

Level Plus[®]

Magnetostrictive Liquid-Level Transmitters
with Temposonics[®] Technology

OPERATION AND INSTALLATION MANUAL

M-Series Model MC420 Analog Transmitter



UNITED STATES

GENERAL:

Tel: +1-919-677-0100
Fax: +1-919-677-2343
Email: info.us@mtssensors.com
<http://www.mtssensors.com>

MAILING AND SHIPPING ADDRESS:

MTS Systems Corporation
Sensors Division
3001 Sheldon Drive
Cary, North Carolina, 27513, USA

CUSTOMER SERVICE:

Tel: +1-800-457-6620
Fax: +1-800-498-4442
Email: orders@mts.com

TECHNICAL SUPPORT AND APPLICATIONS:

24 Hour Emergency Technical Support
Tel: +1-800-633-7609
Email: levelplus@mts.com

OFFICE HOURS (EST):

Monday - Thursday: 8:00 a.m. to 5:00 p.m.
Friday: 8:00 a.m. to 4:00 p.m.

REMITTANCE ADDRESS:

MTS Systems Corporation
Sensors Division
NW 5872
P.O. Box 1450
Minneapolis, MN, 55486-5872

QUOTE AND CONTRACT TERMS & CONDITIONS:

The parties expressly agree that the purchase and use of Material and/or Services from MTS Sensors Division are subject to MTS' Terms and Conditions, in effect as of the date of this document, which are located at <http://www.mtssensors.com> and are incorporated by reference into this and any ensuing contract. Printed Terms and Conditions can be provided upon request by emailing info.us@mtssensors.com or if you prefer, go to <http://www.mtssensors.com> and click the Quote/Contract Terms and Conditions link at the bottom of the page to download the PDF.

GERMANY

GENERAL:

Tel: +49-2351-9587-0
Fax: +49-2351-56491
Email: info.de@mtssensors.com
<http://www.mtssensors.com>

MAILING AND SHIPPING ADDRESS:

MTS Sensor Technologie, GmbH & Co. KG
Auf dem Schüffel 9
D - 58513 Lüdenscheid, Germany

TECHNICAL SUPPORT AND APPLICATIONS:

Tel: +49-2351-9587-0
Email: info.de@mtssensors.com
<http://www.mtssensors.com>

JAPAN

GENERAL:

Tel: +81-42-775-3838
Fax: +81-42-775-5516
Email: info.jp@mtssensors.com
<http://www.mtssensors.com>

MAILING AND SHIPPING ADDRESS:

MTS Sensors Technology Corporation
737 Aihara-cho, Machida-shi
Tokyo 194-0211, Japan

TECHNICAL SUPPORT AND APPLICATIONS:

Tel: +81-42-775-3838
Fax: +81-42-775-5512

Model MC420 Operation and Installation Manual

Reference Information

Notices used in this manual

This manual contains notices to highlight specific information as follows:

Notes:

These notices provide important tips, guidance, or advice.

Important:

These notices provide information that might help you avoid inconvenient or problem situations.

Attention:

These notices indicate possible damage to programs, devices, or data and is placed just before the instruction or situation in which damage could occur.

Caution:

These notices indicate situations that can be potentially hazardous to you. A Caution notice is placed just before a description of a potentially hazardous procedure, step, or situation.

Related publications

The following publications are listed below by part number followed by description and are available in Adobe Acrobat Portable Document Format (PDF) at <http://www.mtssensors.com/>

550752 - Product Specification, Model MC420 Analog Transmitter

551103 - Level Plus Accessories Catalog

For information about safe work procedures, refer to the following documentation:

National Electric Code ANSI/NFPA 70

CSA C22.1 Canadian Electrical Code

How this manual is organized

“Introduction”, provides an overview of the manual.

“Terms and Definitions”, provides definitions of terms used in this manual.

“Product Overview”, gives an overall product description for the Level Plus liquid-level transmitter, its specifications, use, output, and electronics.

“Installation and Mounting”, provides detailed installation and mounting information.

“Electrical Connections and Wiring Procedures”, provides engineering specifications and wiring diagrams to assist in the installation process.

“Maintenance and Field Service”, provides guidelines for general maintenance.

“Troubleshooting”, provides a list of symptoms, their possible cause and the action to be taken when troubleshooting the transmitter.

Setup using magnet - provides procedures for setting 4 and 20 mA set points using supplied magnet.

Setup using HART® Field Communicator - provides procedures for setting 4 and 20 mA set points

Setup using MTS Field Setup Software - provides software installation, parameter setup, and calibration procedures.

“Agency Information” provides comprehensive listings of agency approvals and standards, installation drawings, labels and applicable protocols.

Getting information, help, and service

You can get the latest ordering information and software updates by visiting www.mtssensors.com website

General contact information, shipping and office hours are available on page i.

Contact information

General	i
Mailing and shipping address	i
Customer service	i
Technical support and applications	i
Office hours	i
Remittance address	i
Quote and contract terms and conditions	i

Reference information

Notices used in this manual	ii
Related publications	ii
How this manual is organized	ii
Getting information, help, and service	ii

Introduction

Introduction	1
Public website support portal	1

Terms and definitions

Terms and definitions reference	2
--	----------

Product overview

Product overview	3
Industries	3
Applications	3
Features	3
Components	3
Housing	3
Outer pipe configuration	4
Floats	4
Internal electronics	4
Accessories	4
Theory of operation	5
Accuracy	5
Warranty	5
Model number identification	6
Product specifications	7

Installation and mounting

Installation and Mounting	8
Storage	8
Stilling wells and guide poles	8
Installation	8
Mounting	9

Electrical connections

Electrical connections and wiring procedures	10
Safety recommendations for installation	10
Recommended cable types	11
Cable specifications	11
Grounding	12
Safety barriers for IS installation	12

Maintenance and field service

Maintenance and field service	13
General maintenance and field service requirements	13
Float maintenance	13
Field service	13
Service / RMA policy	13

Troubleshooting

Troubleshooting procedures	13
---	-----------

Setup

Quick set-up procedure	14
Tools needed	14
Setup using supplied magnet	14
To set to Zero	14
To set Span	14
Setup using HART field communicator	15
Preparing the transmitter for re-calibration	15
Setting the low value	15
Setting the upper range value	16
Setup using MTS Field Setup software	16
Using the MTS Field Setup software	16
Advanced setup tab	17
Calibration tab	18
Output tab	18

Agency information

Agency approvals	19
FM/CSA and ATEX	19
Installation drawing	20
Notes	21
Wiring and connections	23
Agency certifications	24
ATEX	24
CSA	28
FM	30
NEPSI	34
EC Declaration of Conformity	41

Model MC420 Operation and Installation Manual

Introduction

Introduction

MTS is recognized as the pioneer, innovator and leader in magnetostrictive sensing. The new Level Plus® M-Series transmitter design represents a continuation of our on-going effort to provide effective, innovative and reliable products to the Liquid Level marketplace.

This manual will provide the following information about the Level Plus Model MC420 analog transmitter:

- Terms and definitions
- Product overview
- Installation and mounting
- Electrical connections
- Maintenance and field service
- Troubleshooting
- Quick start-up guide
- Setup using the supplied magnet
- Setup using a HART® Field Communicator
- Setup using MTS Field Setup Software
- Agency information
- Product certifications

Public website support portal

Visit our support portal at <http://www.mtssensors.com> for:

- Building Level Plus M-Series Model MC420 analog transmitter model numbers
- Latest documentation releases
- Detailed ordering information
- Latest software updates

Terms and definitions reference

H

HART® – a *Bidirectional communication protocol* that provides data access between intelligent field instruments and host systems.

I

Interface – *Noun*; The measurement of the level of one liquid when that liquid is below another liquid.

Interface – *Adj.*; The *Software Graphical User Interface (GUI)* that allows the user to access software protocols (*HART*).

Intrinsic safety – ‘Intrinsically safe’ - Type of protection based on the restriction of electrical energy within apparatus of interconnecting wiring exposed to potentially explosive atmosphere to a level below that which can cause ignition by either sparking or heating effects.

N

NEMA Type 4X – A product *Enclosure* intended for indoor or outdoor use primarily to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose-directed water; and to be undamaged by the formation of ice on the enclosure. They are not intended to provide protection against conditions such as internal condensation or internal icing.

NPT – *U.S. standard* defining tapered pipe threads used to join pipes and fittings.

S

Specific Gravity – The *density ratio* of a liquid to the density of water at the same conditions.

Model MC420 Operation and Installation Manual

Product Overview, Components

Product Overview

The Level Plus Model MC420 Liquid-Level transmitter is a continuous multi-functional magnetostrictive transmitter that provides product level or interface level to the user via 4 to 20 mA current loop or HART. Magnetostrictive technology is one of the most accurate and repeatable level technologies available to date. MTS is the inventor and purveyor of magnetostrictive technology and has been serving the level industry for over 30 years.

INDUSTRIES

- Petrochemical
- Chemical
- Water and Wastewater
- Mining

APPLICATIONS

- General Process
- Industrial Chemicals
- Solvents
- Detergents and Soaps
- Lubricating Oils

FEATURES

- 4 to 20 mA Output with HART®
- Single Channel Output
- Level Measurements
 - Product
 - Interface
- No Scheduled Maintenance or Recalibration
- High Accuracy and Repeatability
- Intrinsically Safe (I.S.)

Components

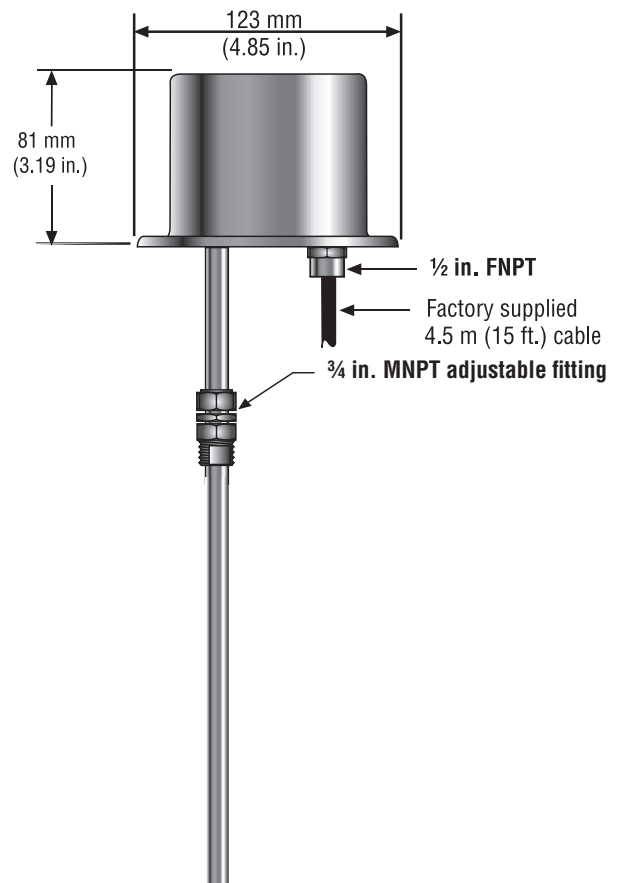
The Level Plus Model MC420 liquid level transmitter consists of four main components; a housing, outer pipe, float, and electronics.

HOUSING

Level Plus Model MC420 transmitters comes standard with a NEMA Type 4X 316L stainless steel housing as shown below:



NEMA Type 4X 316L stainless-steel housing



Product Overview

OUTER PIPE CONFIGURATION

The outer pipe is constructed of 316L (1.4404) stainless steel.

