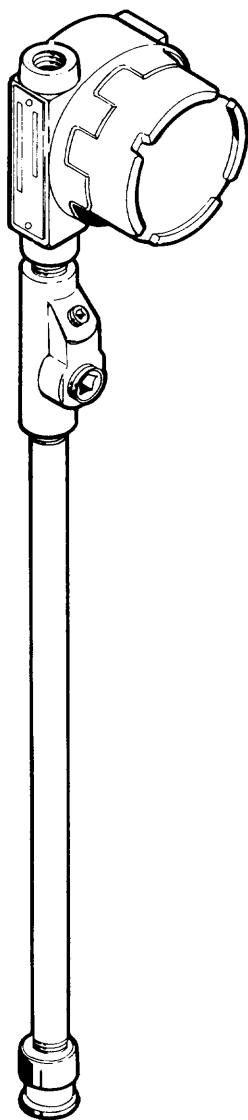


PENBERTHY®

Section 4000  
Instal. Instr. 4952  
Issued 01/97  
Replaces 3/94

# Model MGT-362 Level Measurement Transmitter

(For use with the MULTIVIEW™ Liquid Level Meter)



CE 96



Factory  
Mutual  
System

Approved

Installation/Operation/Maintenance Instructions

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Model MGT-362 Manual - Revision B

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# PRODUCT WARRANTY

Penberthy Inc., warrants its products as designed and manufactured by Penberthy to be free of defects in material and workmanship for a period of **one year** after the date of installation or **eighteen months** after date of manufacture, whichever is earliest. Penberthy 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 Penberthy and obtain written authorization to return the product. Thereafter, the product shall be returned to Penberthy in Prophetstown, Illinois, with freight prepaid.

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

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

**THIS IS PENBERTHY'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 Penberthy unless modified or made in writing and signed by the President or a Vice President of Penberthy.

## 1.0 Introduction

The instructions in this manual pertain to the Penberthy Model MGT-362 Level Measurement Transmitter.

The 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 4X) and explosion-proof (NEMA 7) enclosure.

The 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].

### 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 20mA output signal.

Specifically, the 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.

## 2.0 Specifications/Approvals

### 2.1 Enclosure

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

### 2.2 Transmitter

#### Input

11 Vdc minimum; 30 Vdc maximum

#### Output

4 to 20mA continuous  
22mA Maximum (failure indication)

#### Resolution

0.375"

#### Response Time

30 milliseconds

## Operating Temperature

-40°F to 160°F (-40°C to 70°C) -- Transmitter

-260°F to 257°F (-162°C to 125°C) -- Sensing Element

### 2.3 Approvals

FM Approved

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 Penberthy Drawing: # 18F51-009

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 Penberthy Drawing: # 18F51-009

FM Approved

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 Penberthy Drawing: # 18F52-009 (transmitter)  
# 18J54-009 (MGT-362R sensor)

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 Penberthy Drawing: # 18F52-009 (transmitter)  
# 18J54-009 (MGT-362R sensor)

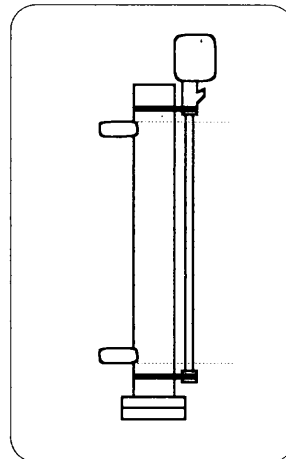
## **3.0 Installation**

### 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.
- 2.) Loosen the clamps holding the indicator to the communicating chamber. The clamps that will be used to mount the MGT-362 must pass between the indicator housing and the communicating chamber.
- 3.) Mount the 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 MGT-362 sensor and the side connections the same. Use the supplied clamps 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.
- 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.



