Kotron®
Series 82 CE

Installation and Operating Manual

RF

Level

Transmitter

Magnetrol®

Read this Manual Before Installing
This manual provides information on the Kotron® Series 82 CE RF Level Transmitter. It is important that all instructions are read carefully and followed in sequence. Detailed instructions are included in the *Installation* section of this manual.

Conventions Used in this Manual
Certain conventions are used in this manual to convey specific types of information. General technical material, support data, and safety information are presented in narrative form. The following styles are used for notes, cautions, and warnings.

NOTE:
Notes contain information that augments or clarifies an operating step. Notes do not normally contain actions. They follow the procedural steps to which they refer.

Cautions
Cautions alert the technician to special conditions that could injure personnel, damage equipment, or reduce a component's mechanical integrity. Cautions are also used to alert the technician to unsafe practices or the need for special protective equipment or specific materials. In this manual, a caution box indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Warnings
Warnings identify potentially dangerous situations or serious hazards. In this manual, a warning indicates an imminently hazardous situation which, if not avoided, could result in serious injury or death.

WARNING! Explosion hazard. Do not connect or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.

Safety Messages
The KOTRON Series 82 CE RF Level Transmitter system may be properly installed in Category II, Pollution Degree 2 installations. Follow all standard industry procedures for servicing electrical and computer equipment when working with or around high voltage. Always shut off the power supply before touching any components. Although high voltage is not present in this system, it may be present in other systems.

Electrical components are sensitive to electrostatic discharge. To prevent equipment damage, observe safety procedures when working with electrostatic sensitive components.

Low Voltage Directive
For use in Category II installations. If equipment is used in a manner not specified by manufacturer, protection provided by equipment may be impaired.

Notice of Trademark, Copyright, and Limitations
Kotron is a registered trademark of Magnetrol International, Incorporated. Kotron Series 82 CE RF Level Transmitter is a trade name of Magnetrol International, Incorporated.

Magnetrol® reserves the right to make changes to the product described in this manual at any time without notice. MAGNETROL makes no warranty with respect to the accuracy of the information in this manual.

Warranty
All MAGNETROL electronic level and flow controls are warranted free of defects in materials or workmanship for one full year from the date of original factory shipment.

If returned within the warranty period; and, upon factory inspection of the control, the cause of the claim is determined to be covered under the warranty; then, MAGNETROL will repair or replace the control at no cost to the purchaser (or owner) other than transportation.

MAGNETROL shall not be liable for misapplication, labor claims, direct or consequential damage or expense arising from the installation or use of equipment. There are no other warranties expressed or implied, except special written warranties covering some MAGNETROL products.

Quality Assurance
The quality assurance system in place at MAGNETROL guarantees the highest level of quality throughout the company. MAGNETROL is committed to providing full customer satisfaction both in quality products and quality service.

The MAGNETROL quality assurance system is registered to ISO 9001 affirming its commitment to known international quality standards providing the strongest assurance of product/service quality available.

Kotron® Series 82 CE
RF Level Transmitter

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1.0 Complete Installation

This section provides detailed procedures for properly installing, configuring, and, as needed, troubleshooting the Kotron® Series 82 CE RF Level Transmitter.

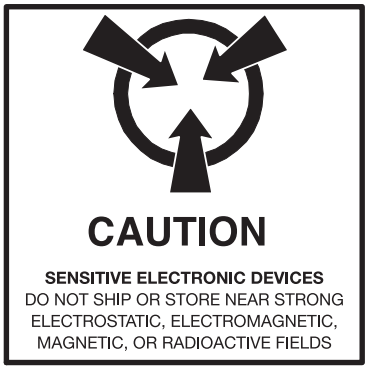
1.1 Unpacking

Unpack the instrument carefully. Make sure all components have been removed from the packing material. Check all the contents against the packing slip and report any discrepancies to the factory.

Before proceeding with the installation, do the following:

- Inspect all components for damage. Report any damage to the carrier within 24 hours.
- Make sure the nameplate model number agrees with the packing slip and purchase order.
- Record the model and serial numbers for future reference when ordering parts.

1.2 Electrostatic Discharge (ESD) Handling Procedure



Magnetrol® electronic instruments are manufactured to the highest quality standards. These instruments use electronic components that may be damaged by static electricity present in most work environments.

The following steps are recommended to reduce the risk of component failure due to electrostatic discharge.

- Ship and store circuit boards in anti-static bags. If an anti-static bag is not available, wrap the board in aluminum foil. Do not place boards on foam packing materials.
- Use a grounding wrist strap when installing and removing circuit boards. A grounded workstation is recommended.
- Handle circuit boards only by the edges. Do not touch components or connector pins.
- Make sure that all electrical connections are completely made and none are partial or floating. Ground all equipment to a good, earth ground.

1.3 Installation Location

KOTRON RF Transmitters should be located for easy access for service, calibration and monitoring. Units should not be exposed to ambient temperatures below -40° F (-40° C) or above +160° F (+70° C). Special precaution should be made to prevent exposure to corrosive atmosphere, excessive vibration, shock or physical damage.

Caution: This unit contains CMOS electronics which may be damaged by static electricity. Do not touch any semi-conductor devices unless you are properly grounded.

1.4 Mounting

The Series 82 CE transmitter can be mounted to a tank using a variety of process connections.

Make sure all mounting connections are properly in place on the tank before installing the probe. Make sure the KOTRON probe is correct for the intended installation.

It is common practice to use the metal tank wall as the reference electrode. In such cases, it is required that the probe housing makes a good electrical connection to the tank wall. If there is any doubt about this connection or to the use of PTFE thread tape gaskets, paint, rust, or any other reason, a separate strap should be installed between the probe housing and the tank.

Caution: This unit contains CMOS electronics which may be damaged by static electricity. Do not touch any semi-conductor devices unless you are properly grounded.

Caution: When a probe is used in an abrasive medium, inspect the probe periodically for visible surface wear. If damage to the probe insulation is found, replace the probe.

1.4.1 Metal Walled Tanks

On water-based liquids, there should be no problem with sensitivity. With non-conductive, low dielectric media, sensitivity can be enhanced by locating the probe close to and parallel with the tank wall. If this is not practical, a ground reference probe may be the solution.

1.4.2 Non-Metallic and Glass-Lined Tank Construction

With plastic, concrete, wood, or any other non-conductive walled vessels, a ground reference is required. Most commonly, this electrode will be in the form of a concentric ground tube (i.e. stilling well). In questionable circumstances, consult the factory. In all cases, a good electrical connection must be made between the ground surface and the probe housing.

1.4.3 Transmitter/Probe Assembly

Transmitters with probes up to and including 12 inches (300 mm) in length are shipped pre-assembled. All other transmitters are shipped unassembled to avoid damage during transit. These transmitters must be assembled prior to mounting. Choose your particular configuration from the following sections and follow the instructions carefully.

