Level Plus®

Liquid-Level Sensors
With Temposonics® Technology

M-Series Model MR
Analog Transmitter

MTS SENSORS

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551409 Revision A

Brief Operation Manual For Safe Use

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Safety instructions

The Brief Operation Manual for Safe Use contains safety instructions. For further information do consult the Operation and Installation Manual, document no.: 550720, available on the Level Product CD, part no.: 550766 supplied with your level transmitter or cost free download at www.mtssensors.com .

INTENDED USE

The Level Plus® Model MR liquid level transmitter is use for continuous measurement of product level, interface level, and/or temperature of liquids in containers in hazardous areas.

INSTALLATION, COMMISSIONING AND OPERATION

- The liquid level transmitter may only be installed, connected, operated and maintained by trained technical personnel. The technical personnel must strictly adhere to the Operating Instructions, prevailing standards, legal regulations and certificates (depending on application).
- If the Brief Operating Manual for Safe Use does not provide sufficient information, you must read the Operation and Installation Manual. There, you can find detailed information on the device.
- The operator may only perform direct replacement of like components manufactured by MTS that are explicitly permitted in the Operating Instructions.
- Do not operate damaged products and secure them against unintentional commissioning. Mark the damaged product as being defective.
- If faults cannot be rectified, the products must be taken out of service and secured against unintentional commissioning.
- The product is designed to meet state-of-the-art safety requirements, has been tested and left the factory in a condition in which it is safe to operate. Relevant regulations and European standards have been observed.
- As the user, you are responsible for complying with the following safety conditions:
  - Installation instructions
  - Local prevailing standards and regulations
- Only use the product according to its specification.

SPECIAL CONDITIONS FOR USE IN EXPLOSION-HAZARDOUS AREAS

- Model MR sensors may only be connected to certified intrinsically safe circuits (Ex ia or Ex ib).
- The electronics housing is to be installed in zone 1 (category 2G, EPL Gb}. The sensor pipe/hose may be installed in zone 0 (category 1, EPL Ga} if not restricted below.
- Equipotential bonding shall be installed inside and outside the hazardous area along the cable for supply and data.
- Float usage:
  - Metallic floats may only be used if they have a weight offset (asymmetric weight distribution).
  - Metallic floats on non-metallic pipes may not be used.
  - Aluminum floats may not be used.
- Plastic floats may only be installed in hazardous areas which require apparatus of category 1G (for zone 0} with explosion group IIA. Plastic floats may not be used on non-metallic pipes.
- Sensors with flexible measuring hoses:
  - The hose has to be mechanically protected from external impacts which may affect its function as separation wall.
  - Avoid kinking or bending the flexible hose in less than 16 inch (406 mm).

Model number configuration for ATEX approval

TRANSMITTER MODEL = **M** 1

M = Magnetostrictive transmitter

TYPE = **R** 2

R = Analog output level transmitter

INPUT POWER = **A** 3

A = 24 Vdc

OUTPUT = ☐ 4

1 = 4-20 mA Single loop with HART
2 = 4-20 mA Dual loops with HART

HOUSING TYPE = ☐ 5

F = NEMA Type 4X, 316L stainless steel with blue cable (ATEX IIA)•
G = SIngle cavity (ATEX IIA)•
H = Dual cavity (ATEX IIA)•
J = Single cavity with display (ATEX IIA)•
K = Dual cavity with display (ATEX IIA)•
Note: • *Maximum length for ATEX IIA is 12192 mm (480 in.)*

P = NEMA Type 4X, 316L stainless steel with blue cable (ATEX IIB) ••
R = SIngle cavity (ATEX IIB) ••
S = Dual cavity (ATEX IIB) ••
T = Single cavity with display (ATEX IIB) ••
U = Dual cavity with display (ATEX IIB) ••
Note: •• *Maximum length for ATEX IIB is 7620 mm (300 in.)*

