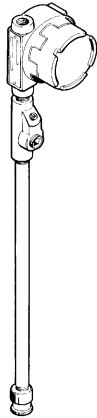




# EMERSON™

## PENBERTHY MODEL MGT-362 LEVEL MEASUREMENT TRANSMITTER INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Before installation, these instructions must be carefully read and understood.



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### PRODUCT WARRANTY

Emerson warrants its Penberthy products as designed and manufactured to be free of defects in the material and workmanship for a period of one year after the date of installation or eighteen months after the date of manufacture, whichever is earliest.

Emerson will, at its option, replace or repair any products which fail during the warranty period due to defective material or workmanship. Prior to submitting any claim for warranty service, the owner must submit proof of purchase to Emerson and obtain written authorization to return the product. Thereafter, the product shall be returned to Emerson with freight paid.

This warranty shall not apply if the product has been disassembled, tampered with, repaired or otherwise altered outside of the Emerson factory, or if it has been subject to misuse, neglect or accident.

The responsibility of Emerson hereunder is limited to repairing or replacing the product at its expense. Emerson shall not be liable for loss, damage or expenses related directly or indirectly to the installation or use of its products, or from any other cause or for consequential damages. It is expressly understood that Emerson is not responsible for damage or injury caused to other products, buildings, personnel or property, by reason of the installation or use of its products.

*This is Emerson's sole warranty and in lieu of all other warranties, expressed or implied which are hereby excluded, including in particular all warranties of merchantability or fitness for a particular purpose.*

This document and the warranty contained herein may not be modified and no other warranty, expressed or implied, shall be made by or on behalf of Emerson unless made in writing and signed by the company's general manager or director of engineering.

### 1 INTRODUCTION

The instructions in this manual pertain to the Penberthy Model MGT-362 level measurement transmitter.

The Model MGT-362 consists of a reed switch/resistor network encased in a pipe (sensor) and an electronics assembly. The electronics assembly is available in a watertight (NEMA 4) and explosion-proof (NEMA 7) enclosure.

The Model MGT-362 is available in either integral or remote mount models. The remote mount is required when the process temperature is greater than 160°F (71°C).

# PENBERTHY MODEL MGT-362 LEVEL MEASUREMENT TRANSMITTER

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### 1.1 System description

The Model MGT-362 level transmitter is designed to be used in conjunction with a Multiview™ liquid level meter. It measures the liquid level in a process vessel by detecting the position of the float in the Multiview™ communicating chamber. The float's position is then relayed by the electronics via a 4 to 20 mA output signal.

Specifically, the Model MGT-362 is a loop powered level measurement transmitter. As the magnet located in the float closes a group of reed switches the divided resistance of the network changes. The electronics located in the transmitter monitor this change in resistance and alter the output current proportionally. As the float ascends, each reed switch encountered will provide a higher voltage output than the previous switch. Therefore, as the float rises the loop current increases.

### 2 SPECIFICATIONS/APPROVALS

#### 2.1 Enclosure

Watertight (NEMA 4) and Explosion-proof (NEMA 7) cast aluminum housing NBR O-ring.

#### 2.2 Transmitter

Input: 11 V DC minimum;  
30 V DC maximum

Output: 4 to 20 mA continuous  
22 mA maximum (failure indication)

Resolution: 0.375 in. (10 mm)

Response time: 30 milliseconds

Operating temperature: -40 to 160°F (-40 to 71°C) transmitter  
-260 to 257°F (-162 to 125°C) sensing element

#### 2.3 Approvals

CSA certified Exi d

Explosion-proof for:

Division 1,2;

Class I; Groups B, C, D;

Class II; Groups E, F, G;

Class III, Type 4

When installed in accordance with control drawing 18F51-009 (Figure 4)

CSA certified Exi a

Intrinsically safe for:

Division 1,2;

Class I; Groups A, B, C, D;

Class II; Groups E, F, G;

Class III, Type 4

When installed in accordance with control drawings:

- For transmitter - 18F52-009 (Figure 5)
- For Model MGT-362R sensor - 18J54-009 (Figure 6)

### 3 INSTALLATION

#### 3.1 Unpacking

Upon receiving the Model MGT-362 level transmitter, check all components carefully for damage incurred in shipping. If damage is evident or suspected, do not attempt installation.

