

Series 7230



INSTALLATION & OPERATING MANUAL
CONTINUOUS LEVEL CONTROLS

7230 HT Series Digital Probe

MAGNETOSTRICTIVE LEVEL SYSTEM



**ABSOLUTE PROCESS CONTROL
KNOW WHERE YOU ARE... REGARDLESS**

Table of Contents

- 7230 Series HT Digital Probe Overview 2
- Part Numbering and Accessories 3
- Mounting and Installation 4
- Temperature and Offset..... 5
- Wiring 6
- 7231 Modbus Set Up..... 7
- 7235 Digital Set Up 8
- Warranty and Return 9
- 7230 Dimension Drawing 10
- 7231 Installation Drawing 11
- 7235 Installation Drawing 12

7230 Series HT Digital Probe Overview

The 7230 Series HT Digital Probe is a new magnetostrictive level measurement system from AMETEK APT for the up-stream Oil & Gas Industry and high temperature applications that require multiple level and temperature measurements.

Magnetostrictive level measurement technology has the capability of providing the highest accuracy of any of the most popular level technologies that are currently offered in today's market. The 7230 Series is no exception, as it exceeds the high accuracy of the proven 7330 Series with an impressive accuracy of 0.01% of measured span.

The 7230 HT Digital Stik is a level measurement solution that provides both total level, interface level and up to 5 temperature readings that requires only one process connection. The 7230 Series has multiple output options, a digital ASCII interface and an RS-485 Modbus RTU digital output with an optional analog interface. The 7230 Series is approved as Explosion Proof (without Intrinsic Safety Barriers) for Class I, Div. 1, and Zone 1 hazardous area installations.

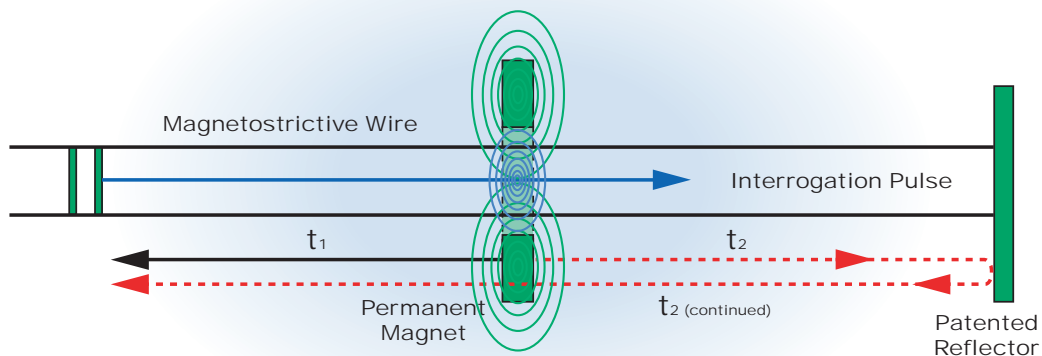
The advantages of magnetostrictive technology

include high accuracy and reliable level measurement capabilities that are completely independent of changes in the process material's electrical characteristics and densities. Hydrocarbon based condensates have a predictable range of specific gravity that are well within the range of floats that are part of this product offering. There is no calibration required to set up the probe. Variations in hydrocarbon make up will not cause any level measurement errors.

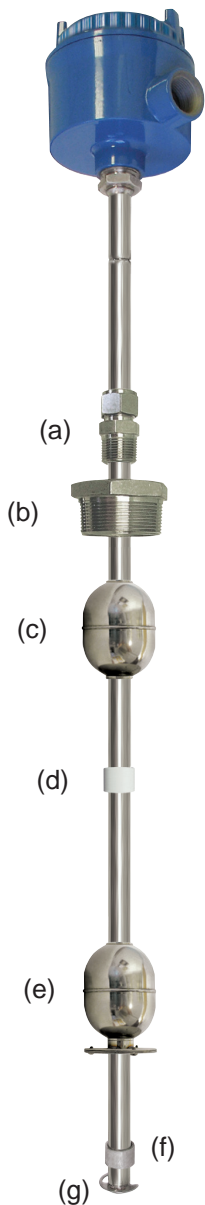
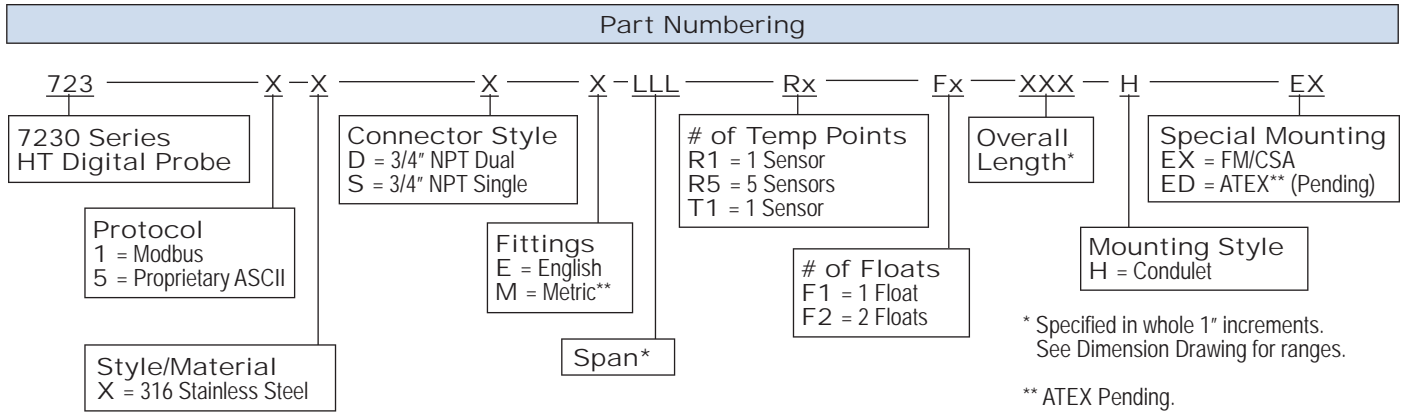
A choice of two communication protocols are available. The 7231 HT standard protocol is Modbus RTU, and offers an optional Modbus to Analog output converter. The 7235 HT has a proprietary ASCII digital output and would be recommended for OEM use. The new sensor has an explosion proof approval for use in Class I, Div. I, Group A, B, C, and D hazardous area installations.