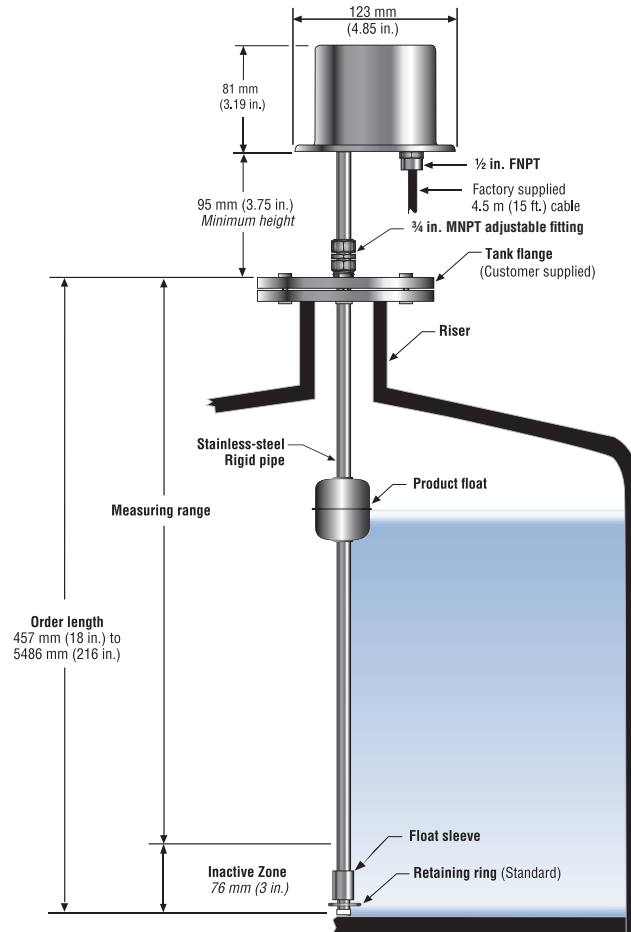


Figure 1. 5/8 in. diameter rigid outer pipe of 316L stainless steel

FLOATS

The Model MC420 comes standard with the float 251981-1 for FM and CSA approvals and float 251981-2 for ATEX approvals. Alternative floats can be ordered for other applications including detecting an interface level. When ordering alternative floats a stop collar is also required, MTS part number 560369-1. To be able to accurately detect the interface level there needs to be a difference of at least 0.05 in specific gravities between the product and interface liquids. For detailed information about floats, refer to the 'Accessories Catalog', MTS part number 551103.

For assistance with selecting a specific float for your application, please contact *Technical Support* with the following information:

- Specific gravity of liquid(s) being measured
- Process temperature
- Vessel pressure
- Process Opening Size

INTERNAL ELECTRONICS

The electronics of the model MC420 are sealed and are not repairable. The electronics consist of a sensing element and a board set. The board set contains two reed switches that allow for setting the 4 and 20 mA set points by using a supplied magnet and moving the float.

ACCESSORIES

MTS also offers a series of displays, housings, converters, and other accessories, please refer to the 'Accessories Catalog', MTS part number 551103.

Theory of operation

Magnetostrictive M-Series transmitters precisely sense the position of an external float by applying an interrogation pulse to a waveguide medium. This current pulse causes a magnetic field to instantly surround the waveguide. The magnet installed within the float also creates a magnetic field. Where the magnetic fields from the waveguide and float intersect, a rotational force is created (waveguide twist). This, in turn, creates a torsional-sonic pulse that travels along the waveguide as shown in *Figure 2*.

The head of the transmitter houses the sensing circuit, which detects the torsional-sonic pulse and converts it to an electrical pulse. The distance from a reference point to the float is determined by measuring the time interval between the initiating current pulse and the return pulse and precisely knowing the speed of these pulses. The time interval is converted into a level measurement.

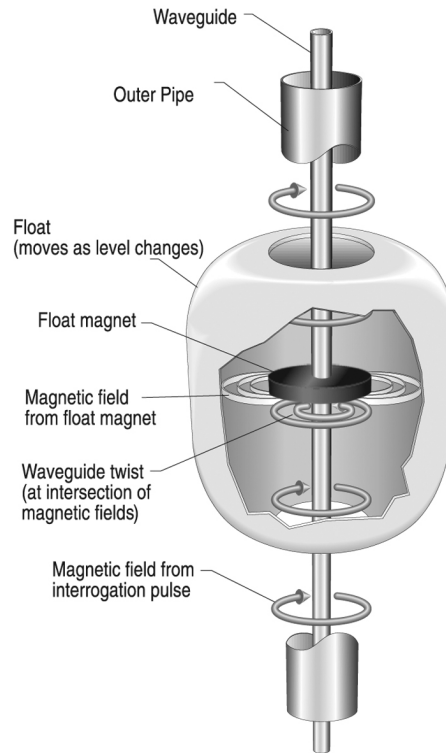


Figure 2. Theory of operation

Accuracy

For magnetostrictive transmitters inherent accuracy is measured in terms of non-linearity. Non-linearity is a measurement of any imperfections in the waveguide that are reflected in the linearity of the transmitter's output. MTS tolerances reflect a maximum non-

linearity of 0.02% of full scale. MTS is able to achieve such strict tolerances by manufacturing all of its own waveguide from a proprietary alloy and testing 100% of all transmitters before shipping.

Warranty

Important:

Contact Technical Support or Customer Service for assistance if you suspect that the transmitter is not working correctly. Technical support can assist you with troubleshooting, part replacement, and *Returned Material Authorization* (RMA) information if required.

All M-Series transmitters come with a two year limited warranty from the factory shipment date. A *Return Materials Authorization* (RMA) number is required and must accompany any transmitter returns. Any unit that was used in a process must be properly cleaned in accordance with OSHA standards, before it is returned to the factory. A *Material Safety Data Sheet* (MSDS) must also accompany the transmitter that was used in any process.

Model number identification

TRANSMITTER MODEL _____ =

M	C	4	2	0
---	---	---	---	---

 1 - 5

M-Series Model MC420 liquid-level transmitter

Comes with one standard product level float (*part number 251981-X, see Standard float section below*).

TRANSMITTER ORDER LENGTHS[□] _____ =

--	--	--

 6 - 8

Length	Code	Length	Code	Length	Code
457 mm (18 in.)	= 018	1829 mm (72 in.)	= 072	3658 mm (144 in.)	= 144
508 mm (20 in.)	= 020	2134 mm (84 in.)	= 084	3962 mm (156 in.)	= 156
610 mm (24 in.)	= 024	2438 mm (96 in.)	= 096	4267 mm (168 in.)	= 168
914 mm (36 in.)	= 036	2743 mm (108 in.)	= 108	4572 mm (180 in.)	= 180
1219 mm (48 in.)	= 048	3048 mm (120 in.)	= 120	4877 mm (192 in.)	= 192
1524 mm (60 in.)	= 060	3353 mm (132 in.)	= 132	5182 mm (204 in.)	= 204
				5486 mm (216 in.)	= 216

□ Standard Range/lengths 457 mm (18 in.) to 5486 mm (216 in.)

OPTIONAL ACCESSORIES _____ =

--	--

 9 - 10

FM / CSA Approved

00 = Standard float (part no.: 251981-1)

FO = Non-Standard float ¥‡

TO = Standard float with Stainless-steel tag

FT = Non-standard float with Stainless-steel tag ¥‡

ATEX / NEPSI Approved

0P = Standard float (part no.: 251981-2) with blue cable

FP = Non-standard float with blue cable ¥‡

No Approval

0N = Standard float (part no.: 251981-2) with gray cable

FN = Non-standard float with gray cable ¥‡

¥ Non-standard floats must be ordered separately.

‡ Requires a stop collar, part no.: 560369-1 (Which must be ordered separately)

APPROVAL AGENCY _____ =

--

 11

F = FM Approval

E = ATEX Approval

C = CSA Approval

N = NEPSI Approval

X = No Approval

Product specifications

Parameters	Specifications
LEVEL OUTPUT	
Measured variable:	Product level and interface level
Output signal and Protocol:	4 to 20 mA with HART®
Order length:	Rigid pipe: 457 mm (18 in.) to 5486 mm (216 in.) § § Order length equals the measurement range plus the inactive zone.
Non-linearity:	0.02% F.S. or 0.794 mm (1/32 in.)* * Whichever is greater
Repeatability:	0.01% F.S. or 0.381 mm (0.015 in.)* (any direction) * Whichever is greater

ELECTRONICS	
Input voltage:	10.5 to 36 Vdc maximum 28 Vdc maximum for I.S. approved
Fail safe:	High (21.4 mA), Low (3.8 mA)
Reverse polarity protection:	Series diode
Lightning/Transient protection:	Stage 1: Line-to-ground surge suppression; IEC 61000-4-5 Stage 2: Line-to-line and line-to-ground transient suppressors; IEC 61000-4-4

CALIBRATION	
Zero adjust range:	Anywhere within the active length
Span adjust range:	Full scale to 152 mm (6 in.) from zero

Parameters	Specifications
ENVIRONMENTAL	
Enclosure rating:	NEMA Type 4X
Humidity:	0 to 100% relative humidity, noncondensing
Operating temperatures:	Electronics*: -34 °C (-30 °F) to 71 °C (160 °F) Sensing element: -40 °C (-40 °F) to 125 °C (257 °F) ◇ ◇ Contact factory for specific temperature ranges. * Consult Agency Approvals section for approval specific ambient temperature rating.
Vessel pressure:	Dependent on float pressure, contact factory for more information
Materials:	Wetted parts: 316L stainless steel Non-wetted parts: 316L stainless steel

FIELD INSTALLATION	
Housing dimensions:	NEMA Type 4X: 81 mm (3.2 in.) by 123 mm (4.85 in.) O.D.
Mounting:	Rigid pipe: ¾ in. Adjustable MNPT fitting
Wiring:	Integral cable: 4.5 m (15 ft.) 2-wire integral cable, shielded
Electrical Connections:	NEMA Type 4X: ½ in. FNPT conduit opening

Installation and mounting

This section contains information about storing your transmitter (prior to installation) and detailed procedures for installing and mounting your transmitter.

Storage

If storage is required prior to installation, store indoors in a dry environment at ambient temperature range not exceeding -40 °C (-40 °F) to 71 °C (160 °F).

Stilling wells and guide poles

Level Plus transmitters can be mounted in slotted or unslotted stilling wells but a slotted stilling well is always preferred. Using an unslotted stilling well will negatively affect performance of any level device as the level in the stilling well can differ from the level in the tank. The Level Plus transmitter can also be installed to one side of the stilling well to also allow for sampling and manual gauging from the same opening as the automatic tank gauging. Contact *Technical Support* for details.

Level Plus transmitters do not require a stilling well for installation. Our transmitters are installed in numerous tanks without stilling wells with no loss in performance. A stilling well is highly recommended for agitated, turbulent, and/or fast filling tanks.

Installation

The installation procedures below are illustrated using the adjustable NPT fitting for a threaded flange mount.

RIGID PROBE

Tools Required:

- Channel lock pliers
- Common screwdriver

Caution:

It is recommended that assembly and mounting of this transmitter should not be performed alone. To ensure proper and safe assembly of the M-Series transmitter, a minimum of two (2) individuals are recommended. Gloves are also recommended. In addition, PPE is required for work areas such as safety shoes, safety glasses, hard hat, and fire resistant clothing.

Perform the following steps to Install the Model MC420 transmitter:

1. Remove the float sleeve and E-ring. With assistance, feed the rigid pipe through the hole of the removed tank flange until the flange is positioned near the top of the transmitter. Insert the threaded portion of the adjustable fitting into the customer supplied flange and tighten (apply pipe thread sealant if required). Be careful not to drop the flange as it can damage the transmitter.
2. Slide the float onto the rigid pipe. Install float sleeve and E-ring. Do not drop the float or allow it to free fall along the rigid pipe as damage may result.

Note:

The stop collar can be removed or adjusted based on the float selected for the application. Please consult the factory for more information.

3. Slide float back down to the float sleeve to prevent it from free falling during installation into the tank. Insert the rigid pipe (with float) through the tank opening and lower the transmitter/float assembly into the tank until it rests on the bottom. **DO NOT DROP OR DAMAGE THE PIPE.**
4. Secure the flange onto the tank mount.
5. Pull the transmitter upward so the end plug is just resting on the floor of the tank. Tighten the adjustable fitting to hold the transmitter in place.
6. Terminate the field wire cables noting proper wire orientation.

Mounting

The method of mounting the transmitter is dependent on the vessel or tank in which it is being used.

THREADED FLANGE MOUNTING

In most applications, the Model MC420 transmitter can be mounted directly to the tank or flange via a NPT threaded fitting, assuming there is a proper threaded connection available. If the float will not fit through the flange opening when the flange is removed, there must be some alternative means to mount the float on the transmitter from inside the vessel; this may require an access port nearby the entry point of the transmitter as shown in *Figure 3*.

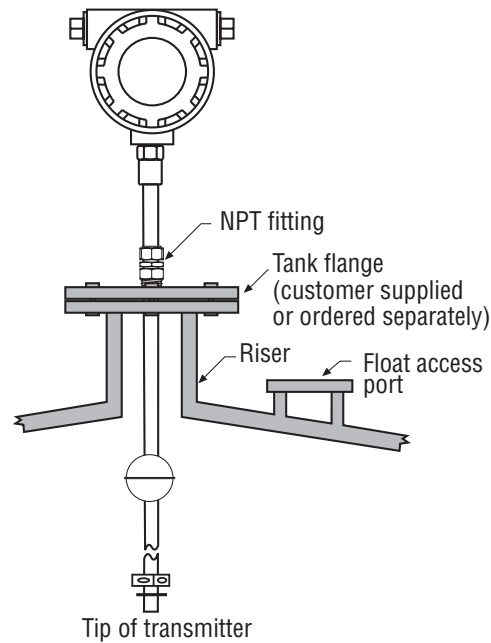


Figure 3. Threaded flange mounting for rigid and flexible pipe

Electrical connections and wiring procedures

A typical intrinsically safe connection for the Level Plus Model MC420 transmitter includes protective safety barriers, a power supply and a reading or monitoring device. Refer to *Agency information* for detailed information.

