JERGUSON®

Magnicator® II

Magnetic Liquid Level Indication Products

The *Magnet* Matters

Includes

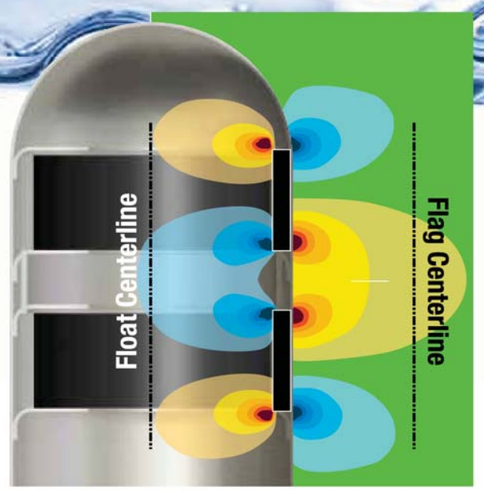
- ***High Pressure***
- ***Cryogenic***
- ***LNG & Light Ends Solutions***

A Superior Float Magnet

Creates a Superior Level Indicator

Magnicator® II

Magnetic Liquid Level Indication Products

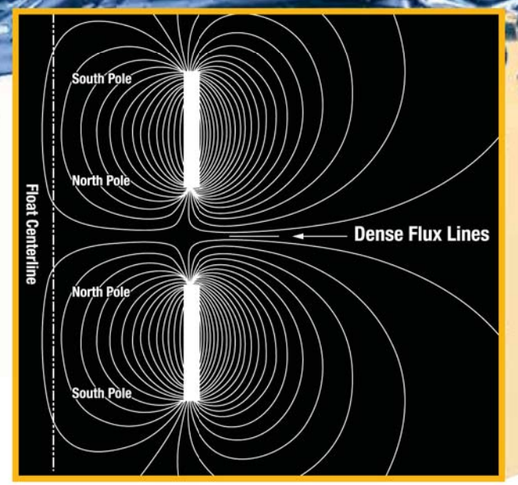


Magnetic Field Density Diagram of Magnicator II Float

Reliability is in the physics. A uniquely strong north magnetic field activates flags, switches and transmitters with a certainty not found elsewhere because only the Magnicator II has a magnet arrangement this powerful, and this focused.

If you are looking for reliable performance from a magnetic level indicator, start with the float magnet. The stronger and more focused the magnetic field of the float, the more reliable the level indicator...and the more reliable the function of magnetically-actuated flag indicators, switches and transmitters.

The Jerguson Magnicator II float has the strongest magnetic field of any magnetic level indicator. Its patented design (U.S. Patent 5,743,137) uses two 360º annular Alnico 8 ring magnets with opposing north poles.



Magnetic Flux Density Plot of Magnicator II Float

Opposing magnetic poles project concentrated flux lines away from the outside diameter of the magnets. This forced deflection creates a stronger field than any other float magnet arrangement, greater than 90 Gauss at the centerline of the indicator flags. Physics has guaranteed that the Magnicator float has the strongest magnetic field...which translates to the most reliable instrument.

Magnicator II Float

Typical Float from other Manufacturer

Typical floats from other manufacturers employ a circular array of Alnico 5 Bar Magnets. Other brands use a single ring magnet. Neither can produce as intense a magnetic field as the Magnicator II float.

How it Works

The Magnicator II gage is connected to a process vessel. The chamber, or "column," contains a sealed float with a permanent magnet assembly which rises and falls as the liquid level changes in the process vessel.

The indicator housing is parallel to the gage column but completely isolated from process liquid. Indicator flags are rotated by the float magnet assembly as it moves up and down in the chamber.

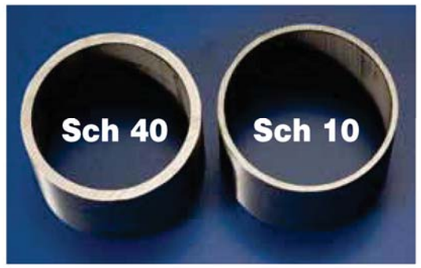
Magnetic liquid level gages are an attractive alternative to sight glasses for many applications. They provide improved visibility, reduced maintenance and eliminate the leak paths associated with sealing glass.

Robust Construction *Inside and Out*

Your demanding application deserves a gage with the guts to stick it out for a long, long time. In addition to complying with ASME B31.1 for power piping and ASME B31.3 for process piping, all Magnicator® II Magnetic Level Gages incorporate additional design and construction benefits you will not find on any comparable product:

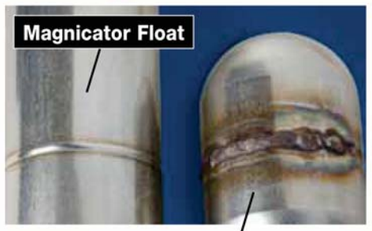
Schedule 40 Chamber Construction is Standard

Most other magnetic level gages are offered as Sch 10, with an upgrade to Sch 40 available. Since most plant piping specifications prohibit Sch 10 pipe, this can be misleading. The difference between Sch 10 and Sch 40 is substantial, with a lower pressure rating and a much greater chance of damage during shipping, handling and construction. For even higher pressures, we offer Sch 80 and Sch 160 chambers, see page 13 for details. This is directly related to the strength of our patented float magnet assembly. No other magnetic level indicator can function as reliably with such robust piping.



Schedule 40 construction is standard for Magnicator II gages. Rated to 2200 psi @ 100° F per ASME B31.3

Schedule 10 is not appropriate for most process applications. Rated to 1200 psi @ 100° F per B31.3



Smooth Autogenous Welds

All Magnicator II floats have full penetration autogenous welds. This means an orbital welding machine has fusion-welded the two halves using only heat and no filler metal. This process—the same used for high purity and sanitary tubing—produces an ultra-smooth weld, without a bead which could interfere with the float's motion.