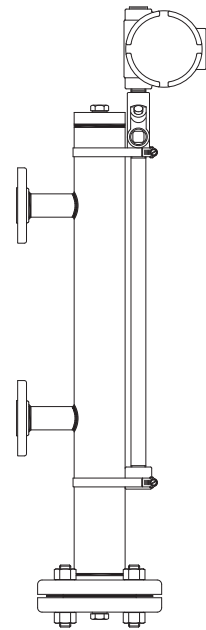
Notify the carrier immediately and request a damage inspection. Check each item against the packing list.

#### 3.2 Mounting the transmitter (for side connected Multiview™)

1. Measure the distance from the top of the indicator on the magnetic level meter to the top of the communicating chamber. Record this distance. If the mounting clamp does not clear the indicator:
2. Loosen the clamps holding the indicator to the communicating chamber. The clamps that will be used to mount the Model MGT-362 must pass between the indicator housing and the communicating chamber.
3. Mount the Model MGT-362 so the top of the sensor cap is below the bottom side connection and the bottom of the seal-off is above the upper side connection. For optimal installation, make the distance between your reference points on the Model MGT-362 sensor and the side connections the same. Use the clamps supplied to secure the sensor to the communicating chamber. The upper clamp should be above the upper side connection and the lower clamp should be below the bottom side connection. Never clamp directly on the sensing tube. If the indicator clamps were loosened:
4. Adjust the position of the indicator so that the distance from the top of the housing to the top of the communicating chamber is the same as in Step 1. Tighten the clamps for the indicator.

FIGURE 1

MGT-362 Standard Mounting Orientation



# PENBERTHY MODEL MGT-362 LEVEL MEASUREMENT TRANSMITTER

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### 3.3 Mounting the transmitter (for end connected Multiview™)

1. Measure the distance from the top of the indicator on the magnetic level meter to the top of the communicating chamber. Record this distance. If the mounting clamp does not clear the indicator:
2. Loosen the clamps holding the indicator to the communicating chamber. The clamps that will be used to mount the Model MGT-362 must pass between the indicator housing and the communicating chamber.
3. Mount the Model MGT-362 so the bottom of the seal-off is four inches above the top of the indicator. Use the clamps supplied to secure the sensor to the communicating chamber. Never clamp directly on the sensing tube. If the indicator clamps were loosened:
4. Adjust the position of the indicator so that the distance from the top of the housing to the top of the communicating chamber is the same as in Step 1. Tighten the clamps for the indicator.

### 3.4 Installation

1. If you are using conduit for the transmitter wiring use a conduit seal with a drain or a drip-loop to prevent condensate from entering the housing. Condensate can cause electrical shorts.

The transmitter housing has a 1/2 NPTF connection for the wiring conduit.

### 3.5 Wiring the transmitter (integral mounted units)

The sensor is pre-wired to the electronics assembly at the factory. All that is necessary is to connect your power supply.

1. Connect the positive (+) lead from your loop power supply to TB2 (+) and the negative (-) lead to TB2 (-). (See Figure 2)

### 3.6 Wiring the transmitter (remote mounted units)

1. Connect the red, green and black sensor wires to TB1. (See Figure 2)
2. Attach the positive (+) lead from your loop power supply to TB2 (+) and the negative (-) lead to TB2 (-). (see Figure 2)
3. The cable connecting the sensor and transmitter should not exceed 50 feet in length. Beldon cable #85240 is recommended for connecting the sensor to the transmitter.

## 4 SET-UP

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### 4.1 Calibration

The Model MGT-362 is factory calibrated for the corresponding Multiview™ unit. However, if necessary the Model MGT-362 may be bench calibrated using the float or the calibration magnet (sold separately). The following procedures require that power be applied to the unit with the cover removed.