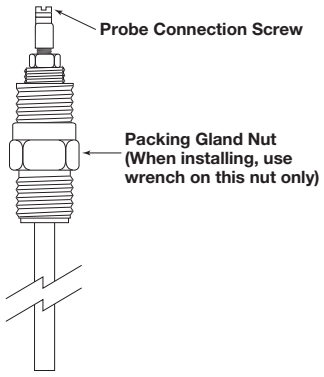


Figure 1

1.5 Probe Installation

1.5.1 Rigid Probe

1. Thread the probe into the mounting connection on the vessel. Tighten securely, making sure that the wrench is applied ONLY to the mounting nut. Refer to Figure 1.
2. Screw the transmitter housing onto the probe until hand tight. The housing can be wrench-tightened to align the conduit connection with the conduit. Refer to Figure 2.

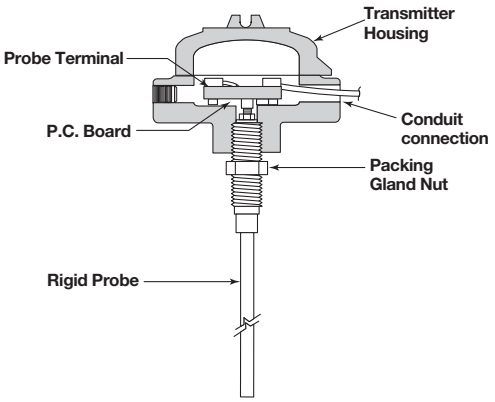


Figure 2
Integral Mount Models with Rigid Probe

1.5.1.1 Integral Electronics

1. Remove the housing cover. Locate the white wire which is fastened to the (+) probe terminal. Refer to Figure 3. Connect the free end of this wire to the probe connection screw. Refer to Figure 1.
2. Proceed to *Wiring, Section 1.6*.

1.5.1.2 Remote Electronics

1. Connect the positive lead of the interconnection cable (supplied by MAGNETROL), to the screw terminal at the top of the probe. Connect the negative lead to the green ground screw at the base of the housing. Cut the shield; do not connect it at probe end. Refer to Figure 4 on page 7.
2. Install the transmitter housing using the bracket (supplied by MAGNETROL). Make sure to provide adequate clearance to remove the housing cover.

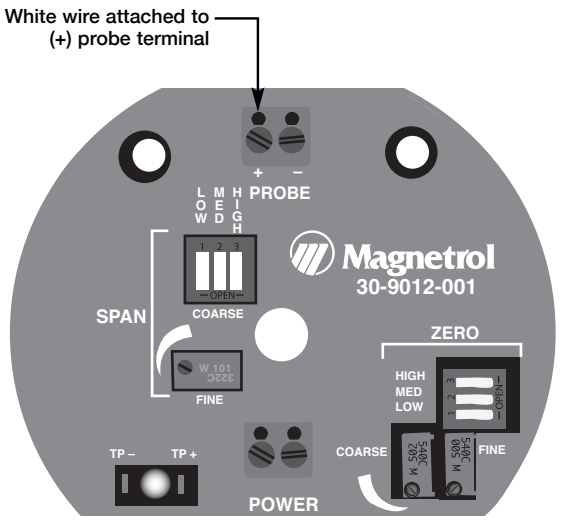


Figure 3

3. Remove the transmitter housing cover. Connect the positive lead of the interconnection cable to the (+) probe terminal. Connect the negative lead and shield to the (–) probe terminal. Refer to Figure 3 on page 6.
4. Proceed to *Wiring, Section 1.6*.

1.5.2 Flexible Probe

Caution: Flexible probes are shipped with the cable clamp and the packing gland nut hand tightened to permit length adjustment in the field. The cable clamp and packing gland nut must be tightened before use. The end of a flexible probe MUST be kept taut by attaching the anchor end at the bottom of the vessel or by using a MAGNETROL supplied probe weight.

Caution: Do not discard the Mylar housing insulator.

Caution: The probe cable must not be in contact with any metallic surface in its final installation position.

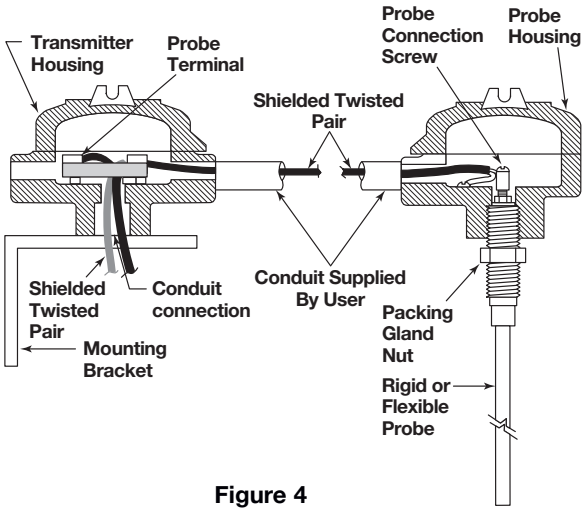
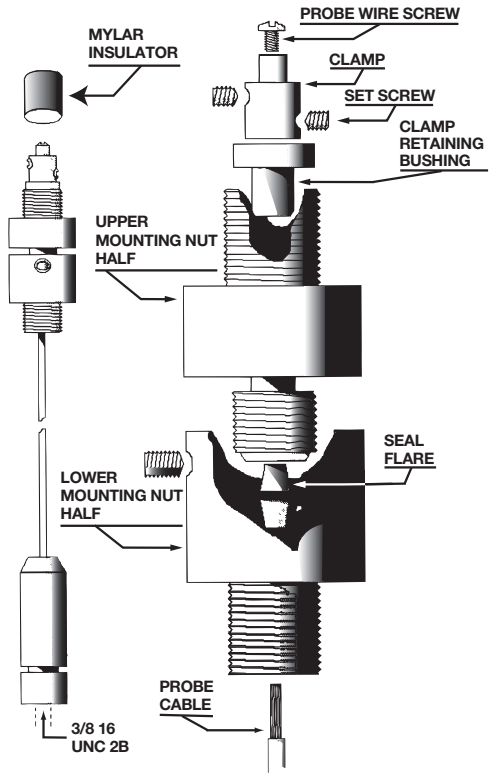


Figure 4
Side View Remote Mount Models w/Rigid or Flexible Probe

1. Attach the weight or anchor assembly to the end of the probe. Insert the probe through the vessel's mounting connection and feed the cable into the vessel. Do not allow the probe to scrape against the connection threads.
2. Secure the anchor assembly (if used) to the bottom of the vessel.
3. Apply thread sealant to the mounting nut. Screw the mounting nut into the mounting connection until tight.
4. Remove the Mylar housing insulator located over the clamp. DO NOT DISCARD.
5. Loosen both socket head screws from the clamp. Pull the clamp and Teflon™ retaining bushing off of the probe.
6. While holding on to the probe cable, loosen the upper packing gland nut. DO NOT ALLOW THE PROBE CABLE TO FALL INTO THE VESSEL.
7. Pull the excess cable up through the packing gland nut until the cable is taut. Tighten the packing gland nut.
8. Cut the cable 1.35 inches (34mm) above the packing gland nut and strip off 1.25 inches (32mm) of insulation.
9. Slide the Teflon™ retaining bushing onto the cable and seat it into the packing gland nut. Slide the clamp onto the cable and seat it against the Teflon™ retaining bushing.



