

DESCRIPTION

The Horizon® 704 is a loop-powered, 24 V DC liquid-level transmitter based on the revolutionary Guided Wave Radar (GWR) technology. The electronics of the Horizon® 704 is integral mount on the GWR probe and allows local configuration via a 3 pushbutton keypad / LCD screen. The Horizon® 704 electronics are compatible with different types of GWR probes each encompassing different application challenges (coaxial or twin rod types). The aluminium or Lexan® housing can be removed for service under process conditions.

FEATURES

- * "REAL LEVEL", measurement not affected by changing media variables eg. dielectrics, pressure, density, pH, viscosity, ...
- * Easy bench configuration - no need for level simulation.
- * 2-line x 8-character LCD / 3-pushbutton keypad or blind transmitter.
- * Two-wire, intrinsically safe loop powered level transmitter.
- * Housing can be easily removed without depressurizing the vessel.
- * HART®/AMS® digital communication.
- * Max process temperature: 200 °C (400 °F).
- * Max process pressure: 70 bar (1000 psig).
- * 4-20 mA output (meets NAMUR NE 43).
- * Integral mount electronics.

APPLICATIONS

MEDIA: Liquids or slurries; hydrocarbons to water-based media (dielectric 1,7 - 100).

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, coating / build up, surface agitation, turbulence and varying dielectric media or specific gravity.

TECHNOLOGY

Horizon Guided Wave Radar is based upon the technology of TDR (Time Domain Reflectometry). TDR utilizes pulses of electromagnetic energy, which are transmitted down a probe. When a pulse reaches a liquid surface that has a higher dielectric than the air/vapor in which it is travelling, the pulse is reflected. An ultra high-speed timing circuit precisely measures the transit time and provides an accurate measure of the liquid level.

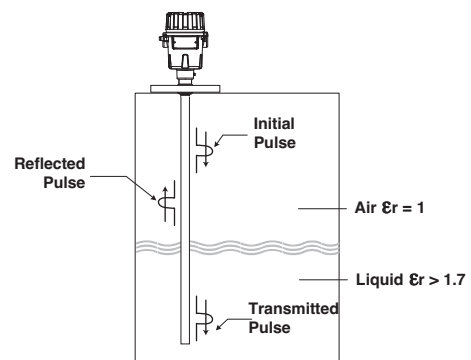
Measures «REAL LEVEL»



AGENCY APPROVALS

Agency	Approvals
ATEX	ATEX II 1 G EEx ia IIC T4, intrinsically safe
FM/CSA®	Non Incendive / Intrinsically safe / Explosion proof

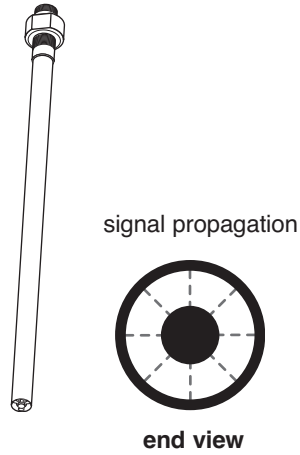
® Consult factory for proper partnumbers



PROBE OVERVIEW

Choosing the proper Guided Wave Radar (GWR) probe is the most important decision in the application process. The probe configuration establishes fundamental performance characteristics. Coaxial and twin rod are the 2 basic configurations used today; each with specific strengths and weaknesses.

COAXIAL TYPE GWR PROBE



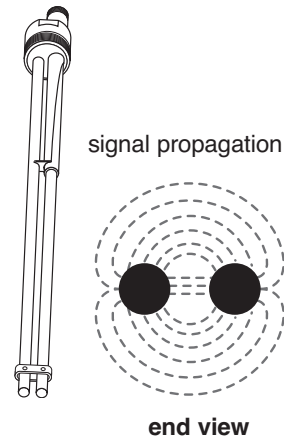
Ideally suited for:

- media $\geq 1,7$
- mounting in by-pass cages
- most efficient GWR probe

Beware of:

- clogging / build up inside coaxial tube (max 500 cP)

TWIN ROD TYPE GWR PROBE



Ideally suited for:

- media $\geq 2,5$
- allows moderate build up (viscosity up to 1500 cP)

Beware of:

- bridging build up between the two rods

EXPEDITE SHIP PLAN (ESP)

Several Horizon® Guided Wave Radar Transmitters are available for quick shipment, within max. 3 weeks after factory receipt of purchase order, through the Expedite Ship Plan (ESP).

