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Level Measurement

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Installation and Operating Instructions

IntelliPoint RF™ RMT Series Two-Wire Point Level Switch with Manual Calibration/Set Point

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IntelliPoint RF™ RMT Series Two-Wire Point Level Switch with Manual Calibration/Set Point



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An ISO 9001 Certified Company

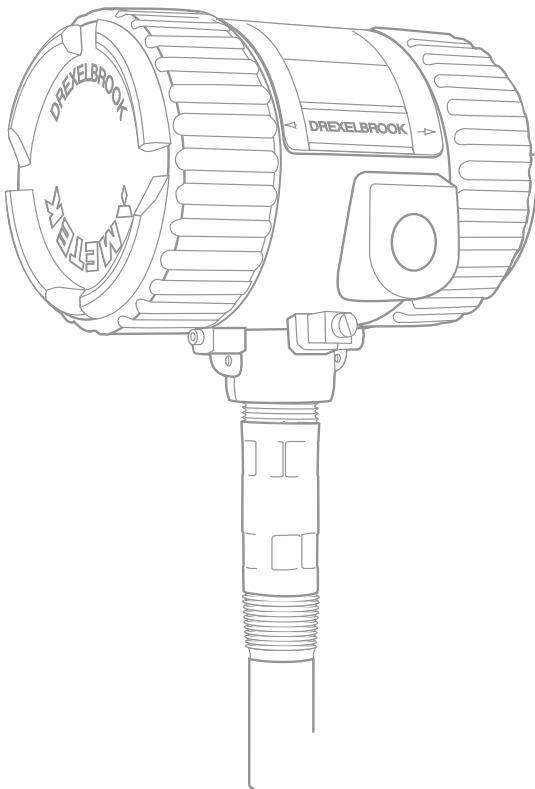
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Section 1: Introduction

1.1 System Description

The AMETEK Drexelbrook, **IntelliPoint RMT and RGT Series** point level switches detect the presence or absence of material and provide a current output for control functions. The RMT and RGT IntelliPoint™ switches are calibrated through a simple potentiometer adjustment.

Since the IntelliPoint RMT Series requires calibration and setpoint adjustments, it is not capable of operating in non-dedicated tanks.

1.2 Technology

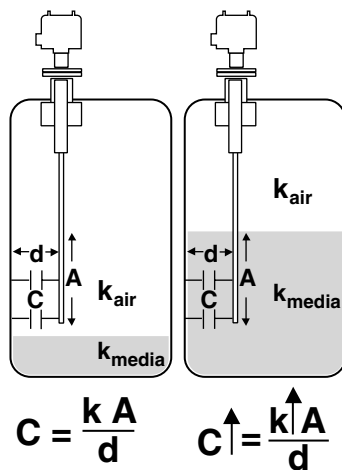


Figure 1-1
Simple Capacitance Probe

In a simple capacitance probe-type sensing element, when the level rises and material covers the probe, the capacitance within the circuit between the probe and the media (conductive applications), or the probe and the vessel wall (insulating applications), increases. This is due to the dielectric constant (k) of the material which causes a bridge imbalance. The signal is demodulated (rectified) and amplified, then the output is increased. There are drawbacks, however, especially when there is coating of the probe.

An RF Admittance level transmitter is the next generation. Although similar to the capacitance concept, IntelliPoint employs a radio frequency signal and adds the Cote-Shield circuitry within the Electronics Unit. This patented Cote-Shield circuitry is designed into the IntelliPoint series and enables the instrument to ignore the effect of buildup, that is, material coating on the sensing element. The sensing element is mounted in the vessel and provides a change in RF admittance indicating the presence or absence of material.

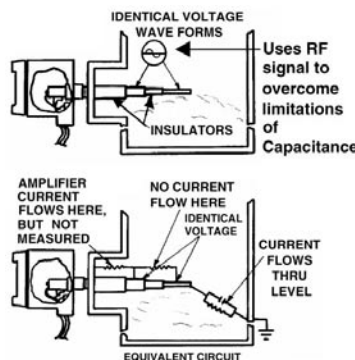


Figure 1-2
RF Admittance Probe with Cote-Shield

The Cote-Shield element of the sensor prevents the transmission of RF current through the coating on the sensing element. The only path to ground available for the RF current is through the material being measured.

The result is an accurate measurement regardless of the amount of coating on the probe, making it the most versatile technology available by far. Not only does it work with all types of materials, it's well suited to a very broad range of conditions, from cryogenics to high temperature, from vacuum all the way to 10,000psi pressure.

1.3 Model Number

RMT Series - IntelliPoint RF™

● **Technology**

R RF Admittance

● **Measurement Type**

- M Manual Calibration, Point Level
- G Manual Calibration, Point Level, with High Sensitivity

● **Input**

T Two-Wire Power Supply, 13-30 Vdc

● **Housing**

- 0 No Approvals, Dual Compartment NEMA 4X/IP66, M20 x 1.5 conduit entries
- 1 No Approvals, Dual Compartment NEMA 4X/IP66 ¾" NPT conduit entries
- 2 GENELEC/ATEX Approved, Dual Compartment NEMA 4X/IP66 M20x1.5 conduit entries
- 3 FM Approved, Dual Compartment NEMA 4X/IP66 ¾" NPT conduit entries
- 4 CSA Approved, Dual Compartment NEMA 4X/IP66 ¾" NPT conduit entries

● **Electronics**

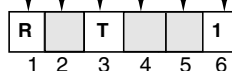
- | | | |
|--------------------------------------|---|---|
| 0 Integral | 7 Rmt. w/ (25 ft.) Tri-Ax Cable | E Rmt. w/ (75 ft.) 1st 10ft Hi-Temp. Cbl. |
| 1 Remote, no cable | 8 Rmt. w/ (50 ft.) Tri-Ax Cable | F Rmt. w/ (5 ft.) G.P. Cable |
| 2 Rmt. w/ 3 m (10 ft.) G.P. Cable | 9 Rmt. w/ (75 ft.) Tri-Ax Cable | G Rmt. w/ (5 ft.) Tri-Ax Cable |
| 3 Rmt. w/ 7.6 m (25 ft.) G.P. Cable | A Rmt. w/ (10 ft.) Hi-Temp. Cable | H Rmt. w/ (10 ft.) Tri-Ax Cable |
| 4 Rmt. w/ 10.6 m (35 ft.) G.P. Cable | B Rmt. w/ (25 ft.) 1st 10ft Hi-Temp. Cbl. | J Rmt. w/ (35 ft.) Tri-Ax Cable |
| 5 Rmt. w/ 15.2 m (50 ft.) G.P. Cable | C Rmt. w/ (35 ft.) 1st 10ft Hi-Temp. Cbl. | K Rmt. w/ (5 ft.) Hi-Temp. Cable |
| 6 Rmt. w/ 23 m (75 ft.) G.P. Cable | D Rmt. w/ (50 ft.) 1st 10ft Hi-Temp. Cbl. | |

● **Output**

0 8-16 mA Output

● **Sensing Element**

| Application | Sensing Element | Pressure/Temperature | Wetted Parts |
|--|--|---|---|
| 00 General purpose | 700-1202-001 remote 700-1202-021 integral | 13.8 bar @ 232°C (200 PSI @ 450°F) | 316SS and PEEK |
| 01 Floating roof with cable attachment and brass bottom weight | 700-1202-012 remote 700-1202-022 integral | 13.8 bar @ 177°C (200 PSI @ 350°F) | 316SS, Brass, and PEEK |
| 02 General purpose, longer insertion lengths with cable attachment and 316SS bottom weight | 700-1202-014 remote 700-1202-024 integral | 13.8 bar @ 177°C (200 PSI @ 350°F) | 316SS and PEEK |
| 03 Proximity | 700-1202-018 remote 700-1202-028 integral | 13.8 bar @ 232°C (200 PSI @ 450°F) | 316SS and PEEK with 76 mm (3) 316SS proximity plate |
| 04 General purpose, high temperature and pressure | 700-1202-041 remote 700-1202-042 integral | 69 bar @ 121°C (1000 PSI @ 250°F) 20.7 bar @ 232°C (300 PSI @ 450°F) | 316SS and PEEK |
| 10 Corrosive liquids (2)(4)(9) | 700-0001-018 | 3.4 bar @ 149°C (50 PSI @ 300°F) | PFA |
| 11 General purpose, higher pressure TFE compatibility required | 700-0201-005 | 69 bar @ 38°C (1000 PSI @ 100°F) 13.8 bar @ 232°C (200 PSI @ 450°F) | 316SS and TFE |
| 12 Corrosive material, higher pressure | 700-0201-005 Hastelloy C | 69 bar @ 38°C (1000 PSI @ 100°F) 13.8 bar @ 232°C (200 PSI @ 450°F) | Hastelloy C and TFE |
| 13 Sanitary (3) | 700-0201-036 | 69 bar @ 38°C (1000 PSI @ 100°F) 13.8 bar @ 232°C (200 PSI @ 450°F) | 316/316L SS and TFE |
| 14 General Purpose, low pressure | 700-0202-002 | 3.4 bar @ 149°C (50 PSI @ 300°F) 1.4 bar @ 232°C (20 PSI @ 450°F) | 316SS and TFE |
| 15 Heavy duty, agitated tanks or material with high bulk density (1) | 700-0202-043 | 69 bar @ 38°C (1000 PSI @ 100°F) 13.8 bar @ 232°C (200 PSI @ 450°F) | 316SS and TFE |
| 16 High integrity seal for hazardous material (8) | 700-0002-360 (Seal Tyte™) | 34.5 bar @ 149°C (500 PSI @ 300°F) | PFA (flange mounting only) |
| 18 Corrosive material, higher pressure with waterlike viscosity (4) | 700-0001-022 | 69 bar @ 38°C (1000 PSI @ 100°F) 34.5 bar @ 149°C (500 PSI @ 300°F) | TFE |
| 20 Miniature Pilot Plant Sensor (1)(7) | 700-0209-002 | 6.9 bar @ 121°C (100 PSI @ 250°F) 0 bar @ 232°C (0 PSI @ 450°F) | 316 SS and TFE |
| 60 Highest pressure and temperature (1) | 700-0204-038 | 138 bar @ 93°C (2000 PSI @ 200°F) 69 bar @ 260°C (1000 PSI @ 500°F) | 316SS and Ceramic |



Continued on next Page

1.3 Model Number (continued)

Fly Ash Precipitators, Baghouse, and Economizers (1) (6)

| Application | Sensing Element | Pressure/Temperature | Wetted Parts |
|--|-----------------|---------------------------------|-----------------------------|
| 31 No hopper installation | 700-0029-001 | 0.1 bar @ 260°C (2 PSI @ 500°F) | 316SS and TFE (CS Inactive) |
| 32 Hopper installation up to 200mm (8 inches) | 700-0029-002 | 0.1 bar @ 260°C (2 PSI @ 500°F) | 316SS and TFE (CS Inactive) |
| 33 Hopper installation up to 250mm (10 inches) | 700-0029-003 | 0.1 bar @ 260°C (2 PSI @ 500°F) | 316SS and TFE (CS Inactive) |
| 35 Hopper installation up to 400mm (16 inches) | 700-0029-005 | 0.1 bar @ 260°C (2 PSI @ 500°F) | 316SS and TFE (CS Inactive) |

Plugged Chute Detection (1) (5)

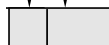
| Application | Sensing Element | Pressure/Temperature | Wetted Parts |
|---|-----------------|---------------------------------|------------------------------|
| 50 Flush Mount Sensor 305mm ² (12 inches ²) heavy duty | 700-0207-001 | 0.1 bar @ 82°C (1 PSI @ 180°F) | 304 SS and Polyurethane |
| 51 Flush Mount Sensor 305mm ² (12 inches ²) higher temperature | 700-0207-002 | 0.1 bar @ 149°C (1 PSI @ 300°F) | 304 SS and TFE |
| 52 Flush Mount Sensor 305mm ² (12 inches ²) with curved radius 153, 229, 305 mm (6, 9, or 12 inches) | 700-0207-003 | 0.1 bar @ 82°C (1 PSI @ 180°F) | 304 SS and Neoprene |
| 53 Flush Mount Sensor 305mm ² (12 inches ²) extra heavy duty | 700-0207-004 | 0.1 bar @ 82°C (1 PSI @ 180°F) | 410 SS and UHMW Polyethylene |
| 55 Flush Mount Sensor 203mm ² (8 inches ²) heavy duty | 700-0207-006 | 0.1 bar @ 82°C (1 PSI @ 180°F) | 304 SS and Polyurethane |

Mounting Type (See separate Mounting Chart for first three digits)

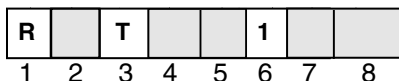
| | IL | CSL | IL | CSL |
|------|--------------|--------------|------|--------------------------------------|
| xxxA | 152 mm (6") | 51 mm (2") | xxxH | 914 mm (36") 254 mm (10") |
| xxxB | 305 mm (12") | 51 mm (2") | xxxJ | 914 mm (36") 0 mm (0") |
| xxxC | 305 mm (12") | 89 mm (3.5") | xxxK | 1219 mm (48") 254 mm (10") |
| xxxD | 457 mm (18") | 51 mm (2") | xxxL | 1524 mm (60") 254 mm (10") |
| xxxE | 457 mm (18") | 89 mm (3.5") | P00X | IL/CSL factory set for Plugged Chute |
| xxxF | 457 mm (18") | 254 mm (10") | A1BX | IL/CSL factory set for Fly Ash |
| xxxG | 457 mm (18") | 0 mm (0") | xxxZ | Other |

- Notes: (1) Available with remote electronics only (6) Use A1B mounting option
 (2) Use A1P mounting option (7) Use A8B mounting option (¼-inch NPT)
 (3) Choose from sanitary mounting options only (8) Choose from flange mounting only
 (4) Available with 0-inch CSL only (9) FM approved with remote electronics only
 (5) Use P00X mounting option

Not all mounting options available with all sensing elements



7 8



| NPT Threads | | |
|-------------|--------|-------------|
| A1B | ¼" NPT | 316SS |
| A1C | ¾" NPT | Hastelloy C |
| A1P | ¾" NPT | PFA |
| A2B | 1" NPT | 316SS |
| A2C | 1" NPT | Hastelloy C |

| Sanitary TriClamps | | |
|--------------------|--------------|-------|
| C2B | 1" TriClamp | 316SS |
| C3B | 1½" TriClamp | 316SS |
| C4B | 2" TriClamp | 316SS |

| DIN Flanges | | |
|-------------|---------------|----------------|
| E01 | 25 mm 16bar | RF 316/316L SS |
| EP1 | 25 mm 40 bar | RF 316/316L SS |
| EQ1 | 50 mm 16 bar | RF 316/316L SS |
| ER1 | 50 mm 40 bar | RF 316/316L SS |
| ES1 | 80 mm 16 bar | RF 316/316L SS |
| ET1 | 80 mm 40 bar | RF 316/316L SS |
| EU1 | 100 mm 16 bar | RF 316/316L SS |
| EV1 | 100 mm 40 bar | RF 316/316L SS |
| EW1 | 150 mm 16 bar | RF 316/316L SS |
| EX1 | 150 mm 40 bar | RF 316/316L SS |

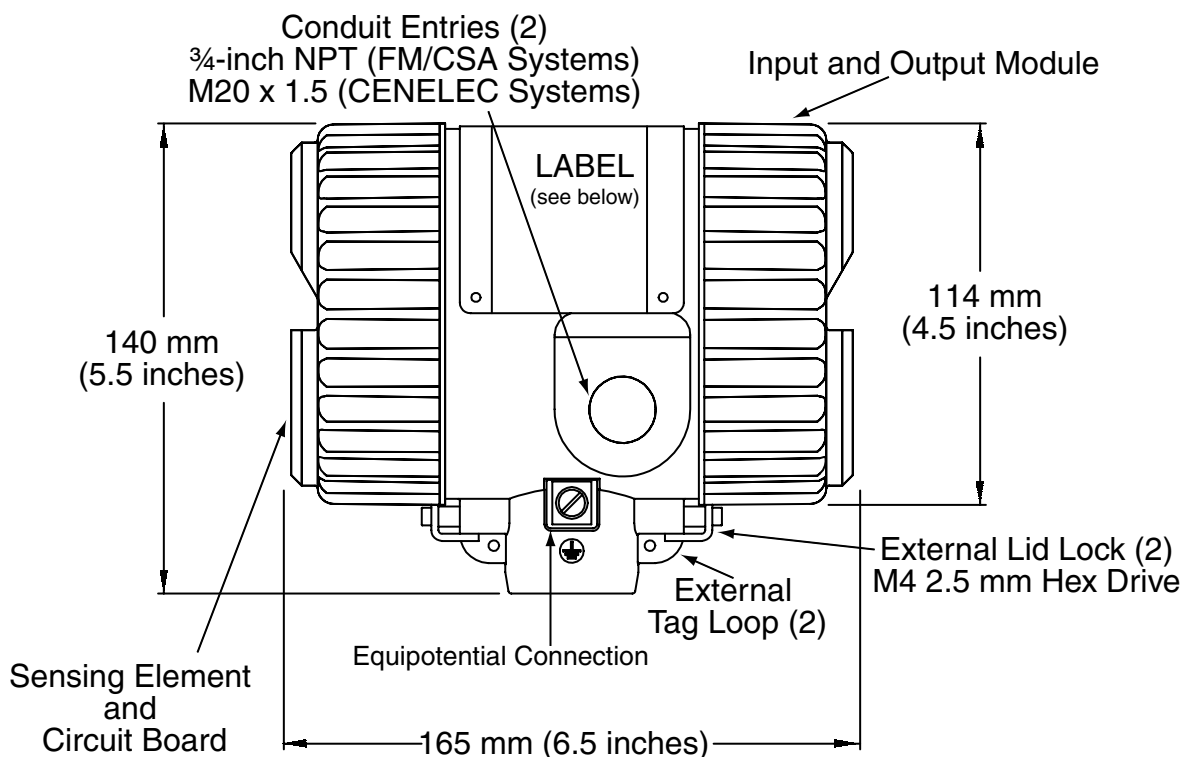
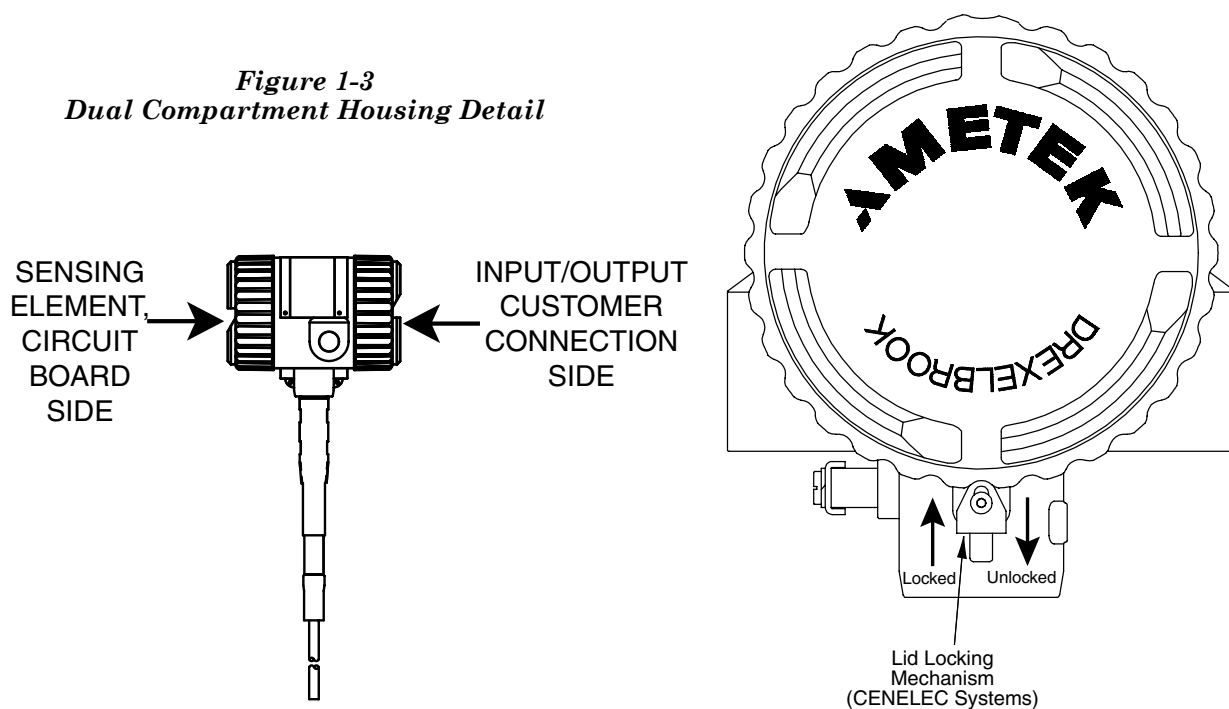
| DIN Flanges (cont.) | | |
|---------------------|---------------|-----------------|
| E02 | 25 mm 16 bar | RF Carbon Steel |
| EP2 | 25 mm 40 bar | RF Carbon Steel |
| EQ2 | 50 mm 16 bar | RF Carbon Steel |
| ER2 | 50 mm 40 bar | RF Carbon Steel |
| ES2 | 80 mm 16 bar | RF Carbon Steel |
| ET2 | 80 mm 40 bar | RF Carbon Steel |
| EU2 | 100 mm 16 bar | RF Carbon Steel |
| EV2 | 100 mm 40 bar | RF Carbon Steel |
| EW2 | 150 mm 16 bar | RF Carbon Steel |
| EX2 | 150 mm 40 bar | RF Carbon Steel |