The advantages of magnetostrictive technology include high accuracy and repeatability, plus reliable level measurement capabilities that are completely independent of the process materials electrical characteristics. The standard float is suitable for most liquids with a minimum density of 0.5 specific gravity.

Magnetostrictive Principle



1. A high current interrogational pulse creates an electromagnetic field along the magnetostrictive wire.
2. Interaction with the permanent magnet creates a torsional strain pulse that travels up (t_1) and down (t_2) the wire.
3. The torsional strain pulse travels up the wire to a small pick up sensor at the top of the transducer. The pulse traveling down the wire is reflected and continues up the wire to be sensed by the same pick up sensor.
4. The time between the pulse (t_1) and the pulse (t_2) is used to determine the level.



Specifications		Approvals
Output Signal/Protocol	Level, Interface and Temperature 7231: RS-485, Modbus RTU 7235: TTL, Proprietary	FM (US and Canada) XP Class I, Div I, Group A, B, C, D, T4 DIP Class II, III, Group E, F, G, T4 
Data	7231: Signed, Long, Binary 7235: ASCII	
Range Temp.	-40°F to 257°F Process -40°F to 158°F Ambient	CSA Class I, Div I, Group A, B, C, D, T4 Class II, Div I, Group E, F, G, T4 Class III, Div I, T4 
Pressure Rating, Wetted Parts	316SS Probe: 1000 psi max. Floats: Dependent. Consult Factory.	
Wetted Parts	316LSS	ATEX, CE Pending
Probe Length	Up to 24 foot, 21" to 288"	
Accuracy	0.01% of Span	
Resolution	0.0001 inches, 0.1 °C	
Power Supply	7231: 10 to 30 VDC 40mA @ 30 VDC max. 26mA @ 24 VDC Typical 7235: 5 VDC, +/-10% Typical 3.7 VDC min. 17mA max.	
Enclosure Type	Type 4/4X IP66	
Null Zone	9.25"	
Dead Band	2.75"	
Specifications are subject to change without notice. Patented.		

Accessories (Purchased separately)

- (a) Compression Fitting, 5/8" to 3/4" NPT, Stainless Steel.
- (b) Reducer Bushing, 2" x 3/4" NPT.
- (c) Level Float, 2", 316 Stainless Steel.
- (d) Float Spacer, PVDF (Kynar®)
Kynar® is a Registered Trademark of Atofina Chemicals, Inc..
- (e) Interface Float, optional, 2", 316 Stainless Steel.
- (f) Dead Band Spacer, 316 Stainless Steel.
- (g) E-Clip, 316 Stainless Steel.
- (h) Two piece Halar® Foot and End Cap, ECTFE
Halar® is a Registered Trademark of Ausimont USA, Inc.



Figure 1

Mounting Conditions

1. The 7230 Series HT Digital Probe level system is designed for industrial applications, but should be mounted in a location as free as possible from vibration, corrosive atmospheres, or any possibility of mechanical damage.
2. Mount the probe in a reasonably accessible location, away from agitation.
3. Process temperature is between -40°F and 257°F (-40°C to 125°C).
4. Mount the probe perpendicular with gravity so the float moves freely along the probe.

CAUTION

When installing probes, do not bend rigid probes. Permanent damage may result. Rigid probes, longer than 10 ft., need to be supported at both ends while handling. Remove the Caution Tag before installing. Probes are built with the electronic circuits sealed inside the tube at the factory. Do not attempt to open or weld on the tube.

Unpacking

Carefully remove the contents of the shipping carton and check each item against the packing list before destroying the packing materials. Any damage must be reported to the shipping company. If you do not receive all of the parts on the packing slip, contact Ametek at 800-635-0289 (US and Canada) or 248-435-0700 (International).

Most rigid probes are shipped in a Tube. To remove the metal end cap, use a large, flat blade screw driver or a metal rod and tap on the inner edge of the cap until it pivots. Grab the cap and pull it out. Use caution as the edge of the metal cap may be sharp.



If you have an RMA warranty claim, pack the probe in a shipping tube or with stiff reinforcement to prevent the probe from being bent in transit.

Installation of a Rigid Probe

The D style connector with dual 3/4 NPT thread does not require a compression fitting for installation. The S style connector will require a compression fitting, which is mounted below the tube crimp on the probe to insure a proper seal.

Assemble the Probe

See Figure 1.

1. Mount the Compression Fitting (a) if the Style S connector is being used.
2. Install the bushing if it is used.
3. If the probe has 1 float, (F1), slide the Level Float (b) or Interface Float (d) onto the probe. If the probe has 2 floats, (F2), slide the Level Float (b) onto the probe, followed by the Float Spacer (c), and then the Interface Float (d). The magnet is located in the middle of the 316 SS Level Float, so orientation does not matter. The 316SS Interface Float must be positioned with the plates at the bottom.
4. Slide the Dead Band Spacer (e) onto the probe.
5. Capture these parts with either a retainer E-Clip (f) or the End Cap (g).
6. Verify that the floats and spacers move smoothly up and down the probe.

Insert the Probe

See Figure 2.

7. Insert the foot of the probe into the tank. **Do not allow the float(s) to drop suddenly since this could damage the float or retainer at foot of the probe.**
8. Thread the bushing into the tank, flange, or bung/riser. Properly fasten the bushing and flange.
9. Thread the compression fitting or probe into the bushing or flange.
10. Hand tighten. To insure Compression Fitting is sealed, turn it 1 1/4 turns after hand tightening.
11. Make final check to see that all fasteners are in proper position and that the probe is securely tightened.