### 3.3 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.
- 2.) Loosen the clamps holding the indicator to the communicating chamber. The clamps that will be used to mount the MGT-362 must pass between the indicator housing and the communicating chamber.
- 3.) Mount the MGT-362 so the bottom of the seal-off is four inches above the top of the indicator. Use the supplied clamps to secure the sensor to the communicating chamber.
- 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 TB100 (+) and the negative (-) lead to TB100 (-). TB100 is located on the top circuit board. (see Figure 1)

### 3.6 Wiring the Transmitter (Remote Mounted Units)

- 1.) Connect the red, green and black sensor wires to TB1 on the lower circuit board. (see Figure 2)
- 2.) Attach the positive (+) lead from your loop power supply to TB100 (+) and the negative (-) lead to TB100 (-). TB100 is located on the top circuit board. (see Figure 1)
- 3.) The cable connecting the sensor and transmitter should not exceed 50 feet in length. Penberthy recommends using Beldon cable #85240 for connecting the sensor to the transmitter.

## 4.0 Set-up

### 4.1 Calibration

The MGT-362 is factory calibrated for the corresponding MULTIVIEW™ unit. However, if necessary the MGT-362 may be bench calibrated using the float or the calibration magnet (supplied). 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 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 TB100. Connect this wire to the positive lead of a milliammeter. Connect the negative lead of your milliammeter to TB100 (+). (Figure 1)

- 4.) Connect the positive (+) lead of a digital voltmeter to TP1 on the lower circuit board. Connect the negative (-) lead of a digital voltmeter to TP2 on the lower circuit board. (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 (R20, R19, and R18) fully counter-clockwise. (Figure 2)
- 7.) Apply power to the unit. The milliammeter should read 4mA or less. If not, contact the factory. If the milliammeter reads over 20mA 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. (Figure 2)
- 8.) Turn the NULL potentiometer (R20) clockwise so that the voltmeter reads  $0.00V \pm 0.01V$  (DO NOT OVER ADJUST). (Figure 2)
- 9.) Turn the OFFSET potentiometer (R18) clockwise so that the milliammeter reads  $4mA \pm 0.05mA$ . (Figure 2)
- 10.) 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.
- 11.) Turn the SPAN potentiometer (R19) clockwise so that the milliammeter reads  $20mA \pm 0.05mA$ . (Figure 2)
- 12.) Lower the float or calibration magnet to the 75%, 50%, and 25% level. Verify that the output goes to 16mA, 12mA, and 8mA respectively.
- 13.) Disconnect the power. Remove the voltmeter and the milliammeter from the unit. Reconnect the positive (+) lead from the power supply to TB100 (+). (Figure 1)

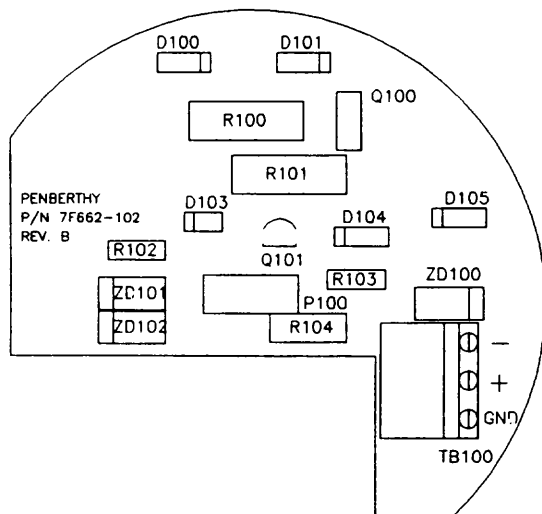


Figure 1

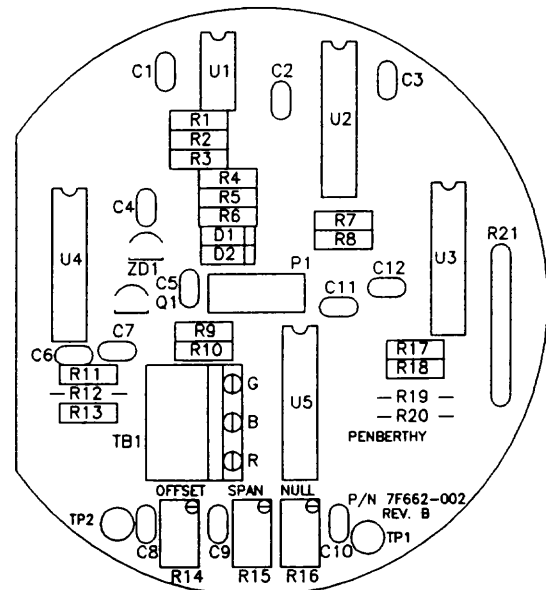


Figure 2



## 5.0 Troubleshooting

### 5.1 Introduction

Your Penberthy 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 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 6.2

## 6.0 Factory Assistance

### 6.1 Field Service

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

Although standard electronic units are generally in stock, Penberthy suggests 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 Telephone Assistance & Equipment Return

If you are having problems with your Penberthy MGT-362 Transmitter, notify your local Penberthy representative, or call the factory direct at (815) 537-2311 and ask for an applications engineer.