Superior Indicators Mean *You Can Trust What You See*

Jerguson recommends flag indicators for virtually all applications, so flags come as standard on Magnicator® II products*. However, there is nothing "standard" about their design and construction. They are the most reliable, shock-resistant and longest lasting available.

* (Follower-style indicators are available as an option – see Options & Accessories, *page 12*.)

The Jerguson Flag

- Each flag is a single stainless steel precision stamping with its own permanent ceramic magnet
- Each flag has dual rotation points and is free to rotate, a redundancy plastic flags do not have

- At rest, each flag is strongly attracted to each adjacent flag of the same color, with an active magnetic field of 200 Gauss at leading edges

This attraction can only be broken by a magnetic field strong enough to cause the flags to rotate (the Magnicator II float assembly), making each flag assembly ***extremely shock and vibration resistant***

Potential Problems with Other Manufacturers' Indicators

Anodized aluminum or plastic flag construction:

- Flags can fade with exposure to UV light (sunlight) or temperatures over 500ºF (260ºC)
- Rough edges of metal burr or flags can get caught in track

Heat has faded these anodized aluminum flags to make them nearly indistinguishable.

This style relies on colored stickers applied to plastic flags.

Followers are "single-point" indicators, versus "multiple-point" flag style indicators. With 2 1/2 flags per inch, if you "lose" one flag (which is unlikely), you still have many working to indicate level.

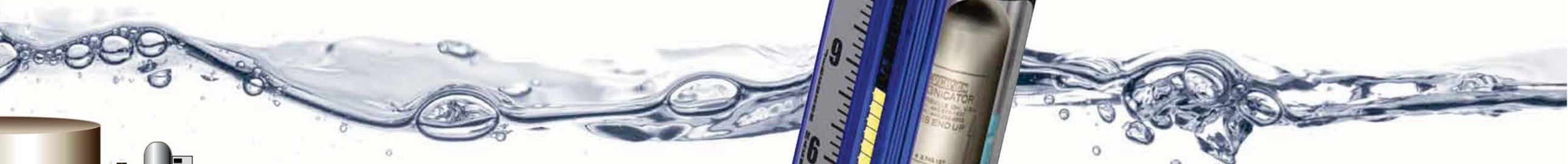
- Vibration (water hammer), rapid movement and turbulence can cause a follower to be "dropped"
- Weak magnetic couplings between flags and float magnet can lead to false trips as shown

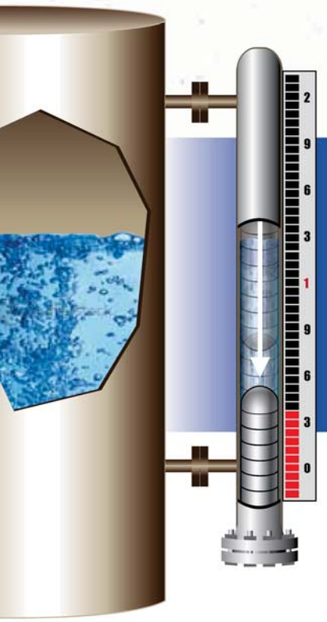
Fallen Follower

False Trips

FlashProof Magnicator® Products

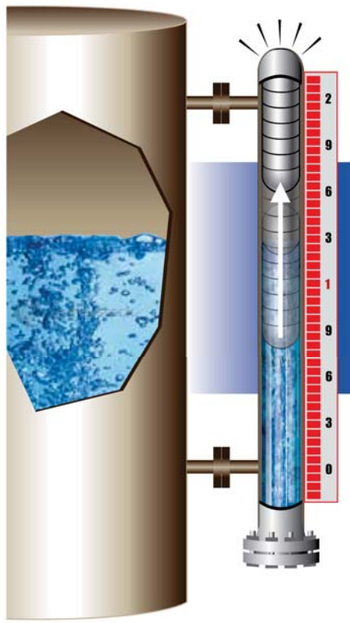
Avoid False Readings in Boiling Fluids and Eliminate Crushed Floats Due to Flashing