| ANSI Flanges | | |
|--------------|----------|----------------|
| DA1 | 1" 150# | RF 316/316L SS |
| DB1 | 1½" 150# | RF 316/316L SS |
| DC1 | 2" 150# | RF 316/316L SS |
| DD1 | 2½" 150# | RF 316/316L SS |
| DE1 | 1" 300# | RF 316/316L SS |
| DF1 | 1½" 300# | RF 316/316L SS |
| DG1 | 2" 300# | RF 316/316L SS |
| DH1 | 2½" 300# | RF 316/316L SS |
| DI1 | 3" 150# | RF 316/316L SS |

| ANSI Flanges (cont.) | | | |
|----------------------|-----|------|-----------------|
| DJ1 | 3" | 300# | RF 316/316L SS |
| DK1 | 4" | 150# | RF 316/316L SS |
| DL1 | 4" | 300# | RF 316/316L SS |
| DM1 | 6" | 150# | RF 316/316L SS |
| DN1 | 6" | 300# | RF 316/316L SS |
| DA2 | 1" | 150# | RF Carbon Steel |
| DB2 | 1½" | 150# | RF Carbon Steel |
| DC2 | 2" | 150# | RF Carbon Steel |
| DD2 | 2½" | 150# | RF Carbon Steel |
| DE2 | 1" | 300# | RF Carbon Steel |
| DF2 | 1½" | 300# | RF Carbon Steel |
| DG2 | 2" | 300# | RF Carbon Steel |
| DH2 | 2½" | 300# | RF Carbon Steel |
| DI2 | 3" | 150# | RF Carbon Steel |
| DJ2 | 3" | 300# | RF Carbon Steel |
| DK2 | 4" | 150# | RF Carbon Steel |
| DL2 | 4" | 300# | RF Carbon Steel |
| DM2 | 6" | 150# | RF Carbon Steel |
| DN2 | 6" | 300# | RF Carbon Steel |

1.4 Dual Compartment Housing

*Figure 1-3
Dual Compartment Housing Detail*



The Input/Output Module (IOM) is located on Customer Connection side; sensing element/circuit board are on opposite side.

Section 2: Installation

2.1 Unpacking

Carefully remove the contents of the shipping carton and check each item against the packing list before destroying any packing material. If there is any shortage or damage report it to the factory immediately.

2.2 Mounting and Installation Guidelines

The IntelliPoint RF instrument can be mounted vertically, horizontally, or at an angle. The mounting location should be as free as possible from vibration, corrosive atmospheres, and the possibility of mechanical damage. Ambient temperatures at the electronics should be between -30 to 70°C (-22 to 158°F).

The IntelliPoint RF utilizes a dual compartment housing and a completely encapsulated input/output module, to reduce the possibility of damage occurring from water migrating into the housing through the conduit.

To further reduce the possibility of damage caused by water in the conduit, install a drip loop and breather drain to purge any accumulating moisture. Refer to **Figure 2-1**.

When properly installed, the GREEN LED will illuminate when power is applied. The RED LED should not be flashing.

If the RED LED is flashing, refer to Section 5, Troubleshooting.

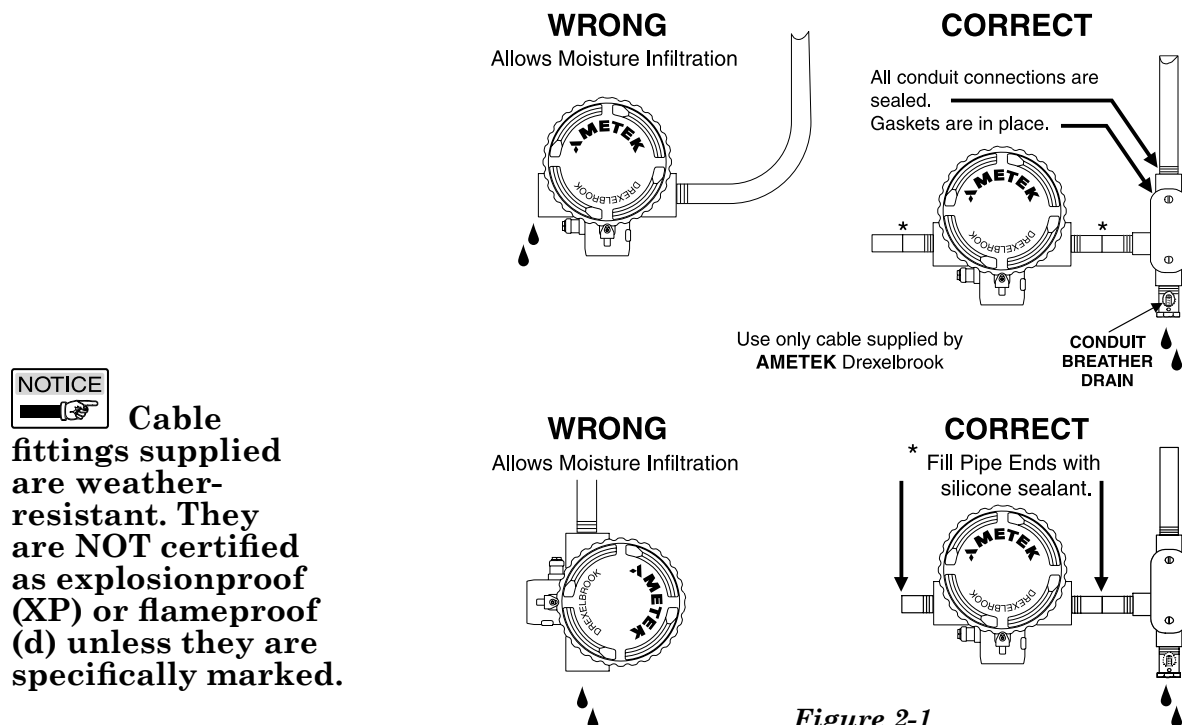


Figure 2-1
Recommended Conduit Connection



NOTICE
Cable fittings supplied are weather-resistant. They are NOT certified as explosionproof (XP) or flameproof (d) unless they are specifically marked.

2.2 Mounting and Installation Guidelines (continued)



The IntelliPoint RF instrument is rated intrinsically safe (I.S.) when power is provided from an I.S. supply.



WARNING:

The IntelliPoint RF equipment is rated explosion-proof. When installing in explosion hazardous areas [rated “potentially hazardous” (EU) or “hazardous classified” (USA)] observe all national and local regulations as well as specifications in the certificate.

Mount the sensing element using the installation guidelines in **Figure 2-2**.

When installing IntelliPoint RF instrument, ambient temperature at electronics must not exceed 70°C (158°F).

When installing flange-mounted sensing elements, keep mating surfaces and bolts free of paint and corrosion to ensure proper electrical contact with vessel. Avoid using excessive amounts of TFE tape when installing threaded sensing elements.

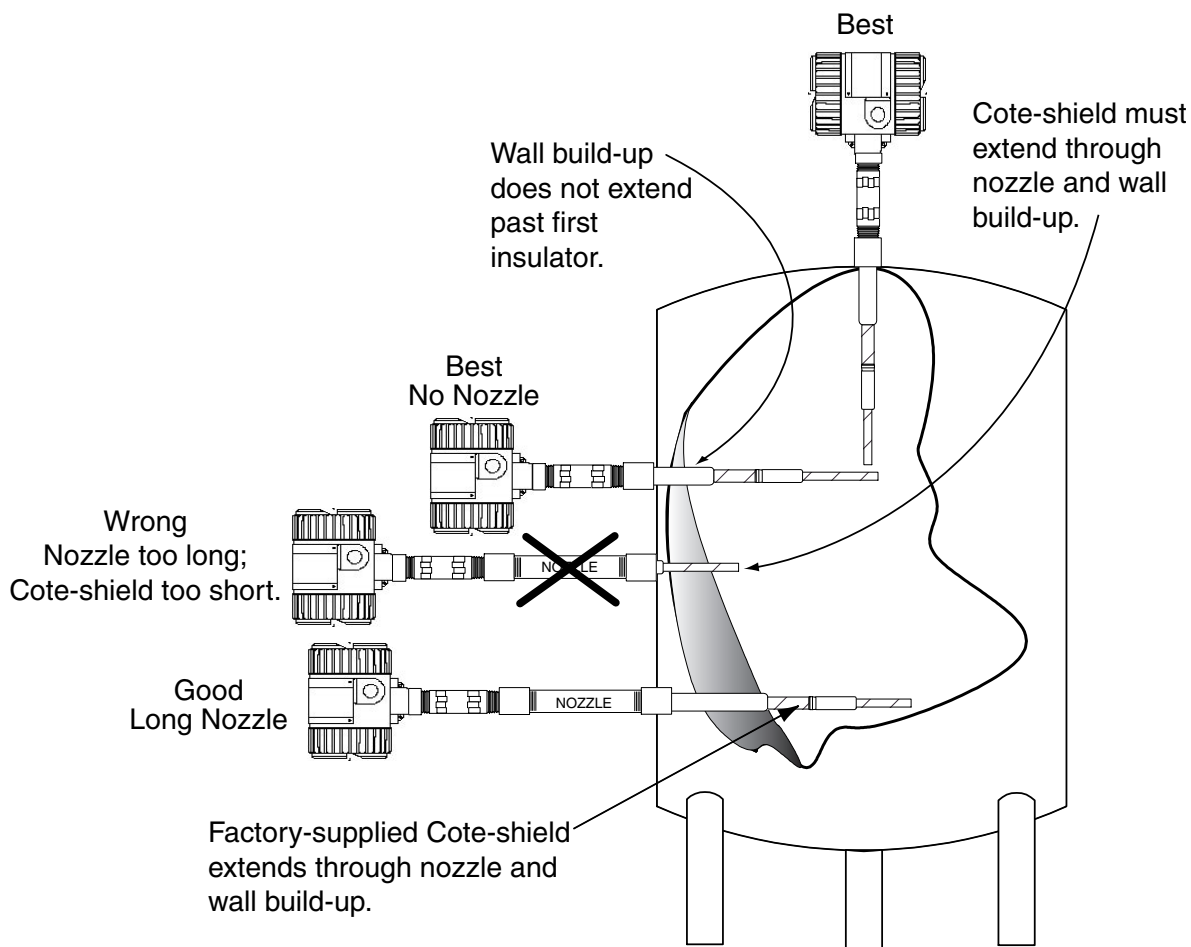


Figure 2-2
Installation Considerations

2.2 Mounting and Installation Guidelines (continued)

Mount the sensing element as to avoid enhancing electrostatic discharge from the process medium, as is good practice with any thermowell, displacer, or sampler. This includes correct bonding to the tank or silo wall.

If installation area is rated explosion-proof and requires conduit seal fittings, they should be used in accordance with company standards and local codes.

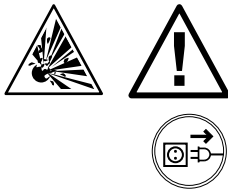
Mounting the sensing element inside a pipe is not recommended.

Do not mount a Cote-Shield sensing element through a nozzle that exceeds the length of first insulator.

Ensure there are no obstructions or agitator blades to interfere with sensing element.

Rigid sensing elements can be mounted either vertically or horizontally.

2.3 Input Wiring



WARNING:

If the IntelliPoint instrument is located in a hazardous environment, do not open the enclosure cover or make/break any electrical connections without first disconnecting electrical power at the source. Ensure that the wiring, electrical fittings and conduit connections conform to electrical codes for the specific location and hazard level.

The IntelliPoint RF instrument requires a 13-30 Vdc supply to operate. To access, remove the housing lid on the customer connections side to reveal the Input/Output Module (IOM). The IOM is an encapsulated assembly that contains the power supply, outputs and eight wiring terminals. IOM is held in place with three screws. *See Figure 2-3.*

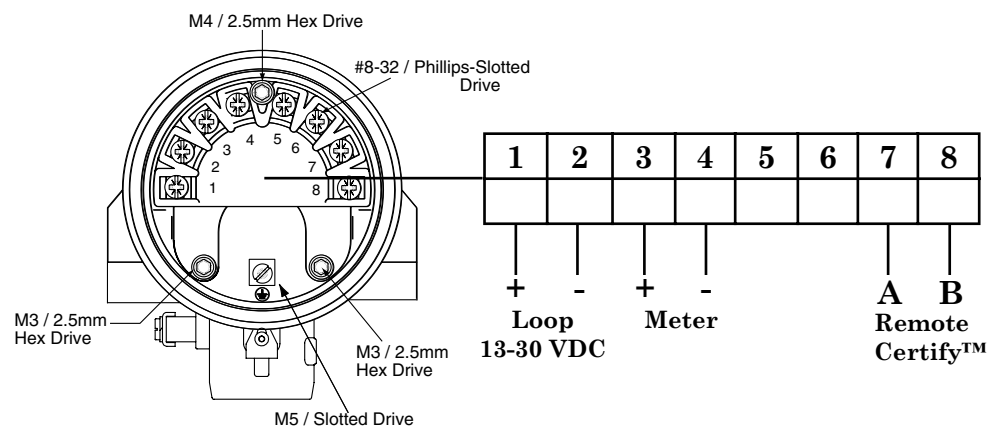


Figure 2-3
Input Wiring

2.4 Spark Protection



Applications involving insulating granulars and insulating liquids may produce a static discharge that can damage the electronics. The RF series instrument is supplied with integral heavy-duty spark protection to prevent static discharges from damaging the electronic units.

2.5 Circuit Board

The circuit board is located on the sensing element/circuit side of the housing (marked on label). Remove the housing lid to access the status LEDs, time delay adjustment, and configuration jumpers. *See Figure 2-4.*

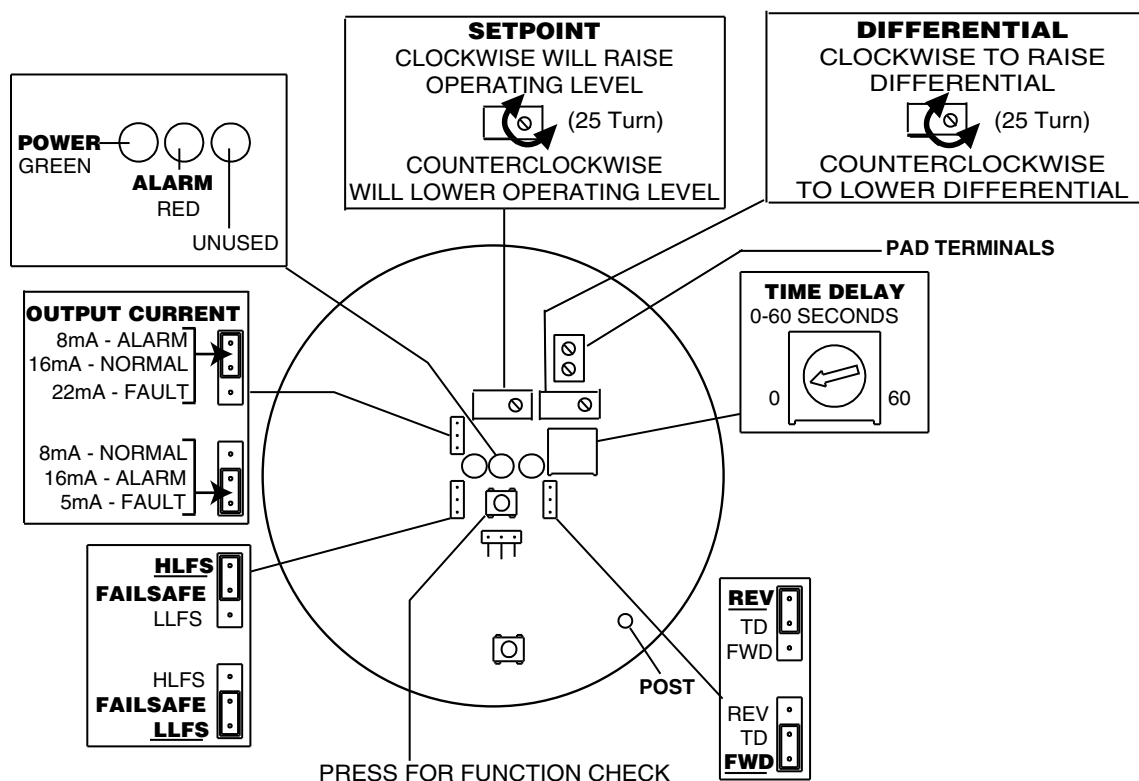


Figure 2-4 Circuit Board (Sensing Element Circuits View)

2.5.1 Time Delay

The TIME DELAY adjustment is located on the sensing element/circuit board side of the housing. It is used to help stop an oscillating relay output due to agitation or waves in the vessel. The time delay adjustment can be field-adjusted from 0 to 60 seconds. The unit is shipped with the TIME DELAY setting at zero (0) seconds.



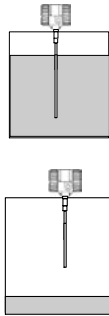
The Time Delay adjustment is a 270-Degree turn pot and is at zero seconds when in the full counter-clockwise position. Do not force the pot past the stop or damage will occur.

2.5.2 Time Delay Action

Time delay action describes whether the relay contacts are delayed from going into the alarm state or recovering from an alarm state.

- FWD: Delays system from coming out of alarm.
- REV: Delays system from going into alarm.
- Instrument is supplied with TIME DELAY action set in forward mode (FWD) position.
- Time delay action is field-selectable using jumper located on sensing element/circuit board side of housing.

2.5.3 Failsafe



"Failsafe" describes the level condition that causes the transmitter to go into alarm.

- The Failsafe is field-selectable using a jumper located on the sensing element/circuit board side of the housing.
- High Level Failsafe (**HLFS**) is the condition when the probe is covered, the unit goes into alarm.
- Low Level Failsafe (**LLFS**) is the condition when the probe is uncovered, the unit goes into alarm.
- The instrument is supplied with the failsafe jumper set in high level (**HLFS**) position.

2.5.4 Current Output Assignment

The Output Current can be configured using the jumpers as follows:

- Jumper on pin #1 and #2 creates:
8mA - Alarm, 16mA - Normal, 22mA - Fault
- Jumper on pin #2 and #3 creates:
8mA - Normal, 16mA - Alarm, 5mA - Fault

2.5.5 Function Check

The **Function Check (High Level Fail Safe Only)** test feature performs a confidence test of the system by duplicating the same signal as a high-level alarm condition without requiring the system to be removed from the tank.

Simulating a high level with the **Function Check** feature:

- Forces unit into an alarm condition.

The **Function Check** test is initiated with the press of the **Function Check** button located on the sensing element/circuit side of the housing. After pressing the button, the green LED flashes for 5 seconds and the red LED illuminates. The output is moved to the alarm condition for 2 seconds. If the red LED does not light, and the loop current does not move to the alarm condition, the Manual Certify test has detected a fault. Consult the trouble-shooting section of this Instruction Manual.

2.6 Output and LED Status

There are two status LEDs located on the sensing element/circuit board side of the housing. One is used to indicate the unit has power. The other LED is used to indicate the status of the unit: NORMAL or ALARM. See *Figure 2-4*.



