

# Installation Instructions for Hazardous Location Flow Meters

## Attention:

Applies only to Max Model EX295 and EX296 Transmitters with explosion proof certification.

These transmitters provide protection via a flame proof housing and through current limiting to the circuit board: Must wire with a class 2 power supply (See table for loads page 6).

Meets US and Canadian Haz-Loc classifications, Class I, Div 1, Groups C and D, Tx  
As well as ATEX/IECEX II 2 G Ex db IIB Tx Gb  
Certification numbers Demko 11 ATEX 1013058X and IECEX UL 10.0048X

Meets the following standards:

IEC 60079-0, 7th Edition, Issued 2017-12

IEC 60079-1, 7th Edition, Issued 2014-06

EN IEC 60079-0:2018, Issued 2018-07

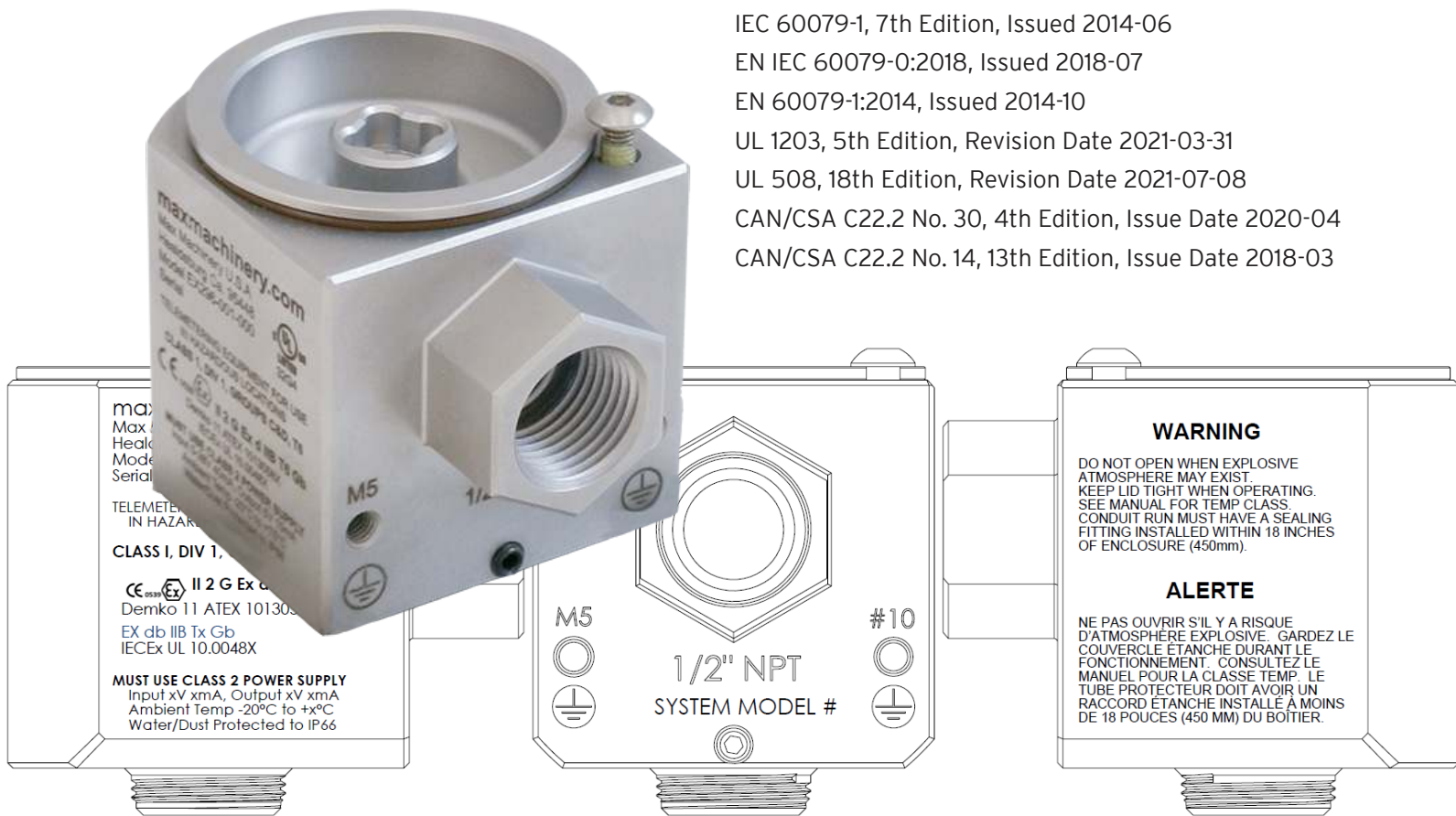
EN 60079-1:2014, Issued 2014-10

UL 1203, 5th Edition, Revision Date 2021-03-31

UL 508, 18th Edition, Revision Date 2021-07-08

CAN/CSA C22.2 No. 30, 4th Edition, Issue Date 2020-04

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# max

# Hazardous Location Installation Instructions - Precautions



Never run the meter dry or blow compressed air through the meter. Damage will occur.



Never steam clean the meter. Damage will occur. (Bypass or remove the meter if necessary).



Do not run water or aqueous solutions through Max meters approved for use in hazardous locations.



Do not disassemble the mechanical fluid side of the meter. No serviceable parts inside.



Do not over pressurize the meter or apply excessive differential pressure across the meter. Damage may occur.



Do not exceed maximum flow rates. Damage may occur.



Do not allow materials to cure and solidify in meter.



Read the entire manual and installation instructions before installing and operating the meter.



Purge all air bubbles from meter before operating your system.



Verify the meter hazardous location classifications meet the requirements for your application.



Filter your fluid to prevent damage from debris and foreign materials.



Install bypass plumbing around the flowmeter.



Remeltable solid materials must fully liquify before pumping through your meter.



Follow all local regulations and your company safety procedures when installing, operating, servicing, and maintaining your flow meter.



Attention: Observe Precautions for Handling Electrostatic Sensitive Devices



Warning: Electrical shock hazard. Serious or fatal injury may occur. Disconnect power before performing field maintenance.

## Tools Required:

You will need the following tools to complete these instructions:



2.5 mm Flat Head Screwdriver



3.5 mm Flat Head Screwdriver



Phillips Head Screwdriver



3/32 inch Hex Head Driver



3/8 inch Socket Drive



Internal Snap Ring Tool



5/32 inch Hex Head Driver



M5 Hex Head Driver

# Mechanical Transmitter Installation for Haz-Loc Flow Meters

The outer transmitter housing freely rotates to align the conduit hole with your electrical connection point. Transmitters come factory assembled to the mechanical meter. Follow these instructions to attach the flow meter transmitter to your electrical connection point:

1. Rotate to align conduit port in the desired direction.
2. Remove lid for wiring by removing safety screw on edge of lid and removing lid using a 3/8" socket drive.
3. Install conduit and torque to 10 ft-lbs. Within 18" of the housing install a conduit stop and fully seal with potting compound.
4. Wire per Diagram 4.1 for frequency transmitters, Diagram 4.2 for analog transmitters, or Diagram 4.3 for two part transmitters. Tighten terminal screws with 2 mm flat head screwdriver.
5. Grounding the transmitter is required. A case ground terminal is provided internally for use with grounded metallic conduit. Other installation methods must use one of the external grounds below the conduit fitting. For metric- use either a 6 or 8 mm long stainless steel M5 x 8.0 bolt. For inch measurement - use either a 1/4" or 5/16" long stainless steel #10-32 bolt.
6. Reattach cap and tighten to 40 in-lbs to seal enclosure. Install safety lock screw at the edge of the lid and hand tighten.

## Removal of Transmitter from Mechanical Meter

The transmitter does not need to be removed from the flow meter for any field servicing or adjustments. The mechanical meter and transmitter are shipped back to the factory for calibration as a unit. If removal is necessary, follow these steps:

1. Remove lid for wiring by removing safety screw on edge of lid and removing lid using a 3/8" socket drive.
2. Disconnect wires at the terminal block and remove wiring conduit from transmitter.
3. Remove the locking set screw located below the conduit hole using a 3/32" hex wrench.
4. Rotate the outer housing clockwise until the screw hole lines up with a hole in the inner housing. (Inserting an Allen key into the threaded hole while rotating the housing can help in finding the point of alignment.)
5. Re-insert the set screw and hand-tighten it to lock the inner and outer housing together.
6. Unscrew the transmitter, using a strap wrench if necessary.