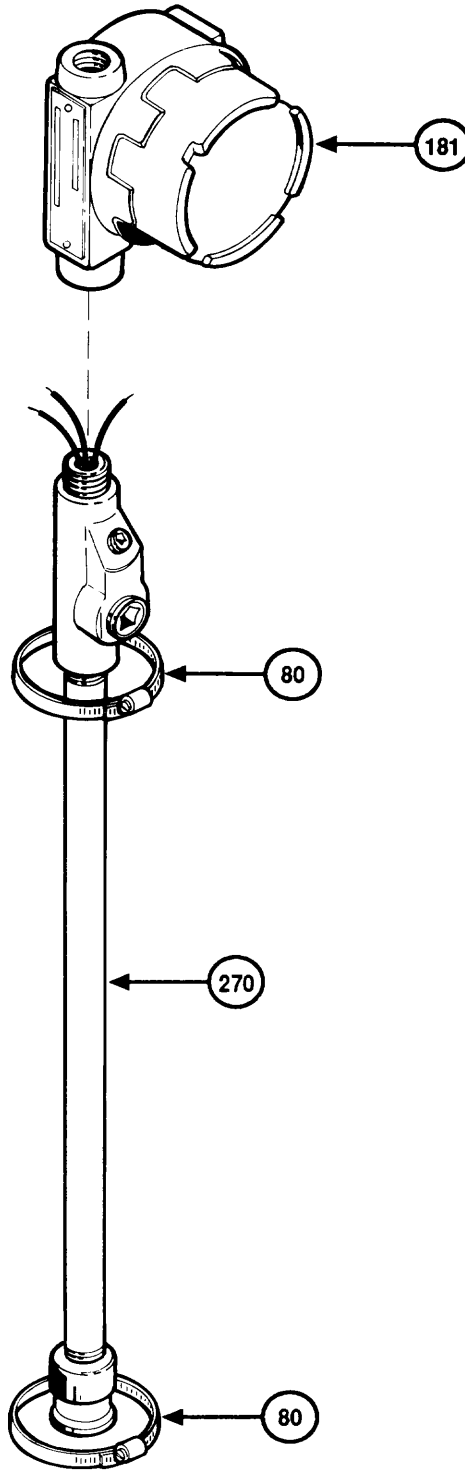
To help us to assist you more effectively, please have as much of the following information as possible when you call:

- **Instrument Model # (MGT-362)**
- **Process Temperature**
- **Brief description of the problem**
- **Checkout procedures (from the instruction manual) that failed**