Second Red LED is not used on the Two-Wire Transmitter

| Tank Condition | LED Output Status AutoVerify = disabled | Tank Condition | LED Output Status AutoVerify = disabled |
|---|--|--|--|
| <p>High Level Failsafe Tank Empty</p> | <p>Power GREEN LED On</p> <p>RED LED Off</p> | <p>Low Level Failsafe Tank Empty</p> | <p>Power GREEN LED On</p> <p>RED LED On</p> |
| <p>High Level Failsafe Tank Full</p> | <p>Power GREEN LED On</p> <p>RED LED On</p> | <p>Low Level Failsafe Tank Full</p> | <p>Power GREEN LED On</p> <p>RED LED Off</p> |

| Tank Condition | LED Output Status AutoVerify = enabled |
|---|---|
| <p>Fault Condition Detected</p> <p>High Level Failsafe Tank Empty</p> | <p>Power GREEN LED</p> <p>RED LED</p> <p>Flashes Alternately</p> <p>High Level Failsafe only</p> |

Figure 2-5
Output and LED Status

2.7 Sensing Element Connection

Sensing element connects to rear side of circuit board and is factory-installed. If sensing element must be removed from housing due to mounting requirements during installation, or because a different insertion length is discovered to be needed, use the following steps:

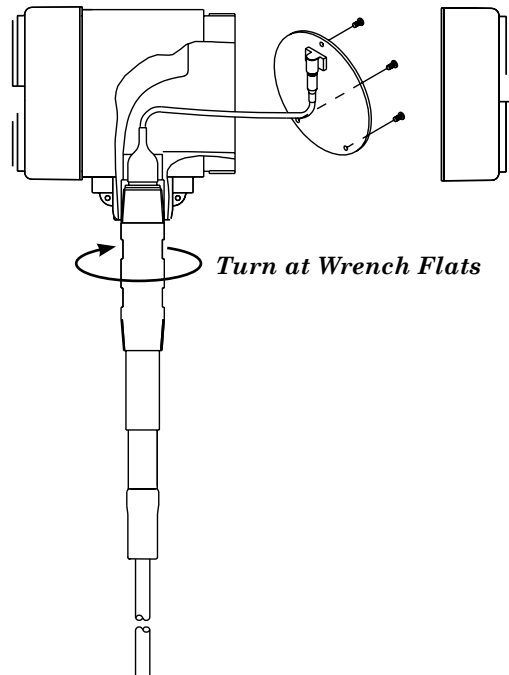


To **Remove** sensing element:

- Remove power from system.
- Remove lid from sensing element/circuit side of housing.
- Remove three retaining screws that hold the board in place.
- Remove circuit board by gently pulling post located at lower right edge of board.
- Disconnect wire harness from rear side of circuit board.
- Remove sensing element by rotating it counter clockwise.

To **Reinstall** the sensing element:

- Insert wire harness into housing through bottom process entry.
- Apply thread sealant to $\frac{3}{4}$ -inch NPT threads on sensing element.
- Install sensing element by threading it clockwise into housing.
- Connect wire harness to rear of circuit board.
- Carefully align the six feed through pins and place circuit board in housing.
- Install the three retaining screws.
- Install lid on sensing element/circuit side of housing.
- Apply power.



Disconnecting sensing element from integrally mounted transmitter is not usually necessary.

*Figure 2-6
Sensing Element Connection
(Integral Housing)*

2.7 Sensing Element Connection (continued)

For IntelliPoint RF instruments that are mounted remotely from the sensing element, the cable connections from the sensing element to the electronic unit are made to the terminals on the sensing element side of the housing. *See Figure 2-7.* Connect Green (Ground) wire to green screw, Red (Shield) wire to red screw, and Blue (Center) wire to blue screw.

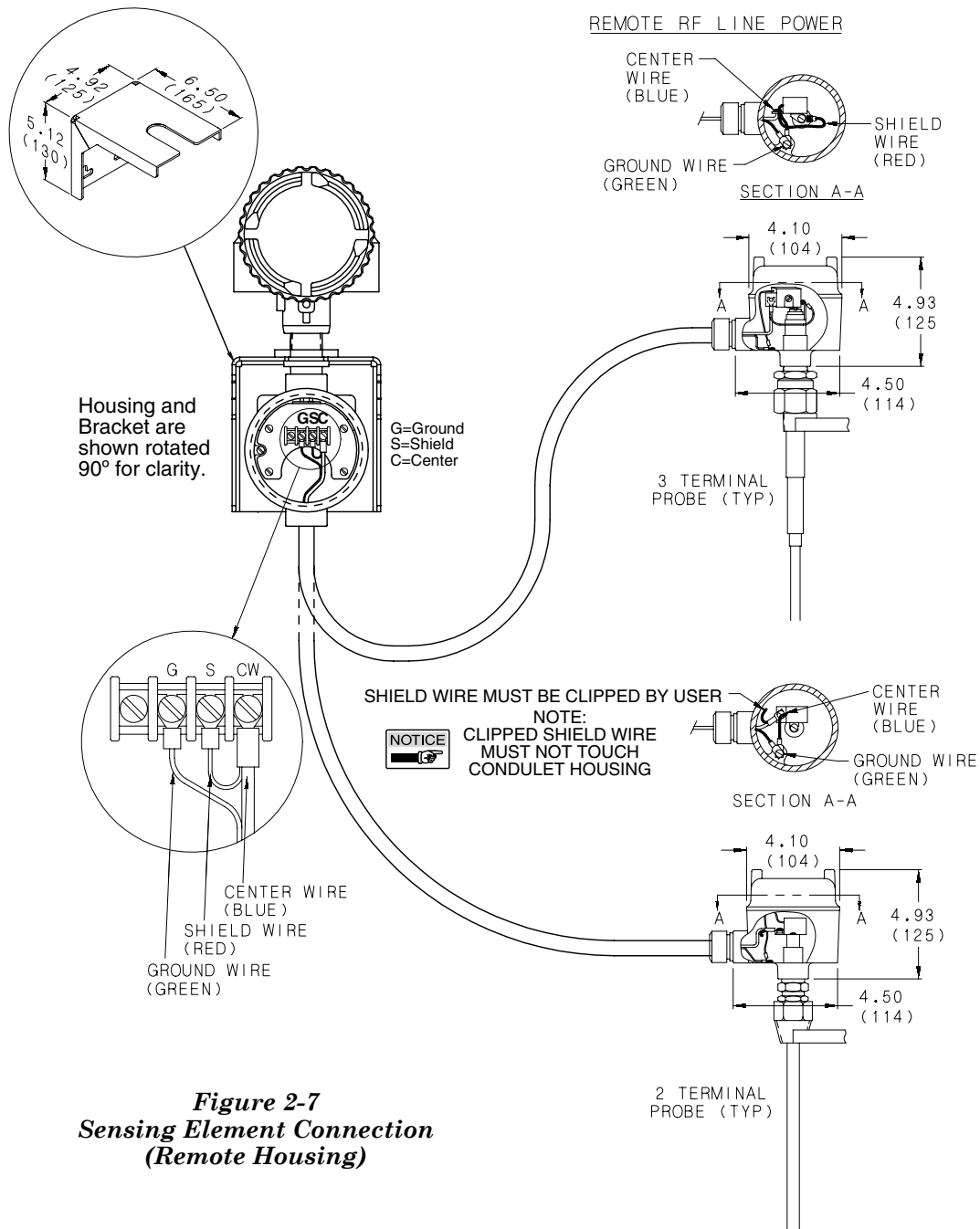


Figure 2-7
Sensing Element Connection
(Remote Housing)

Section 3: Calibration



WARNING:

Before removing the explosion-proof housing cover in a potentially hazardous area, make certain that the area is safe. When calibration is complete, the cover must be replaced. Each conduit from the explosion-proof case must be equipped with an approved seal fitting.

3.1 Setpoint Control

There is a single adjustment located on top of the instrument that controls the point at which the Alarm/ Normal condition switches. A Red LED indicates the Alarm condition.

Each revolution of the control changes the operating point approximately 4 pF. (For high-sensitivity models, each revolution will change operating point approximately 1 pF.)

Turning the adjustment clockwise will raise the level at which the Alarm/Normal condition switches. Turning the adjustment counterclockwise will lower the level at which the Alarm/Normal condition switches. Refer to *Figure 3-1* and *Section 3.3*.

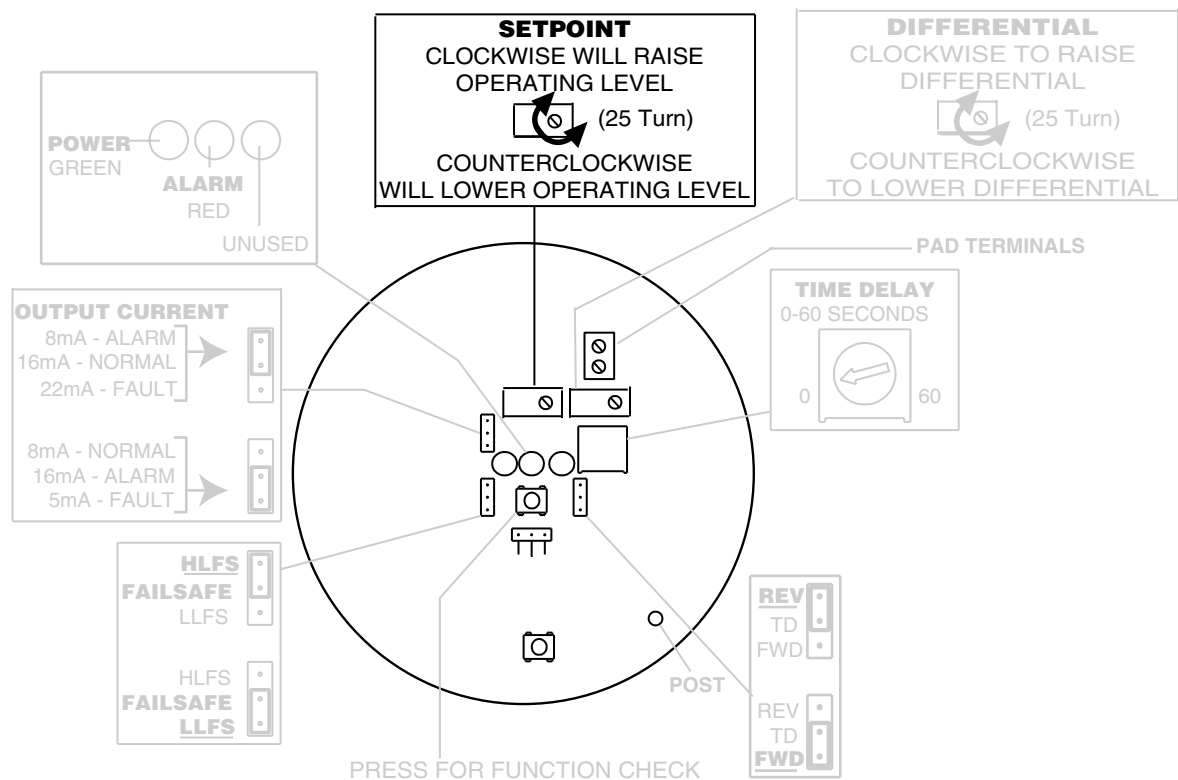
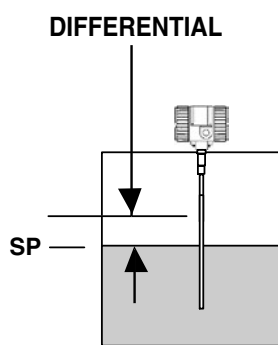


Figure 3-1
SetPoint Adjustment

3.2 Adjustable Differential Controls



Differential is the hysteresis (dead band), or change in level, necessary to switch electronic unit from one state to another. It is useful to prevent oscillation "chatter" on those occasions when level happens to be right at switching point or when surface is agitated.

RMT Series level control with adjustable differential allows user to determine amount of capacitance change (hence level) between control point and recovery point. User can select two points on a vertical sensing element where Alarm and Normal points switch.

Range of operation is 3 to 100pF.

Low point range is that range of capacitance over which lower switching point may be adjusted.

Differential range corresponds to differential in level on sensing element and depends on both the capacitance of the element itself and the properties of the material being measured. *See Figure 3-2* for location of adjustments. For calibration of adjustable differential units, see *Section 3.3.5*

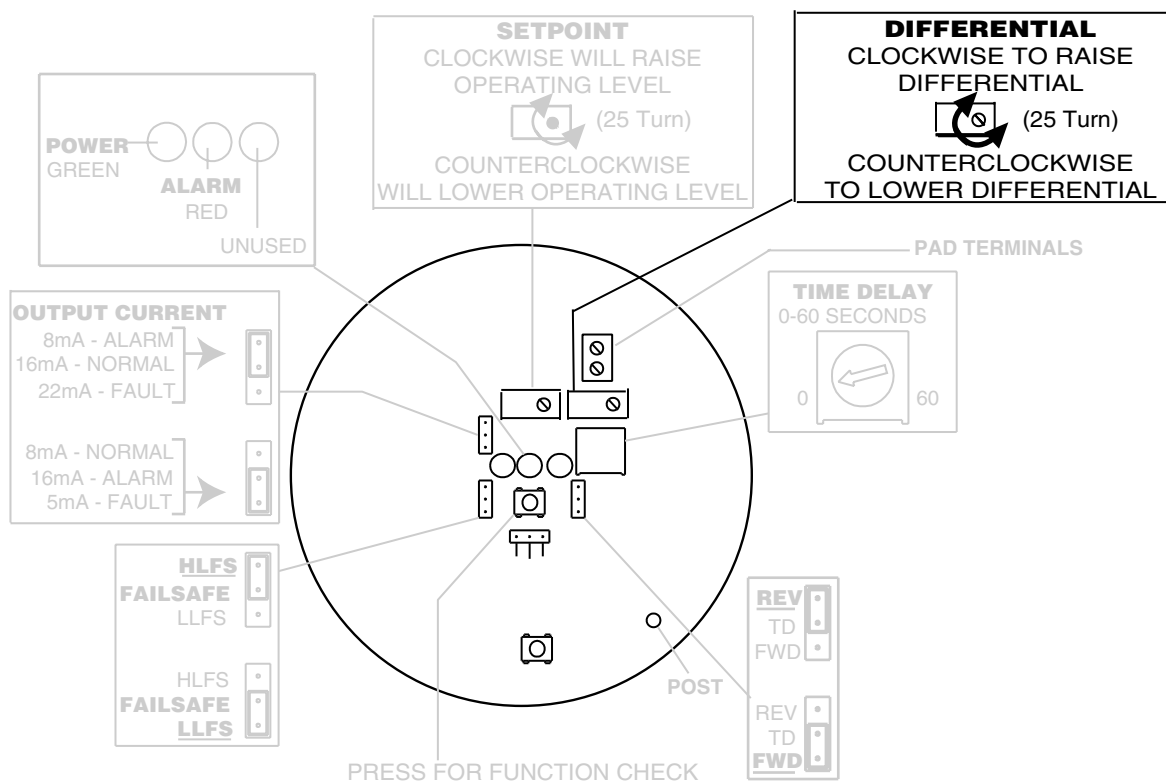


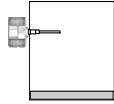
Figure 3-2
Differential Adjustment

3.3 Calibration Procedures



All RMT Series controls with bare metal sensing elements are factory-set to switch in all water-based conducting materials. NO calibration adjustment is needed.

3.3.1 Quick Calibration



Quick Calibration method is **ONLY** recommended for horizontally mounted, bare metal, Cote-Shield sensing elements. In all cases it is necessary to have material level **below** the probe (sensing element in air).

Red LED OFF = normal condition

1. Turn the Differential adjustor to the full counterclockwise position.
2. For either High Level Fail Safe (HLFS) or Low Level Fail Safe (LLFS) begin with the sensing element totally uncovered.
3. Starting with SetPoint adjustor in full counter clockwise (ccw) position, slowly turn clockwise (cw) until switch changes state. [Red LED will turn OFF in HLFS and turn ON in LLFS].
4. Note position of SetPoint adjustor. Turn it clockwise (cw) from this point the additional number of turns indicated in **Quick Calibration Table 3-1**.

Calibration is Complete

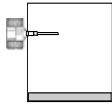
| Material Being Measured | Mode #7 (Standard Sensitivity) | Mode # 8 (High Sensitivity) |
|--|-----------------------------------|--------------------------------|
| Conductive Materials (Water-Based) see note #1 | 15 Turns (Note 2) | 20 Turns |
| Insulating Liquids, Organics, Oil, Plastics | 1/2 Turns | 2 Turns |
| Granular / Solid materials above 50# / ft ³ | 1/2 Turns | 2 Turns |
| Granular / Solid materials above 25-50# / ft ³ | 1/2 Turns | 1 Turn |
| Granular / Solid materials less 20# / ft ³ | Use High Sensitivity Mode #8 | 3/4 Turn |

Note 1 - Most water based materials can be considered conductive, such as acids, bases, salt solutions, water based slurries, and very wet granular materials. Carbon black and powdered metals conduct even without water.

Note 2 - With conducting materials, if heavy build up is anticipated, calibration adjustment can be turned to its clockwise limit.

Table 3-1
Quick Calibration Chart

3.3.2 Calibration of Horizontal Insulated Sensing Elements or Horizontal Sensing Elements in Insulating Materials



1. Begin with sensing element totally uncovered.
2. Turn the Differential adjustor to the full counterclockwise position.
3. Starting with the SetPoint adjustor in full counter clockwise (**ccw**) position, slowly turn clockwise (**cw**) until switch changes state. [Red LED will turn **OFF** in **HLFS**, and turn **ON** in **LLFS**].
4. Note position of adjustor.
5. Increase material level well above sensing element.
6. Turn SetPoint adjustor clockwise (**cw**) from this point, counting the additional number of turns until the Red LED, once again, changes state.
Note: Pot continues to spin even at the end of its adjustment (no mechanical stop).
7. Turn SetPoint adjustor back counterclockwise (**ccw**) half the number of turns that were counted in step 6.
8. Record that half number of turns as "PRELOAD" for use later in recalibration. *See Section 3.3.4.*

Calibration is Complete

If less than 1/4 turn of adjustment is observed between point where sensing element was uncovered and when covered, consult factory.

3.3.3 Calibration of Vertical Insulated Sensing Elements or Vertical Sensing Elements in Insulating Materials



Red LED OFF = normal condition

1. Turn the Differential adjustor to the full counterclockwise position.
2. Set level to where control is desired. [Minimum of 3 inches should cover sensing element.]
3. Starting from full counterclockwise (**ccw**) position, turn SetPoint adjustor clockwise (**cw**), counting the turns until switch changes state [LED changes state].
4. Record that number of turns as "PRELOAD" for use later in recalibration. *See Section 3.3.4.*

Calibration is Complete

3.3.4 Recalibration

If amount of preloading was recorded at time of initial calibration, it is possible to replace instrument without experimentally determining proper amount of preload.

1. Turn the Differential adjustor to the full counterclockwise position.
2. For recalibration using procedure in *Section 3.3.2*, follow Steps 1, 2, 3, and 4, then turn SetPoint adjustor further clockwise (**cw**) amount of preload.
3. For recalibration using procedure in *Section 3.3.3*, turn SetPoint adjustor clockwise (**cw**), from full counterclockwise (**ccw**) position, by amount of preload.
4. When recalibrating for bare sensing elements in conductive materials (factory set), turn tuning SetPoint adjustor to full clockwise (**cw**) position. No other adjustment is necessary. (Minimum of 25 turns.)

3.3.4 Recalibration (Continued)

Nonvolatile Memory

The IntelliPoint has nonvolatile memory which allows the unit to re-start after power outages without recalibrating.

When The IntelliPoint is powered for the first time the internal microprocessor records and stores the “Air” value.

This is the uncovered value of the sensor mounted in the vessel. The IntelliPoint will also store the last covered value and the last uncovered value.

Whenever The IntelliPoint is powered it uses these values as a reference point to determine its current condition (normal or alarm).

The IntelliPoint has nonvolatile memory which retains the recorded values even if power is lost for months. When The IntelliPoint regains power after a power outage, the microprocessor compares the stored values to the current measured value. It will then determine its current status based on this.