Boiling Fluids

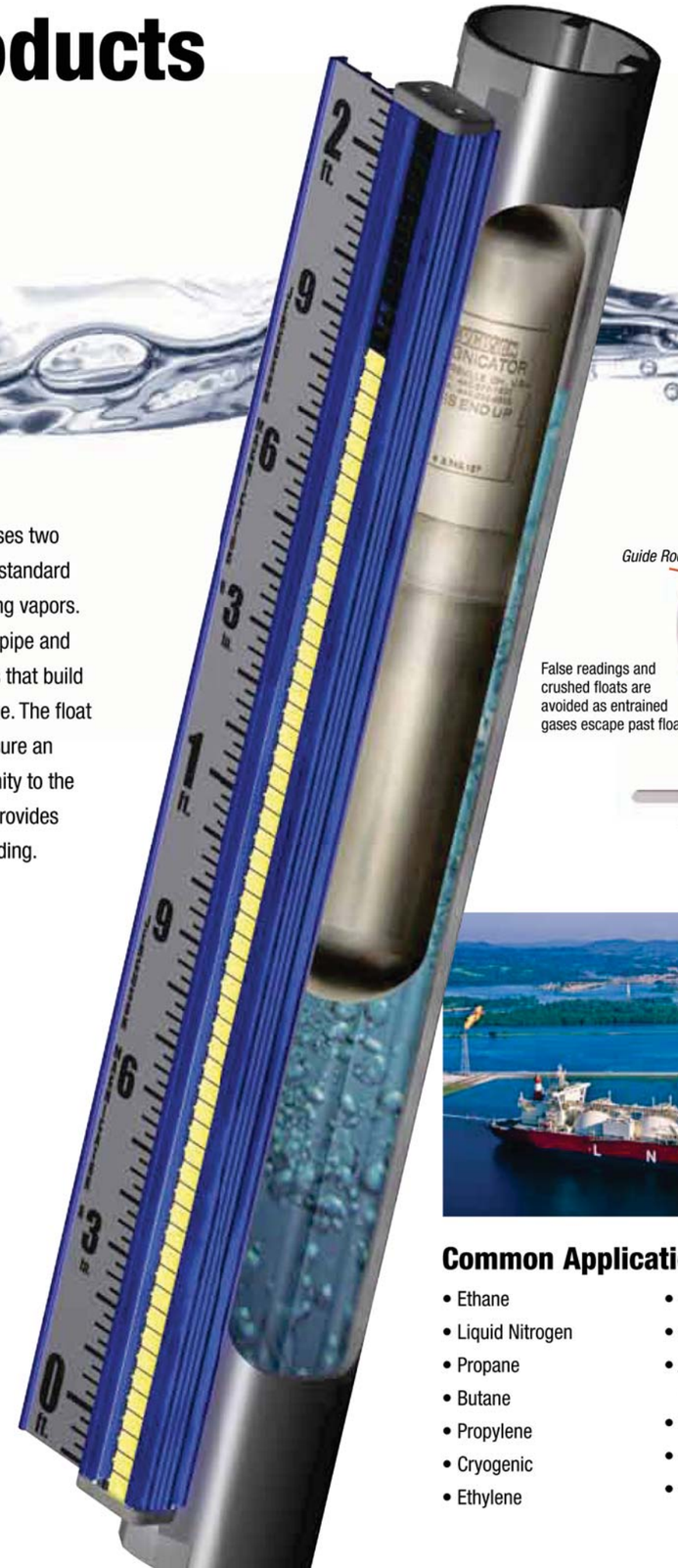
Boiling fluids can cause the float to sink in a traditional level indicator. This situation is common when there are substantial temperature differences between the fluid in a vessel and the fluid in a gage (Think: cold liquid in vessel; hot summer day for gage.)

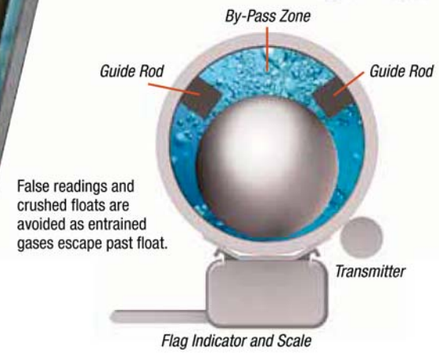


Flashing Vapors

Flashing vapors can cause a float to accelerate upwards rapidly, crashing into the top of the chamber due to depressurization.

The Jerguson FlashProof design addresses two potential problems that may occur with standard level indicators: boiling fluids and flashing vapors. By employing a larger (3") Schedule 40 pipe and two internal guide rods, entrained gases that build up under the float can harmlessly escape. The float is held to one side of the chamber to insure an optimized magnetic field in close proximity to the indicator, transmitter or switches. This provides an accurate float level and indicator reading.





TOP VIEW

Common Applications

- Ethane
- Liquid Nitrogen
- Propane
- Butane
- Propylene
- Cryogenic
- Ethylene
- Methane
- Carbon Dioxide
- Anhydrous Ammonia and other refrigerants
- LPG
- LNG
- Light End Hydrocarbons

FlashProof Indicator

Specification Overview

- Larger diameter chamber with float guides
- Complies to ASME B31.1 and ASME B31.3
- Available with full range of Jerguson indicators, transmitters and switches
- Schedule 40 pipe chamber as standard
- Size Range from 12" to 240" (304mm to 6090mm) vessel centers (Consult factory for longer units)
- Specific gravity minimum: 0.32
- Pressure class rating up to 1900 psi (131 bar) @ 100ºF (37ºC) as per ASME B31.3 (Higher pressures are available with larger diameter chambers.)
- Temperature Range: -325ºF to 1000ºF (-198ºC to 537ºC)

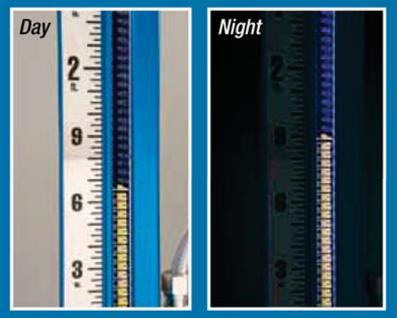
NightStar LED Illuminators Provide *24 Hour Visibility*

Here's a Really Bright Idea

NightStar Indicators for the Magnicator® II make a level gage continuously visible... night or day with bright LED illumination. No more flashlight searches, no more spending more time than needed in process areas.

NightStar Illuminators provide an array of bright LEDs to shine on standard mechanical flag indicators. No light or low-light, the operator can easily and reliably verify level.