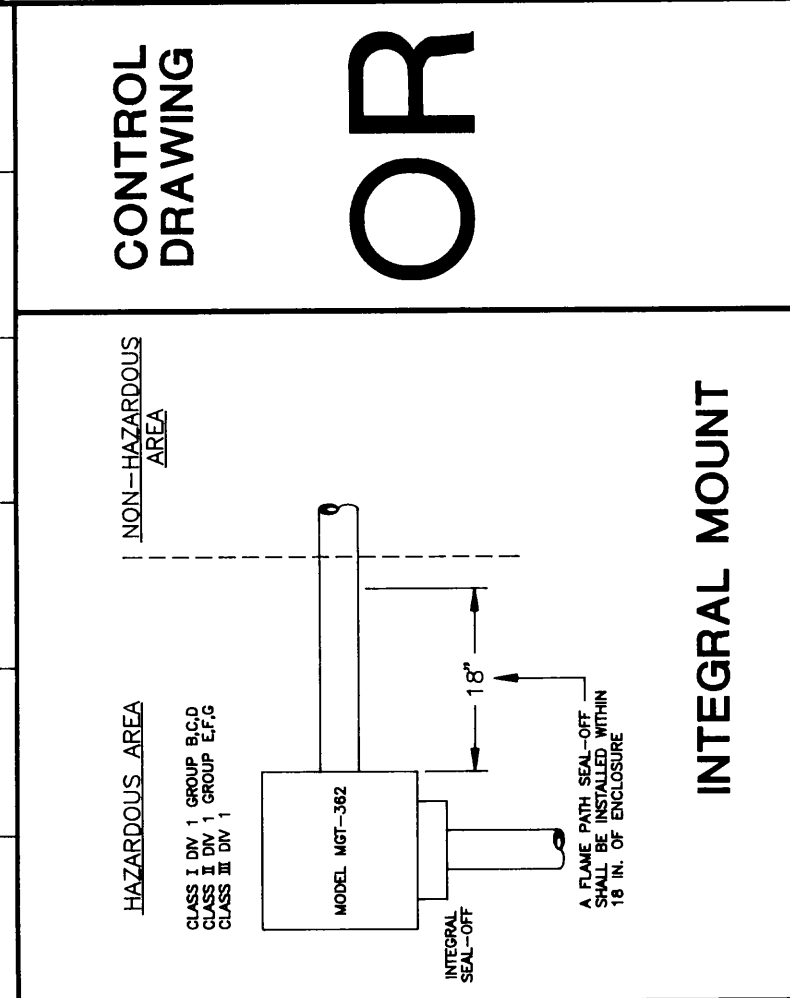
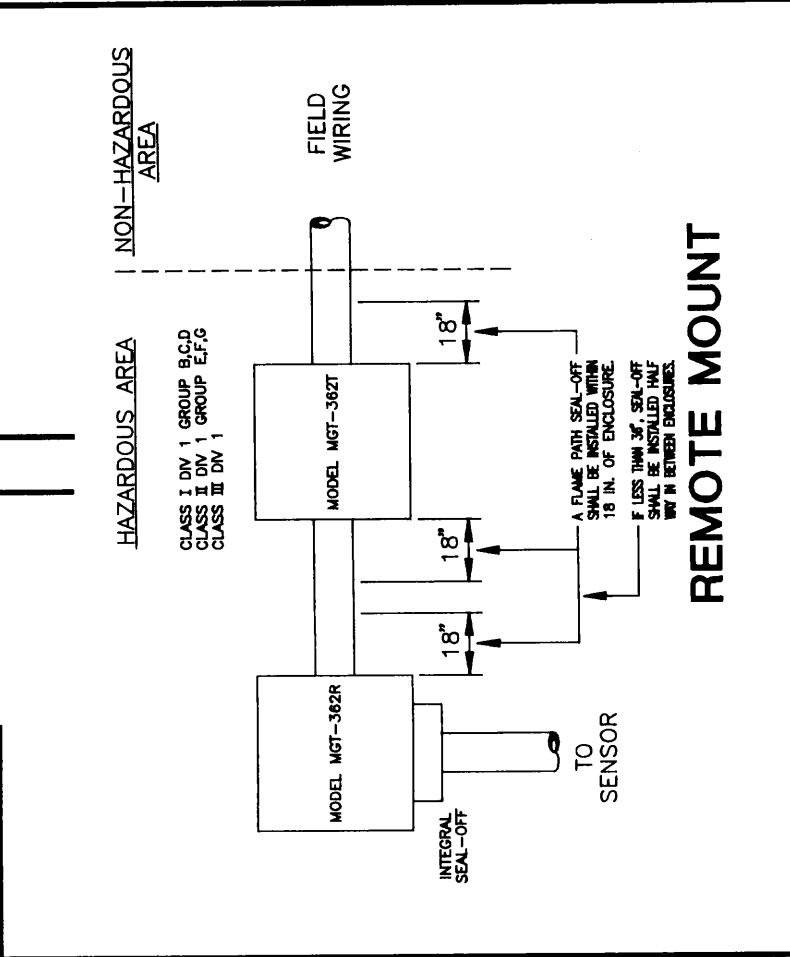
If attempts to solve your problem fail, you may be requested to return your instrument to the factory for testing. You must contact your local Penberthy representative for return instructions.

