

The Metrix Speed, Vibration and Position Measurement System is a rugged and industry proven proximity sensor system. Other Metrix Datasheets outline the specifics regarding the MX8030 Proximity Probes, MX8031 Extension Cables, MX2033 Drivers, suitable for use with a monitoring system, and the MX2034 Proximity Transmitters, suitable for use with a variety of control systems (e.g. DCS, PLC, SCADA, etc.). This Datasheet is intended to outline the specifics regarding the speed, vibration and position systems used in Cryogenic applications.

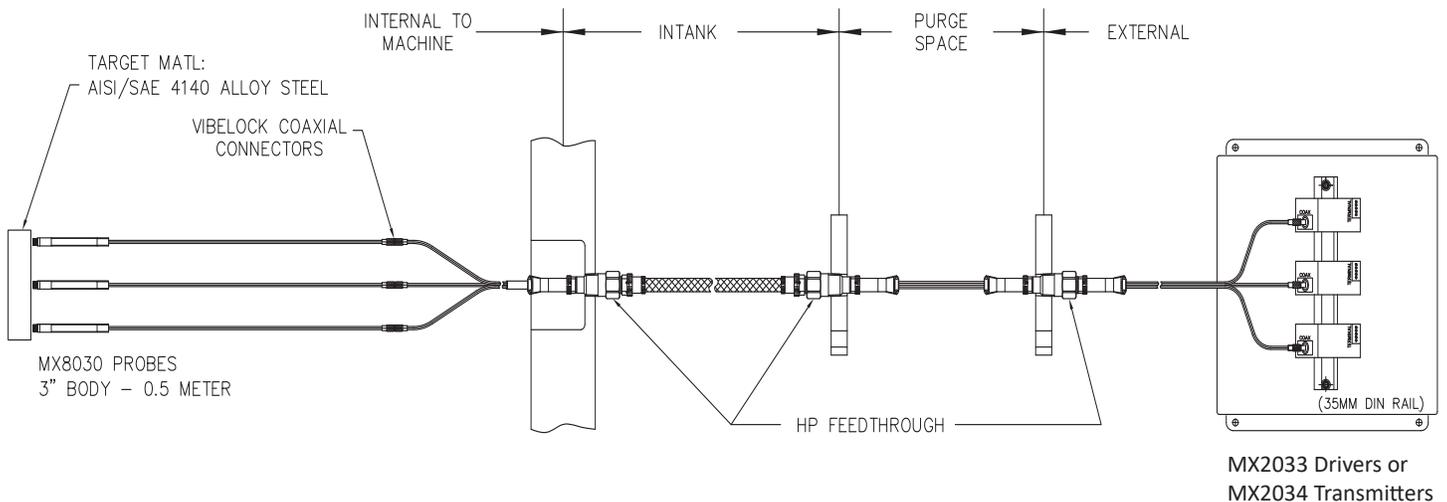


ENVIRONMENTAL

- -192°C (-313°F) MX8030 Probes and MX8031 Cables
- System Lengths – up to 12-meter for Position and Vibration
- System Lengths – up to 18-meter for Speed
- Fully LNG submerged triaxial probe and cable systems
- 2 to 5 Probe Systems
- 6-Pin and 10-Pin High Pressure Feedthroughs Available
- Feedthroughs 150 Bar (2175 psig) – 203.4 N-m torque (150 ft-lbs)