ECTFE Flexible Probe

10. Tighten both socket head screws on the clamp to approximately 35 in./lbs of torque. Slip the Mylar insulator over the clamp.
11. Screw the transmitter onto the probe until hand tight. The housing can be wrench-tightened to align the conduit connection with the conduit. Refer to Figure 2 on page 6.

1.5.2.1 Integral Electronics

1. Remove the housing cover. Locate the white wire which is fastened to the (+) probe terminal. Connect the free end of this wire to the probe connection screw.
2. Proceed to *Wiring, Section 1.6*.

1.5.2.2 Remote Electronics

1. Connect the positive lead of the interconnection cable (supplied by MAGNETROL), to the screw terminal at the top of the probe. Connect the negative lead to the green ground screw at the base of the housing. Cut the shield; do not connect it at probe end. Refer to Figure 4 on page 7.
2. Install the transmitter housing using the bracket (supplied by MAGNETROL). Make sure to provide adequate clearance to remove the housing cover.
3. Remove the transmitter housing cover. Connect the positive lead of the interconnection cable to the (+) probe terminal. Connect the negative lead and shield to the (–) probe terminal. Refer to Figure 3 on page 6.
4. Proceed to *Wiring, Section 1.6*.

1.6 Wiring

The wiring directions are different depending upon the configuration of your particular transmitter. Choose the appropriate configuration from the following sections and follow the directions carefully.

1.6.1 Two-Wire Transmitter without Meter

WARNING: These units are designed to operate with voltages between 14 VDC and 40 VDC only. Application of 120 VAC will destroy the transmitter.

Caution: All power must be turned off until all of the wiring connections have been made.

All wiring between the power supply and the transmitter should be done with 16 AWG to 22 AWG shielded twisted pair. The connection is made at the terminal strip within the transmitter enclosure.

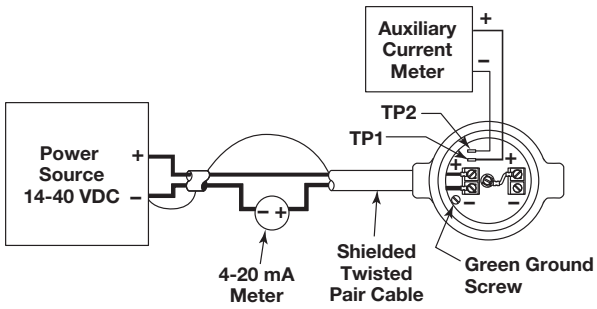


Figure 5

1. Remove the transmitter housing cover. Pull the power supply wires through the conduit connection.
2. Connect the positive supply wire to the (+) terminal and the negative supply wire to the (–) terminal. Connect the shield to the green ground screw at the base of the housing. Make the shield wire as short as possible. Refer to Figure 3 on page 6, and Figure 5.
3. Replace the transmitter housing cover until calibration.
4. Connect the positive supply wire to the positive terminal on the power source. Connect the negative supply wire to the negative terminal on the power source. Connect the shield to the power source's ground terminal and apply power. The yellow LED on the potted module should be on.
5. Proceed to *Calibration, Section 1.7*.

1.6.2 Two-Wire Transmitter with Meter

WARNING: These units are designed to operate with voltages between 14 VDC and 40 VDC only. Application of 120 VAC will destroy the transmitter.

Caution: All power must be turned off until all of the wiring connections have been made.

All wiring between the power supply and the transmitter should be done with 16 AWG to 22 AWG shielded twisted pair. The connection is made at the terminal strip within the transmitter enclosure.

1. Remove the meter housing cover.
2. Remove the two screws holding the meter bracket to the housing. Pull the meter gently out of the housing, being careful not to disturb the wiring. Lay it on one side.

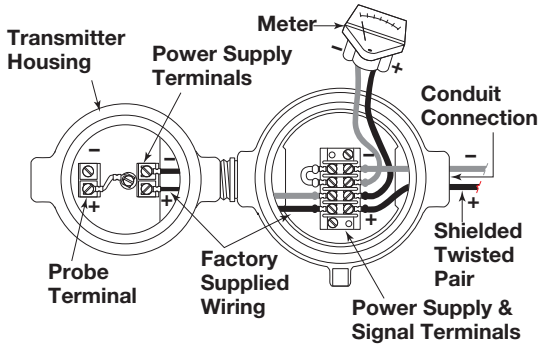


Figure 6

3. Pull the power supply wires through the conduit connection.
4. Connect the positive supply wire to the (+) terminal and the negative supply wire to the (–) terminal. Connect the shield to the green ground screw at the base of the housing. Make the shield wire as short as possible. Refer to Figure 6.
5. Replace the meter in its housing and install the meter bracket screws. Be sure that the meter wires are tucked away before replacing the meter housing cover.
6. Connect the positive supply wire to the positive terminal on the power source. Connect the negative supply wire to the negative terminal on the power source. Connect the shield to the power source's ground terminal.
7. Apply power; the yellow LED on the potted module should be on.
8. Proceed to *Calibration, Section 1.7*.

1.6.3 Four-Wire Transmitter without Meter

Caution: All power must be turned off until all of the wiring connections have been made.

All wiring between the power supply and the transmitter should be done with 14 AWG to 18 AWG wire. The connection is made at the terminal strip, on the vertical board, within the transmitter enclosure.

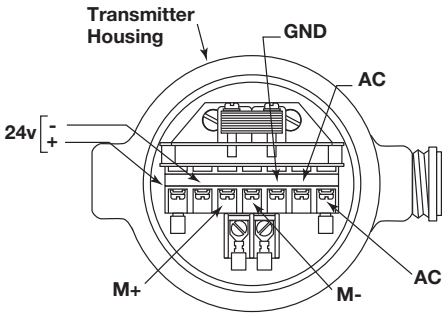


Figure 7

1. Remove the transmitter housing cover. Pull the power supply and signal wires through the conduit connection.
2. Connect the hot and neutral wires to the terminals marked AC. Connect the ground wire to the terminal marked GND. Refer to Figure 7.
3. Connect the positive signal wire to the (M+) terminal and the negative signal wire to the (M-) terminal. Connect the shield to the GND terminal.
4. Replace the transmitter housing cover until calibration.
5. Proceed to *Calibration, Section 1.7*.