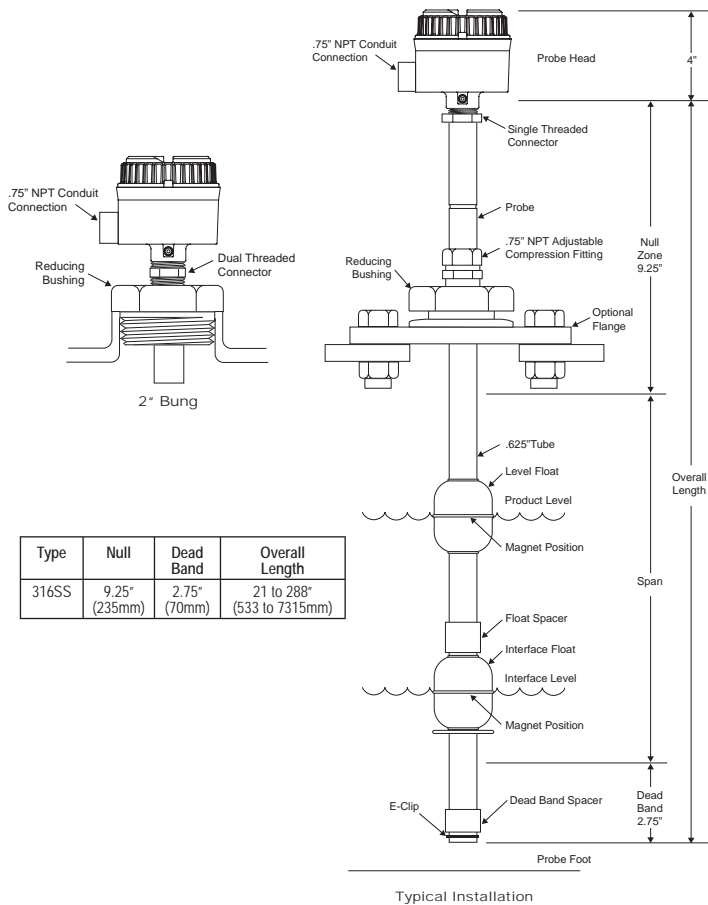
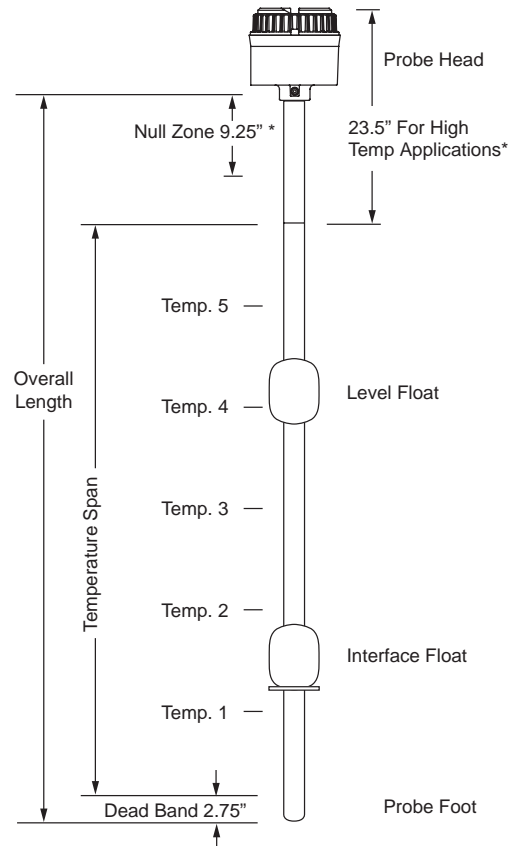


Figure 2
(Drawing not to scale.)



* For High-Temperature applications between 70-125 deg. C, use a compression fitting 23.5\"/>

Figure 3
(Drawing not to scale.)

Temperature Sensor Locations

The 7230 Series probes come with 1 or 5 temperature sensors. See Figure 3. The physical location of the temperature sensors is based upon the probe span.

Single Temp Sensors

R1 probes have the temperature sensor located 18\"/>

Multiple Temp Sensors

R5 probes have the temperature sensors equally spaced over the span. The distance between each temp sensor is the span plus the dead band divided by six.

Off-Set Procedure

Analog probes require you to assign a value to the incremental change to the span from 4mA to 20mA. The 7230 Series is a digital probe with high resolution and repeatability, but the overall accuracy is also dependant upon the installation set-up. The 7231/7235 position output is the actual position of the float magnet on the active area of the magnetostrictive wave guide. While there is no calibration of the probe, you must provide a reference point for the level measurement. The probe output indicates the position of the magnet on the probe, the instrument does not know where it is located in the tank. The measurement of a level change is extremely accurate, but to insure an accurate absolute level measurement, the level may require correction.

1. Measure the level of the tank manually.
2. Install the probe and compare the sensor's level position with the manual measurement.
3. If necessary, calculate the correction factor ("offset") and apply this to the probe output in the controller.

Wiring

Wiring for the 7231 HT Modbus probe is illustrated in Figure 4 and Installation Drawing E0242100, Sheet 1. The probe is approved for hazardous locations, so it is important to use the appropriate conduit and seals.

As many as 32 Modbus devices may be multi-dropped on the same bus. A twisted pair is used to connect the 7231 to a host, such as a PC with a RS-485 converter or PC card. It is recommended that the twisted pair be shielded and at least 22 AWG. The shield should be connected to common only at one end.

NOTE: If the RS-485 bus already has terminating resistors installed, the jumper JP1 on the motherboard must be set to position 2-3. This will remove the built-in terminating resistor that is connected by default.

CAUTION

Do not remove the explosion proof cover in a hazardous area. You must make certain that the power is locked out and the area is safe. When servicing is completed, the cover must be replaced and secured with the set screw before power is applied to the instrument.

