

# **DREXELBROOK®**

A Leader in Level Measurement

## Installation and Operating Instructions

For the

**Universal IV™ CM Model**

2-Wire, 4-20 mA, Water Cut Meter  
with HART® Protocol

**For Assistance Call + 215-674-1234**

**AMETEK®**  
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# Universal IV™ CM Model

2-Wire, 4-20 mA  
Water Cut Meter  
with HART® Protocol



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**Section 1**  
**Introduction**

## Section 1: Introduction

### 1.1 System Description

The instructions in this manual are for the AMETEK Drexelbrook Universal IV CM Model Water Cut Meter for measurement of the percentage of water in oil. Each AMETEK Drexelbrook Universal IV CM system consists of a two-wire, 4-20 mA electronic unit and a 700 series sensing element. Communication with the device is done by either an onboard keypad or with a laptop via HART® protocol.

AMETEK Drexelbrook has been measuring water cut with capacitive technology for over 40 years. Using capacitance to measure water cut is widely successful because of the large difference between the dielectric constants of oil ( $k \approx 2.3$ ) and water ( $k \approx 80$ ). The sensing element and the pipe wall form the necessary two plates of the concentric capacitor. The system electronics transmit a radio frequency voltage to the sensing element that measures changes in capacitance. As the amount of water in the flowing oil increases, the net dielectric of the fluid increases which causes the capacitance to increase. The onboard electronics can then compute the relationship between capacitance change and water cut.

It is termed a two-wire transmitter because the same two wires that are used to power the unit also indicate the change in Cut (4-20 mA).

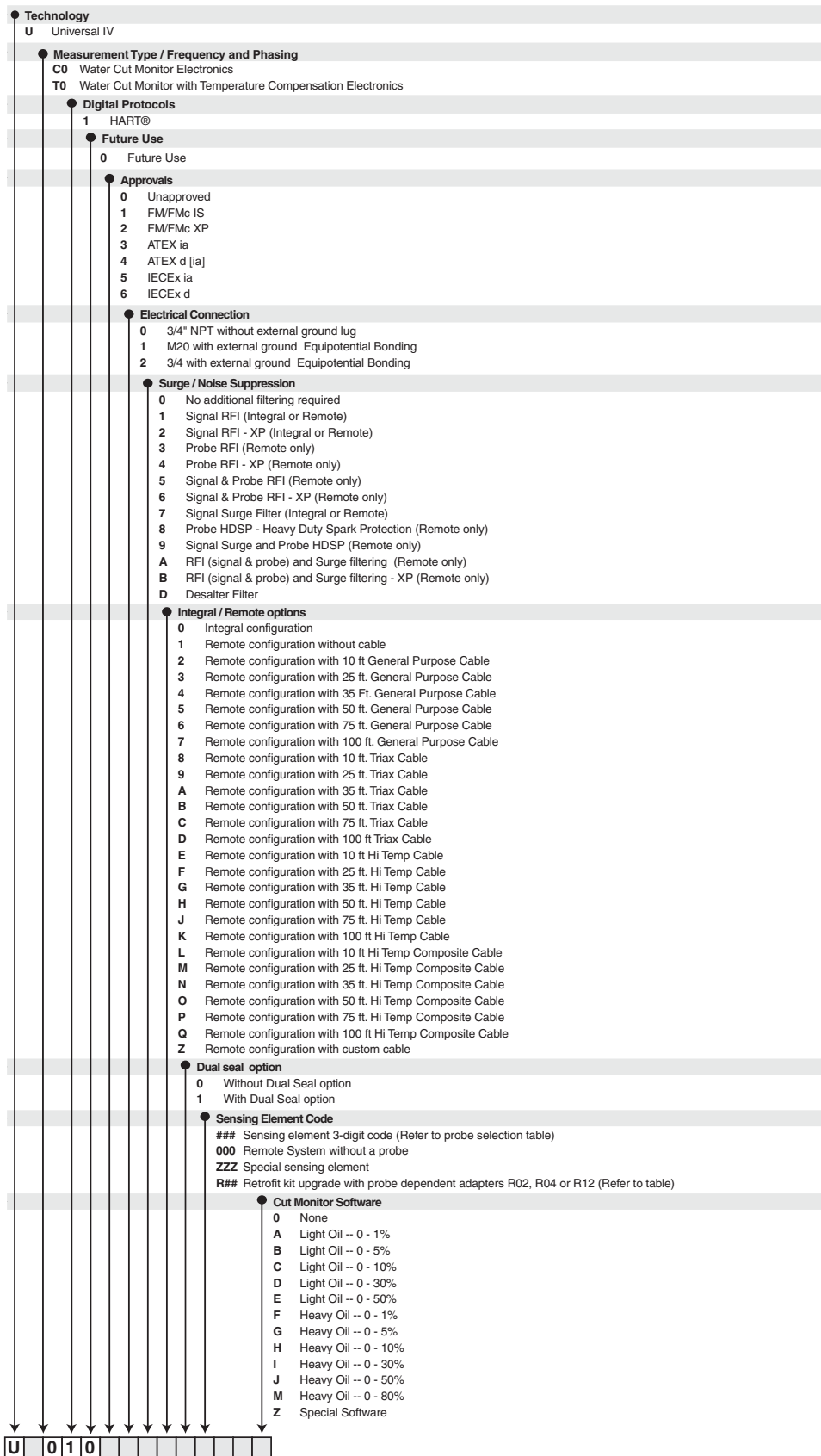
### 1.2 Unpacking

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



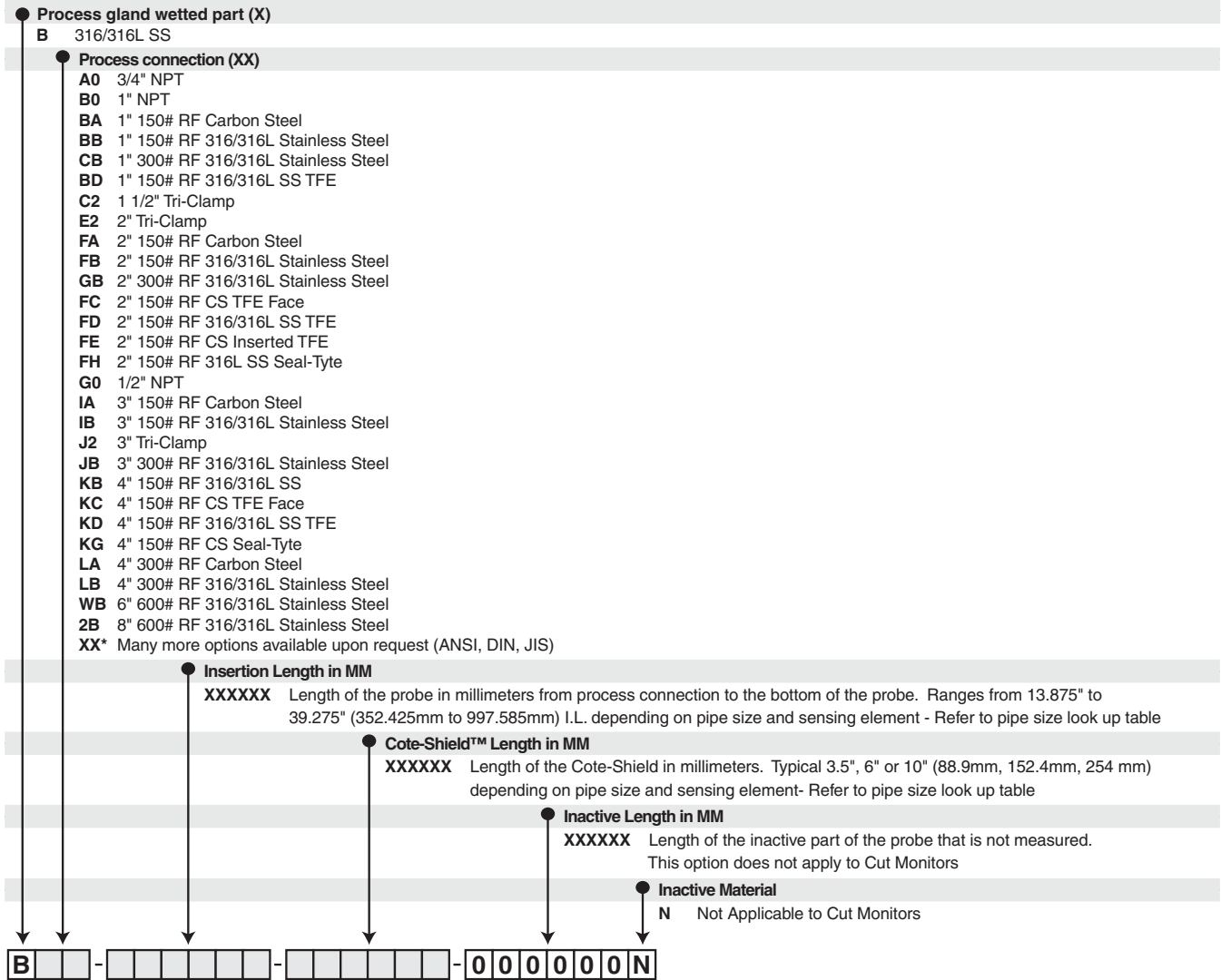
# 1.3 Model Numbering

## System Electronics and Probe Model



## 1.3 Model Numbering (Continued)

### Dimensions and Process Connection



# **Section 2**

# **Installation**

## Section 2: Installation

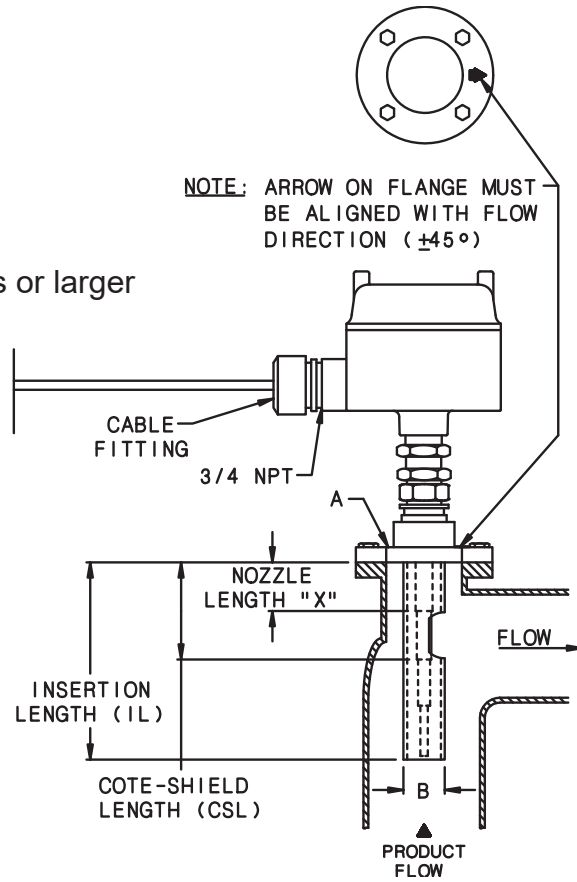
### 2.1 Installation Guide

Use the following mounting and installation instructions so that the sensing element will operate properly and accurately:

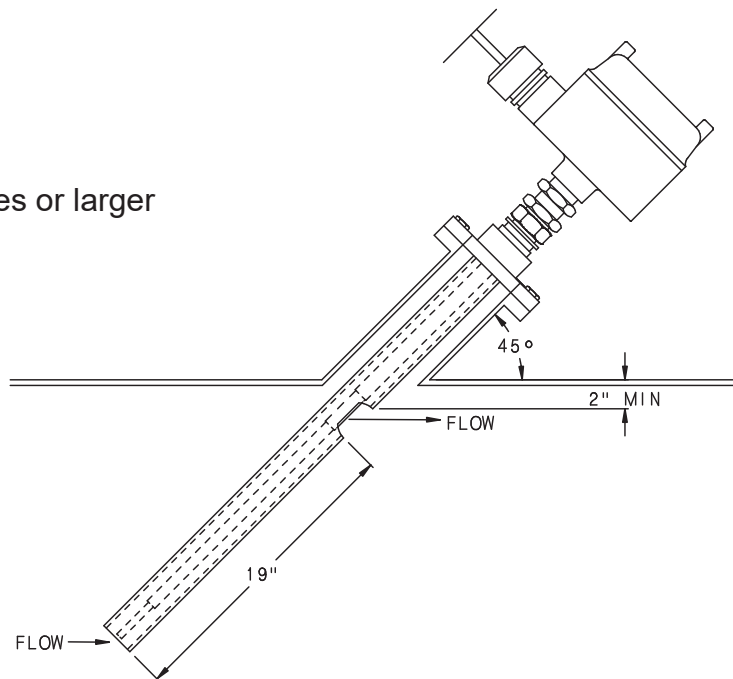
- The insertion style sensing element should be mounted in a section of pipe as close to the center and as parallel to the pipe as possible. Factory calibration assumes mounting on the pipe centerline and in the correct size pipe.
- Vertical mounting, with the tip down, is preferred for the insertion style sensing elements, but not essential.
- Gas bubbles must be excluded from the active area by maintaining pressure and, if necessary, a degasser upstream from the sensing element. Gas bubbles (whether from natural gas, air or steam) decrease the accuracy of the measurement.
- Do not take the sensing element apart or loosen the packing glands.
- In large pipe installations (greater than eight inches), the length of the cote shield section must be long enough (i.e. length of nozzle short enough) that the cutout in the concentric tube is in the actual flow of oil.
- For large pipes with no bends (18 inch and larger), it is possible to mount the sensing element at a 45 degree angle to provide sufficient flow through the shield of the sensing element.

2.1 Installation Guide (Continued)

Installation in a Pipe 8 inches or larger



Installation in a Pipe 18 inches or larger



## 2.2 Installation Considerations

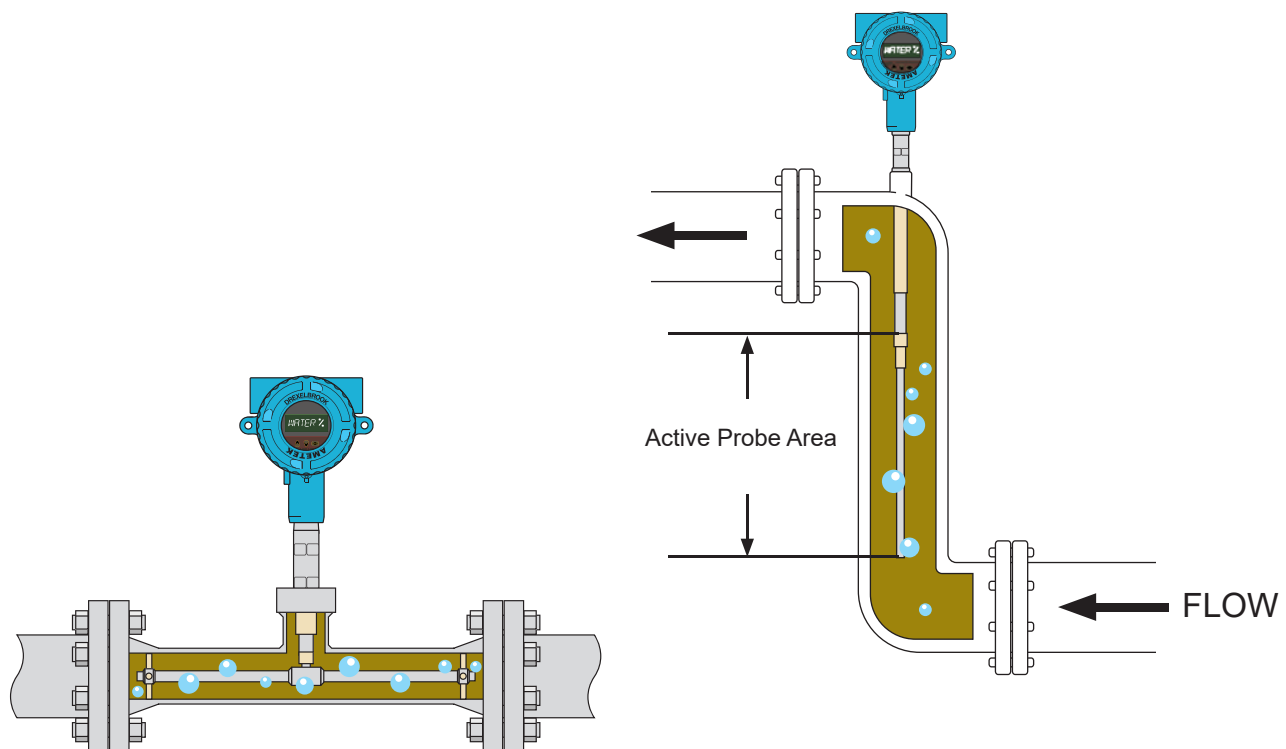
The insertion style sensing element must be mounted at an existing or created, 90 degree bend in the pipe. It can be installed through a tee or a weld-o-let to a 90 degree elbow. The vertically downward mounting attitude is preferred for ease of inspection or cleaning, since draining of the pipe is not required. Regardless, the probe will function in any attitude, as long as the pipe is completely full in the active probe area. **See the figure below** for ideal installation orientation.

The probe is active from its tip to the end of the Cote-Shield element. In the area of the Cote-Shield, it is completely inactive.

In all cases, the presence of gas bubbles, whether from air, petroleum vapor, steam, or natural gas, will reduce accuracy, producing lower readings. One of the most common causes of gas bubbles is abrupt pressure drops in high temperature streams, which can allow water and light ends to flash.

An in-line mixer just upstream of the Water Cut Meter is highly recommended for streams which go above 10% water cut. Accuracy is based on uniform, oil-continuous emulsion, so any unplanned separation will cause errors.

All instruments are factory calibrated. If calibration trimming is required, it may be done through the Keypad or with AMETEK Drexelbrook PC software. The proprietary software allows one shot calibration trimming with one reading and sample. The Real-time View window is useful for observing transmitter function and troubleshooting.



Suggested Installation

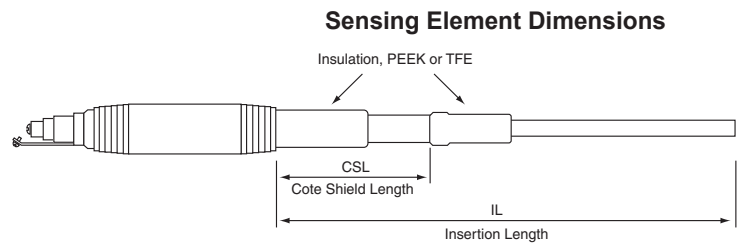
## 2.3 Sensing Element Insertion and Active Lengths

The Water Cut Meter sensing element varies with pipe size. The larger the pipe diameter size, the longer the sensing element active length must be. The Cote-Shield length is sized so the sensing element is fully extended into the fluid beyond nozzles and elbows. Below are some standard sensor dimensions.

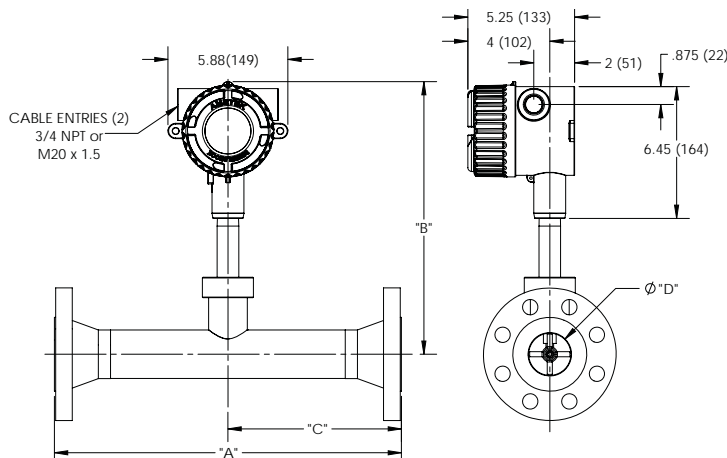
NACE MR0175 Certification is available upon request.

700-1202-0XX Series Sensing Elements (Peek™ Insulation)		
Pipe Size	Cote-Shield Length	Insertion Length
2"	3.5"	21.25"
2"	6"	23.75"
2"	10"	27.75"
3"	3.5"	25.5"
3"	6"	28"
3"	10"	32"
4"	6"	31.125"
4"	10"	35.125"
6"	6"	35.375"
6"	10"	39.375"
8" and >	10"	25.5"
In Tank	3.5"	19"
In Tank	6"	21.5"
In Tank	10"	25.5"

700-0201-0XX Series Sensing Elements (TFE Insulation)			
Pipe Size	Cote-Shield Length	Insertion Length	Model Number
2"	6"	28.1"	700-0201-052
3"	10"	2.9"	700-0202-053
4"	10"	32.1"	700-0202-054
6"	12"	38.4"	700-0202-056
8" and >	18"	37"	700-0201-058
In Tank	8"	27"	700-0201-059



Size	Dimension "A"	Dimension "B"	Dimension "C"	Dimension "D"	Flange
2 inch	17.0" (432)	13.4" (340)	8.5" (216)	2.125" (54)	150#/300#
3 inch	32.0" (813)	13.9" (353)	19.0" (429)	3.125" (79)	150#/300#
4 inch	32.0" (813)	14.3" (363)	21.8" (554)	4.625" (117)	150#/300#



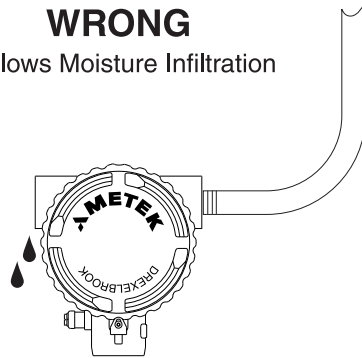
## 2.4 Mounting the Electronic Unit

The integral electronic unit is mounted with the sensing element. The remote electronic unit is designed for field mounting, but it should be mounted in a location as free as possible from vibration, corrosive atmospheres, and any possibility of mechanical damage. For convenience at start-up, mount the instrument in a reasonably accessible location. Ambient temperatures should be between -40°F and 167°F (-40°C and 75°C).



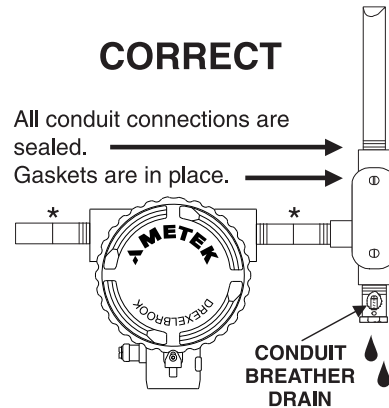
When installing conduit to the electronic unit, be sure that vertical conduit runs will not cause water to enter the electronic unit housing, as shown in Figure Below.

**WRONG**  
Allows Moisture Infiltration



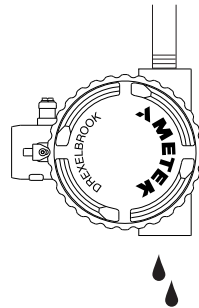
**CORRECT**

All conduit connections are sealed.  
Gaskets are in place.



Use only cable supplied by  
**AMETEK** Drexelbrook

**WRONG**  
Allows Moisture Infiltration



**CORRECT**

\* Fill Pipe Ends with  
silicone sealant.

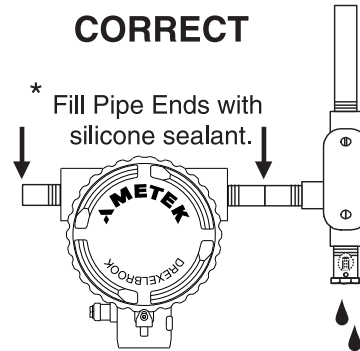
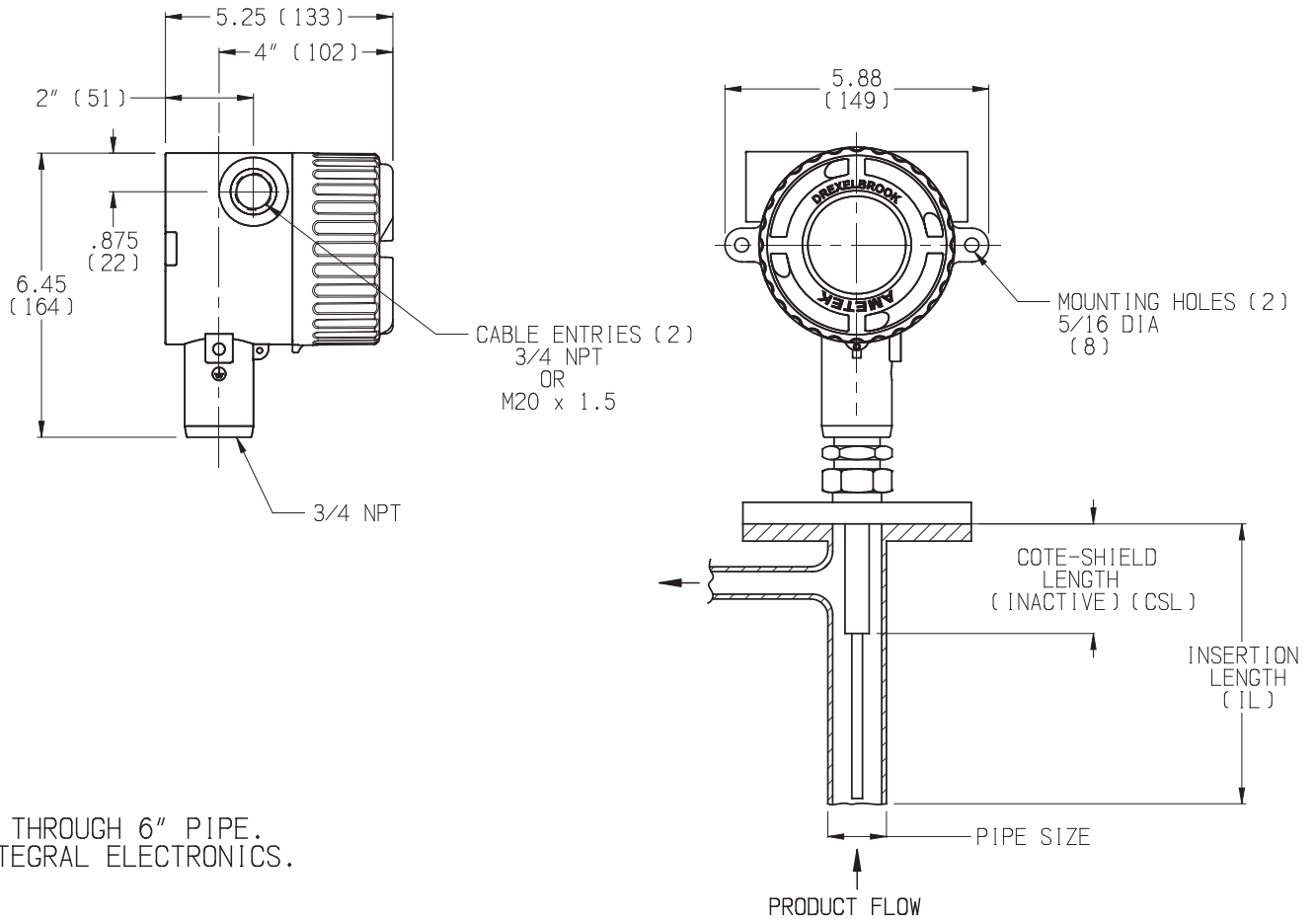


Figure 2-1  
Recommended Conduit Installation



## 2.4 Mounting the Electronic Unit (Continued)

### Integral System Mounting



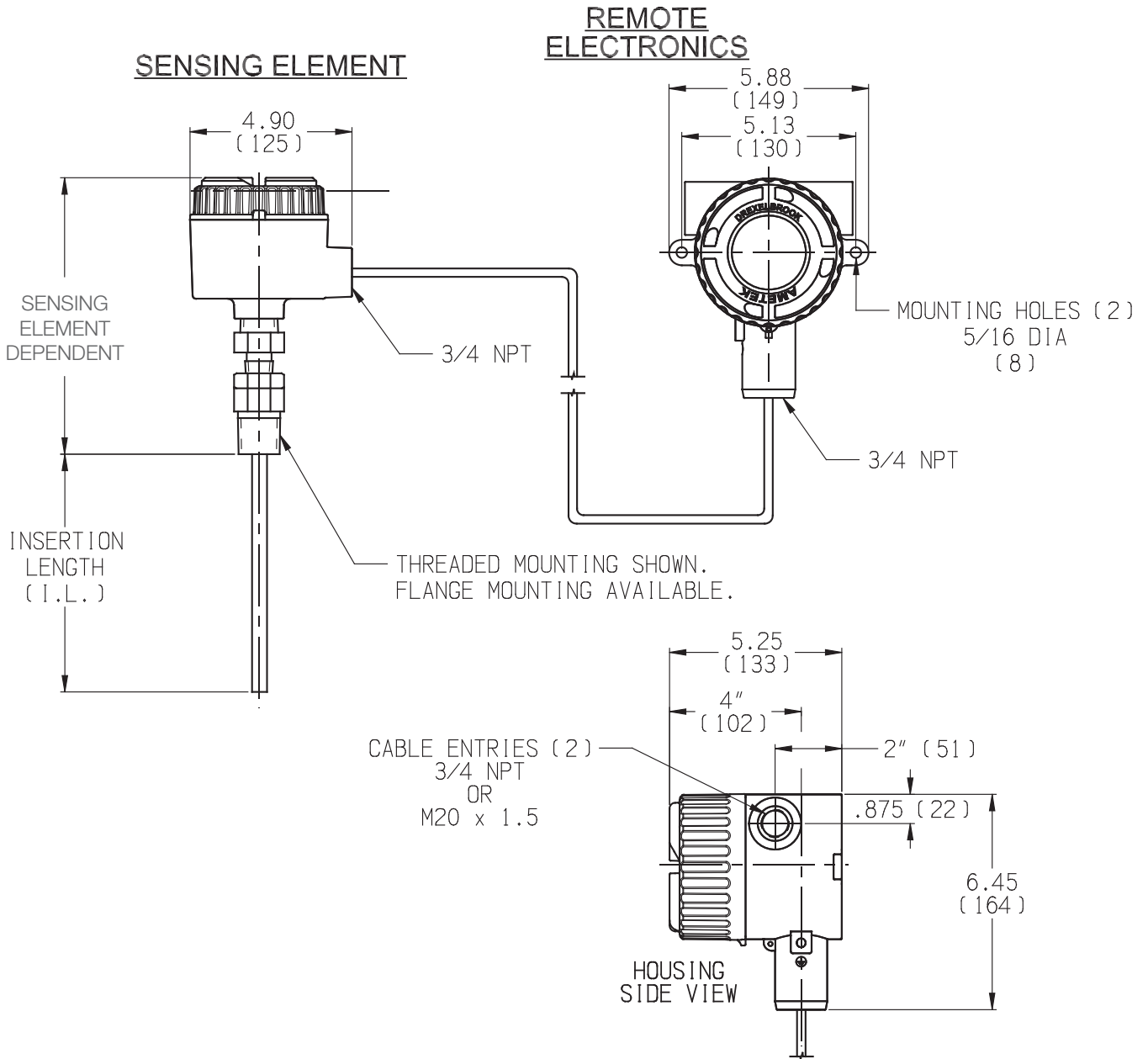
NOTES:

1. 1" THROUGH 6" PIPE.
2. INTEGRAL ELECTRONICS.