Transmitter Housing

Mechanical Meter

Example Only  
Differs by Part Number

## Attaching the Transmitter to the Mechanical Meter

If the transmitter has been removed, follow these instructions to reattach the transmitter:

1. Screw the transmitter onto the exterior threads on top of the mechanical flow meter.
2. Remove the locking set screw located below the conduit hole using a 3/32" hex wrench.
3. Rotate the outer housing clockwise until the screw hole lines up with a hole in the inner housing. (Inserting an Allen key into the threaded hole while rotating the housing can help in finding the point of alignment.)
4. Re-insert the set screw and hand-tighten it to lock the inner and outer housing together.
5. Torque the transmitter onto the meter by applying 2 to 5 ft.-lb. (2.7 to 6.78 N-m).
6. Back out the locking set screw until flush with surface of transmitter housing.
7. Housing can now rotate to align conduit port in the desired direction.

# Electrical Installation for Haz-Loc Flow Meters

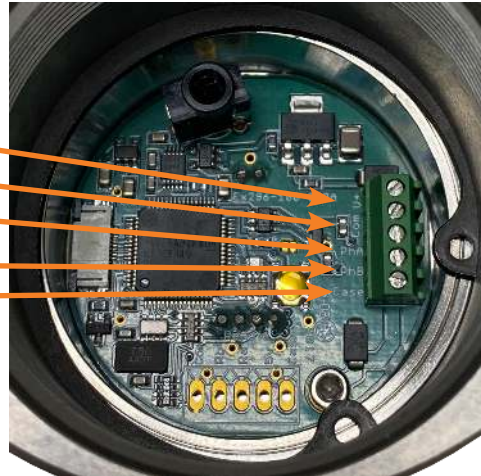
Refer to the diagrams below for wire number and functions.

## Frequency Pulse Wiring

Diagram 4.1

Pulse Output Wiring	Pulse PCB Label	Wiring Adaptor Pin #
Power *	V+	1
Common	Com	2
Signal Output	PhA	3
(Quad only)	PhB	4
Case Ground	Case	5

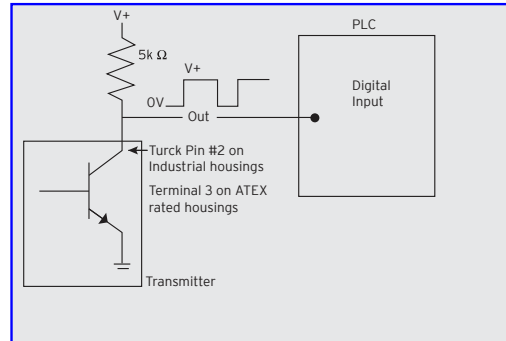
Image 4.a



## Current Sinking Wiring (EX29x-6xx-0xx)

A current sinking device uses the transmitter's transistor output to act as a switch. Use pulse output wiring Diagram 4.1 above and note the following addition. Positive DC voltage must be applied to the transmitter's output pin (#3). When the pulse output is triggered, this voltage is grounded to zero volts by the transmitter. Warning: Use a 5k ohm resistor to limit current if your system does not have other means to limit current into the transmitter. See Diagram 4.1.1.

Diagram 4.1.1

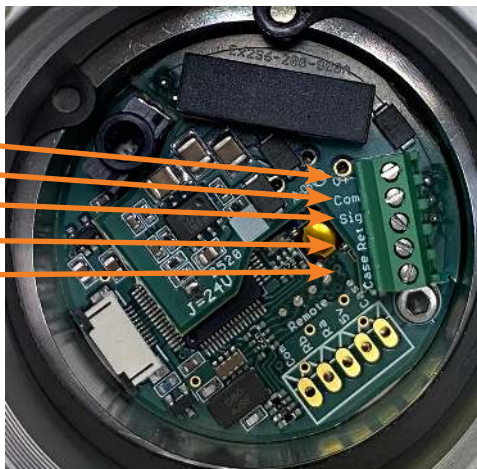


## Analog Wiring

Diagram 4.2

Analog Output Wiring	Analog PCB Label	Wiring Adaptor Pin #
Power	V+	1
Common	Com	2
Signal Output (+)	Sig	3
Signal Output (-)	Ret	4
Case Ground	Case	5