Example:

Air value is 10pF

covered value is 20pF

Uncovered value is 11pF

Setpoint = Alarm or recovery value.

For alarm this would typically be 2pF above the last uncovered value (13pF in this case). For recovery this would be halfway between the uncovered and covered value (15.5pF in this case). The setpoint is stored in memory to indicate the last status of the switch.

So, when the unit regains power the microprocessor reads the current value of the sensor and determines the status based on the stored values. It will only re-calibrate if the re-call button is pressed.

3.3.5 Calibration of Adjustable Differential Units (HLFS and LLFS)

1. Put Fail-Safe switch in **HLFS** position.
See Section 2.5.3.
2. Turn SetPoint adjustor to full counterclockwise (**ccw**) position.
3. Turn Differential adjustor to full counterclockwise (**ccw**) position as well.
4. Adjust material level to lower point of desired control band.

3.3.5 Calibration of Adjustable Differential Units (Continued)

5. Slowly turn SetPoint adjustor clockwise (**cw**) until instrument just operates (Red LED changes state).
6. Turn Differential adjustor to full clockwise (**cw**) position (maximum differential).
7. Raise material level to upper point of desired control band.
8. Slowly turn the Differential adjustor counter-clockwise (**ccw**) until the Red LED changes state.
9. Select desired Fail-Safe position.

Calibration is Complete

3.3.6 High Level Fail Safe Blind Calibration of Control w/Flush Sensing Element (Alarm when chute is full at sensor)

1. Start with sensing element uncovered, (no material at sensing element), and tuning SetPoint adjustment to the full counter-clockwise (**ccw**) position. At this point Red LED will be ON.
2. Turn SetPoint adjustor clockwise (**cw**) until the Red LED just turns OFF.
3. Test unit by turning SetPoint adjustor slowly counter-clockwise (**ccw**), then clockwise (**cw**) to determine differential of the electronics.

If ON/OFF differential of LED is more than one quarter turn, unit is not operating correctly. Please consult factory service department for assistance. This is a simple function test of the electronics.

4. If above operation is satisfactory, then continue turning SetPoint adjustor clockwise (**cw**):
 - One (1) turn for granulars containing moisture. (1 = 4PF)
 - One half (1/2) turn for dry insulating powders.

Calibration is Complete

3.3.7 Low Level Fail Safe Blind Calibration of Control w/Flush Sensing Element (Alarm when chute is empty at sensor)

1. Start with sensing element uncovered, (no material at sensing element), and tuning the SetPoint adjustor to full counterclockwise (**ccw**) position. Red LED will be OFF.
2. Turn the SetPoint adjustor clockwise (**cw**) until the Red LED just turns ON.
3. Test the unit by turning adjustor slowly counter-clockwise (**ccw**), then clockwise (**cw**) to determine differential of the electronics.

If ON/OFF differential of LED is more than one quarter turn, unit is not operating correctly. Please consult factory service department for assistance. This is a simple function test of the electronics.

4. If above operation is satisfactory, then continue turning adjustor clockwise (**cw**):
 - One (1) turn for granulars containing moisture. (1 = 4PF)
 - One half (1/2) turn for dry insulating powders.

Calibration is Complete



When excessive build-up on sensor occurs, turning adjustor clockwise will generally eliminate a false high-level signal. Build-up may continue to form, or, it may drop off. If the build-up drops off, the sensing element may cease to respond when material reaches it. This should be discussed with factory service. Call 1-800-527-6297.

Section 4: Spare Parts List

| | |
|--|-----------------|
| O-ring | 250-1-75 |
| Housing ¼-inch NPT Conduit Entry | 260-2-540 |
| Housing M20 Conduit Entry | 260-2-542 |
| Input/Output Module..... | 385-48-10-2 |
| Circuit Board..... | Contact Factory |
| Integral Sensing Element Cable | 380-9000-97 |

Section 5: Troubleshooting

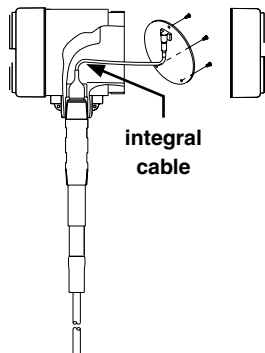


WARNING:

If IntelliPoint instrument is located in a hazardous environment, do not open enclosure cover or make/break any electrical connections without first disconnecting electrical power at the source. Ensure that wiring, electrical fittings, and conduit connections conform to electrical codes for the specific location and hazard level.

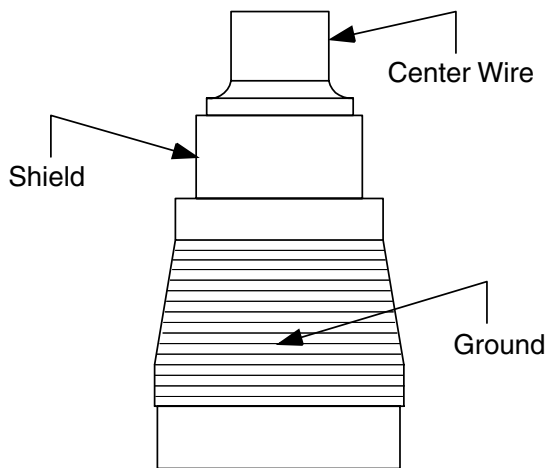
5.1 Testing Sensing Element

To test the sensing element, disconnect the integral cable. Refer to *Figure 5.1*.



Expect the following measurements:

Three Terminal Probes without Shield Tab



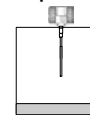
Measured Resistance (Sensor dry and clean):

| | |
|----------------------|---------------|
| Center Wire - Shield | ∞ Ohms |
| Center Wire - Ground | ∞ Ohms |
| Shield - Ground | ∞ Ohms |



When tank level is known to be below the sensor, minimum acceptable values are:

| | |
|------|------------|
| CW-G | 1000 ohms. |
| CW-S | 600 ohms. |
| S-G | 300 ohms. |



If the readings are less than the minimum acceptable values:

1. Check to see if tank is full, or if a severe coating is present.
2. Clean sensor and re-measure the sensor resistances.



Note: Low resistance readings are acceptable if the sensor is covered with a conductive liquid. Also, low resistance readings can be the result of material lodging in a long mounting nozzle. Refer to Figure 2-2.

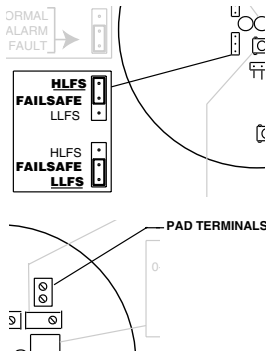
Note: A reading of zero ohms usually indicates a metal-to-metal short circuit. Check for contact with tank wall, mounting nozzle, or other tank structure.

Resistance readings must be taken using an analog ohmmeter set to Rx1000 scale.

*Figure 5.1
Testing Sensing Element*

5.2 Testing Electronic Unit

Use the following steps to test the electronic unit:



1. Be sure environment is safe before removing lid from housing.
2. Observe failsafe jumper on circuit board on top of electronic unit (shown in *Figure 2-4*). Move jumper from current setting to alternate setting [HLFS to LLFS or vice versa]. Alarm should change state.
3. If possible to access sensing element with material below sensor, or remove the IntelliPoint from vessel, use your finger to touch upper pad terminal, shown in *Figure 2-4*, while holding any bare metal portion of instrument housing with other hand. Alarm should change state.
4. Again, with no material touching sensor element, touch tip of sensing element with your finger while holding any bare metal portion of instrument housing with other hand. Alarm should change state.
5. If IntelliPoint changes state while touching test point, but not when touching tip of sensor, in most cases, integral cable is faulty. Refer to *Section 5.5* Testing Integral Cable.
6. If IntelliPoint is stuck in one state:
 - a. Remove power.
 - b. Disconnect coax cable that joins sensing element to electronic unit.
 - c. Apply power.
 - d. Repeat steps 3 and 4.
 - e. If IntelliPoint changes state with sensing element disconnected, in most cases, sensing element is faulty. Refer to *Section 5.1* Testing Sensing Element.
7. If IntelliPoint fails all of the above tests, in most cases the instrument is faulty. Use a replacement Input/Output Module (IOM) or circuit board to determine fault. Consult factory.

5.3 Over Range

If the Red LED is flashing quickly (4 times per second), instrument has detected that uncovered sensing element capacitance exceeds limits of transmitter. Consult factory for pad capacitor values and instructions.

5.4 Under Range

If the Red LED is flashing slowly (once per second), instrument has detected that pad capacitor value is too large. Consult factory for pad capacitor values.

5.5 Testing Integral Cable

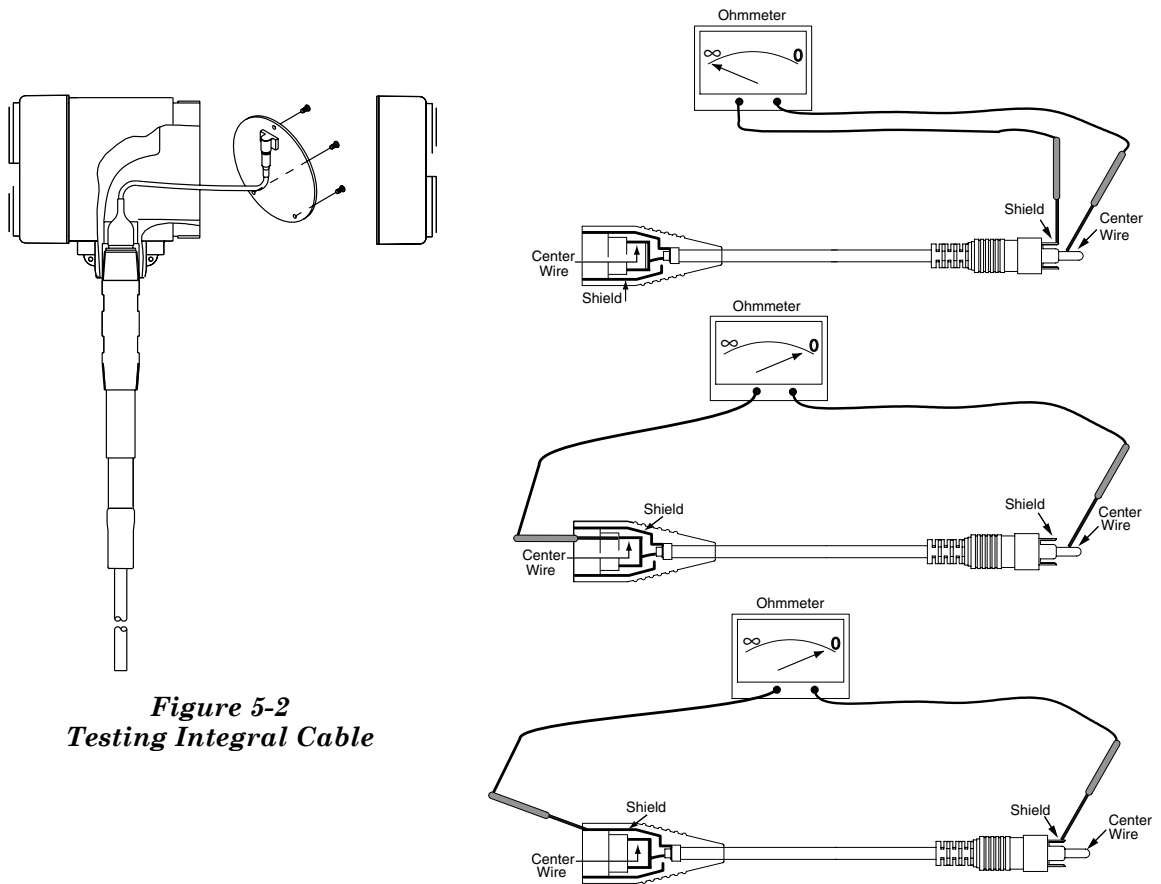


Figure 5-2
Testing Integral Cable

5.6 Testing Remote Cable

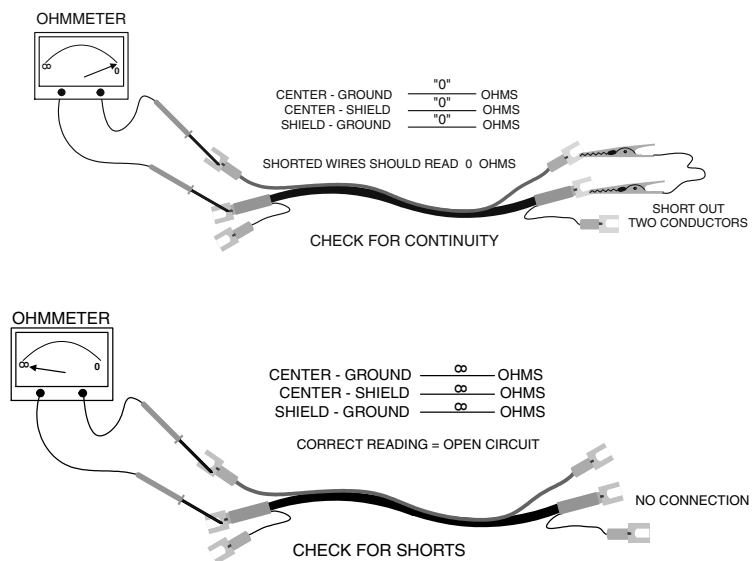


Figure 5-3
Testing Remote Cable

5.7 Testing Power Supply

Power supply can be tested separately as follows:



A. Remove power from electronic unit.

B. Remove three screws holding circuit board into housing.

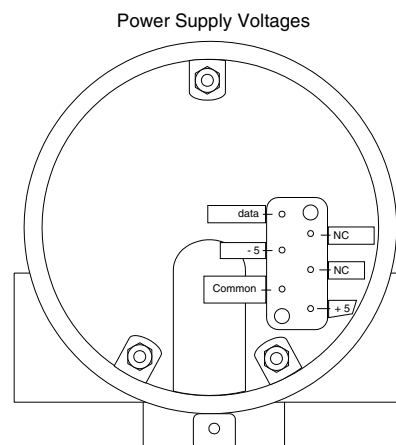
C. Disconnect sensing element connection. Refer to **Figure 2-6 or 2-7**.



D. Reapply power.

E. Using a DC voltmeter, measure voltage from -5 to Common and +5 to Common. Correct readings are -5 to -6 and +5 to +6 Vdc. See **Figure 5-4**.

Figure 5-4
Testing Power Supply
VIEW INTO CUSTOMER
CONNECTIONS SIDE



5.8 Factory Assistance

AMETEK Drexelbrook can answer any questions about your level measurement system. Call Customer Service at 1-800-553-9092 (US and Canada) , or +1-215-674-1234

If you require assistance and attempts to locate the problem have failed:

- **Contact** your local Drexelbrook representative
- **Call** the Service department toll-free:
1-800-527-6297 (US and Canada), or +1-215-674-1234
- **FAX** the Service department at +1-215-443-5117
- **E-Mail** to drexelbrook.service@ametek.com

Please provide the following information:

- Instrument Model Number
- Sensing Element Model Number and Length
- Original Purchase Order Number
- Material being measured
- Temperature
- Pressure
- Agitation
- Brief description of the problem
- Checkout procedures that have failed

5.9 Field Service

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

5.10 Customer Training

Periodically AMETEK Drexelbrook holds customer training seminars at the factory where the instruments are made. Guided by Drexelbrook engineers and specialists these sessions provide detailed information on all aspects of level measurement, from theory to the practice of instrument operation. For more information about these valuable workshops, write to AMETEK Drexelbrook, attention: Communications/ Training Group, or call direct +1-215-674-1234.

5.11 Equipment Return

In order to provide the best service, any equipment being returned for repair or credit must be pre-approved by the factory.

In many applications, sensing elements are exposed to hazardous materials.

- OSHA mandates that our employees be informed and protected from hazardous chemicals.
- Material Safety Data Sheets (MSDS) listing the hazardous materials to which the sensing element has been exposed MUST accompany any repair.
- It is your responsibility to fully disclose all chemicals and decontaminate the sensing element.

To obtain a Return Authorization Number (RA#), contact the Service department at 1-800-527-6297 (US and Canada) or +1-215-674-1234.

Please provide the following information:

- Model Number of Return Equipment
- Serial Number
- Original Purchase Order Number
- Process Materials to which equipment has been exposed.
- MSDS sheets for any hazardous materials

- Billing Address
- Shipping Address
- Purchase Order Number for Repairs

Please include a purchase order even if the repair is under warranty. If repair is covered under warranty, you will not be charged.

Ship equipment freight prepaid to:
AMETEK-DREXELBROOK.
205 KEITH VALLEY ROAD
HORSHAM, PA 19044-1499

COD shipments will not be accepted.

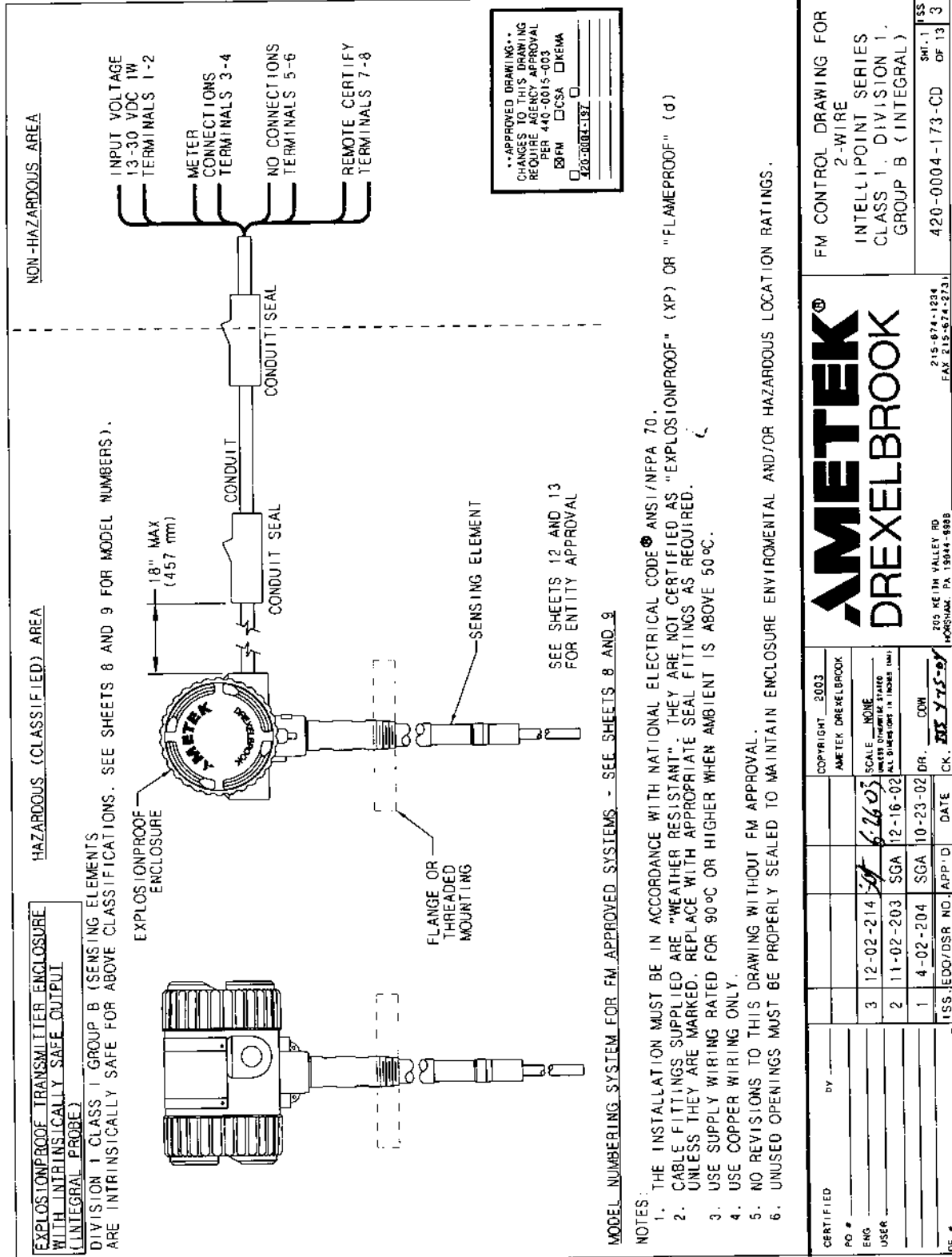
Section 6: Specifications

| | |
|-------------------------------|--|
| Technology: | RF/Capacitance |
| Calibration: | None |
| Modes of Operation: | High and Low level |
| Repeatability: | 2mm (0.08 inch) conductive liquids |
| Response Time: | Less than 1 second |
| Time Delay: | 0 to 60 seconds forward and reverse acting |
| Ambient Electronics: | -30 to 70°C (-28 to 158°F) KEMA -40 to 70°C (-40 to 158°F) FM (CSA pending) |
| Storage Temperature: | -40 to 85°C (-40 to 185°F) |
| Indicators: | LEDs: Green Power, Red Alarm Status |
| Self-Check: | Continuous AutoVerify and Manual Certify |
| Power Supply: | 13 to 30 Vdc <i>Note: The minimum supply voltage at the transmitter terminal is:</i> 13 Volts at 22mA (Fault) 18 Volts at 5mA (Fault) |
| Power Consumption: | 1 watt maximum |
| Output: | 8 mA - Alarm 16 mA - Normal 22 mA - Fault (or field-selectable) 8 mA - Normal 16 mA - Alarm 5 mA - Fault |
| Housing (Electronics): | Dual Compartment, powder-coated aluminum with two cable entries |
| Cable Entry: | M20 x 1.5 CENELEC ¾-inch NPT FM/CSA |
| Ingress Protection: | IP66 NEMA 4X |

Section 7: Control Drawings

7.1 FM Control Drawings

No. 420-0004-173-CD SHEET 1 OF 3



EXPLOSIONPROOF TRANSMITTER ENCLOSURE WITH INTRINSICALLY SAFE OUTPUT (INTEGRAL PROBE)

DIVISION 1 CLASS 1 GROUP B (SENSING ELEMENTS ARE INTRINSICALLY SAFE FOR ABOVE CLASSIFICATIONS. SEE SHEETS 8 AND 9 FOR MODEL NUMBERS).