Figure 2-2  
Integral Mounting Dimensions

## 2.4 Mounting the Electronic Unit (Continued)

### Remote System Mounting



DIMENSIONS ARE IN INCHES  
( mm )

Figure 2-3  
Remote Mounting Dimensions

## 2.5 Wiring the Electronic Unit

The signal connections are made to the three-terminal block on the front of the chassis. Due to the low power consumption of the instrument, the wiring need only be light gauge (e.g. 20 AWG). Shielded twisted pair cables are recommended.

Integral units are pre-wired to the sensing element at the factory. **Figure 2-5** shows the wiring of the integral unit.

See **Figure 2-6** for wiring connections of the remote unit. The cable from the sensing element is connected to the terminal strip below the instrument chassis. The cable connections are sensing element (prb), center wire (cw), ground (gnd), and shield (shd).



### CAUTION!

Before using Intrinsic Safety Barriers, read manufacturer's instruction for barrier operation.



The Universal IV has a built-in current limiter which holds the signal current to a maximum of 28 mA.

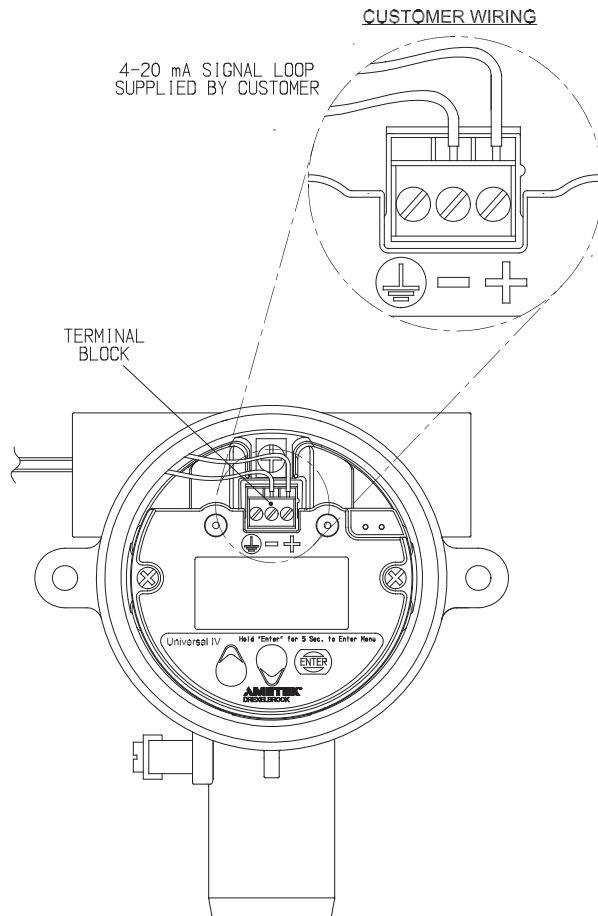


Figure 2-4  
Universal IV Wiring Connections

## 2.6 Wiring the Sensing Element

The cable connections to the remote sensing element are shown in **Figure 2-6**

- Do not connect the cable to the sensing element until after the sensing element has been installed in the vessel and the conduit / housing has been secured.

Only cables supplied by Drexelbrook should be used to connect the transmitter to the sensing element. Use of other cables can result in unstable performance.

### Integral System Sensing Element Wiring

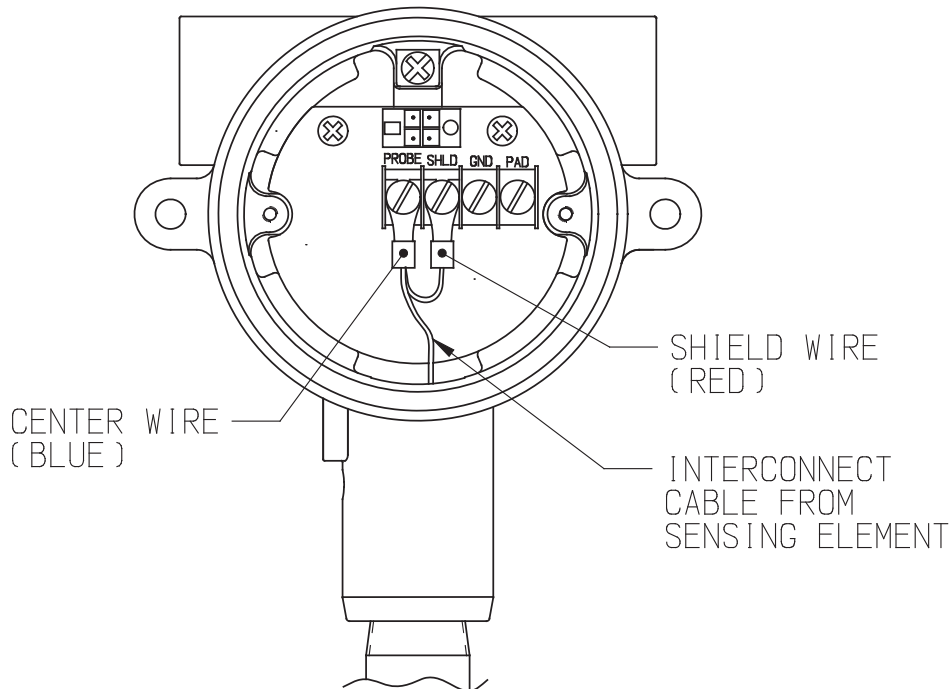


Figure 2-5  
Universal IV Wiring Connections Integral Mounting

## 2.6 Wiring the Sensing Element (Continued)

### Remote System Sensing Element Wiring

ELECTRONIC UNIT REMOVED FOR CLARITY

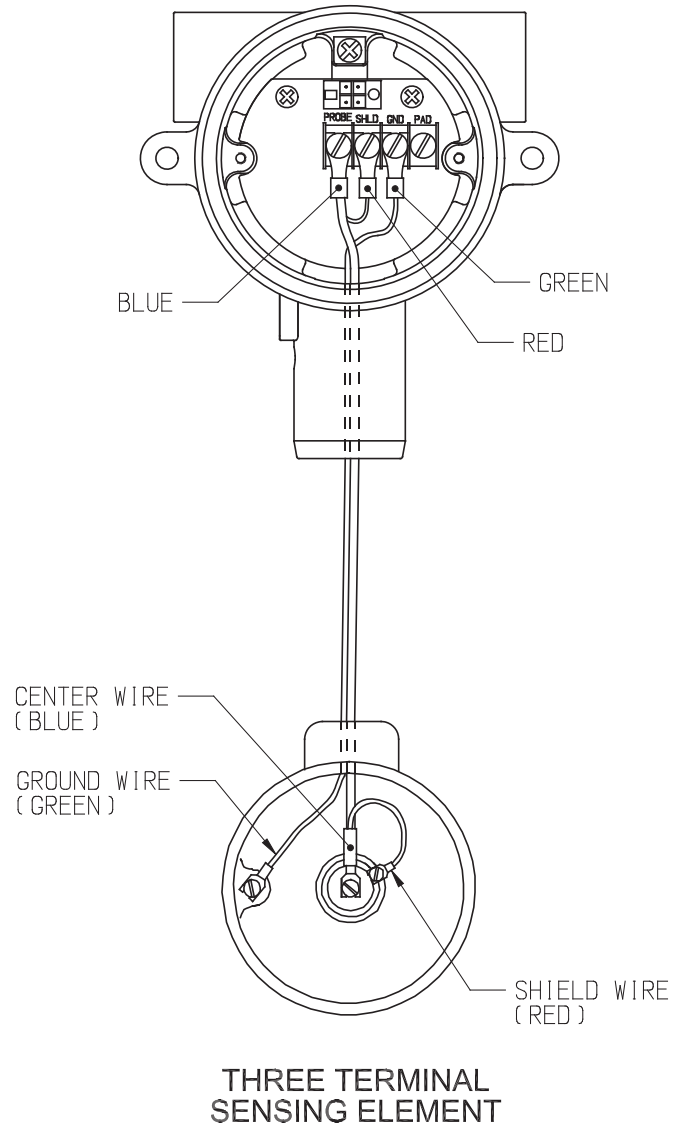


Figure 2-6  
Universal IV Wiring Connections, Remote Mounting

## 2.7 Surge Voltage (Lightning) Protection

Optional surge protection can be supplied with transmitters that are expected to be exposed to surge voltages or surges due to lightning near the two-wire loop. A Drexelbrook Model 401-0016-028 Signal Filter Assembly affords additional protection to the transmitter but is not absolute in its protection against a very close lightning strike. **Refer to Figure 2-9** to properly connect the Signal Filter Assembly. You must insure the transmitter housing is well connected to an earth ground.

## 2.8 RFI (Radio Frequency Interference) Filters

When installing the Universal IV transmitter, follow these recommendations to avoid problems with Radio Frequency Interference (RFI).

- Choose a location to mount the electronic unit at least 6 feet (2m) from a walkway where personnel using walkie talkies may pass.
- For remotely-mounted electronic units connect the sensor to the electronic unit by placing the coaxial cable in grounded metal conduit. Integrally mounted electronic unit sensor connections and triaxial cables are already shielded.
- Use Shielded Twisted Pair wiring for all loop wiring. Loop wiring should also be in grounded metallic conduit.
- Ground the electronic unit and housing with a minimum of 14 gauge wire to a good earth ground. Make sure that conduits entering and leaving the housing have a good electrical ground connection to the housing

If the recommendations listed are followed, it is usually not necessary to add RFI filtering to protect against signal strengths of 10 Volts/ Meter or less. This degree of protection is usually sufficient to protect against walkie talkies that are used 3 feet (1m) or more from a typical electronic unit. If greater protection is required, or filters have already been provided, install RFI filters as shown in **Figure 2-8**.

### **CE Mark Certification:**

Triaxial Cable - Systems with remote mounted electronics that connect to the sensing element via a triaxial cable do not need a sensing element RFI filter or metal conduit to maintain CE Mark certification.

2.8 RFI Filters (Continued)

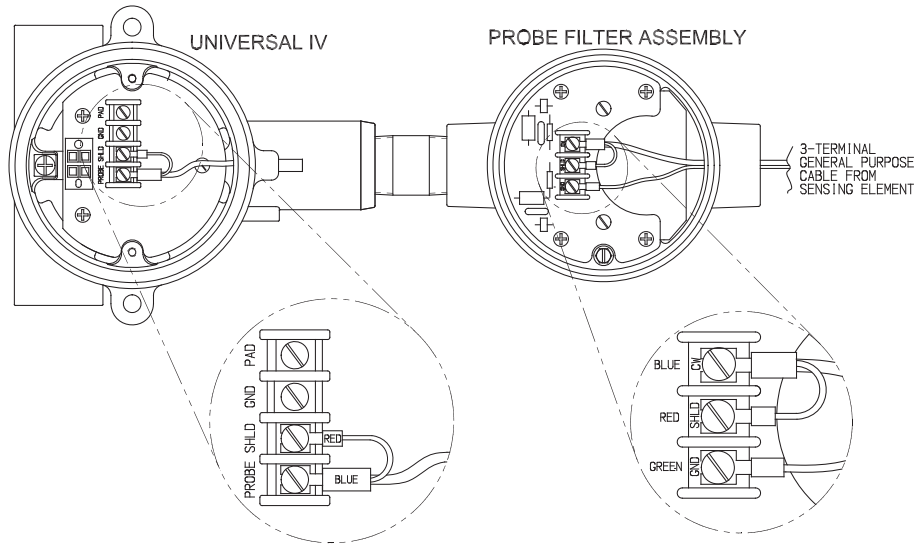


Figure 2-8  
Sensing element Radio Frequency Interference (RFI) Filters  
Part # 401-0016-029

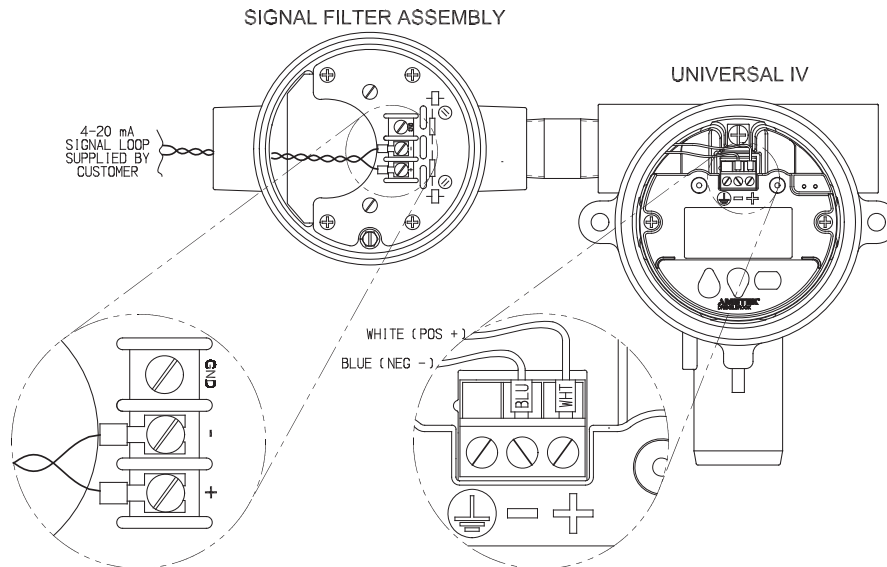


Figure 2-9  
Signal Radio Frequency Interference (RFI) Filters / Surge Protection  
Part # 401-0016-028

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# **Section 3**

## **Configuration & Calibration**

## Section 3: Configuration and Calibration with Drexelbrook Software, HRTWin

This section instructs the user how to use the AMETEK Drexelbrook PC calibrator software to configure and calibrate the Universal IV (RF Admittance) Transmitter.

### 3.1 Installing The USB Modem

HART® Modems are available from third party vendors. Refer to directions supplied by modem manufacturer.

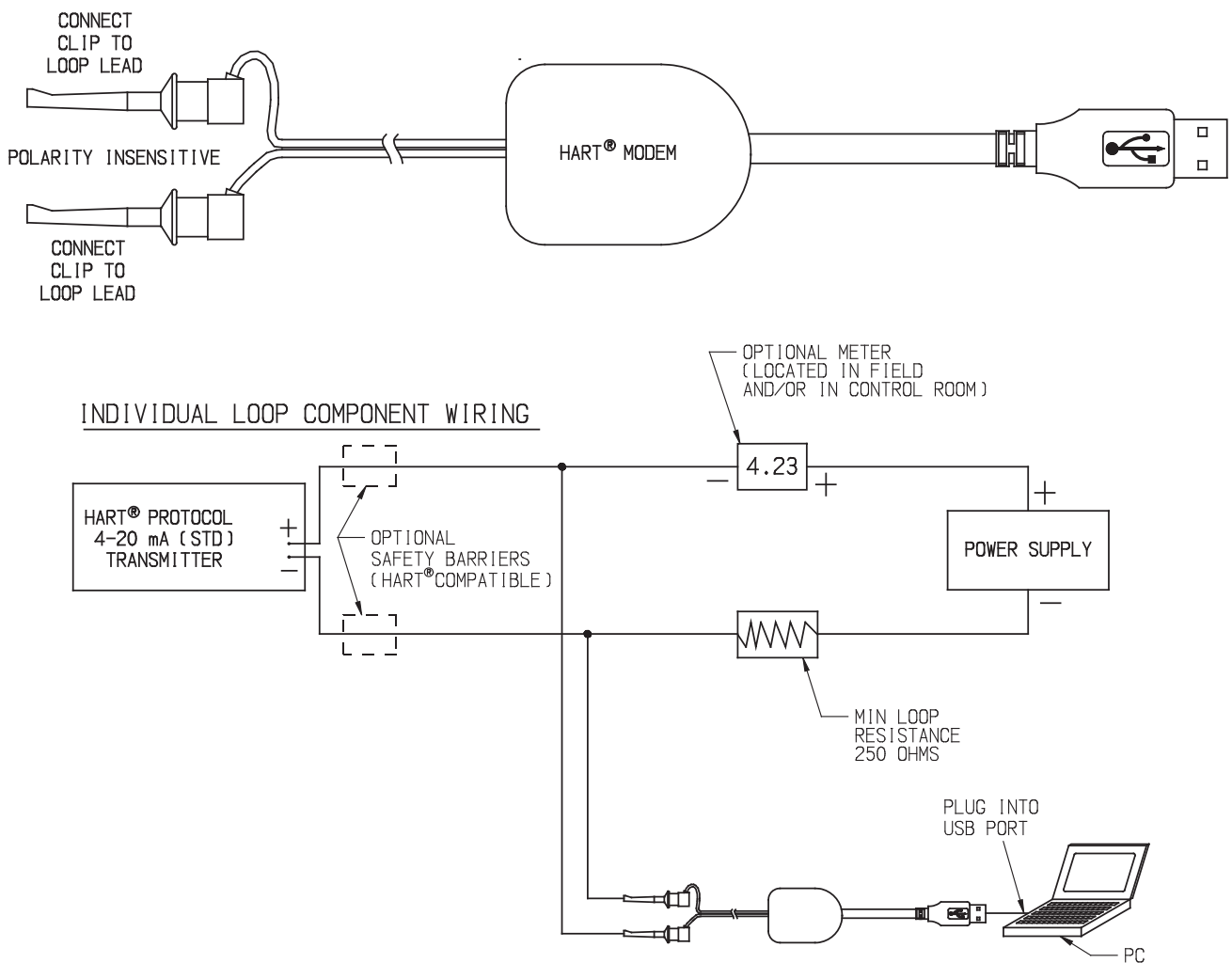


Figure 3-1  
USB Modem Assembly & Loop Connection

## 3.2 Install the Windows Version HRTWin Software

Installation is quite simple.

- A. Download the software from [www.drexelbrook.com](http://www.drexelbrook.com).
- B. If program does not "Auto-Run", select the location where the file was saved and run the set-up program manually.
- C. Follow "On-Screen" instructions in Setup to create program file.
- D. Once loaded, double click "HRTWin" icon and the program will run under its own window.
- E. Select communication port [Com 1, Com 2, etc.] and then click "OK." See **Figure 3-2**.
- F. If you are not sure which communication port you are using (such as when first using a USB modem), select "Search Ports," then OK. The software automatically will seek out the correct one. In either case the software begins to communicate with the HART protocol transmitter and returns with a view (below) containing "name plate data," Tag ID and all default or existing configuration information. This is the same as if you clicked on the Read Transmitter function button.
- G. The next view, shown in **Figure 3-3**, appears automatically, displaying current transmitter data for calibration set-up for your selected Tag ID. The Scratch Pad will automatically show the last message (last user, last calibration, etc.) up to 32 characters. If this is a new transmitter, the Tag ID is user-defined. Serial number, transmitter software version, range, etc. is automatically entered from the "name plate data" embedded in the transmitter:

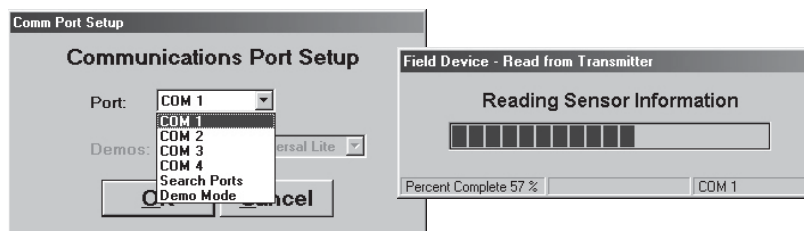


Figure 3-2  
Selecting COM ports during software installation

### 3.2 Install the Windows Version HRTWin Software (Continued)

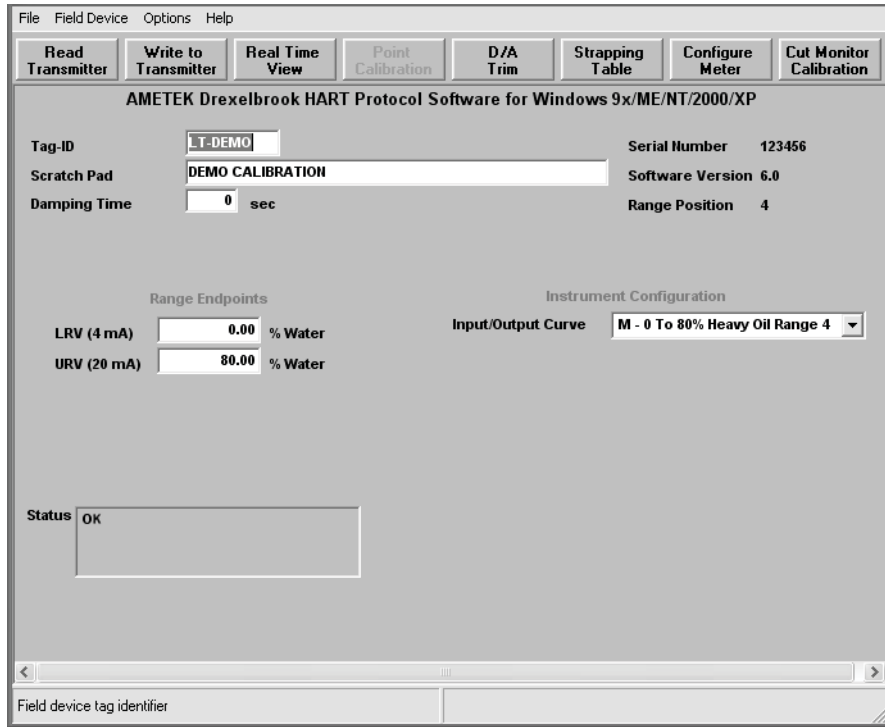


Figure 3-3

PC Software Menu Screen automatically communicates all "name plate data" from transmitter

### 3.3 Description of Function Keys

The following paragraphs describe the function buttons. The data fields are described in Section 3.7 Configuration.

#### **Read Transmitter [F3 on keyboard]**

Reads all pertinent data from the transmitter and displays it on the screen. The Read function also updates the real time window. Keep in mind that it takes several seconds to load the information from the transmitter. When the load is complete, the screen shows the data parameters, except any user-defined strapping table information. This command is also used when connecting to another transmitter.

#### **Write to Transmitter [F5 on keyboard]**

Sends new or edited configuration data to the transmitter. Data fields that have been edited but not sent to the transmitter are displayed in red.

#### **Real Time View [F4 on keyboard]**

Displays the real time values of water percentage, capacity, loop current, and status.

#### **D/A Trim**

Allows for correction of transmitter output current. Requires a calibrated current meter in the signal loop.

See Section 3.9.

#### **Strapping Table**

Displays the values of the input (pF) vs. output (% water) in a table of up to 21-points. Allows points to be adjusted when actual data deviated from the theoretical input/output curve.

See Section 3.8.4

#### **Configure Meter**

Configures the Digital Integral Meter (440-44-3) used for local indication. See Section 3.10

#### **Water Cut Meter Calibration (One-Shot®)**

Used to adjust calibration to specific oil and temperature that the transmitter monitors. See Section 3.8.1

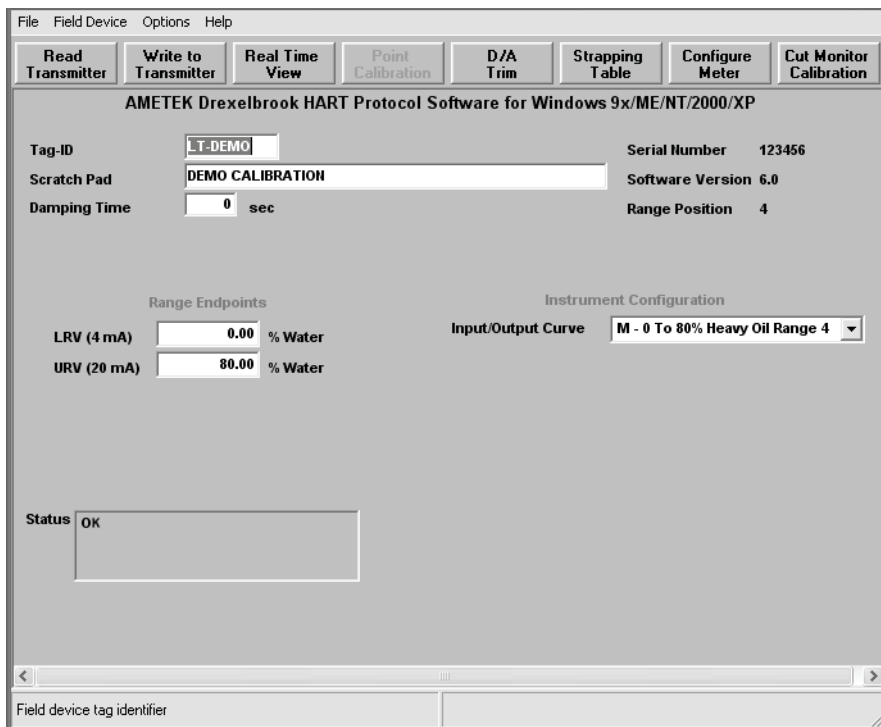


HRTWin Tool Bar

### 3.4 Configuration

Configuration involves downloading information to the HART protocol transmitter that is specific to the application that is being measured.

- A. Begin configuration by using **Tag ID** (8 characters) to identify the unit or vessel. Use the **Scratchpad** (32 characters) to record the date of calibration or other similar notes. Press Tab or Enter on your keyboard.
- B. Edit **Damping Time** from 0-90 seconds, if desired.
- C. Click on **Write to Transmitter**.



HRTWin Main Screen

### 3.5 Calibration

All Drexelbrook Universal IV CM Water Cut Meter instruments are calibrated at the factory according to:

- Size of pipe, and
- Density of oil

Specific factors could cause the factory calibration to be less accurate than is required. For example,

- A. Pipe I.D. is smaller than nominal size (Sched. 80, 160, or extra heavy pipe)
- B. Sensing element is not centered (parallel to axis) in pipe. This condition causes higher (never lower) readings.
- C. Oil may be heavier (higher readings) or lighter (lower readings) than expected.
- D. Major temperature deviations.

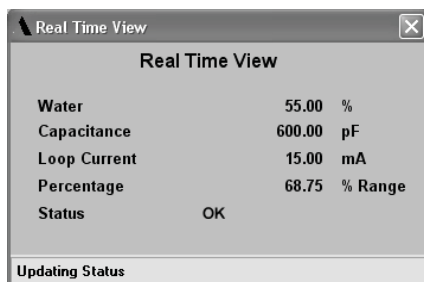
Do not change the factory calibration without obtaining data that indicates a calibration change is necessary. If the output reading is low because of gas, steam, or air in the stream, then no amount of calibration will produce satisfactory performance.

Once the gas is gone, an accurate calibration check can be made. The following equipment is required to check the calibration of a Water Cut Meter application and record sample data:

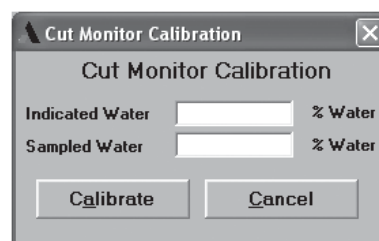
- A centrifuge (or other API-approved standard) to sample water content.
- If the stream temperature is greater than 150°F (65°C), a sampling bomb with a minimum capacity of 500 ml.
- Temperature stabilization bath.

### 3.5.1 One Shot® Calibration Trim Using HRTWin Software

- A. With a PC connected to the signal loop, click on the Real Time View button to open the “Real Time View” Screen.
- B. Take a sample of the fluid from as close to the probe as possible. Use a sampling bomb if the stream temperature is greater than 150°F. Stabilize at 150°F before determining water content.
- C. Read and record water percentage from the “Real Time View” as the sample is being taken.
- D. After determining the actual water percentage in the sample, close the “Real Time View” window and open the “Calibration Screen” by clicking on the Cut Monitor Calibration button.
- E. Enter the % water reading, recorded at the time of sampling in the “Indicated Water” box. Enter the result of the sample test in the “Sampled Water” box and click on the Calibrate button.
- F. Click on the Write To Transmitter button to install the revised calibration in the transmitter.
- G. Depending on the range, if the original calibration and the measured sample differed by more than 2.5% water, another iteration will probably be required. Unless there is an overwhelming discrepancy, it is best to monitor the performance with this new calibration for a few days before making a second change.



RTV Window



Calibration Window



### 3.5.2 Range Change

It is possible to reduce the span of an existing calibration simply by lowering the % water URV on the “Menu Screen”. If the reduction in span fall within a lower Input/Output curve, the lower curve should be selected.

When changing ranges on the Universal IV CM it is important to understand that the shape of the input/output curve may require revision, as well as the 100% point. The simplest way to re-range an instrument is to select a different input curve.

**Range Endpoints**

<b>LRV (4 mA)</b>	<b>0.00</b>	<b>% Water</b>
<b>URV (20 mA)</b>	<b>80.00</b>	<b>% Water</b>

**Instrument Configuration**

**Input/Output Curve** M - 0 To 80% Heavy Oil Range 4 ▾

**User Defined**

A - 0 To 1% Light Oil Range 1

B - 0 To 5% Light Oil Range 1

C - 0 To 10% Light Oil Range 2

D - 0 To 30% Light Oil Range 2

E - 0 To 50% Light Oil Range 3

F - 0 To 1% Heavy Oil Range 1

G - 0 To 5% Heavy Oil Range 1

H - 0 To 10% Heavy Oil Range 2

I - 0 To 30% Heavy Oil Range 2

J - 0 To 50% Heavy Oil Range 3

M - 0 To 80% Heavy Oil Range 4

P - 0 To 50% Heavy Oil Range 3

Captures from Main Screen

### 3.5.3 Strapping Table

If none of the available input/output curves are adequate for the application, a user defined table may have to be created. This is accomplished by editing the strapping table.