1.6.4 Four-Wire Transmitter with Meter

Caution: All power must be turned off until all of the wiring connections have been made.

All wiring between the power supply and the transmitter should be done with 14 AWG to 18 AWG wire. The connection is made at the terminal strip, on the vertical board, within the transmitter enclosure.

1. Remove the meter housing cover.
2. Remove the two screws holding the meter bracket to the housing. Pull the meter gently out of the housing, being careful not to disturb the wiring. Lay it on one side.
3. Pull the power supply wires through the conduit connection.
4. Connect the hot and neutral wires to the outer terminals on the terminal strip. Connect the ground wire to the green ground screw at the base of the housing. Refer to Figure 8.
5. Replace the meter in its housing and install the meter bracket screws. Be sure that the meter wires are tucked away before replacing the meter housing cover.
6. Replace the transmitter housing cover until calibration.
7. Proceed to *Calibration, Section 1.7*.

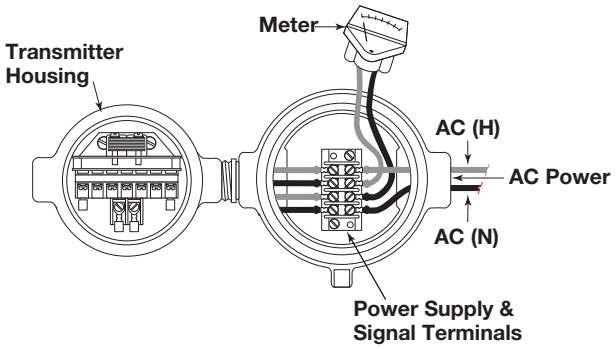


Figure 8

1.7 Calibration

There are two calibration methods that can be used, depending on your particular situation. Calibration Procedure A will require moving the level from the 0% point (4 mA) to the 100% point (20 mA). Calibration Procedure B allows you to start at a level greater than 0% and stop at a level less than 100%. To attain the best accuracy and linearity use Calibration Procedure A. The following is a list of abbreviations and definitions used in the procedures.

L0 The level of the media in the vessel which corresponds to the 0% (4 mA) point

L1 A media level higher than L0

L2 A media level higher than L0 and L1 but less than L3

L3 The level of the media in the vessel which corresponds to the 100% (20 mA) point

Refer to Figure 9.

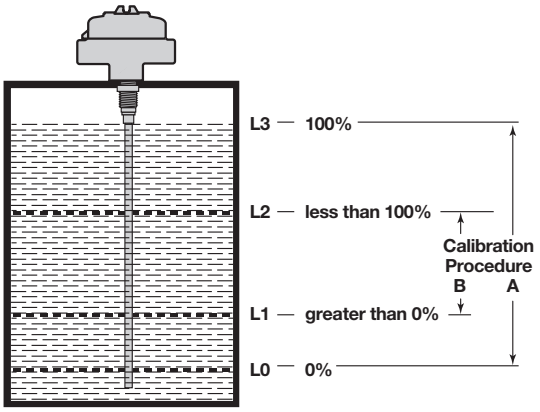


Figure 9

The output current can be measured either by inserting a milliammeter into the loop, or by measuring across TP1 (+) and TP2 (–). The intensity of the LED between the test points is a relative indicator of current flow. (The LED will not light with a meter across the test points.)

NOTE: Prior to starting any calibration procedure, turn all potentiometers Zero Coarse, Zero Fine, and Span Fine, 20 turns clockwise. Place the Span Coarse DIP switches in the open position. The Zero Coarse DIP switch should have only the "low" position closed.

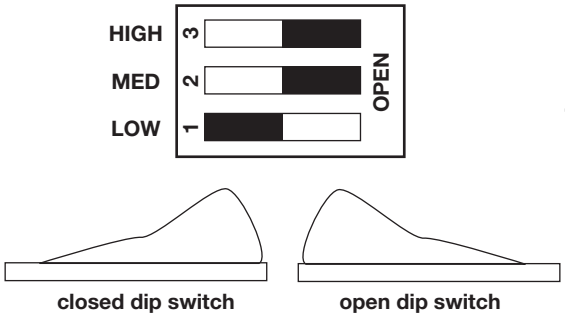


Figure 10

1.7.1 Calibration Procedure A

1. Move the media level in the vessel to the 0% (4 mA) point.
2. Turn potentiometer Zero Coarse counterclockwise until the loop output is between 4.00 mA and 4.50 mA.
3. If the loop current can not be decreased to at least 4.50 mA, turn the Zero Coarse potentiometer fully clockwise, close DIP switch positions "MED" and "HIGH" sequentially (ONLY ONE SWITCH POSITION SHOULD BE CLOSED AT A TIME—THE OTHER TWO POSITIONS MUST REMAIN OPEN). Repeat Step 2. See Figure 10.
4. Turn potentiometer Zero Fine counterclockwise until the loop output reads exactly 4.00 mA.
5. Move the media level in the vessel to the 100% (20 mA) point.
6. Turn the Span Fine potentiometer counterclockwise until the loop current is exactly 20.00 mA.

7. If 20 mA cannot be reached, individually close Span Coarse DIP switches (in sequence), #1, #2, and #3, until the loop current is close to (and not less than), 20 mA. (ONLY ONE SWITCH POSITION SHOULD BE CLOSED AT A TIME—THE OTHER TWO POSITIONS MUST REMAIN OPEN).
8. Turn the Span Fine potentiometer counterclockwise until the loop current is exactly 20.00 mA. If 20 mA cannot be reached, repeat Step 6.

   Calibration is now complete.

1.7.2 Calibration Procedure B

1. Move the media level in the vessel to the lowest level you can set.
2. To determine the correct output level at this point, use the following formula:

$$L1_{mA} = \left(\frac{(L1 - L0)}{(L3 - L0)} \times 16\right) + 4$$

3. Turn the Zero Coarse potentiometer counterclockwise until the loop output is between L1mA and L1mA + 0.5 mA.
4. If the loop current output cannot be decreased to at least L1mA + 0.5 mA, turn the Zero Coarse potentiometer fully clockwise, close Zero Coarse DIP switch positions #2 and #3 sequentially (ONLY ONE SWITCH POSITION SHOULD BE CLOSED AT A TIME—THE OTHER TWO POSITIONS MUST REMAIN OPEN). Repeat Step 3. See Figure 10.
5. Turn potentiometer Zero Fine counterclockwise until the loop output reads exactly L1mA.
6. Move the media level in the vessel to the highest level you can set.
7. To determine the correct output level at this point, use the following formula:

$$L2_{mA} = \left(\frac{(L2 - L0)}{(L3 - L0)} \times 16\right) + 4$$

8. Turn the Span Fine potentiometer counterclockwise until the loop current reaches the desired value calculated (L2mA) in Step 7.
9. If the desired value cannot be obtained, individually close the Span Coarse DIP switches #1, #2, and #3, until the loop current is as close to (and not less than), L2mA. (ONLY ONE SWITCH POSITION SHOULD BE CLOSED AT A TIME—THE OTHER TWO POSITIONS MUST REMAIN OPEN).
10. Turn the Span Fine potentiometer counterclockwise until the loop current is exactly L2mA.