Models covered by ESP service are conveniently colour coded in the selection data charts.

To take advantage of ESP, simply match the colour coded model number codes (standard dimensions apply).

ESP service may not apply to orders of ten units or more. Contact your local representative for lead times on larger volume orders, as well as other products and options.

SELECTION DATA

A complete measuring system consists of:

1. Horizon® 704 transmitter head/electronics
2. Horizon® 704 GWR probe

1. Order code for HORIZON 704 transmitter head/electronics

BASIC MODEL NUMBER

7	0	4	Horizon 704 guided wave radar transmitter
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POWER

5	24 V DC, two wire
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SIGNAL OUTPUT

1	4-20 mA with HART® communication
0	4-20 mA only (requires local display and keypad - Accessories code A)

MENU LANGUAGE (Hart® communication is only available in English language)

1	English
2	Spanish
3	French
4	German

ACCESSORIES

A	Plug in digital display and keypad
0	Blind transmitter (no display/keypad) – only available for units with HART® communication

MOUNTING/CLASSIFICATION (Consult factory for FM/CSA approvals)

1	Integral, General Purpose (& I.S. FM/CSA)
A	Integral, ATEX II 1 G EEx ia IIC T4 (needs cast aluminium housing)

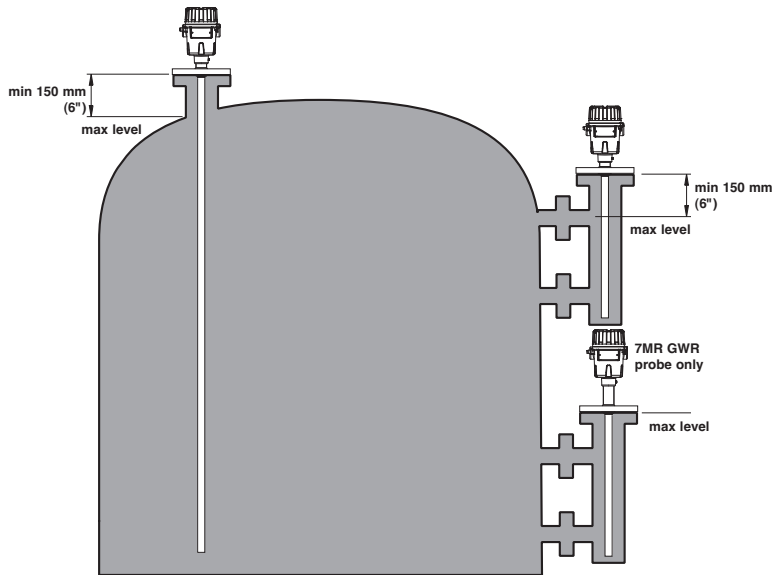
HOUSING (Single compartment type housing)

3	0	Lexan® housing - 2 entries (cable gland and plug incl.) - for Non Ex use
4	1	Cast aluminium housing - M20 x 1,5 (2 entries - one plugged)
4	0	Cast aluminium housing - 3/4" NPT (2 entries - one plugged)

7	0	4	5						
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complete order code for HORIZON 704 transmitter head/electronics

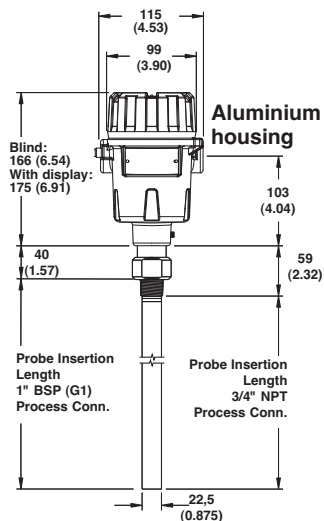
MOUNTING 7MA/7MR/7MB



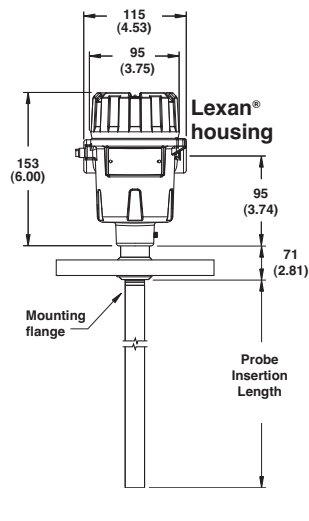
High level shutdown / Overfill protection