HAZARDOUS (CLASSIFIED) AREA

NON-HAZARDOUS AREA

APPROVED DRAWING... CHANGES TO THIS DRAWING REQUIRE AGENCY APPROVAL PER 440-0015-003
 FM JCSA KEMA
 420-0004-173

MODEL NUMBERING SYSTEM FOR FM APPROVED SYSTEMS - SEE SHEETS 8 AND 9

- NOTES:
1. THE INSTALLATION MUST BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE ANSI/NFPA 70.
 2. CABLE FITTINGS SUPPLIED ARE "WEATHER RESISTANT". THEY ARE NOT CERTIFIED AS "EXPLOSIONPROOF" (XP) OR "FLAMEPROOF" (d) UNLESS THEY ARE MARKED. REPLACE WITH APPROPRIATE SEAL FITTINGS AS REQUIRED.
 3. USE SUPPLY WIRING RATED FOR 90°C OR HIGHER WHEN AMBIENT IS ABOVE 50°C.
 4. USE COPPER WIRING ONLY.
 5. NO REVISIONS TO THIS DRAWING WITHOUT FM APPROVAL.
 6. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.

| | | | |
|------------------|-------|----------------|----------------------|
| CERTIFIED | BY | COPYRIGHT 2003 | AMETEK DREXELBROOK |
| PO # | 3 | 12-02-214 | SCALE NONE |
| ENG | 2 | 11-02-203 | SGA 12-16-02 |
| USER | 1 | 4-02-204 | SGA 10-23-02 |
| ISS. EDO/DSR NO. | APP'D | DATE | CK. BY YLS-07 |
| DE # | | | |

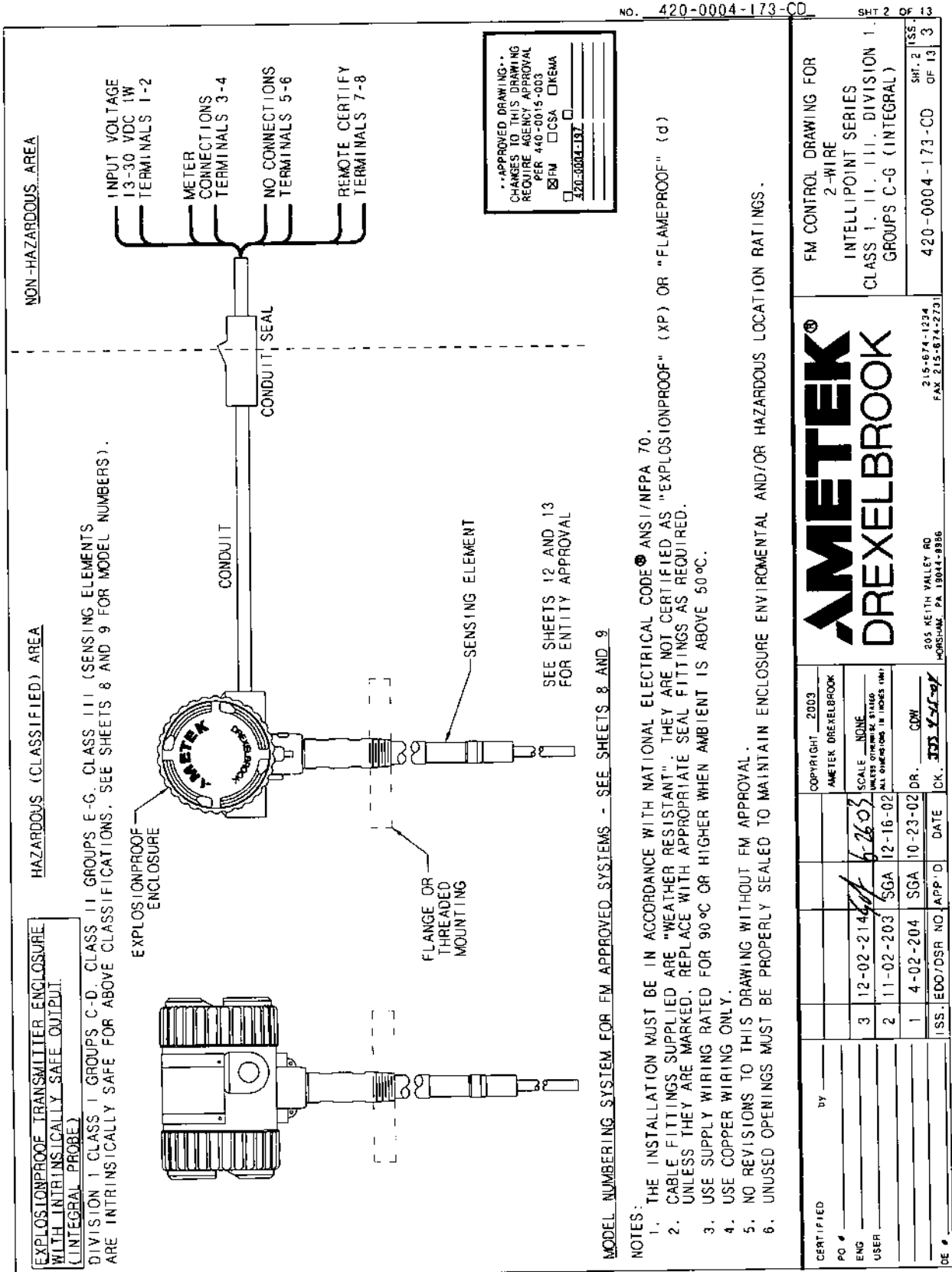
AMETEK®
DREXELBROOK

205 KEVIN VALLEY RD.
 HORSBURG, PA. 19044-9988
 215-674-1234
 FAX 215-674-2731

FM CONTROL DRAWING FOR 2-WIRE INTELLIPOINT SERIES CLASS 1 DIVISION 1, GROUP B (INTEGRAL)

420-0004-173-CD SHEET 1 OF 3

7.1 FM Control Drawings (Continued)



APPROVED DRAWING... CHANGES TO THIS DRAWING REQUIRE AGENCY APPROVAL PER 440-0015-003
 FM CSA KEMA
 420-0004-173

NO. 420-0004-173-CD SHT 2 OF 13

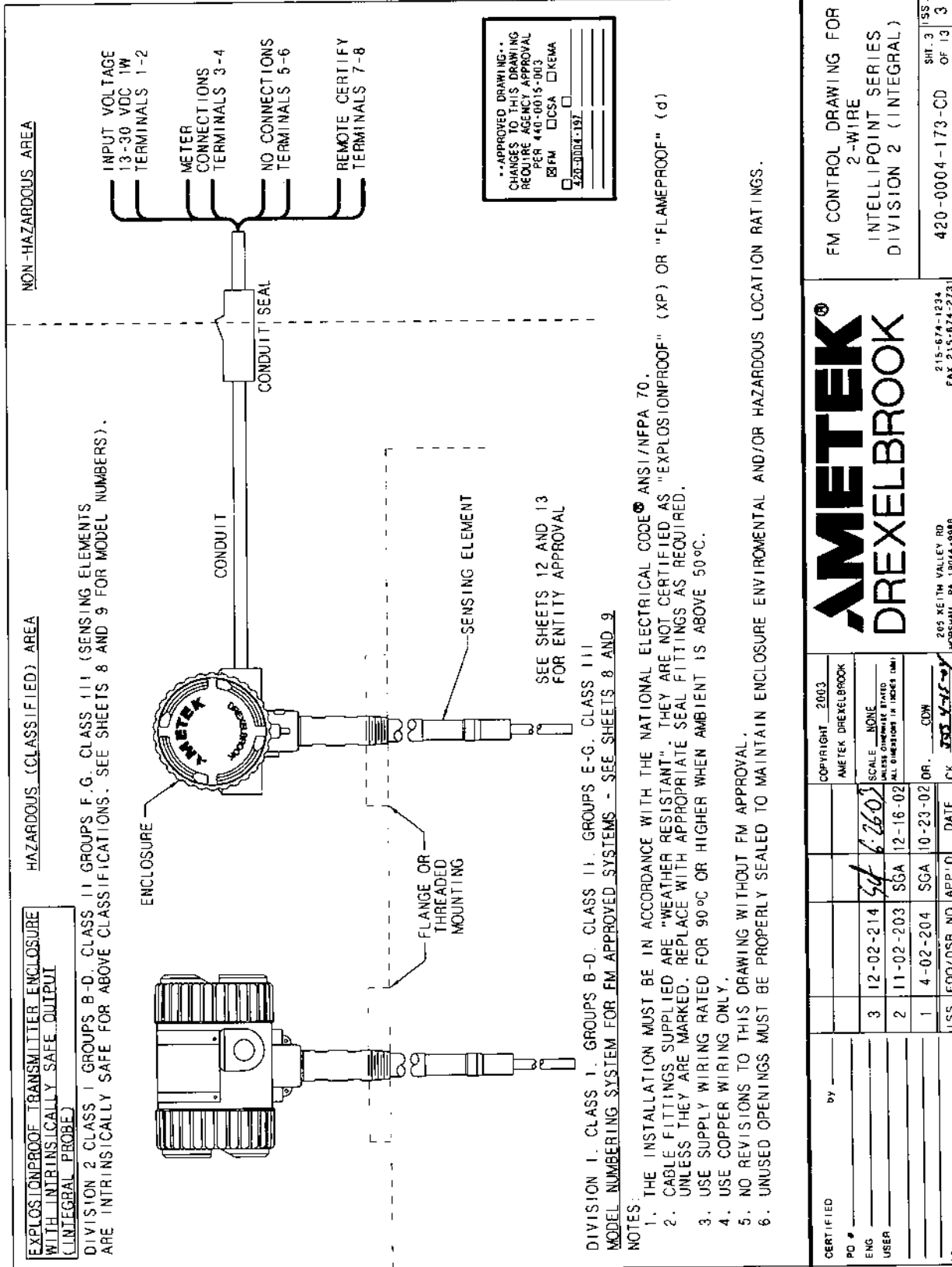
- MODEL NUMBERING SYSTEM FOR FM APPROVED SYSTEMS - SEE SHEETS 8 AND 9
- NOTES:
1. THE INSTALLATION MUST BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE ANSI/NFPA 70.
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 3. USE SUPPLY WIRING RATED FOR 90°C OR HIGHER WHEN AMBIENT IS ABOVE 50°C.
 4. USE COPPER WIRING ONLY.
 5. NO REVISIONS TO THIS DRAWING WITHOUT FM APPROVAL.
 6. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.

| | | | | | |
|---|-------------|---|--------------|---|--------------|
| CERTIFIED BY _____ | | COPYRIGHT 2003 AMETEK DREXELBROOK | | FM CONTROL DRAWING FOR 2-WIRE INTELLIPOINT SERIES CLASS 1, II, III, DIVISION 1, GROUPS C-G (INTEGRAL) | |
| PO # | 3 12-02-214 | SCALE | NONE | ISS | SHT. 2 OF 13 |
| ENG | 6-26-03 | UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM) | SGA 12-16-02 | OF 13 | 3 |
| USER | 2 11-02-203 | DATE | 10-23-02 | 420-0004-173-CD | |
| ISS. | 1 4-02-204 | APP'D | SGA | 215-674-1234 | |
| EDD/DSR NO. | 10-23-02 | DR. | CDW | 215-674-1234 | |
| DATE | 10-23-02 | CK. | YSL | FAX 215-674-2723 | |
| 305 KEITH VALLEY RD HORSBURG, PA 19044-8986 | | | | | |

7.1 FM Control Drawings (Continued)

NO. 420-0004-173-CD

SHT 3 OF 13



FM CONTROL DRAWING FOR 2-WIRE INTELLIPOINT SERIES DIVISION 2 (INTEGRAL)

420-0004-173-CD

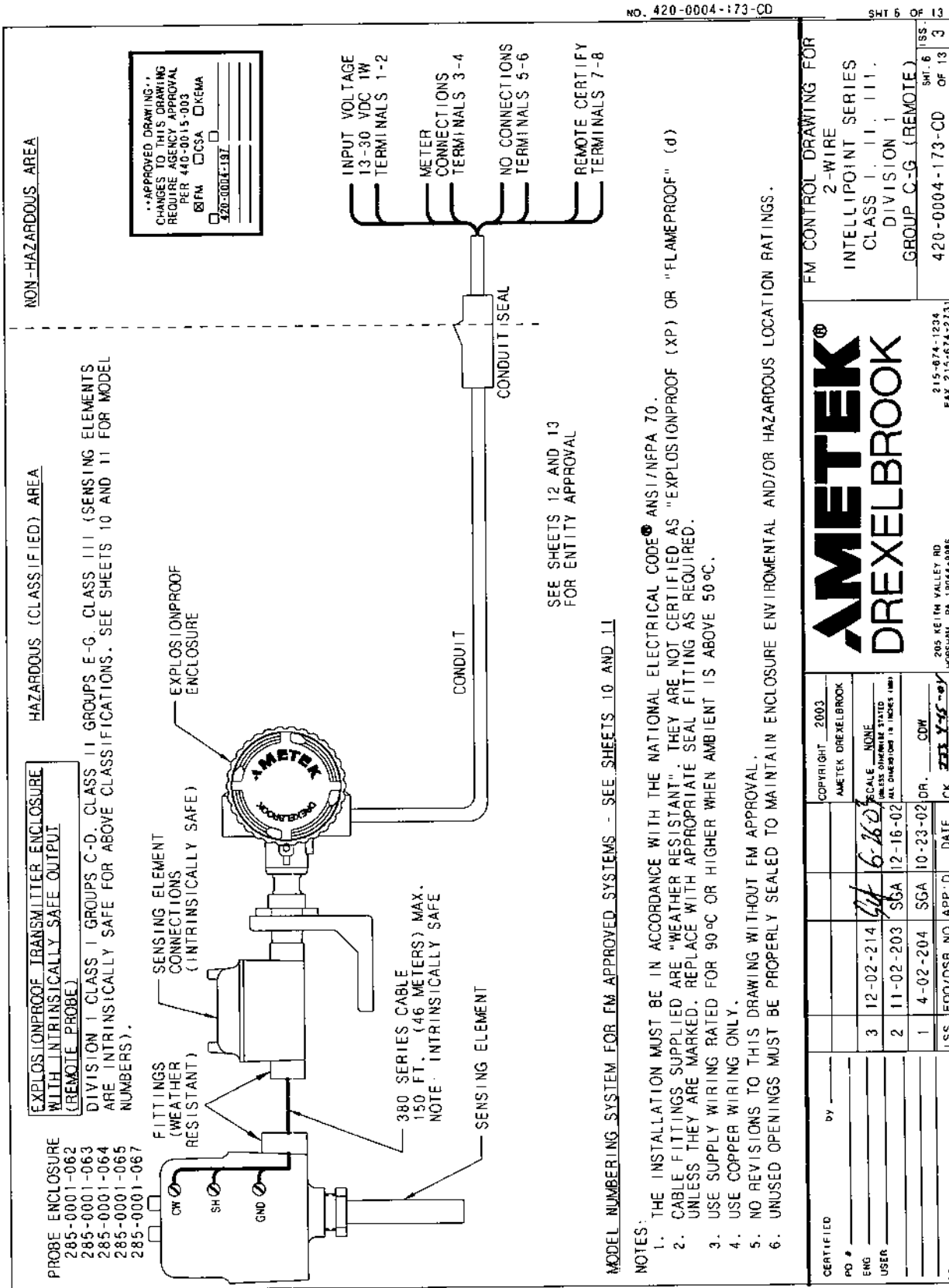
SHT 3 OF 13

AMETEK® DREXELBROOK

215-874-1234
205 KETIM VALLEY RD
MONROE, PA 19063-9988

| | | | |
|--------------|-------------------------|--|--------------------|
| CERTIFIED | by | COPYRIGHT 2003 | AMETEK DREXELBROOK |
| PO # | 3 | 12-02-214 | SGA 6-2603 |
| ENG | 2 | 11-02-203 | SGA 12-16-02 |
| USER | 1 | 4-02-204 | SGA 10-23-02 |
| ISS. EDD/DSR | NO. APP. D. | DATE | CK. <i>YLF</i> |
| SCALE NONE | UNLESS OTHERWISE STATED | ALL DIMENSIONS IN INCHES UNLESS OTHERWISE STATED | |

7.1 FM Control Drawings (Continued)



NO. 420-0004-173-CD

SHT 6 OF 13

APPROVED DRAWING... CHANGES TO THIS DRAWING REQUIRE AGENCY APPROVAL PER 440-0015-003

FM CSA KEMA

420-0004-173

INPUT VOLTAGE 13-30 VDC 1W TERMINALS 1-2

METER CONNECTIONS TERMINALS 3-4

NO CONNECTIONS TERMINALS 5-6

REMOTE CERTIFY TERMINALS 7-8

SEE SHEETS 12 AND 13 FOR ENTITY APPROVAL

MODEL NUMBERING SYSTEM FOR FM APPROVED SYSTEMS - SEE SHEETS 10 AND 11

NOTES:

1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE® ANSI/NFPA 70.
2. CABLE FITTINGS SUPPLIED ARE "WEATHER RESISTANT". THEY ARE NOT CERTIFIED AS "EXPLOSIONPROOF (XP) OR "FLAMEPROOF" (d) UNLESS THEY ARE MARKED. REPLACE WITH APPROPRIATE SEAL FITTING AS REQUIRED.
3. USE SUPPLY WIRING RATED FOR 90°C OR HIGHER WHEN AMBIENT IS ABOVE 50°C.
4. USE COPPER WIRING ONLY.
5. NO REVISIONS TO THIS DRAWING WITHOUT FM APPROVAL.
6. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.

| | | | |
|------------------------|---|-----------------------------------|---------|
| CERTIFIED BY | | COPYRIGHT 2003 AMETEK DREXELBROOK | |
| PO # | 3 | 12-02-214 | 6-16-02 |
| ENG USER | 2 | 11-02-203 | SGA |
| DATE | 1 | 4-02-204 | SGA |
| ISS. EDO7DSR NO1 APP'D | | | |
| DATE | | | |
| DR. | | | |
| CK. | | | |
| ISS. | | | |

EXPLOSIONPROOF TRANSMITTER ENCLOSURE (INTRINSICALLY SAFE)

HAZARDOUS (CLASSIFIED) AREA

NON-HAZARDOUS AREA

EXPLOSIONPROOF ENCLOSURE

AMETER

SENSING ELEMENT CONNECTIONS (INTRINSICALLY SAFE)

FITTINGS (WEATHER RESISTANT)

SENSING ELEMENT

380 SERIES CABLE 150 FT. (46 METERS) MAX. NOTE: INTRINSICALLY SAFE

CONDUIT SEAL

CONDUIT

INPUT VOLTAGE 13-30 VDC 1W TERMINALS 1-2

METER CONNECTIONS TERMINALS 3-4

NO CONNECTIONS TERMINALS 5-6

REMOTE CERTIFY TERMINALS 7-8

SEE SHEETS 12 AND 13 FOR ENTITY APPROVAL

MODEL NUMBERING SYSTEM FOR FM APPROVED SYSTEMS - SEE SHEETS 10 AND 11

NOTES:

1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE® ANSI/NFPA 70.
2. CABLE FITTINGS SUPPLIED ARE "WEATHER RESISTANT". THEY ARE NOT CERTIFIED AS "EXPLOSIONPROOF (XP) OR "FLAMEPROOF" (d) UNLESS THEY ARE MARKED. REPLACE WITH APPROPRIATE SEAL FITTING AS REQUIRED.
3. USE SUPPLY WIRING RATED FOR 90°C OR HIGHER WHEN AMBIENT IS ABOVE 50°C.
4. USE COPPER WIRING ONLY.
5. NO REVISIONS TO THIS DRAWING WITHOUT FM APPROVAL.
6. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.