Image 4.b



# Electrical Installation for Haz-Loc Flow Meters

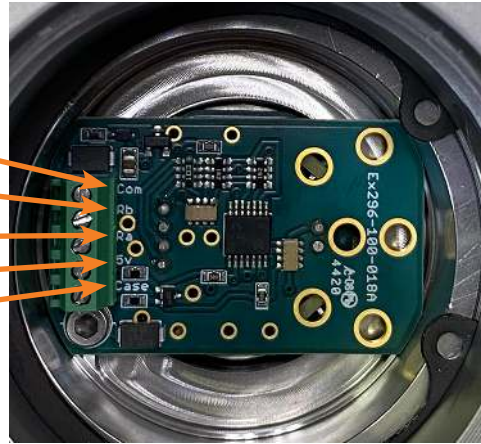
## Two Part Transmitter Unit Wiring

Max Machinery, Inc. supplies a two part transmitter for use at higher metered liquid temperatures. This product consists of a hazardous location transmitter housing with sender unit as shown in Image 4.d and a remote transmitter housing that is not classified for use in hazardous locations, shown in Image 4.e. Appropriate ex-proof wiring from the EX29x-051-0xx to the 29x-x8x-xxx are the responsibility of the purchaser and user of the equipment. The 29x-x8x-xxx MUST be mounted in a safe, unclassified zone of the facility or mounted in a hazardous location compliant enclosure rated for the appropriate zone. Wiring the ex-proof sender to the remote receiver follows the instructions in Diagram 4.4. Wiring the remote receiver to the customer output via a 5-pin M12 Turck connector follows standard Max Machinery, Inc. industrial wiring installation instructions, see Diagram 4.5 and Diagram 4.6.

Diagram 4.4

Two Part Transmitter Wiring		Wiring Adaptor Pin #
Ex-Proof Sender (Example: EX29x-051-000)	Remote Receiver - Unclassified Zone Only (Example: 29x-x8x-xxx)	
Com	Com	5
Rb	Rb	4
Ra	Ra	3
5V	5V	2
Case	Case	1

Image 4.d



## Remote Receiver - 29x-x8x-xxx

Image 4.e



Industrial Turck Connector  
Unclassified  
Zone Only

Squeeze tight fitting accepts user wiring from ex-proof sender. Remote receiver MUST be located in unclassified zone. Wire per Diagram 4.4.

## Frequency Output Transmitters - Industrial Diagram 4.5

PCA Label	Turck® Connector	
	Pin #	Mating Cable Wire Color
Power (+5 to 26 Vdc)	V+	1 Brown
Common	Com	4 Black
Pulse Output	Ph A	2 White
Output Phase B (Quad only)	Ph B	5 Grey
Case Ground	Case	3 Blue

## Analog Output Transmitters - Industrial Diagram 4.6

PCA Label	Turck® Connector	
	Pin #	Mating Cable Wire Color
Power *	V+	1 Brown
Common	Com	4 Black
Signal Output (+)	Sig	5 Grey
Signal Output (-)**	Ret	2 White
Case Ground	Case	3 Blue

# Electrical Installation for Haz-Loc Flow Meters

The device must be powered with a Class 2 power supply. Electrical loads are specific to model number:

Part #'s	Transmitter Type	Electrical Input Requirements	Output Electrical Requirements
EX29x-051-0xx	Sender Unit Transmitter	5 Vdc 30 mA	2 channel 5V, < 1mA
EX29x-0xx-0xx	Pulse Output Transmitter	5-28Vdc 40mA	Single Line 0-5V 10mA (500 ohm pulldown or greater)
EX29x-1xx-0xx	Quadrature Output Transmitter	5-28Vdc 50mA	2 Lines 0-5V 10mA each (500 ohm pulldown or greater)
EX29x-2xx-0xx	mA Output Transmitter (24Vdc)	24-28Vdc 50mA	Isolated current loop, max 500 ohms in line, 12Vdc max
EX29x-2xx-1xx	mA Output Transmitter (12Vdc)	12-15Vdc 100mA	Isolated current loop, max 500 ohms in line, 12Vdc max
EX29x-3xx-0xx	V Output Transmitter (24Vdc)	24-28Vdc 50mA	Isolated voltage loop, min 1000 ohms across line, 12Vdc
EX29x-3xx-1xx	V Output Transmitter (12Vdc)	12-15Vdc 100mA	Isolated voltage loop, min 1000 ohms across line, 12Vdc
EX29x-6xx-0xx	Current Sinking Pulse Output Transmitter	5-28Vdc 30mA	Single line, current sinking, max 28Vdc, max 25mA

