or Monel <sup>®</sup> (2.4360)
	Float	316 (1.4401), 316L (1.4404), Titanium or Hastelloy C <sup>®</sup> (2.4819)
	Process seal	None, welded construction
Probe diameter		16 mm (0.63")
Float diameter (for direct insertion models only)		Min 47 mm (1.85") – max 65 mm (2.55") see partnumber on page 7
Probe length		Min 15 cm (6") – max 570 cm (224") selectable per 1 cm increments
Dead band	Upper	Direct insertion model: 50 mm (2"). External mount model: depending configuration.
	Bottom	50 mm (2") – for units with standard electronics and single float 152 mm (6") – for units with standard electronics and dual floats
Inactive zone - bottom		127 mm (5") – for units with SIL enhanced electronics
Process temperature	Direct insertion	-40 °C to +95 °C (-40 °F to +200 °F) – standard probe -40 °C to +260 °C (-40 °F to +500 °F) – high temperature probe
	External mount	-40 °C to +120 °C (-40 °F to +250 °F) – standard -196 °C to +455 °C (-320 °F to +850 °F) – with factory insulated MLI
Process Pressure <sup>①</sup>	316 and 316L	Max 22,8 bar @ +40 °C (330 psig @ 100 °F)
	Titanium	Max 26,2 bar @ +40 °C (380 psig @ 100 °F)
	Hastelloy C	Max 18,6 bar @ +40 °C (270 psig @ 100 °F)
Vacuum service		Full vacuum

<sup>①</sup> Consult factory for higher pressure (custom float).

# ELECTRICAL WIRING



## QUALITY ASSURANCE - ISO 9001:2000

THE QUALITY ASSURANCE SYSTEM IN PLACE AT MAGNETROL GUARANTEES THE HIGHEST LEVEL OF QUALITY DURING THE DESIGN, THE CONSTRUCTION AND THE SERVICE OF CONTROLS. OUR QUALITY ASSURANCE SYSTEM IS APPROVED AND CERTIFIED TO ISO 9001:2000 AND OUR TOTAL COMPANY IS COMMITTED TO PROVIDING FULL CUSTOMER SATISFACTION BOTH IN QUALITY PRODUCTS AND QUALITY SERVICE.

## PRODUCT WARRANTY

ALL JUPITER® 200 LEVEL CONTROLS ARE WARRANTED FREE OF DEFECTS IN MATERIALS AND WORKMANSHIP FOR FIVE FULL YEARS (MECHANICAL PARTS) / ONE FULL YEAR (ELECTRONIC PARTS) FROM THE DATE OF ORIGINAL FACTORY SHIPMENT.

IF RETURNED WITHIN THE WARRANTY PERIOD; AND, UPON FACTORY INSPECTION OF THE CONTROL, THE CAUSE OF THE CLAIM IS DETERMINED TO BE COVERED UNDER THE WARRANTY; THEN, MAGNETROL INTERNATIONAL WILL REPAIR OR REPLACE THE CONTROL AT NO COST TO THE PURCHASER (OR OWNER) OTHER THAN TRANSPORTATION.

MAGNETROL SHALL NOT BE LIABLE FOR MISAPPLICATION, LABOR CLAIMS, DIRECT OR CONSEQUENTIAL DAMAGE OR EXPENSE ARISING FROM THE INSTALLATION OR USE OF THE EQUIPMENT. THERE ARE NO OTHER WARRANTIES EXPRESSED OR IMPLIED, EXCEPT, SPECIAL WRITTEN WARRANTIES COVERING SOME MAGNETROL PRODUCTS.



BULLETIN N°:  
EFFECTIVE:  
SUPERSEDES:

BE 46-148.0  
MARCH 2007  
New

UNDER RESERVE OF MODIFICATIONS

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## OUR NEAREST REPRESENTATIVE