7.0 Exploded Parts Drawing

Reference No.	Part Description
80	Clamp
181	Housing
270	Sensor



18F51-009	REV. A	NOTES UNLESS OTHERWISE SPECIFIED
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CASE TEMPERATURE CANNOT EXCEED 100°C (212°F)		COMPUTER SCALE 1 = 1	
WIRING TO BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE (NEC) PERTINENT PARTS OF THE 500 SERIES OF ARTICLE 5 OR LOCAL CODES AS APPLICABLE.		DRAWING SCALE 1 = 1	
UNLESS OTHERWISE SPECIFIED		DATE 5/14/93	
TOLERANCES ON MACHINED DIMENSIONS:		Q.C.	
X = ±.063[1.60]	Fractional dimensions: ± 1/8[3]	APVD. <i>BJG</i> REL. 33940	
XX = ±.031[.79]	Angles: ± 30 minutes	DO NOT SCALE	
XXX = ±.015[.38]	Filet radii: .000 thru +.063[1.60]		
250 R.L.S. maximum	Holes: .000 thru +.005[.13]		
TOLERANCES ON CAST OR FABRICATED DIMENSIONS:			
Fractions: ± 1/8 [3] Angles: ± 1 degree			
ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]			
DASH NO.	NAME	MATERIAL DESCRIPTION	MATERIAL SPECIFICATION
NO CHANGES TO THIS DRAWING WITHOUT PREVIOUS APPROVAL FROM FACTORY MUTUAL.		TITLE	
		EXPLOSION PROOF CONTROL DRAWING MGT-362	
		SHEET 1 OF 1 REV. A	
		DRAWING NO. 18F51-009	

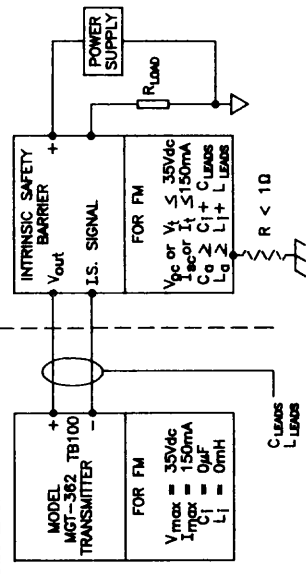
A. 18F52-009	B. 18F52-009	C. 18F52-009	REF. C
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NOTES UNLESS OTHERWISE SPECIFIED

ENTITY CONTROL DRAWING

HAZARDOUS AREA | NON-HAZARDOUS AREA

CLASS I DIV 1 GROUP A,B,C,D  
CLASS II DIV 1 GROUP E,F,G  
CLASS III DIV 1

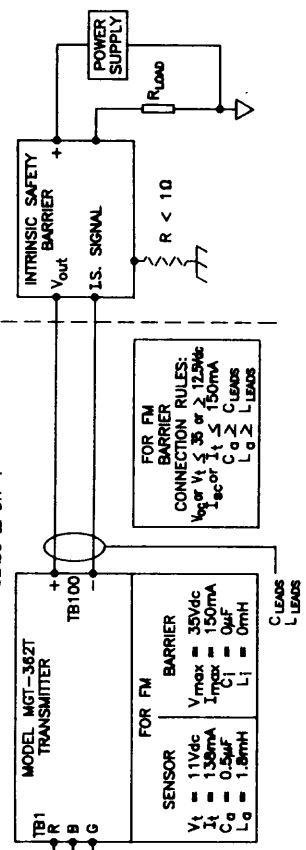


### INTEGRAL MOUNT

ENTITY CONTROL DRAWING

HAZARDOUS AREA | NON-HAZARDOUS AREA

CLASS I DIV 1 GROUP A,B,C,D  
CLASS II DIV 1 GROUP E,F,G  
CLASS III DIV 1



### REMOTE MOUNT

EQUIPMENT SUPPLYING INTRINSIC SYSTEM MUST NOT PRODUCE MORE THAN 250Vdc OR 250V rms.  
NOMINAL POWER SUPPLY VOLTAGE = 25.5Vdc  
USE ONLY ONE SINGLE OR DUAL CHANNEL BARRIER PER TRANSMITTER CIRCUIT.  
LOOP WIRE DISTANCE NOT TO EXCEED 1,500 FT. USING  $C_{LEADS} = 60pF/FT.$   
 $L_{LEADS} = 0.20\mu H/FT.$