Special consideration is necessary in any application where guided wave radar is to be used for high level shutdown / overfill protection. To ensure proper measurement, the guided wave radar probe should be installed so the maximum overfill level is a minimum of 150 mm (6") (300 mm (12") for 7MA/7MB) below the process connection. This may include utilizing a nozzle or spool piece to raise the probe. No special precautions are required for the 7MR probe.

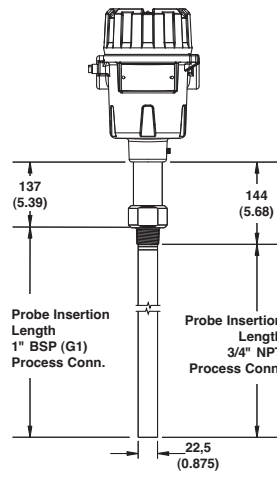
DIMENSIONS in mm (inches)



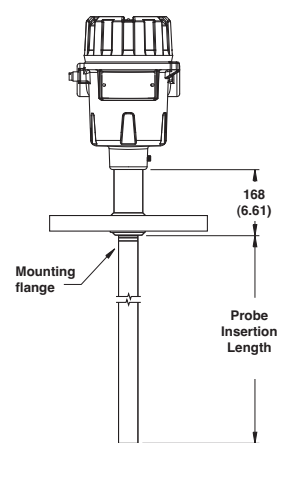
Horizon 7MA
with threaded connection



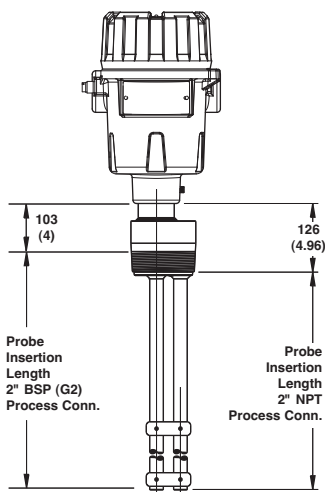
Horizon 7MA
with flanged connection



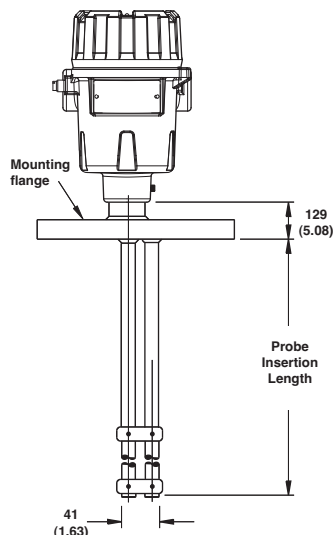
Horizon 7MR
with threaded connection



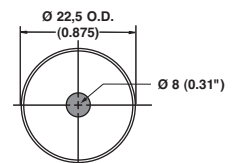
Horizon 7MR
with flanged connection



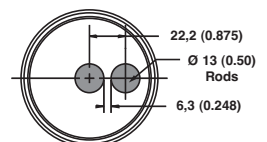
Horizon 7MB
with threaded connection



Horizon 7MB
with flanged connection



**Coaxial GWR Probe,
End View**



**Twin Rod GWR Probe,
End View**

2. Order code for HORIZON 704 Coaxial or Twin rod GWR probe

BASIC MODEL NUMBER

7 M A	Coaxial GWR probe	(dielectric range: ≥ 1,7)
7 M R	Overfill safe coaxial GWR probe	(dielectric range: ≥ 1,7)
7 M B	Twin rod GWR probe	(dielectric range: ≥ 2,5)

MATERIAL OF CONSTRUCTION - wetted parts (including process connection flange when applicable)