Safety recommendations for installation

Be sure to:

1. Always follow applicable local and national electrical codes and observe polarity when making electrical connections.
2. Never make electrical connections to the M-Series transmitter with power turned on.
3. Make sure that no wire strands are loose or sticking out of the terminal block connection which could short and cause a problem.
4. Make sure that no wire strands, including shield, are in contact with the electronic module enclosure.
5. The electronics module enclosure is grounded through internal circuitry and is electronically isolated from the explosion-proof housing.

Refer to the safe operating power chart (see *Figure 4*), which shows the relationship between loop resistance and operating voltage.

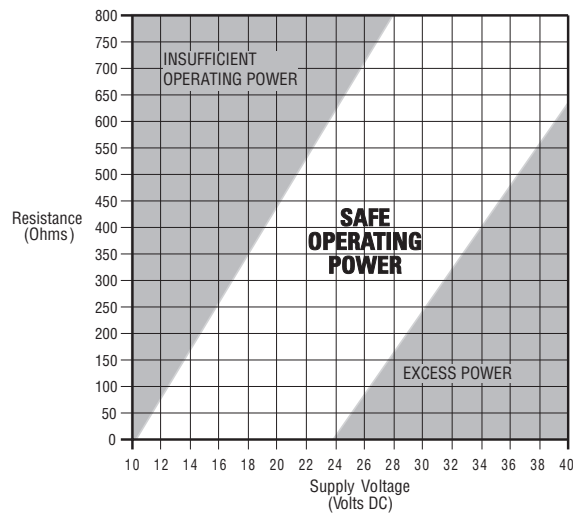


Figure 4. Safe operating power chart

Model MC420 Operation and Installation Manual

Cable Types and Electrical Conduit Installation

Recommended cable types

Refer to 'Table 1' below for general requirements of cable types for the Level Plus Model MC420 analog transmitter.

CABLE SPECIFICATIONS

Parameter	Specification
Minimum cable size	24 AWG or heavier (0.51 mm diameter) Contact factory for assistance selecting proper cable.
Cable type	Single pair shielded or multiple pair with overall shield
Maximum cable length	Twisted pair: 10,000 ft. (3,048 m) Multiple twisted pair: 5,000 ft. (1,524 m)
Maximum cable length formula	Use the following formula to determine the maximum cable length for a specific application: Where: $L = [(65 \times 106) \div (R \times C)] - [(Cf + 10,000) \div C]$ L = Length in meters or feet R = Resistance in ohms, current sense resistance plus barrier resistance C = Cable capacitance in pF/ft, or pF/m Cf = Maximum shunt capacitance of smart field devices in pF Example: Assume a high performing smart transmitter, a control system, and a single pair of shielded wires. R = 250 ohms C = 50 pF/ 0,3 m (ft) Cf = 5,000 pF $L = [(65 \times 106) \div 250 \times 50] - [(5,000 + 10,000) \div 50]$ L = 1,494 m (4,900 ft.)

Table 1. Cable specification and parameters

Grounding

Note:

Grounding the transmitter through a threaded conduit connection does not provide sufficient ground.

The earth ground for the internal electronics is connected to the housing and the drain wire of the integral cable. The drain wire should be connected to an earth ground for maximum surge protection.

Safety barriers for IS installation

Refer to *Table 2* for entity parameters and *Figure 5* for passive and active safety barrier types for Model MC420 transmitter installations.

Entity parameters						
CSA	V _{max} = 36.1 Vdc					
	I _{max} = 118 mA					
	C _i = 0.0 μF					
	L _i = 0.2 mH					
FM/ATEX	V _{max} = 28 Vdc					
	I _{max} = 118 mA					
	C _i = resistivity low					
	L _i = 0.2 mH					
Supplier	Type	Maximum voltage	Maximum current (each channel)	Maximum power (each channel)	Maximum resistance (each channel)	Number of channels
STAHL	9001/51-280-091-141	28 Vdc	91 mA	637 mW	350Ω	1

Table 2. Safety barrier entity parameter references

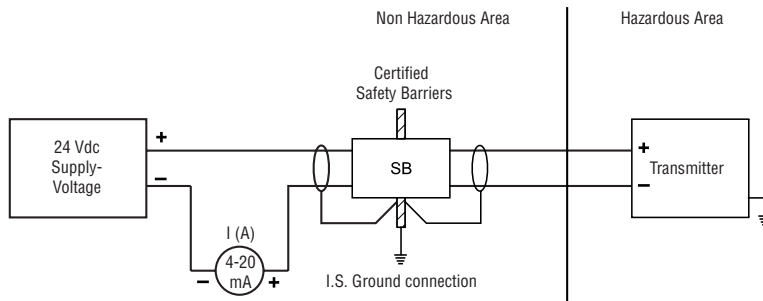


Figure 5. Safety barrier connections

Maintenance and field service

This section contains information about post installation maintenance and provides an overview of MTS Sensors’ repair and replacement procedures.

General maintenance and field service requirements

Notes:

Please contact Technical Support or Customer Service for help when damage occurs in order to obtain a return materials authorization (RMA) number. Packages without a RMA number may be rejected. Any unit that was used in a process must be properly cleaned in accordance with OSHA standards, before it is returned to the factory. A Material Safety Data Sheet (MSDS) must accompany material that was used in any media.

FLOAT MAINTENANCE

Level Plus M-Series transmitters use magnetostrictive technology and only have one moving part—the float. This technology ensures no scheduled maintenance or recalibration is required. However, MTS recommends that you check the transmitter pipe annually for build up of process material. Floats should move freely along the pipe. If they do not, routine cleaning should be performed.

FIELD SERVICE

The Model MC420 transmitter is not repairable. Troubleshooting may be performed but if there is any damage to the MC420 transmitter a new one must be ordered.

SERVICE / RMA POLICY

If the customer suspects their transmitter is damaged or not functioning correctly, call *MTS Technical Support* for further instruction. If it is necessary to return the transmitter to the factory, an RMA number is required and can only be issued by Technical Support. Product returns that do not include an RMA will be returned to the customer. MTS evaluates the transmitter and advises the customer whether a repair or replacement is necessary and any cost that might be incurred. If the customer declines repair/replacement or the transmitter has no fault found, the unit is sent back as is and the customer is charged with a standard evaluation fee.

If the transmitter is under warranty and a manufacturer’s defect is detected, there will be no cost to the customer for repair or replacement. If the transmitter is out of warranty or if the customer has damaged the transmitter, a repair or replacement quote will be provided. In specific cases where the transmitter can not be removed and returned to the factory for evaluation, field evaluations can be performed in the field by an MTS technician. If field evaluation must be performed, the customer is responsible for all expenses incurred for travel, evaluation, parts and repair time. However, if the transmitter is under warranty and the problem is due to a manufacturer’s defect, there is no cost to the customer for replacement parts. To discuss all service options, contact *Technical Support*.

Troubleshooting

The table below contains troubleshooting information for the Model MC420 analog transmitter.

TROUBLESHOOTING PROCEDURES

Symptom	Possible Cause	Action
No communication with transmitter	No power	Check voltage at transmitter
	Wiring incorrect	Reference installation drawing (see ‘Electrical connections’)
	Wrong software	Confirm correct software
Output in Alarm (3.8 mA or 21.4 mA)	Float not recognized	Confirm that the float is attached
	Float is in the dead zone	Raise float to see if the error stops

Table 3. Troubleshooting reference

Quick set-up procedure

Note:

Output will vary depending on the location of the 4 and 20 mA set points.

Tools Needed:

- 24 Vdc linear regulated power supply
- Current Meter

QUICK START-UP PROCEDURE

1. Connect 24 Vdc power supply
2. Turn on power supply
3. Connect Current Meter to loop.
4. Move the float to the tip of the pipe and verify 4 mA output
5. Move the float to the top of the pipe and verify 20 mA output
6. Turn off power and disconnect power supply
7. Install in tank
8. Connect power and turn on

Setup using supplied magnet

Note:

To ensure that the new settings are correct, place a current meter in line with the MC420 so that it is visible during the calibration process.

The Model MC420 transmitter comes calibrated from the factory with standard 4 mA setpoint equal to 76 mm (3in.) and 20 mA setpoint equal to order length minus 127 mm (5 in.). To change the Zero (4 mA) or Span (20 mA) settings, use the following procedure.

To set the Zero (4 mA) setpoint

1. Place float in desired position for the zero (4 mA) point.
2. Locate the recess marked (Z) on the underside of the baseplate.
3. Using the MTS provided magnet briefly tap the (Z) to enable calibration.
4. Place the magnet in the recess marked (Z) and hold for 3 seconds, then release.

To set the Span (20 mA) setpoint

1. Move the float to the desired span (20 mA) location.
2. Locate the recess marked (S) on the underside of the base plate.
3. Using the MTS provided magnet, briefly tap the recess marked (S) to enable calibration.
4. Place the magnet in the recess marked (S) for 3 seconds, then release.

Setup using HART Field Communicator

Refer to the documentation that comes with the *Rosemount Model 275 and 375 Field Communicator* for specific sensor calibration information. This section describes how the HART protocol is applied to the Level Plus Model MC420 transmitter only.

Using the HART interface allows for calibration without having to remove the transmitter from the process and position the floats. You can perform this function by using HART commands 35 and 65.

Calibration set points for level are given as the absolute displacement (in the appropriate units) from the tip of the sensor pipe. For example, if the Zero (LRV) position for level 1 is given as 5 inches, the transmitter will produce 4 mA when the float is 5 inches from the tip of the sensor pipe. If the Span (URV) position for level 1 is given as 30 inches, the transmitter will produce 20 mA when the float is 35 inches from the top of the sensor pipe. To calibrate the temperature set points, the Zero (LRV) and Span (URV) points are given in degrees. For temperature, the Zero (LRV) value (in degrees) must always be less than the Span (URV) value (in degrees).

PREPARING THE TRANSMITTER FOR RE-CALIBRATION

The Model MC420 transmitter can be re-calibrated by using the model 275 and 375 Field Communicator. Complete the following procedure to reset the zero and span values for loop 1 (only loop 1 can be calibrated with the HART Field Communicator using the generic XMTR type driver). To access both loops as well as other parameters, the MTS device driver must be purchased and installed in to the 275/375 field communicator. For more information about the HART device driver, go to HARTcomm.org.

Attention:

DO NOT enter a high value that exceeds the active length of the sensor.

Before you begin, perform the following steps:

1. Connect the transmitter to a clean 24 Vdc power supply. Use a linear supply, switching types do not provide ripple-free power. HART cannot tolerate more than a 25 mV voltage ripple.
2. If the unit is installed in a live application, place your automatic controllers in manual mode and be advised that the output current will change during calibration.
3. Follow safe working procedures for working on live equipment in a hazardous location before you remove the housing cover.
4. Connect the HART Field Communicator to the loop.
5. Press the black and white I/O button on the HART terminal. The HART terminal will perform an automatic self test. The Main window displays. If the device is not connected properly, the message "No device found" displays.
6. In the Main window, press the **Key #1**, the Device Setup window displays.
7. In the Device setup window, press **Key #3**. The Basic Setup window displays.
8. In the Basic Setup window, press **Key #3**. The Range Values window displays.

SETTING THE LOW VALUE

Complete the following steps to set the low value:

1. To set the low value, Process Variable, Low Range Value (PV LRV) to 4 mA, select Key #1. The PV LRV window displays the current low value. Below the highlighted value located under the current value, key in the low value you want (example 3.00 in. is shown; if 4 inches is the value you want, key in 4.) then, press Enter (F4) located below the LCD display.
2. To write the changed lower value to memory, press the Send key.
3. Two Warning messages will display before the new values take affect; if your new low values are correct, respond to the Warning messages by pressing OK when prompted. This action resets the Low Range Value, or 4 mA position into the transmitter's memory.
4. Go back to the Range Values window to verify that the new parameters have been accepted into the transmitter's memory.
5. **Do one of the following:**

- 5a. Exit program mode.
- 5b. To reset the upper value, continue with “Setting the Upper Range Value.

SETTING THE UPPER RANGE VALUE

Caution:

DO NOT enter a high value that exceeds the active length of the sensor.