The wiring for the 7235 HT Digital probe is illustrated in Figure 5 and connects to a standard terminal block located in the housing as shown in Drawing E0242100, Sheet 2. The 7235 is also approved for hazardous locations, so it is important to use the appropriate conduit and seals. The recommend cable is a three conductor with shield, Belden# 6501FE, 22 AWG and the maximum recommended cable length is 150 feet.

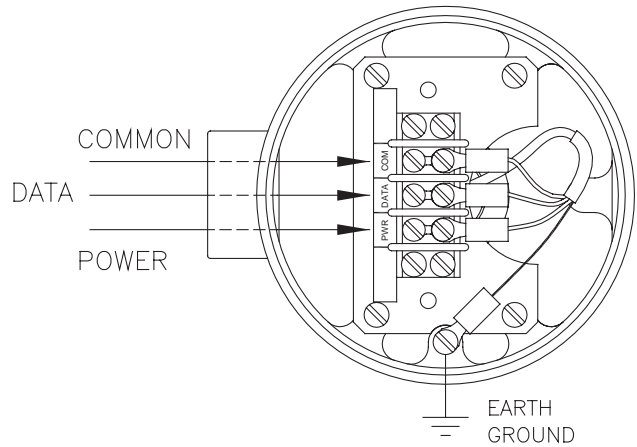


Figure 5 - 7235 Wiring

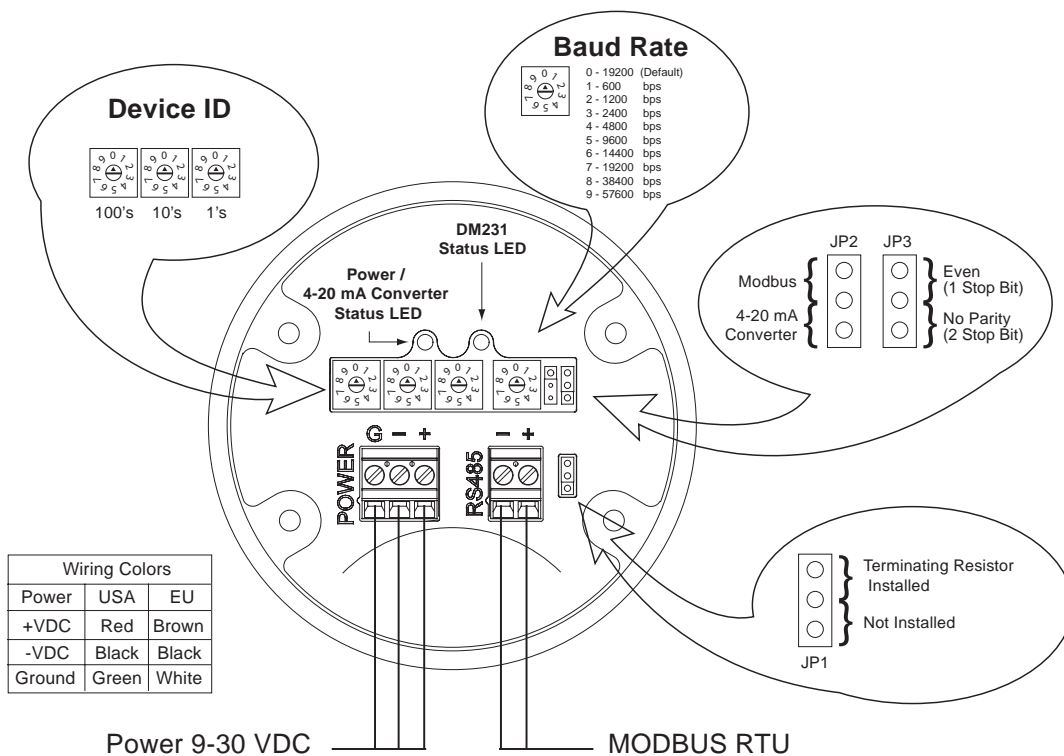


Figure 4 - 7231 Wiring
(Switches and jumpers shown in the default positions.)

7231 Modbus Set Up

The 7231 uses the Modbus protocol for communicating with a PC or devices such as a programmable logic controller. Modbus is a master-slave protocol that is openly published. Many PC programs currently exist for communicating with Modbus supported devices. The 7231 supports the RTU transmission mode over RS-485.

By default the 7231 is configured as a Modbus Master, for writing to the optional 4-20 mA converter. (Refer to the Data Sheet Z313, supplied with the converter P/N 04534047). To configure the 7231 to communicate with the optional 4-20mA converter; change the Modbus / Converter Jumper (JP2) to the “down” position. When the 7231 is configured to communicate with the converter, all of the other switches and jumpers will have no effect. In this case, the communication parameters are fixed at 9600 baud, 8 data bits, no parity and 2 stop bits.

Implementation Class

The 7231 uses the Basic Implementation Class of the Modbus protocol. The table below shows configurations capabilities of the basic implementation class.

	Basic
Addressing	Configurable address from 1 to 247
Broadcast	Yes
Baud Rate	600 to 57,600 bps
Mode	RTU
Parity	Even, None
Stop Bits	1 if Even Parity, 2 if No Parity,
Electrical Interface	RS-485 2W-Cabling
Connector Type	3 Wire Terminal

Configuration

Refer to the Figure 4 for switch and jumper positions. The following configurations are only applicable when the 7231 is configured as a Modbus Slave Device.

Baud Rate

The Baud Rate may be adjusted by changing the position of the baud rate switch. The default baud rate is 19200 bps.

Baud Rate Switch Position

0 - 19200 bps	5 - 9600 bps
1 - 600 bps	6 - 14400 bps
2 - 1200 bps	7 - 19200 bps
3 - 2400 bps	8 - 38400 bps
4 - 4800 bps	9 - 57600 bps

Device ID

The Device ID is a unique address used to multi-drop the 7231 with up to 32 Modbus devices using the RS-485 Interface. The 7231 may be configured for a Device ID of 1 to 247. The Device ID may be adjusted by changing the position of the Device ID switches. A switch position of ‘0’ and ‘1’ will be an ID of 1. Any values between 1 and 247 will be the corresponding ID. Any switch position greater than 247 will be set to 247.