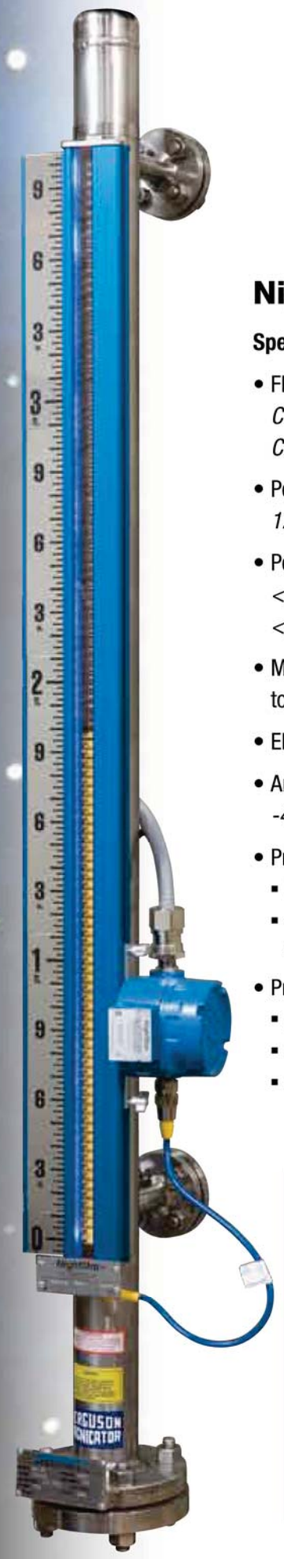
- High contrast indication
- Not angle dependent – viewer can see clearly from many positions
- Reduced operator exposure in process areas can increase safety
- LEDs have a nominal life of 10 years
- Approved for use in Class 1, Div. I classified locations



NightStar LED base illuminator for the Magnicator® II

An Easy Upgrade for Any Magnetic Level Gage

NightStar Indicators can be field-upgraded on any Jerguson magnetic gage, or other manufacturer's gage, by replacing both the float and indicator.



NightStar Indicator

Specification Overview

- FM & CSA Approval to:
  Class I, Div. I, Grps. B, C, & D
  Class II, Div. II, Grps. E, F, & G
- Power Supply:
  120 or 240 VAC
- Power Consumption:
  < 750 mA @ 120 VAC
  < 375 mA @ 240 VAC
- Max. Remote Distance from Power Supply to Light Strip = ~80 feet (24.3m)
- Electrical Connection: 3/4" FNPT
- Ambient Temperature:
  -40ºF (-40ºC) to 170ºF (77ºC)
- Process Temperature:
  - *Up to 450ºF (232ºC)*
  - *450ºF (232ºC) to 600ºF (316ºC) with air purge kit on indicator*
- Protection Methods:
  - *Explosion-proof power supply*
  - *Intrinsically-safe lighting circuit*
  - *NEMA 4X design*

> "Not only have the Jerguson magnetic gauges become the standard for our FCCU in Marcus Hook, but our operators specifically request the NightStar on all models we install."
>
> **– Beth Lavine,**
> *Project Specialist*
> Sunoco-Philadelphia Refinery

Magnicator® II Gage *with Guided Wave Radar*

Redundant Sensing Technologies for the Ultimate in Reliable Level Indication

By combining guided wave radar (GWR) with a magnetic level gage, the Magnicator® II Guided Wave Radar (MGWR) brings a new standard of assurance to level indication.

The primary advantage of a guided wave radar (GWR) transmitter over a Magnetostrictive or Reed Switch transmitter is that the GWR transmitter is an independent device that does not rely on the float's magnetic field to obtain a reading. A Magnetostrictive or Reed Switch transmitter measures the position of the float inside the magnetic gage, while the GWR transmitter detects the actual fluid level.

The GWR transmitter obtains an independent reading of the liquid level, providing an accurate output even in the case of a float failure. Also, the GWR transmitter will read the true level of the fluid, even if the density of the product varies. With a magnetic gage, the float is sized for the minimum specific gravity and the gage float position in the fluid will change with the specific gravity.

Guided Wave Radar
Changes in product specific gravity do not affect output.

Transmitter Features

- Measurement independent of density, conductivity, dielectric constant and temperature
- Measurement unaffected by foam or turbulent surfaces
- Process temperatures from -328˚F (-200˚C) to 752˚F (400˚C)
- Pressure ranges from full vacuum up to 3500 psi (240 bar) for MGWR or 5802 psi (400 bar) for GWR chamber alone
- Models available for interface applications; both total and interface level can be provided on one Hart® signal
- Models available with gas phase compensation for steam applications
- Communication Protocols
  - *4-20 mA SIL Hart®*
  - *Fieldbus Foundation™*

Also available as by-pass chamber or bridle assemblies.

Switches and *Transmitters*

Cutaway view

SAS-16 Tri-Magnet Latching Switch

Unique design creates a snap action switch strictly through the use of repelling magnetic fields.

- No cams or springs
- Highly vibration-resistant
- UL approved for hazardous locations Class 1, Div. I, Grps. A, B, C, & D
- ATEX Ex d IIC T5
- NEMA 4X design
- Easy installation – externally clamps to gage chamber
- Available with integral terminal block enclosure

MTII-4200 Magnetostrictive Transmitter

- .001" resolution continuous output
- FM & CSA - Class 1, Div. I, Grps. B, C, & D; Class 1, Div. II, Grps. E, F, & G
- ATEX EEx ia IIB + H2 T4
- NEMA 4X design
- Adjustable zero and span
- LCD display and window cover are standard
- Communication Protocols
  - *4-20 mA loop-powered transmitter with Hart® protocol (standard)*
  - *Fieldbus Foundation™*

RST2 - Reed Switch Transmitter

- 4-20 mA loop-powered transmitter
- 1/2" (Std), 1/4" (Optional) resolution
- UL & C-UL Class 1, Div. I, Grps. B, C, & D Class 2, Grps. E, F, & G
- NEMA 4X design
- Field Adjustable Span

RS-2 or RS-2/2 Hermetically-Sealed Reed Switch

- Low power switches for DCS and starter circuits
- SPDT and DPDT switch configuration
- 120 Maximum VAC; 1 Amp Maximum; 30 Watts Maximum (Volt X Amps = Watts)
- UL & C-UL listed Class 1, Div. I, Grps. B, C, & D
- NEMA 4X design

Options, Accessories *and Special Gages*

Consult our Specification Guide for complete model numbers and configuration options.