- A. With a PC connected to the signal loop (as in section 3.4) click on the strapping table button
- B. Click on Write Strapping Table button to re-range the transmitter to the new values.
- C. Click on the Exit to return to the “Menu Screen” It may be necessary to do a “One Shot” calibration on the installed instrument.



For user defined tables it will be necessary to adjust the URV (20 mA) point to the desired range (See section 3.8.3) and adjust the local indicator so that the maximum value is equal to the maximum % water in viewing % water is desired.

### 3.5.4 Linearity Correction

On high water ranges (greater than 10%) the shape of the % Water/Capacitance curve will typically vary somewhat from one field to another. If it is determined that the output is accurate at high and low water levels, but incorrect at some intermediate area, it is possible to manipulate the break points in the strapping table to improve accuracy.

A step-by-step procedure is beyond the scope of this publication. Several AWT users have successfully trimmed the theoretical curve and in one case determined their own curve to satisfy particular conditions in their installation.

When attempting to optimize the input/output curve there are 3 precautions to keep in mind:

- A. Try to err on the side of under compensation for perceived deviations
- B. The top three points are designed to clip the output at 20 mA and should not be disturbed. They have no significant effect on the curve below 20 mA.
- C. Before beginning, be sure have a record of the starting curve, in case it becomes necessary to start over.

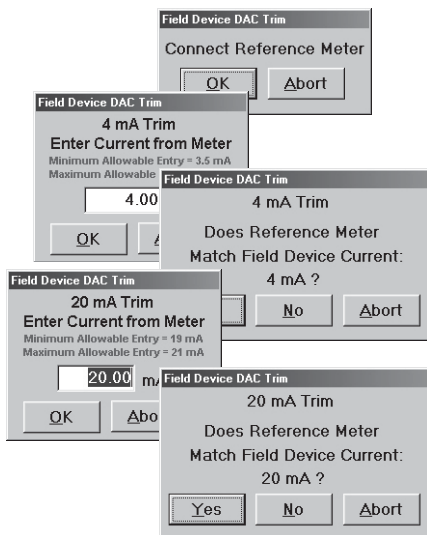
### 3.6 Set D/A Trim

**D/A Trim is NOT a calibration! This is a pre calibrated alignment to precision factory settings and is rarely in need of change. The procedure is intended only as a slight "meter" adjustment to a known external reference.**

The Digital to Analog (D/A) Trim adjusts the transmitter mA (current) output. Since the smart transmitter performs a digital to analog conversion, there may be a discrepancy in the 4-20 mA output loop as measured with a reliable external milliamperemeter.

For example: perhaps after calibration you observe that the tank is empty and a hand-held mA meter reads only 3.94 mA, while the Real Time View in the PC Menu shows 4.00 mA. By adjusting the D/A trim, you may digitally manipulate the output current to equal 4.00. You may also wish to adjust the high end to 20.00 mA.

To make these adjustments, click on **D/A Trim** on the PC software Menu Screen and follow the pop-up window instructions.



Setting D/A Trim Menu Screen  
Windows

### 3.7 Save/Print Entries

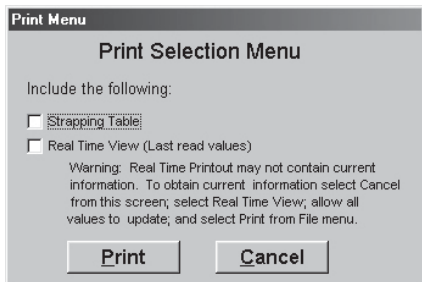
In addition to your own convenience, many regulatory agencies are requiring a record of the values being used during certain processes. All of the values developed in this configuration and calibration procedure may be saved to be reloaded into another (or replacement) transmitter. All of the values may likewise be printed out as hard copy, including the Serial Number, Transmitter Software Version, Tag ID, Scratch Pad, Instrument Calibration, all of the Real Time View numbers, and all of the Strapping Table entries.

Pop-up screens come from selections in the **FILE** pull down at the top left of the PC menu Screen.

Copies are saved in both .Universal IV CM file and .txt files.

The .Universal IV CM file will download into a transmitter through the **OPEN** command. The text file may be printed out, or reformatted.

**PRINT** command provides a pre-formatted hard copy.



Print Pop-up from Menu

<b>AMETEK Drexelbrook</b> 205 Keith Valley Road Horsham, PA 19044 Telephone: 215-674-1234 FAX: 215-674-2731 Service: 800-527-6297	
Tag-ID: LT-DEMO Scratch Pad: Damping Time: 0 sec.	Serial Number: 123456 Software Version: 6.0 Range Position: 4
<b>Instrument Configuration</b> Input/Output Curve: M - 0 To 80% Heavy Oil Range 4	
<b>Real Time View</b> Percent Water: 55.00 % Capacitance: 600.00 pF Loop Current: 15.00 mA Percentage: 68.75 % Status: OK	
<b>Input/Output Table</b> Number of Points: 15	
Input pF	Output % Water
40.00	0.00
56.20	10.00
73.00	23.00
122.20	35.00
189.00	40.00
256.00	42.00
395.00	50.00
600.00	55.00
750.00	57.00
900.00	60.00
1100.00	65.00
2400.00	70.00
2700.00	75.00
2900.00	80.00
3450.00	83.00

### 3.8 Calibration & Configuration via Display/Keypad

**To enter the Configuration Menu:**

- Press and Hold the "Enter" Button for approximately 5 seconds.
- Use the "Up" and "Down" Buttons to scroll through the available menu selections.
- Press "Enter" to access sub-menu items.
- Use the "Up" and "Down" Buttons to adjust settings.  
*Settings that can be adjusted will be "flashing".*
- Press "Enter" to accept the adjustment...Or...
- Press and Hold the "Enter" Button for approximately 5 seconds to exit to the previous menu level.



Menu Function (display abbreviation)	"Values" (display abbreviat	Description
"Fct 1.00 Water Cut Ranges (RANGE)"		Select the water cut range for optimal measurement
	0 to 1% water in Light Oil (LIGHT A)	Light Oil is defined as oil with API Gravity greater than 25. Heavy Oil is defined as oil with API Gravity less than 25.
	0 to 5% water in Light Oil (LIGHT B) 0 to 10% water in Light Oil (LIGHT C) 0 to 30% water in Light Oil (LIGHT D) 0 to 50% water in Light Oil (LIGHT E) 0 to 1% water in Heavy Oil (HEAVY F) 0 to 5% water in Heavy Oil (HEAVY G) 0 to 10% water in Heavy Oil (HEAVY H) 0 to 30% water in Heavy Oil (HEAVY I) 0 to 50% water in Heavy Oil (HEAVY J) 0 to 80% water in Heavy Oil (HEAVY M) - Default	
	CUSTOM	Custom range requires a custom strapping table. See Fct 3.00
"Fct 2.00 Point Cal		
"Fct 2.01 Last Cal Point (LST CAL)	Value of last cut entered for calibration - read only	User can view the last % cut entered
"Fct 2.02 Actual Cal Point (ACT CAL)	Water cut % from actula cut % - 0.0 (Default)	Enter the actual water cut reading verified by another method of water cut measurement
"Fct 3.00 Calibration (CAL)"		Enter this menu to calibrate the unit
"Fct 3.01 Indicated Calibration Point (IND CAL)"	% water - 0.0 Default	Enter the water cut reading captured at the time of taking the sample for calibration measurement
"Fct 3.02 Actual Calibration Point (ACT CAL)"	% water - 0.0 Default	Enter the actual water cut reading verified by another method of water cut measurement

### 3.8 Calibration & Configuration via Display/Keypad (Continued)

"Fct 4.00 Strapping table (STRAP)"		Use this strapping table menu to define a custom range if selected in FCT 1.00. Otherwise the correct strapping table is automatically loaded when range is selected in FCT 1.00. Default values are for 'HEAVY M' range
"Fct 4.01 Maximum points (MAX PNT)"	15 (Default)	Enter the total number of points in the strapping table which is range dependent
"Fct 4.02 Point number index (INDEX)"	"1..MAX PNT 1 (Default)"	Enter the point number index
"Fct 4.03 Input value in PF (INPT #) "	Value in PF	Enter the capacitance value in pF
"Fct 4.04 Output value in water cut% (OUT #)"	Value in % water	Enter the cut value associate with the capacitance in pF and point index. Repeat FCT 3.02 to FCT 3.04 until all points are entered in the strapping table
"Fct 5.00 Output (OUTPUT)"		Configure the output from the unit including LRV, URV, damping and fixed output
"Fct 5.01 Lower Range Value (LRV)"	0.0 (Default)	Enter the lower range value in % water equivalent to 4mA output
"Fct 5.02 Upper Range Value (URV)"	80.0 (Default)	Enter the upper range value in % water equivalent to 20mA output
"Fct 5.03 Damping in Seconds (DAMPING)"	0.0 (Default)	Enter damping in seconds to delay and filter (software RC filter) the output in case of rapid water cut variations
"Fct 5.04 4mA Trim (TRIM 4)"	4.00 (Default)	Use this menu to calibrate the 4 mA output which is not common practice. Requires calibrated meter to measure actual current output
"Fct 5.05 20mA Trim (TRIM 20)"	20.00 (Default)	Use this menu to calibrate the 20 mA output which is not common practice. Requires calibrated meter to measure actual current output
"Fct 5.06 Fixed Output (LOCK mA)"	0.00 (Default)	Use this menu to fix the output to a certain mA value regardless of the measurement. Enter the value in mA. The output will stay at this value until exiting the menu or if display times out in approx. 30 seconds
"Fct 5.07 Device ID (POLL)"	0 (Default)	Enter the device ID to be used on the HART loop. Each device on the loop must have a unique device ID. Change only for multi-drop configuration
"Fct 5.08 Water Cut Clamping (H2O CLP)"	ENABLE (Default)	Clamps the indicated water cut to values of 0.0% and above
"Fct 6.00 Display (DISPLAY)"		Setup the parameter(s) to be displayed on the unit during operation
"Fct 6.01 Toggle the display (TOGGLE?)"	NO (Default)	Toggle between enabled parameters. YES or NO
"Fct 6.02 Water Cut (H2O)"	ENABLE (Default)	Enable or disable water cut measurement display
"Fct 6.03 Density Corrected Water Cut (DC H2O)"	ENABLE (Default)	Enable or disable the automatic display of the density corrected water cut ONLY when connected to a DCM.
"Fct 6.03 Capacitance (CAP)"	DISABLE (Default)	Enable or disable capacitance measurement in pF
"Fct 6.04 Calculated current (4-20)"	DISABLE (Default)	Enable or disable the calculated current output

"Fct 7.00 Service (SERVICE)"		Use this menu for troubleshooting and service
"Fct 7.01 Restore factory default (RST FAC)"	NO (Default)	Select YES to restore factory default in which case all parameters will be replaced with factory default setting. Restoring the factory default will initiate this message on the display 'DEFAULT PARAMS SET' until power is cycled.
"Fct 7.02 Pad Capacitor in PF (PAD CAP)"	15.0 (Default)	Enter the value of an external capacitor that must be connected to the unit. Padding capacitors are used to reduce the sensing element standing capacitance in order to improve the measurement resolution
"Fct 7.03 Contrast (CONTRST)"	0 (Default)	0 is the highest contrast. 20 is the lowest contrast
"Fct 7.04 Parameter Number (PAR NUM)"	0	Contact factory
"Fct 7.05 Parameter Offset (PAR OFS)"	0	Contact factory
"Fct 7.06 Parameter Value (PAR VAL)"	44	Contact factory
"Fct 7.07 Select Decimal Value (H2O DEC)	0 1 2 Default	Allows the user to select the number of decimal places displayed for % water

### 3.9 HART® - Multi-drop mode

All AMETEK Drexelbrook HART protocol transmitters default to a polling address of "0".

In order to put the transmitter in the "Multi-drop" mode, the polling address must be changed from "0".

A polling address of "1 - 15" is acceptable under "Hart revision 5". The transmitter will set the output to a fixed current of "6 mA". All Multi-drop transmitters are placed in parallel on the Loop.

***Page Has No Content***



**Section 4**  
**Specifications**

## Section 4: Specifications

### 4.1 Transmitter Specifications

**Technology**

RF Admittance / Capacitance

**Supply Voltage**

13-30VDC, 2-wire loop powered

**Output/Digital Protocol**

4-20mA, HART

Compatible with HART®

**Accuracy and Resolution**

Water Cut Range	Nominal Water Cut Variance*	Water Cut Resolution**
-----------------	-----------------------------	------------------------

0 to 1%	+/- 0.03	0.0002
0 to 5%	+/- 0.04	0.0009
0 to 10%	+/- 0.04	0.0009
0 to 30%	+/- 0.12	0.0030
0 to 50%	+/- 0.35	0.0080
0 to 80% (Heavy Oil)	+/- 0.25	0.0035

\* The measurement accuracy of an inline, dynamic water cut measurement is dependent upon many process variables including: oil dielectric consistency, fluid velocity at the sample point, mounting geometry and homogeneity of the oil/water emulsion. The values above represent nominal water cut measurement variances for a properly installed sensor under consistent measurement point conditions.

\*\* The smallest water cut step that the instrument can resolve

**Load Resistance**

Maximum 550 ohms at 24 VDC

Minimum 250 ohms for HART protocol

**Ambient Temperature**

-40°C to 75°C (-40°F to 167°F)

**Process Temperature (Sensing Element)**

Up 232°C (450°F)

**Process Pressure (Sensing Element)**

Up 103 bar (1,500 psi), probe dependent

**Process Connection (Sensing Element)**

NPT, ANSI, and more upon request

**Integral or Remote Configuration**

25 ft max cable length for remote configuration

**Response Time**

350 msec nominal (no damping applied)

1-90 seconds programmable damping time

**Supply Voltage Effect**

0.2% of full scale max

**Temperature Effect**

0.5% per 100°F (37.7°C) change

**Start-Up Time**

< 12 seconds

**Configuration and Calibration**

Standard LCD display and keypad are built-in

HRTWIN™ PC-based software (free download)

**Emission and Surge Protection**

Compliant with IEC6100-4.2, 3, 4, 6, 8

Compliant with CISPR11 Group I, Class B

**Approvals**

Intrinsically Safe (IS)

Explosion Proof (XP) without IS barrier



**Section 5**  
**Normal Maintenance**

## **Section 5: Normal Maintenance**

### **5.1 Viewport Cleaning**

The viewport (if supplied) is made of Borosilicate glass and can be cleaned with any common glass cleaning product (e.g.: Windex™, Isopropyl alcohol, etc.) that is suitable for the Class and Division rating of the specific system installation.

**Section 6**  
**Hazardous Locations**

## Section 6: Hazardous Location Approval Supplementary Installation & Operating Instructions

### 6.1 General safety information

This document contains installation instructions for potentially explosive atmosphere applications.

The Universal UIV is approved for use in hazardous locations when properly installed. Control drawings detailing installation guidelines are available in **Section 8**.

Always Install to Local Codes / Requirements / Directives as Mandated by the Authority Having Jurisdiction.

The aluminum enclosure must be protected from mechanical friction and impact that could cause ignition capable sparks.

#### 6.1.2 Warning



- Installation, Start-Up, and Service should only be performed by personnel trained in explosive atmosphere installations.
- Substitution of Components May Impair Intrinsic Safety.

#### 6.1.3 Device Description

The Universal IV is a Continuous Level Measurement System. Measurements are displayed via remote communications or an integrated display screen.

#### 6.1.4 Electrical connection

##### **WARNING! Read the following information carefully.**



- Live Maintenance should only be carried out by Skilled Personnel trained in explosion protection methods.
- Test Equipment used to perform “Live Maintenance” must be certified to use in the associated hazardous area.

##### **Intrinsically Safe Installations**



When the Universal IV is installed as an intrinsically safe device per the agency control drawings, the housing cover may be safely opened. For system configuration, remove the view port housing cover to access the display keypad for local system configuration.

##### **Explosionproof or Flameproof Installations**



No Live maintenance is permitted. Disconnect power to the device and check that the atmosphere is clear of hazardous substances.

## 6.1.5 Commissioning

### Start-up checklist



Do not connect power until you have gone through the checklist below

1. Are the wetted components (gasket, flange and sensing element) resistant to the corrosive properties of the tank product?
2. Does the information given on the nameplate correspond with the application?
3. Ex d applications: Have you connected the equipotential bonding system correctly?
4. Ex i applications: Are you using an intrinsic barrier within the correct parameters?
5. Did you install cable entries of the correct internal diameter so that there is a good seal around the cable? Are the cable glands suitably certified per the application and the hazardous area parameters?
6. Do not use the earth terminal in the wiring compartment: use the equipotential bonding system.

## 6.2 The Compartment Cover

Viewport Cleaning: The viewport is made of Borosilicate glass and can be cleaned with any common glass cleaning product (e.g.: Windex™, Isopropyl alcohol, etc.) that is suitable for the Class and Division rating of the specific system installation.

### 6.2.1 Opening the cover

Procedure

1. Unscrew cover stop, if applicable
2. Unscrew terminal compartment cover

### 6.2.2 Closing the cover



**Warning: Ex d [ia] applications**

Check that the terminal compartment cover is screwed tight and the cover stop (if applicable) is fastened tightly to the cover.

## 6.3 Standards and Approvals

### 6.3.1 FM US Approvals - Install per 420-0004-412-CD

The Universal IV Level Transmitter is rated as Intrinsically Safe for Class I, II and III, Groups A-G and Class I, Zone 0, Group IIC, in accordance with drawing 420-0004-412-CD; Nonincendive Class I, Division 2, Groups A-D Hazardous (Classified) Locations.

Furthermore, the Integral version is rated as Explosionproof for Class I, Division 1, Groups C & D; Dust Ignitionproof for Class II & III, Division 1, Groups E-G and Class I, Zone 1, Group IIB Hazardous (Classified) Locations with an integral sensor that is Intrinsically Safe for Class I, II & III, Groups A-G and Class I, Zone 1 Hazardous (Classified) Locations. The Remote version is rated as Explosionproof Class I, Division 1, Groups C & D; Dust-Ignitionproof for Class II & III, Division 1, Groups E-G and Class I, Zone 1, Group IIB Hazardous (Classified) Locations with connections to a 700 Series sensor that is Intrinsically Safe for Class I, II & III, Groups A-G and Class I, Zone 1 Hazardous (Classified) Locations.

### 6.3.2 FM Canada Approvals - Install per 420-0004-412-CD

The Universal IV Level Transmitter is rated as Intrinsically Safe for Class I, II and III, Groups A-G and Class I, Zone 0, Group IIC, in accordance with drawing 420-0004-412-CD; Nonincendive Class I, Division 2, Groups A-D Hazardous Locations.

Furthermore, the Integral version is rated as Explosionproof for Class I, Division 1, Groups C & D; Dust Ignitionproof for Class II & III, Division 1, Groups E-G and Class I, Zone 1, Group IIB Hazardous Locations with an integral sensor that is Intrinsically Safe for Class I, II & III, Groups A-G and Class I, Zone 1 Hazardous Locations. The Remote version is rated as Explosionproof Class I, Division 1, Groups C & D; Dust-Ignitionproof for Class II & III, Division 1, Groups E-G and Class I, Zone 1, Group IIB Hazardous Locations with connections to a 700 Series sensor that is Intrinsically Safe for Class I, II & III, Groups A-G and Class I, Zone 1 Hazardous Locations.



## 6.3 Standards and Approvals (Continued)

### 6.3.3 ATEX Approvals - Install per 420-0004-424-CD

Universal IV Level Transmitter – Integral

II 1 G Ex ia IIC T4 Ga  $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$ ; IP66 (For models U\*\*103\*\*00-\*.\*)

II 2 G Ex d ia IIB T4 Gb  $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$ ; IP66 (For models U\*\*104\*\*00-\*.\*)

II 2 D Ex tb ia IIIC Db T90°C  $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$ ; IP66 (For models U\*\*104\*\*00-\*.\*)

Universal IV Level Transmitter – Remote (excluding models U\*\*10\*\*\*00-\*.\*)

II 1 G Ex ia IIC T4  $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$ ; IP66 (For models U\*\*103\*\*\*0-\*.\*)

II 2 (1) G Ex d [ia] IIB T4  $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$ ; IP66 (For models U\*\*104\*\*\*0-\*.\*)

II 2 (1) D Ex tb [ia] IIIC T90°C  $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$ ; IP66 (For models U\*\*10\*\*\*0-\*.\*)

700-\*, Universal IV Sensors

II 1 G Ex ia IIC T2...T5 Ga  $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$

II 1 D Ex ia IIIC T300°C...T90°C Da  $-40^{\circ}\text{C} \leq T_{\text{amb}} \leq +75^{\circ}\text{C}$

### 6.3.4 IECEx Approvals - Install per 420-0004-424-CD

Integral:

Ex ia IIC T4 Ga; Ex d ia IIB T4 Gb; Ex tb ia IIIC T90°C Db;  $-40^{\circ}\text{C} \leq T_{\text{a}} \leq +75^{\circ}\text{C}$ ; IP66

Input Voltage: 13-30Vdc; 1W

Remote:

Ex ia IIC T4 Ga; Ex tb [ia] IIIC T90°C Db; Ex d [ia] IIB T4 Gb; Ex tb [ia] IIIC T90°C

Db;  $-40^{\circ}\text{C} \leq T_{\text{a}} \leq +75^{\circ}\text{C}$ ; IP66

Input Voltage: 13-30Vdc; 1W

Remote Sensor:

Ex ia IIC T5 ... T2 Ga; Ex ia IIIC T90°C ... T300°C Da;  $-40^{\circ}\text{C} \leq T_{\text{a}} \leq +75^{\circ}\text{C}$ ; IP66

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# **Section 7**

## **Troubleshooting**

## Section 7: Troubleshooting

Problem/Symptom	Tests in order of probability	Reference Section(s)	Comments
Can't communicate with transmitter using Drexelbrook PC Software	Check modem connections Check for 250 Ω resistance (min.) in the loop. Check voltage at transmitter Try another modem Power from a battery source	7.2 and 7.3	Often a result of loop connection problems or output current > 20 mA
0 mA output all the time (no measurable output current at any time)	Check voltage at transmitter Check polarity of loop	7.2	Probable loop problem. Faulty connection in loop
More than 20 mA output all the time	Check for moisture in housing Check transmitter Verify sensing element wiring is correct Test Sensing Element Check Calibration	7.4 7.6	
Output drifts (output accuracy varies slowly over time...e.g. hours or days)	Test transmitter without sensing element (drift test)	7.5	
Output erratic - (output jumps around noticeably in terms of seconds or minutes)	Check probe and cable Check for radio interference Check for noise on loop	7.6 7.7	Erratic readings often show actual process conditions. Look for bubbles or stratification, etc.
Output intermittent (output jumps quickly usually between >4mA and some "on scale" value)	Check signal loop connections Possible water slug	7.2	Intermittent Loop Connection
Inaccurate readings (% water readings are incorrect compared to sample)	Check calibration Check method of comparison	3	
Reading does not change with level	Check cables Check sensing element	7.6	Verify % water reading.
Output goes in opposite direction from level change	Check LRV/URV	3	Probable LRV/URV reversal.
<b>Application related problems</b>	<b>Comments</b>		
Gas bubbles	The presence of gas bubbles will decrease the dielectric constant of the liquid and therefore the reading. Bubbles must be eliminated for proper operation. Situations that can result in pressure drops, such as changing pipe diameters, should be avoided.		
Separation of oil and water	A homogeneous mixture is required for proper operation. Consider using an upstream mixer if separation is suspected.		

*Table 7-1 Problem / Symptom Chart*

## 7.1 Identifying a Problem/Symptom



Use Table 7-1 as a guide to find and correct a problem when it occurs. Most problems are not related to transmitter failure. It is important to be methodical when tracking down a problem. If you experience a problem that you cannot solve using this guide, call Drexelbrook Service at 215-674-1234. You may also E-mail us at the Internet address: [drexelbrook.service@ametek.com](mailto:drexelbrook.service@ametek.com). Further service information may be found at our World Wide Web address [www.drexelbrook.com](http://www.drexelbrook.com).

When you contact us, be prepared to give the service person as much information as you can about the model numbers, serial numbers, application requirements, and the materials being measured.

## 7.2 Troubleshooting Loop Connection

Specific transmitter loop connections will vary from installation to installation but in general will be connected in a similar manner to typical transmitter loop in **Figure 2-3**. When troubleshooting the loop connection, verify the following items.

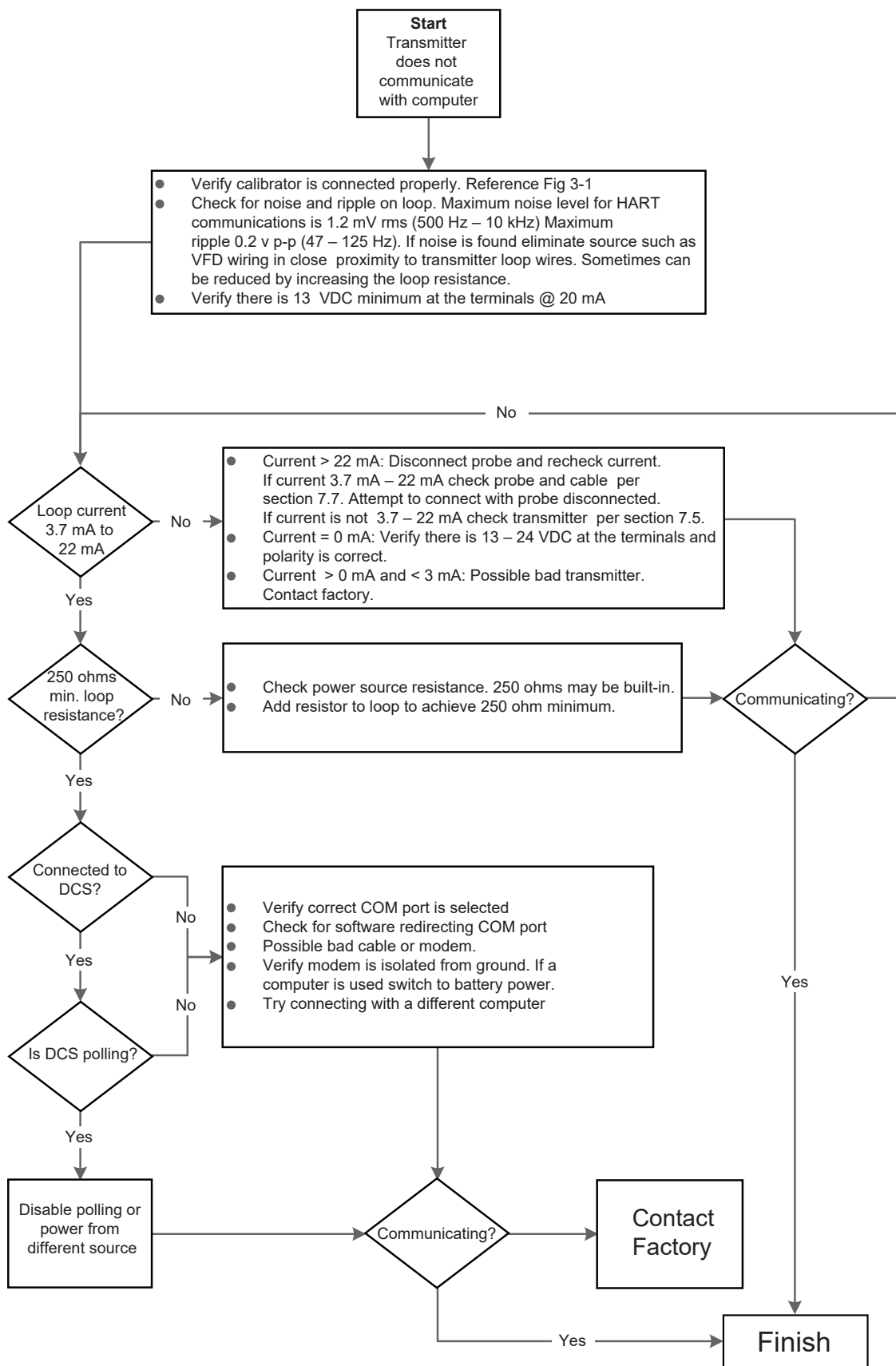
1. Loop devices are wired in series.
2. There is at least 250 ohms total loop resistance for HART communications.
3. There is at least 13 VDC available for the transmitter when a loop current of 20 mA is flowing.
4. The open circuit voltage does not exceed 30 VDC
5. Power the unit from a portable source. 3 – 9 volt batteries in series will produce 27 VDC

## 7.3 Radio Frequency interference

All Drexelbrook transmitters have a significant amount of RFI protection built in. However, there are situations where the standard protection is inadequate. RFI filters are available to provide additional protection for the 4-20 mA loop from unusually difficult sources of interference. Proper grounding and careful attention to installation practices can usually make them unnecessary. Some recommended installation practices are referenced in Section 2.

If RFI continues to be a problem, contact the Drexelbrook service department for the proper filters and assistance.

## 7.4 Transmitter Does Not Communicate with HRTWin Software



## 7.5 Transmitter Function Test

If the unit is reading an incorrect value it is necessary perform the following steps .

1. Verify the transmitter power is correct. (10-30 VDC, 13 VDC-22mA or 18VDC-22mA with 250 Ohms)
2. Disconnect power
3. Remove the transmitter from the housing.
4. Apply power
5. Perform a factory reset using Fct 6.01
6. Reset Water Cut range to 0-5% Light Fct 1.01
  - A. Unit should display 13.xx pf. If not correct, contact factory
  - B. If (A) is correct, remove probe wires from the mounting board and install transmitter in housing. Unit should now show 7.xx pf. If this is correct, transmitter is operating properly. If this is not correct, contact factory.