A	316/316L (1.4401/1.4404) stainless steel
B	Hastelloy C (2.4819)
C	Monel (2.4360)

PROCESS CONNECTION - SIZE/TYPE (consult factory for other process connections)

7MA/7MR – Threaded

1 1	3/4" NPT thread
2 2	1" BSP (G1) thread

7MB – Threaded

4 1	2" NPT thread
4 2	2" BSP (G2) thread

7MA/7MR – ANSI flanges

2 3	1"	150 lbs. ANSI RF
2 4	1"	300 lbs. ANSI RF
2 5	1"	600 lbs. ANSI RF
3 3	1 1/2"	150 lbs. ANSI RF
3 4	1 1/2"	300 lbs. ANSI RF
3 5	1 1/2"	600 lbs. ANSI RF
4 3	2"	150 lbs. ANSI RF
4 4	2"	300 lbs. ANSI RF
4 5	2"	600 lbs. ANSI RF

7MA/7MR/7MB – ANSI flanges

5 3	3"	150 lbs. ANSI RF
5 4	3"	300 lbs. ANSI RF
5 5	3"	600 lbs. ANSI RF ①
6 3	4"	150 lbs. ANSI RF
6 4	4"	300 lbs. ANSI RF
6 5	4"	600 lbs. ANSI RF ①

① Not for 7MB probes

7MA/7MR – DIN flanges

B A	DN 25, PN 16	EN 1092-1 Type A
B B	DN 25, PN 25/40	EN 1092-1 Type A
B C	DN 25, PN 63/100	EN 1092-1 Type B2
C A	DN 40, PN 16	EN 1092-1 Type A
C B	DN 40, PN 25/40	EN 1092-1 Type A
C C	DN 40, PN 63/100	EN 1092-1 Type B2
D A	DN 50, PN 16	EN 1092-1 Type A
D B	DN 50, PN 25/40	EN 1092-1 Type A
D D	DN 50, PN 63	EN 1092-1 Type B2
D E	DN 50, PN 100	EN 1092-1 Type B2

7MA/7MR/7MB – DIN flanges

E A	DN 80, PN 16	EN 1092-1 Type A
E B	DN 80, PN 25/40	EN 1092-1 Type A
E D	DN 80, PN 63	EN 1092-1 Type B2
E E	DN 80, PN 100	EN 1092-1 Type B2 ①
F A	DN 100, PN 16	EN 1092-1 Type A
F B	DN 100, PN 25/40	EN 1092-1 Type A
F D	DN 100, PN 63	EN 1092-1 Type B2
F E	DN 100, PN 100	EN 1092-1 Type B2 ①

① Not for 7MB probes

PROCESS SEAL - MATERIAL ①

0	Viton® GFLT seal - for universal use / steam applications	Min. -40 °C (-40 °F) / +200 °C (+400 °F)
8	Aegis PF 128 - for aggressive media	Min. -20 °C (-4 °F) / +200 °C (+400 °F)

① Consult factory for alternative seal materials

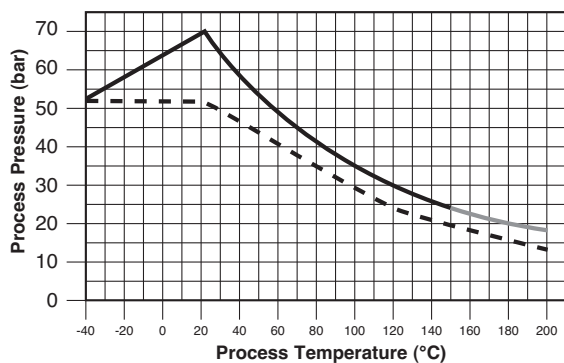
INSERTION LENGTH – specify per 1 cm (0.39") increments

0 6 0	min 60 cm (24") insertion length
4 9 0	max 490 cm (192") insertion length



complete code for HORIZON 704 Coaxial or Twin Rod GWR probe

TEMPERATURE-PRESSURE RATING



- 7MA: coaxial GWR probe
- - - 7MB: standard twin rod GWR probe
- 7MR: overflow prevention GWR probe