Modbus Register Address Map

Modbus Register Address Map			
Parameter	Address	Data Type	Valid Values
Product (x1000)	300001	Long	Read Only
Interface (x1000)	300003	Long	Read Only
Temperature 1 (x10000)	300007	Long	Read Only
Temperature 2 (x10000)*	300009	Long	Read Only
Temperature 3 (x10000)*	300011	Long	Read Only
Temperature 4 (x10000)*	300013	Long	Read Only
Temperature 5 (x10000)*	300015	Long	Read Only
Status	300051	Long	Read Only

- * For R1 and T1 options, all temperature data will be of just the one temperature sensor (i.e. all temperature readings will all be the same.)
- All Registers may be accessed as both, Holding Registers and Input Registers. Example: The product can be accessed from both 300001 and 400001.
- Registers with a scale factor such as (x1000) will need to be scaled by the master to show the appropriate floating point number.
- Product level is the average of the 10 level readings.

Code and Unit Tables

The code and unit tables give meaning to some of the parameters listed in the register map.

Status bit Definitions	
bit	Definition
0-7	Reserved
8	Magnet Missing/Fault with Product or Interface/Loss of Signal
9	Temperature 1 Fault
10	Temperature 2 Fault
11	Temperature 3 Fault
12	Temperature 4 Fault
13	Temperature 5 Fault
14-31	Reserved

7235 Digital Set Up

Data Signal

The “Data” signal is an “open-drain” type signal and is used for the bidirectional half duplex asynchronous serial communications. Any device connected to the probe must be of an “open-drain” type signal and must not be driven to a high logic level. Because this data signal may be driven by either the master or any slave device, a single pull up resistor of typically 1kΩ should be the only element that establishes the high logic level voltage. Also, because of this scheme, there could be multiple master or slave devices connected together.

The logic level voltage thresholds are similar to TTL levels and a pull-up resistor must be included in the user’s interface circuitry. This signal is clamped internally by the 7235 with a +5V TVS device. The inactive or “idle” state is at a “high” logic level.

Power Consumption

The 7235 draws roughly 13mA of current when it is not taking temperature measurements and roughly 15mA of current when it is taking temperature measurements (with 5 temperature sensors).

Communication Parameters (fixed)

baud	9600
parity	odd
data bits	7
start bits	1
stop bits	1

Data Format

The data string is in ASCII format and the total data string transmission time is roughly one (1) second.

Approximately 100ms after power up, a carat (^) character is transmitted and the first product position is measured and transmitted. Subsequent position measurement and transmission continues every 100ms until 10 products have been transmitted. One interface position is transmitted immediately following the 10th product position. All temperature data is then transmitted along with a final 2-digit ASCII Checksum followed by a Carriage Return character to end the string. This whole data string transmission process continuously repeats itself while power is applied to the probe.

NOTE: A comma character is transmitted between each position and temperature measurement (see example in Data String table).

The data string length is 139 bytes total. The data string is comprised of a carat (^) character (i.e. start character), 10 product levels, 1 interface level, and 5 temperature sensor levels followed by a 2-digit ASCII Checksum and a carriage return character (<CR>).

Data String	
^,ppp.pppp,ppp.pppp,... ...,ppp.pppp,iii.iiii,+/-ttt.t,...,+/-ttt.t,CC<cr>	
^:	Start Character (identifies protocol, type and quantity of following data)
ppp.pppp:	Product (“000.0000” to “600.0000”)
iii.iiii:	Interface (“000.0000” to “600.0000”) (NOTE: Interface = 000.0000 if Stik is ordered with only 1 float)
+/-ttt.t:	Temperature (-40.0°C to +125.0°C)
CC:	2 digit ASCII checksum (see calculation of checksum below)
<cr>:	End of data string - carriage return

For probes ordered with only 1 temperature sensor (i.e. T1 or R1), a temperature reading is taken on that one temperature sensor and that value is placed in all five temperature data locations in the string.

NOTE: Data values outside the ranges specified above indicate an error condition.

A value of “999.9999” will be transmitted if there is an error in the product or interface levels. A value of “-999.9” will be transmitted if there is an error in the temperature sensor measurement.

Calculation of Checksum

All characters (from and including the start character (^) to and including the comma (,) after the final temperature digit) in the data string are added up to a byte (8-bit) value. Take the upper nibble (4-bits) and lower nibble (4-bits) of that byte and convert each nibble value to its equivalent ASCII character.

For example:

If all the characters add up to 0xA5 (hex); it would transmit an ‘A’ and a ‘5’ char to represent the upper and lower nibble values. The 2-digit ASCII checksum (CC) would be: 0x41 0x35 (or the ASCII equivalent chars ‘A’ ‘5’).

Data Transmission Example

The following example represents the data transmitted from a 7235 HR Digital Stik.

The following example represents a full transmission data string (139 bytes) from a 7235 HR Digital Stik probe with the following information (Bytes 0 - 135 are used to compute the checksum):

NOTE: The Level data in the following chart may not be representative of a valid product level. The data is for demonstration purposes only.

Data Transmission		
Byte #s	ASCII Chr String	Level Name
0-1	^,	Start Character
2-10	123.4567,	Product 1
11-19	456.7890,	Product 2
20-28	654.3212,	Product 3
29-37	987.6543,	Product 4
38-46	124.5789,	Product 5
47-55	234.5678,	Product 6
56-64	267.4310,	Product 7
65-73	478.2354,	Product 8
74-82	752.6143,	Product 9
83-91	891.4578,	Product 10
92-100	002.5389,	Interface 1
101-107	+122.1,	Temperature 1
108-114	+122.3,	Temperature 2
115-121	+122.5,	Temperature 3
122-128	+122.3,	Temperature 4
129-135	+122.1,	Temperature 5
136-137	CC	2-digit ASCII Checksum
138	<cr>	Carriage Return

Warranty

All AMETEK APT electronic level instruments are warranted to be free of defects in materials or workmanship for one full year from the date of original factory shipment.