#### WARNING

*'Live' electrical circuits can ignite flammable gases. Be sure that the unit is properly grounded and that a suitable intrinsically safe barrier has been installed between the power supply and this unit. Failure to use a barrier can result in severe personal injury or property damage.*

1. Turn off power to the unit.
2. Remove the housing cover and check to see that all wires have been properly installed.
3. Disconnect the positive (+) loop wire from TB2. Connect this wire to the positive lead of a millimeter. Connect the negative lead of your millimeter to TB2 (+). (See Figure 2)
4. Connect the positive (+) lead of a digital voltmeter to TP1 on the circuit board. Connect the negative (-) lead of a digital voltmeter to TP2 on the circuit board. (See Figure 2)
5. Lower the liquid level in the vessel to the 'zero' point. For bench calibration place the float or calibration magnet on the sensing element at the zero point.
6. Turn the NULL, SPAN and OFFSET potentiometers (R16, R15, and R14) fully counter clockwise. (See Figure 2)
7. Apply power to the unit. The millimeter should read 4 mA or less. If not, contact the factory. If the millimeter reads over 20 mA then the float or calibration magnet may not be in proximity to the sensor or the sensor wires are not properly connected at TB1. Reposition the float or inspect the wiring.

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- The NULL potentiometer is properly set as part of the factory calibration and should not require any further adjustment.

### CAUTION

Should the NULL require adjustment; care must be taken to ensure that the potentiometer is not over-ranged. The NULL potentiometer should be set with the liquid in the vessel set to the 'zero' point. A digital voltmeter should be connected to test points TP1 (+) and TP2 (-). Slowly turn the NULL potentiometer so that the reading on the voltmeter approaches a reading of 0.0 volts. At some point (usually within 0.1 Volts) the reading on the meter will no longer respond to any adjustment of the NULL potentiometer. At this point, turn the NULL potentiometer back slightly, so that the potentiometer is at the threshold of meter response. The reading does not have to be exactly 0.00 Volts.

Any additional adjustment of the NULL potentiometer beyond the point described above will decrease the available gain of the current loop and hinder proper calibration.

- Turn the OFFSET potentiometer (R14) clockwise so that the millimeter reads 4 mA  $\pm$  0.05 mA. (See Figure 2)
- Raise the liquid level to the highest possible level. For bench calibration place the float at the point on the sensing element corresponding to 100% level.
- Turn the SPAN potentiometer (R15) clockwise so that the millimeter reads 20 mA  $\pm$  0.0 5mA. (See Figure 2)
- Lower the float or calibration magnet to the 75%, 50% and 25% level. Verify that the output goes to 16 mA, 12 mA, and 8 mA respectively.
- Disconnect the power. Remove the voltmeter and the millimeter from the unit. Reconnect the positive (+) lead from the power supply to TB2 (+). (See Figure 2)

## 5 TROUBLESHOOTING

### 5.1 Introduction

Your Penberthy Model MGT-362 transmitter is designed to give you years of unattended service. However, failure of electrical equipment can occur. Sound maintenance practices require periodic inspection of the instrument to ensure it is in good working order.

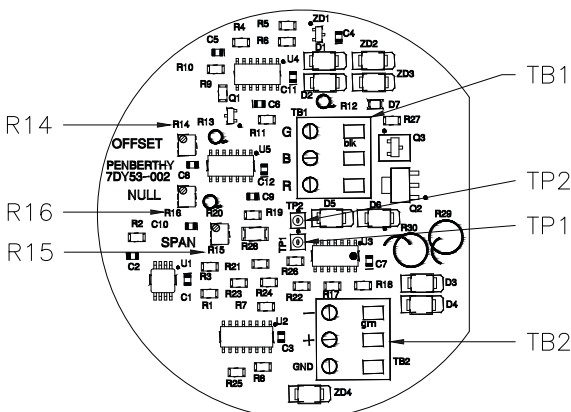
### WARNING

'Live' electrical circuits can ignite flammable gases. Be sure that the unit is properly grounded and that a suitable intrinsically safe barrier has been installed between the power supply and this unit. Failure to use a barrier can result in severe personal injury or property damage.

### 5.2 Test procedure

Follow the procedure in Section 4.1. If this doesn't solve the problem, go to Section 6.

FIGURE 2  
MGT-362 PCB Details for Wiring and Calibration



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### 6 FACTORY ASSISTANCE

#### 6.1 Field service

Trained field service engineers are available on a time-plus-expense basis to assist in startups, diagnosing difficult problems, or in plant training of personnel. Contact the Emerson factory for further details.

Although standard electronic units are generally in stock, it is suggested that you keep a spare transmitter on hand if the application is critical. A good benchmark is one spare unit for every ten units in service.