$V_{max}$  = MAXIMUM VOLTAGE AT SWITCH INPUT TERMINALS  
 $I_{max}$  = MAXIMUM SWITCH CURRENT

$C_1$  = MAXIMUM UNPROTECTED INTERNAL CAPACITANCE  
 $L_1$  = MAXIMUM UNPROTECTED INTERNAL INDUCTANCE  
 $V_{oc}$  or  $V_t$  = OPEN CIRCUIT VOLTAGE AVAILABLE FROM BARRIER  $V_{oc}$  or  $V_t \leq V_{max}$   
 $I_{sc}$  or  $I_t$  = SHORT CIRCUIT CURRENT AVAILABLE FROM BARRIER  $I_{sc}$  or  $I_t \leq I_{max}$   
 $C_0$  = MAXIMUM ALLOWABLE CAPACITANCE CONNECTED TO BARRIER INTRINSICALLY SAFE TERMINALS  
 $L_0$  = MAXIMUM ALLOWABLE INDUCTANCE CONNECTED TO BARRIER INTRINSICALLY SAFE TERMINALS

FOR CSA  
USE CSA CERTIFIED SAFETY BARRIERS:  
USE DIODE RETURN 1/2'S ONLY

MANUFACTURER MODEL  
PEPPERL + FUCHS Z487/Ex  
MTL MTL 7875+  
STAHL MTL 702  
STAHL 9002/13-280-083-00  
STAHL 9001/51-280-081-14

NO CHANGES TO THIS DRAWING  
WITHOUT PREVIOUS APPROVAL  
FROM FACTORY MUTUAL AND  
CANADIAN STANDARDS ASSOCIATION.

UNLESS OTHERWISE SPECIFIED		COMPUTER SCALE 1=1	TITLE INTRINSIC SAFETY CONTROL DRAWING MGT-362
TOLERANCES ON MACHINED DIMENSIONS: X = ±.003[.60] Fractional dimensions: ± 1/8[3] XX = ±.031[.76] Angles: ± 30 minutes XXX = ±.015[.38] Fillet radii: .000 thru +.063[1.60] 250 MAHR max. Holes: .000 thru +.005[.13]	DRAWING SCALE 1=1	DATE 5/14/93	PROPHETSTOWN, IL USA 61277
TOLERANCES ON CAST OR FABRICATED DIMENSIONS: Fractions: ± 1/8 [3] Angles: ± 1 degree ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]	APPROVED [Signature]	REL. NO. 33940	This drawing covers a proprietary item and is the property of PENBERTHY not to be copied or used without the approval of PENBERTHY
DASH NO.	NAME	MATERIAL DESCRIPTION	MATERIAL SPECIFICATION
DO NOT SCALE			

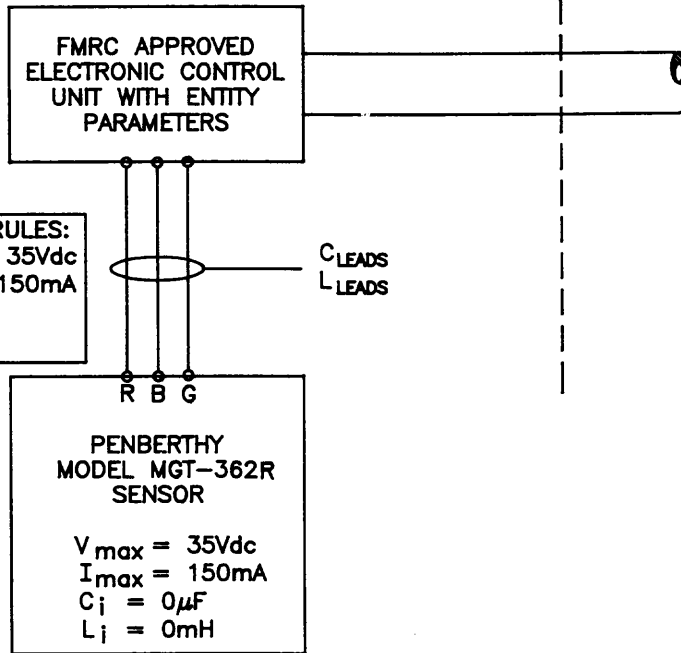
19141-000  
19141-000

DWG. NO. 18J54-009

HAZARDOUS AREA

NON-HAZARDOUS AREA

CLASS I DIV 1 GROUP A,B,C,D  
 CLASS II DIV 1 GROUP E,F,G  
 CLASS III DIV 1



CONNECTION RULES:  
 $V_{oc}$  or  $V_t \leq 35Vdc$   
 $I_{sc}$  or  $I_t \leq 150mA$   
 $C_a \geq C_{LEADS}$   
 $L_a \geq L_{LEADS}$

PENBERTHY  
 MODEL MGT-362R  
 SENSOR

$V_{max} = 35Vdc$   
 $I_{max} = 150mA$   
 $C_i = 0\mu F$   
 $L_i = 0mH$

NO CHANGES TO THIS DRAWING  
 WITHOUT PREVIOUS APPROVAL  
 FROM FACTORY MUTUAL.