PROBE SPECIFICATIONS

Description		7MA/7MR: coaxial GWR probe	7MB: twin rod GWR probe
Materials	Probe	316/316L (1.4401/1.4404), Hastelloy C [®] (2.4819) or Monel [®] (2.4360)	
	Process seal	TFE with Viton [®] GFLT, EPDM or Kalrez 4079 (Consult factory for alternatives)	
Probe diameter		Inside rod: 8 mm (0.3125") – Outer tube: 22,5 mm (0.875")	Two 13 mm (0,5") Ø rods – 22 mm (0.875") \varnothing to \varnothing
Mounting		In-tank mounting only – 7MA External cage and/or in-tank mounting – 7MR	Twin rod probe must be used in metallic vessel or stillwell > 25 mm (1") from any surface or obstruction.
Process Connection		Threaded: 3/4" NPT or 1" BSP (G1) Flanged: Various ANSI or DIN flanges	Threaded: 2" NPT or 2" BSP (G2) Flanged: Various ANSI or DIN flanges
Probe length		From 600 mm to 4900 mm (24 to 192"), selectable per 10 mm	
Transition Zone ^①	Top	ϵ_r : 2,0 = 25 mm (1") / ϵ_r : 80 = 150 mm (6") – 7MA 0 mm (0") – 7MR	$\epsilon_r \geq 2,5 = 150$ mm (6")
	Bottom	ϵ_r : 2,0 = 150 mm (6") / ϵ_r : 80 = 25 mm (1")	ϵ_r : 2,0 = 150 mm (6")/ ϵ_r : 80 = 25 mm (1")
Max Process Temp.		7MA: +150 °C @ 27 bar (+250 °F @ 400 psi) 7MR: +200 °C @ 20 bar (+400 °F @ 270 psi)	+150 °C @ 20 bar (+250 °F @ 300 psi) / +200 °C (+400 °F) with max ambient temp. of +30 °C (+86 °F) @ 13 bar (200 psi)
Min Process Temp.		-40 °C @ 50 bar (-40 °F @ 750 psi)	
Max Process Pressure		70 bar @ +20 °C (1000 psi @ +70 °F) – see table at page 8	50 bar @ +20 °C (750 psi @ +70 °F) – see table at page 8
Max Viscosity		500 cP	1500 cP
Dielectric Range		1,7 to 100	2,5 to 100
Vacuum service		Negative pressure but not full vacuum	
Media coating		Not recommended in case of media coating	Film: 3% error of coated length, bridging not recommended ^②