## 7.6 Transmitter Drift Test

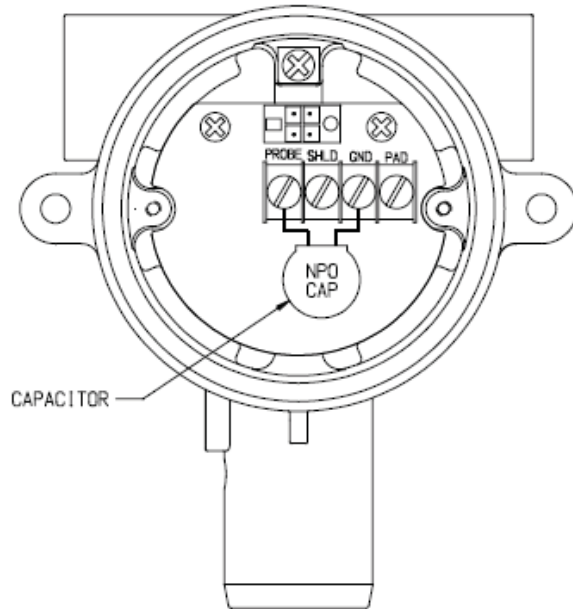
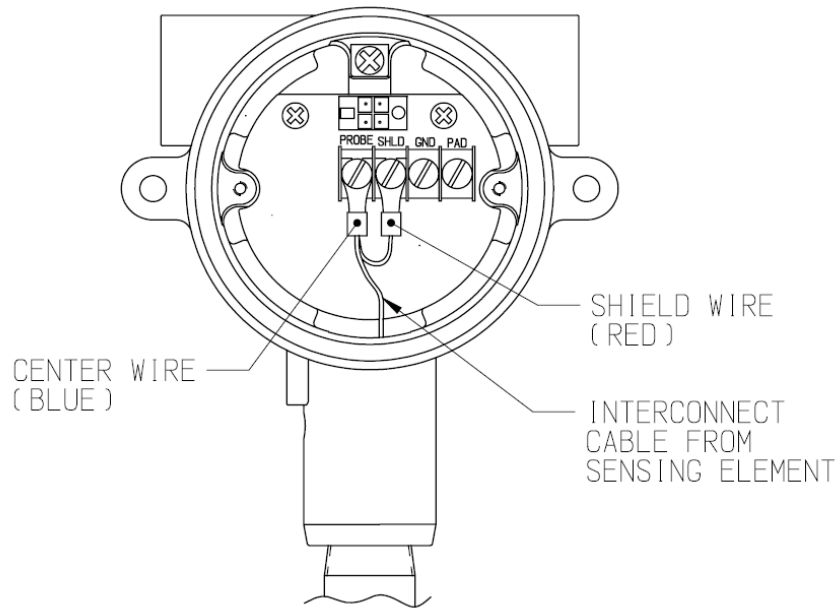


If symptoms point toward calibration drift, it is important to determine if the apparent drift is coming from the transmitter, the sensing element, or the application of the equipment. The following test determines if the transmitter is stable. In most cases, no drift will be found in the transmitter.



1. Disconnect the coaxial cable from the transmitter terminals.
2. Without changing any data stored in the transmitter;
  - A. Connect a Drexelbrook capacitance substitution box (401-0006-008) or an NPO test capacitor from the "PROBE" terminal to the **Left** "GND" terminal on the transmitter "Figure 7-1" on page <OT>. (Select a capacitance value that produces between 4 and 20 mA of loop current.)
3. Observe the loop current See "Figure 7-2" on page 46 over a 12-hour period to confirm the stability of the unit. If the readings remain stable for this period, then the problem is not in the transmitter. If the loop current has changed more than 1% during the test period, then the unit is defective. Please contact the Service department for further instructions regarding repair or replacement.

7.6 Transmitter Drift Test (Continued)



*Electronic unit removed to access sensing element board terminal block. Sensing element wires removed.*

*Figure 7-1*



7.6 Transmitter Drift Test (Continued)

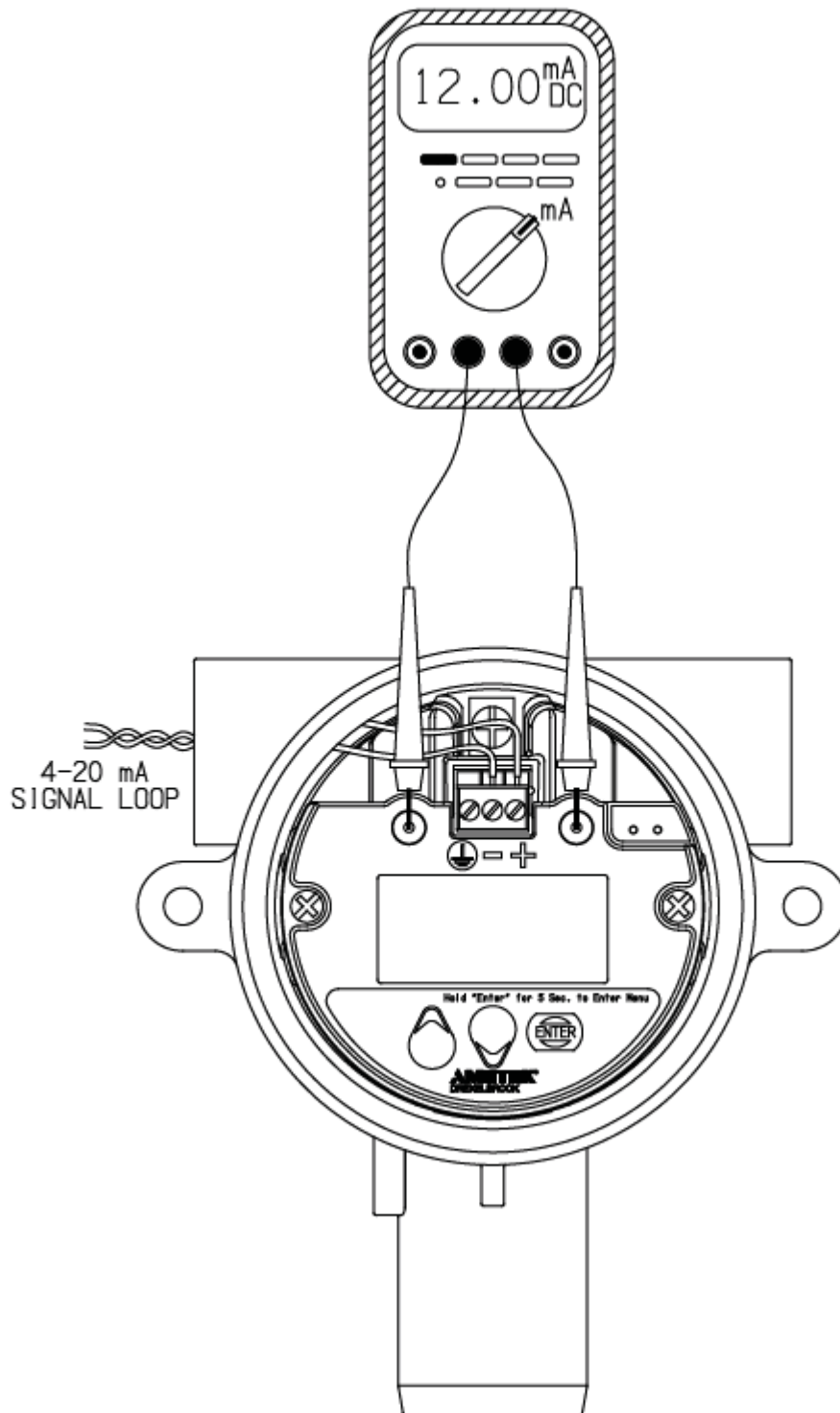


Figure 7-2

## 7.7 Testing the Sensing Element

1. With the sensing element installed normally, remove electronic unit from housing.
2. Test in an empty pipe or pipe filled with oil. Use an analog meter.
3. *Ref Figure 7-3 on page 52.* Remove probe and shield wires. Measure from Probe center wire (Blue) to GRD terminal, Probe center wire (blue) to Shield wire (Red) and Shield wire (Red) to GRD terminal. All reading should be open.
4. Any measurement less than 1 Meg Ohm and probe must be removed from the pipe and retested per #3.
5. If resistance reading was low when it was installed in the pipe and now reads open when removed from pipe, then the probe (sensing element) was touching the pipe wall. Inspect installation for the proper fit keeping the probe (sensing element) centered in the pipe and parallel to the pipe wall.
6. If the resistance reading is still low after removal, check for paraffin buildup on probe and pipe and clean. Retest per #3. If an unsuccessful test is concluded then run the Cable Test below.

### 7.71 Testing the Cable

1. Integral system
    - A. Probe center Wire (Blue) should be shorted to the tip of the probe (listed as center rod (active)) in Fig 7-3. Probe center wire (Blue) should be open to ground and the the Shield wire (Red).
    - B. Shield wire (Red) should be shorted to the probe shield (listed as Cote Shield Element in Fig 7-3.) and open to probe (Center Rod Active) and ground screws.
- \*Any bad reading indicates that there is a faulty probe or wires. Consult Factory.

2. Remote system cables
    - A. Disconnect wires from the probe and electronic mounting board. PErform an end to end continulity test of each wire and check to insure that they are isolated from one another.
- \*Any bad reading indicates that there are faulty wires. Repair or replace cable.

*Table 7-2*

7.7 Testing the Sensing Element - RF Admittance (Continued)

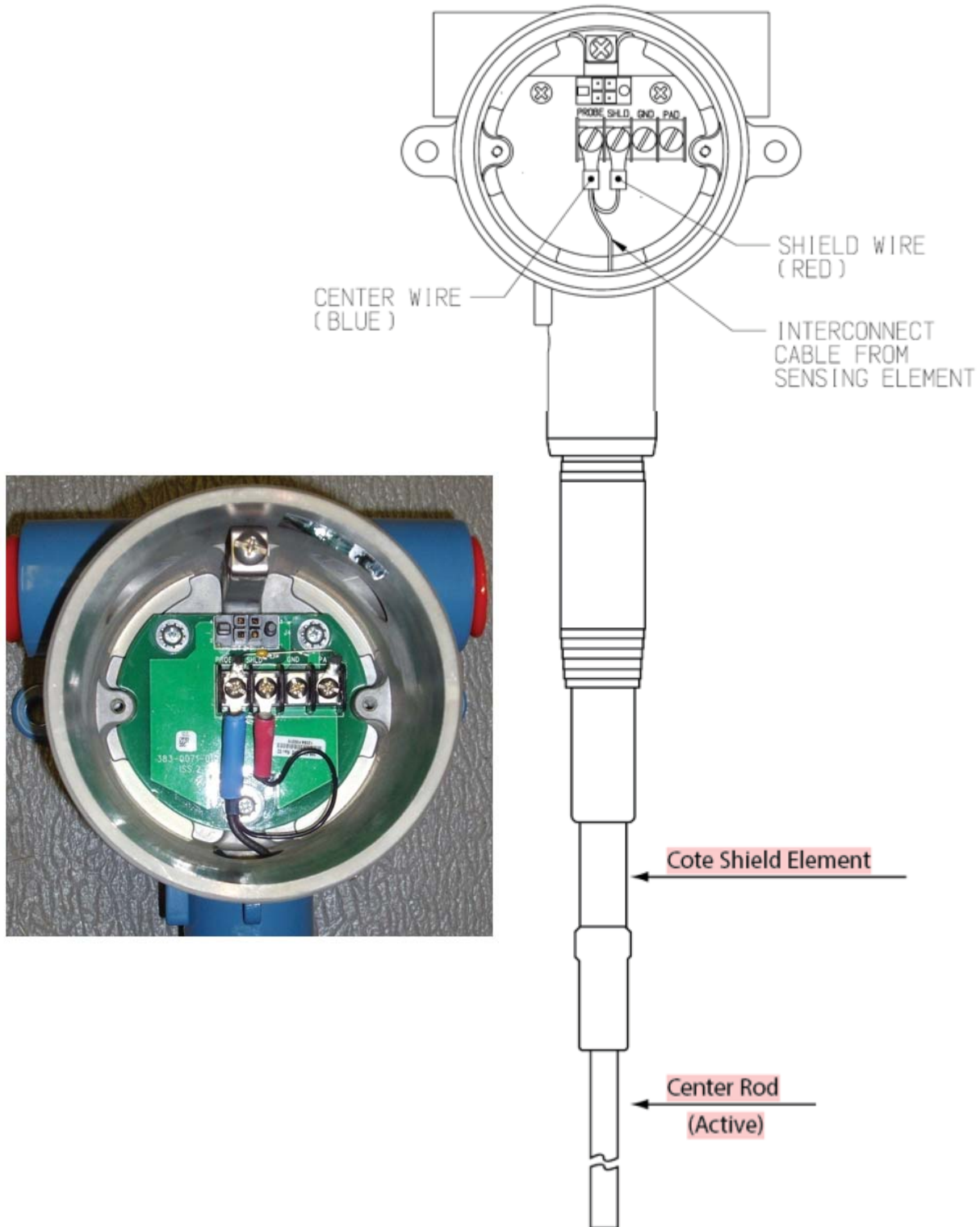


Figure 7-3

## 7.8 Status Messages

The Universal IV CM has two types of error conditions, critical and non-critical. Critical error conditions cause device to go to a fault state loop current and scroll a message across the display. Non-critical error conditions allow the unit to continue normal operations, but scroll a message across the display to indicate to the user the nature of the non-critical faults. Most non-critical errors are the result of a transient condition affecting a very small number of readings and are not indicative of a failure but informational only.

### Critical Errors

Below is a list of all the critical errors that can occur in the U-IV Cut Monitor:

Error Message:	<b>SENSOR CRITICAL SHIELD ERROR</b>
Cause:	The preamp has failed to take a shield reading for 10 consecutive attempts.
Action:	Contact factory
Error Message:	<b>SENSOR CRITICAL PROBE ERROR</b>
Cause:	The preamp has failed to take a probe reading for 10 consecutive attempts. Most likely cause is a capacitance reading above the calibrated range
Action:	Perform sensing element and cable tests in troubleshooting section. Verify calibration and configuration parameters are set correctly. Contact factory
Error Message:	<b>SENSOR CRITICAL REF CAP ERROR</b>
Cause:	The preamp has failed to take a reference cap reading for 10 consecutive attempts.
Action:	Contact factory
Error Message:	<b>SENSOR CRITICAL COMM ERROR</b>
Cause:	The output module has failed to communicate with the preamp for 20 consecutive readings.
Action:	Contact factory.
Error Message:	<b>SENSOR STACK OVERFLOW</b>
Cause:	An error has occurred during operation that corrupted the SRAM.
Action:	Contact factory.
Error Message:	<b>SENSOR FLASH CKSM ERROR</b>
Cause:	The preamp failed the checksum test on power-up.
Action:	The unit needs to be replaced. Contact factory.
Error Message:	<b>SENSOR SPI ERROR</b>
Cause:	Preamp could not communicate with A2D through SPI bus.
Action:	Contact factory.
Error Message:	<b>SENSOR INVALID PROFILE</b>
Cause:	An invalid profile has been downloaded to the preamp.
Action:	Contact factory.
Error Message:	<b>POWER UP FAILURE</b>
Cause:	The output module failed to download all startup parameters to the preamp.
Action:	Cycle power to the system to attempt power-up procedure again. Contact factory
Error Message:	<b>FLASH CKSM ERROR</b>

## 7.8 Status Messages (Continued)

Cause:	The output module failed the checksum test on power-up.
Action:	The unit needs to be replaced. Contact factory.
Error Message:	<b>STACK OVERFLOW</b>
Cause:	An error occurred during operation that corrupted the SRAM.
Action:	Contact factory.
Error Message:	<b>FORCED RANGE MODE</b>
Cause:	The output module is in forced range mode because of HART command 215.
Action:	Contact factory.
Error Message:	<b>CALIBRATION SETUP ERROR</b>
Cause:	Calibration parameters produce calculated max capacitance above max range Incorrect configuration or calibration entry
Action:	Review calibration and configuration data Contact factory
Error Message:	<b>BEYOND MAX CAP ERROR</b>
Cause:	Live capacitance has exceed the max capacitance of the unit Probe or sensing element shorted
Action:	Review calibration and configuration data Perform sensing element and cable tests per section 5.5 and 5.6 Contact factory

## 7.8 Status Messages (Continued)

### Noncritical Errors

The following is a list of all the non critical error messages that could be displayed on the U-IV Cut Monitor:

Error Message:	<b>SENSOR NONCRITICAL SHIELD ERROR</b>
Cause:	The preamp encountered an error when attempting to take a shield reading.
Action:	If error persists, contact factory.
Error Message:	<b>SENSOR NONCRITICAL PROBE ERROR</b>
Cause:	The preamp encountered an error when attempting to take a probe reading.
Action:	If error persists see actions for SENSOR CRITICAL PROBE ERROR.
Error Message:	<b>SENSOR NONCRITICAL REF CAP ERROR</b>
Cause:	The preamp encountered an error when attempting to take a ref cap reading.
Action:	If error persists, contact factory.
Error Message:	<b>SENSOR NONCRITICAL LEVEL VALID ERROR</b>
Cause:	The preamp encountered an error when attempting to take a test cap reading.
Action:	If error persists, contact factory.
Error Message:	<b>SENSOR NONCRITICAL COMM ERROR</b>
Cause:	Communication between the output module and the preamp are intermittently timing out.
Action:	If error persists, contact factory.
Error Message:	<b>FIXED CURRENT MODE SET</b>
Cause:	The output module is in fixed current mode because of HART command 40.
Action:	Consult factory.
Error Message:	<b>OVERRANGE</b>
Cause:	% range is over 105%, Level > URV, Cable shield open circuit, Cable or sensing element shorted
Action:	Verify level is within specified operating range, Perform sensing element and cable tests per section 9.8, Contact factory
Error Message:	<b>UNDERRANGE</b>
Cause:	% range is under -5 %, Level < LRV, Cable or sensing element open circuit
Action:	Verify oil does not have gas bubbles, Perform sensing element and cable tests per section 9.8, Contact factory
Error Message:	<b>INVALID CAP</b>
Cause:	Unit has calculated a negative capacitance
Action:	Verify the sensing element is fully covered in oil, Verify sensing element is connected properly, Perform sensing element and cable tests per section 9.8

## 7.9 Factory Assistance

AMETEK Drexelbrook can answer any questions about your level measurement system.



For Technical Support and Customer Assistance: + 215-674-1234

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

- For Technical Assistance call + 215-674-1234,
- FAX: + 215-443-5117,
- E-mail: [drexelbrook.service@ametek.com](mailto:drexelbrook.service@ametek.com)

Please complete the troubleshooting guide, section 7.14, and include any checkout procedures performed with the results.

## 7.10 Field Service

Trained field service engineers 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.

## 7.11 Customer Training

Periodically, AMETEK Drexelbrook instrument training seminars for customers are held at the factory. These sessions are guided by Drexelbrook engineers and specialists, and provide detailed information on all aspects of level measurement, including theory and practice of instrument operation. For more information about these valuable workshops, write to AMETEK Drexelbrook, attention: Communications/ Training Group, or call direct + 215-674-1234.

## 7.12 Return Equipment

Any equipment being returned for evaluation 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 (RA#), contact the Service department at + 215-674-1234.

Please provide the following information:

- Model Number of Return Equipment
- Serial Number
- Process Materials to which equipment has been exposed
- MSDS sheets for any hazardous materials
- Billing Address
- Shipping Address
- Purchase Order No. for Replacement / evaluation

Please include a purchase order even if the returned unit 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.



## 7.13 Universal IV Cut Monitor Troubleshooting Guide

AMETEK Drexelbrook  
 Universal IV™ CM Model Troubleshooting Guide  
 Service Department (215) 674-1234 FAX (215) 443-5117

Service Dept. Contact \_\_\_\_\_

Customer Name \_\_\_\_\_ Company \_\_\_\_\_ City/State \_\_\_\_\_

Phone # \_\_\_\_\_ Fax # \_\_\_\_\_ Email \_\_\_\_\_

Electronic Unit Model # \_\_\_\_\_ Serial # \_\_\_\_\_

Sensing Element Model # \_\_\_\_\_ Serial # \_\_\_\_\_ Insertion Length \_\_\_\_\_ Cote Shield Length \_\_\_\_\_

Process Material \_\_\_\_\_ Temp. \_\_\_\_\_ Press. \_\_\_\_\_ Other \_\_\_\_\_

Provide as much of the following information as possible. **All** of the information is available from the Drexelbrook Calibration Software. Information with an asterisk is available from the display.

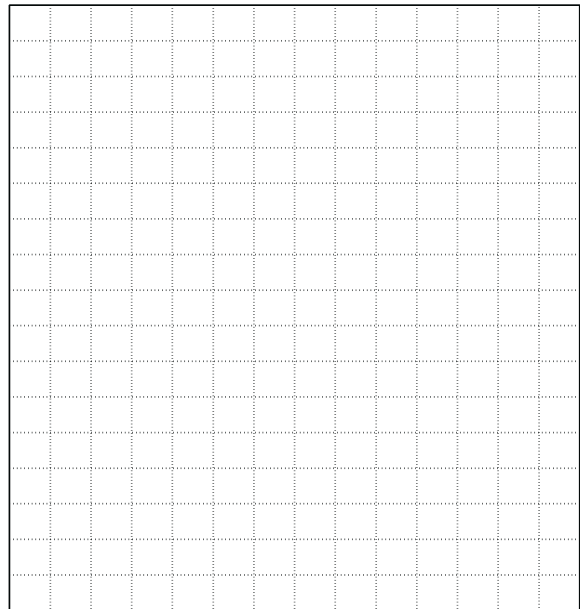
AMETEK Drexelbrook HRTWin Protocol Software Version \_\_\_\_\_

Tag ID \_\_\_\_\_ Serial Number \_\_\_\_\_

Scratch Pad \_\_\_\_\_ Software Version \_\_\_\_\_

\*Damping Time \_\_\_\_\_ Span Range \_\_\_\_\_

Vessel Sketch



Show principal tank dimensions, including vessel construction, mounting location, nozzle, LRV, URV, present level, etc.

**Range Endpoints**

\*LRV (4mA) \_\_\_\_\_

\*URV (20mA) \_\_\_\_\_

**Press F4 for Real-Time View**

\*Temperature     N/A    

\*Water % \_\_\_\_\_

\*Capacitance \_\_\_\_\_

\*Loop Current \_\_\_\_\_

\*Percentage \_\_\_\_\_

\*Status \_\_\_\_\_

**Instrument Configuration**

\*Oil Type \_\_\_\_\_

\*Temperature Units     N/A    

\*Analog Loop Assign. \_\_\_\_\_

\*Temperature Compensation     N/A    

Detailed description of problem: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

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\_\_\_\_\_

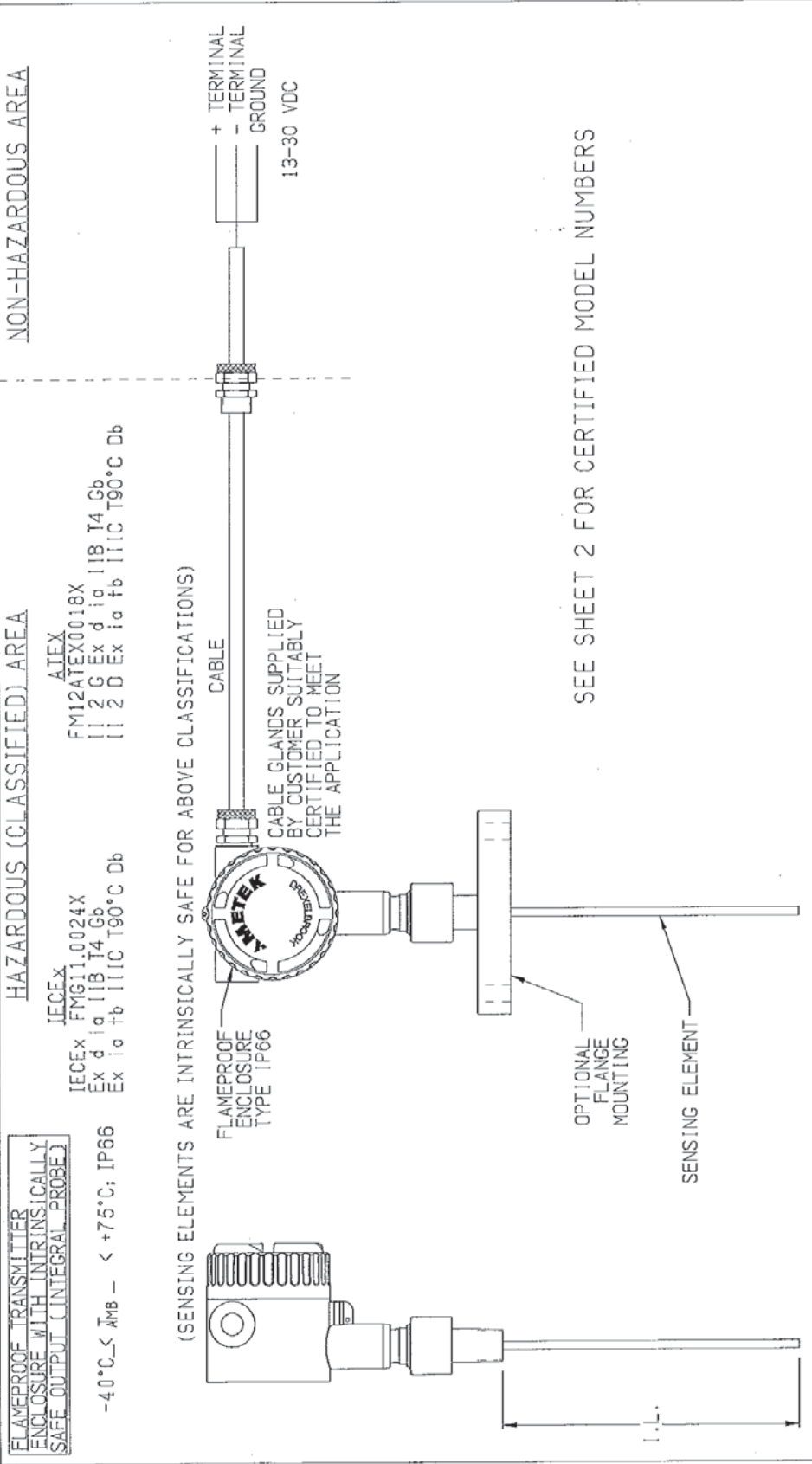
***Page Has No Content***

**Section 8**  
**Control Drawings**

Section 8: Control Drawings

8.1 ATEX / IECEX

NO. 420-0004-424-CD SHT. 1 OF 10



SEE SHEET 2 FOR CERTIFIED MODEL NUMBERS

- NOTES:
1. EUROPEAN LOCAL CODES AND INSTALLATION STANDARDS SHALL BE FOLLOWED.
  2. NO REVISION TO DRAWING WITHOUT PRIOR FM APPROVAL.
  3. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLASURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.

CERTIFIED by _____		7	7-15-103	SGA	7-9-15	COPYRIGHT 2015	<b>AMETEK®</b> <b>DREXELBROOK</b> 205 KEITH VALLEY RD HORSHAM, PA 19044-9986 215-674-1234 FAX 215-674-2731	ATEX - IECEX CONTROL DRAWING FOR UNIVERSAL IV (INTEGRAL) FLAMEPROOF INSTALLATION	420-0004-424-CD SHT. 1 OF 10
PO #	6	2-15-122	SGA	5-6-15	AVETEK DREXELBROOK				
ENG	5	11-14-107	SGA	11-25-14	SCALE NOTE UNLESS OTHERWISE NOTED				
USER	4	7-13-129	SGA	7-29-13	ALL DIMENSIONS IN INCHES (UN)				
DE #	3	12-12-109	SGA	5-21-13	DR. IDH 7-9-15 CK. JEN 7-9-15				

8.1 ATEX / IECEx (Continued)

NO. 420-0004-424-CD SHT 2 OF 10

SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS

Uab10cd000-e-f. Universal IV - Flameproof - Model Code

- a = TYPE P, L, C, T, OR M
- b = FREQUENCY AND PHASING 0, 1, 2, OR 3
- c = APPROVAL 4 (ATEX), 6 (IECEx)
- d = ENTRIES 1 OR 2
- e = SENSING ELEMENT 201, 202, 203, 204, 205, 206, 251, 252, 253, 254, 255,  
256, 257, 258, 259, 260, 261, 262
- f = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

CERTIFIED		7-9-15		7-9-15		COPYRIGHT 2015		ATEX - IECEx CONTROL DRAWING FOR UNIVERSAL IV (INTEGRAL) FLAMEPROOF INSTALLATION	
PO #	by	7-15-103	SGA	5-6-15	AMETEK DREXELBROOK	ISS. SHT. 2 OF 10			
ENG		2-15-122	SGA	11-25-14	SCALE NONE	420-0004-424-CD			
USER		11-14-107	SGA	7-29-13	ALL DIMENSIONS IN INCHES (MM)	7			
		7-13-129	SGA	5-21-13	DR. TDH				
		12-12-109	SGA		DATE				
DE #		ISS. EDO/DSR NO.	APP'D	DATE	DATE				

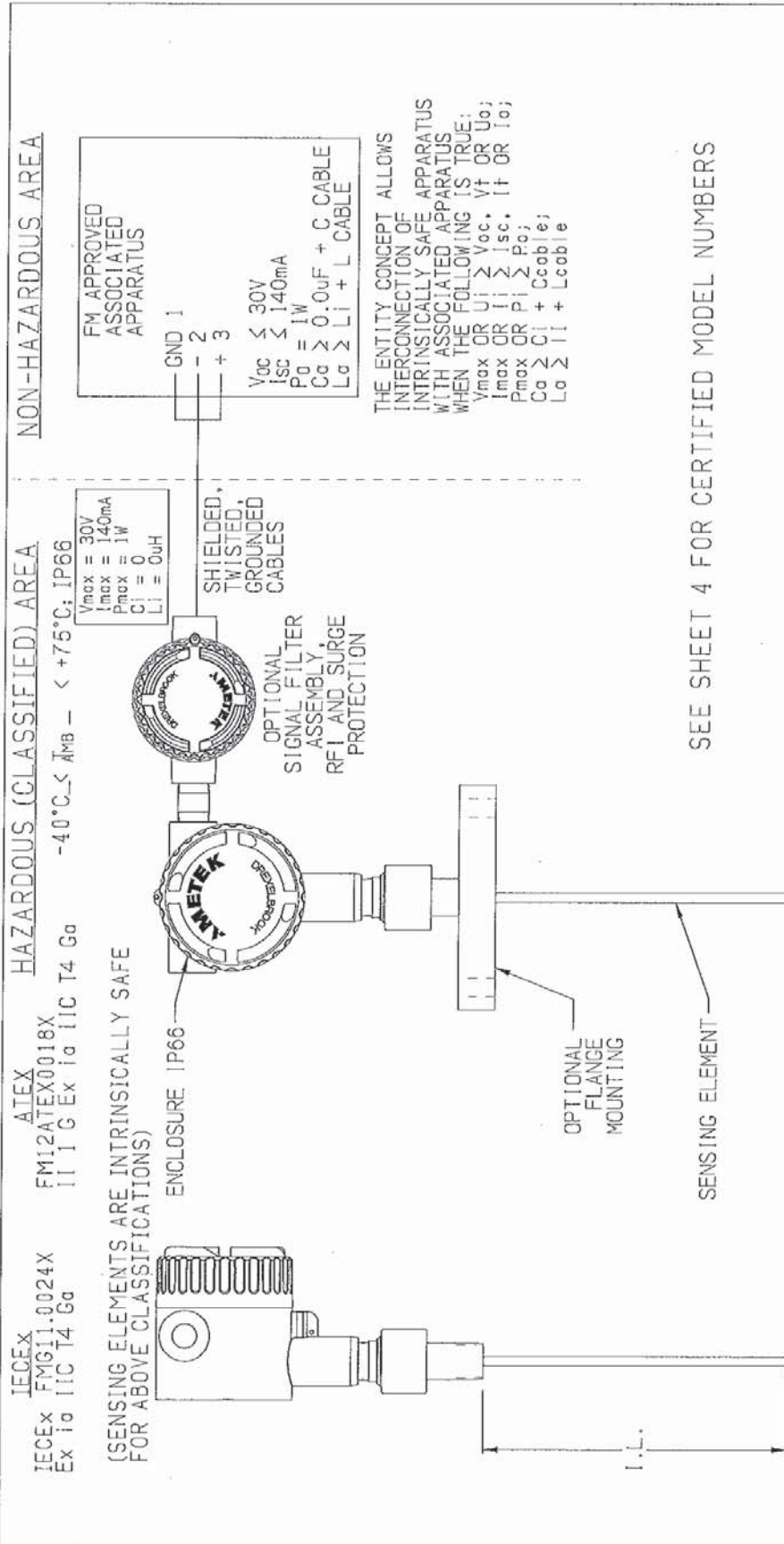


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 215-674-1234  
 FAX 215-674-2731

8.1 ATEX / IECEx (Continued)

NO. 420-0004-424-CD

SHT 3 OF 10



THE ENTITY CONCEPT ALLOWS INTERCONNECTION OF INTRINSICALLY SAFE APPARATUS WITH ASSOCIATED APPARATUS WHEN THE FOLLOWING IS TRUE:

- $V_{\text{max}}$  OR  $U_{\text{i}} \geq V_{\text{oc}}$ ,  $V_{\text{f}}$  OR  $U_{\text{o}}$ ;
- $I_{\text{max}}$  OR  $I_{\text{i}} \geq I_{\text{sc}}$ ,  $I_{\text{f}}$  OR  $I_{\text{o}}$ ;
- $P_{\text{max}}$  OR  $P_{\text{i}} \geq P_{\text{a}}$ ;
- $C_{\text{a}} \geq C_{\text{i}} + C_{\text{cable}}$ ;
- $L_{\text{a}} \geq L_{\text{i}} + L_{\text{cable}}$

SEE SHEET 4 FOR CERTIFIED MODEL NUMBERS

- NOTES:
- EUROPEAN LOCAL CODES AND INSTALLATION STANDARDS SHALL BE FOLLOWED.
  - NO REVISION TO DRAWING WITHOUT PRIOR FM APPROVAL.
  - CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250  $V_{\text{rms}}$  OR  $V_{\text{dc}}$ .
  - ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
  - WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
  - UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.