FM CONTROL DRAWING FOR 2-WIRE INTELLIPOINT SERIES CLASS I, II, III, DIVISION 1 GROUP C-G (REMOTE)

420-0004-173-CD

215-874-1234 FAX 215-874-2131

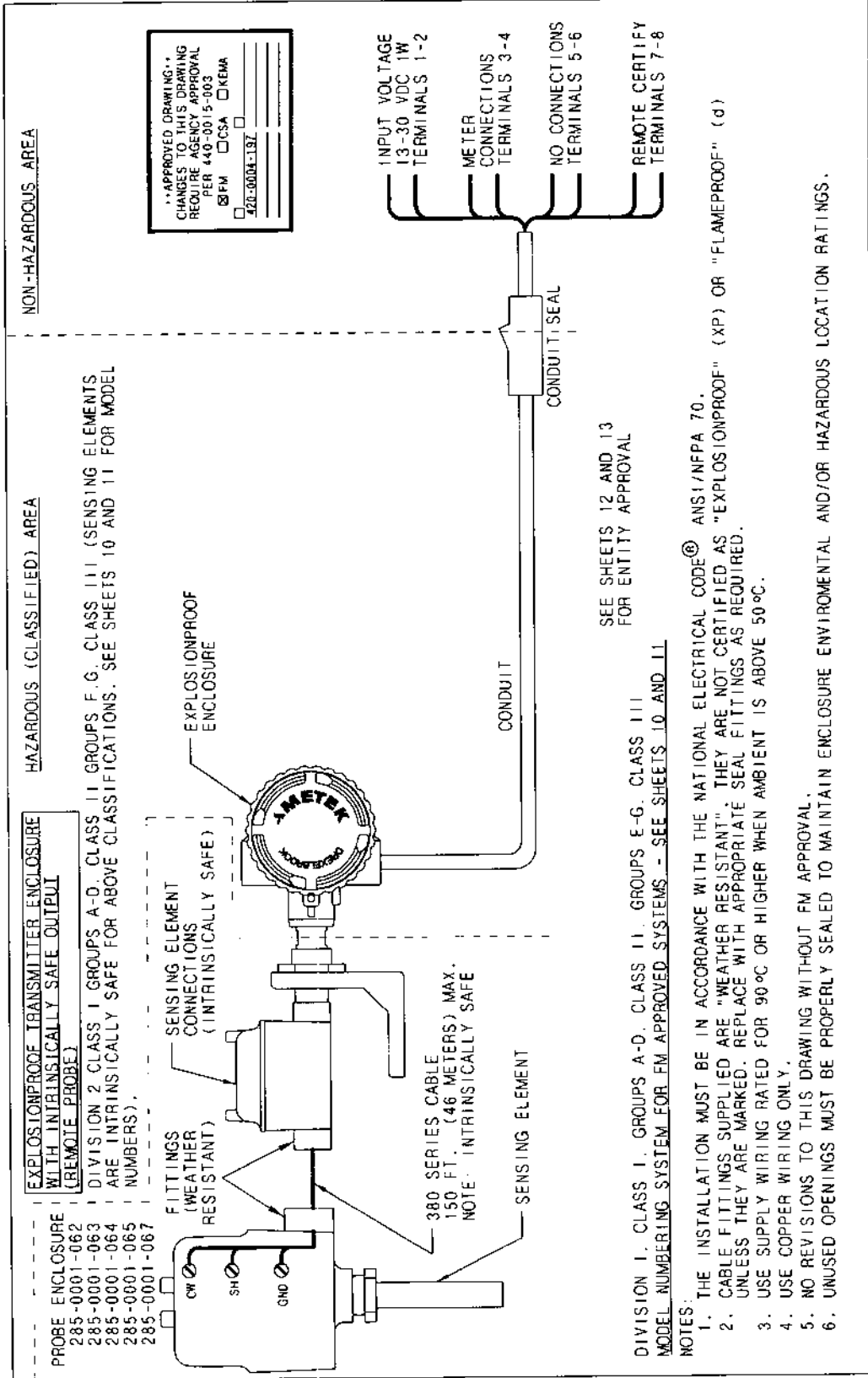
265 KEITH VALLEY RD HORSHAM, PA 19044-9985

AMETEK® DREXELBROOK

7.1 FM Control Drawings (Continued)

NO. 420-0004-173-CD

SHT 7 OF 13



APPROVED DRAWING...
CHANGES TO THIS DRAWING
REQUIRE AGENCY APPROVAL
PER 440-3015-003

FM CSA KEMA

420-0004-173

DIVISION I, CLASS I, GROUPS A-D, CLASS II, GROUPS E-G, CLASS III
MODEL NUMBERING SYSTEM FOR FM APPROVED SYSTEMS - SEE SHEETS 10 AND 11

- NOTES:
1. THE INSTALLATION MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE® ANSI/NFPA 70.
 2. CABLE FITTINGS SUPPLIED ARE "WEATHER RESISTANT". THEY ARE NOT CERTIFIED AS "EXPLOSIONPROOF" (XP) OR "FLAMEPROOF" (d) UNLESS THEY ARE MARKED. REPLACE WITH APPROPRIATE SEAL FITTINGS AS REQUIRED.
 3. USE SUPPLY WIRING RATED FOR 90°C OR HIGHER WHEN AMBIENT IS ABOVE 50°C.
 4. USE COPPER WIRING ONLY.
 5. NO REVISIONS TO THIS DRAWING WITHOUT FM APPROVAL.
 6. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.

| | | | | | | | | | | | | | |
|-----------|-----------|-----|----------|------|----------|-------|-----|-----|--|---------|--|------|--|
| CERTIFIED | | by | | DATE | | APP'D | | NO. | | EDD/OSR | | ISS. | |
| 3 | 12-02-214 | GA | 12-16-02 | SGA | 10-23-02 | DR. | CGW | | | | | | |
| 2 | 11-02-203 | SGA | 12-16-02 | SGA | 10-23-02 | DR. | CGW | | | | | | |
| 1 | 4-02-204 | SGA | 10-23-02 | SGA | 10-23-02 | DR. | CGW | | | | | | |

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AMETEK DREXELBROOK

SCALE: NONE
UNLESS OTHERWISE STATED
ALL DIMENSIONS IN INCHES (MM)

AMETEK®
DREXELBROOK

205 KEITH VALLEY RD
HORSBURG, PA 19044-5886

215-674-1234
FAX 215-674-2731

FM CONTROL DRAWING FOR
2-WIRE
INTELLIPOINT SERIES
DIVISION 2 (REMOTE)


420-0004-173-CD

SHT. 7 OF 13

7.1 FM Control Drawings (Continued)

| COLUMNS 9 AND UP DO NOT AFFECT SAFETY | | | | | | | | | | | | |
|---------------------------------------|---|---|---|---|---|---|---|---|----|----|----|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| R | a | T | 3 | 0 | 0 | b | c | * | * | * | d | a = OPTIONS N = NO-CAL (STD) M = MANUAL SET POINT ADJUSTMENT H = HI SENSITIVITY G = HI SENSITIVITY MANUAL SET POINT ADJUSTMENT |
| | a | | | | | | | | | | | N = NO-CAL (STD) M = MANUAL SET POINT ADJUSTMENT H = HI SENSITIVITY G = HI SENSITIVITY MANUAL SET POINT ADJUSTMENT |
| | | | | | | b | | | | | | b = 0, 1 OR Z SENSING ELEMENTS |
| | | | | | | c | | | | | | c = 0-4, 6 & 8, Z SENSING ELEMENTS |
| | | | | | | | | | | | | SENSING ELEMENTS |
| | | | | | 0 | 0 | | | | | | 700-1202-021 |
| | | | | | | 1 | | | | | | 700-1202-022 |
| | | | | | | 2 | | | | | | 700-1202-024 |
| | | | | | | 3 | | | | | | 700-1202-028 |
| | | | | | | 4 | | | | | | 700-1202-042 |
| | | | | | | I | 1 | | | | | 700-0201-005 |
| | | | | | | | 2 | | | | | 700-0201-005 HAST C |
| | | | | | | | 3 | | | | | 700-0201-036 |
| | | | | | | | 6 | | | | | 700-0002-360 |
| | | | | | | | 8 | | | | | 700-0001-022 |
| | | | | | Z | Z | | | | | | SEE SHEET 9 FOR A LIST OF OTHER APPROVED INTEGRAL SENSING ELEMENTS |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | d |
| | | | | | | | | | | | | c = A-F, H, K, L OR Z |
| | | | | | | | | | | | | INSERTION LENGTH/COTE SHIELD LENGTH |
| | | | | | | | | A | | | | 6" / 2" & 152.4mm / 50.8mm |
| | | | | | | | | B | | | | 12" / 2" & 304.8mm / 50.8mm |
| | | | | | | | | C | | | | 12" / 3.5" & 304.8mm / 88.9mm |
| | | | | | | | | D | | | | 18" / 2" & 457.2mm / 50.8mm |
| | | | | | | | | E | | | | 18" / 3.5" & 457.2mm / 88.9mm |
| | | | | | | | | F | | | | 18" / 10" & 457.2mm / 254mm |
| | | | | | | | | H | | | | 36" / 10" & 914.4mm / 254mm |
| | | | | | | | | K | | | | 48" / 10" & 1219.2mm / 254mm |
| | | | | | | | | L | | | | 60" / 10" & 1524mm / 254mm |
| | | | | | | | | Z | | | | OTHER |

| | | | |
|--|--|--------------------|--|
| COPYRIGHT 2003 AMETEK DREXELBROOK | | CERTIFIED by _____ | |
| SCALE NONE UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM) | | PO # _____ | |
| DR. CDW | | ENG _____ | |
| CK. JJS 4-15-07 | | USER _____ | |
| | | DE # _____ | |

| | | | | | |
|------|-------------|-------|----------|--|---|
| 3 | 12-02-214 | GA | 6-16-03 |  | FM APPROVED INTEGRAL 2-WIRE INTELLIPOINT MODEL NUMBERING SYSTEM |
| 2 | 11-02-203 | SGA | 11-13-02 | | |
| 1 | 4-02-204 | SGA | 10-23-02 | | |
| ISS. | EDO/DSR NO. | APP'D | DATE | 205 KEITH VALLEY RD HORSHAM, PA 19044-9986 215-674-1234 FAX 215-674-2731 | 420-0004-173-CD SHT. 8 OF 13 ISS. 3 |

NO. 420-0004-173-CD

SHT. 8 OF 13

7.1 FM Control Drawings (Continued)

| | | |
|--------------|--------------|--------------|
| 700-0001-001 | 700-0002-053 | 700-0018-124 |
| 700-0001-002 | 700-0002-054 | 700-0018-126 |
| 700-0001-004 | 700-0002-055 | 700-0018-134 |
| 700-0001-005 | 700-0002-056 | 700-0018-144 |
| 700-0001-007 | 700-0002-057 | 700-0018-222 |
| 700-0001-012 | 700-0002-059 | 700-0018-226 |
| 700-0001-013 | 700-0002-060 | 700-0018-234 |
| 700-0001-014 | 700-0002-061 | 700-0018-242 |
| 700-0001-016 | 700-0002-062 | 700-0018-243 |
| 700-0001-022 | 700-0002-063 | 700-0018-245 |
| 700-0001-023 | 700-0002-064 | 700-0018-246 |
| 700-0001-024 | 700-0002-321 | 700-0018-262 |
| 700-0001-026 | 700-0002-360 | 700-0021-001 |
| 700-0001-029 | 700-0003-009 | 700-0021-002 |
| 700-0001-034 | 700-0004-038 | 700-0021-003 |
| 700-0001-035 | 700-0004-045 | 700-0021-007 |
| 700-0001-038 | 700-0004-050 | 700-0021-008 |
| 700-0001-039 | 700-0005-012 | 700-0201-005 |
| 700-0001-042 | 700-0005-014 | 700-0201-008 |
| 700-0001-044 | 700-0005-018 | 700-0201-009 |
| 700-0001-045 | 700-0005-028 | 700-0201-010 |
| 700-0001-051 | 700-0005-035 | 700-0201-015 |
| 700-0001-052 | 700-0005-038 | 700-0201-016 |
| 700-0001-053 | 700-0005-045 | 700-0201-018 |
| 700-0001-054 | 700-0005-048 | 700-0201-025 |
| 700-0001-061 | 700-0005-054 | 700-0201-026 |
| 700-0001-062 | 700-0005-114 | 700-0201-035 |
| 700-0001-063 | 700-0005-148 | 700-0201-036 |
| 700-0001-064 | 700-0005-214 | 700-0201-105 |
| 700-0001-324 | 700-0005-314 | 700-0201-108 |
| 700-0001-344 | 700-0005-348 | 700-0201-109 |
| 700-0002-012 | 700-0005-354 | 700-0201-118 |
| 700-0002-018 | 700-0008-122 | 700-0201-135 |
| 700-0002-021 | 700-0008-123 | 700-0202-002 |
| 700-0002-022 | 700-0008-124 | 700-0202-004 |
| 700-0002-023 | 700-0008-126 | 700-0202-019 |
| 700-0002-024 | 700-0008-134 | 700-0202-023 |
| 700-0002-025 | 700-0008-144 | 700-0202-024 |
| 700-0002-027 | 700-0008-222 | 700-0202-033 |
| 700-0002-028 | 700-0008-226 | 700-0202-036 |
| 700-0002-029 | 700-0008-234 | 700-0202-043 |
| 700-0002-033 | 700-0008-242 | 700-0202-102 |
| 700-0002-035 | 700-0008-243 | 700-0204-038 |
| 700-0002-036 | 700-0008-245 | 700-0204-045 |
| 700-0002-037 | 700-0008-246 | 700-0204-048 |
| 700-0002-039 | 700-0008-262 | 700-0221-002 |
| 700-0002-041 | 700-0009-002 | 700-1202-001 |
| 700-0002-042 | 700-0009-024 | 700-1202-018 |
| 700-0002-043 | 700-0011-001 | 700-1202-021 |
| 700-0002-044 | 700-0011-003 | 700-1202-022 |
| 700-0002-047 | 700-0011-004 | 700-1202-024 |
| 700-0002-051 | 700-0011-015 | 700-1202-028 |
| 700-0002-052 | 700-0018-122 | 700-1202-041 |
| | 700-0018-123 | 700-1202-042 |

| | |
|--|--------------------|
| COPYRIGHT 2003 | CERTIFIED by _____ |
| AMETEK DREXELBROOK | PO # _____ |
| SCALE NONE | ENG _____ |
| UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM) | USER _____ |
| DR. CDW | _____ |
| CK. <i>ms 4/11/07</i> | DE # _____ |

| | | | |
|------|-------------|------------|----------------|
| 3 | 12-02-214 | <i>SGA</i> | <i>6-16-03</i> |
| 2 | 11-02-203 | SGA | 11-13-02 |
| 1 | 4-02-204 | SGA | 10-23-02 |
| ISS. | EDO/DSR NO. | APP'D | DATE |



205 KEITH VALLEY RD
MORSHAM, PA 19044-9986
215-674-1234
FAX 215-674-2731


FM APPROVED
ADDITIONAL INTEGRAL
SENSING ELEMENTS

420-0004-173-CD
SHT. 9 OF 13
ISS. OF 13 3

NO. 420-0004-173-CD

SHT. 9 OF 13

7.1 FM Control Drawings (Continued)

| COLUMNS 9 AND UP DO NOT AFFECT SAFETY | | | | | | | | | | | | | |
|---------------------------------------|-------------|-------|----------|--|---|---|---|---|----|--|----|--|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | |
| R | a | T | 3 | b | 0 | c | d | . | . | . | e | a = OPTIONS N = NO-CAL (STD) M = MANUAL SET POINT ADJUSTMENT H = HI SENSITIVITY G = HI SENSITIVITY MANUAL SET POINT ADJUSTMENT | |
| | a | | | | | | | | | | | b = 1-6 CABLE LENGTHS | |
| | | | | b | | | | | | | | c = 0-3, 5, 6, OR Z SENSING ELEMENTS | |
| | | | | | c | | | | | | | d = 0-6, & 8, OR Z SENSING ELEMENTS | |
| | | | | | | d | | | | | | SENSING ELEMENTS | |
| | | | | | | 0 | 0 | | | | | 700-1202-001 | |
| | | | | | | | 1 | | | | | 700-1202-012 | |
| | | | | | | | 2 | | | | | 700-1202-014 | |
| | | | | | | | 3 | | | | | 700-1202-018 | |
| | | | | | | | 4 | | | | | 700-1202-041 | |
| | | | | | | 1 | 0 | | | | | 700-0001-018 | |
| | | | | | | | 1 | | | | | 700-0201-005 | |
| | | | | | | | 2 | | | | | 700-0201-005 HAST C | |
| | | | | | | | 3 | | | | | 700-0201-036 | |
| | | | | | | | 4 | | | | | 700-0202-002 | |
| | | | | | | | 5 | | | | | 700-0202-043 | |
| | | | | | | | 6 | | | | | 700-0002-360 | |
| | | | | | | | 8 | | | | | 700-0001-022 | |
| | | | | | | 2 | 0 | | | | | 700-0209-002 | |
| | | | | | | 3 | 1 | | | | | 700-0029-001 | |
| | | | | | | | 2 | | | | | 700-0029-002 | |
| | | | | | | | 3 | | | | | 700-0029-003 | |
| | | | | | | | 5 | | | | | 700-0029-005 | |
| | | | | | | 5 | 0 | | | | | 700-0207-001 | |
| | | | | | | | 1 | | | | | 700-0207-002 | |
| | | | | | | | 2 | | | | | 700-0207-003 | |
| | | | | | | | 3 | | | | | 700-0207-004 | |
| | | | | | | | 4 | | | | | 700-0207-005 | |
| | | | | | | | 5 | | | | | 700-0207-006 | |
| | | | | | | 6 | 0 | | | | | 700-0204-038 | |
| | | | | | | Z | Z | | | | | SEE SHEET 11 FOR ADDITIONAL APPROVED REMOTE SENSING ELEMENTS | |
| | | | | | | | | e | | | | d = A-F, H, K, L OR Z | |
| | | | | | | | | | | | | INSERTION LENGTH/COTE SHIELD LENGTH | |
| | | | | | | | | A | | | | 6" / 2" & 152.4mm / 50.8mm | |
| | | | | | | | | B | | | | 12" / 2" & 304.8mm / 50.8mm | |
| | | | | | | | | C | | | | 12" / 3.5" & 304.8mm / 88.9mm | |
| | | | | | | | | D | | | | 18" / 2" & 457.2mm / 50.8mm | |
| | | | | | | | | E | | | | 18" / 3.5" & 457.2mm / 88.9mm | |
| | | | | | | | | F | | | | 18" / 10" & 457.2mm / 254mm | |
| | | | | | | | | H | | | | 36" / 10" & 914.4mm / 254mm | |
| | | | | | | | | K | | | | 48" / 10" & 1219.2mm / 254mm | |
| | | | | | | | | L | | | | 60" / 10" & 1524mm / 254mm | |
| | | | | | | | | Z | | | | OTHER | |
| | | | | | | | | | | COPYRIGHT 2003 AMETEK DREXELBROOK SCALE NONE UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM) DR. CDW CK. JJD Y-45-ey | | | |
| | | | | | | | | | | CERTIFIED by _____ PO # _____ ENG _____ USER _____ DE # _____ | | | |
| 3 | 12-02-214 | GA | 6-23-02 |  | | | | | | | | FM APPROVED REMOTE 2-WIRE INTELLIPOINT MODEL NUMBERING SYSTEM | |
| 2 | 11-02-203 | SGA | 11-13-02 | | | | | | | | | 420-0004-173-CD | |
| 1 | 4-02-204 | SGA | 10-23-02 | | | | | | | | | SHI 10 OF 13 OF 13 3 | |
| ISS. | EDD/DSR NO. | APP'D | DATE | | | | | | | | | 205 KEITH VALLEY RD MORSHAM, PA 19044-8886 215-874-1234 FAX 215-874-2733 | |