TRANSMITTER SPECIFICATIONS

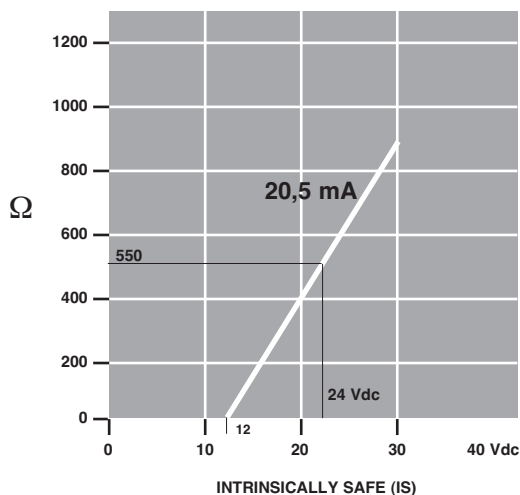
FUNCTIONAL/PHYSICAL

Description	Specification
Power (at terminals)	General Purpose / ATEX Intrinsically Safe: 12 to 28,4 V DC
Signal Output	4-20 mA or 4-20 mA with HART® 3,8 to 20,5 mA useable (meets NAMUR NE 43)
Span	150 to 4900 mm (6 to 193")
Resolution	Analog: 0,01 mA Display: 0,1 cm (inch)
Loop Resistance (see tables at page 12)	550 Ω @ 24 V DC (20,5 mA)
Damping	Adjustable 0-10 s
Diagnostic Alarm	22 mA, fixed
User Interface	3-button keypad with LED's
Display	2-line x 8-character LCD
Menu Language	English/Spanish/French/German
Housing Material	Lexan® - EXL 9330 IP 67/Aluminium A356T6 (< 0.20 % copper)
Approvals	ATEX II 1G EEx ia II C T4 (needs cast aluminium housing) FM - CSA: Non Incendive / Intrinsically safe / Explosion proof
Electrical Data	Ui = 28,4 V, Ii = 94 mA, Pi = 0,67 W
Equivalent Data	Ci = 16 nF, Li = 400 μH
Shock/Vibration Class	ANSI/ISA-571.03 SA1 (Shock), ANSI/ISA-571.03 VC2 (Vibration)
Net and Gross Weight	1,59 kg net; 2,10 kg gross (with Aluminium housing) 0,68 kg net; 1,18 kg gross (with Lexan® housing)
Overall Dimensions	Aluminium: H 166 mm (6.54") x W 99 mm (3.90") x Ø 115 mm (4.53") Aluminium (with display): H 175 mm (6.91") x W 99 mm (3.90") x Ø 115 mm (4.53") Lexan®: H 153 mm (6") x W 95 mm (3.75") x Ø 115 mm (4.53")

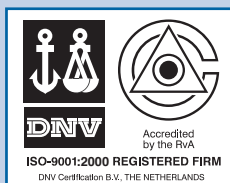
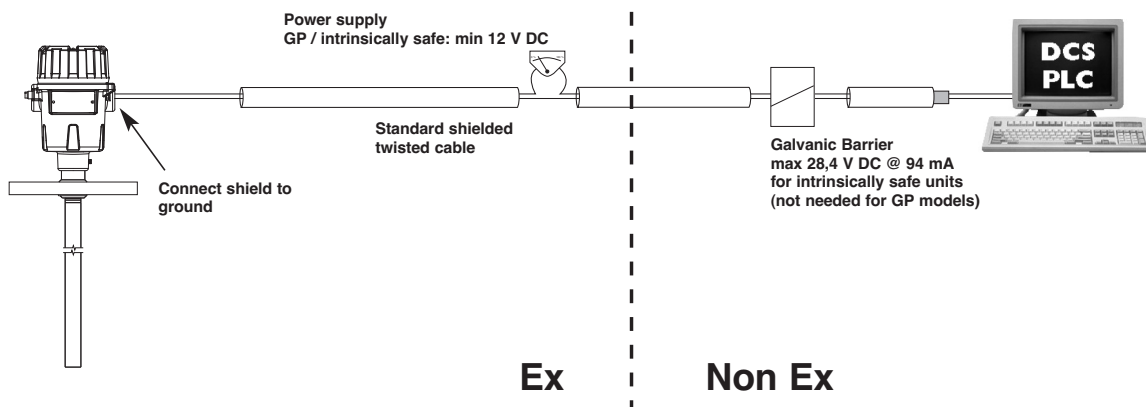
PERFORMANCE

Description	Specification
Reference Conditions with a 1,8 m (72")	Reflection from water at +20 °C (70 °F) with 185 mm (72") GWR probe
Linearity	7MA/7MR GWR probe: ± 6,3 mm (0,25") 7MB GWR probe: ± 12,7 mm (0,50")
Resolution	± 4 mm (0.15")
Repeatability	< 4 mm (0.15")
Hysteresis	< 4 mm (0.15")
Response Time	< 1 second
Warm-up Time	< 5 seconds
Ambient Temp.	blind transmitters -40 °C to +80 °C (-40 °F to +175 °F) – Aluminium housing transmitters with LCD -40 °C to +70 °C (-40 °F to +160 °F) – Lexan® housing -20 °C to +70 °C (-5 °F to +160 °F)
Process Dielectric Effect	< 13 mm (0.5") within selected range
Operating Temp. Effect	± 0,03 % of probe length/°C for probes ≥ 2,5 m (8')
Humidity	0-99 %, non-condensing
Electromagnetic Compatibility	Meets CE requirements (EN-61326: 1997 + A1 + A2) (twin-rod probe must be used in metallic vessel or stillwell)

LOOP RESISTANCE



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 MAGNETROL ELECTRONIC AND ULTRASONIC LEVEL CONTROLS ARE WARRANTED FREE OF DEFECTS IN MATERIALS AND WORKMANSHIP FOR ONE FULL YEAR 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.



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UNDER RESERVE OF MODIFICATIONS

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