CERTIFIED by _____		7	7-15-103	SGA	7-9-15	COPYRIGHT 2015
PO #	_____	6	2-15-122	SGA	5-6-15	AMETEK DREXELBROOK
ENG	_____	5	11-14-107	SGA	11-25-14	SCALE NONE
USER	_____	4	7-13-129	SGA	7-29-13	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)
DE #	_____	3	12-12-109	SGA	5-21-13	DR. JTDH 7-9-15
ISS. EDO/DSR NO. APP'D		DATE	CK.	JEN 7-9-15		
205 KEITH VALLEY RD HURSHAM, PA. 19044-9986 215-674-1284 FAX 215-674-2793						
ATEX - IECEX CONTROL DRAWING FOR UNIVERSAL IV (INTEGRAL) IS ENTITY INSTALLATION						SHT. 3 OF 10
420-0004-424-CD						7

8.1 ATEX / IECEx (Continued)

NO. 420-0004-424-CD SHT 4 OF 10

SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS

Uab10cde00-f-g. Universal IV - Integral Intrinsically Safe - Model Code

- a = TYPE P, L, C, T, OR M
- b = FREQUENCY AND PHASING 0, 1, 2, OR 3
- c = APPROVAL 3 (ATEX), 5 (IECEx)
- d = ENTRIES 1 OR 2
- e = SURGE SUPPRESSION 0 OR 1
- f = SENSING ELEMENT R00, R01, R02, R03, R04, R05, 201, 202, 203, 204, 205,  
 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262,  
 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313,  
 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326,  
 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504,  
 505, 506, 507, 508, 509, 510, 511, 512, 513, 601, 603, 604, 605,  
 606, 607, 608, 609, 610, 611, 613, 703, 705, 706, 708, 709, 713,  
 714, 715, 722, ZZZ
- g = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

ZZZ = SPECIAL SENSING ELEMENT  
 700- ANY 7 DIGIT NUMERIC COMBINATION

NOTES:

1. MAXIMUM PROCESS TEMPERATURE 290°C
2. MAXIMUM SENSOR CAPACITANCE < 1uF
3. MAXIMUM INSERTION LENGTH RIGID SENSOR 30 FEET (9.144 METERS)
4. MAXIMUM INSERTION LENGTH FLEXIBLE SENSOR 2000 FEET (609.6 METERS)
5. SENSING ELEMENT ENCLOSURE IP66 (IP RATING DOES NOT APPLY TO  
 SPECIAL SENSORS SUPPLIED WITHOUT A 285- SERIES SENSING ELEMENT ENCLOSURE).

CERTIFIED	7	7-15-103	SGA	7-9-15	COPYRIGHT 2015
PG #	6	2-15-122	SGA	5-6-15	METEK DREXELBROOK
ENG	5	11-14-107	SGA	11-25-14	SCALE NONE
USER	4	7-13-129	SGA	7-29-13	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (IPK)
ISS./EDD./DSR NO./APP'D	3	12-12-109	SGA	5-21-13	DR. TDH 7-9-15
DATE	CK.	JEN 7-9-15			

**METEK®**  
**DREXELBROOK**

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 HORSHAM, PA 19044-9956

215-674-1234  
 FAX 215-674-2731

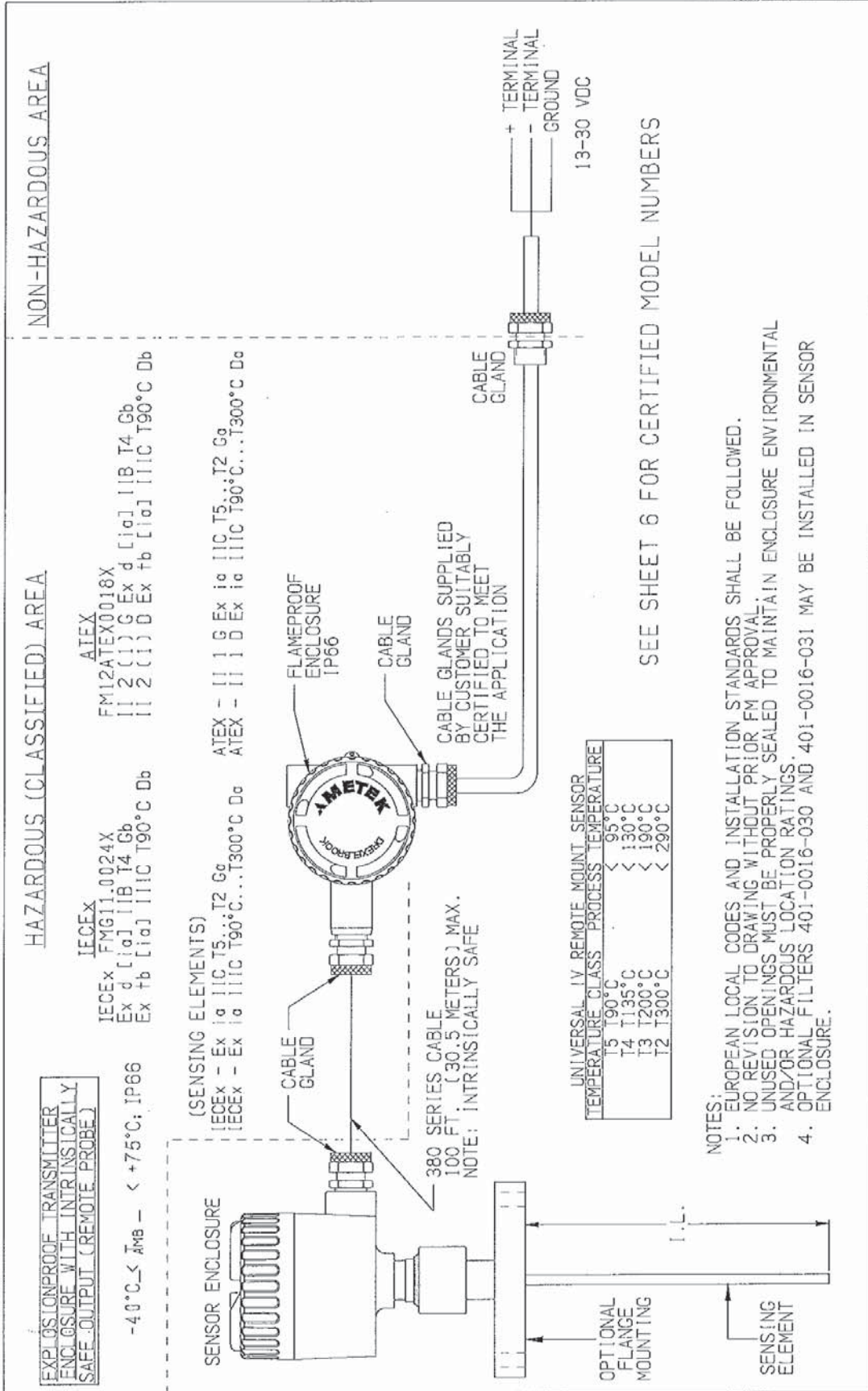
ATEX - IECEx  
 CONTROL DRAWING FOR  
 UNIVERSAL IV (INTEGRAL)  
 IS ENTITY INSTALLATION

420-0004-424-CD SHT 4 OF 10

8.1 ATEX / IECEx (Continued)

NO. 420-0004-424-CD

SHT 5 OF 10



NON-HAZARDOUS AREA

HAZARDOUS (CLASSIFIED) AREA

EXPLOSIONPROOF TRANSMITTER ENCLOSURE WITH INTRINSICALLY SAFE OUTPUT (REMOTE PROBE)

IECEX: FMG11.0024X  
Ex d [ia] IIB T4 Gb  
Ex tb [ia] IIC T90°C Db

IECEX: FMG11.0024X  
Ex d [ia] IIB T4 Gb  
Ex tb [ia] IIC T90°C Db

ATEX: FM12ATEX0018X  
II 2 (1) G Ex d [ia] IIB T4 Gb  
II 2 (1) D Ex tb [ia] IIC T90°C Db

(SENSING ELEMENTS)  
IECEX - Ex ia IIC T5...T2 Gg  
IECEX - Ex ia IIC T90°C...T300°C Dg

ATEX - II 1 G Ex ia IIC T5...T2 Gg  
ATEX - II 1 D Ex ia IIC T90°C...T300°C Dg

FLAMEPROOF ENCLOSURE IP66

CABLE GLAND

CABLE GLANDS SUPPLIED BY CUSTOMER SUITABLY CERTIFIED TO MEET THE APPLICATION

380 SERIES CABLE  
100 FT. (30.5 METERS) MAX.  
NOTE: INTRINSICALLY SAFE

TEMPERATURE CLASS	PROCESS TEMPERATURE
T5 190°C	< 95°C
T4 135°C	< 130°C
T3 200°C	< 190°C
T2 300°C	< 290°C

SEE SHEET 6 FOR CERTIFIED MODEL NUMBERS

- NOTES:
1. EUROPEAN LOCAL CODES AND INSTALLATION STANDARDS SHALL BE FOLLOWED.
  2. NO REVISION TO DRAWING WITHOUT PRIOR FM APPROVAL.
  3. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.
  4. OPTIONAL FILTERS 401-0016-030 AND 401-0016-031 MAY BE INSTALLED IN SENSOR ENCLOSURE.

CERTIFIED	by _____	7-9-15	SGA	7-9-15	COPYRIGHT 2015	ATEX - IECEx CONTROL DRAWING FOR UNIVERSAL IV (REMOTE) FLAMEPROOF INSTALLATION	
PO #		6-15-12	SGA	5-6-15	AMETEK DREXELBROOK	420-0004-424-CD	
ENG		5-14-107	SGA	11-25-14	SCALE NONE	SHT. 5 OF 10	
USER		7-13-129	SGA	7-29-13	SCALE NONE (ALL DIMENSIONS IN INCHES (IN))	SHT. 10 OF 10	
DE #		12-12-109	SGA	5-21-13	DR. IDH 7-9-15	420-0004-424-CD	
ISS. EDO/DSR NO. APP'D	DATE	7-9-15	SGA	5-21-13	CK. JEN 7-9-15	SHT. 5 OF 10	



205 KEITH VALLEY RD  
HORSHAM, PA 19044-9966  
215-674-1234  
FAX 215-674-2731



8.1 ATEX / IECEx (Continued)

NO. 420-0004-424-CD SHT 6 OF 10

SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT IMPACT OR FRICTION.

CERTIFIED MODELS


Uab10cdef0-g-h. Universal IV - Remote Flameproof - Model Code

c = TYPE P, L, OR C  
 b = FREQUENCY AND PHASING 0, 1, 2, OR 3  
 d = APPROVAL 4 (ATEX), 6 (IECEx)  
 e = ENTRIES 1 OR 2  
 f = SURGE SUPPRESSION 0, 4, OR D  
 g = REMOTE CONFIGURATION 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, OR Z  
 h = SENSING ELEMENT R09, 000, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 513, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, ZZZ

ZZZ = SPECIAL SENSING ELEMENT  
 700- ANY 7 DIGIT NUMERIC COMBINATION

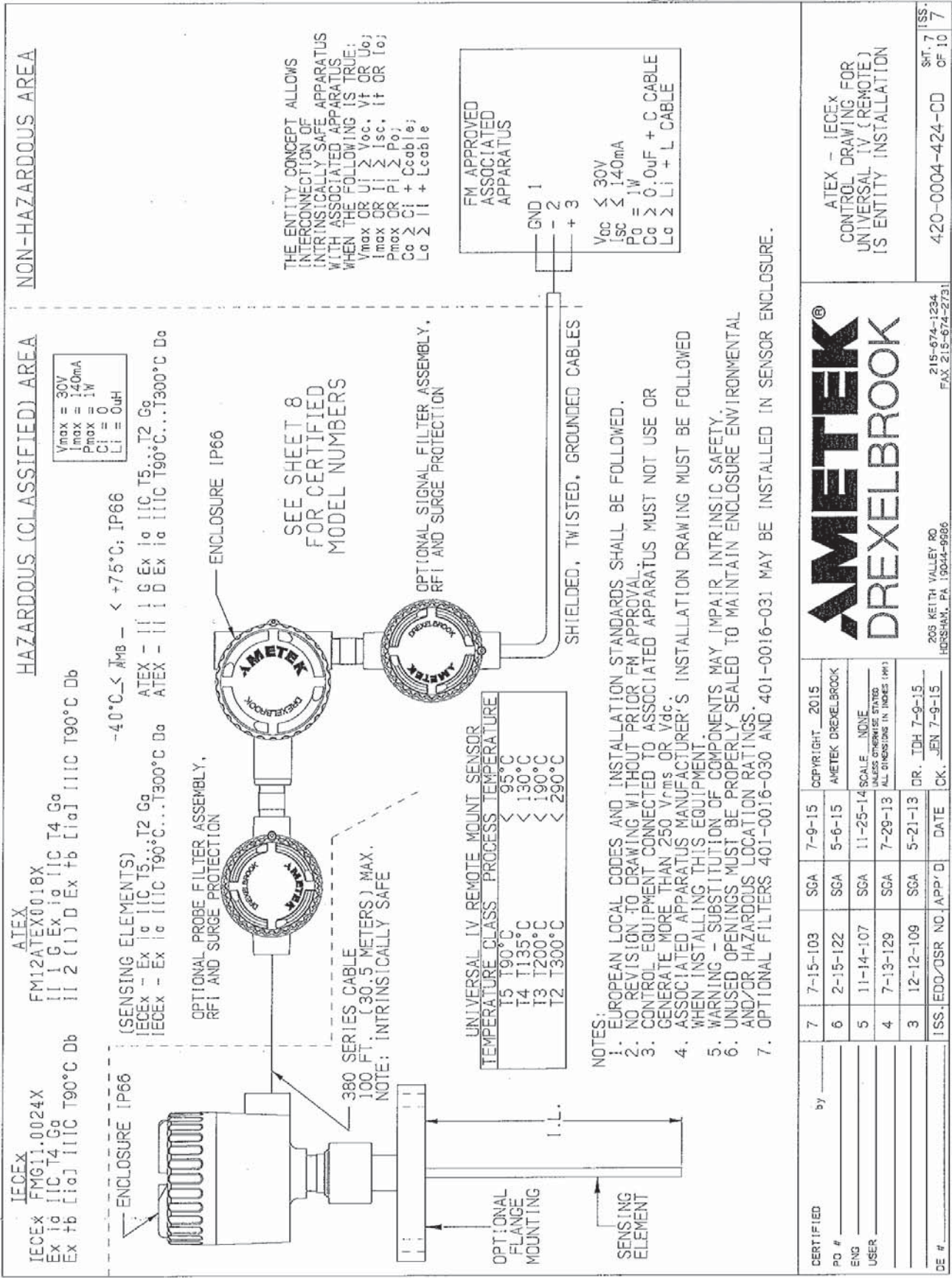
NOTES:

1. MAXIMUM PROCESS TEMPERATURE 290°C
2. MAXIMUM SENSOR CAPACITANCE < 1uF
3. MAXIMUM INSERTION LENGTH *RIGID SENSOR* 30 FEET (9.144 METERS)
4. MAXIMUM INSERTION LENGTH *FLEXIBLE SENSOR* 2000 FEET (609.6 METERS)
5. SENSING ELEMENT ENCLOSURE IP66 (IP RATING DOES NOT APPLY TO SPECIAL SENSORS SUPPLIED WITHOUT A 285- SERIES SENSING ELEMENT ENCLOSURE).

CERTIFIED	by _____	7	7-15-103	SSA	7-9-15	COPYRIGHT 2015	 <p>215-674-1234 FAX 215-674-2731</p> <p>205 KEITH VALLEY RD HORSHAM, PA 19044-9986</p>	ATEX - IECEx CONTROL DRAWING FOR UNIVERSAL IV (REMOTE) FLAMEPROOF INSTALLATION	
PO #	6	2-15-122	SSA	5-6-15	AMETEK DREXELBROOK	DR. TDH 7-9-15 CK. JEN 7-9-15			420-0004-424-CD SHT. 6 OF 10
ENG	5	11-14-107	SSA	11-25-14	SCALE NONE				
USER	4	7-13-129	SSA	7-29-13	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)				
DE #	3	12-12-109	SSA	5-21-13					
ISS. EDO/OSR NO.	APP'D	DATE				ISS. OF	7		

8.1 ATEX / IECEx (Continued)

NO. 420-0004-424-CD SHT 7 OF 10



CERTIFIED	by _____	7-9-15	SGA	7-9-15	COPYRIGHT 2015
PO #		5-6-15	SGA	5-6-15	AMETEK DREXELBROOK
ENG		11-25-14	SGA	11-25-14	SCALE NONE
USER		7-29-13	SGA	7-29-13	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)
DR #		5-21-13	SGA	5-21-13	DR. JDH 7-9-15
ISS. EDO/OSR NO.	APP'D	DATE	CK.	JEN 7-9-15	

ATEX - IECEx CONTROL DRAWING FOR UNIVERSAL IV (REMOTE) IS ENTITY INSTALLATION

205 KEITH VALLEY RD. HORSHAM, PA. 19044-9686  
 215-674-1234  
 FAX 215-674-2731

420-0004-424-CD SHT 7 OF 10

8.1 ATEX / IECEx (Continued)

NO. 420-0004-424-CD

SHT 8 OF 10

SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS


Uab1.0cdef0-g-h. Universal IV - Remote Intrinsically Safe - Model Code

a = TYPE P, L, OR C  
 b = FREQUENCY AND PHASING 0, 1, 2, OR 3  
 c = APPROVAL 3 (ATEX), 5 (IECEx)  
 d = ENTRIES 1 OR 2  
 e = SURGE SUPPRESSION 0, 1, 2, 3, 4, 5, 6, 7, OR D  
 f = REMOTE CONFIGURATION 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, OR Z  
 g = SENSING ELEMENT R09, 000, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 513, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, ZZZ  
 h = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

ZZZ = SPECIAL SENSING ELEMENT  
 700- ANY 7 DIGIT NUMERIC COMBINATION

NOTES:

1. MAXIMUM PROCESS TEMPERATURE 290°C
2. MAXIMUM SENSOR CAPACITANCE < 1uF
3. MAXIMUM INSERTION LENGTH RIGID SENSOR 30 FEET (9.144 METERS)
4. MAXIMUM INSERTION LENGTH FLEXIBLE SENSOR 2000 FEET (609.6 METERS)
5. SENSING ELEMENT ENCLOSURE IP66 (IP RATING DOES NOT APPLY TO SPECIAL SENSORS SUPPLIED WITHOUT A 285- SERIES SENSING ELEMENT ENCLOSURE).

CERTIFIED	7	7-15-103	SGA	7-9-15	COPYRIGHT 2015	 <p>215-674-1234                  FAX 215-674-2731</p> <p>205 KEITH VALLEY RD                  HORSHAM, PA 19044-9986</p>	ATEX - IECEx CONTROL DRAWING FOR UNIVERSAL IV (REMOTE) IS ENTITY INSTALLATION	SHIT. 8 / ISS. OF 10 / 7
PG #	6	2-15-122	SGA	5-6-15	AMETEK DREXELBROOK			
ENG	5	11-14-107	SGA	11-25-14	SCALE NONE			
USER	4	7-13-129	SGA	7-29-13	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)			
DE #	3	12-12-109	SGA	5-21-13	DR. IDH 7-9-15			
ISS, EDO/DSR NO.	APP'D	DATE	CK.	JEN 7-9-15	420-0004-424-CD			



8.2 FM US / FMC (Continued)

NO. 420-0004-412-CD SHT 2 OF 20

SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS

Uab102cd00ef

- a = TYPE P, L, C, T OR M
- b = FREQUENCY AND PHASING 0, 1, 2, 3
- c = ENTRIES 0, 2
- d = SURGE/NOISE SUPPRESSION 0, 1
- e = SENSING ELEMENT: R111, R112, R113, R114, R115, 201, 202, 203, 204, 205,  
 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260,  
 261, 262, 301, 302, 303, 304, 305, 306, 307, 308, 309,  
 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320,  
 321, 322, 323, 324, 325, 326, 327, 502, 503, 504, 505,  
 506, 507, 508, 510, 511, 512, 513, 514, 516, 518,  
 S42, S43, S44, S46, S48
- f = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

CERTIFIED		by _____		11-23-15		COPYRIGHT 2015		FM/FMC CONTROL DRAWING FOR UNIVERSAL IV ( INTEGRAL ) XP INSTALLATION	
PG #	8	6-15-112	SGA	8-13-15	AMETEK DREXELBROOK	ISS. 2 OF 20			
ENG	7	6-15-112	SGA	5-5-15	SCALE NONE	SHT. 2 OF 20			
USER	6	2-15-122	SGA	11-25-14	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (M)	420-0004-412-CD			
	5	11-14-107	SGA	1-15-13	DR. IDH 11-23-15	215-674-1234 FAX 215-674-2731			
	4	12-12-109	SGA	DATE	CK. JEN 11-23-15	205 KEITH VALLEY RD			
DE #	ISS	EDO/DSR NO.	APP'D	DATE					





8.2 FM US / FMC (Continued)

NO. 420-0004-412-CD SHT 4 OF 20


SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS

Uab102cd01ef

- a = TYPE P, L, C, T OR M
- b = FREQUENCY AND PHASING 0, 1, 2, 3
- c = ENTRIES 0, 2
- d = SURGE/NOISE SUPPRESSION 0, 1
- e = SENSING ELEMENT: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111,  
 112, 113, 201, 202, 203, 204, 205, 206, 301, 302, 303,  
 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314,  
 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325,  
 326, 327, 302, S03, S04, S06, S08

f = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

CERTIFIED	8	6-15-112	SGA	11-23-15	COPYRIGHT 2015	 <p>205 KE 11TH VALLEY RD                  HORSBANK, PA 19044-9966                  215-674-1234                  FAX 215-674-2731</p>	FM/FMC CONTROL DRAWING FOR UNIVERSAL IV (INTEGRAL) XP INSTALLATION DUAL SEAL OPTION	SHT. 4 OF 20
PO #	7	6-15-112	SGA	8-13-15	AMETEK DREXELBROOK			
ENG	6	2-15-122	SGA	5-5-15	SCALE NONE			
USER	5	11-14-107	SGA	11-25-14	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)			
DR #	4	12-12-109	SGA	1-15-13	DR. IDH 11-23-15			
ISS/EDO/DSR NO./APP'D				DATE	CK. JEN 11-23-15	420-0004-412-CD	SHT. 4 OF 20	

8.2 FM US / FMC (Continued)

NO. 420-0004-412-CD

SHT 5 OF 20

NON-HAZARDOUS AREA

HAZARDOUS (CLASSIFIED) AREA

FM-CANADA

IS/1, II, III/1/ABCDEFG/T4 Ta=75°C  
 ENTITY; I/O/Ex ia IIC/T4 Ta=75°C  
 ENTITY; NI/1/2/ABCD/T4 Ta=75°C  
 TYPE 4, 4X; IP66

IS/1, II, III/1/ABCDEFG/T4 Ta=75°C  
 ENTITY; I/O/Ex ia IIC/T4 Ta=75°C  
 ENTITY; NI/1/2/ABCD/T6 Ta=75°C

V<sub>max</sub> = 30V  
 I<sub>max</sub> = 140mA  
 P<sub>max</sub> = 1W  
 C<sub>i</sub> = 0  
 L<sub>i</sub> = 0uH

(SENSING ELEMENTS ARE INTRINSICALLY SAFE FOR ALL OF THE ABOVE RATINGS)

FM APPROVED  
 ASSOCIATED  
 APPARATUS

GND 1  
 - 2  
 + 3

V<sub>oc</sub> ≤ 30V  
 I<sub>sc</sub> ≤ 140mA  
 P<sub>o</sub> = 1W  
 C<sub>o</sub> ≥ 0.0uF + C CABLE  
 L<sub>o</sub> ≥ L<sub>i</sub> + L CABLE

SUITABLE WIRING  
 METHOD PER  
 THE AREA  
 CLASSIFICATION

OPTIONAL  
 SIGNAL FILTER  
 ASSEMBLY,  
 RFI AND SURGE  
 PROTECTION

EXPLOSIONPROOF  
 AND FLAMEPROOF  
 ENCLOSURE  
 TYPE 4, 4X, IP66

FLANGE  
 MOUNTING

SENSING ELEMENT

SEE SHEET 6 FOR CERTIFIED MODELS

NOTES:

1. THE INSTALLATION SHALL COMPLY WITH THE RELEVANT REQUIREMENTS OF THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE® (ANSI/NFPA 70) AND THE CANADIAN ELECTRICAL CODE (C22.1) AS APPLICABLE.
2. NO REVISION TO DRAWING WITHOUT PRIOR FM APPROVAL.
3. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 V<sub>rms</sub> OR V<sub>dc</sub>.
4. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
5. DUST-TIGHT BOUNDARY SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS.
6. WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
7. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.

CERTIFIED	by _____	8	6-15-112	SGA	11-23-15	COPYRIGHT 2015
PG #		7	6-15-112	SGA	8-13-15	AMETEK DREXELBROOK
ENG		6	2-15-122	SGA	5-5-15	SCALE NONE
USER		5	11-14-107	SGA	11-25-14	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (IN)
ISS	EDD/DSR NO. APP'D	4	12-12-109	SGA	1-15-13	DR. TDH 11-23-15
DATE	CK.					JEN 11-23-15



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

FM/FMC CONTROL DRAWING FOR  
 UNIVERSAL IV (INTEGRAL)  
 IS ENTITY INSTALLATION

SHT. 5 OF 20

420-0004-412-CD



8.2 FM US / FMC (Continued)

NO. 420-0004-412-CD SHT 6 OF 20

SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS

Uab101cd00ef

a = TYPE P, L, C, T OR M  
 b = FREQUENCY AND PHASING 0, 1, 2, 3  
 c = ENTRIES 0, 2  
 d = SURGE/NOISE SUPPRESSION 0, 1  
 e = SENSING ELEMENT: R00, R01, R02, R03, R04, R05, 201, 202, 203, 204, 205,  
 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260,  
 261, 262, 301, 302, 303, 304, 305, 306, 307, 308, 309,  
 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320,  
 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331,  
 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507,  
 508, 509, 510, 511, 512, 513, 601, 603, 604, 605, 606,  
 607, 608, 609, 610, 611, 613, 703, 705, 706, 708, 709,  
 713, 714, 715, 722, S12, S13, S14, S16, S18, S42, S43,  
 S44, S46, S48, ZZZ\*

f = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

\*ZZZ = SPECIAL SENSING ELEMENT  
 700- ANY 7 DIGIT NUMERIC COMBINATION

NOTES:

1. MAXIMUM PROCESS TEMPERATURE 290°C
2. MAXIMUM SENSOR CAPACITANCE < 1uF
3. MAXIMUM INSERTION LENGTH RIGID SENSOR 30 FEET (9.144 METERS)
4. MAXIMUM INSERTION LENGTH FLEXIBLE SENSOR 2000 FEET (609.6 METERS)
5. SENSING ELEMENT ENCLOSURE IP66 (IP RATING DOES NOT APPLY TO SPECIAL SENSORS SUPPLIED WITHOUT A 285- SERIES SENSING ELEMENT ENCLOSURE).