INSTALLATION SHALL CONFORM TO THE MANUFACTURER'S INSTRUCTIONS SUPPLIED WITH THE ELECTRONIC CONTROL UNIT AS WELL AS THE NATIONAL ELECTRIC CODE AND ANSI/ISA-RP12.6 "INSTALLATION OF INTRINSICALLY SAFE INSTRUMENT SYSTEMS IN HAZARDOUS (CLASSIFIED) LOCATIONS."

MAXIMUM NON-HAZARDOUS AREA VOLTAGE MUST NOT EXCEED 250 Vrms OR Vdc.

ENCLOSURE: NEMA4, ENCL4

UNLESS OTHERWISE SPECIFIED

TOLERANCES ON MACHINED DIMENSIONS:  
 .X = ±.063[1.60] Fractional dimensions: ±1/8[3]  
 .XX = ±.031[.79] Angles: ±30 minutes  
 .XXX = ±.015[.38] Fillet radii: .000 thru +.063[1.60]  
 250 AARH max. Holes: .000 thru +.005[.13]

TOLERANCES ON CAST OR FABRICATED DIMENSIONS:  
 Fractions: ±1/8 [3] Angles: ±1 degree  
 DIMENSIONS IN INCHES [MILLIMETERS]

**PENBERTHY**  
 PROPHETSTOWN, IL. USA 61277

INTRINSIC SAFETY  
 TITLE CONTROL DRAWING MGT-362 SENSOR

DRAWING SCALE: 1=1	APVD. <i>BJ</i>
COMPUTER SCALE: 1=1	REV. A
REL. 33940	SHEET 1 OF 1

DRW. <i>JS</i>	DATE 12/22/93	DRAWING NO. 18J54-009
----------------	---------------	-----------------------

# PENBERTHY

## DECLARATION of CONFORMITY

Application of EU Council Directives:

92/59/EEC; 89/392/EEC; 77/23/EEC; 89/336/EEC

Standards to which conformity is declared:

EN 50081-1; EN 50081-2; EN 50082-1; EN 50082-2;  
EN 55011; CISPR 11; IEC 801-2; IEC 801-3;  
ENV 50140; ENV 50204; ENVS 500141; IEC 801-4;  
IEC 801-5; IEC 801-6; IEC 1000-4-8; ISO 7-1;  
BS 10; BS 21; BS 1506; BS 1560; BS 1965;  
BS 3076; BS 3605; BS 3643; BS 3799; BS 4504;  
CSA C22.2: #25, #30, #142, #157;  
NFPA NEC Art 500; ANSI/ASME B1.1;  
ANSI/ASME B1.20.1; ANSI/ASME B18.3;  
ANSI/ASME B18.6.3

Manufacturer's Name: Penberthy, Incorporated

Manufacturer's Address: 320 Locust Street  
Prophetstown, IL 61277-1147 U.S.A.

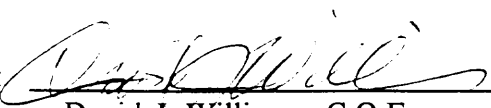
Type of Equipment: Industrial Instrumentation

Equipment Class: Process Control 4-20 mA Transmitter - Hazardous Area

Model Designations: MGT-362, MGT-368

*I, the undersigned, hereby declare that the equipment specified above conforms to the above Directives and Standards.*

Date: 30 December 1996

Signature: 

Name: David J. Williams, C.Q.E.

Position: Quality Assurance Manager

Technical Construction File is available at stated address. Signatory is contact person.

***Notes***

**Penberthy**  
Penberthy, Inc.  
320 Locust Street  
Prophetstown, IL 61277  
Phone: 815/537-2311  
Fax: 815/537-5764

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