If returned within the warranty period, and upon factory inspection to determine whether the cause of the claim is covered under the warranty, AMETEK APT will repair or replace the instrument at no cost to the purchaser (or owner), other than transportation.

AMETEK APT shall not be liable for misapplication, labor claims, director or consequential damage or expense arising from the installation or use of the equipment. There are no other warranties expressed or implied. A complete description of the product warranty is contained in the Terms and Conditions of Sale.

Equipment Return

Contact your Distributor before returning equipment to the factory.

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

You must have a Returned Material Authorization Number! To obtain a Returned Material Authorization (RMA#), contact your distributor.

Please provide the following information:

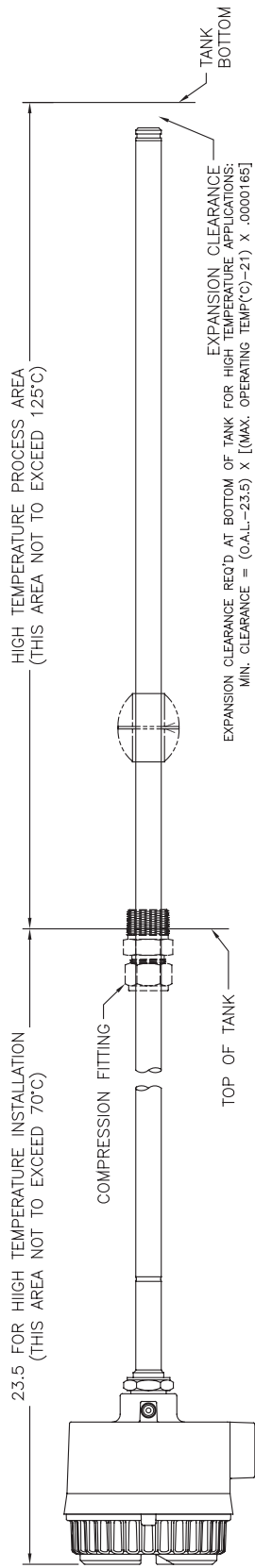
- Model Number of returned equipment
- Serial Number
- Original Purchase Order Number
- Detailed description of the failure
- Contact Name and Phone Number

In many applications, the probes are exposed to hazardous materials. It is your responsibility to fully disclose all chemicals and decontaminate the entire product.

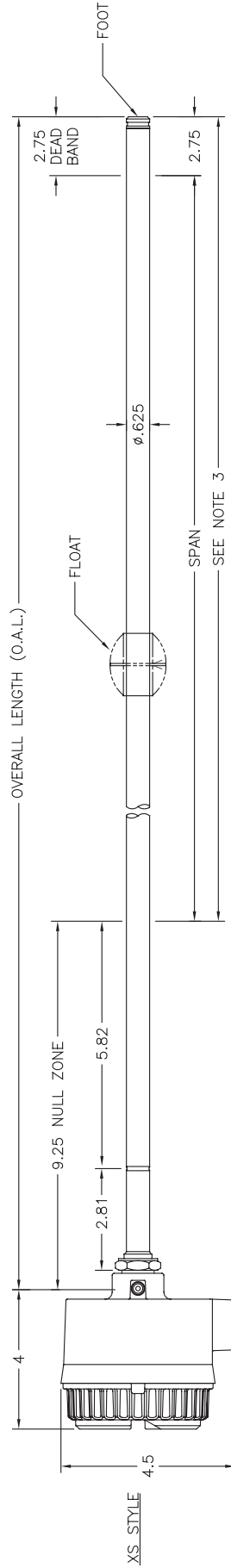
- OSHA mandates that our employees be informed and protected from hazardous chemicals.
- A **Material Safety Data Sheet (MSDS)** listing any hazardous material to which the probe has been exposed **MUST** accompany any return.

REV.	DESCRIPTION	REVISION	DATE	BY
A	REVISED NULL ZONE & DEAD BAND DIM		12/21/06	KTP

HIGH TEMPERATURE APPLICATIONS UP TO 125°C



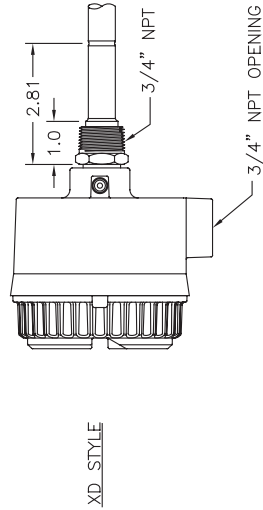
APPLICATIONS UP TO 70°C



STANDARD PROBE LENGTHS:

TEMPERATURE SENSOR TYPE	MAXIMUM O.A.L. (in)	MINIMUM TEMP. SPAN (in)	MINIMUM O.A.L. (in) -40°C TO 70°C	MINIMUM O.A.L. (in) -40°C TO 125°C	TEMPERATURE SENSOR SPACING @ 21°C
R5	288	14	31	37	(TEMP. SPAN=2.75"/6
R1	288	16	35	39	18" TO PROBE FOOT
T1	288	2	21	25	4" TO PROBE FOOT

- NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL DIMENSIONS ARE FOR REFERENCE ONLY.
 2. ENSURE MAGNET DOES NOT ENTER NULL ZONE AND DEAD BAND AREAS.
 3. TEMPERATURE SENSORS ARE SPACED EQUALLY OVER RANGE SPECIFIED.
 4. FOR FIVE TEMPERATURE SENSOR PROBES, SENSORS ARE NUMBERED R1 TO R5 WITH R1 BEING NEAREST TO FOOT OF PROBE AND R5 NEAREST TO ENCLOSURE.