205 KEITH VALLEY RD  
 HORSHAM, PA 19044-9966

215-674-1234  
 FAX 215-674-2731

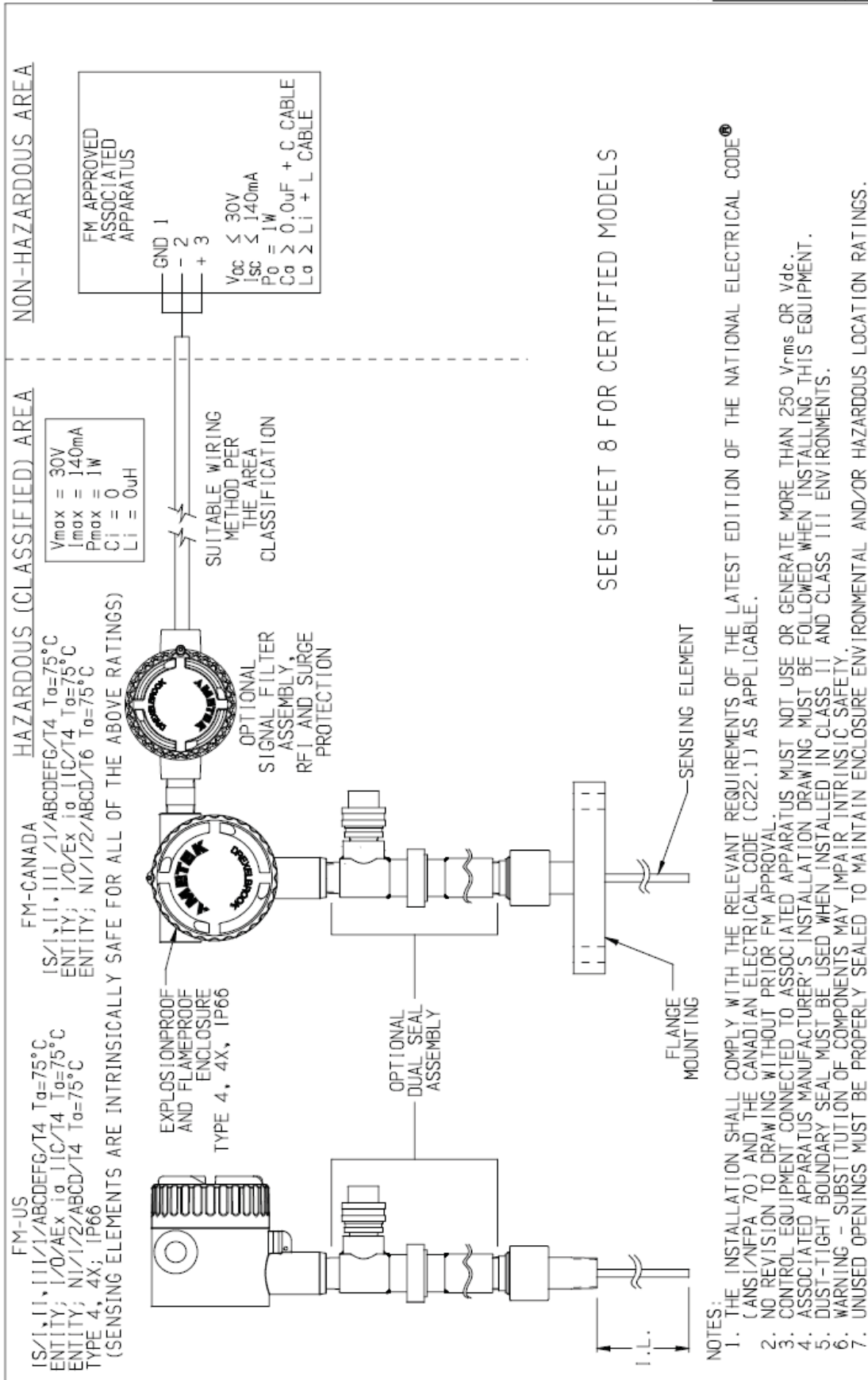
FM/FMC CONTROL DRAWING FOR  
 UNIVERSAL IV (INTEGRAL)  
 IS ENTRY INSTALLATION

420-0004-412-CD SHT. 6 OF 20

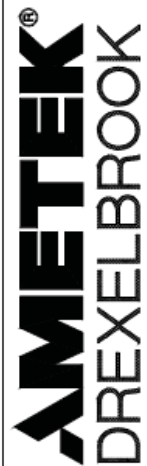
CERTIFIED	8	6-15-112	SGA	11-23-15	COPYRIGHT 2015
PO #	7	6-15-112	SGA	8-13-15	AMETEK DREXELBROOK
ENG	6	2-15-122	SGA	5-5-15	SCALE NONE
USER	5	11-14-107	SGA	11-25-14	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)
DE #	4	12-12-109	SGA	1-15-13	DR. TDH 11-23-15
ISS.		EDD/OSR NO.	APP'D	DATE	CK. JEN 11-23-15

8.2 FM US / FMC (Continued)

NO. 420-0004-412-CD SHT 7 OF 20



CERTIFIED		by		11-23-15		COPYRIGHT 2015	
PO #	8	6-15-112	SGA	11-23-15	AMETEK	DREXELBROOK	
ENG	7	6-15-112	SGA	8-13-15			
USER	6	2-15-122	SGA	5-5-15	SCALE	NONE	
	5	11-14-107	SGA	11-25-14	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)		
	4	12-12-109	SGA	1-15-13	DR.	JDH 11-23-15	
DE #	ISS	EDO/DSR NO.	APP'D	DATE	CK.	JEN 11-23-15	
<p>FM/US IS/1, 1I, 1II, 1/1/1/ABCDEF/T4 Ta=75°C ENTITY; 1/0/AEx ia IIC/T4 Ta=75°C ENTITY; NI/1/2/ABCD/T4 Ta=75°C TYPE 4, 4X; IP66 (SENSING ELEMENTS ARE INTRINSICALLY SAFE FOR ALL OF THE ABOVE RATINGS)</p>							
<p>FM-CANADA IS/1, 1I, 1II, 1/1/1/ABCDEF/T4 Ta=75°C ENTITY; 1/0/Ex ia IIC/T4 Ta=75°C ENTITY; NI/1/2/ABCD/T6 Ta=75°C</p>							
<p>HAZARDOUS (CLASSIFIED) AREA</p>							
<p>NON-HAZARDOUS AREA</p>							
<p>SEE SHEET 8 FOR CERTIFIED MODELS</p>							
<p>NOTES: 1. THE INSTALLATION SHALL COMPLY WITH THE RELEVANT REQUIREMENTS OF THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND THE CANADIAN ELECTRICAL CODE (C22.1) AS APPLICABLE. 2. NO REVISION TO DRAWING WITHOUT PRIOR FM APPROVAL. 3. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc. 4. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT. 5. DUST-TIGHT BOUNDARY SEAL MUST BE USED WHEN INSTALLED IN CLASS II AND CLASS III ENVIRONMENTS. 6. WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY. 7. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.</p>							
<p>FM/FMc CONTROL DRAWING FOR UNIVERSAL IV (INTEGRAL) IS ENTITY INSTALLATION DUAL SEAL OPTION</p>							
<p>205 KEITH VALLEY RD HORSBURG, PA 19044-9066 215-674-1234 FAX 215-674-2731</p>							
<p>420-0004-412-CD SHT. 7 OF 20</p>							



8.2 FM US / FMC (Continued)

NO. 420-0004-412-CD SHT 8 OF 20


SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS

Uab101cd01ef

- a = TYPE P, L, C, T OR M
- b = FREQUENCY AND PHASING 0, 1, 2, 3
- c = ENTRIES 0, 2
- d = SURGE/NOISE SUPPRESSION 0, 1
- e = SENSING ELEMENT: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111,  
 112, 113, 201, 202, 203, 204, 205, 206, 301, 302, 303,  
 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314,  
 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325,  
 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 601,  
 603, 604, 605, 606, 607, 608, 609, 610, 611, 613, S02,  
 S03, S04, S06, S08

f = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

CERTIFIED	by	8	6-15-112	SGA	11-23-15	COPYRIGHT 2015	 <p>205 KEITH VALLEY RD                  HORSBACH, PA 19044-9666                  215-674-1234                  FAX 215-674-2731</p>	FM/FMc CONTROL DRAWING FOR UNIVERSAL IV (INTEGRAL) IS ENTITY INSTALLATION DUAL SEAL OPTION	ISS. 8 OF 20 420-0004-412-CD OF 20 8
PG #		7	6-15-112	SGA	8-13-15	AMETEK DREXELBROOK			
ENG		6	2-15-122	SGA	5-5-15	SCALE NONE			
USER		5	11-14-107	SGA	11-25-14	ALL DIMENSIONS IN INCHES (IN)			
DE #		4	12-12-109	SGA	1-15-13	DR. IDH 11-23-15			
		ISS.	EDO/DSR NO.	APP'D	DATE	CK.	JEN 11-23-15		



8.2 FM US / FMC (Continued)

NO. 420-0004-412-CD SHT 10 OF 20

SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS


Uab102cde0fg

- a = TYPE P, L, OR C.
- b = FREQUENCY AND PHASING 0, 1, 2, 3
- c = ENTRIES 0, 2
- d = SURGE/NOISE SUPPRESSION 0, 1, 2, 3, 4, 5, 6, 7, D
- e = CABLE OPTIONS 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, Z
- f = SENSING ELEMENT: R09, 000, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 513, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, S02, S03, S04, S06, S08, ZZZ\*

g = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

ZZZ = SPECIAL SENSING ELEMENT  
 700- ANY 7 DIGIT NUMERIC COMBINATION

- NOTES:
1. MAXIMUM PROCESS TEMPERATURE 290°C
  2. MAXIMUM SENSOR CAPACITANCE < 1uF
  3. MAXIMUM INSERTION LENGTH *RIGID SENSOR* 30 FEET (9.144 METERS)
  4. MAXIMUM INSERTION LENGTH *FLEXIBLE SENSOR* 2000 FEET (609.6 METERS)
  5. SENSING ELEMENT ENCLOSURE IP66 (IP RATING DOES NOT APPLY TO SPECIAL SENSORS SUPPLIED WITHOUT A 285- SERIES SENSING ELEMENT ENCLOSURE).

CERTIFIED	by	8	6-15-112	SGA	11-23-15	COPYRIGHT	2015
PO #		7	6-15-112	SGA	8-13-15	AMETEK	DREXELBROOK
ENG		6	2-15-122	SGA	5-5-15	SCALE	NONE
USER		5	11-14-107	SGA	11-25-14	INLET/OUTLET	INCHES (MM)
DE #		4	12-12-109	SGA	1-15-13	DR.	IDH 11-23-15
ISS.	EDO/DSR	NO.	APP'D	DATE	CK.	JEN	11-23-15
							
FM/FMc CONTROL DRAWING FOR UNIVERSAL TV (REMOTE) XP INSTALLATION							
420-0004-412-CD							
SHT. 10 OF 20							

215-674-1234  
 FAX 215-674-2731

205 KEITH VALLEY RD



8.2 FM US / FMC (Continued)

NO. 420-0004-412-CU SHT. 12 OF 20

SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS

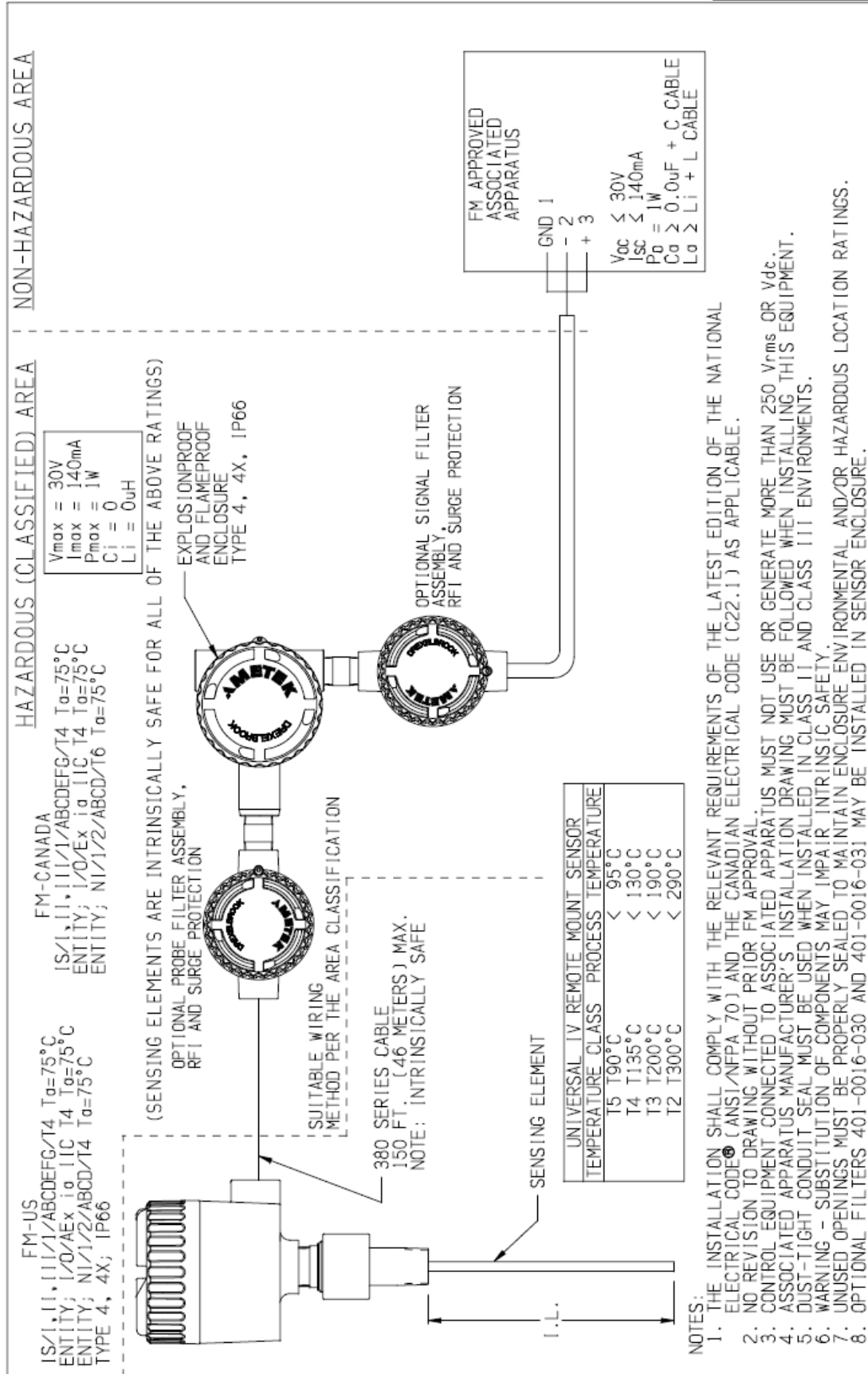
Uab102cde1fg

- a = TYPE P, L, OR C.
- b = FREQUENCY AND PHASING 0, 1, 2, 3
- c = ENTRIES 0, 2
- d = SURGE/NOISE SUPPRESSION 0, 2, 3, 4, 5, 6, 7, D
- e = CABLE OPTIONS: 1, 2, 3, 4, 5, 6, 7, 8, 9, A, C, B, D, E, F, G, H, J, K, L, M, N, P, R, S, Z
- f = SENSING ELEMENT: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, S02, S03, S04, S06, S08
- g = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

CERTIFIED	by	8	6-15-112	SGA	11-23-15	COPYRIGHT 2015	 <p>205 KEITH VALLEY RD                  HORSBURG, PA 19044-9966                  215-674-1234                  FAX 215-674-2731</p>	FM/FMC CONTROL DRAWING FOR UNIVERSAL IV (REMOTE) XP INSTALLATION DUAL SEAL OPTION	420-0004-412-CD SHT. 12 OF 20 ISS. OF 20 8
PO #		7	6-15-112	SGA	8-13-15	AMETEK DREXELBROOK			
ENG		6	2-15-122	SGA	5-5-15	SCALE NONE			
USER		5	11-14-107	SGA	11-25-14	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (IN)			
DE #		4	12-12-109	SGA	1-15-13	DR. IDH 11-23-15			
ISS.	EDO/DSR NO.	APP'D	DATE	CK.	JEN 11-23-15				

8.2 FM US / FMC (Continued)

NO. 420-0004-412-CD SHT 13 OF 20



- NOTES:
1. THE INSTALLATION SHALL COMPLY WITH THE RELEVANT REQUIREMENTS OF THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE® (ANSI/NFPA 70) AND THE CANADIAN ELECTRICAL CODE (C22.1) AS APPLICABLE.
  2. NO REVISION TO DRAWING WITHOUT PRIOR FM APPROVAL.
  3. CONTROL EQUIPMENT CONNECTED TO ASSOCIATED APPARATUS MUST NOT USE OR GENERATE MORE THAN 250 Vrms OR Vdc.
  4. ASSOCIATED APPARATUS MANUFACTURER'S INSTALLATION DRAWING MUST BE FOLLOWED WHEN INSTALLING THIS EQUIPMENT.
  5. DUST-TIGHT CONDUIT SEAL MUST BE USED WHEN INSTALLED IN CLASS I1 AND CLASS I11 ENVIRONMENTS.
  6. WARNING - SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
  7. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.
  8. OPTIONAL FILTERS 401-0016-030 AND 401-0016-031 MAY BE INSTALLED IN SENSOR ENCLOSURE.

**AMETEK®**  
**DREXELBROOK**

205 KEITH VALLEY RD  
HORSHAM, PA 19044-9686  
215-674-1234  
FAX 215-674-2731

CERTIFIED	by	8	6-15-112	SGA	11-23-15	COPYRIGHT	2015
PO #		7	6-15-112	SGA	8-13-15	AMETEK	DREXELBROOK
ENG		6	2-15-122	SGA	5-5-15	SCALE	NONE
USER		5	11-14-107	SGA	11-25-14	UNLESS OTHERWISE STATED	ALL DIMENSIONS IN INCHES (MM)
ISS/EDO/DSR NO./APP'D		4	12-12-109	SGA	1-15-13	DR.	TDH 11-23-15
DE #						DATE	CK. JEN 11-23-15

FM/FMC CONTROL DRAWING FOR  
UNIVERSAL IV (REMOTE)  
IS ENTITY INSTALLATION

420-0004-412-CD SHT 13 OF 20



8.2 FM US / FMC (Continued)

SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS

Uab101cde0fg

- o = TYPE P, L, OR C.
- b = FREQUENCY AND PHASING 0, 1, 2, 3
- c = ENTRIES 0, 2
- d = SURGE/NOISE SUPPRESSION 0, 1, 2, 3, 4, 5, 6, 7, D
- e = CABLE OPTIONS 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, Z
- f = SENSING ELEMENT: R09, 000, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 513, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, S02, S03, S04, S06, S08, ZZZ

g = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

\*ZZZ = SPECIAL SENSING ELEMENT

700- ANY 7 DIGIT NUMERIC COMBINATION

NOTES:

1. MAXIMUM PROCESS TEMPERATURE 290°C
2. MAXIMUM SENSOR CAPACITANCE < 1uF
3. MAXIMUM INSERTION LENGTH RIGID SENSOR 30 FEET (9.144 METERS)
4. MAXIMUM INSERTION LENGTH FLEXIBLE SENSOR 2000 FEET (609.6 METERS)
5. SENSING ELEMENT ENCLOSURE IP66 (IP RATING DOES NOT APPLY TO SPECIAL SENSORS SUPPLIED WITHOUT A 285- SERIES SENSING ELEMENT ENCLOSURE).

CERTIFIED	8	6-15-112	SGA	11-23-15	COPYRIGHT 2015
PO #	7	6-15-112	SGA	8-13-15	AMETEK DREXELBROOK
ENG	6	2-15-122	SGA	5-5-15	SCALE NONE
USER	5	11-14-107	SGA	11-25-14	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)
DE #	4	12-12-109	SGA	1-15-13	DR. TDH 11-23-15
ISS.	EDG/OSR	NO.	APP'D	DATE	CK. JEN 11-23-15

**AMETEK®**  
**DREXELBROOK**

205 KEITH VALLEY RD  
 HORSBANK, PA 19044-9066  
 215-674-1234  
 FAX 215-674-2731

FM/FMC CONTROL DRAWING FOR  
 UNIVERSAL IV (REMOTE)  
 IS ENTITY INSTALLATION

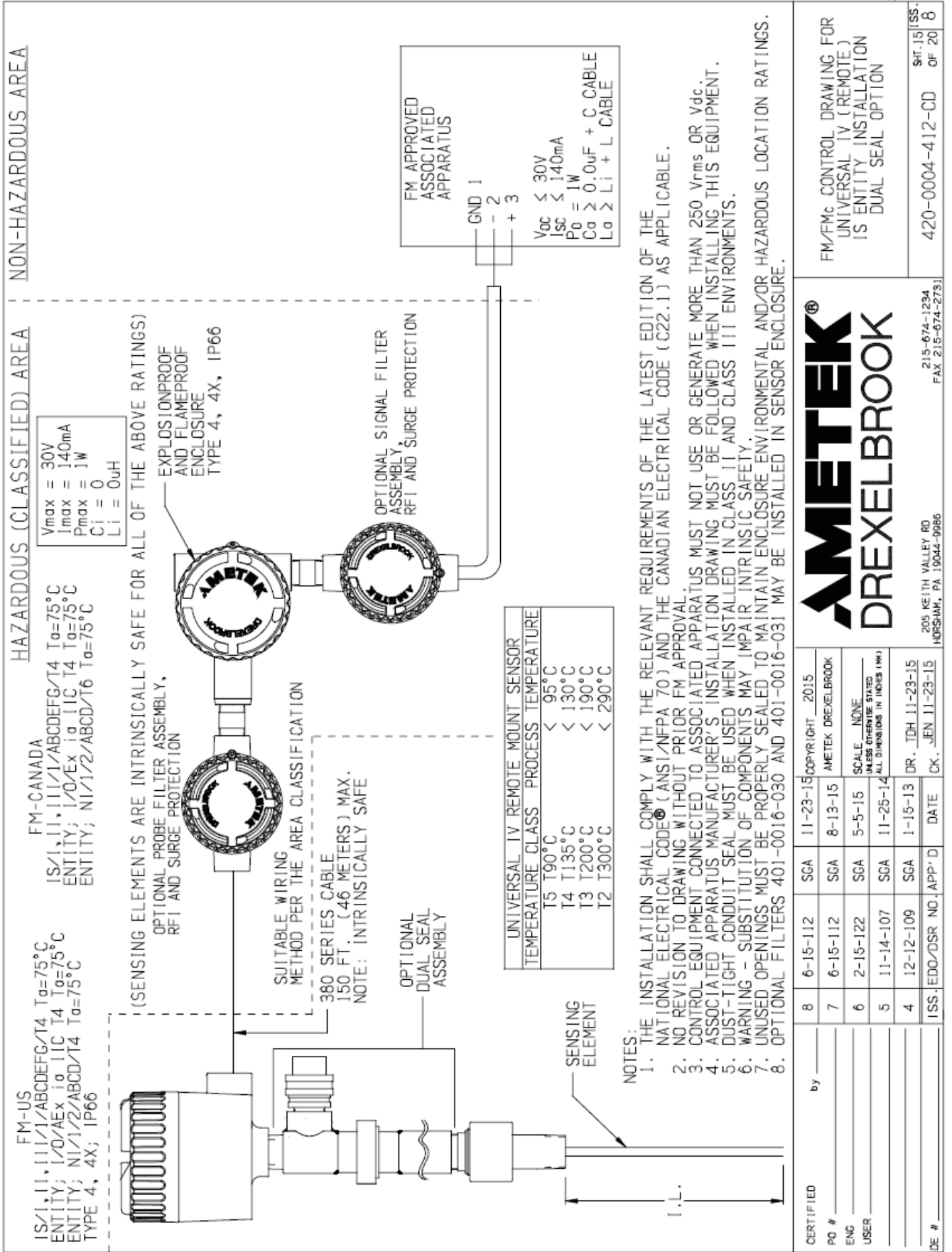
420-0004-412-CD

SHT. 14 OF 18  
 OF 20

8.2 FM US / FMC (Continued)

NO. 420-0004-412-CU

SHT 15 OF 20



205 KEITH VALLEY RD  
HORSBURG, PA 19044-9966

215-674-1234  
FAX 215-674-2731

CERTIFIED	by _____	8	6-15-112	SGA	11-23-15	COPYRIGHT 2015
PO #		7	6-15-112	SGA	8-13-15	AMETEK DREXELBROOK
ENG		6	2-15-122	SGA	5-5-15	SCALE NONE
USER		5	11-14-107	SGA	11-25-14	UNLESS OTHERWISE SPECIFIED ALL DIMENSIONS IN INCHES (MM)
DE #		4	12-12-109	SGA	1-15-13	DR. IDH 11-23-15
ISS. EDD/DSR NO.	APP'D	DATE	CK.	JEN 11-23-15		

FM/FMC CONTROL DRAWING FOR UNIVERSAL IV (REMOTE) IS ENTITY INSTALLATION DUAL SEAL OPTION

420-0004-412-CD

SHT 15 OF 20

8.2 FM US / FMC (Continued)

NO. 420-0004-412-CD SHT 16 OF 20

SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS

Uab101cde1fg

- a = TYPE P, L, OR C.
- b = FREQUENCY AND PHASING 0, 1, 2, 3
- c = ENTRIES 0, 2
- d = SURGE/NOISE SUPPRESSION 0, 1, 2, 3, 4, 5, 6, 7, D
- e = CABLE OPTIONS: 1, 2, 3, 4, 5, 6, 7, 8, 9, A, C, B, D, E, F, G, H, J, K, L, M, N, P, R, S, Z
- f = SENSING ELEMENT: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, S02, S03, S04, S06, S08
- g = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

CERTIFIED	by _____	8	6-15-112	SCA	11-23-15	COPYRIGHT 2015	 <p>205 KEITH VALLEY RD                  HORSHAM, PA 19044-9986                  215-674-1234                  FAX 215-674-2793</p>	FM/FMC CONTROL DRAWING FOR UNIVERSAL IV (REMOTE) IS ENTITY INSTALLATION DUAL SEAL OPTION	SHT. 16 OF 20 ISS. OF 20
PO #	_____	7	6-15-112	SCA	8-13-15	AMETEK DREXELBROOK			
ENG	_____	6	2-15-122	SCA	5-5-15	SCALE NONE			
USER	_____	5	11-14-107	SCA	11-25-14	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)			
DE #	_____	4	12-12-109	SCA	1-15-13	DR. TDH 11-23-15			
ISS.	EDD/USR NO. APP'D	DATE	CK.	JEN 11-23-15			420-0004-412-CD		



8.2 FM US / FMC (Continued)

NO. 420-0004-412-CD SH 18 OF 20


SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS

UDa109bc00de

a = FREQUENCY AND PHASING 0, or R\*  
 b = ENTRIES 0, 2  
 c = SURGE/NOISE SUPPRESSION 0, 1  
 d = SENSING ELEMENT: R111, R112, R113, R114, R115, 201, 202, 203, 204, 205,  
 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260,  
 261, 262, 301, 302, 303, 304, 305, 306, 307, 308, 309,  
 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320,  
 321, 322, 323, 324, 325, 326, 327, 502, 503, 504, 505,  
 506, 507, 508, 510, 511, 512, 512, S12, S13, S14, S16, S18,  
 S42, S43, S44, S46, S48  
 e = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

\*R = Retrofit

CERTIFIED	by _____	8	6-15-112	SCA	11-23-15	COPYRIGHT 2015	AMETEK DREXELBROOK		 <p>205 KEITH VALLEY RD.                  HORSHAM, PA. 19044-9986                  215-674-1234                  FAX 215-674-2731</p>	FM/FMC CONTROL DRAWING FOR UNIVERSAL IV (INTEGRAL) XP INSTALLATION WITH REMOTE DENSITY COMMUNICATIONS MODULE	420-0004-412-CD SH 18 OF 20
PO #	7	6-15-112	SCA	8-13-15	AMETEK DREXELBROOK		SCALE NONE UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (UN)	ISS. 18 OF 20			
ENG	6	2-15-122	SCA	5-5-15							
USER	5	11-14-107	SCA	11-25-14							
DE #	4	12-12-109	SCA	1-15-13	DR. IDH 11-23-15						
		ISS. EDO/DSR NO. APP' D	DATE	CK. JEN 11-23-15							



8.2 FM US / FMC (Continued)

NO. 420-0004-412-CD SHT 20 OF 20

SPECIFIC CONDITIONS FOR USE:  
 THE APPARATUS ENCLOSURE CONTAINS ALUMINUM AND IS CONSIDERED TO  
 CONSTITUTE A POTENTIAL RISK OF IGNITION BY IMPACT OR FRICTION. CARE  
 MUST BE TAKEN INTO ACCOUNT DURING INSTALLATION AND USE TO PREVENT  
 IMPACT OR FRICTION.

CERTIFIED MODELS

UDa109bc01de

a = FREQUENCY AND PHASING 0, or R\*


b = ENTRIES 0, 2

c = SURGE/NOISE SUPPRESSION 0, 1

d = SENSING ELEMENT: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111,  
 112, 113, 201, 202, 203, 204, 205, 206, 301, 302, 303,  
 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314,  
 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325,  
 326, 327, S02, S03, S04, S06, S08

e = 24 CHARACTER NUMBERING SYSTEM THAT DOES NOT AFFECT SAFETY

\*R = Retrofit

CERTIFIED	8	6-15-112	SCA	11-23-15	COPYRIGHT 2015	 <p>AMETEK® DREXELBROOK</p> <p>205 KEITH VALLEY RD HORSHAM, PA. 19044-9966</p> <p>215-674-1234 FAX 215-674-2731</p>	FM/FMC CONTROL DRAWING FOR UNIVERSAL IV (INTEGRAL) XP INSTALLATION WITH REMOTE DENSITY COMMUNICATIONS MODULE, DUAL SEAL OPTION	SHT. 20 OF 20 OF 20 8
PG #	7	6-15-112	SCA	8-13-15	AMETEK DREXELBROOK			
ENG	6	2-15-122	SCA	5-5-15	SCALE NONE			
USER	5	11-14-107	SCA	11-25-14	UNLESS OTHERWISE STATED ALL DIMENSIONS IN INCHES (MM)			
DR #	4	12-12-109	SCA	1-15-13	DR. JDH 11-23-15			
ISS. EDD/DSR NO. APP'D				DATE	CK. JEN 11-23-15	420-0004-412-CD		

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**Section 9**  
**Approval Certificates**

## Section 9: Approval Certificates

### 9.1 FM US Approval Certificate

<b>420-0004-429</b>		Shl. of	1 6	APPD BY SGA
ISSUE	EDO NO.	APPD	DATE	
5	2-16-112	THP	2-16-16	
6	2-16-121	Scf	6-17-16	



Member of the FM Global Group

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

# CERTIFICATE OF COMPLIANCE

## HAZARDOUS (CLASSIFIED) LOCATION ELECTRICAL EQUIPMENT

This certificate is issued for the following equipment:

**Uab102cd00-e-f. Universal IV - Integral**

XP-IS / I / I / CD / T4 Ta = 75 °C – 420-0004-412-CD;  
 I / I / AEx d ia IIB / T4 Ta = 75 °C – 420-0004-412-CD;  
 DIP-IS / II, III / I / EFG / T4 Ta = 75 °C – 420-0004-412-CD;  
 NI / I / 2 / ABCD / T4 Ta = 75 °C

Type 4, 4X; IP66

- a = Type P, L, C, M or T.
- b = Frequency and Phasing 0, 1, 2, or 3.
- c = Entries 0 or 2.
- d = Surge/Noise suppression 0 or 1.
- e = Sensing element R111, R112, R113, R114, R115, 201, 202, 203, 204, 205, 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 502, 503, 504, 505, 506, 507, 508, 510, 511, 512, S12, S13, S14, S16 or S18.
- f = 24 character numbering not affecting safety.