#### 6.2 Disposal at the end of useful life

Penberthy Model MGT-362 transmitters are used in a variety of fluid applications. By following the appropriate federal and industry regulations, the user must determine the extent of preparation and treatment the transmitter must incur before its disposal. A Material Safety Data Sheet (MSDS) may be required before disposal services accept certain components.

Metal, glass and polymers should be recycled whenever possible. Refer to order and relevant technical data sheets for materials of construction.

#### 6.3 Telephone assistance

If you are having difficulty with your Penberthy Model MGT-362 transmitter, contact your local Penberthy distributor. You may also contact the factory direct at (281) 274-4400 and ask for an applications engineer. So that we may assist you more effectively, please have as much of the following information available as possible when you call:

- Model #
- Name of the company from whom you purchased your transmitter
- Invoice # and date
- Process temperature
- A brief description of the problem
- Trouble shooting procedures that failed

If attempts to solve your problem fail, you may request to return your Model MGT-362 Transmitter to the factory for intensive testing. You must obtain a return authorization (R.A.) number from Emerson before returning anything. Failure to do so will result in the unit being returned to you without being tested, freight collect. To obtain an R.A. number, the following information (in addition to that above) is needed:

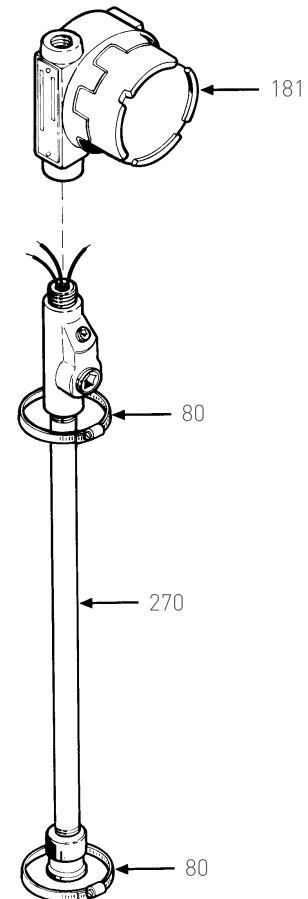
- Reason for return
- Person to contact at your company
- 'Ship-to' address

There is a minimum charge for evaluation of non-warranty units. You will be contacted before any repairs are initiated should the cost exceed the minimum charge. If you return a unit under warranty, but it is not defective, the minimum charge will apply.