Hermetically-Sealed Flag Indicator

- Designed to meet needs of offshore industry, chemical wash-down, and severe environments
- Flag indicators are purged with inert gas and permanently sealed in:
  - polycarbonate tubing with epoxy-sealed end plugs to 500˚F (260˚C) process temperatures; or
  - glass tubing with 100% fused glass end seals to 1000˚F (537˚C) process temperatures
- No gaskets: ***can't leak or fog***

LevelStar® LED Indicators

- LED indicators have no moving parts
- 10 year nominal life on LED
- Field-upgradeable; easy clamp-on installation
- Approved for use in general purpose areas
- Red and green standard; other colors available
- 120/240 VAC
- -40˚F (-40˚C) to 170˚F (76˚C) ambient
- Process temperature:
  - *Up to 450˚F (232˚C)*
  - *450˚F (232˚C) to 600˚F (316˚C) with air purge kit on indicator*

ASME Section I Boiler Code Gage

- Up to 900 psi (62 bar) per code requirements
- Indicator range 2" less than vessel connections (not to encroach on high/low side of steam/water connections)
- Lowest visibility must be 2" above lowest safe operating level, as determined by boiler manufacturer
- Cannot replace code required direct reading glass level gage
- Accessories are NOT permitted for any control functions. (Includes Point Level Switches, Magnetostrictive Transmitters, or Guided Wave Transmitters.)
- (Reference PG60 of ASME Section I Boiler Code)

Follower Style Indicators

- Gold anodized follower
- Are purged with inert gas and sealed in polycarbonate or glass tube
- Aluminum or 316 stainless steel housing
- Hermetically sealed follower indicators in 316SS housing are available. Suitable for offshore environments.
  - polycarbonate tubing with epoxy-sealed end plugs to 500˚F (260˚C) process temperatures; or
  - glass tubing with 100% fused glass end seals to 1000˚F (537˚C) process temperatures

Hot or Cold Insulation

Hot Insulation
550˚F (287˚C) to 1000˚F (537˚C)

Jacket covers entire gage and includes drawcords at each end for closure. Provided with openings for gage process connections, indicator and switches or transmitters.

- PTFE coated & impregnated fiberglass
- 1" thickness to 550˚F (287˚C)
- 2" thickness to 800˚F (426˚C)
- 3" thickness to 1000˚F (537˚C)
- Stainless steel grommets
- Polypropylene / fiberglass drawcord at ends

Cryogenic Insulation
32˚F (0˚C) to -250˚F (-156˚C)

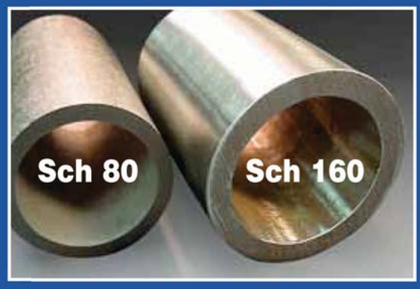
- Polyisocyanurate foam insulation - 2" thick
- .016" aluminum jacketing with moisture barrier
- All joints sealed
- Optional non-frost extension required

Combination Sight Glass / Magnetic Gage

- Use glass level gage for calibration and level verification only
- Maintenance is virtually eliminated
- Available as an upgrade for sight glass installations
- Not for use in ASME Section I Installations

Mini Magnicator

- Economical magnetic gage features single bar magnet float
- Pressures to 400 psi (27 bar)
- Temperatures to 500˚F (260˚C)
- Specific gravity 0.7 or greater
- Local indication only



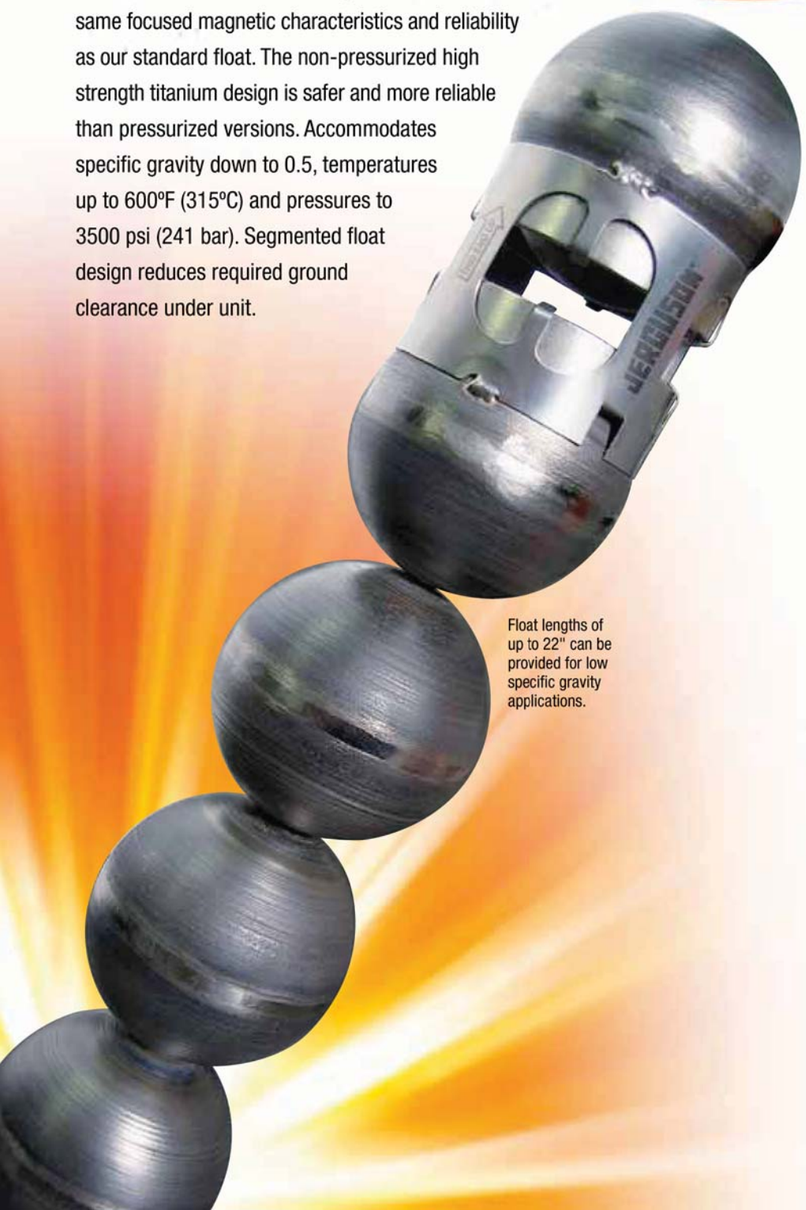
Sch 80 and Sch 160 Columns for High Pressure