**Uab102cd01-e-f. Universal IV - Integral with Dual Seal**

XP-IS / I / I / CD / T4 Ta = 75 °C – 420-0004-412-CD;  
 I / I / AEx d ia IIB / T4 Ta = 75 °C – 420-0004-412-CD;  
 DIP-IS / II, III / I / EFG / T4 Ta = 75 °C – 420-0004-412-CD;  
 NI / I / 2 / ABCD / T4 Ta = 75 °C

Type 4, 4X; IP66

- a = Type P, L, or C.
- b = Frequency and Phasing 0, 1, 2, or 3.
- c = Entries 0 or 2.
- d = Surge/Noise suppression 0 or 1.
- e = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, S12, S13, S14, S16 or S18.
- f = 24 character numbering not affecting safety.

To verify the availability of the Approved product, please refer to [www.approvalguide.com](http://www.approvalguide.com)

FM Approvals HLC 5/13

0003043661

Page 1 of 6

## 9.1 FM US Approval Certificate (Continued)

420-0004-429	Shl of	2 6	ISSUE 6
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**Uab101cd00-e-f. Universal IV - Integral**

IS / I, II, III / 1 / ABCDEFG / T4 Ta = 75 °C – 420-0004-412-CD; Entity

I / 0 / AEx Ia IIC / T4 Ta = 75 °C – 420-0004-412-CD; Entity

NI / I / 2 / ABCD / T4 Ta = 75°C;

Type 4, 4X; IP66

Entity Parameters:  $U_i < 30$  V,  $I_i < 140$  mA,  $P_i < 1$  W,  $C_i = 0$ ,  $L_i = 0$ 

a = Type P, L, C, M or T.

b = Frequency and Phasing 0, 1, 2, or 3.

c = Entries 0 or 2.

d = Surge/noise suppression 0 or 1.

e = Sensing element R00, R01, R02, R03, R04, R05, 201, 202, 203, 204, 205, 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 613, 703, 705, 706, 708, 709, 713, 714, 715, 722, S12, S13, S14, S16, S18, or any other 3 digit numeric combination maintaining the limits of 420-0004-412-CD.

f = 24 character numbering not affecting safety.

**Uab101cd01-e-f. Universal IV – Integral with Dual Seal**

IS / I, II, III / 1 / ABCDEFG / T4 Ta = 75 °C – 420-0004-412-CD; Entity

I / 0 / AEx Ia IIC / T4 Ta = 75 °C – 420-0004-412-CD; Entity

NI / I / 2 / ABCD / T4 Ta = 75°C;

Type 4, 4X; IP66

Entity Parameters:  $U_i < 30$  V,  $I_i < 140$  mA,  $P_i < 1$  W,  $C_i = 0$ ,  $L_i = 0$ 

a = Type P, L, or C.

b = Frequency and Phasing 0, 1, 2, or 3.

c = Entries 0 or 2.

d = Surge/noise suppression 0 or 1.

e = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 613, S12, S13, S14, S16 or S18.

f = 24 character numbering not affecting safety.

**Uab102cde0-f-g. Universal IV - Remote**

XP-AIS / I / 1 / CD / T4 Ta = 75 °C; – 420-0004-412-CD;

I / 1 / AEx d [Ia] IIB / T4 Ta = 75 °C; – 420-0004-412-CD;

DIP-AIS / II, III / 1 / EFG / T4 Ta = 75 °C; – 420-0004-412-CD;

NI / I / 2 / ABCD / T4 Ta = 75 °C;

Type 4, 4X; IP66

a = Type P, L, or C.

b = Frequency and Phasing 0, 1, 2, or 3.

c = Entries 0 or 2.

d = Surge/Noise suppression 0, 1, 2, 3, 4, 5, 6, 7, or D

e = Cable options 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, or Z

f = Sensing element RO9, 000, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 513, 601, 603, 604, 605, 606, 607, 608, 609, 607, 608, 609, 610, 611, 612, 613, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, S02, S03, S04, S06, S08, or any other 3 digit numeric combination maintaining the limits of 420-0004-412-CD.

g = 24 character numbering not affecting safety.

To verify the availability of the Approved product, please refer to [www.approvalguide.com](http://www.approvalguide.com)  
 FM Approvals HLC 5/13 0003043661

9.1 FM US Approval Certificate (Continued)

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**Uab102cde1-f-g. Universal IV – Remote with Dual Seal**

XP-AIS / I / I / CD / T4 Ta = 75 °C – 420-0004-412-CD;  
 I / I / AEx d [ia] IIB / T4 Ta = 75 °C – 420-0004-412-CD;  
 DIP-AIS / II, III / I / EFG / T4 Ta = 75 °C – 420-0004-412-CD;  
 NI / I / 2 / ABCD / T4 Ta = 75 °C;

Type 4, 4X; IP66

Entity Parameters: Ui = 30 V, Ii = 140 mA, Pi = 1 W, Ci = 0, Li = 0

- a = Type P, L, or C.
- b = Frequency and Phasing 0, 1, 2, or 3.
- c = Entries 0 or 2.
- d = Surge/Noise suppression 0, 1, 2, 3, 4, 5, 6, 7, or D.
- e = Cable options 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, or Z
- f = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 601, 603, 604, 605, 606, 607, 608, 609, 607, 608, 610, 611, 612, 613, S02, S03, S04, S06 or S08.
- g = 24 character numbering not affecting safety.

**Uab101cde0-f-g. Universal IV - Remote**

IS / I, II, III / I / ABCDEFG / T4 Ta = 75 °C – 420-0004-412-CD; Entity  
 I / 0 / AEx ia IIC / T4 Ta = 75°C – 420-0004-412-CD; Entity  
 NI / I / 2 / ABCD / T4 Ta = 75°C

Type 4, 4X; IP66

Entity Parameters: Ui < 30 V, Ii < 140 mA, Pi < 1 W, Ci = 0, Li = 0

- a = Type P, L, or C.
- b = Frequency and Phasing 0, 1, 2, or 3.
- c = Entries 0 or 2.
- d = Surge/Noise suppression 0, 1, 2, 3, 4, 5, 6, 7, or D.
- e = Cable options 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, Z.
- f = Sensing element RO9, 000, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 513, 601, 603, 604, 605, 606, 607, 608, 609, 607, 608, 609, 610, 611, 612, 613, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, S02, S03, S04, S06, S08, or any other 3 digit numeric combination maintaining the limits of 420-0004-412-CD.
- g = 24 character numbering not affecting safety.

**Special Conditions of Use:**

1. In Zone 0 locations, care must be taken when installing the aluminium enclosure that even in the event of rare incidents, an ignition source due to impact or friction between the enclosure and iron / steel is excluded.

## 9.1 FM US Approval Certificate (Continued)

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**Uab101cde1-f-g. Universal IV – Remote with Dual Seal**

IS / I, II, III / 1 / ABCDEFG / T4 Ta = 75 °C – 420-0004-412-CD; Entity

I / 0 / AEx ia IIC / T4 Ta = 75 °C – 420-0004-412-CD; Entity

NI / 1 / 2 / ABCD / T4 Ta = 75 °C;

Type 4, 4X; IP66

Entity Parameters: Ui &lt; 30 V, Ii &lt; 140 mA, Pi &lt; 1 W, Ci = 0, Li = 0

a = Type P, L, or C.

b = Frequency and Phasing 0, 1, 2, or 3.

c = Entries 0 or 2.

d = Surge/noise suppression 0, 1, 2, 3, 4, 5, 6, 7, or D.

e = Cable options 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, Z.

f = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, S02, S03, S04, S06 or S08.

g = 24 character numbering not affecting safety.

**Special Conditions of Use:**

1. In Zone 0 locations, care must be taken when installing the aluminium enclosure that even in the event of rare incidents, an ignition source due to impact or friction between the enclosure and iron / steel is excluded.

**UDA109bc00de – Universal IV – Integral with Remote Density Communications Module**

XP-IS / I / 1 / CD / T4 Ta = 75 °C – 420-0004-412-CD;

I / 1 / AEx d ia IIB / T4 Ta = 75 °C – 420-0004-412-CD;

DIP-IS / II, III / 1 / EFG / T4 Ta = 75 °C – 420-0004-412-CD;

NI / 1 / 2 / ABCD / T4 Ta = 75 °C

Type 4, 4X; IP66

a = Frequency and Phasing 0 or R.

b = Entries 0 or 2.

c = Surge/Noise suppression 0 or 1.

d = Sensing element R111, R112, R113, R114, R115, 201, 202, 203, 204, 205, 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 301, 302, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 502, 503, 504, 505, 506, 507, 508, 510, 511, 512, S12, S13, S14, S16, S18, S42, S43, S44, S46 or S48.

e = 24 character numbering not affecting safety.

**UDA109bc00de – Universal IV – Integral with Remote Density Communications Module and Dual Seal**

XP-IS / I / 1 / CD / T4 Ta = 75 °C – 420-0004-412-CD;

I / 1 / AEx d ia IIB / T4 Ta = 75 °C – 420-0004-412-CD;

DIP-IS / II, III / 1 / EFG / T4 Ta = 75 °C – 420-0004-412-CD;

NI / 1 / 2 / ABCD / T4 Ta = 75 °C

Type 4, 4X; IP66

a = Frequency and Phasing 0 or R.

b = Entries 0 or 2.

c = Surge/Noise suppression 0 or 1.

d = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 201, 202, 203, 204, 205, 206, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, S02, S03, S04, S06 or S08.

e = 24 character numbering not affecting safety.

To verify the availability of the Approved product, please refer to [www.approvalguide.com](http://www.approvalguide.com)

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9.1 FM US Approval Certificate (Continued)

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**700-a, Sensor.**

IS / I, II, III / 1 / ABCDEFG / T2...T5 Ta = 75°C – 420-0004-412-CD;

I / 1 / AEx ia IIC T2...T5 Ta = 75°C – 420-0004-412-CD;

- a = 1202-014, 1202-001, 1202-018, 1202-041, 0001-022, 0001-024, 0001-026, 0001-034, 0001-044, 0001-054, 0001-0634, 0001-344, 0002-023, 0002-024, 0002-027, 0002-028, 0002-033, 0002-054, 0002-321, 0002-360, 0005-054, 0201-005, 0201-025, 0201-026, 0201-028, 0201-036, 1202-031, 1202-033, 1202-061, 1202-081, 0001-016, 0001-324, 0003-009, 0005-035, 0005-048, 0005-348, 0202-036, 0202-043, 0001-040, 0001-074, 0002-037, 0002-040, 0002-044, 0002-057, 0002-064, 0002-224, 0002-321, 0201-027, 0201-051, 0201-052, 0201-058, 0201-059, 0202-002, 0202-053, 0001-018, 0001-045, 0002-027, 0002-029, 0002-036, 0002-046, 0002-059, 0002-227, 0002-363, 0004-031, 0004-050, 0005-009, 0005-018, 0005-019, 0005-028, 0005-029, 0005-036, 0005-045, 0005-085, 0005-095, 0005-096, 0005-354, 0009-002, 0009-024, 0009-057, 011-001, 011-003, 011-015, 0021-001, 0021-002, 0021-003, 0021-007, 0202-054, 0202-056, 0203-003, 0203-004, 0204-002, 0204-022, 0204-024, 0204-038, 0204-048, 0204-049, 0205-005, 0205-015, 0205-018, 0205-075, 0205-078, 0205-079, 0209-002, 0209-024, 1202-010, 9100-403, 1202-061, 9100-195, 1202-051, or any other 7 digit numeric combination maintaining the limits of 420-0004-412-CD..

**Equipment Ratings:**

The Universal IV Level Transmitter is rated as Intrinsically Safe for Class I, II and III, Groups A-G and Class I, Zone 0, Group IIC, in accordance with drawing 420-0004-412-12; Nonincendive Class I, Division 2, Groups A-D Hazardous (Classified) Locations.

Furthermore, the Integral version is rated as Explosionproof for Class I, Division 1, Groups C & D; Dust Ignitionproof for Class II & III, Division 1, Groups E-G and Class I, Zone 1, Group IIB Hazardous (Classified) Locations with an integral sensor that is Intrinsically Safe for Class I, II & III, Groups A-G and Class I, Zone 1 Hazardous (Classified) Locations. The Remote version is rated as Explosionproof Class I, Division 1, Groups C & D; Dust-Ignitionproof for Class II & III, Division 1, Groups E-G and Class I, Zone 1, Group IIB Hazardous (Classified) Locations with connections to a 700 Series sensor that is Intrinsically Safe for Class I, II & III, Groups A-G and Class I, Zone 1 Hazardous (Classified) Locations.

**FM Approved for:**

AMETEK Drexelbrook  
Horsham, PA

To verify the availability of the Approved product, please refer to [www.approvalguide.com](http://www.approvalguide.com)  
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## 9.1 FM US Approval Certificate (Continued)



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

FM Class 3600	2011
FM Class 3610	2010
FM Class 3611	2004
FM Class 3615	2006
FM Class 3616	2011
FM Class 3810	2005
ANSI/ISA 61010-1 (82.02.01)	2004
ANSI/ISA 60079-0	2013
ANSI/ISA 60079-1	2013
ANSI/ISA 60079-11	2013
ANSI/ISA 60079-31	2013
ANSI/IEC 60529	2004
ANSI/NEMA 250	2003

Original Project ID: 3043661

Approval Granted: May 11, 2012

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
3049315	June 21, 2013		
3049315-1	September 10, 2013		
3054913	June 10, 2015		
3055545	January 13, 2016		

FM Approvals LLC

J.E. Marquedant  
Manager of Electrical Systems

13 January 2016

Date

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## 9.2 FM Canada Approval Certificate

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ISSUE	EDO NO.	APP'D	DATE
4	2-16-112	THP	2-16-16
5	2-16-121	Sub	6-17-16



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

# CERTIFICATE OF COMPLIANCE

## HAZARDOUS LOCATION ELECTRICAL EQUIPMENT PER CANADIAN REQUIREMENTS

This certificate is issued for the following equipment:

**Uab102cd00-e-f. Universal IV - Integral**

XP-IS / I / 1 / CD / T4 Ta = 75 °C – 420-0004-412-CD;  
 I / 1 / Ex d ia IIB / T4 Ta = 75 °C – 420-0004-412-CD;  
 DIP-IS / II, III / 1 / EFG / T4 Ta = 75 °C – 420-0004-412-CD;  
 NI / I / 2 / ABCD / T4 Ta = 75 °C

Type 4, 4X; IP66

- a = Type P, L, C, M or T.
- b = Frequency and Phasing 0, 1, 2, or 3.
- c = Entries 0 or 2.
- d = Surge/Noise suppression 0 or 1.
- e = Sensing element R111, R112, R113, R114, R115, 201, 202, 203, 204, 205, 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 502, 503, 504, 505, 506, 507, 508, 510, 511, 512, S12, S13, S14, S16 or S18.
- f = 24 character numbering not affecting safety.

**Uab102cd01-e-f. Universal IV - Integral with Dual Seal**

XP-IS / I / 1 / CD / T4 Ta = 75 °C – 420-0004-412-CD;  
 I / 1 / Ex d ia IIB / T4 Ta = 75 °C – 420-0004-412-CD;  
 DIP-IS / II, III / 1 / EFG / T4 Ta = 75 °C – 420-0004-412-CD;  
 NI / I / 2 / ABCD / T4 Ta = 75 °C

Type 4, 4X; IP66

- a = Type P, L, or C.
- b = Frequency and Phasing 0, 1, 2, or 3.
- c = Entries 0 or 2.
- d = Surge/Noise suppression 0 or 1.
- e = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, S12, S13, S14, S16 or S18.
- f = 24 character numbering not affecting safety.

To verify the availability of the Approved product, please refer to [www.approvalguide.com](http://www.approvalguide.com)



## 9.2 FM Canada Approval Certificate (Continued)

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6ISSUE  
5**Uab101cd00-e-f. Universal IV - Integral**

IS / I, II, III / 1 / ABCDEFG / T4 Ta = 75 °C – 420-0004-412-CD; Entity

I / 0 / Ex ia IIC / T4 Ta = 75 °C – 420-0004-412-CD; Entity

NI / I / 2 / ABCD / T4 Ta = 75°C;

Type 4, 4X; IP66

Entity Parameters: Ui &lt; 30 V, Ii &lt; 140 mA, Pi &lt; 1 W, Ci = 0, Li = 0

a = Type P, L, C, M or T.

b = Frequency and Phasing 0, 1, 2, or 3.

c = Entries 0 or 2.

d = Surge/noise suppression 0 or 1.

e = Sensing element R00, R01, R02, R03, R04, R05, 201, 202, 203, 204, 205, 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 613, 703, 705, 706, 708, 709, 713, 714, 715, 722, S12, S13, S14, S16, S18, or any other 7 digit numeric combination maintaining the limits of 420-0004-412-CD.

f = 24 character numbering not affecting safety.

**Uab101cd01-e-f. Universal IV – Integral with Dual Seal**

IS / I, II, III / 1 / ABCDEFG / T4 Ta = 75 °C – 420-0004-412-CD; Entity

I / 0 / Ex ia IIC / T4 Ta = 75 °C – 420-0004-412-CD; Entity

NI / I / 2 / ABCD / T4 Ta = 75°C;

Type 4, 4X; IP66

Entity Parameters: Ui &lt; 30 V, Ii &lt; 140 mA, Pi &lt; 1 W, Ci = 0, Li = 0

a = Type P, L, or C.

b = Frequency and Phasing 0, 1, 2, or 3.

c = Entries 0 or 2.

d = Surge/noise suppression 0 or 1.

e = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 613, S12, S13, S14, S16 or S18.

f = 24 character numbering not affecting safety.

**Uab102cde0-f-g. Universal IV - Remote**

XP-AIS / I / 1 / CD / T4 Ta = 75 °C – 420-0004-412-CD;

I / 1 / Ex d [ia] IIB / T4 Ta = 75 °C – 420-0004-412-CD;

DIP-AIS / II, III / 1 / EFG / T4 Ta = 75 °C;

NI / I / 2 / ABCD / T4 Ta = 75 °C;

Type 4, 4X; IP66

a = Type P, L, or C.

b = Frequency and Phasing 0, 1, 2, or 3.

c = Entries 0 or 2.

d = Surge/Noise suppression 0, 1, 2, 3, 4, 5, 6, 7, or D

e = Cable options 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, or Z

f = Sensing element RO9, 000, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 513, 601, 603, 604, 605, 606, 607, 608, 609, 607, 608, 609, 610, 611, 612, 613, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, S02, S03, S04, S06, S08, or any other 3 digit numeric combination maintaining the limits of 420-0004-412-CD.

g = 24 character numbering not affecting safety.

To verify the availability of the Approved product, please refer to [www.approvalguide.com](http://www.approvalguide.com)

## 9.2 FM Canada Approval Certificate (Continued)

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**Uab102cde1-f-g. Universal IV – Remote with Dual Seal**

XP-AIS / I / 1 / CD / T4 Ta = 75 °C – 420-0004-412-CD;  
 I / 1 / Ex d [ia] IIB / T4 Ta = 75 °C – 420-0004-412-CD;  
 DIP-AIS / II, III / 1 / EFG / T4 Ta = 75 °C – 420-0004-412-CD;  
 NI / I / 2 / ABCD / T4 Ta = 75 °C;  
 Type 4, 4X; IP66

Entity Parameters: Ui < 30 V, li < 140 mA, Pi < 1 W, Ci = 0, Li = 0

- a = Type P, L, or C.
- b = Frequency and Phasing 0, 1, 2, or 3.
- c = Entries 0 or 2.
- d = Surge/Noise suppression 0, 1, 2, 3, 4, 5, 6, 7, or D.
- e = Cable options 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, or Z
- f = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 601, 603, 604, 605, 606, 607, 608, 609, 607, 608, 609, 610, 611, 612, 613, S02, S03, So4, S06 or S08.
- g = 24 character numbering not affecting safety.

**Uab101cde0-f-g. Universal IV - Remote**

IS / I, II, III / 1 / ABCDEFG / T4 Ta = 75 °C – 420-0004-412-CD; Entity  
 I / 0 / Ex ia IIC / T4 Ta = 75 °C – 420-0004-412-CD; Entity  
 NI / I / 2 / ABCD / T4 Ta = 75°C;  
 Type 4, 4X; IP66

Entity Parameters: Ui = 30 V, li = 140 mA, Pi = 1 W, Ci = 0, Li = 0

- a = Type P, L, or C.
- b = Frequency and Phasing 0, 1, 2, or 3.
- c = Entries 0 or 2.
- d = Surge/Noise suppression 0, 1, 2, 3, 4, 5, 6, 7, or D.
- e = Cable options 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, Z.
- f = Sensing element RO9, 000, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 513, 601, 603, 604, 605, 606, 607, 608, 609, 607, 608, 609, 610, 611, 612, 613, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, S02, S03, S04, S06, S08, or any other 3 digit numeric combination maintaining the limits of 420-0004-412-CD.
- g = 24 character numbering not affecting safety.

**Special Conditions of Use:**

1. In Zone 0 locations, care must be taken when installing the aluminium enclosure that even in the event of rare incidents, an ignition source due to impact or friction between the enclosure and iron / steel is excluded.

## 9.2 FM Canada Approval Certificate (Continued)

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5**Uab101cde1-f-g. Universal IV – Remote with Dual Seal**

IS / I, II, III / 1 / ABCDEFG / T4 Ta = 75 °C – 420-0004-412-CD; Entity

I / 0 / Ex ia IIC / T4 Ta = 75 °C – 420-0004-412-CD; Entity

NI / I / 2 / ABCD / T4 Ta = 75 °C;

Type 4, 4X; IP66

Entity Parameters: Ui = 30 V, Ii = 140 mA, Pi = 1 W, Ci = 0, Li = 0

a = Type P, L, or C.

b = Frequency and Phasing 0, 1, 2, or 3.

c = Entries 0 or 2.

d = Surge/noise suppression 0, 1, 2, 3, 4, 5, 6, 7, or D.

e = Cable options 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, Z.

f = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, S02, S03, S04, S06 or S08.

g = 24 character numbering not affecting safety.

**Special Conditions of Use:**

1. In Zone 0 locations, care must be taken when installing the aluminium enclosure that even in the event of rare incidents, an ignition source due to impact or friction between the enclosure and iron / steel is excluded.

**UDA109bc00de – Universal IV – Integral with Remote Density Communications Module**

XP-IS / I / 1 / CD / T4 Ta = 75 °C – 420-0004-412-CD;

I / 1 / Ex d ia IIB / T4 Ta = 75 °C – 420-0004-412-CD;

DIP-IS / II, III / 1 / EFG / T4 Ta = 75 °C – 420-0004-412-CD;

NI / I / 2 / ABCD / T4 Ta = 75 °C

Type 4, 4X; IP66

a = Frequency and Phasing 0 or R.

b = Entries 0 or 2.

c = Surge/Noise suppression 0 or 1.

d = Sensing element R111, R112, R113, R114, R115, 201, 202, 203, 204, 205, 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 301, 302, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 502, 503, 504, 505, 506, 507, 508, 510, 511, 512, S12, S13, S14, S16, S18, S42, S43, S44, S46 or S48.

e = 24 character numbering not affecting safety.

**UDA109bc01de – Universal IV – Integral with Remote Density Communications Module and Dual Seal**

XP-IS / I / 1 / CD / T4 Ta = 75 °C – 420-0004-412-CD;

I / 1 / Ex d ia IIB / T4 Ta = 75 °C – 420-0004-412-CD;

DIP-IS / II, III / 1 / EFG / T4 Ta = 75 °C – 420-0004-412-CD;

NI / I / 2 / ABCD / T4 Ta = 75 °C

Type 4, 4X; IP66

a = Frequency and Phasing 0 or R.

b = Entries 0 or 2.

c = Surge/Noise suppression 0 or 1.

d = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 201, 202, 203, 204, 205, 206, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, S02, S03, S04, S06 or S08.

e = 24 character numbering not affecting safety.

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9.2 FM Canada Approval Certificate (Continued)

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**Uab101cde1-f-g. Universal IV – Remote with Dual Seal**  
 IS / I, II, III / 1 / ABCDEFG / T4 Ta = 75 °C – 420-0004-412-CD; Entity  
 I / 0 / Ex ia IIC / T4 Ta = 75 °C – 420-0004-412-CD; Entity  
 NI / I / 2 / ABCD / T4 Ta = 75 °C;  
 Type 4, 4X; IP66  
 Entity Parameters: Ui = 30 V, Ii = 140 mA, Pi = 1 W, Ci = 0, Li = 0  
 a = Type P, L, or C.  
 b = Frequency and Phasing 0, 1, 2, or 3.  
 c = Entries 0 or 2.  
 d = Surge/noise suppression 0, 1, 2, 3, 4, 5, 6, 7, or D.  
 e = Cable options 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, Z.  
 f = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, S02, S03, S04, S06 or S08.  
 g = 24 character numbering not affecting safety.

**Special Conditions of Use:**

1. *In Zone 0 locations, care must be taken when installing the aluminium enclosure that even in the event of rare incidents, an ignition source due to impact or friction between the enclosure and iron / steel is excluded.*

**UDa109bc00de – Universal IV – Integral with Remote Density Communications Module**

XP-IS / I / 1 / CD / T4 Ta = 75 °C – 420-0004-412-CD;  
 I / 1 / Ex d ia IIB / T4 Ta = 75 °C – 420-0004-412-CD;  
 DIP-IS / II, III / 1 / EFG / T4 Ta = 75 °C – 420-0004-412-CD;  
 NI / I / 2 / ABCD / T4 Ta = 75 °C  
 Type 4, 4X; IP66  
 a = Frequency and Phasing 0 or R.  
 b = Entries 0 or 2.  
 c = Surge/Noise suppression 0 or 1.  
 d = Sensing element R111, R112, R113, R114, R115, 201, 202, 203, 204, 205, 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 301, 302, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 502, 503, 504, 505, 506, 507, 508, 510, 511, 512, S12, S13, S14, S16, S18, S42, S43, S44, S46 or S48.  
 e = 24 character numbering not affecting safety.

**UDa109bc01de – Universal IV – Integral with Remote Density Communications Module and Dual Seal**

XP-IS / I / 1 / CD / T4 Ta = 75 °C – 420-0004-412-CD;  
 I / 1 / Ex d ia IIB / T4 Ta = 75 °C – 420-0004-412-CD;  
 DIP-IS / II, III / 1 / EFG / T4 Ta = 75 °C – 420-0004-412-CD;  
 NI / I / 2 / ABCD / T4 Ta = 75 °C  
 Type 4, 4X; IP66  
 a = Frequency and Phasing 0 or R.  
 b = Entries 0 or 2.  
 c = Surge/Noise suppression 0 or 1.  
 d = Sensing element 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 201, 202, 203, 204, 205, 206, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, S02, S03, S04, S06 or S08.  
 e = 24 character numbering not affecting safety.