NO. 420-0004-173-CD

SHI 10 OF 13

7.1 FM Control Drawings (Continued)

MODEL NUMBERS OF APPROVED REMOTE SENSING ELEMENTS

701-mnop-qrst LEVEL PROBE

- l = FAMILY NO. 0, 4
- m = FAMILY NO. 0 THROUGH 9, BLANK
- n = FAMILY NO. 0 THROUGH 9, BLANK
- o = 0 THROUGH 9, BLANK
- p = 0 THROUGH 9
- q = FAMILY NO. 0 THROUGH 9, BLANK
- r = FAMILY NO. 0 THROUGH 9, BLANK
- s = FAMILY NO. 0 THROUGH 9
- t = 14 CHARACTER EXPANDED NUMBERING SYSTEM, DOES NOT AFFECT SAFETY

COPYRIGHT 2003
 AMETEK DREXELBROOK
 SCALE NONE
UNLESS OTHERWISE STATED
 ALL DIMENSIONS IN INCHES (MM)
 DR. CDW
 CK. *TTS Y-JS-0Y*

CERTIFIED by _____
 PO # _____
 ENG _____
 USER _____
 DE # _____

NO. 420-0004-173-CD

| | | | |
|------|-------------|-----------|---------------|
| 3 | 12-02-214 | <i>SA</i> | <i>6-2602</i> |
| 2 | 11-02-203 | SGA | 11-13-02 |
| 1 | 4-02-204 | SGA | 10-23-02 |
| ISS. | EDD/DSR NO. | APP'D | DATE |

AMETEK[®]
DREXELBROOK

205 KEITH VALLEY RD
 HORSHAM, PA 19044-8985

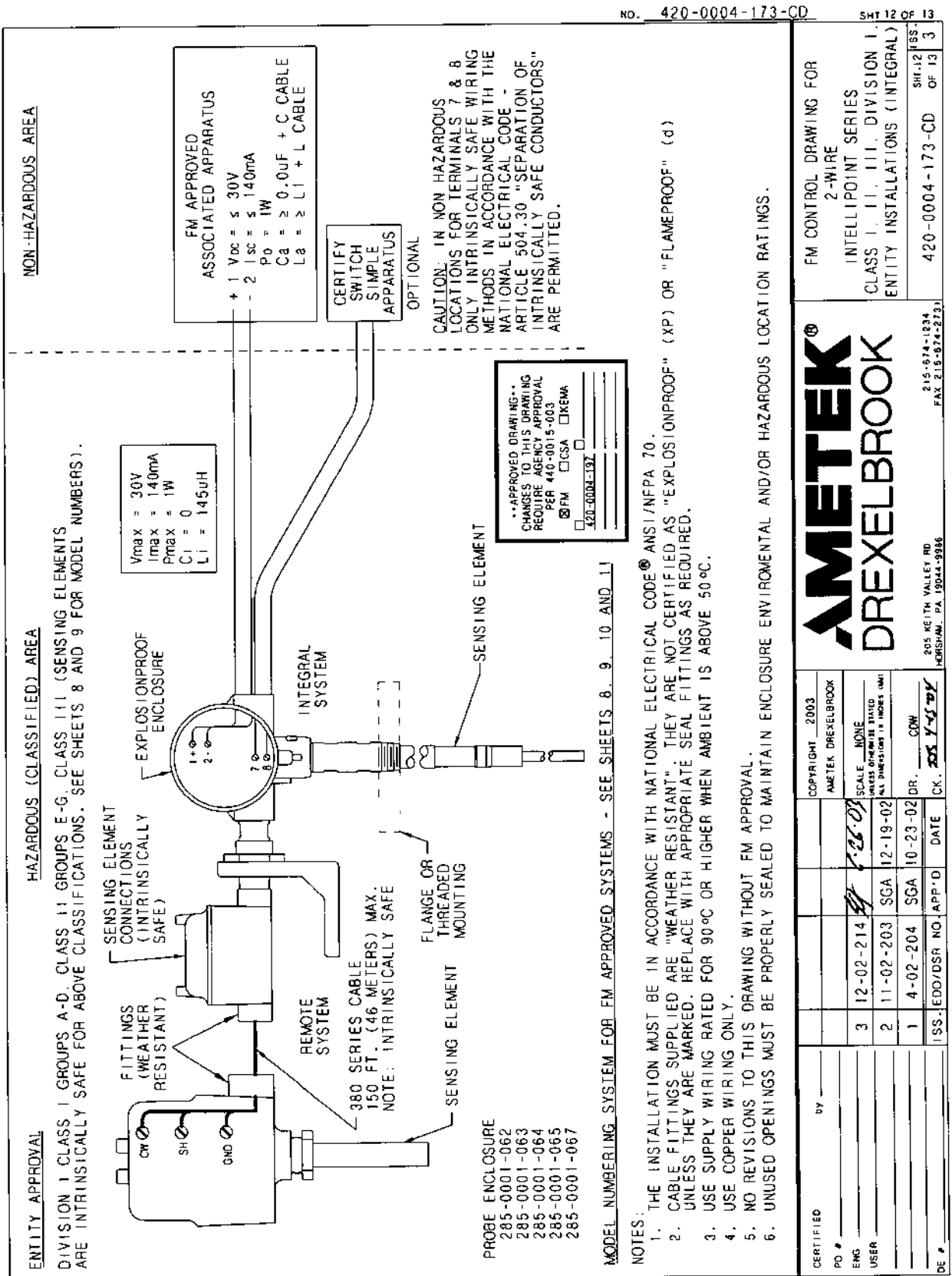
215-674-1234
 FAX 215-674-2731

FM APPROVED
 ADDITIONAL REMOTE
 SENSING ELEMENTS

420-0004-173-CD SHT. 11 OF 13 ISS. 3

SHT 11 OF 13

7.1 FM Control Drawings (Continued)



NON-HAZARDOUS AREA

HAZARDOUS (CLASSIFIED) AREA

DIVISION 1 CLASS 1 GROUPS A-D, CLASS 11 GROUPS E-G, CLASS 111 (SENSING ELEMENTS ARE INTRINSICALLY SAFE FOR ABOVE CLASSIFICATIONS. SEE SHEETS 8 AND 9 FOR MODEL NUMBERS).

FM APPROVED ASSOCIATED APPARATUS
 + 1 Vdc = ≤ 30V
 - 2 Isc = ≤ 140mA
 Po = 1W
 Ca = ≥ 0.0uF + C CABLE
 La = ≥ LI + L CABLE

CERTIFY SWITCH SIMPLE APPARATUS OPTIONAL

CAUTION: IN NON HAZARDOUS LOCATIONS FOR TERMINALS 7 & 8 ONLY INTRINSICALLY SAFE WIRING METHODS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE - ARTICLE 504.30 "SEPARATION OF INTRINSICALLY SAFE CONDUCTORS" ARE PERMITTED.

Vmax = 30V
 Imax = 140mA
 Pmax = 1W
 Ci = 0
 Li = 145uH

APPROVED DRAWING
 CHANGES TO THIS DRAWING REQUIRE AGENCY APPROVAL PER 440-0015-003
 FM GSA KSWA
 420-0004-173

MODEL NUMBERING SYSTEM FOR FM APPROVED SYSTEMS - SEE SHEETS 8, 9, 10 AND 11

- NOTES:
1. THE INSTALLATION MUST BE IN ACCORDANCE WITH NATIONAL ELECTRICAL CODE ANSI/NFPA 70.
 2. CABLE FITTINGS SUPPLIED ARE "WEATHER RESISTANT". THEY ARE NOT CERTIFIED AS "EXPLOSIONPROOF" (XP) OR "FLAMEPROOF" (F).
 3. USE SUPPLY WIRING RATED FOR 90°C OR HIGHER WHEN AMBIENT IS ABOVE 50°C.
 4. USE COPPER WIRING ONLY.
 5. NO REVISIONS TO THIS DRAWING WITHOUT FM APPROVAL.
 6. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.

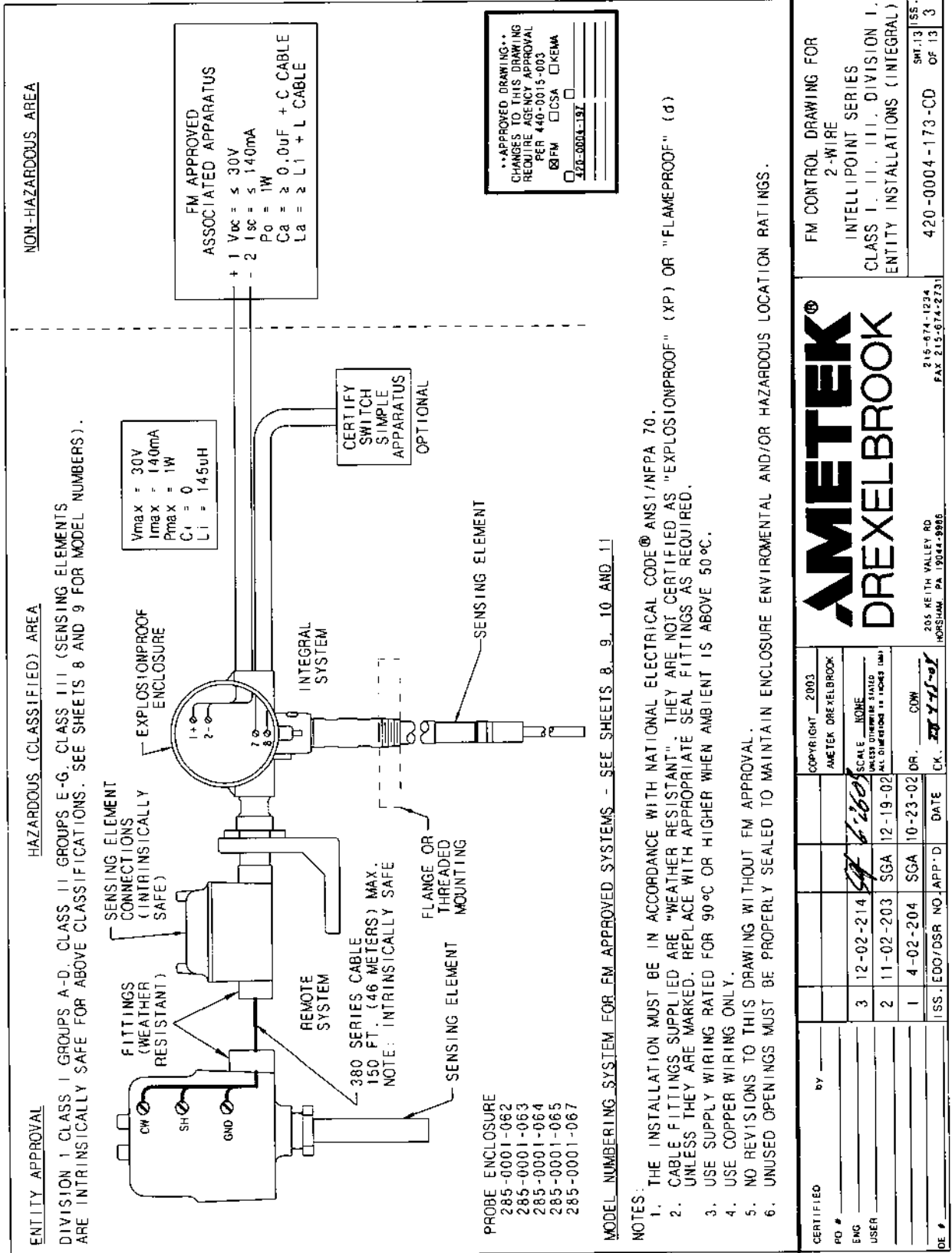
| | | | |
|---|-------------|--|--------------------|
| CERTIFIED BY | | COPYRIGHT 2003 AMETEK DREXELBROOK | |
| PO # | 3 12-02-214 | SCALE | NONE |
| ENG | 2 11-02-203 | REVISED DATE | 12-19-02 |
| USER | 1 4-02-204 | ALL DIMENSIONS IN INCHES UNLESS OTHERWISE STATED | SGA 10-23-02 |
| ISS. EDD/DSR | NOI APP'D | DATE | CK. <i>DS Y-17</i> |
| FM CONTROL DRAWING FOR 2-WIRE INTELLIPOINT SERIES CLASS 111, III, DIVISION 1, ENTITY INSTALLATIONS (INTEGRAL) | | 420-0004-173-CD | |
| SHT 12 OF 13 | | SHT 12 OF 13 | |

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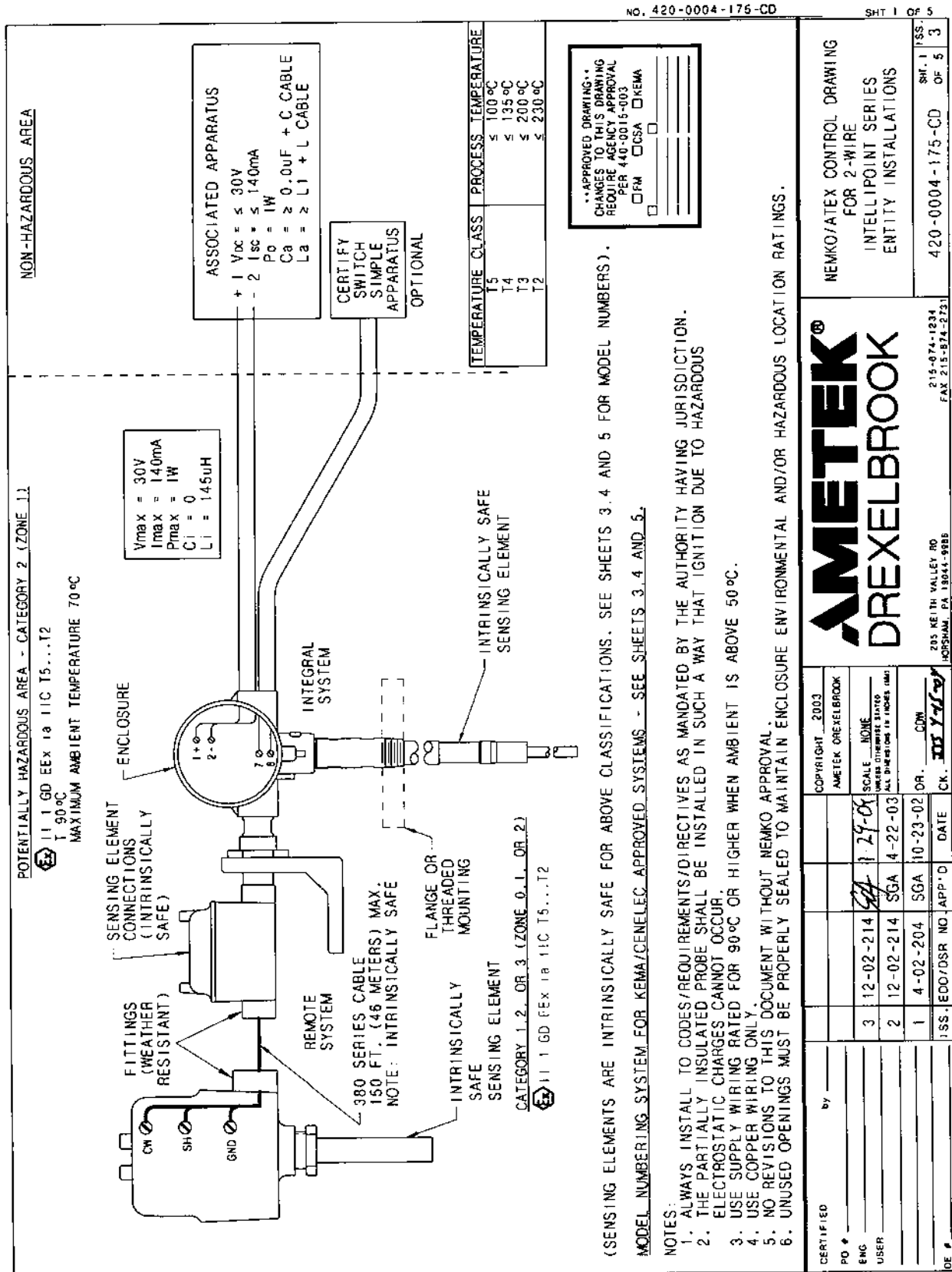
215-674-1234
 205 KEITH VALLEY RD.
 HORSHAM, PA 19044-9986
 FAX 215-674-2233

7.1 FM Control Drawings (Continued)

NO. 420-0004-173-CD SHEET 13 OF 13



7.2 KEMA / CENELEC Control Drawings



N. 420-0004-175-CD

SHT 1 OF 3

APPROVED DRAWING
CHANGES TO THIS DRAWING
REQUIRE AGENCY APPROVAL
PER 440-0015-003

FM CSA KEMA

(SENSING ELEMENTS ARE INTRINSICALLY SAFE FOR ABOVE CLASSIFICATIONS. SEE SHEETS 3, 4 AND 5 FOR MODEL NUMBERS).
MODEL NUMBERING SYSTEM FOR KEMA/CENELEC APPROVED SYSTEMS - SEE SHEETS 3, 4 AND 5.