THIRD ANGLE PROJECTION	DR.	TITLE
	KTP	DIMENSION DRAWING
SURFACE FINISH $\sqrt{63}$ UNLESS OTHERWISE SPECIFIED TOLERANCE ALLOWANCE UNLESS OTHERWISE SPECIFIED: +/- 0.010 ON 2 PLACE DECIMALS +/- 0.0005 ON 4 PLACE DECIMALS +/- .30 MIN. ON ALL ANGLES	DATE 09/15/06	7230 SERIES HT
	APP.	DIGITAL STIK
	SCALE	DRAWING NO. D0257800
		REV. SIZE A B

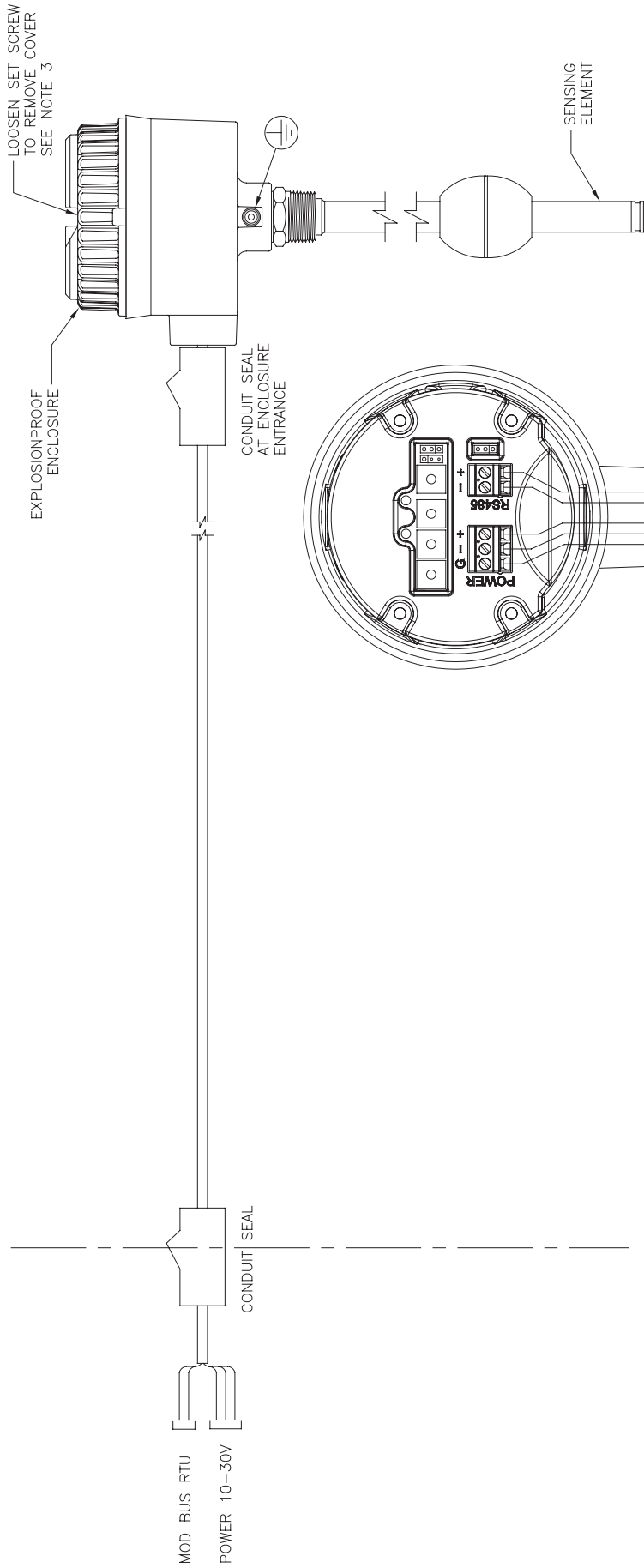


Clawson, MI 48017 U.S.A.