Complete the following steps to set the Upper Range Value:

1. Open the Range Values window. To set the 20 mA Upper Range Value, press Key #2. The Process Variable, Upper Range Value (PV URV) window displays.
2. As shown the Lower Value window, the current value displays with a highlighted number below the value displayed. To change the upper value, key in the new value. You can use whole numbers or whole numbers and decimals (example, 40 = 40 inches, or 40.5 = 40.50 inches.) Whole numbers will be converted as decimal equivalents automatically by the HART terminal.
3. Key in the new Upper Range Value and press Enter or (F4). The Range Values window displays.
4. Verify that the upper and lower values are correct. If the values are correct, press Send.
5. You will be prompted with two Warning messages, press OK in response to both warnings.

Setup using MTS Field Setup software

Adjustments to the calibration and setup parameters of the transmitter may be done using the MTS Field Setup Software and a RS232 to HART converter (SMAR HI-311, MTS Part # 380068). Be sure to install the latest software package, go to www.mtssensors.com for more information.

USING THE MTS FIELD SETUP SOFTWARE

Tools Required:

- HART adapter/converter
- 24 Vdc power supply
- PC

Complete the following steps to Install Setup Software

1. Insert the software installation CD into computer or go to www.mtssensors.com and download the latest software.
2. Open folder “Setup software Analog_Digital”
3. Open folder “Analog”
4. Open file “M-Series Field Setup”
5. Follow on screen instructions

Complete the following steps to Install the hardware

1. Connect Power Supply to level transmitter
2. Connect HART adapter to level transmitter and PC

Model MC420 Operation and Installation Manual

Setup

Attention:

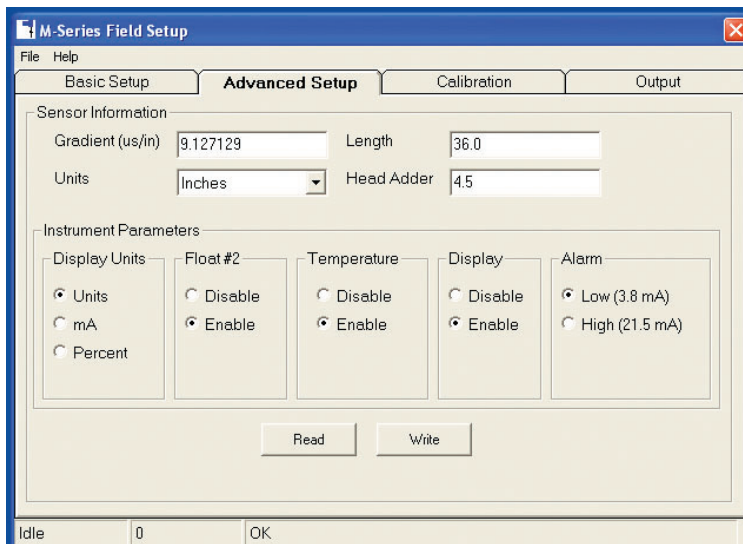
Be sure loop #1 is connected to a load of 250 to 500 ohm. A transmitter installed in a control loop is a good example of the loop load. A 250 ohm load resistor may need to be added to the loop for HART to communicate effectively.

3. Turn on power
4. Open Setup Software. Data should fill in. If no data appears select a different serial communication port.

ADVANCED SETUP TAB

Note:

Not all parameters are available on the MC420 including display units, float #2, temperature and display.



Gradient: A calibration factor that is specific to each level transmitter. This value should not be changed unless directed to do so by Technical Support.

Length: The order length of the transmitter. This value should not be changed unless directed to do so by Technical Support.

Units: The unit of measure for Length and Head Adder. This is used when writing new values of Length and Head Adder to the transmitter. Use the Output Tab to change units of measure for all data.

Head Adder: The distance between the sensing element and the order length. Each model has a slightly different head adder. This value should not be changed unless directed to do so by Technical Support.

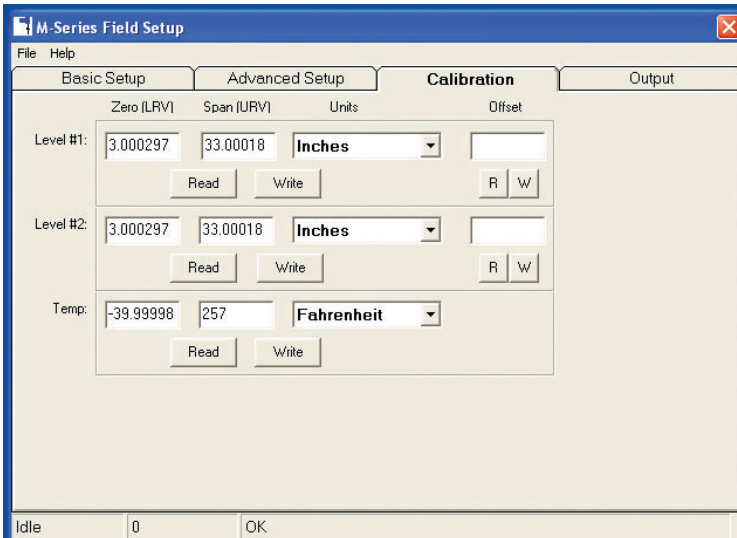
Transmitter style	Length
NEMA 4X housing, standard rigid pipe	4.3 to 4.5 in (109 to 114 mm)

Alarm: The output state that the level transmitter enters upon failure. Alarm can be Low (3.8 mA) or High (21.5 mA).

CALIBRATION TAB

Note:

Not all parameters are available on the MC420 including level #2, temperature and offset.

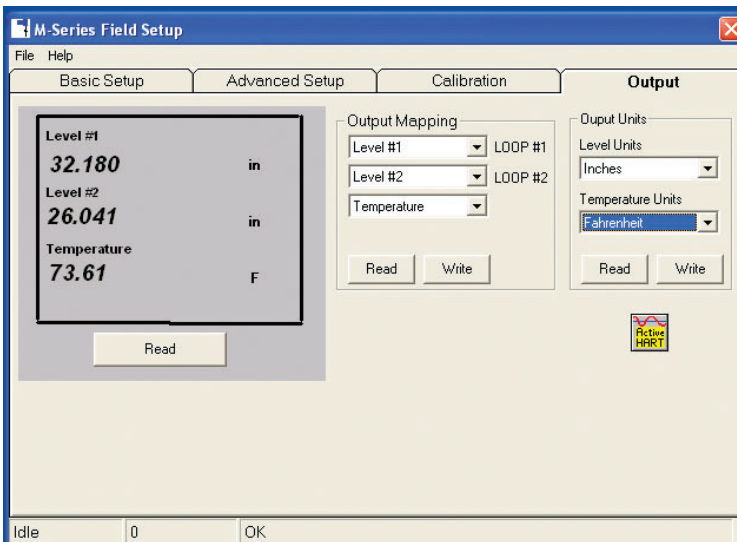


1. Changing the 4 and 20 mA set points occurs on the Calibration Tab. The procedure is the same for Level 1, Level 2 and Temperature.
2. Click 'Read' to determine current set point and units.
3. Select units from drop down menu.
4. Change set point. The 4 mA set point is the Zero or Lower Range Value (LRV). The 20 mA set point is the Span or Upper Range Value (URV).
5. Click 'Write.' Click 'Read' and confirm the new set points are correct.

OUTPUT TAB

Note:

Not all parameters are available on the MC420 including output mapping and temperature units.




Output Units: The units of measure for level and temperature may be selected using the pull down menus. When changing units, these selections should be changed on this screen first, prior to changing units on any of the other tabs (Advance Setup or Calibration).

Read: This button sends a single read command to the transmitter and displays the data which the transmitter responds with.

Model MC420 Operation and Installation Manual

Agency Information

Agency approvals

Intrinsically safe	
C22.2 No. 157	Class I, Division 1, Groups A, B, C and D Class II, Division 1, Groups E, F and G Class III, T4 Division 1, NEMA Type 4X Ta = 71° C
FM 3610	Class I, Division 1, Groups C and D Class II, Division 1, Groups E, F and G Class III, T4 Division 1, NEMA Type 4X Ta = 71° C
EN 60079-11:2007	PTB 10 ATEX 2011 X  II 1/2 G bzw. II 2 G Ex ia IIB T4 bzw. Ex ia IIA T4 ** Ta = -20° C to 80° C ** Contact factory for model numbers
GB 3836.4-2010	GYJ14.1052X Ex ia IIB T4 Ga/Gb Ta = -20° C to 80° C

FM/CSA/ATEX

INSTALLATION DRAWING NOTES (FIGURE 6)


Model number	Approval agency				Approval type	Approval classification	Ground connection
	FM	CSA	ATEX	NEPSI			
MC420____E	X				X	 II ½ G Ex ia IIB T4 Ga/Gb bzw Gb	Figure 7
MC420____C	X				X	CL I, Div 1, GR A,B,C,D CL II, Div 1, GR E,F,G, CL III	Figure 7
MC420____F		X			X	CL I, Div 1, GR C,D CL II, Div 1, GR E,F,G, CL III	Figure 7
MC420____N		X			X	Ex ia IIB T4 Ga/Gb	Figure 7

Figure 6 . Notes. Product Model / Hazardous location breakdown (Reference only)

Installation drawing

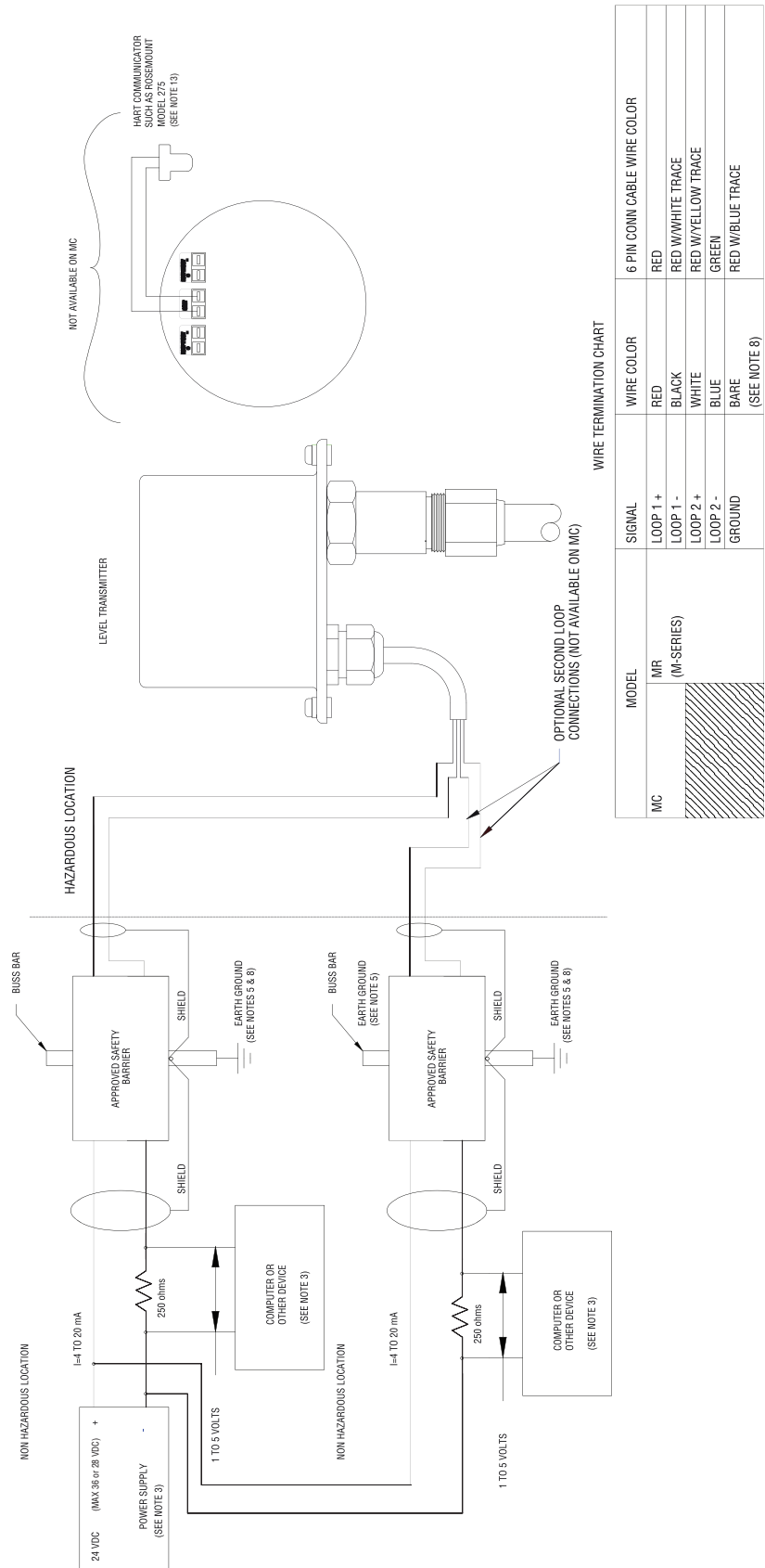


Figure 6. Integral cable installation drawing (Reference only)