### 7 EXPLODED PARTS DIAGRAM

80	Clamp
181	Housing
270	Sensor

FIGURE 3  
MGT-362 Exploded Parts Diagram

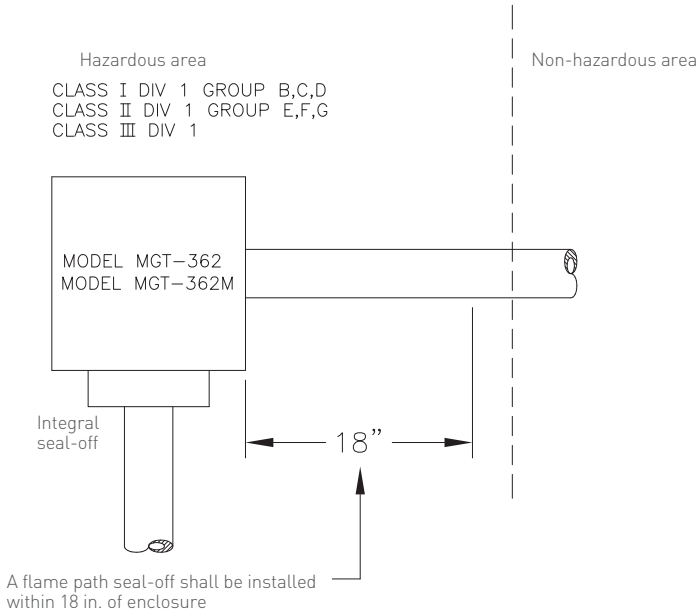


# PENBERTHY MODEL MGT-362 LEVEL MEASUREMENT TRANSMITTER

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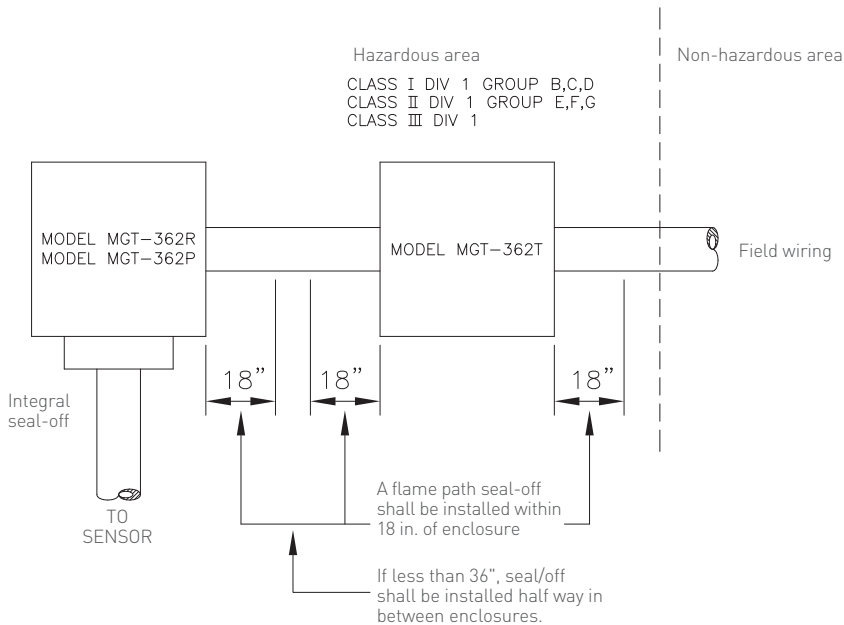
FIGURE 4  
Control Drawing Explosion-Proof for MGT-362 (18F51-009)

### INTEGRAL MOUNT



OR

### REMOTE MOUNT



### NOTES

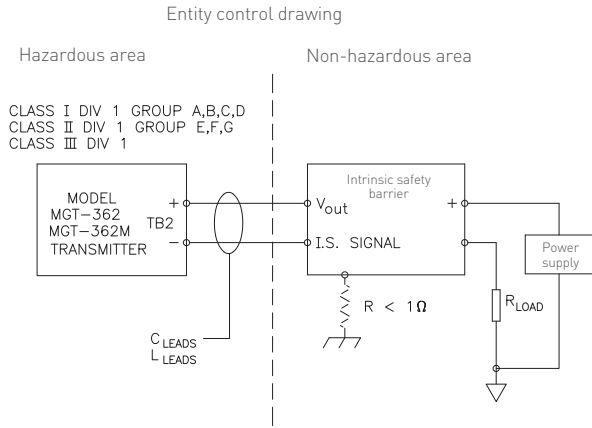
1. Case temperature can not exceed 100°C [212°F].
2. Wiring to be in accordance with national electrical code (NEC) pertinent parts of the 500 Series of Article 5 or local codes as applicable.

# PENBERTHY MODEL MGT-362 LEVEL MEASUREMENT TRANSMITTER

## INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

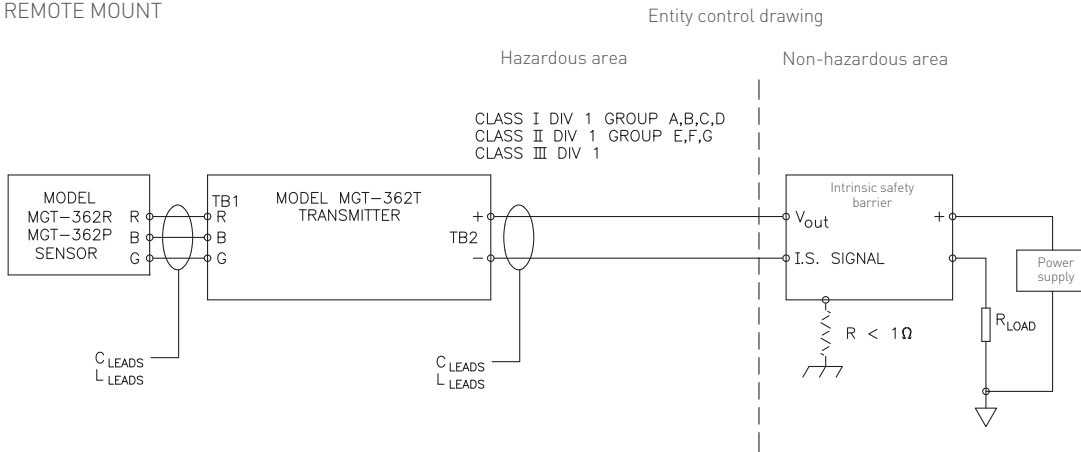
FIGURE 5  
Control Drawing Intrinsically Safe for Transmitter (18F52-009)