    Calibration is now complete.

2.0 Reference Information

This section presents an overview of the operation of the KOTRON Series 82 CE RF Level Transmitter, information on troubleshooting common problems, intrinsic safety information, physical, functional and performance specifications, listings of agency approvals, and a list of recommended parts.

2.1 Description

KOTRON Series 82 CE Level Transmitters are designed to measure liquids, slurries, dry-bulk, or liquid-liquid interfaces. The transmitter may be mounted integrally with the probe or can be remote mounted up to 40 feet (12 meters) away. This unit is available as a four-wire transmitter with either 120 VAC or 240 VAC input power, or as a two-wire transmitter with a supply voltage between 16 VDC and 40 VDC. Available options include an analog meter. This transmitter can be used with any KOTRON R.F. Capacitance probe.

2.2 Theory of Operation

The KOTRON Series 82 CE Level Transmitter monitors the level by determining the capacitance of the media. The probe and a ground (usually the metal tank wall), form a capacitor. As the level rises and falls in the tank, the amount of capacitance developed between the probe and the ground changes. This change of capacitance is converted to a proportional 4–20 mA signal.

2.3 Troubleshooting

The output current can be measured either by inserting a milliammeter into the loop, or by measuring across TP1 (+) and TP2 (–). The intensity of the LED between the test points is a relative indicator of current flow.

Caution: When a probe is used in an abrasive medium, inspect the probe at least annually for visible surface wear. In case any wear is found, replace the probe or consult the factory.

2.3.1 Installation

LED does not light after wiring is completed and power turned on.

a. Wires reversed at supply or transmitter.

b. Wires broken or not connected.

c. Excessive loop resistance. Refer to chart on page 18 for maximum resistance.

d. Power supply not turned on.

e. Insufficient source voltage. 14 volts minimum is required at transmitter terminals.

f. Test points jumpered together with current meter. Remove meter.

g. LED is actually on but very dim. Turn span and zero potentiometers fully clockwise; if LED is now on, proceed with calibration.

h. Potted module defect. Consult factory for help.

2.3.2 Calibration

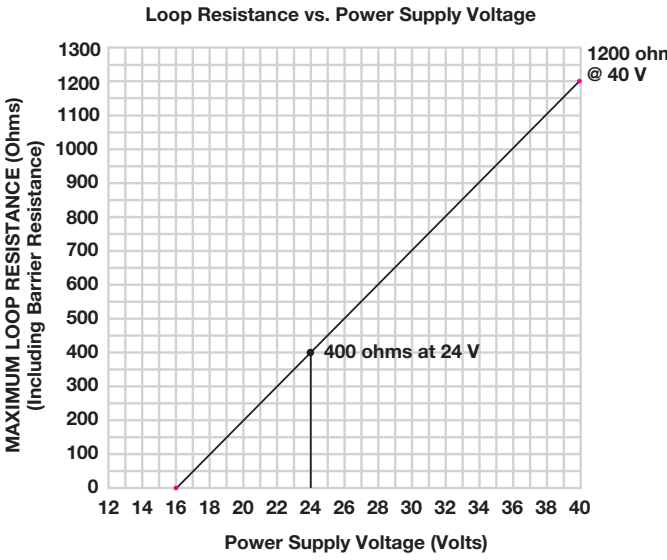
1. Test meter connected to calibration points, but LED still on.
   a. Wrong test meter mode. Use low resistance current meter.
   b. Test meter resistance is too high. Obtain meter with less than 10 ohms resistance.
   c. Test meter not properly connected to calibration points.
   d. Defective test meter or leads; meter fuse blown.
2. Cannot read loop current at calibration points and LED is off.
   a. Meter set at too high of a range. Maximum loop current is 38 mA (0.038 amps).
   b. Calibration points jumpered together. Remove jumper.
   c. No power, or sufficient power at transmitter terminals.
      — Refer to Steps “a” through “h” under **Installation** section beginning on page 14.
3. Zero point cannot be set to 4.00 mA at low level.
   a. Wires reversed at supply or transmitter.
   b. Span controls incorrectly set
      — Turn span potentiometers fully clockwise before calibrating zero.
   c. Excessive probe capacitance
      — Decrease length of probe covered at zero level;
      — Remove stilling well;
      — Increase diameter or stilling well;
      — Locate probe farther from walls;
      — Use probe with lower dielectric insulation;
      — Replace bare probe with insulated probe;
      — Consult factory.

4. Span point cannot be increased to 20 mA at high level.
   a. Span controls incorrectly set
      — Turn span controls clockwise
   b. Insufficient probe capacitance
      — Increase span length or probe;
      — Increase probe diameter;
      — Locate probe closer to wall(s);
      — Use probe with higher dielectric insulation;
      — Install stilling well;
      — Use smaller diameter stilling well;
      — Consult factory.
   c. Excessive loop resistance
      — Refer to chart on page 18 for maximum allowable loop resistance.
5. Span current cannot be reduced to 20 mA at high level.
   a. Span controls set too high
      — Turn span controls counterclockwise
   b. Excessive probe capacitance
      — Maximum span range is:
        110 pF – switches open
        485 pF – switch 1 closed
        1950 pF – switch 2 closed
        4000 pF – switch 3 closed
      — Decrease span length of probe;
      — Remove stilling well;
      — Increase diameter of stilling;
      — Locate probe farther from walls;
      — Use probe with lower dielectric insulation; or
      — Replace bare probe with an insulated one;
      — Consult factory.
   c. Low probe resistance to ground
      — Probe resistance must be more than 10 megohms.
      — Consult factory.