Model MC420 Operation and Installation Manual

Agency Information

FM/CSA/ATEX

INSTALLATION DRAWING NOTES (FIGURE 6)

NOTES:

1. FOR I.S. FIELD INSTALLATION WIRING SHALL BE INSTALLED IN ACCORDANCE WITH THE COUNTRY IN USE (eg CANADIAN ELECTRICAL CODE, PART 1, NATIONAL ELECTRIC CODE ANSI/NFPA 70 ARTICLE 504-30.)
2. SHIELDED TWISTED CABLE OF 24 AWG OR HEAVIER SHOULD BE USED. CABLE CAPACITANCE SHALL BE LESS THAN 30 PF PER FOOT.
3. CONTROL ROOM EQUIPMENT SHOULD NOT USE OR GENERATE MORE THAN 250 V RMS.
4. BARRIERS MUST BE HAZARDOUS AREA APPROVED.
5. THE CONNECTION BETWEEN THE EARTH GROUND TERMINAL OF THE ENTITY APPROVED SAFETY BARRIERS AND SYSTEM EARTH GROUND MUST BE LESS THAN 1 ohm.
6. SAFETY BARRIERS ARE ENTITY APPROVED SAFETY BARRIERS USED IN AN APPROVED CONFIGURATION WHERE TRANSMITTER V_{max} IS GREATER THAN BARRIER V_{oc} AND TRANSMITTER I_{max} IS GREATER THAN BARRIER I_{sc} .
7. TRANSMITTER C_i PLUS TOTAL CABLE CAPACITANCE FOR EACH LOOP MUST NOT EXCEED BARRIER C_a . TRANSMITTER L_i PLUS TOTAL CABLE INDUCTANCE FOR EACH LOOP MUST NOT EXCEED BARRIER L_a . (SEE NOTE 14)
8. GAUGE ENCLOSURE SHALL BE GROUNDED TO EARTH GROUND THROUGH THE PROVIDED GROUND LUG IN THE ENCLOSURE. WHERE INTEGRAL CABLE IS PROVIDED, LOOP 2 SHIELD IS INSTRUMENT GROUND.
9. NO REVISIONS SHALL BE MADE WITHOUT NOTIFICATION OF APPROVAL AGENCY(S).
10. EACH LOOP ENTITY PARAMETERS
 $V_{max} = 28V$
 $I_{max} = 118mA$
 $C = 0$
 $L = 200\mu H$
11. TEMPERATURE CODE IS T4.
12. USE ONLY NRTL LISTED AND CSA CERTIFIED DUST-TIGHT SEAL FOR CLASS AND CLASS HAZARDOUS LOCATIONS.

1

FM/CSA/ATEX

INSTALLATION DRAWING NOTES (FIGURE 6)



Model number	Approval agency			Approval type	Approval classification	Ground connection
	FM	CSA	ATEX	IS		
MC420___OOC		X		X	CL. I, Div. 1, GR. A, B, C, D CL. II, Div. 1, GR. E, F, G CLASS III	Figure 7
MC420___TOC		X		X	CL. I, DIV. 1, GR. A, B, C, D CL. II, DIV. 1, GR. E,F,G CLASS III	Figure 7
MC420___FOC		X		X	CL. I, Div. 1, GR. A, B, C, D CL. II, Div. 1, GR. E, F, G CLASS III	
MC420___FTC		X		X	CL. I, DIV. 1, GR. A, B, C, D CL. II, DIV. 1, GR. E, F, G CLASS III	Figure 7
MC420___OPE			X	X	 II ½ G Ex ia IIA T4 bzw Ex ia IIB T4 Ga/Gb bzw Gb	Figure 7
MC420___FPE			X	X	 II ½ G Ex ia IIA T4 bzw Ex ia IIB T4 Ga/Gb bzw Gb	
MC420___ON					N/A	Figure 7
MC420___FN					N/A	Figure 7
MC420___OOF	X			X	CL. I, Div. 1, GR. C, D CL. II, Div. 1, GR. E, F, G CLASS III	Figure 7
MC420___TOF	X			X	CL. I, DIV. 1, GR. C, D CL. II, DIV. 1, GR. E,F,G CLASS III	Figure 7
MC420___FOF	X			X	CL. I, Div. 1, GR. C, D CL. II, Div. 1, GR. E, F, G CLASS III	Figure 7
MC420___FTF	X			X	CL. I, DIV. 1, GR. C, D CL. II, DIV. 1, GR. E, F, G CLASS III	Figure 7

Figure 6 . Notes. Product Model / Hazardous location breakdown (Reference only)

Wiring and connections

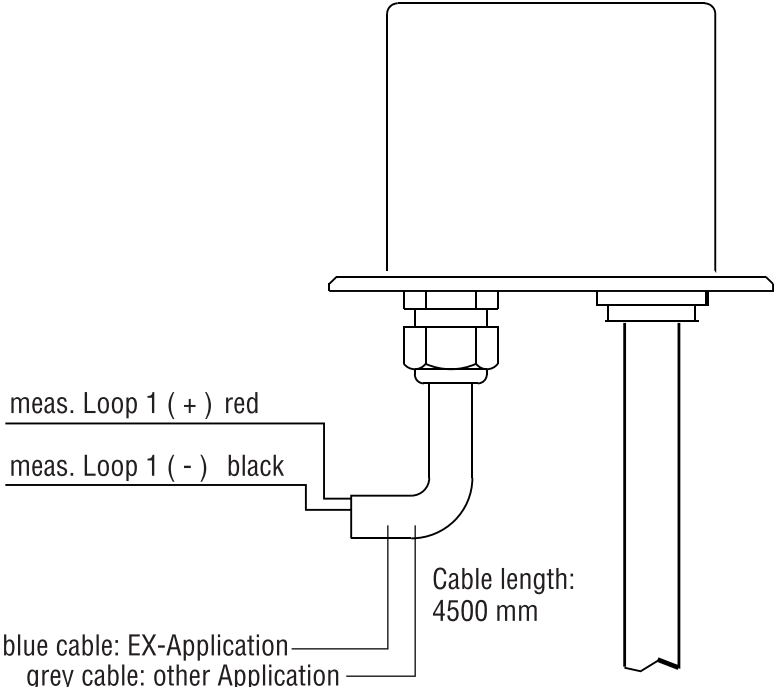


Figure 7. NEMA 4X housing with integrated cable.

Agency Certifications

ATEX APPROVAL

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin



(1) **EC-TYPE-EXAMINATION CERTIFICATE**
(Translation)

- (2) Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres - **Directive 94/9/EC**
(3) EC-type-examination Certificate Number:



PTB 10 ATEX 2011 X

- (4) Equipment: Level sensors Level Plus M-Series, types MRA... and MC420...
(5) Manufacturer: MTS Sensor Technologie GmbH & Co. KG
(6) Address: Auf dem Schüffel 9, 58513 Lüdenscheid, Germany
(7) This equipment and any acceptable variation thereto are specified in the schedule to this certificate and the documents therein referred to.
(8) The Physikalisch-Technische Bundesanstalt, notified body No. 0102 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in the confidential test report PTB Ex 10-29149.

- (9) Compliance with the Essential Health and Safety Requirements has been assured by compliance with:
EN 60079-0:2009 EN 60079-11:2007 EN 60079-26:2007
(10) If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.
(11) This EC-type-examination Certificate relates only to the design, examination and tests of the specified equipment in accordance to the Directive 94/9/EC. Further requirements of the Directive apply to the manufacturing process and supply of this equipment. These are not covered by this certificate.
(12) The marking of the equipment shall include the following:

II 1/2 G or II 2 G Ex ia IIA T4 or Ex ia IIB T4 Ga/Gb or Gb

Zertifizierungssektor Explosionsschutz
On behalf of PTB:

Braunschweig, May 12, 2011

(signature)

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

4 pages, correct and complete as regards content.
By order:

Dr.-Ing. Johannsmeyer Braunschweig, April 24, 2014
Direktor und Professor

sheet 1/4

ZSEx10100e.dotm ZSEx001e

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • GERMANY

Agency Certifications

ATEX APPROVAL

Physikalisch-Technische Bundesanstalt
Braunschweig und Berlin



SCHEDULE

(13)

(14) **EC-TYPE-EXAMINATION CERTIFICATE PTB 10 ATEX 2011 X**

(15) Description of equipment

The level sensors Level Plus M-Series, types MRA... and MC420... are applied in tanks for the continuous level measurement of liquids or for the interface detection in liquids. The level sensors Level Plus M-Series of types MRA... are furthermore used to detect the liquid temperature. The level sensors Level Plus M-Series of types MRA... can be equipped with a display for the visualization of measurement data.

The level sensors consist of an enclosure for the associated evaluation electronics, the process connection element and the sensor element with float. Depending on the design the level sensors are used in hazardous areas of

explosion group II A (marking Ex II 1/2 G or 2 G Ex ia IIA T4 Ga/Gb or Gb) or
explosion group II B (marking Ex II 1/2 G or 2 G Ex ia IIB T4 Ga/Gb or Gb)

For the respective variants, reference is made to the type code.

Category-1/2-equipment

The enclosure for the electronics system is installed in the hazardous area for category-2-equipment. The process connection elements are installed in the partition separating areas from each other where equipment of category 2 or 1 is required. The sensor element is installed in areas requiring equipment of category 1.

Category-2-equipment

The level sensors are installed in hazardous areas for category-2-equipment.

For relationship between maximum permissible ambient temperature and supplied power, reference is made to the table given below.

Electrical data

Supply and
data circuits

Types MC420...

type of protection Intrinsic Safety Ex ia IIB
or Ex ib IIB

Only for connection to certified intrinsically safe circuits.

Maximum values:

$U = 28 \text{ V}$

$\Sigma I = 118 \text{ mA}$

C_i negligibly low

$L_i = 0.2 \text{ mH}$

sheet 2/4

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • GERMANY

Agency Certifications

ATEX APPROVAL

Physikalisch-Technische Bundesanstalt



Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 10 ATEX 2011 X

Total power ΣP_i	Ambient temperature at the electronics
1.3 W	- 20 ... +40 °C
1.2 W	- 20 ... +60 °C
1.0 W	- 20 ... +80 °C

For applications requiring category-1 equipment the process pressure of the media shall range from 0.8 bar up to 1.1 bar and the process temperatures from -20 °C up to +60 °C. In case of a deviation from these abovementioned operating conditions it shall be observed that the sensor does not show any self-heating (not even in the event of a fault) and that the operating company is responsible for the safe operation of the system with respect to the pressures / temperatures of the media used. The manufacturer's specifications shall be observed here.

Supply and data circuits (Loop 1 and 2)

Types MRA...
type of protection Intrinsic Safety Ex ia IIB or Ex ia IIA or Ex ib IIB or Ex ib IIA

Only for connection to certified intrinsically safe circuits.
Maximum values per circuit:
 $U_i = 28 \text{ V}$
 $I_i = 118 \text{ mA}$
 C_i negligibly low
 $L_i = 0.2 \text{ mH}$

Power P_i	Ambient temperature at the electronics
1.3 W	- 20 ... +40 °C
1.2 W	- 20 ... +60 °C
1.0 W	- 20 ... +80 °C

For applications requiring category-1 equipment the process pressure of the media shall range from 0.8 bar up to 1.1 bar and the process temperatures from -20 °C up to +60 °C. In case of a deviation from these abovementioned operating conditions it shall be observed that the sensor does not show any self-heating (not even in the event of a fault) and that the operating company is responsible for the safe operation of the system with respect to the pressures / temperatures of the media used. The manufacturer's specifications shall be observed here.

(16) Test report PTB Ex 10-29149

(17) Special conditions for safe use

1. Since the supply and data circuits of the level-transmitters are operationally grounded equipotential bonding shall be provided along the entire cable run of the supply and data circuits inside and outside of the hazardous area.

sheet 3/4

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • GERMANY

Agency Certifications

ATEX APPROVAL

Physikalisch-Technische Bundesanstalt



Braunschweig und Berlin

SCHEDULE TO EC-TYPE-EXAMINATION CERTIFICATE PTB 10 ATEX 2011 X

2. Level-transmitters which are equipped with plastic floats shall only be installed in hazardous areas requiring equipment of category 1 with equipment group II A.

(18) Essential health and safety requirements

met by compliance with the standards mentioned above

Zertifizierungssektor Explosionsschutz
On behalf of PTB:

Braunschweig, May 12, 2011

(signature)

Dr.-Ing. U. Johannsmeyer
Direktor und Professor

sheet 4/4

EC-type-examination Certificates without signature and official stamp shall not be valid. The certificates may be circulated only without alteration. Extracts or alterations are subject to approval by the Physikalisch-Technische Bundesanstalt. In case of dispute, the German text shall prevail.

Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • GERMANY

Agency Certifications

ATEX APPROVAL



Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin



EG-Baumusterprüfbescheinigung

- (1)
- (2) Geräte und Schutzsysteme zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen - **Richtlinie 94/9/EG**
- (3) EG-Baumusterprüfbescheinigungsnummer



PTB 10 ATEX 2011 X

- (4) Gerät: Füllstandsensoren Level Plus M-Serie Typen MRA... und MC420...
- (5) Hersteller: MTS Sensor Technologie GmbH & Co. KG
- (6) Anschrift: Auf dem Schüffel 9, 58513 Lüdenscheid, Deutschland
- (7) Die Bauart dieses Gerätes sowie die verschiedenen zulässigen Ausführungen sind in der Anlage und den darin aufgeführten Unterlagen zu dieser Baumusterprüfbescheinigung festgelegt.
- (8) Die Physikalisch-Technische Bundesanstalt bescheinigt als benannte Stelle Nr. 0102 nach Artikel 9 der Richtlinie des Rates der Europäischen Gemeinschaften vom 23. März 1994 (94/9/EG) die Erfüllung der grundlegenden Sicherheits- und Gesundheitsanforderungen für die Konzeption und den Bau von Geräten und Schutzsystemen zur bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen gemäß Anhang II der Richtlinie.

Die Ergebnisse der Prüfung sind in dem vertraulichen Bewertungs- und Prüfbericht PTB Ex 10-29149 festgehalten.

- (9) Die grundlegenden Sicherheits- und Gesundheitsanforderungen werden erfüllt durch Übereinstimmung mit

EN 60079-0:2009 EN 60079-11:2007 EN 60079-26:2007

- (10) Falls das Zeichen „X“ hinter der Bescheinigungsnummer steht, wird auf besondere Bedingungen für die sichere Anwendung des Gerätes in der Anlage zu dieser Bescheinigung hingewiesen.
- (11) Diese EG-Baumusterprüfbescheinigung bezieht sich nur auf Konzeption und Prüfung des festgelegten Gerätes gemäß Richtlinie 94/9/EG. Weitere Anforderungen dieser Richtlinie gelten für die Herstellung und das Inverkehrbringen dieses Gerätes. Diese Anforderungen werden nicht durch diese Bescheinigung abgedeckt.
- (12) Die Kennzeichnung des Gerätes muss die folgenden Angaben enthalten:

II 1/2 G bzw. II 2 G Ex ia IIA T4 bzw. Ex ia IIB T4 Ga/Gb bzw. Gb

Zertifizierungssektor Explosionschutz
Im Auftrag

Braunschweig, 12. Mai 2011

Dr.-Ing. U. Johannsmeyer
Direktor und Professor



ZSEx10100d.dot

Seite 1/4

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
Diese EG-Baumusterprüfbescheinigung darf nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.
Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • DEUTSCHLAND



Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

- (13) **A n l a g e**
- (14) **EG-Baumusterprüfbescheinigung PTB 10 ATEX 2011 X**
- (15) Beschreibung des Gerätes

Die Füllstandsensoren Level Plus M-Serie Typen MRA... und MC420... werden in Behältern zur kontinuierlichen Füllstandmessung von Flüssigkeiten oder zur Messung von Trennschichten in Flüssigkeiten verwendet. Weiterhin wird bei den Füllstandsensoren Level Plus M-Serie Typen MRA... die Temperatur der Flüssigkeiten erfasst. Zur Visualisierung der Messdaten können die Füllstandsensoren Level Plus M-Serie Typen MRA... mit einem Display bestückt werden.

Die Füllstandsensoren bestehen aus einem Elektronikgehäuse mit der zugehörigen Auswertelektronik, dem Prozessanschlusselement und dem Sensorelement mit Schwimmer. Je nach Ausführung werden die Füllstandsensoren in explosionsgefährdeten Bereichen der

Explosionsgruppe II A (Kennzeichnung Ex II 1/2 G bzw. 2 G Ex ia IIA T4 Ga/Gb bzw. Gb) oder der Explosionsgruppe IIB (Kennzeichnung Ex II 1/2 G bzw. 2 G Ex ia IIB T4 Ga/Gb bzw. Gb) verwendet. Die Varianten sind den jeweiligen Typschlüsseln zu entnehmen.

Kategorie-1/2-Betriebsmittel

Das Elektronikgehäuse wird im explosionsgefährdeten Bereich für Kategorie-2-Betriebsmittel errichtet. Die Prozessanschlüsselemente werden in die Trennwand errichtet, die die Bereiche voneinander trennt, in denen Betriebsmittel der Kategorie 2 oder 1 erforderlich sind. Das Sensorelement wird in Bereichen errichtet, die Betriebsmittel der Kategorie 1 erfordern.

Kategorie-2-Betriebsmittel

Die Füllstandsensoren werden in explosionsgefährdeten Bereichen für Kategorie-2-Betriebsmittel errichtet.

Die Zuordnung zwischen höchstzulässiger Umgebungstemperatur und zugeführter Leistung ist der u.a. Tabelle zu entnehmen.

Elektrische Daten

Versorgungs- und
Datenstromkreise

Typen MC420...

in Zündschutzart Eigensicherheit Ex ia IIB
bzw. Ex ib IIB

Nur zum Anschluss an bescheinigte eigensichere Stromkreise.

Höchstwerte:

$U = 28 \text{ V}$

$\Sigma I = 118 \text{ mA}$

C_i vernachlässigbar klein

$L_i = 0,2 \text{ mH}$

Seite 2/4

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
Diese EG-Baumusterprüfbescheinigung darf nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.
Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • DEUTSCHLAND

ATEX APPROVAL



Physikalisch-Technische Bundesanstalt

Braunschweig und Berlin

Anlage zur EG-Baumusterprüfbescheinigung PTB 10 ATEX 2011 X

Summenleistung ΣP_i	Umgebungstemperatur an der Elektronik
1,3 W	- 20 ... +40 °C
1,2 W	- 20 ... +60 °C
1,0 W	- 20 ... +80 °C

Der Prozessdruck der Medien bzw. die Mediumtemperatur muss bei Anwendungen, die Kategorie-1-Betriebsmittel erfordern, zwischen 0,8 bis 1,1 bar bzw. -20 ... +60 °C liegen. Wird von diesen oben genannten Einsatzbedingungen am Messfühler abgewichen, ist zu beachten, dass der Messfühler (auch im Störfall) keine eigene Erwärmung aufweist und dass der sichere Betrieb der Anlage im Hinblick auf Drücke/Temperaturen der verwendeten Stoffe dem Betreiber obliegt. Hierbei sind die Kenndaten des Herstellers zu beachten.

Typen MRA...
in Zündschutzart Eigensicherheit Ex ia IIB bzw. Ex ia IIA
bzw. Ex ib IIB bzw. Ex ib IIA
Nur zum Anschluss an bescheinigte eigensichere Stromkreise.
Höchstwerte je Stromkreis:
 $U_i = 28 \text{ V}$
 $I_i = 118 \text{ mA}$
 C_i vernachlässigbar klein
 $L_i = 0,2 \text{ mH}$

Leistung P_i	Umgebungstemperatur an der Elektronik
1,3 W	- 20 ... +40 °C
1,2 W	- 20 ... +60 °C
1,0 W	- 20 ... +80 °C

Der Prozessdruck der Medien bzw. die Mediumtemperatur muss bei Anwendungen, die Kategorie-1-Betriebsmittel erfordern, zwischen 0,8 bis 1,1 bar bzw. -20 ... +60 °C liegen. Wird von diesen oben genannten Einsatzbedingungen am Messfühler abgewichen, ist zu beachten, dass der Messfühler (auch im Störfall) keine eigene Erwärmung aufweist und dass der sichere Betrieb der Anlage im Hinblick auf Drücke/Temperaturen der verwendeten Stoffe dem Betreiber obliegt. Hierbei sind die Kenndaten des Herstellers zu beachten.

(16) Bewertungs- und Prüfbericht PTB Ex 10-29149

(17) Besondere Bedingungen

- Da die Versorgungs- und Datenstromkreise der Füllstand-Transmitter betriebsmäßig gerundet sind, ist längs des Leitungszuges der Versorgungs- und Datenstromkreise innerhalb und außerhalb des explosionsgefährdeten Bereiches Potentialausgleich zu errichten.

Seite 3/4

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
Diese EG-Baumusterprüfbescheinigung darf nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.
Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • DEUTSCHLAND



Physikalisch-Technische Bundesanstalt

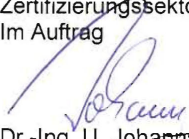
Braunschweig und Berlin

Anlage zur EG-Baumusterprüfbescheinigung PTB 10 ATEX 2011 X

2. Werden die Füllstand-Transmitter mit Kunststoffschwimmern ausgerüstet, so dürfen sie nur in explosionsgefährdeten Bereichen errichtet werden, die Betriebsmittel der Kategorie 1 mit der Betriebsmittelgruppe IIA erfordern.

- (18) Grundlegende Sicherheits- und Gesundheitsanforderungen
erfüllt durch die Übereinstimmung mit den vorgenannten Normen

Zertifizierungssektor Explosionsschutz
Im Auftrag


Dr.-Ing. U. Johannsmeyer
Direktor und Professor



Braunschweig, 10. Mai 2011

Seite 4/4

EG-Baumusterprüfbescheinigungen ohne Unterschrift und ohne Siegel haben keine Gültigkeit.
Diese EG-Baumusterprüfbescheinigung darf nur unverändert weiterverbreitet werden.
Auszüge oder Änderungen bedürfen der Genehmigung der Physikalisch-Technischen Bundesanstalt.
Physikalisch-Technische Bundesanstalt • Bundesallee 100 • 38116 Braunschweig • DEUTSCHLAND

CSA APPROVAL



Certificate of Compliance

Certificate: 1002006 (LR 81728)

Master Contract: 156704

Project: 2472822

Date Issued: February 6, 2012

Issued to: MTS Systems Corporation

Sensors Division
3001 Sheldon Dr
Cary, NC 27513
USA

Attention: Birch Bulkowski

The products listed below are eligible to bear the CSA Mark shown



Darrellyn Smith

Issued by: Darrellyn Smith

PRODUCTS

CLASS 2258 02 - PROCESS CONTROL EQUIPMENT - For Hazardous Locations

CLASS 2258 04 - PROCESS CONTROL EQUIPMENT - Intrinsically Safe, Entity - For Hazardous Locations

CLASS 2258 02

Class I, Groups B, C and D; Class II, Groups E, F and G; Class III; Enclosure 4X:

- M-SERIES Level Gauge, Types MRAabcdefghijijk, rated 36V dc max., 4-20 mA; Suffixes in Type number denote electronics options, housing type, mounting, materials, process connections and sensor length.

- M-SERIES Digital Level Gauge, Types MGAx#xxxxxxxxxxxx where # = B, C, D, E, 6 or 7, rated 32Vdc, 100 mA max; Suffixes in Type number denote electronics options, output, mounting, materials, process connections and sensor length.

Class I, Division 2, Groups A, B, C and D; Enclosure 4X:

- M-SERIES Digital Level Gauge, Types MGAx#xxxxxxxxxxxx, where # = A, B, C, D, E, 3, 6, 7, or 9; rated 30 Vdc max., 100 mA; Suffixes in Type number denote electronics options, output, mounting, materials, process connections and sensor length.

CLASS 2258 04

CSA APPROVAL



Certificate:	1002006 (LR 81728)	Master Contract:	156704
Project:	2472822	Date Issued:	February 6, 2012

Class I, Groups A, B, C and D; Class II, Groups E, F and G; Class III; Enclosure 4X:

- M-SERIES Level Gauge, Types MRAabcdefghijjkk, rated 36V dc max., 4-20 mA; intrinsically safe when connected per installation Drawing 650805, Temp. Code T4; suffixes in Type number denote electronics options, housing type, mounting, materials, process connections and sensor length.

- MC420 Level Gauge, rated 36V dc, 4-20 mA; intrinsically safe when connected per installation Drawing 650805, Temp. Code T4.

- M-SERIES Digital Level Gauge, Types MGAX#xxxxxxxxxxxxx, where # = A, B, C, D, E, L, 3, 6, 7, 8, or 9 (MGAXL and MGAX8 suitable for Class I locations only); rated 30 Vdc max., 100 mA; intrinsically safe when connected per installation drawing 650838, temp. code T4; suffixes in Type number denote electronics options, output, mounting, materials, process connections and sensor length.

Class I, Groups A, B, C and D; Enclosure 4X:

- M-SERIES USTD/PTM Level Gauge, Type MUAxUxxxxxxxxxxxxx; rated 30 Vdc max., 100 mA; intrinsically safe when connected per installation drawing 650844, temp. code T4; suffixes in Type number denote electronics options, output, mounting, materials, process connections and sensor length.