The focused strength of the Magnicator II float permits reliable operation in heavy wall chambers up to Sch 160.

High Pressure Float

for Pressures Up to 3500 psi (241 bar)

This unique spherical float design delivers the same focused magnetic characteristics and reliability as our standard float. The non-pressurized high strength titanium design is safer and more reliable than pressurized versions. Accommodates specific gravity down to 0.5, temperatures up to 600ºF (315ºC) and pressures to 3500 psi (241 bar). Segmented float design reduces required ground clearance under unit.



Float lengths of up to 22" can be provided for low specific gravity applications.

Magnicator® II Level Products

Specifications

Column Construction

- Complies with ASME B31.1 (Power Piping) and B31.3 (Process Piping) design requirements
- NACE MR0175
- ASME Section VIII U Stamp Available
- Welding in accordance with ASME Section IX
- 100% Hydrostatic testing to 1.5x the column rating (typically limited by flange rating)
- 2-1/2" Schedule 40 standard, options for 2-1/2" Sch. 80 or 3" Sch 160
  - *3" Sch 40 standard with FlashProof Chamber (See pages 6-7)*
  - *Schedule 10 utilized for PFA Coated Gages Only*

Materials of Construction - Column

- Austenitic Stainless Steel Grades 304/304L, 316/316L, 317, 321, 347
- Alloy 20, Hastelloy® C-276, Hastelloy® B3, Monel,® Titanium, Inconel® 625/825, Zirconium, AL-6XN, SM0254
- Other non-ferrous alloys
- CPVC, PVDF (Kynar®)
- PFA Teflon or Kynar® Lining Options Available (All flanged connections required)

Pressure Range

- Full vacuum to 3500 psi (241 bar)
  - *Consult Factory for high pressure applications*

Temperature Range

- -328˚F (-200˚C) to 1000˚F (537˚C)

Measurement Range

- 12" (304.8mm) to 240" (6096mm) Standard
- Lengths up to 60 feet (18m) available; consult factory

Specific Gravity

- 0.32 Minimum

Float Construction

- Pressures up to 3500 psi (241 bar) with Sealed Float
- Permanent magnet arrangement of Alnico 8 or higher energy level
- 316L Stainless Steel, Titanium, Monel® or Hastelloy® C-276
- Autogenous welding
- Magnetic field strength of 90 Gauss at flag indicator

Visual Indicators

- Yellow/Black bi-color anti-vibration flag standard (other colors available)
- NightStar white LED Illuminated standard flag
- Hermetically sealed flag indicator in 316SS housing suitable for offshore environments
  - *Polycarbonate tubing with epoxy-sealed end plugs to 500˚F (260˚C) process temperatures*
  - *Glass tubing with 100% fused glass end seals to 1000˚F (537˚C) process temperatures*
- Hermetically sealed follower indicator in 316SS housing suitable for offshore environments
  - *Polycarbonate tubing with epoxy-sealed end plugs to 500˚F (260˚C) process temperatures*
  - *Glass tubing with 100% fused glass end seals to 1000˚F (537˚C) process temperatures*
- LevelStar bi-color LED

Indicator Flag Construction

- Stainless steel indicator flag and rotation pin
- Individual permanent magnet in each indicator flag

Indicator Housing Construction

- Anodized aluminum or 316SS indicator housing with 316SS photo-etched scale
  - *Inches/feet*
  - *Centimeters/meters*
  - *Percentage*
  - *Negative values*
  - *Custom*

Switch Options

- Magnetic snap-action
  - *SAS-16: SPDT 16A @ 120VAC*
- Reed element
  - *RS-2: SPDT 1A, 120VAC, 30W*
  - *RS-2/2: DPDT 1A, 120VAC, 30W*

Transmitter Options

- MTII-4200 magnetostrictive element (0.001" resolution)
- Guided Wave Radar
- RST2 reed switch elements (1/2" or 1/4" resolution)