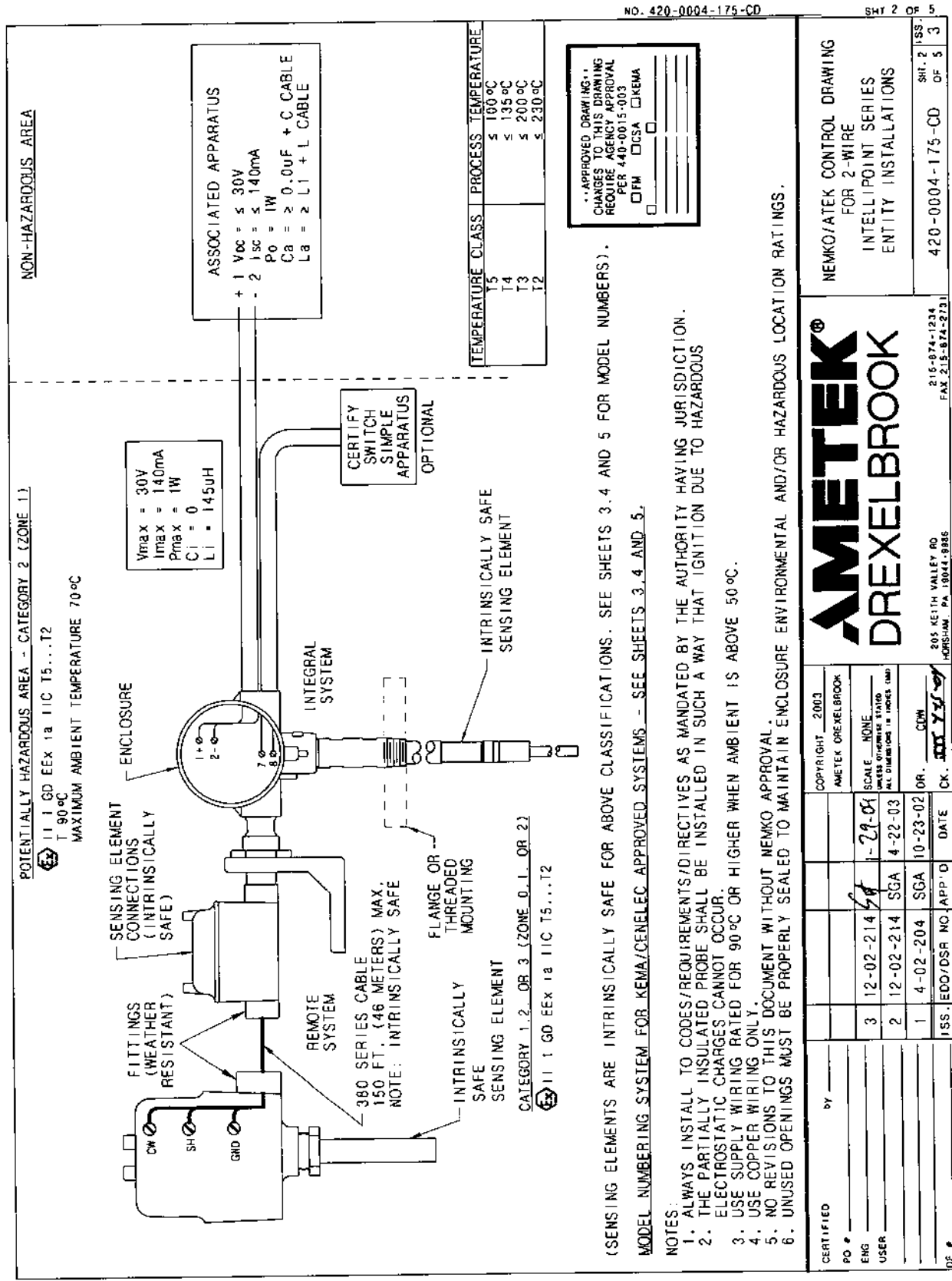
- NOTES:
1. ALWAYS INSTALL TO CODES/REQUIREMENTS/DIRECTIVES AS MANDATED BY THE AUTHORITY HAVING JURISDICTION.
 2. THE PARTIALLY INSULATED PROBE SHALL BE INSTALLED IN SUCH A WAY THAT IGNITION DUE TO HAZARDOUS ELECTROSTATIC CHARGES CANNOT OCCUR.
 3. USE SUPPLY WIRING RATED FOR 90°C OR HIGHER WHEN AMBIENT IS ABOVE 50°C.
 4. USE COPPER WIRING ONLY.
 5. NO REVISIONS TO THIS DOCUMENT WITHOUT NEMKO APPROVAL.
 6. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.

| | | | | | |
|-----------|------------------|--------------------|----------------|----------------------------|--|
| CERTIFIED | | COPYRIGHT - 2003 | | NEMKO/ATEX CONTROL DRAWING | |
| PO # | by | AMETEK DREXELBROOK | SCALE | FOR 2-WIRE | |
| ENG | 3 12-02-214 | SCALE NONE | 1 29-01 | INTELLIPOINT SERIES | |
| USER | 2 12-02-214 | SCALE NONE | 2 SGA 4-22-03 | ENTITY INSTALLATIONS | |
| DATE | 1 4-02-204 | SCALE NONE | 1 SGA 10-23-02 | 420-0004-175-CD | |
| APP'D | ISS. EDO/DSR NO. | SCALE NONE | OR. CDW | SHT. 1 OF 3 | |
| DATE | 10-23-02 | SCALE NONE | CK. MS YL | OF 5 3 | |

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7.2 KEMA / CENELEC Control Drawings (Continued)



POTENTIALLY HAZARDOUS AREA - CATEGORY 2 (ZONE 1)

II 1 GD EEx ia IIC T5...T2
T 90°C
MAXIMUM AMBIENT TEMPERATURE 70°C

NON-HAZARDOUS AREA

NO. 420-0004-175-CD

SHT 2 OF 5

(SENSING ELEMENTS ARE INTRINSICALLY SAFE FOR ABOVE CLASSIFICATIONS. SEE SHEETS 3, 4 AND 5 FOR MODEL NUMBERS).

MODEL NUMBERING SYSTEM FOR KEMA/CENELEC APPROVED SYSTEMS - SEE SHEETS 3, 4 AND 5.

- NOTES:
1. ALWAYS INSTALL TO CODES/REQUIREMENTS/DIRECTIVES AS MANDATED BY THE AUTHORITY HAVING JURISDICTION.
 2. THE PARTIALLY INSULATED PROBE SHALL BE INSTALLED IN SUCH A WAY THAT IGNITION DUE TO HAZARDOUS ELECTROSTATIC CHARGES CANNOT OCCUR.
 3. USE SUPPLY WIRING RATED FOR 90°C OR HIGHER WHEN AMBIENT IS ABOVE 50°C.
 4. USE COPPER WIRING ONLY.
 5. NO REVISIONS TO THIS DOCUMENT WITHOUT NEMKO APPROVAL.
 6. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.

| | | | |
|-----------|-------------|----------------|--------------------|
| CERTIFIED | by | COPYRIGHT 2003 | NEMTEK DREXELBROOK |
| PO # | | SCALE | NONE |
| ENG | 3 12-02-214 | DATE | 1-29-01 |
| USER | 2 12-02-214 | SCALE | 4-22-03 |
| | 1 4-02-204 | DATE | 10-23-02 |
| ISS. | EDD/DSR NO. | APP'D | DATE |
| DE # | | | |


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NEMKO/ATEK CONTROL DRAWING
FOR 2-WIRE
INTELLIPOINT SERIES
ENTITY INSTALLATIONS

420-0004-175-CD
SHT. 2 OF 5
OF 5 3

7.2 KEMA / CENELEC Control Drawings (Continued)

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | | |
|------|-------------|-------|----------|---|---|---|---|---|----|----|---|--|--|-----------------|-------------|
| R | a | T | b | 0 | 1 | 0 | c | . | . | . | d | | | | |
| a | | | | | | | | | | | | | | | |
| | | | | | | | | | | | a = CALIBRATION | | | | |
| | | | | | | | | | | | N = NO CALIBRATION POINT LEVEL, M = MANUAL SET POINT. | | | | |
| | | | | | | | | | | | H = HI SENSITIVITY, G = MANUAL SET POINT HI SENSITIVITY | | | | |
| | | | b | | | | | | | | b = 2 | | | | |
| | | | 2 | | | | | | | | M20 KEMA/CENELEC SYSTEMS | | | | |
| | | | | | | | c | | | | c = 0-4 | | | | |
| | | | | | | | | | | | SENSING ELEMENTS | | | | |
| | | | | 0 | 0 | | | | | | 700-1202-001 | | | | |
| | | | | | 1 | | | | | | 700-1202-012 | | | | |
| | | | | | 2 | | | | | | 700-1202-014 | | | | |
| | | | | | 3 | | | | | | 700-1202-018 | | | | |
| | | | | | 4 | | | | | | 700-1202-041 | | | | |
| | | | | 1 | 0 | | | | | | 700-0001-018 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 1 | | | | | | 700-0201-005 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 2 | | | | | | 700-0201-005 HAST C INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 3 | | | | | | 700-0201-036 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 4 | | | | | | 700-0202-002 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 5 | | | | | | 700-0202-043 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 6 | | | | | | 700-0002-360 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 8 | | | | | | 700-0001-022 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | 2 | 0 | | | | | | 700-0209-002 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | 3 | 1 | | | | | | 700-0029-001 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 2 | | | | | | 700-0029-002 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 3 | | | | | | 700-0029-003 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 5 | | | | | | 700-0029-005 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | 5 | 0 | | | | | | 700-0207-001 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 1 | | | | | | 700-0207-002 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 2 | | | | | | 700-0207-003 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 3 | | | | | | 700-0207-004 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 4 | | | | | | 700-0207-005 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 5 | | | | | | 700-0207-006 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | 6 | 0 | | | | | | 700-0204-038 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | 6 | 1 | | | | | | 700-0204-002 | | | | |
| | | | | 6 | 2 | | | | | | 700-0204-048 | | | | |
| | | | | Z | Z | | | | | | SEE SHEET 5 FOR ADDITIONAL APPROVED INTRINSICALLY SAFE SENSING ELEMENTS | | | | |
| | | | | | | | | | | | SEE MOUNTING CHART | | | | |
| | | | | | | | | | | | d | | | | |
| | | | | | | | | | | | d = A-F, H, K, L OR Z | | | | |
| | | | | | | | | | | | INSERTION LENGTH/COTE SHIELD LENGTH | | | | |
| | | | | | | | | | | | A 6" / 2" & 152.4mm / 50.8mm | | | | |
| | | | | | | | | | | | B 12" / 2" & 304.8mm / 50.8mm | | | | |
| | | | | | | | | | | | C 12" / 3.5" & 304.8mm / 88.9mm | | | | |
| | | | | | | | | | | | D 18" / 2" & 457.2mm / 50.8mm | | | | |
| | | | | | | | | | | | E 18" / 3.5" & 457.2mm / 88.9mm | | | | |
| | | | | | | | | | | | F 18" / 10" & 457.2mm / 254mm | | | | |
| | | | | | | | | | | | H 36" / 10" & 914.4mm / 254mm | | | | |
| | | | | | | | | | | | K 48" / 10" & 1219.2mm / 254mm | | | | |
| | | | | | | | | | | | L 60" / 10" & 1524mm / 254mm | | | | |
| | | | | | | | | | | | Z OTHER | | | | |
| | | | | | | | | | | | CERTIFIED | | | | |
| | | | | | | | | | | | PO # _____ | | | | |
| | | | | | | | | | | | ENG _____ | | | | |
| | | | | | | | | | | | USER _____ | | | | |
| | | | | | | | | | | | DATE _____ | | | | |
| | | | | | | | | | | | DR. CDW | | | | |
| | | | | | | | | | | | JET Y&B | | | | |
| | | | | | | | | | | | COPYRIGHT 2003 | | | | |
| | | | | | | | | | | | AMETEK DREXELBROOK | | | | |
| | | | | | | | | | | | SCALE NONE | | | | |
| | | | | | | | | | | | UNLESS OTHERWISE STATED | | | | |
| | | | | | | | | | | | ALL DIMENSIONS IN INCHES (mm) | | | | |
| | | | | | | | | | | | NO. 420-0004-175-CD | | | | |
| 3 | 12-02-214 | SGA | 1-29-04 | | | | | | | | |  | KEMA/CENELEC APPROVED 2-WIRE INTELLIPOINT MODEL NUMBERING SYSTEM (INTEGRAL) | | |
| 2 | 12-02-214 | SGA | 4-22-03 | | | | | | | | | | | | |
| 1 | 4-02-204 | SGA | 10-23-02 | | | | | | | | | | | | |
| ISS. | EDO/DSR NO. | APP'D | DATE | | | | | | | | | 205 KEITH VALLEY RD HORSHAM, PA 19044-9886 | 215-674-1234 FAX 215-674-2731 | 420-0004-175-CD | SHT. 3 OF 5 |

7.2 KEMA / CENELEC Control Drawings (Continued)

| COLUMNS 9 AND UP DO NOT AFFECT SAFETY | | | | | | | | | | | | | | | |
|---------------------------------------|-------------|------------|----------------|---|---|---|---|--|----|--|---|--|--|--|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | | |
| P | a | T | 2 | b | l | c | d | * | * | * | e | | | | |
| a | | | | | | | | | | | | | | | |
| | | | | | | | | | | | a = CALIBRATION N = NO CALIBRATION POINT LEVEL, M = MANUAL SET POINT | | | | |
| | | | | | | | | | | | H = HI SENSITIVITY, G = MANUAL SET POINT HI SENSITIVITY | | | | |
| | | | | b | | | | | | | b = 1-9, A-E CABLE OPTIONS (REMOTE) | | | | |
| | | | | | c | | | | | | c = 0-3, 5, 6, OR Z SENSING ELEMENTS | | | | |
| | | | | | | d | | | | | d = 0-6, & 8, OR Z SENSING ELEMENTS | | | | |
| | | | | | | | | | | | SENSING ELEMENTS | | | | |
| | | | | | 0 | 0 | | | | | 700-1202-001 | | | | |
| | | | | | | 1 | | | | | 700-1202-012 | | | | |
| | | | | | | 2 | | | | | 700-1202-014 | | | | |
| | | | | | | 3 | | | | | 700-1202-018 | | | | |
| | | | | | | 4 | | | | | 700-1202-041 | | | | |
| | | | | | 1 | 0 | | | | | 700-0001-018 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 1 | | | | | 700-0201-005 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 2 | | | | | 700-0201-005 HAST C INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 3 | | | | | 700-0201-036 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 4 | | | | | 700-0202-002 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 5 | | | | | 700-0202-043 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 6 | | | | | 700-0002-360 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 8 | | | | | 700-0001-022 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 2 | 0 | | | | | 700-0209-002 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 3 | 1 | | | | | 700-0029-001 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 2 | | | | | 700-0029-002 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 3 | | | | | 700-0029-003 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 5 | | | | | 700-0029-005 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 5 | 0 | | | | | 700-0207-001 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 1 | | | | | 700-0207-002 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 2 | | | | | 700-0207-003 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 3 | | | | | 700-0207-004 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 4 | | | | | 700-0207-005 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | | 5 | | | | | 700-0207-006 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 6 | 0 | | | | | 700-0204-038 INTRINSICALLY SAFE SENSING ELEMENT | | | | |
| | | | | | 6 | 1 | | | | | 700-0204-002 | | | | |
| | | | | | 6 | 2 | | | | | 700-0204-048 | | | | |
| | | | | | Z | Z | | | | | SEE SHEET 5 FOR ADDITIONAL APPROVED INTRINSICALLY SAFE SENSING ELEMENTS | | | | |
| | | | | | | | | e | | | e = A-F, H, K, L OR Z | | | | |
| | | | | | | | | | | | INSERTION LENGTH/COTE SHIELD LENGTH | | | | |
| | | | | | | | | A | | | 6" / 2" & 152.4mm / 50.8mm | | | | |
| | | | | | | | | B | | | 12" / 2" & 304.8mm / 50.8mm | | | | |
| | | | | | | | | C | | | 12" / 3.5" & 304.8mm / 88.9mm | | | | |
| | | | | | | | | D | | | 18" / 2" & 457.2mm / 50.8mm | | | | |
| | | | | | | | | E | | | 18" / 3.5" & 457.2mm / 88.9mm | | | | |
| | | | | | | | | F | | | 18" / 10" & 457.2mm / 254mm | | | | |
| | | | | | | | | H | | | 36" / 10" & 914.4mm / 254mm | | | | |
| | | | | | | | | K | | | 48" / 10" & 1219.2mm / 254mm | | | | |
| | | | | | | | | L | | | 60" / 10" & 1524mm / 254mm | | | | |
| | | | | | | | | Z | | | OTHER | | | | |
| | | | | | | | | COPYRIGHT 2003 AMETEK DREXELBROOK | | SCALE NONE UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM) | | | | | |
| | | | | | | | | DR. COW | | NO. 420-0004-175-CD | | | | | |
| | | | | | | | | CK. <i>WJ Y-J-WY</i> | | | | | | | |
| | | | | | | | | CERTIFIED by _____ | | | | | | | |
| | | | | | | | | PO # _____ | | | | | | | |
| | | | | | | | | ENG _____ | | | | | | | |
| | | | | | | | | USER _____ | | | | | | | |
| | | | | | | | | DE # _____ | | | | | | | |
| 3 | 12-02-214 | <i>SGA</i> | <i>1-29-06</i> | | | | |  | | | | KEMA APPROVED 2-WIRE INTELLIPOINT MODEL NUMBERING SYSTEM (REMOTE) | | | |
| 2 | 12-02-214 | SGA | 4-16-03 | | | | | | | | | | | | |
| 1 | 4-02-204 | SGA | 10-23-02 | | | | | | | | | | | | |
| ISS. | EDO/DSR NO. | APP'D | DATE | 205 KEITH VALLEY RD HORSHAM, PA 19044-9986 | | | | 215-674-1234 FAX 215-674-2731 | | | | 420-0004-175-CD SHT. 4 OF 5 ISS. 3 | | | |

7.2 KEMA / CENELEC Control Drawings (Continued)

MODEL NUMBERS OF APPROVED INTRINSICALLY SAFE SENSING ELEMENTS

700-mnop-qrs-t LEVEL PROBE

- m = FAMILY NO. 0 THROUGH 9, BLANK
- n = FAMILY NO. 0 THROUGH 9, BLANK
- o = 0 THROUGH 9, BLANK
- p = 0 THROUGH 9
- q = FAMILY NO. 0 THROUGH 9, BLANK
- r = FAMILY NO. 0 THROUGH 9, BLANK
- s = FAMILY NO. 0 THROUGH 9
- t = 14 CHARACTER EXPANDED NUMBERING SYSTEM, DOES NOT AFFECT SAFETY

| |
|-------------------------------|
| COPYRIGHT 2003 |
| AMETEK DREXELBROOK |
| SCALE NONE |
| UNLESS OTHERWISE STATED |
| ALL DIMENSIONS IN INCHES (MM) |
| DR. CDW |
| CK. JTB 7-18-04 |

| | |
|-----------|----------|
| CERTIFIED | by _____ |
| PO # | _____ |
| ENG | _____ |
| USER | _____ |
| DE # | _____ |

| | | | |
|------|-------------|-------|----------|
| 3 | 12-02-214 | GA | 1-29-04 |
| 2 | 12-02-214 | SGA | 4-22-03 |
| 1 | 4-02-204 | SGA | 10-23-02 |
| ISS. | EDO/DSR NO. | APP'D | DATE |

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HORSHAM, PA 19044-9986

215-674-1234
FAX 215-674-2731

KEMA APPROVED
ADDITIONAL INTRINSICALLY
SAFE SENSING ELEMENTS
(REMOTE)

420-0004-175-CD

SHT. 5 OF 5
DF 5 3

NO. 420-0004-175-CD

SHT. 5 OF 5

Appendix A: Shortening or Lengthening the Sensing Element



CAUTION:

The insulation length of either **Flush Sensing Elements** or **Insulated Sensing Elements** can **NOT** be changed. **Cable Sensing Elements** can only be shortened. Instructions are included with each unit.

The Need

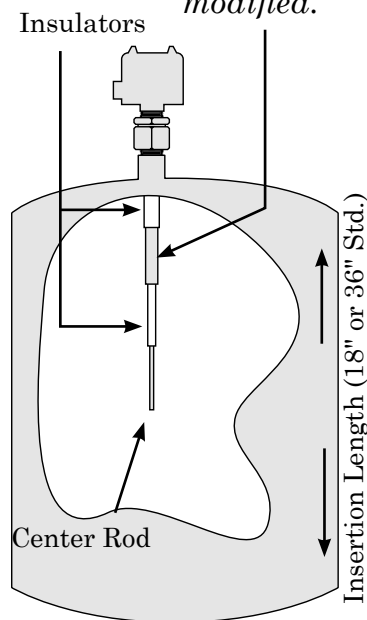
Sometimes your application calls for probe lengths other than the standard 18-inch or longer insertion lengths supplied. Shortening the sensing element is quite simple and can be done in the field. Lengthening the sensing element, however, is more difficult because the metal rod, typically 304 SS or 316 SS, must be welded.

Before making any Adjustments:

- 1) Read the following instructions thoroughly.
- 2) Remove power.
- 3) Disconnect the electronics.
- 4) Protect electronics from any static discharge.
- 5) Protect electronics from any heat.

NOTE:

Cote-Shield element must **NEVER** be modified.



Shortening

The bare metal center rod of the sensing element can be shortened with a hacksaw. Be careful not to cut either of the two insulators. See Figure on this page.

In applications using conductive or water-based materials, shortening is not a problem. Leave a minimum bare metal center rod length of two (2) inches.

For dry granular materials, such as powder, sand, corn, clinker, etc., you must leave a minimum bare metal center rod length of eight (8) inches. Consult the factory before shortening beyond this point.

Lengthening

To lengthen the sensing element, an extension rod can be welded onto the end of the bare metal center rod. Make sure that the extension rod is the same metal as the sensing element.

An alternate option is to add a pipe coupling and a section of metal pipe after threading the tip of the sensing element. In this case, the metal pipe need not be identical to the metal of the sensing element.



Any changes to probe length after calibration requires re calibration to ensure proper operation.


DREXELBROOK
An ISO 9001 Certified Company

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Fax: +1 215-674-2731
E-mail: drexelbrook.info@ametek.com
Website: www.drexelbrook.com