Class I, Groups A, B, C and D:

- M-SERIES Digital Level Gauge, Type MVUxxxS; rated 30 Vdc max., 100 mA; intrinsically safe when connected per installation drawing 650838, temp. code T4; xxx in Type number denotes sensor length.

APPLICABLE REQUIREMENTS

- CSA Std C22.2 No. 0-10- General Requirements - Canadian Electrical Code Part II
- CSA Std C22.2 No. 25-1966 (R 2009) - Enclosures for Use in Class II, Groups E, F and G Hazardous Locations
- CSA Std C22.2 No. 30-M1986 (R 2007) - Explosion-Proof Enclosures for Use in Class I Hazardous Locations
- CAN/CSA-C22.2 No. 94-M91(R 2006) - Special Purpose Enclosures
- CSA Std C22.2 No. 142-M1987 (R 2009) - Process Control Equipment
- CAN/CSA-C22.2 No. 157-92 (R 2006) - Intrinsically Safe and Non-incendive Equipment for Use in Hazardous Locations
- CSA Std C22.2 No. 213-M1987 (R 2008)- Non-Incendive Electrical Equipment for Use in Class I Division 2 Hazardous Locations



Member of the FM Global Group

FM Approvals
1151 Boston Providence Turnpike
P.O. Box 9102 Norwood, MA 02062 USA
T: 781 762 4300 F: 781-762-9375 www.fmapprovals.com

CERTIFICATE OF COMPLIANCE

HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

MGAabcdefghijklk. M-Series Digital Level Transmitters.

XP / I / 1 / BCD / T6 Ta = 71°C; DIP / II,III / EFG / T6 Ta = 71°C; Type 4X

IS / I,II,III / 1 / ABCDEFG / T4 Ta = 71°C - 650838; Entity; Type 4X

NI / I / 2 / ABCD / T4 Ta = 71°C; Type 4X

Entity Parameters:

$V_{Max} = 28\text{ V}$, $I_{Max} = 200\text{ mA}$, $C_i = 0\text{ }\mu\text{F}$, $L_i = 0\text{ mH}$.

a = Output M, D, O, N or T.

b = Housing Type A, B, C, D, E, L, 3, 6, 7, 8 or 9 (A, 3, 9 are IS only) (L, 8 are IS, Class I only) (B, C, D, E, 6, 7 are XP or IS).

c = Electronics Mounting 1, 3, 4, 5 or 6.

d = Sensor Pipe B, C, D, E, F, M, N, P, R, S, T, U, 1, 2 or 3.

e = Material of Construction 1, 2, 3, 9, A or C.

f = Process Connection Type 1, 4, 5, 6, 7, 8 or X.

g = Process Connection Size A, B, C, D, E, F, G, H, J or X.

h = DT 0, 1, 2, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K or L.

i = Unit of Measure M or U.

j = Length.

k = Special S, E or R.

MGAabcdefghijklk. M-Series Digital Level Transmitters.

XP / I / 1 / BCD / T6 Ta = 71°C; DIP / II,III / 1 / EFG / T6 Ta = 71°C; Type 4X

a = Output M, D, F, O, N, S or T.

b = Housing Type B, C, D, E, 6 or 7.

c = Electronics Mounting 1, 3, 4, 5 or 6.

d = Sensor pipe B, C, D, E, F, M, N, P, R, S, T, U, 1, 2, or 3.

e = Material of Construction 1, 2, 3, 9, A or C.

f = Process Connection Type 1, 4, 5, 6, 7, 8 or X.

g = Process Connection Size A, B, C, D, E, F, G, H, J or X.

h = DT 0, 1, 2, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K or L.

i = Unit of Measure M or U.

j = Length.

k = Special S, E or R.



USTD II abcdef M-Series Digital Level Transmitters.

IS / I / 1 / ABCD / T4 Ta = 71°C - 650838; Entity; Type 4X

Entity Parameters:

$V_{Max} = 28\text{ V}$, $I_{Max} = 200\text{ mA}$, $C_i = 0\text{ }\mu\text{F}$, $L_i = 0\text{ mH}$.

a = Unit of Measure. M or U.

b = Length (X through XXXX).

c = Process connection type H or A.

d = Cable S or C.

e = Output D or M.

MRabcdeghijkS. M-Series Level Transmitters.

XP / I / 1 / BCD / T6 Ta = 71°C

DIP / II,III / 1 / EFG / T6 Ta = 71°C; Type 4X

IS / I,II,III / 1 / CDEFG / T4 Ta = 71°C – 650805-1 Entity; Type 4X

Entity Parameters:

$V_{Max} = 28\text{ V}$, $I_{Max} = 118\text{ mA}$, $C_i = 0\text{ }\mu\text{F}$, $L_i = 220\text{ }\mu\text{H}$.

a = Agency Approval A, F, X.

b = Output 1, 2, 3 or 4.

c = Housing type A, B, C, D, E, L, M or 3, V, W, Y or Z (A, L, M or 3 intrinsically safe only).

d = Electronics mounting 1, 2, 3, 4, 5, 6.

e = Sensor pipe B, C, D, E, F, H, J, K, L, R, S, T, U, 1, 2 or 3.

f = Material of construction 1, 2, 3, 9, A or C.

g = Process connection type 1, 3, 4, 5, 6, 7, 8 or X.

h = Process connection size A, B, C, D, E, F, G, H, J or X.

i = RTD 0, 1 or 2.

j = Unit of measure M or U.

k = Length

l = Special S or E.

MRabcdeghijkl. M-Series Level Transmitters.

XP / I / 1 / BCD / T6 Ta = 71°C

DIP / II,III / 1 / EFG / T6 Ta = 71°C; Type 4X

IS / I,II,III / 1 / DEFG / T4 Ta = 71°C – 650805-1 Entity; Type 4X

Entity Parameters:

$V_{Max} = 28\text{ V}$, $I_{Max} = 118\text{ mA}$, $C_i = 0\text{ }\mu\text{F}$, $L_i = 220\text{ }\mu\text{H}$.

a = Agency Approval A, F, X.

b = Output 1, 2, 3 or 4.

c = Housing type A, B, C, D, E, L, M or 3, V, W, Y or Z (A, L, M or 3 intrinsically safe only).

d = Electronics mounting 1, 2.

e = Sensor pipe B, C, D, E, F, H, J, K, L, R, S, T, U, 1, 2 or 3.

f = Material of construction 1, 2, 3, 9, A or C.

g = Process connection type 1, 3, 4, 5, 6, 7, 8 or X.

h = Process connection size A, B, C, D, E, F, G, H, J or X.

i = RTD 0, 1 or 2.

j = Unit of measure M or U.

k = Length

l = Special S or E.

MC420abc. M-Series Level Transmitters.

IS / I,II,III / 1 / CDEFG / T4 Ta = 71°C – 650805-1 Entity; Type 4X

Entity Parameters: $V_{Max} = 28\text{ V}$, $I_{Max} = 118\text{ mA}$, $C_i = 0\text{ }\mu\text{F}$, $L_i = 220\text{ }\mu\text{H}$.

a = Length 011 to 216.

b = Agency Approval F.

c = Options S, N, 1, 2, 3.



Equipment Ratings:

MGA – Explosionproof for Class I, Division 1, Groups B, C, D; Dust-Ignitionproof for Class II, III Division 1, Groups E, F & G; Intrinsically Safe for Class I, II, III Division 1, Groups A, B, C, D, E, F & G Hazardous (Classified) outdoor (Type 4X) locations in accordance with Entity requirements and MTS Installation Drawing 650838

USTD II - Intrinsically Safe for Class I, Division 1, Groups A, B, C, D Hazardous (Classified) outdoor (Type 4X) locations in accordance with Entity requirements and MTS Installation Drawing 650838

MR - Explosionproof for Class I, Division 1, Groups B, C, D; Dust-Ignitionproof for Class II, III Division 1, Groups E, F & G; Intrinsically Safe for Class I, II, III Division 1, Groups C, D, E, F & G Hazardous (Classified) outdoor (NEMA Type 4X) locations in accordance with Entity requirements and MTS Installation Drawing 650805-1

MR - Explosionproof for Class I, Division 1, Groups B, C, D; Dust-Ignitionproof for Class II, III Division 1, Groups E, F & G; Intrinsically Safe for Class I, II, III Division 1, Groups D, E, F & G Hazardous (Classified) outdoor (NEMA Type 4X) locations in accordance with Entity requirements and MTS Installation Drawing 650805-1

MC420 - Intrinsically Safe for Class I, II, III Division 1, Groups C, D, E, F & G Hazardous (Classified) outdoor (NEMA Type 4X) locations in accordance with Entity requirements and MTS Installation Drawing 650805-1

FM Approved for:

MTS Systems Corporation
Sensors Division
Cary, NC
USA



This certifies that the equipment described has been found to comply with the following Approval Standards and other documents:

Class 3600	2011
Class 3610	2010
Class 3615	2006
Class 3810	2005
ANSI/NEMA 250	1991

Original Project ID: 3006790

Approval Granted: March 27, 2000

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
3008314	July 17, 2000	3041372	March 26, 2012
3008777	September 8, 2000	3045596	June 14, 2013
3009320	October 23, 2000		
3011770	September 24, 2001		
3010813	November 26, 2001		
3013732	March 18, 2002		
3014667	October 25, 2002		
031113	November 26, 2003		
040115	February 2, 2004		
040624	July 7, 2004		
040830	October 1, 2004		
050915	September 22, 2005		
060424	May 4, 2006		
060619	August 9, 2006		
070917	September 20, 2007		
071024	October 29, 2007		
080310	March 31, 2008		
080430	July 24, 2008		
100720	August 31, 2010		

FM Approvals LLC



 J.E. Marquedant
 Group Manager, Electrical

14 June 2013

 Date



EXPLOSION PROTECTION CERTIFICATE OF CONFORMITY

Cert NO.GYJ14.1052X

This is to certify that the product

Liquid Level Transmitter

manufactured by Auf dem Schuffel 9, 58513 Ludenscheid, Deutschland

(Address:Auf dem Schuffel 9, 58513 Ludenscheid, Deutschland)

which model is MC420 series

Ex marking

Ex ia II A T4 Ga/Gb Ex ia II A T4 Gb

Ex ia II B T4 Ga/Gb Ex ia II B T4 Gb

product standard /

drawing number 280241

has been inspected and certified by NEPSI, and that it conforms

to GB 3836.1-2010,GB 3836.4-2010,GB 3836.20-2010

This Approval shall remain in force until 2019.02.23

Remarks

- 1.Conditions for safe use are specified in the attachment to this certificate.
- 2.Symbol "X" placed after the certification number denotes specific conditions of use, which are specified in the attachment to this certificate.
- 3.Model designation is specified in the attachment to this certificate.
- 4.Intrinsic safety parameters specified in the attachment to this certificate.

Director



National Supervision and Inspection Centre for
Explosion Protection and Safety of Instrumentation

Issued Date 2014.02.24

This Certificate is valid for products compatible with the documents and samples approved by NEPSI.

103 Cao Bao Road
Shanghai 200233, China

<http://www.nepsi.org.cn>
Email: info@nepsi.org.cn

Tel: +86 21 64368180
Fax: +86 21 64844580



防爆合格证

证号: GYJ14.1052X

由 MTS Sensor Technologie GmbH & Co. KG
(地址: MTS Sensor Technologie GmbH & Co. KG)

制造的产品:

名称 液位变送器

型号规格 MC420系列

防爆标志 Ex ia II A T4 Ga/Gb Ex ia II A T4 Gb Ex ia II B T4
Ga/Gb Ex ia II B T4 Gb

产品标准 /

图样编号 280241

经图样及技术文件的审查和样品检验, 确认上述产品符合 GB 3836.1-2010、GB 3836.4-2010、GB 3836.20-2010 标准, 特颁发此证。

本证书有效期: 2014年2月24日至2019年2月23日

- 备注
1. 安全使用注意事项见本证书附件。
 2. 证书编号后缀“X”表明产品具有安全使用特殊条件, 内容见本证书附件。
 3. 型号规格说明见本证书附件。
 4. 本安电气参数见本证书附件。

站长

国家级仪器仪表防爆安全监督检验站

颁发日期二〇一四年二月二十四日

本证书仅对与认可文件和样品一致的产品有效。

地址: 上海市漕宝路103号
邮编: 200233

网址: www.nepsi.org.cn
Email: info@nepsi.org.cn

电话: +86 21 64368180
传真: +86 21 64844580

国家级仪器仪表防爆安全监督检验站

National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation

(GYJ14.1052X)

(Attachment I)

Attachment I to GYJ14.1052X

MC420 series Liquid Level Transmitter, manufactured by MTS Sensor Technologie GmbH & Co.KG, has been certified by National Supervision and Inspection Center for Explosion Protection and Safety of Instrumentation (NEPSI). The Liquid Level Transmitter accords with following standards:

GB3836.1-2010 Explosive atmospheres-Part 1: Equipment – General requirements

GB3836.4-2010 Explosive atmospheres-Part 4: Equipment protection by intrinsic safety “i”

GB3836.20-2010 Explosive atmospheres-Part 20: Equipment with equipment protection level (EPL) Ga

Liquid Level Transmitter has the Ex marking Ex ia II A T4 Ga/Gb or Ex ia II A T4 Gb or Ex ia II B T4 Ga/Gb or Ex ia II B T4 Gb.