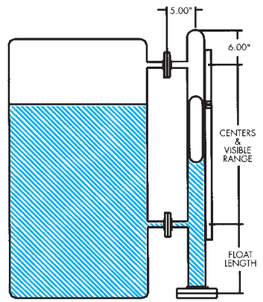
Temperature Maintenance

- Steam or Electric Tracing

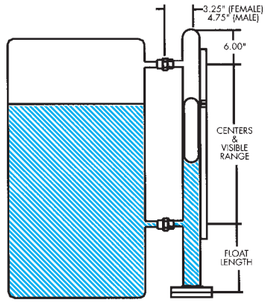
Insulation

- Cyrogenic with non-frost acrylic extension down to -328˚F (-200˚C)
- High Temperature removable jacket up to 1000˚F (537˚C)

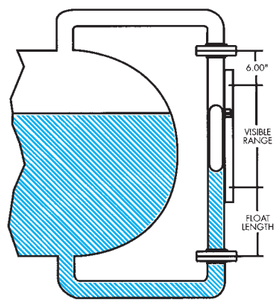
TYPICAL INSTALLATION



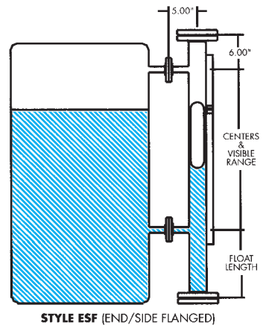
STYLE SF (SIDE FLANGED)



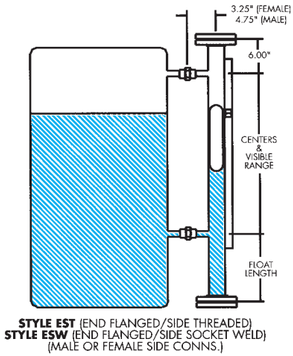
STYLE ST (SIDE THREADED)
STYLE SW (SIDE SOCKET WELD)
(MALE OR FEMALE SIDE CONNS.)



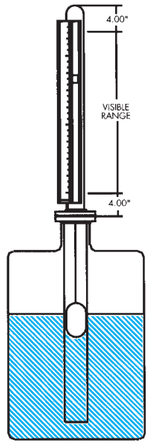
STYLE EF (END FLANGED)



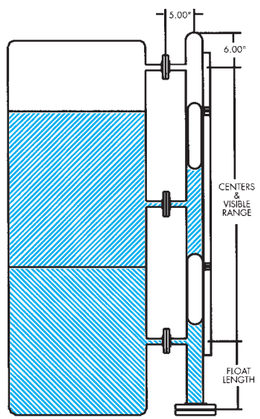
STYLE ESF (END/SIDE FLANGED)



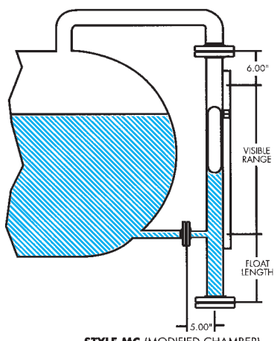
STYLE EST (END FLANGED/SIDE THREADED)
STYLE ESW (END FLANGED/SIDE SOCKET WELD)
(MALE OR FEMALE SIDE CONNS.)



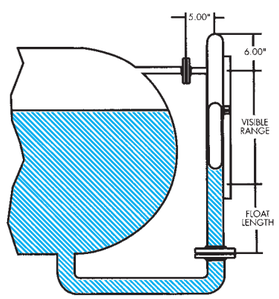
STYLE BEF (BOTTOM END FLANGED)
(TANK TOP)



STYLE SF (SIDE FLANGED w/ MULT. CONNS.)
(INTERFACE w/ DUAL FLOATS)



STYLE MC (MODIFIED CHAMBER)
(TOP/BOTTOM SIDE FLANGED)



STYLE MC (MODIFIED CHAMBER)
(TOP SIDE/BOTTOM FLANGED)

TO CONSTRUCT A PART NUMBER

1. MAGNICATOR ®II
2. SELECT STYLE
3. PROCESS CONNECTION SIZE
4. FLANGE CLASS RATING (ANSI)
5. SPECIFY CHAMBER MATERIAL
6. PROCESS SPECIFIC GRAVITY
7. SPECIFY MAXIMUM WORKING PRESSURE (PSIG)
8. SPECIFY MAXIMUM WORKING TEMPERATURE (°F)
9. CENTER/VISIBLE RANGE
10. INDICATOR TYPE
11. OPTIONS

HOW TO ORDER MAGNICATOR®II

Part Number: MII [1] [2] [3] [4] [5] [6] [7] [8] [9] [10] [11]

Magnicator® II (1)

Chamber Style (2)
SF
ST
ESF
EST
BEF
EF
MC
SW
ESW

Process Connection Size (3)
04 = ½"
06 = ¾"
08 = 1"
12 = 1 ½"
16 = 2"
20 = 2 ½"
24 = 3"
32 = 4"
48 = 6"

Flange Class (ANSI) (4)
01 = 150#
03 = 300#
06 = 600#
09 = 900#
15 = 1500#
25 = 2500#
50 = 5000#

General Material (5)
R = 304 / 304L SS
RA = 304, CS Flanges
T = 316 / 316L SS
TA = 316, CS Flanges
K = Alloy 20
M = Monel
TT = Titanium
LB = Hastelloy®B
LC = Hastelloy®C
GS = 321 SS
ZR = Zirconium
CP = CPVC
PF = PVDF (Kynar)
TC = PFA Coated
TF = TFE
CM = Customer Spec.