ELECTRONICS MOUNTING = ☐ 6

1 = Integral electronics

TRANSMITTER PIPE/HOSE = ☐ 7

B = Industrial end-plug with stop collar, 5/8 in. OD
C = Sanitary, T-bar, TB
D = Sanitary, drain-in-place, DP
E = Sanitary, clean-in-place, CP
F = Sanitary, drain-in-place, no hole, DN
H = Flexible w/bottom fixing hook (stainless steel only)
J = Flexible w/bottom fixing weight (stainless steel only)
K = Flexible w/bottom fixing magnet (stainless steel only)
R = Industrial endplug 1/2 in. OD

MATERIALS OF CONSTRUCTION (WETTED PARTS) = ☐ 8

1 = Stainless steel, 1.4404
2 = Stainless steel, 1.4404 electropolished (3A approved, Ra 15 finish)
3 = Hastelloy C
A = Teflon / FEP

PROCESS CONNECTION TYPE = ☐ 9

1 = NPT, Adjustable fitting
4 = Sanitary, welded
5 = Sanitary, adjustable fitting
6 = 150 lbs. welded RF flange
7 = 300 lbs. Welded RF flange
8 = 600 lbs. welded RF flange
9 = DIN flange welded according to specification

PROCESS CONNECTION SIZE = ☐ 10

A = ¾ in. (NPT for ⅝ in. pipe)
B = 1 in. (NPT for ⅞ in. hose)
C = 1½ in.
D = 2 in.
E = 2½ in.
F = 3 in.
G = 4 in.
H = 5 in. (except sanitary)
J = 6 in.

TEMPERATURE = ☐ 11

0 = None
2 = One RTD, customer defined position ǂ
Note: ǂ*If this RTD option is selected, option '**18 E**' must also be selected*
1 = One RTD, fixed position 76 mm (3 in.) from the end of pipe

UNIT OF MEASUREMENT = ☐ 12

M = Metric (millimeters) Encode length in millimeters if using metric (XXXXX mm)
U = US Customary (inches) Encode length in inches if ordering in US Customary (XXX.XX in.)

Continued on page 3.

LENGTH (Order length based on unit of measurement) = ☐☐☐☐☐ 13-17

= Rigid or Sanitary transmitter: 508 mm (20 in.) to 7620 mm (300 in.) = Teflon: 508 mm (20 in.) to 6096 mm (240 in.)

= Flexible transmitter: 3048 mm (120 in.) to 12,192 mm (480 in.) except ATEX IIB max. length 7620 mm (300 in.)

SPECIAL = ☐ 18

S = Standard product **E** = Engineering special (not affecting agency controlled parts or features)

Marking

Model	Housing Type [5]	Material of Construction [8]	ATEX marking
MR	F, G, H, J K	1, 2, 3	II 1/2 G Ex ia IIA T4 Ga/Gb
		A	II 2 G Ex ia IIA T4 Gb
	P, R, S T,U	1, 2, 3	II 1/2 G Ex ia IIB T4 Ga/Gb
		A	II 2 G Ex ia IIB T4 Gb

Table 1. Approval marking

Entity Parameters

Entity parameters	
ATEX	VUi = 28 Vdc
	∑Ii = 118 mA per loop (circuit)
	Ci = Negligibly low
	Li = 0.2 mH per loop (circuit)

Table 2. MR entity parameter references

Total power consumption ∑Pi	Ambient temperature
1.3 W	-20 to +40 °C (electronics)
1.2 W	-20 to +60 °C (electronics)
1.0 W	-20 to +80 °C (electronics, functionality up to 71 °C)
-	-40 to +125 °C (sensing element)
-	-40 to 105 °C (sensing element)