## 9.2 FM Canada Approval Certificate (Continued)

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

CSA C22.2 No. 0.4-1982	Reaffirmed 2013
CSA C22.2 No. 0.5-1982	Reaffirmed 2012
CSA C22.2 No. 25-1966	Reaffirmed 2014
CSA C22.2 No. 30-1986	Reaffirmed 2012
CSA C22.2 No. 94-M91	Reaffirmed 2011
CSA C22.2 No. 213-M1987	Reaffirmed 2013
CSA C22.2 No. 61010-1-12	2012
CSA C22.2 No. 60529	2010
CAN/CSA C22.2 No. 60079-0:11	2011
CAN/CSA C22.2 No. 60079-1:11	2011
CAN/CSA C22.2 No. 60079-11:14	2014
CAN/CSA C22.2 No. 60079-31:12	2012

Original Project ID: 3043661C

Approval Granted: May 11, 2012

Subsequent Revision Reports / Date Approval Amended

Report Number	Date	Report Number	Date
3049315	June 21, 2013		
3054913	June 10, 2015		
3055545	January 13, 2016		
RR204236	February 24, 2016		

FM Approvals LLC

J.E. Marquedant  
Manager of Electrical Systems



24 February 2016

Date

9.3 IECEx Approval Certificate

<b>420-0004-431</b>		Sht. 1 of 4	APPD BY SGA
ISSUE	EDO NO.	APPD	DATE
5	2-16-121	SGA	6-17-16
6	10-16-117	SGA	12-16-16

This official IECEx Certificate is available as a printable PDF copy for download at the link provided

## IECEX Certificate of Conformity

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**INTERNATIONAL ELECTROTECHNICAL COMMISSION  
IEC Certification Scheme for Explosive Atmospheres**

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Download : [Certificate](#) [Annexes](#)

Certificate No.: IECEX FMG 11.0024X issue No.: 10

Status: **Current**

Date of Issue: **2016-10-17** Page 1 of 4

Applicant: **AMETEK Drexelbrook**  
205 Keith Valley Road  
Horsham, PA 19044  
United States of America

Equipment: **Universal IV Level Transmitter**  
Optional accessory:

Type of Protection: **Intrinsic Safety "I"; Flameproof "d"**

Marking: **Integral:**  
Ex ia IIC T4 Ga; Ex d IIB T4 Gb; Ex tb IIC T90°C Db; -40°C ≤ Ta ≤ +75°C; IP66  
Input Voltage: 13-30Vdc; 1W  
**Remote:**  
Ex ia IIC T4 Ga; Ex tb [ia] IIC T90°C Db; Ex d [ia] IIB T4 Gb; Ex tb [ia] IIC T90°C Db;  
-40°C ≤ Ta ≤ +75°C; IP66  
Input Voltage: 13-30Vdc; 1W  
**Remote Sensor:**  
Ex ia IIC T5...T2 Ga; Ex ia IIC T90°C...T300°C Da; -40°C ≤ Ta ≤ +75°C; IP66  
UIV Remote Communications Module:  
Ex d IIB T4 Gb; Ex tb IIC T90°C Db; -40°C ≤ Ta ≤ +75°C; IP66  
Input Voltage: 19-30Vdc; 1W

Approved for issue on behalf of the IECEx  
Certification Body: **J. E. Marquedant**

Position: **Manager, Electrical Systems**


---

1. This certificate and schedule may only be reproduced in full.  
2. This certificate is not transferable and remains the property of the issuing body.  
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

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Certificate issued by:

**FM Approvals LLC**  
1151 Boston-Providence Turnpike  
Norwood, MA 02062  
United States of America



Member of the FM Group

## 9.3 IECEx Approval Certificate (Continued)

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## IECEx Certificate of Conformity

Certificate No.: IECEx FMG 11.0024X

Date of Issue: 2016-10-17

Issue No.: 10

Page 2 of 4

Manufacturer: **AMETEK Drexelbrook**  
205 Keith Valley Road  
Horsham, PA 19044  
United States of America

Additional Manufacturing location(s):

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacturer's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

**STANDARDS:**

The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

<b>IEC 60079-0 : 2011</b> Edition: 6.0	Explosive atmospheres - Part 0: General requirements
<b>IEC 60079-1 : 2014-06</b> Edition: 7.0	Explosive atmospheres - Part 1: Equipment protection by flameproof enclosures "d"
<b>IEC 60079-11 : 2011</b> Edition: 6.0	Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"
<b>IEC 60079-31 : 2013</b> Edition: 2	Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

*This Certificate does not indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

**TEST & ASSESSMENT REPORTS:**

*A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in*

Test Report:

US/FMG/ExTR11.0027/01	US/FMG/ExTR11.0027/02	US/FMG/ExTR11.0027/03
US/FMG/ExTR11.0027/04	US/FMG/ExTR11.0027/05	US/FMG/ExTR11.0027/06
US/FMG/ExTR11.0027/07	US/FMG/ExTR11.0027/08	US/FMG/ExTR11.0027/09
US/FMG/ExTR11.0027/10		

Quality Assessment Report:

NO/DNV/QAR13.0008/00

9.3 IECEx Approval Certificate (Continued)

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# IECEx Certificate of Conformity

Certificate No.: IECEx FMG 11.0024X  
Date of Issue: 2016-10-17  
Issue No.: 10  
Page 3 of 4

**Schedule**

**EQUIPMENT:**

*Equipment and systems covered by this certificate are as follows:*

See attachment for List of Equipment covered by this certificate

**SPECIFIC CONDITIONS OF USE: YES as shown below:**

**Specific Conditions of Use:**

Consult the manufacturer if dimensional information on the flameproof joints is necessary.  
In locations requiring EPL Ga equipment, care must be taken when installing the aluminium enclosure that even in the event of rare incidents, an ignition source due to impact or friction between the enclosure and iron / steel is excluded.



9.3 IECEx Approval Certificate (Continued)

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# IECEx Certificate of Conformity

Certificate No.: IECEx FMG 11.0024X  
 Date of Issue: 2016-10-17  
 Issue No.: 10  
 Page 3 of 4

Schedule

**EQUIPMENT:**

*Equipment and systems covered by this certificate are as follows:*

See attachment for List of Equipment covered by this certificate

**SPECIFIC CONDITIONS OF USE: YES as shown below:**

**Specific Conditions of Use:**

Consult the manufacturer if dimensional information on the flameproof joints is necessary.  
 In locations requiring EPL Ga equipment, care must be taken when installing the aluminium enclosure that even in the event of rare incidents, an ignition source due to impact or friction between the enclosure and iron / steel is excluded.

## 9.4 ATEX Approval Certificate

<b>420-0004-432</b>		Sht. 1 of 9	APP'D BY SGA
ISSUE	EDO NO.	APP'D	DATE
9	2-16-121	SGA	6-17-16
10	10-16-117	SGA	12-16-16



### 1 EU-TYPE EXAMINATION CERTIFICATE

- 2 **Equipment or Protective systems intended for use in Potentially Explosive Atmospheres - Directive 2014/34/EU**
- 3 **EU-Type Examination Certificate No:** FM12ATEX0018X
- 4 **Equipment or protective system:** U\*\*103\*\*0-\*, U\*\*104\*\*0-\*, and 700-\* Universal IV Level Transmitter with Integral and Remote Sensor  
(Type Reference and Name)
- 5 **Name of Applicant:** AMETEK Drexelbrook
- 6 **Address of Applicant:** 205 Keith Valley Road, Horsham, PA 19044 USA
- 7 This equipment or protective system and any acceptable variation thereto is specified in the schedule to this certificate and documents therein referred to.
- 8 FM Approvals Ltd, notified body number 1725 in accordance with Article 17 of Directive 2014/34/EU of 26 February 2014, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.  
  
The examination and test results are recorded in confidential report number:  
  
3043661EC dated 11<sup>th</sup> May 2012
- 9 Compliance with the Essential Health and Safety Requirements, with the exception of those identified in item 15 of the schedule to this certificate, has been assessed by compliance with the following documents:  
  
EN60079-0:2012+A11:2013, EN60079-1:2014, EN60079-11:2012, EN60079-31:2014, EN60529:1992+A2:2013
- 10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to specific conditions of use specified in the schedule to this certificate.
- 11 This EU-Type Examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the directive 2014/34/EU. Further requirements of the Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by this certificate.
- 12 The marking of the equipment or protective system shall include:



© Mick Gower, or FM Approvals,  
or,  
email: mick.gower@fmaprovals.com, or 08  
2016.10.10 12:56:13 +0100

**Mick Gower**  
Certification Manager, FM Approvals Ltd.

Issue date: 18<sup>th</sup> October 2016

**THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE**

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T: +44 (0) 1753 750 000 F: +44 (0) 1753 868 700 E-mail: [atex@fmaprovals.com](mailto:atex@fmaprovals.com) [www.fmaprovals.com](http://www.fmaprovals.com)

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## 9.4 ATEX Approval Certificate (Continued)

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**SCHEDULE**

to EU-Type Examination Certificate No. FM12ATEX0018X

**Universal IV Level Transmitter – Integral**

- II 1 G Ex ia IIC T4 -40°C ≤ Tamb ≤ +75°C; IP66 (For models U\*\*103\*\*00-\*\*-\*)  
 II 2 G Ex d ia IIB T4 -40°C ≤ Tamb ≤ +75°C; IP66 (For models U\*\*104\*\*00-\*\*-\*)  
 II 2 D Ex tb ia IIIC T90°C -40°C ≤ Tamb ≤ +75°C; IP66 (For models U\*\*104\*\*00-\*\*-\*)

**Universal IV Level Transmitter – Remote (excluding models U\*\*10\*\*\*00-\*\*-\*)**

- II 1 G Ex ia IIC T4 -40°C ≤ Tamb ≤ +75°C; IP66 (For models U\*\*103\*\*00-\*\*-\*)  
 II 2 (1) G Ex d [ia] IIB T4 -40°C ≤ Tamb ≤ +75°C; IP66 (For models U\*\*104\*\*00-\*\*-\*)  
 II 2 (1) D Ex tb [ia] IIIC T90°C -40°C ≤ Tamb ≤ +75°C; IP66 (For models U\*\*10\*\*\*00-\*\*-\*)

**Universal IV – Integral with Remote Density Communications Module (models UD\*10A\*000-\*\*-\*)**

- II 2 G Ex d ia IIB T4 -40°C ≤ Tamb ≤ +75°C; IP66  
 II 2 D Ex tb ia IIIC T90°C -40°C ≤ Tamb ≤ +75°C; IP66

**700-\*, Universal IV Sensors**

- II 1 G Ex ia IIC T2...T5 -40°C ≤ Tamb ≤ +75°C  
 II 1 D Ex ia IIIC T300°C...T90°C -40°C ≤ Tamb ≤ +75°C

**13 Description of Equipment or Protective System:**

The model series Universal IV Level Transmitter is a two-wire capacitance to current transmitter which provides a 4-20 mA current output signal proportional to a change in capacitance at the probe terminals. It is designed to be used in conjunction with the AMETEK-Drexelbrook Series 700 Capacitance Probes.

The transmitter circuitry is contained on five printed circuit boards and housed in an aluminium housing. Terminals are supplied, and appropriately marked, for power connections and also connection to the sensing probes. A majority of the board set is encapsulated in potting material.

The transmitter electronics operate on a supply of 13 to 30 Vdc or 18 to 30 Vdc with an output range of 4-20 mA. The ambient operating temperature range of the transmitter is -40°F to +167°F (-40°C to 75°C). The Energy Limitation Parameters for the intrinsically safe versions are as follows: Ui = 30 V, Ii = 140 mA, Pi = 1 W, Ci = 0, Li = 0

The electronic circuitry is contained in a combination of 5 circuit boards. One of these boards, the Probe Board, is mounted in the main housing and serves as the interface for the probe to the potted electronic module. The remaining 4 circuit boards are assembled in a plastic housing which is potted. The potted assembly contains a Terminal, Display, Power, and Bridge board. There are 3 variations of this potted assembly to service 3 different applications. For these three assemblies, the only differences are different component inclusion/exclusions on the Bridge board.

**THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE**

FM Approvals Ltd. 1 Windsor Dials, Windsor, Berkshire, UK. SL4 1RS  
 T: +44 (0) 1753 750 000 F: +44 (0) 1753 868 700 E-mail: [atex@fmapprovals.com](mailto:atex@fmapprovals.com) [www.fmapprovals.com](http://www.fmapprovals.com)

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9.4 ATEX Approval Certificate (Continued)

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**SCHEDULE**

to EU-Type Examination Certificate No. FM12ATEX0018X

**Model Options:**

**Uab103de00-f-g. Universal IV – Integral**

- a = Type P, L, C, M or T.
- b = Frequency and Phasing 0, 1, 2, or 3.
- d = Entries 1 or 2
- e = Surge/Noise suppression 0 or 1
- f = Sensing element R00, R01, R02, R02, R03, R04, R05, 201, 202, 203, 204, 205, 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 613, 703, 705, 706, 708, 709, 713, 714, 715, 722, or any other 3 digit numeric combination maintaining the limits of 420-0004-424-CD.
- g = 24 character numbering system not affecting safety.

**Uab104d00-e-f. Universal IV – Integral**

- a = Type P, L, C, M or T.
- b = Frequency and Phasing 0, 1, 2, or 3.
- d = Entries 1 or 2
- e = Sensing element 201, 202, 203, 204, 205, 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, or 262.
- f = 24 character numbering system not affecting safety.

**Uab103cde0-f-h. Universal IV – Remote**

- a = Type P, L, or C.
- b = Frequency and Phasing 0, 1, 2, or 3.
- c = Entries 1 or 2
- d = Surge/Noise suppression 0 or 1
- e = Remote Configuration 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, O, P, Q, or Z.
- f = Sensing element R09, 000, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 513, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 701, 702, 703, 704, 705, 706, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, or any other 3 digit numeric combination maintaining the limits of 420-0004-424-CD.
- h = 24 character numbering system not affecting safety.

**THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE**

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## 9.4 ATEX Approval Certificate (Continued)

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of 4  
9ISSUE  
10**SCHEDULE**

to EU-Type Examination Certificate No. FM12ATEX0018X

**Uab104de0-fg-h. Universal IV – Remote**

a = Type P, L, or C.

b = Frequency and Phasing 0, 1, 2, or 3.

d = Entries 1 or 2

e = Surge/Noise suppression 0, 4 or D.

f = Remote Configuration 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F, G, H, J, K, L, M, N, O, P, Q, or Z.

g = Sensing element 000, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 513, 601, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 701, 702, 703, 704, 705, 706, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, or any other 3 digit numeric combination maintaining the limits of 420-0004-424-CD.

h = 24 character numbering system not affecting safety.

**UDa10Ac000-d-e. Universal IV – Integral with Remote Density Communications Module**

a = Frequency and Phasing 0 or R.

c = Entries 1 or 2

d = Sensing element 201, 202, 203, 204, 205, 206, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261 or 262.

e = 24 character numbering system not affecting safety.

**700-a. Sensor.**

a = 1202-014, 1202-001, 1202-018, 1202-041, 0001-022, 0001-024, 0001-026, 0001-034, 0001-044, 0001-054, 0001-0634, 0001-344, 0002-023, 0002-024, 0002-027, 0002-028, 0002-033, 0002-054, 0002-321, 0002-360, 0005-054, 0201-005, 0201-025, 0201-026, 0201-028, 0201-036, 1202-031, 1202-033, 1202-061, 1202-081, 0001-016, 0001-324, 0003-009, 0005-035, 0005-048, 0005-348, 0202-036, 0202-043, 0001-040, 0001-074, 0002-037, 0002-040, 0002-044, 0002-057, 0002-064, 0002-224, 0002-321, 0201-027, 0201-051, 0201-052, 0201-058, 0201-059, 0202-002, 0202-053, 0001-018, 0001-045, 0002-027, 0002-029, 0002-036, 0002-046, 0002-059, 0002-227, 0002-363, 0004-031, 0004-050, 0005-009, 0005-018, 0005-019, 0005-028, 0005-029, 0005-036, 0005-045, 0005-085, 0005-095, 0005-096, 0005-354, 0009-002, 0009-024, 0009-057, 011-001, 011-003, 011-015, 0021-001, 0021-002, 0021-003, 0021-007, 0202-054, 0202-056, 0203-003, 0203-004, 0204-002, 0204-022, 0204-024, 0204-038, 0204-048, 0204-049, 0205-005, 0205-015, 0205-018, 0205-075, 0205-078, 0205-079, 0209-002, 0209-024, 1202-010, 9100-403, 1202-061, 9100-195, 1202-051, or any other 7 digit numeric combination maintaining the limits of 420-0004-424-CD.

**14 Specific Conditions of Use:**

1. Consult the manufacturer if dimensional information on the flameproof joints is necessary.
2. In locations requiring Category 1 equipment, care must be taken when installing the aluminium enclosure that even in the event of rare incidents, an ignition source due to impact or friction between the enclosure and iron / steel is excluded.

**THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE**

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## 9.4 ATEX Approval Certificate (Continued)

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### SCHEDULE

to EU-Type Examination Certificate No. FM12ATEX0018X

**15 Essential Health and Safety Requirements:**

The relevant EHSRs that have not been addressed by the standards listed in this certificate have been identified and assessed in the confidential report identified in item 8.

**16 Test and Assessment Procedure and Conditions:**

This EU-Type Examination Certificate is the result of testing of a sample of the product submitted, in accordance with the provisions of the relevant specific standard(s), and assessment of supporting documentation. It does not imply an assessment of the whole production.

Whilst this certificate may be used in support of a manufacturer's claim for CE Marking, FM Approvals Ltd accepts no responsibility for the compliance of the equipment against all applicable Directives in all applications.

This Certificate has been issued in accordance with FM Approvals Ltd's ATEX Certification Scheme.

**17 Schedule Drawings**

A list of the significant parts of the technical documentation is annexed to this certificate and a copy has been kept by the Notified Body.

**18 Certificate History**

Details of the supplements to this certificate are described below:

Date	Description
29 <sup>th</sup> May 2012	Original Issue.
06 <sup>th</sup> September 2012	<u>Supplement 1:</u> Report Reference: – 3043661REV120801 dated 24 <sup>th</sup> August 2012 Description of the Change: Corrected minor errors in drawings and added notes.
16 <sup>th</sup> October 2012	<u>Supplement 2:</u> Report Reference: – 3043661REV120829 dated 26 <sup>th</sup> September 2012 Description of the Change: Replacing a potted capacitor.
25 <sup>th</sup> June 2013	<u>Supplement 3:</u> Report Reference: – 3049315 dated 21 <sup>st</sup> June 2013 Description of the Change: Alternate versions of the bridge PCB added. Model number options also added on the integral system to incorporate temperature options for the sensor.
22 <sup>nd</sup> October 2013	<u>Supplement 4:</u> Report Reference: – 3043661REV130909 dated 11 <sup>th</sup> October 2013 Description of the Change: Adjusted resistor values and unrelated label changes.
02 <sup>nd</sup> January 2014	<u>Supplement 5:</u> Report Reference: – 3049315REV131118 dated 18 <sup>th</sup> December 2014 Description of the Change: Update of CE Notified Body number and associated drawings and label.

**THIS CERTIFICATE MAY ONLY BE REPRODUCED IN ITS ENTIRETY AND WITHOUT CHANGE**

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## 9.4 ATEX Approval Certificate (Continued)

**SCHEDULE**

to EU-Type Examination Certificate No. FM12ATEX0018X

Date	Description
21 <sup>st</sup> July 2014	<u>Supplement 6:</u> Report Reference: – 3043661REV1410507 dated 14 <sup>th</sup> July 2014 Description of the Change: Non-safety critical model number options added. Minor drawing updates. Standard issue corrected
19 <sup>th</sup> January 2015	<u>Supplement 7:</u> Report Reference: – 3043661REV141020 dated 12 January 2015 Description of the Change: Non-safety critical change to sensor enclosure and related drawings.
19 <sup>th</sup> June 2015	<u>Supplement 8:</u> Report Reference: - 3054913 dated 10 <sup>th</sup> June 2015 Description of the Change: Update to latest edition of all standards. Minor drawing updates.
14 <sup>th</sup> January 2016	<u>Supplement 9:</u> Report Reference: - 3055545 dated 13 <sup>th</sup> January 2016 Description of the Change: Addition of Remote Density Communications Module
18 <sup>th</sup> October 2016	<u>Supplement 10:</u> Report Reference: – RR206702, dated 17 <sup>th</sup> October 2016 Description of the Change: <ul style="list-style-type: none"> <li>- The voltage range is changed from 18-30Vdc to 19-30Vdc for the Density Communications Module.</li> <li>- Miscellaneous manufacturing and component changes.</li> <li>- Updated certificate to EU format.</li> </ul>

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## 9.4 ATEX Approval Certificate (Continued)

420-0004-432	Sheet of 9	ISSUE 10
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FM Ref: 3043661

Date: 18<sup>th</sup> October 2016

**JoAnn Gerhard**  
**AMETEK Drexelbrook,**  
**205 Keith Valley Road,**  
**Horsham,**  
**PA 19044**  
**USA**

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### ATEX EU Type Examination Certificate FM12ATEX0018X Supplement 10

Dear Mr Arnold

I am pleased to confirm that the **U\*\*103\*\*0-\*\*-\*, U\*\*104\*\*0-\*\*-\* and 700-\* Universal IV Level Transmitter with Integral and Remote Sensor** has been certified under Annex III of the ATEX Directive and in accordance with the rules of the ATEX Certification Scheme.

Your copy of the updated certificate is enclosed.

Please retain all documents in a safe and secure location as they represent the evidence upon which the compliance of the above product is based and you may be required to produce them, if challenged by a duly appointed authority, in support of your claims of compliance with the ATEX Directive. Please also ensure that the scope of the technical file is extended to include the details of the model variants as this is a condition of the ATEX Directive.

Certification is dependent upon continued conformity with all of the requirements of the ATEX Certification Scheme as set out in the latest edition of the scheme rules. Please read these rules carefully and contact us if you have any questions.

Yours sincerely



cc: Mick Gower, c-FM Approvals,  
or,  
cc:al-mick.gower@fmapprovals.  
com, s408  
2016.10.18 14:55:32 +0000

Mick Gower  
Certification Manager  
FM Approvals Ltd

Registered No. 5505567 England  
Registered Office: FM Approvals Ltd, 1 Windsor Diels, Windsor,  
Berkshire, UK, SL4 1RS



## 9.5 CE Mark Declaration of Conformity



205 Keith Valley Road, Horsham, PA 19044  
 Telephone: 215-674-1234 Fax: 215-674-2731  
 www.ametek.com www.drexelbrook.com



420-0004-433		Sht. of	APPD BY
ISSUE	EDO NO.	APPD	DATE
3	1-16-106	SGA	1-18-16
4	4-16-102	SGA	4-20-16

### Declaration of Conformity

**AMETEK DREXELBROOK  
 205 KEITH VALLEY ROAD  
 HORSHAM, PENNSYLVANIA  
 USA, 19044**

We declare under our sole responsibility that the product Universal IV Series Level Measurement Systems to which this declaration relates is in conformity with the following standards and entitled to carry the CE Mark:

***Product Type: Measurement, Control Equipment and laboratory***

*Following the provisions of 2014/30/EU Directive,*

**Conforms to the requirements of:**

EN 61326-1-:2013	Clause 7.2 Emissions Class A and Class B
EN 61326-1-:2013	Table 2 Immunity Group 1, Class B Industrial Area

*Following the provisions of 2014/34/EU ATEX Directive, Harmonized Standards*

Conforms to the requirements of:	Harmonized Standards
EN 60079-0:2009	EN 60079-0:2012
EN 60079-1:2007	EN 60079-1:2014
EN 60079-11:2012	EN 60079-11:2012
EN 60079-31:2009	EN 60079-31:2014
EN 60529+A12000	EN 60529+A2:2013

The revised (now harmonized) standards have been compared to the standards used for certification purposes and that no changes in the "state of the art" apply to the equipment.

EC-Type Examination Certificate Number FM12ATEX0018X Notified Body number 1725  
 FM Approvals Ltd. 1 Windsor Dials, Windsor, Berkshire, UK SL4 1RS

Quality Assurance & Product Safety Manager

Issue Date: 4-20-16

**TERMS AND CONDITIONS OF SALE**

**GENERAL:** ALL ORDERS ARE SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS. ANY ACCEPTANCE OF ANY OFFER OF BUYER FOR ANY GOODS OR SERVICES IS CONDITIONED UPON THESE TERMS AND CONDITIONS, AND SELLER OBJECTS TO ANY ADDITIONAL OR DIFFERENT TERMS PROPOSED BY BUYER IN ANY DOCUMENT, WHICH SHALL NOT BE BINDING UPON SELLER. No salesman or other party is authorized to bind the AMETEK DREXELBROOK Division of AMETEK, Inc. (hereinafter "Seller") by any agreement, warranty, statement, promise, or understanding not herein expressed, and no modifications shall be binding on Seller unless the same are in writing and signed by an executive officer of Seller or his or her duly authorized representative. Verbal orders shall not be executed until written notification has been received and acknowledged by Seller.

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**ORDER ACCEPTANCE:** All Orders are subject to final approval and acceptance by Seller at its office located at 205 Keith Valley Road, Horsham, Pennsylvania 19044.

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**CREDIT:** Seller reserves the right at any time to revoke any credit extended to Buyer or otherwise modify terms of payment if Buyer fails to pay for any shipments when due or if in Seller's opinion there is a material adverse change in Buyer's financial condition. Seller may, at its option, cancel any accepted Order if Buyer fails to pay any invoices when due.

**DELIVERY:** Shipments are F.O.B place of manufacture ("Shipping Point") and the Buyer shall pay all freight, transportation, shipping, duties, fees, handling, insurance, storage, demurrage, or similar charges from Shipping Point. Delivery of goods to common carrier shall constitute delivery and passing of title to the Buyer, and all risk of loss or damage in transit shall be borne by Buyer. Any claims or losses for damage or destruction after such delivery shall be the responsibility of Buyer.

Seller reserves the right to make delivery in installments which shall be separately invoiced and paid for when due, without regard to subsequent deliveries. Delay in delivery of any installment shall not relieve Buyer of its obligation to accept remaining deliveries.

Acknowledged shipping dates are approximate only and based on prompt receipt of all necessary information from Buyer and Buyer's compliance with terms of payment.

**TAXES:** All sales, excise and similar taxes which Seller may be required to pay or collect with respect to the goods and/or services covered by any Order, shall be for the account of the Buyer except as otherwise provided by law or unless specifically stated otherwise by Seller in writing.

**TERMINATION AND HOLD ORDERS:** No Order may be terminated by Buyer except upon written request by Buyer and approval by Seller, and if said request is approved by Seller, under the following conditions: (1) Buyer agrees to accept delivery of all of the units completed by Seller through the workday on which Seller receives the written termination request; (2) Buyer agrees to pay to Seller all direct costs and expenses applicable to the portion of the Order that is incomplete.

**WARRANTY:**

A. **Hardware:** Seller warrants its goods against defects in materials and workmanship under normal use and service for one (1) year from the date of invoice.

B. **Software and Firmware:** Unless otherwise specified, Seller warrants for a period of one (1) year from date of invoice that standard software or firmware, when used with Seller specified hardware, shall perform in accordance with Seller's published specifications. Seller makes no representation or warranty, expressed or implied, that the operation of the software or firmware shall be uninterrupted or error-free, or that functions contained therein shall meet or satisfy the Buyer's intended use or requirements.

C. **Services:** Seller warrants that services, including engineering and custom application, whether provided on a fixed cost or time and material basis, shall be performed in accordance with generally accepted industry practices.

D. **Remedies:** Seller's liability under this section is restricted to replacing, repairing, or issuing credit (at Seller's option) for any returned goods and only under the following conditions: (1) Seller must be promptly notified, in writing, as soon as possible after the defects have been noted by the Buyer, but not later than (1) year from date of invoice from Seller; (2) The defective goods are to be returned to the place of manufacture, shipping charges prepaid by the Buyer; (3) Seller's inspection shall disclose to its satisfaction that the goods were defective in materials or workmanship at the time of shipment; (4) Any warranty service (consisting of time, travel and expenses related to such services) performed other than at Seller's factory, shall be at Buyer's expense.

E. **Repaired/Reconditioned Goods:** As to out-of-warranty goods which Seller has repaired or reconditioned, Seller warrants for a period of sixty (60) days from date of its invoice only new components replaced in the most recent repair/reconditioning.

F. **Returns and Adjustments:** No goods may be returned unless authorized in advance by Seller and then only upon such conditions to which Seller may agree. Buyer must obtain an RMA (Return Material Authorization) number from Seller prior to any return shipment and such RMA number must appear on the shipping label and packing slip. Buyer shall be responsible for the returned goods until such time as Seller receives the same at its plant and for all charges for packing, inspection, shipping, transportation, or insurance associated with returned goods. In the event that credit for returned goods is granted, it shall be at the lesser of the then current prices or the original purchase price. Claims for shortage or incorrect material must be made within five (5) days after receipt of shipment.

**ALL OTHER WARRANTIES, FOR ANY OF SELLER'S GOODS OR SERVICES, WHETHER ORAL, WRITTEN, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE ARE EXCLUDED.**

**INTELLECTUAL PROPERTY:** Seller's sale of goods or provision of related documentation or other materials to Buyer shall not transfer any intellectual property rights to Buyer unless Seller specifically agrees to do so in writing. Seller shall retain ownership of all applicable patents, trademarks, copyrights and other intellectual property rights. Buyer shall not use, copy or transfer any such items in violation of Seller's intellectual property rights or applicable law, or for any purposes other than that for which the items were furnished.

Seller shall defend any lawsuit brought against the Buyer based on a claim that the design or construction of the goods sold hereunder by Seller infringe any United States or Canadian Patent, Copyright or Mask Work Registration, provided that Buyer promptly notifies Seller of such claim in writing and further provided that, at Seller's expense, (1) Buyer gives Seller the sole right to defend or control the defense of the suit or proceeding, including settlement, and (2) Buyer provides all necessary information and assistance for that defense. In the event of a charge of infringement, Seller's obligation under the agreement shall be fulfilled if Seller, at its option and expense, either (i) settles such claim; (ii) procures for Buyer the right to continue using such goods; (iii) replaces or modifies goods to avoid infringement; or (iv) accepts the return of any infringing goods and refunds their purchase price; or (v) defends against such claim.

If Buyer furnishes specifications or designs to Seller, the obligations of Seller set forth above shall not apply to goods made by Seller using such specifications or designs, and Buyer shall defend, indemnify and hold Seller harmless against any third party claims for infringement which arise out of Seller's use of specifications or designs furnished by Buyer.

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**PACKAGING/WEIGHTS AND DIMENSIONS:** Buyer specified packing or marking may be subject to additional charges not otherwise included in the price of the goods. Published weights and dimensions are estimates or approximate only and are not warranted.

**FORCE MAJEURE:** Seller shall not be responsible for delays in delivery or any failure to deliver due to causes beyond Seller's control, including but not limited to the following items: acts of God, war, terrorism, mobilization, civil commotion, riots, embargoes, domestic or foreign governmental regulations or orders, governmental priorities, port congestion, acts of the Buyer, its agents or employees, fires, floods, strikes, lockouts and other labor difficulties, shortages or inability to obtain shipping space or transportation, inability to secure fuel, supplies or power at current prices or on account of shortages thereof, or due to limitations imposed by the extent of availability of Seller's normal manufacturing facilities.

If a delay excused per the above extends for more than ninety (90) days and the parties have not agreed upon a revised basis for continuing providing the goods or services at the end of the delay, including adjustment of the price, then Buyer, upon thirty (30) days' prior written notice to Seller may terminate the Order with respect to the unexecuted portion of the goods or services, whereupon Buyer shall promptly pay Seller its reasonable termination charges upon submission of Seller's invoices thereof.

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**GOVERNING LAW:** Seller intends to comply with all laws applicable to its performance under any order. All matters relating to interpretation and effect of these terms and any authorized changes, modifications or amendments thereto shall be governed by the laws of the Commonwealth of Pennsylvania. No government contract regulations or clauses shall apply to the goods or services, this agreement, or act to bind Seller unless specifically agreed to by Seller in writing.

**NON-WAIVER BY SELLER:** Waiver by Seller of a breach of any of these terms and conditions shall not be construed as a waiver of any other breach.

**SEVERABILITY AND ENTIRE AGREEMENT:** If any provision of these terms and conditions is unenforceable, the remaining terms shall nonetheless continue in full force and effect. This writing, together with any other terms and conditions Seller specifically agrees to in writing, constitutes the entire terms and conditions of sale between Buyer and Seller and supercedes any and all prior discussions, and negotiations on its subject matter.

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