Specific Gravity (6)
.32 and up

Max. Working Press PSIG) (7)
Up to 2400 PSIG
(2400-5600 PSIG available)

Max. Working Temp. (°F) (8)
Up to 1000° F

Centers/Visible Range (9)
Exact Inches (or mm)

Indicator Type (10)
BF = Follower
SF = Stainless Follower
FL = Flag (Wafer)

Options (11)
AS = Acrylic Scale
MS = Metric Scale
PS = Percentage Scale
NGS = Negative Scale
SS = Special Scale (Specify Type)
SP = Set Point Arrows (Specify Qty)
DI = Dual Indication (BF Only)
IF = Interface
IL = Illuminator
NF = Non-Frost Extension
PI = Polycarbonate Indicator
EH = Electric Heat Trace
CI = Cold Insulation
ST = Steam Traced
IB = Insulation Blanket
BW = All Butt Weld Construction
WN = Weld Neck Flanges
RJ = Ring Joint Flanges
SE = Stub End/Lap Joint
NDE = Non-Dest. Exam (Specify Type)
VV = Valves (Specify)
FF = Smooth Finish Flanges (125-250 RMS)
SW = Socket Weld Process Flanges
NS = No Scale
NI = No Indicator
DV = 3/4" Vent / Drain, Plugged
X = Other (Specify)

EXAMPLE:

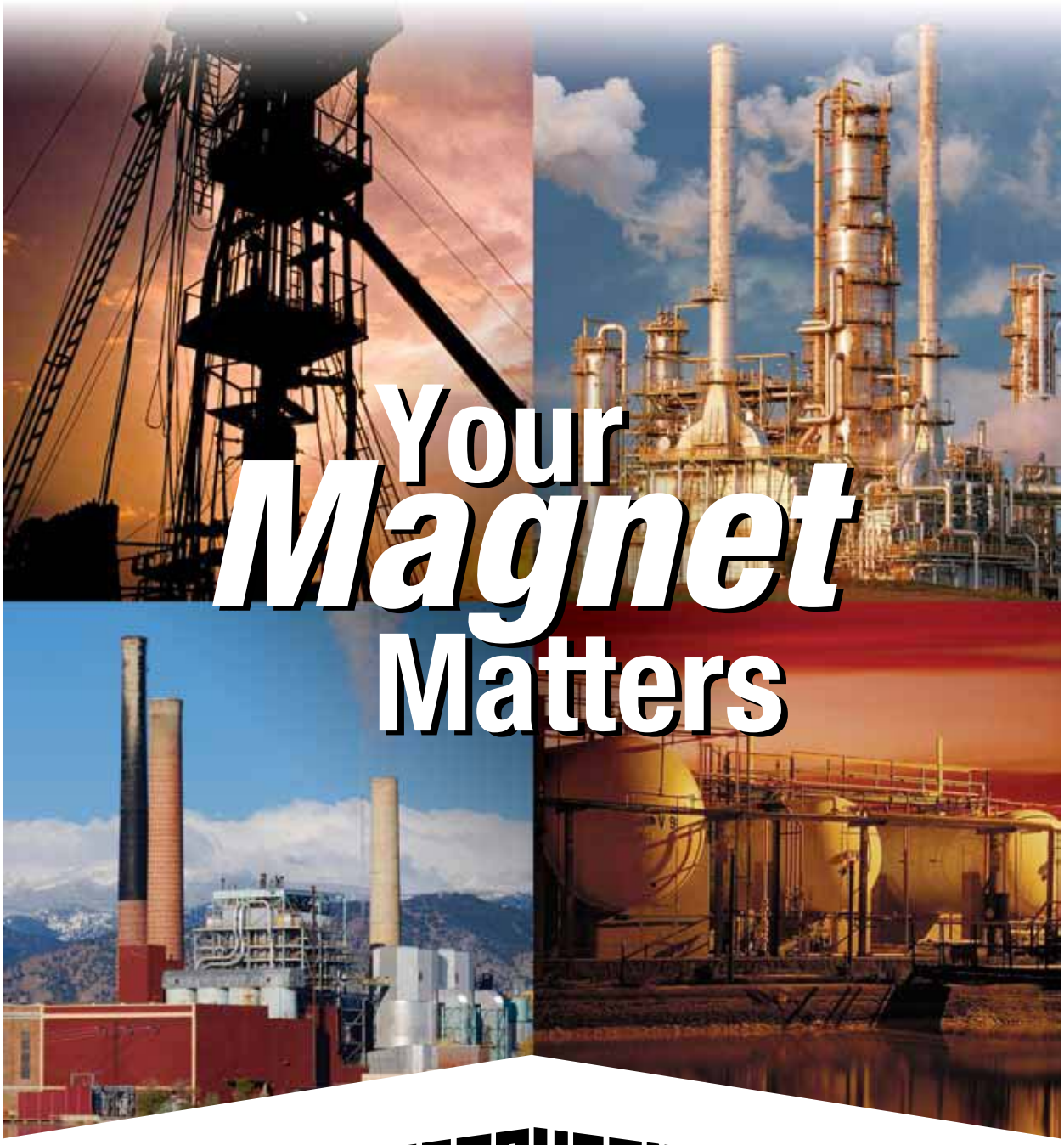
MII-SF-08-15-TA-.55-1000-500-48.0"-FL-IB-WN

DESCRIPTION:

2. STYLE SF (SIDE FLANGED)
3. PROCESS CONNECTIONS: 1.0" RF
4. FLANGE RATING: 1500# ANSI
5. CHAMBER MATERIAL
   316SS WITH CARBON STEEL FLANGES
6. SPECIFIC GRAVITY: .55
7. MAX WORKING PRESSURE: 1000 PSIG
8. MAX WORKING TEMP.: 500 F
9. PROCESS CONNECTION C/L: 48.0"
10. FLAG INDICATION
11. OPTIONS: INSULATION BLANKET
    WELD NECK FLANGES

Magnicator® II

Magnetic Liquid Level Indication Products



JERGUSON®

Products Manufactured by the Clark•Reliance® Corporation

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