Table 3. Power and ambient temperature ranges

IS Installation

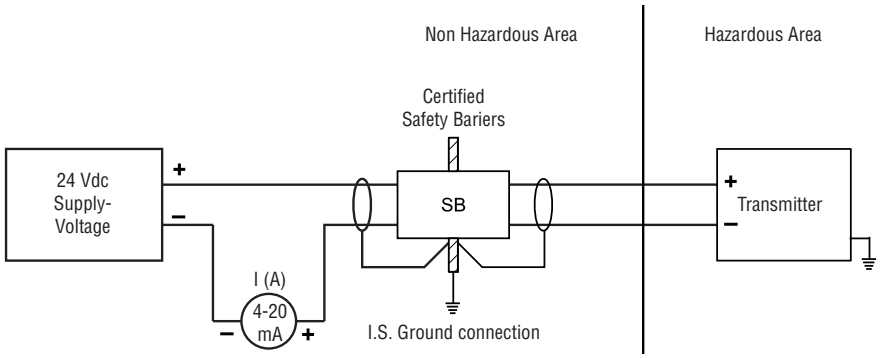


Figure 1. Safety barrier connections

Wiring connections

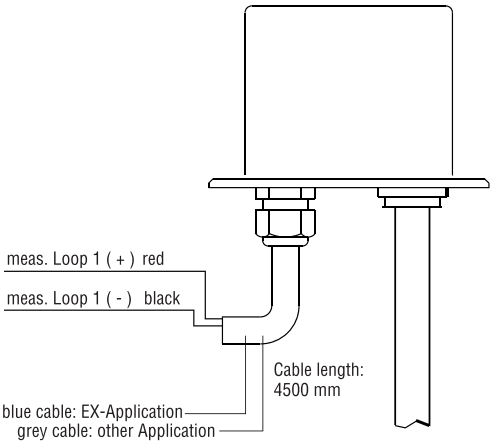


Figure 2. NEMA 4X housing with integrated cable.

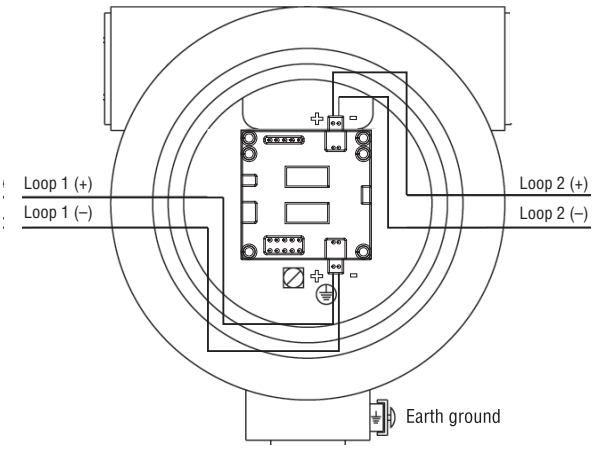


Figure 3. Single-cavity housing

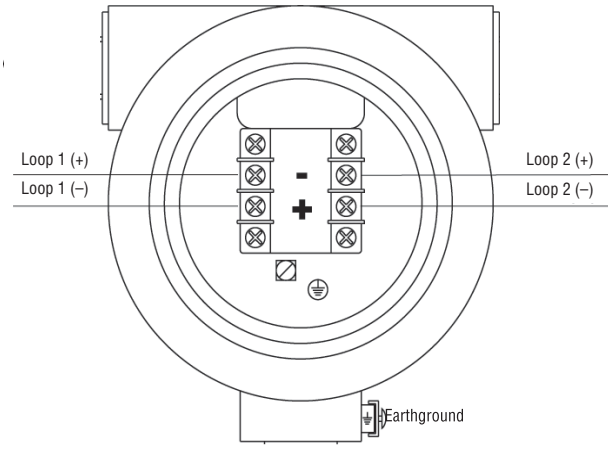


Figure 4. Dual-cavity housing

Safety barrier examples

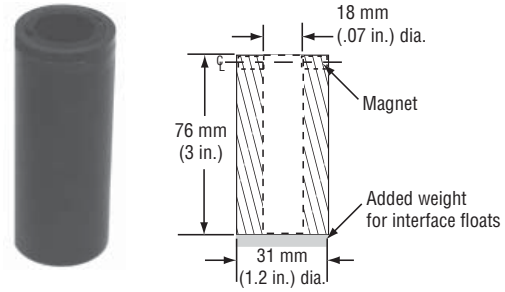
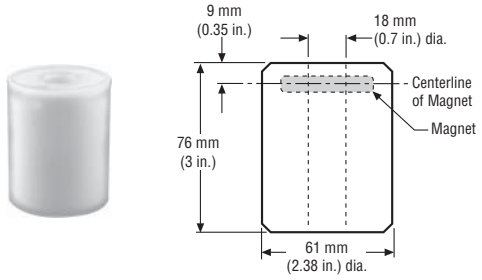
Supplier	Type	Uo Maximum voltage	Io Maximum current (each channel)	Po Maximum power (each channel)	Maximum resistance (each channel)	Number of channels
STAHL	9001/51-280-091-141	28 Vdc	91 mW	637 mW	350Ω	1