2.3.3 Operation

1. Loop current oscillates or hunts.
   a. Waves or disturbances in medium
      — Use stilling well;
      — Use external cage or standpipe for transmitter;
      — Correct instability of medium.
   b. Probe moving within vessel
      — Improve probe anchoring

2. Loop current randomly unstable.
   a. Disturbances in medium
      — Correct instability of medium
   b. Power supply unstable
      — Repair or replace power supply
   c. Electrical interference (RFI)
      — Consult factory.
3. Loop current exceeds 20 mA.
   a. Incorrect calibration
      — Recalibrate unit
   b. Material level above 100%
      — No corrective action needed on transmitter
   c. Extreme material buildup on probe
      — Possible misapplication; consult factory.
   d. Shorted or resistive probe
      — Replace probe.
   e. Supply voltage out of limits at transmitter terminals
      — Allowable voltage between 14 and 40 VDC. Refer to chart on page 18.
   f. Excessive temperatures at transmitter electronics
      — Use remote electronics
   g. Excessive loop resistance. Refer to chart on page 18.
      — Reduce loop resistance;
      — Increase supply voltage; consult factory.
4. Loop current less than 4 mA.
   a. Incorrect calibration
      — Recalibrate unit
   b. Material level below 0%
      — No corrective action needed on transmitter
   c. Shorted or resistive probe
      — Replace probe.
   d. Supply voltage out of limits at transmitter terminals
      — Adjust power supply; or
      — Reduce loop resistance
   e. Excessive temperatures at transmitter electronics
      — Use remote electronics
   f. Excessive loop resistance.
      — Reduce loop resistance



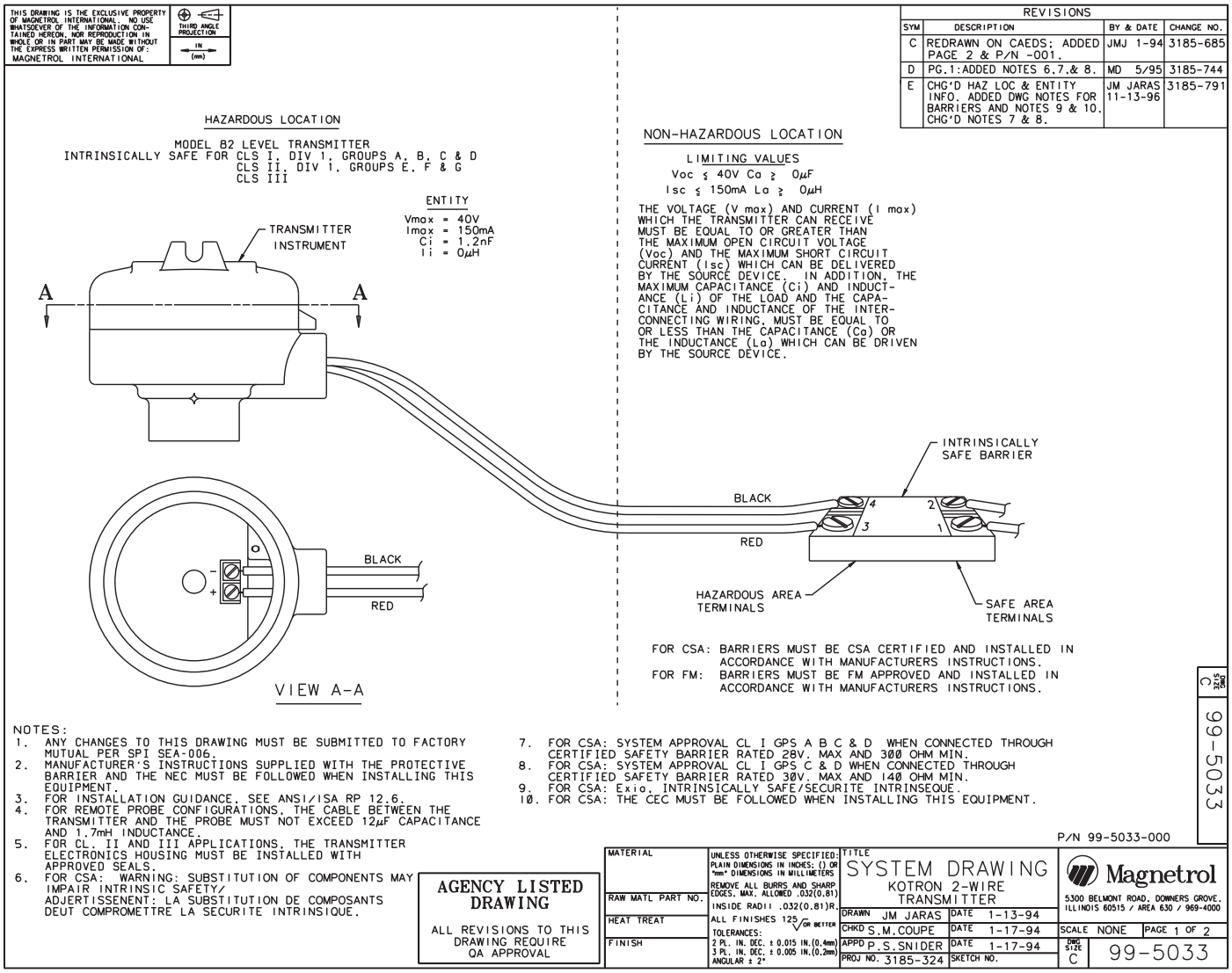
5. Non-linear output
   a. Incorrect calibration
      — Recalibrate unit
   b. Excessive loop resistance.
      — Reduce loop resistance
   c. Damaged jacket on insulated probe
      — Replace probe
   d. Extreme material build-up on probe
      — Possible misapplication; consult factory.
   e. Interfering surfaces too close to probe
      — Mount probe in better location;
      — Use stilling well;
      — Use non-metallic brackets and/or standoffs to position flexible or extremely long rigid probes a uniform distance from the tank wall.
   f. Curved or non-parallel surfaces near probe
      — Mount probe in better location;
      — Use stilling well.

2.4 Agency Approvals

AGENCY	APPROVED MODEL	PROTECTION METHOD	AREA CLASSIFICATION
FM FM APPROVED	082-8303-400 082-8303-410	Intrinsically Safe	Class I, Div 1, Groups A, B, C & D; Class II, Div 1, Groups E, F & G; Class III, NEMA 4X
		Non-Incendive	Class I, Div 2, Groups A, B, C & D
		Suitable for:	Class II, Div 2, Groups F & G; Class III
CSA	082-8303-400 082-8303-410	Intrinsically Safe ①	Class I, Div 1, Groups A, B, C & D; Class II, Div 1, Groups E, F & G; Class III, TYPE 4X
		Suitable for:	Class I, Div 2, Groups A, B, C & D; Class II, Div 2, Groups F & G; Class III
	082-8303-400 082-8303-410	Explosion Proof ②	Class I, Div 1, Groups C & D; Class II, Div 1, Groups E, F & G Class III, TYPE 4X

① Not I.S. (CSA) for Groups E & F when used with a bare probe.
② Approval is valid only with the use of insulated probes.