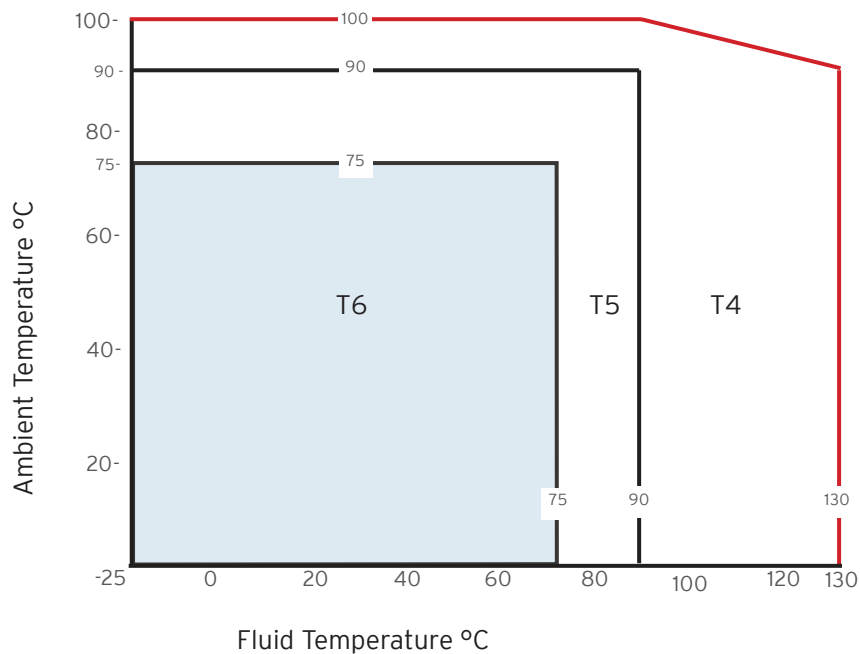
Note: The addition of the "-S" suffix does not impact the electrical ratings.

## Temperature Classification

Temperature class is a function of fluid temperature used in the meter and ambient temperature. For hot fluids, meter must be insulated and transmitter must be left exposed. All transmitters are rated to operate within the BLUE region, but only the remote sender unit variants (EX29x-x5x-xxx or EX29x-x5x-xxx-S) can operate up to the maximum temperatures shown in the chart. Consult factory for installation details when operating near temperature limits.

**Note:** Consult factory to determine the functional temperature limit of your transmitter variant. Temperature class ratings do not correspond with the continuous duty area for the electronics within the transmitter. A complete description of your transmitter may be found on the Max Machinery web site ([www.maxmachinery.com](http://www.maxmachinery.com)). Individual specification sheets and product family manuals are also available for viewing or downloading.

Temperature class chart for all explosion proof variants:



## Electrical Installation for Haz-Loc Flow Meters

The transmitter includes a wiring pigtail and 2 part connector - use of the pigtail is optional and direct wiring to the PCA is recommended if the circuit board is accessible. Use wiring that is between 20 and 28 gauge and rated to at least 5°C above the maximum ambient temperature, and rated to at least 80% of the maximum fluid temperature. Cut back the cable bundles' outer sheath several inches to make it easier to coil the wire loop inside the housing. The pigtail connector's terminals correspond to the terminal block on the PCA. Refer to the diagrams on the previous page for wire number and functions.

The circuit board fastener screws are torqued to 15 in oz with a 2.5 mm flat screwdriver.

The pigtail extension fastener screws are torqued to 25 in oz with a 3.5 mm flat screwdriver.



## Notes About Hazardous Location Flow Meters

### Moisture Protection

The housing is a liquid and vapor-tight enclosure certified to IP66. There is an O-ring seal at the lid of the housing – the seal needs to be fully seated to provide moisture protection and achieve flameproof specifications.

### About Explosion proof installations

For the Model EX295 and EX296 to fully adhere to the HazLoc certifications, the wiring must meet the appropriate codes. (Use of a wire conduit does not make the installation explosion proof - read below.) The transmitters which are certified for use in hazardous locations require the use of a 1/2" NPT hazardous location rated conduit fitting. The wiring conduit must be sealed with a conduit stop within 18" of the device. If you choose to use exposed cables, cable seals must be used with sealing fittings and the wiring must be an approved armored cable. (For detailed information on the joint constructions used to achieve a flame proof housing, please contact Max Machinery.)

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The logo for Max Machinery, Inc. features the word "max" in a bold, lowercase, orange sans-serif font. The letter 'a' is stylized with a thick, curved underline that extends to the right, creating a sense of motion or a signature.