The certificate number is GYJ14.1052X.

The certified type codes are:

MC420`abcde`

`abc` indicates length, which is specified in the instruction manual.

`d` indicates optional float, which could be O or F.

`e` indicates Ex specifications, which could be P or 2.

1. Special conditions for safe use

The suffix “X” placed after the certificate number indicates that this product is subject to special conditions for safe use:

- Ground potential balance is required when used in hazardous location.
- For applications in area where the use of EPL Ga apparatus is required, electrostatic charges on the non-metallic parts of Liquid Level Transmitter shall be avoided.
- The relationship between Ex marking and `e` specified in the model specification are as following¹:

code <code>e</code>	Ex marking
P	Ex ia II A T4 Ga/Gb or Ex ia II A T4 Gb or Ex ia II B T4 Ga/Gb or Ex ia II B T4 Gb

(GYJ14.1052X)

(Attachment I)

code	Ex marking
2	Ex ia II B T4 Ga/Gb or Ex ia II B T4 Gb

note1: See instruction manual for details.

2. Conditions for safe use

2.1 The relationship between intrinsic safety parameters and ambient temperature range are as following:

T _{amb.}	U _i	I _i	C _i	L _i	P _i
-20°C~+40°C	28V	118mA	≈0μF	0.2mH	1.3W
-20°C~+60°C					1.2W
-20°C~+80°C					1.0W

2.2 The Liquid Level Transmitter must be used together with safety barriers to form an intrinsic safety system thus can be used in hazardous locations. The wiring and installation must fulfil the requirements from instruction manuals of the Liquid Level Transmitter and chosen safety barriers.

2.3 The connection cable between the transmitter and associated apparatus should be two-core shielded cable with insulating sheath. The shielding layer should be grounded in safe area and insulated from the enclosure.

2.4 Forbid end user to change the configuration to ensure the equipment's explosion protection performance.

2.5 When installation, use and maintenance of Liquid Level Transmitter, observe following standards

GB3836.13-1997 "Electrical apparatus for explosive gas atmospheres Part 13:Repair and overhaul for apparatus used in explosive gas atmospheres"

GB3836.15-2000 "Electrical apparatus for explosive gas atmospheres Part 15:Electrical installations in hazardous area (other than mines)"

GB3836.16-2006 "Electrical apparatus for explosive gas atmospheres Part 16:Inspection and maintenance of electrical installation (other than mines)"

GB50257-1996 "Code for construction and acceptance of electric device for explosion atmospheres and fire hazard electrical equipment installation engineering"

3. Manufacturer's Responsibility

3.1 Special condition for safe use specified above should be included in the instruction manual.

3.2 Manufacturing should be done according to the documentation approved by NEPSI.

3.3 Following items should be added to the nameplate:

- a) NEPSI logo 
- b) Ex marking

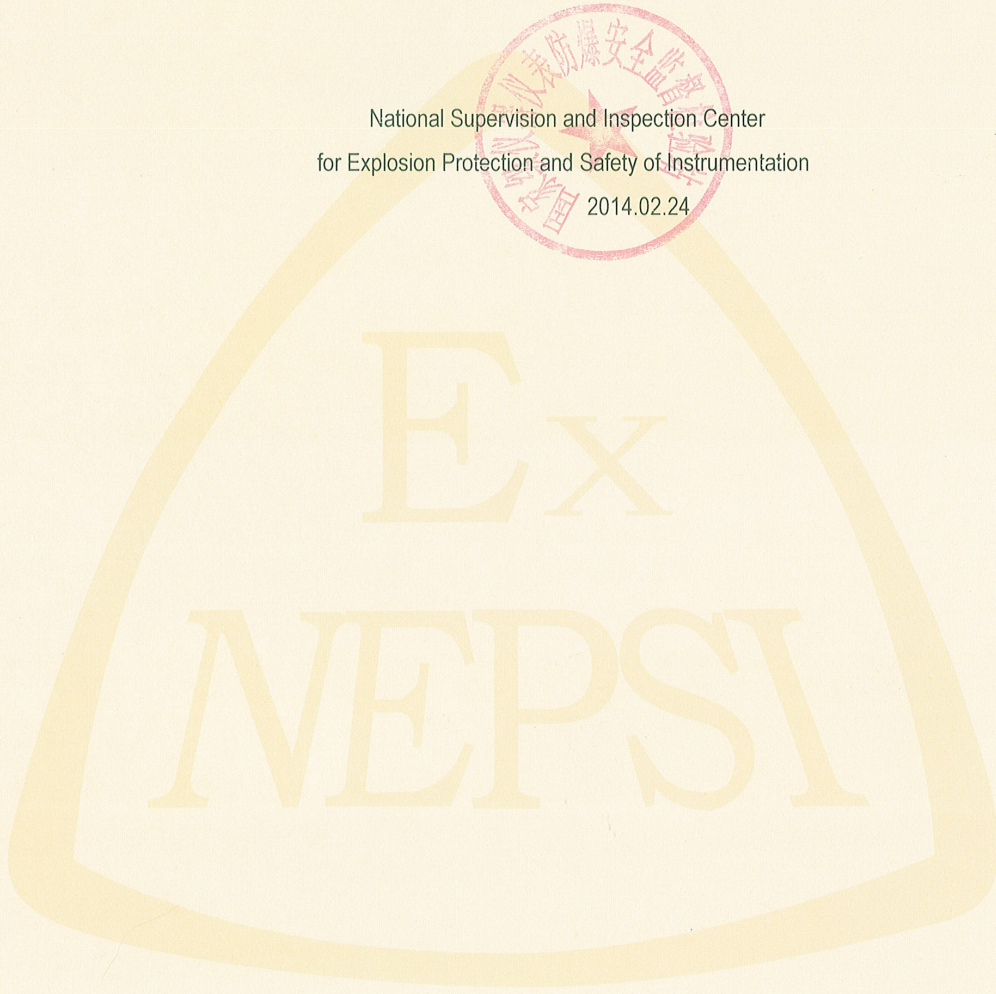
(GYJ14.1052X)

(Attachment I)

- c) Certificate number
- d) Ambient temperature range
- e) Intrinsic safety parameters

National Supervision and Inspection Center
for Explosion Protection and Safety of Instrumentation

2014.02.24



国家级仪器仪表防爆安全监督检验站

National Supervision and Inspection Centre for
Explosion Protection and Safety of Instrumentation

(GYJ14.1052X)

(Attachment I)

GYJ14.1052X防爆合格证附件 I

由MTS Sensor Technologie GmbH & Co.KG生产的MC420系列液位变送器（以下简称变送器），经国家级仪器仪表防爆安全监督检验站（NEPSI）检验，符合以下国家标准的规定：

GB3836.1-2010 爆炸性环境 第1部分：设备 通用要求

GB3836.4-2010 爆炸性环境 第4部分：由本质安全型“i”保护的設備

GB3836.20-2010 爆炸性环境 第20部分：设备保护级别（EPL）为Ga级的设备

产品防爆标志为Ex ia II A T4 Ga/Gb或Ex ia II A T4 Gb或Ex ia II B T4 Ga/Gb或Ex ia II B T4 Gb，防爆合格证号为GYJ14.1052X。

本次认可的产品型号为MC420 $abcde$ ，其中：

abc 代表测量管长度，详见使用说明书；

d 代表可选浮子，可为O或F；

e 代表防爆信息，可为P或2；

一、产品安全使用特殊条件

防爆合格证编号后的X表示其安全使用特殊条件，具体如下：

- 变送器在现场使用时必须保证地电位平衡。
- 当产品的测量元件作为设备保护等级（EPL）为Ga级使用时，应采取措施以防静电点燃危险。
- 产品防爆标志与产品型号中 e 代码的关系如下（注1）：

代码 e	防爆标志
P	Ex ia II A T4 Ga/Gb或 Ex ia II A T4 Gb或 Ex ia II B T4 Ga/Gb或 Ex ia II B T4 Gb
2	Ex ia II B T4 Ga/Gb或 Ex ia II B T4 Gb

注1：具体防爆标志参见产品使用说明书。

(GYJ14.1052X)

(Attachment I)

二、 产品使用注意事项

1. 变送器的最大输入参数（LOOP1， LOOP2）与使用环境温度范围的关系如下：

使用环境温度	U_i	I_i	C_i	L_i	P_i
-20℃~+40℃	28V	118mA	≈0 μF	0.2mH	1.3W
-20℃~+60℃					1.2W
-20℃~+80℃					1.0W

2. 变送器必须与已通过防爆认证的关联设备配套共同组成本安防爆系统方可使用于现场存在爆炸性气体混合物的危险场所。其系统接线必须同时遵守产品和所配关联设备的使用说明书要求，接线端子不得接错。

3. 变送器与关联设备的连接电缆应为带绝缘护套的屏蔽电缆，其屏蔽层应接地。

4. 用户不得自行随意更换该产品的电气零部件，应会同产品制造商共同解决运行中出现的故障，以免影响防爆性能和损坏现象的发生。

5. 产品的安装、使用和维护应同时遵守产品使用说明书、GB3836.13-1997“爆炸性气体环境用电气设备 第13部分：爆炸性气体环境用电气设备的检修”、GB3836.15-2000“爆炸性气体环境用电气设备 第15部分：危险场所电气安装（煤矿除外）”、GB3836.16-2006“爆炸性气体环境用电气设备 第16部分：电气装置的检查和维修（煤矿除外）”及GB50257-1996“电气设备安装工程爆炸和火灾危险环境电气装置施工及验收规范”的有关规定。

三、 制造厂责任

1. 产品制造厂必须将上述产品安全使用特殊条件及使用注意事项纳入该产品的使用说明书中。

2. 制造厂必须严格按照NEPSI认可的文件资料生产。

3. 产品铭牌中应至少包括下列内容：

a) NEPSI认可标志



b) 产品防爆标志

c) 防爆合格证号

d) 使用环境温度范围

e) 本质安全参数

国家级仪器仪表防爆安全监督检验站

二〇一四年二月二十四日

第 2 页 共 2 页

Document Part number:
550760 Revision E (EN) 02/2016

LOCATIONS

USA

**MTS Systems Corporation
Sensors Division**
3001 Sheldon Drive
Cary, N.C. 27513, USA
Tel. +1 919 677-0100
Fax +1 919 677-0200
info.us@mtssensors.com
www.mtssensors.com

GERMANY

**MTS Sensor Technologie
GmbH & Co. KG**
Auf dem Schüffel 9
58513 Lüdenscheid, Germany
Tel. +49 2351 9587-0
Fax +49 2351 56491
info.de@mtssensors.com
www.mtssensors.com

JAPAN

MTS Sensors Technology Corp.
737 Aihara-machi,
Machida-shi,
Tokyo 194-0211, Japan
Tel. +81 42 775-3838
Fax +81 42 775-5512
info.jp@mtssensors.com
www.mtssensors.com

FRANCE

MTS Systems SAS
Zone EUROPARC Bâtiment EXA 16
16/18, rue Eugène Dupuis
94046 Creteil, France
Tel. +33 1 58 4390-28
Fax +33 1 58 4390-03
info.fr@mtssensors.com
www.mtssensors.com

ITALY

MTS Systems Srl.Sensor Division
Via Diaz,4
25050 Provaglio d'Isèo (BS), Italy
Tel. +39 030 988 3819
Fax +39 030 982 3359
info.it@mtssensors.com
www.mtssensors.com

CHINA

MTS Sensors
Room 504, Huajing Commercial Center,
No. 188, North Qinzhou Road
200233 Shanghai, China
Tel. +86 21 6485 5800
Fax +86 21 6495 6329
info.cn@mtssensors.com
www.mtssensors.com

LEGAL NOTICES

MTS, Temposonics and Level Plus are registered trademarks of MTS Systems Corporation. All other trademarks are the property of their respective owners. Printed in USA. Copyright © 2016 MTS Systems Corporation. All Rights Reserved in all media.

All specifications are subject to change. Contact MTS for specifications and engineering drawings that are critical to your application. Drawings contained in this document are for reference only. Go to <http://www.mtssensors.com> for the latest product information.