2.4.1 Agency Specifications – Intrinsically Safe Installation



2.5 Parts

2.5.1 Replacement Parts

2.5.1.1 Transmitter

Item	Description		Part Number
①	Potted Module	4-20 mAdc 20-4 mAdc	Z30-9012-001 Z30-9012-002
②	Base		004-9104-001
③	Cover		004-9105-001
④	O-Ring		012-2101-345
⑤	Probe		Same as Original Part Number
⑥	Probe Wire		009-7176-001
⑦	Shielded Twisted Pair	Up to 20 ft. (6.1M) 20 to 40 ft. (6.1 to 12 M)	009-7176-001 009-8222-001
⑧	Flexible Probe Anchor Assembly		032-8814-001
⑨	Flexible Probe Weight		004-4355-001
	Four-Wire Power Supply Assembly consisting of: Transformer, Power Supply Board and Bracket	120 VAC 240 VAC	Z30-9111-001 Z30-9111-002

2.5.1.2 Meter

Item	Description	Part Number
⑩	Meter Assembly	037-3145-001
⑪	Base	004-9112-001
⑫	Cover Assembly	036-3908-001
⑬	O-Ring	012-2501-247
⑭	1" x ¾" Bushing	004-1739-001
⑮	1.5" Long, ¾" NPT Pipe Nipple	011-1105-014

2.5.1.3 Remote Probe Housing

Item	Description	Part Number
⑯	Base	004-9104-001
⑰	Cover	004-9105-001
⑱	O-Ring	012-2101-345

2.5.1.4 Remote Transmitter Housing

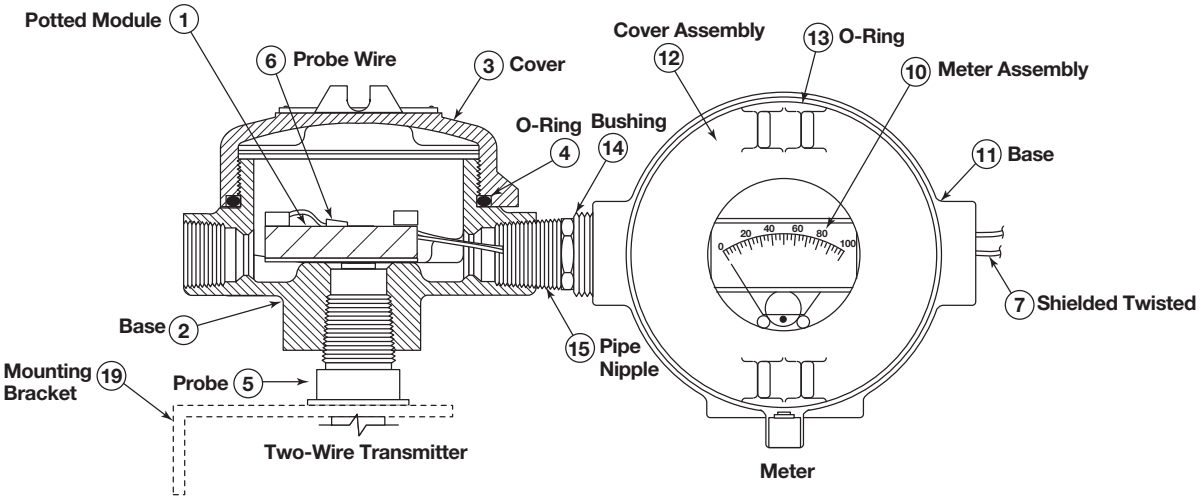
Item	Description	Part Number
⑲	Mounting Bracket	036-3805-001

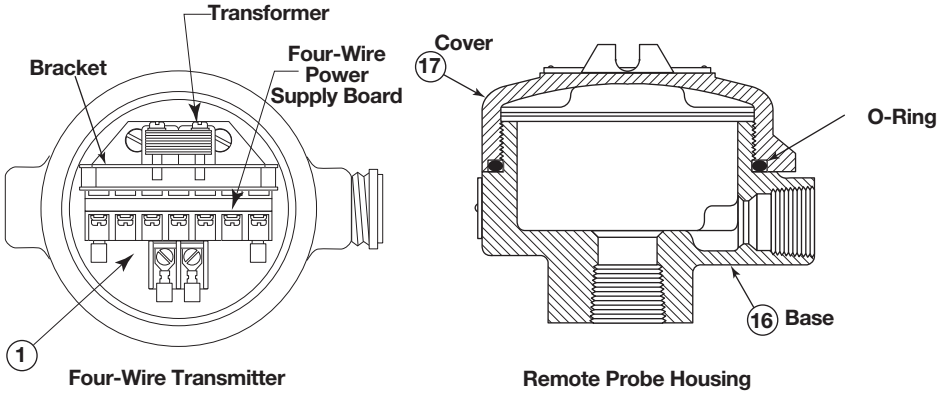
2.6 Specifications

2.6.1 Electrical

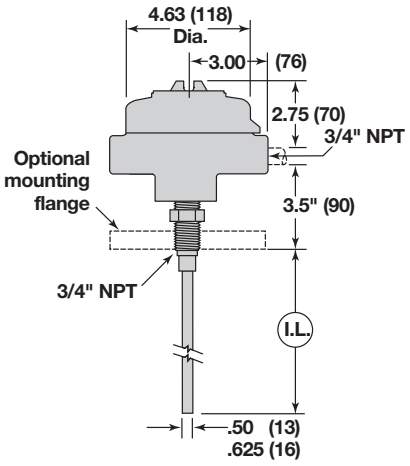
Supply Voltage	24 VDC, (14-40 VDC)
	120/240 VAC, 50-60 Hz, (+10/-15%)
Current	38 mA maximum
Line Variation	Less than ± .10%/volt, for voltages between 16-40 VDC
Ambient Temperature	-40° to +160° F (-40 to +70° C)①
Zero Range	1000 pF (max.), 0pF (min.)
Span Range	4000 pF (max.), 50pF (min.)
Output Linearity	50-500 pF ± 1% of span
	501-1500 pF ± 2% of span
	1501-4000 pF ± 1% of span
Response Time	Less than 0.1 second
Repeatability	± 0.25%
Temperature Coefficient of Output	4000 pF span: Less than 0.035%/° F (0.063%/° C)
-40° to +160° F (-40° to +70° C)	1000 pF span: Less than 0.025%/° F (0.045%/° C)
	50 pF span: Less than 0.075%/° F (0.135%/° C)