Table 4. MR safety barrier parameters

Floats

Model MR transmitters should be used with a float having an offset weight and made of stainless steel or Hastelloy C. This allows the float to stay in contact with the pipe to prevent the buildup of electrostatic charge. For detailed information about floats, refer to the 'Accessories Catalog', MTS part number 551103.

Non-metalic floats with a projected surface area of less than 5,000 mm² should only be used in Zone 0, Gas group IIA such as float part numbers 201643-2, 201649-2, 201650-2, 201109, 251115 and 251116. All other non-metallic floats offered by MTS such as, 251939, 251119, 251120 and 252999, should not be used in a hazardous area application.

NITROPHYL FLOATS Float and dimension reference	Projected surface area	Part number
	2356 mm²	201643-2 201649-2 201650-2
TEFLON FLOATS **Float and dimension reference**	**Projected surface area**	**Part number**
	4635 mm²	201109 251115 251116

MTS SENSORS

EC13.002A

EG-Konformitätserklärung
EC Declaration of Conformity
Déclaration CE de Conformité

MTS Sensor Technologie GmbH & Co. KG, Auf dem Schüffel 9, 58513 Lüdenscheid, GERMANY

erklärt als Hersteller oder dessen Bevollmächtigter in alleiniger Verantwortung, dass die Produkte
declares as manufacturer or as his authorized representative in sole responsibility that the products
déclare en qualité de fabricant ou de son mandataire sous sa seule responsabilité que les produits

Liquid Level Sensors	**MRA x a xxxxxxxxxxx**	**with a = F, G, H, J, K, P, R, S, T, U**
	MC420 xxx ab	**with ab = 0P or FP**

den Vorschriften folgender Europäischen Richtlinien entsprechen:
comply with the regulations of the following European Directives:
sont conformes aux prescriptions des directives européennes suivantes :

94/9/EC	Geräte und Schutzsysteme zur Verwendung in explosionsgefährdeten Bereichen Equipment and protective systems for use in potentially explosive atmospheres Appareils et systèmes de protection à être utilisés en atmosphères explosibles
2004/108/EC	Elektromagnetische Verträglichkeit Electromagnetic Compatibility Compatibilité électromagnétique

Angewandte harmonisierte Normen:
Applied harmonized standards:
Normes harmonisées appliquées :
EN 60079-0:2009, EN 60079-11:2007, EN 60079-26:2007
EN 61326-1:2006, EN 61326-2-3:2006

EG-Baumusterprüfbescheinigung: EC type examination certificate: Certificat de l'examen CE de type :	**PTB 10 ATEX 2011 X**
ausgestellt durch / issued by / exposé par:	**Physikalisch-Technische Bundesanstalt (PTB) Braunschweig, GERMANY**
Benannte Stelle für Qualitätsüberwachung: Notified body for quality assurance control: Organisme notifié pour l'assurance qualité :	**Physikalisch-Technische Bundesanstalt (PTB) Braunschweig, GERMANY**
Kennnummer / Ident number / Numéro d'identification :	**0102**
Kennzeichnung / Marking / Marquage :	**Ⓔx II 1/2G Ex ia IIB T4 Ga/Gb resp. Ⓔx II 2G Ex ia IIB T4 Gb resp. Ⓔx II 1/2G Ex ia IIA T4 Ga/Gb resp. Ⓔx II 2G Ex ia IIA T4 Gb**

Lüdenscheid, 2013-03-15

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