### INTEGRAL MOUNT



OR

### REMOTE MOUNT



### NOTES

1. Equipment supplying intrinsic system must not produce more than 250 V DC or 250 V rms.
2. Nominal power supply voltage = 25.5 V DC.
3. Use only one single or dual channel barrier per transmitter circuit.
4. Loop wire distance not to exceed 1500 ft using  $C_{leads} = 60 \text{ pF/FT}$ ,  $L_{leads} = 0.20 \text{ μH/FT}$ .

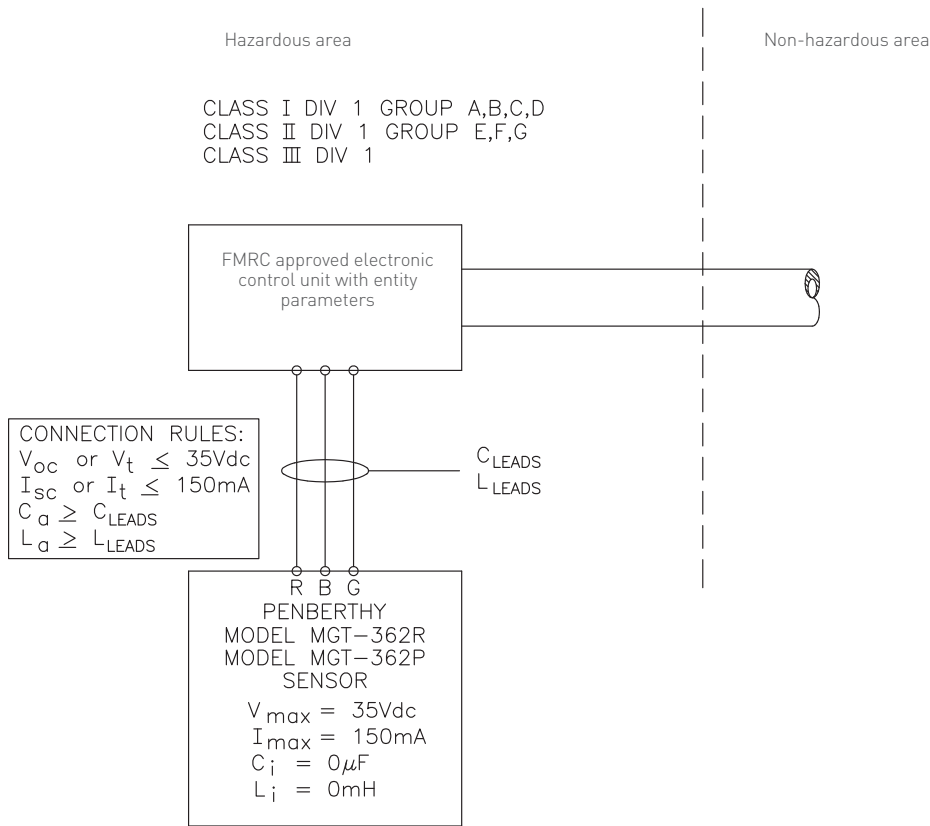
For CSA use CSA certified safety barriers:  
use diode return 1/2's only

MANUFACTURER	MODEL
Pepperl + Fuchs	Z487/Ex
MTL	MTL 787S+
MTL	MTL 702
Stahl	9002/13-280-093-00
Stahl	9001/51-280-091-14

# PENBERTHY MODEL MGT-362 LEVEL MEASUREMENT TRANSMITTER

## INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

FIGURE 6  
Control Drawing Intrinsically Safe for Model MGT-362R Sensor (18J54-009)



### NOTES

1. Installation shall conform to the manufacturer's instructions supplied with the electronic control unit as well as the national electric code and ANSI/ISA-RP 12.6 'installation of intrinsically safe instrument systems in hazardous (classified) locations'.
2. Maximum non-hazardous area voltage must not exceed 250 V rms or V DC.
3. Enclosure: NEMA4, ENCL4.

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