① Consult factory for higher temperatures on remote mounted transmitter

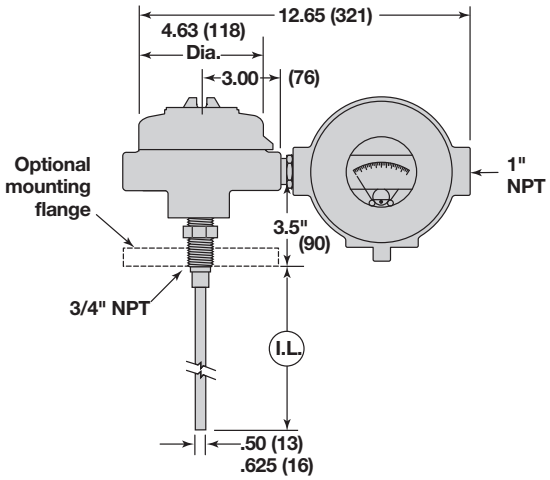




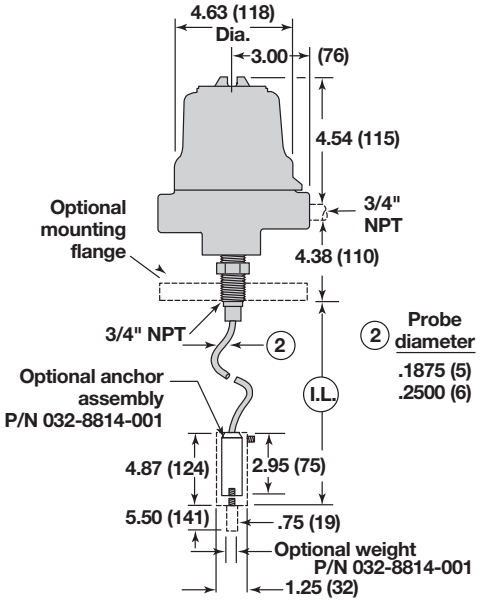
2.6.2 Physical



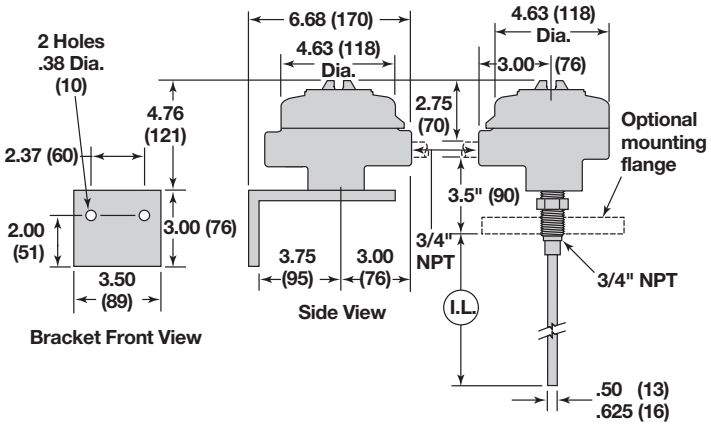
Integral Mount with Rigid Probe
(24 VDC Two-Wire)



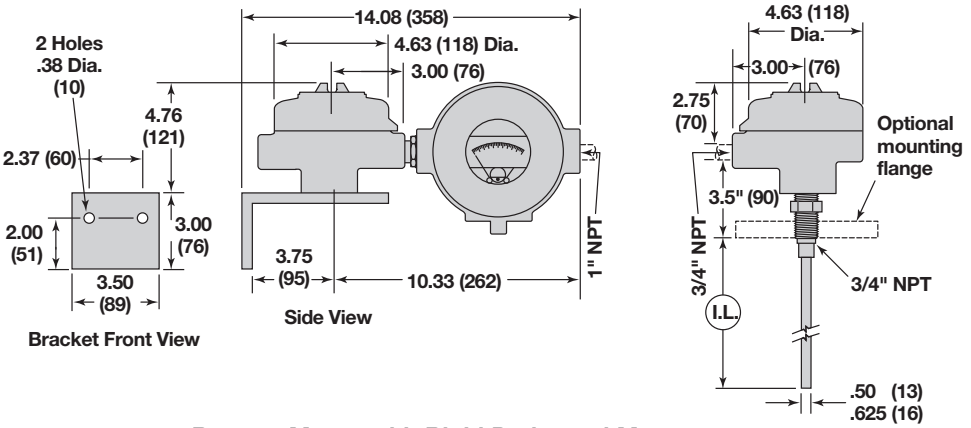
Integral Mount with Rigid Probe and Meter
(24 VDC Two-Wire)



Integral Mount with Flexible Probe
(120 VAC or 240 VAC Four-Wire)



Remote Mount with Rigid Probe
(24 VDC Two-Wire)



Remote Mount with Rigid Probe and Meter
(24 VDC Two-Wire)

3.0 Model Numbers

BASIC

082	82 CE transmitter

HOUSING

8	¾" NPT dual conduit

FUNCTION/INPUT POWER

0	Four-wire, 120 VAC ①
1	Four-wire, 240 VAC ①
3	Two-wire, 24 VDC Nominal (14 to 40 VDC), FM, CSA
4	Two-wire, 24 VDC Nominal (14 to 40 VDC), ATEX Intrinsically Safe

METER

0	None
1	Analog meter (Not CSA, FM, or ATEX approved)

OUTPUT SIGNAL

3	Standard 4-20 mA

MOUNTING CONFIGURATION

00	Integral, aluminum housing
04	Integral, 316 stainless steel housing ② ⑤
10	Remote, aluminum housing ③ ④
14	Remote, 316 stainless steel housing ② ③ ④ ⑤

PROBE ASSEMBLIES

A full range of rigid and flexible probes, for conductive and non-conductive process media, is available. For further information on probe assemblies, please refer to bulletin 50-125.

① Not available with mounting codes 04 and 14.

② Not available with function/input power codes 0 and 1.

③ Remote units supplied with separate probe and transmitter housing, 20 feet (6 meters) of cable and transmitter housing bracket.

④ Remote units up to 40 feet (12 meters) with special cable, order cable part number 009-8222-001.

⑤ Not available with Meter option code 1.

0	8	2	—	8			3	—	4		

Service Policy

Owners of Magnetrol® may request the return of a control or any part of a control for complete rebuilding or replacement. They will be rebuilt or replaced promptly. Controls returned under our service policy must be returned by Prepaid transportation. MAGNETROL will repair or replace the control at no cost to the purchaser (or owner) other than transportation if:

1. Returned within the warranty period; and
2. The factory inspection finds the cause of the claim to be covered under the warranty.

If the trouble is the result of conditions beyond our control; or, is NOT covered by the warranty, there will be charges for labor and the parts required to rebuild or replace the equipment.

In some cases it may be expedient to ship replacement parts; or, in extreme cases a complete new control, to replace the original equipment before it is returned. If this is desired, notify the factory of both the model and serial numbers of the control to be replaced. In such cases, credit for the materials returned will be determined on the basis of the applicability of our warranty.

No claims for misapplication, labor, direct or consequential damage will be allowed.

Return Material Procedure

So that we may efficiently process any materials that are returned, it is essential that a "Return Material Authorization" (RMA) number be obtained from the factory, prior to the material's return. This is available through your MAGNETROL local representative or by contacting the factory. Please supply the following information:

1. Company Name
2. Description of Material
3. Serial Number
4. Reason for Return
5. Application

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.

All shipments returned to the factory must be by prepaid transportation.

All replacements will be shipped F.O.B. factory.

NOTE: See Electrostatic Discharge Handling Procedure on page 4.

Magnetrol®

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