REV.	DESCRIPTION	REVISION	DATE	BY

****APPROVED DOCUMENT****
CHANGES TO THIS DOCUMENT
REQUIRE AGENCY APPROVAL

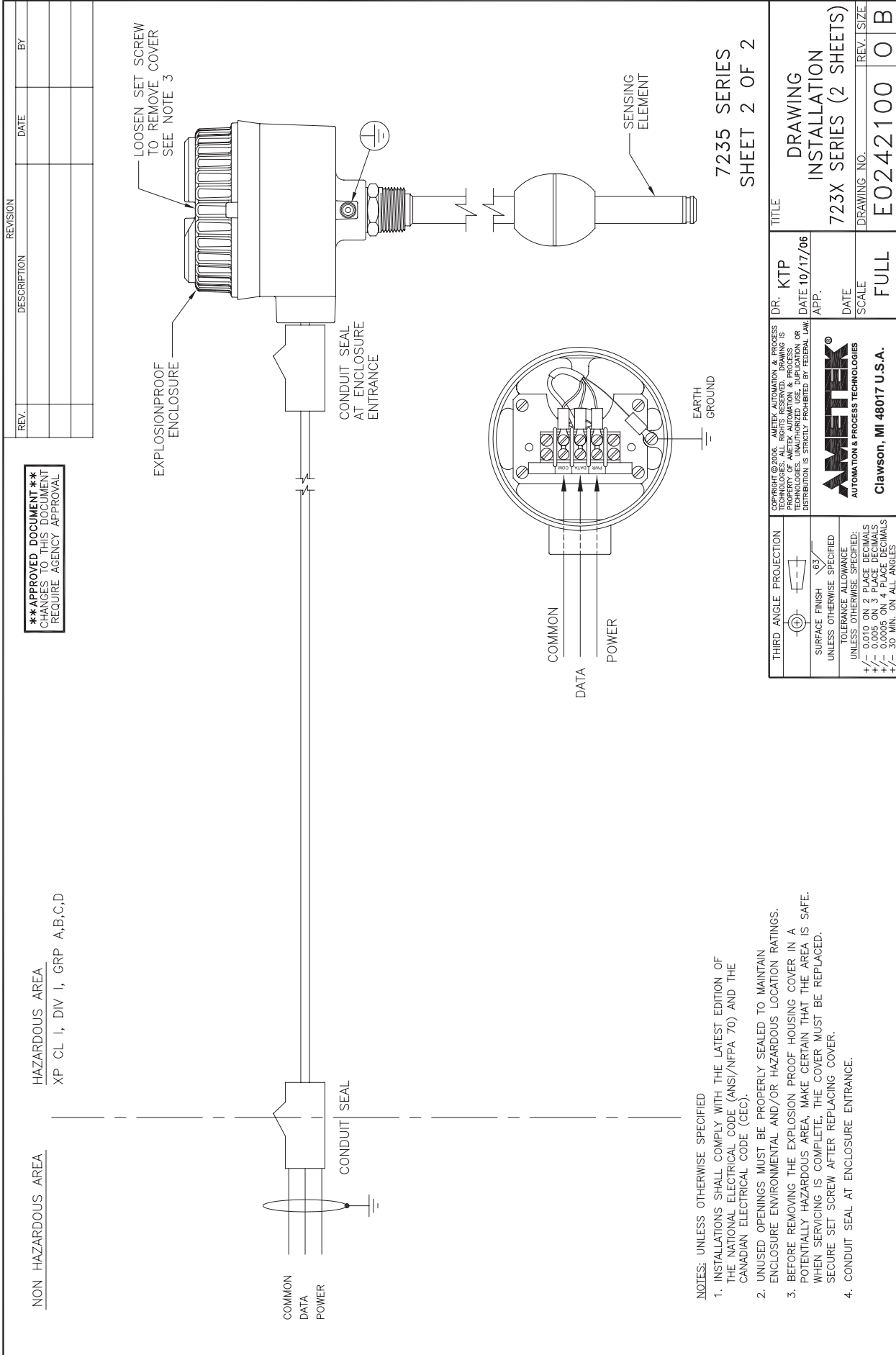
NON HAZARDOUS AREA
HAZARDOUS AREA
XP CL 1, DIV 1, GRP A,B,C,D



7231 SERIES
SHEET 1 OF 2

- NOTES: UNLESS OTHERWISE SPECIFIED
1. INSTALLATIONS SHALL COMPLY WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND THE CANADIAN ELECTRICAL CODE (CEC).
 2. UNUSED OPENINGS MUST BE PROPERLY SEALED TO MAINTAIN ENCLOSURE ENVIRONMENTAL AND/OR HAZARDOUS LOCATION RATINGS.
 3. BEFORE REMOVING THE EXPLOSION PROOF HOUSING COVER IN A POTENTIALLY HAZARDOUS AREA, MAKE CERTAIN THAT THE AREA IS SAFE. WHEN SERVICING IS COMPLETE, THE COVER MUST BE REPLACED. SECURE SET SCREW AFTER REPLACING COVER.
 4. CONDUIT SEAL AT ENCLOSURE ENTRANCE.

THIRD ANGLE PROJECTION	DR. KTP	TITLE
SURFACE FINISH $\sqrt{32}$	DATE 10/17/06	DRAWING NO.
TOLERANCE ALLOWANCE UNLESS OTHERWISE SPECIFIED: +/- 0.010 ON 3 PLACE DECIMALS +/- 0.0005 ON 4 PLACE DECIMALS +/- .30 MIN. ON ALL ANGLES	SCALE FULL	REV. SIZE
<p>Copyright © 2006, AMETEK Automation & Process Technologies. All rights reserved. Reproduction, distribution, or use of this document without the written permission of AMETEK Automation & Process Technologies is strictly prohibited by Federal Law, App.</p> <p>AMETEK Automation & Process Technologies</p> <p>Clawson, MI 48017 U.S.A.</p>	<p>DRAWING TITLE 723X SERIES (2 SHEETS)</p>	<p>0 B</p>



REV.	DESCRIPTION	REVISION	DATE	BY

****APPROVED DOCUMENT****
 CHANGES TO THIS DOCUMENT
 REQUIRE AGENCY APPROVAL

NON HAZARDOUS AREA
 HAZARDOUS AREA
 XP CL 1, DIV 1, GRP A,B,C,D

- NOTES: UNLESS OTHERWISE SPECIFIED
- INSTALLATIONS SHALL COMPLY WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND THE CANADIAN ELECTRICAL CODE (CEC).
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 - CONDUIT SEAL AT ENCLOSURE ENTRANCE.

7235 SERIES
 SHEET 2 OF 2

THIRD ANGLE PROJECTION		DR.	TITLE
		KTP	DRAWING
SURFACE FINISH UNLESS OTHERWISE SPECIFIED		DATE	INSTALLATION
TOLERANCE ALLOWANCE UNLESS OTHERWISE SPECIFIED:		APP.	723X SERIES (2 SHEETS)
+/- 0.010 ON 2 PLACE DECIMALS		DATE	DRAWING NO.
+/- 0.005 ON 4 PLACE DECIMALS		SCALE	E0242100
+/- 30 MIN. ON ALL ANGLES		FULL	REV. SIZE
			O B

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AMETEK
 AUTOMATION & PROCESS TECHNOLOGIES
 Clawson, MI 48017 U.S.A.

Notes

Part Number

Serial Number

Purchase Order Number

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Comments



Other Products



- GEMCO**
- LINEAR DISPLACEMENT TRANSDUCERS
- PLC INTERFACE PRODUCTS
- ROTARY POSITION PRODUCTS
- PROGRAMMABLE LIMIT SWITCHES
- EXTREME DUTY CABLE REEL PRODUCTS
- ROTARY LIMIT SWITCHES
- RESOLVERS
- MILL DUTY ENCLOSURES
- ULTRA HIGH SPEED PLS
- SAFETY PRODUCTS



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