TYPICAL SPEED SYSTEM

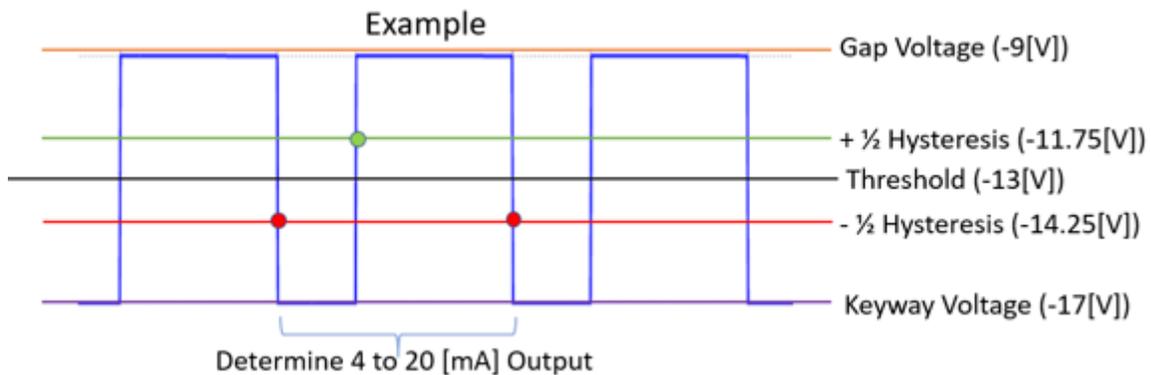




OVERVIEW

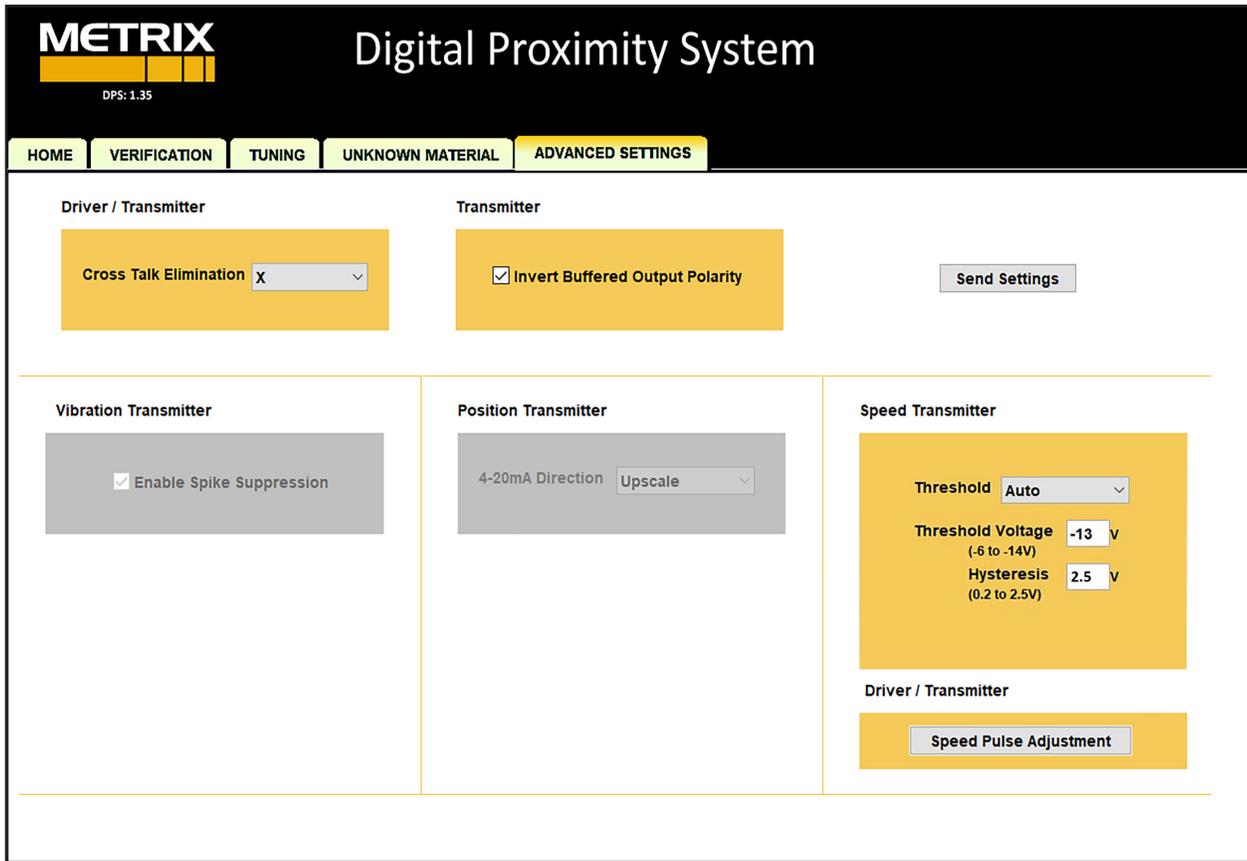
The Metrix Cryogenic Proximity System is a 9, 10, 12 or 18-meter system that is designed to take advantage of the Metrix Digital Proximity System. From the factory Metrix has done several things to help ensure the proximity system is easy to install and provides excellent data:

1. Interchangeable parts. Due to the Metrix Digital Proximity System's ability to tune cables to various system lengths, and to different frequencies. Metrix can supply replacement parts to the field. If the parts are purchased separately, then each System will need to be configured and tuned in the field using Metrix free software, downloadable from the Website.
2. To prevent Cross Talk between the probes and long cables Metrix sets each of the Oscillator Demodulator Frequencies to different Frequencies so the systems don't electrically talk to each other. From the factory the DPS units, whether MX2033 Driver's or MX2034 Transmitter's, are marked W, X, Y and Z depending upon the number of probe cables in the set. If the parts are purchased separately, then each System will need to be configured for different Frequencies and tuned in the field.
3. The ability to change the frequency of the Oscillator Demodulator is enabled in the DPS Software. This allows the user to purchase a new DPS Unit and adjust the frequency as required in the field for W, X, Y or Z frequencies for the 9-meter, 10-meter, 12-meter or 18-meter system lengths.
4. Increased the Auto Speed setting hysteresis to prevent low level noise from being counted as speed. The Auto Threshold is set at half the peak to peak value of the voltage sensed. At zero speed, or even at high speed, if there is low level noise it is possible for the counter to detect the changes in voltage, and due to the noise give erroneous speed readings, even when the unit is not rotating. To prevent this the Auto Threshold has to see a pulse greater than the low level noise peak to peak to be counted.
5. The diagram below shows the voltage of a keyway and how the Threshold and Hysteresis values work. Note: half the peak to peak voltage is -13 Vdc ($(-9 \text{ Vdc} + -17 \text{ Vdc}) / 2 = -13 \text{ Vdc}$).



The Hysteresis feature is used to improve the performance of the speed measuring system. Threshold is used with a 'Speed' selected transmitter, this feature allows the user to use an Auto Threshold setting (Auto is set at the Factory), which will trigger the DPS when the voltage passes through half (½) the peak to peak amplitude with a dead band of 2.5 volts, or Manual Threshold setting where the user can select the Threshold Value (usually -13 Vdc) and a hysteresis band of up to 2.5 Vdc for a negative going pulse. One must ensure the negative going pulse will produce a more negative voltage than the Hysteresis dead band. Hysteresis creates a dead band around the Threshold Value. For example, if the Threshold was set at -13Vdc, and the Hysteresis was set at 2.5 Vdc, the negative going pulse would have to pass -14.25Vdc (-14.25Vdc = -13Vdc-1.25Vdc) to have the counter within the transmitter see the pulse, and then the counter would not reset until it saw the voltage pass through -11.75Vdc (11.75Vdc = -13Vdc+1.25Vdc) on its way back to the original gap voltage. Using Threshold and Hysteresis are ways to help reduce noise and increase accuracy in a speed measurement system. The same or similar adjustment can be made in a Monitoring System.

6. If the pulse height from the MX2033 Driver is not large enough for the Monitoring System to provide a reliable speed indication, or the MX2034 Transmitter is not providing a large enough pulse to have a reliable 4-20 mA speed output, then take advantage of the “Speed Pulse Adjustment” in the DPS Software “Advanced Features” tab:

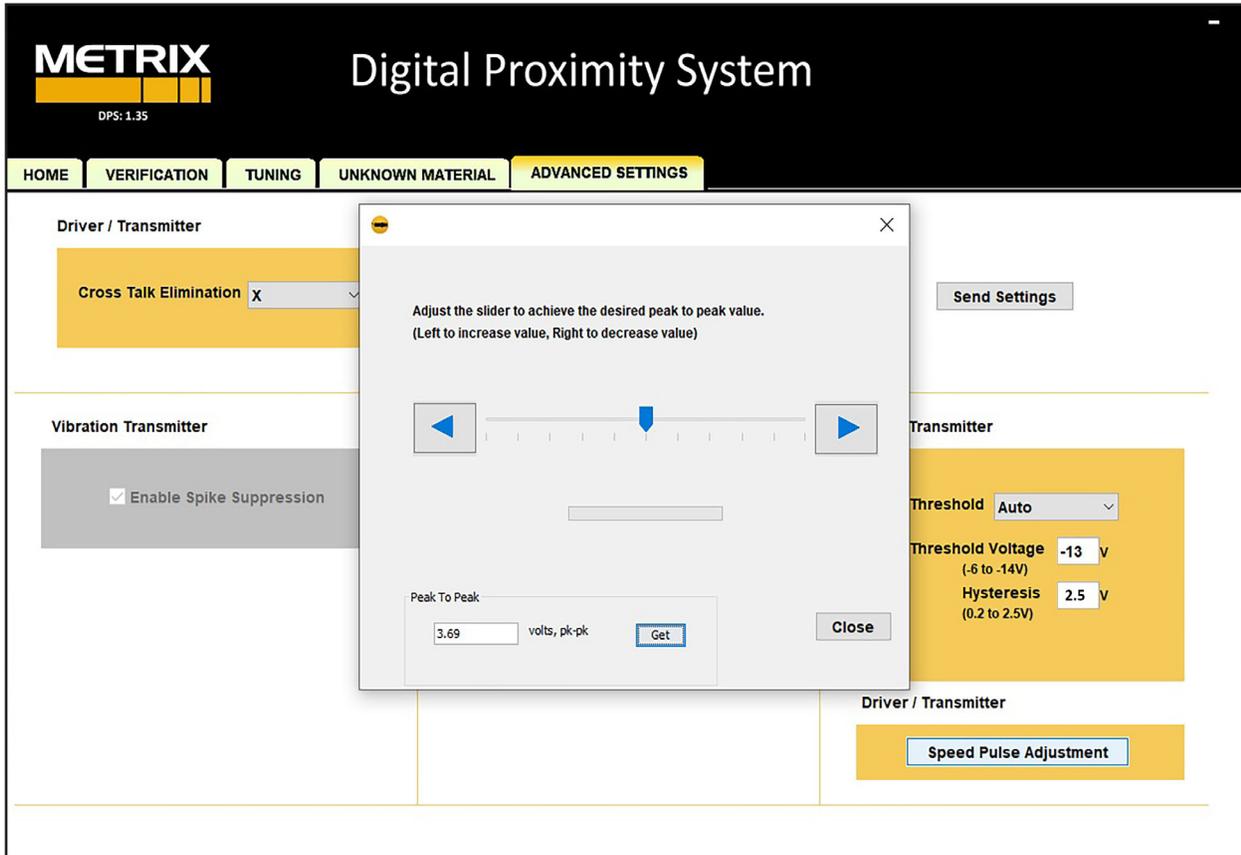


Caution: This process is done with the machine running. Take necessary precautions to ensure safe work and prevent an unnecessary shutdown.

With the machine running, connect the DPS Unit to the computer with the DPS Software using the USB to mini USB cable.

Export the current configuration of the DPS Unit to the computer. This is done in order to restore the configuration to the DPS Unit if necessary.

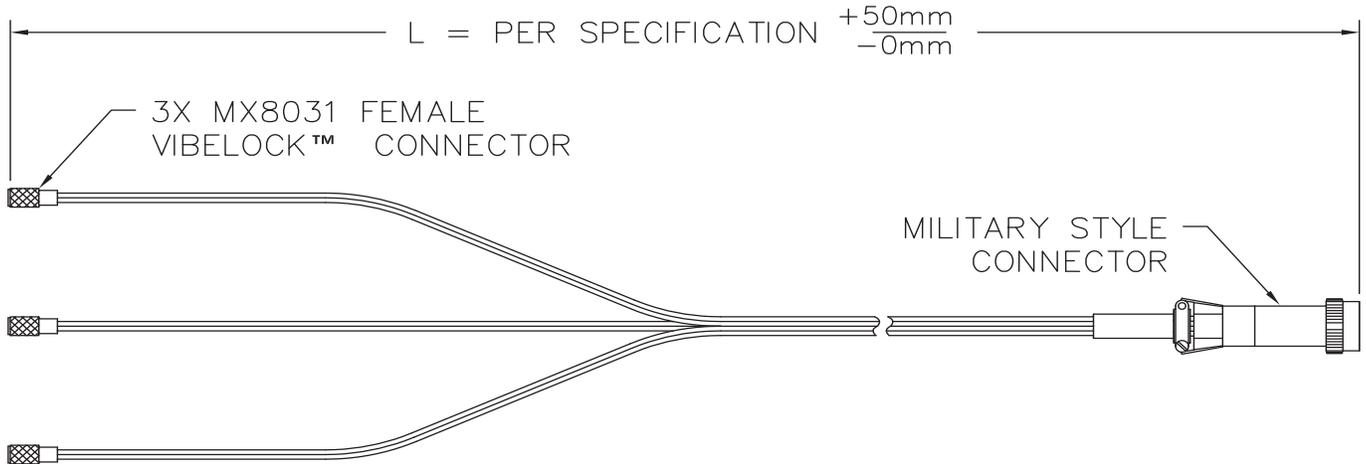
Go to the “Advanced Settings” tab. Select the button “Speed Pulse Adjustment”, you will see the following screen:



While observing the pulse height of the speed output on the software, a multimeter or an oscilloscope, move the slider bar several divisions in the left direction and observe the impact on speed pulse height. If the move is favorable, continue to move in that same direction until the pulse height is greater than 5 V pp. If the move is unfavorable, move in the opposite direction until the pulse height is greater than 5 V pp. This control changes the scale factor of the DPS Unit to optimize the speed pulse, to provide an adequate pulse for a reliable speed reading. It is used only as necessary.

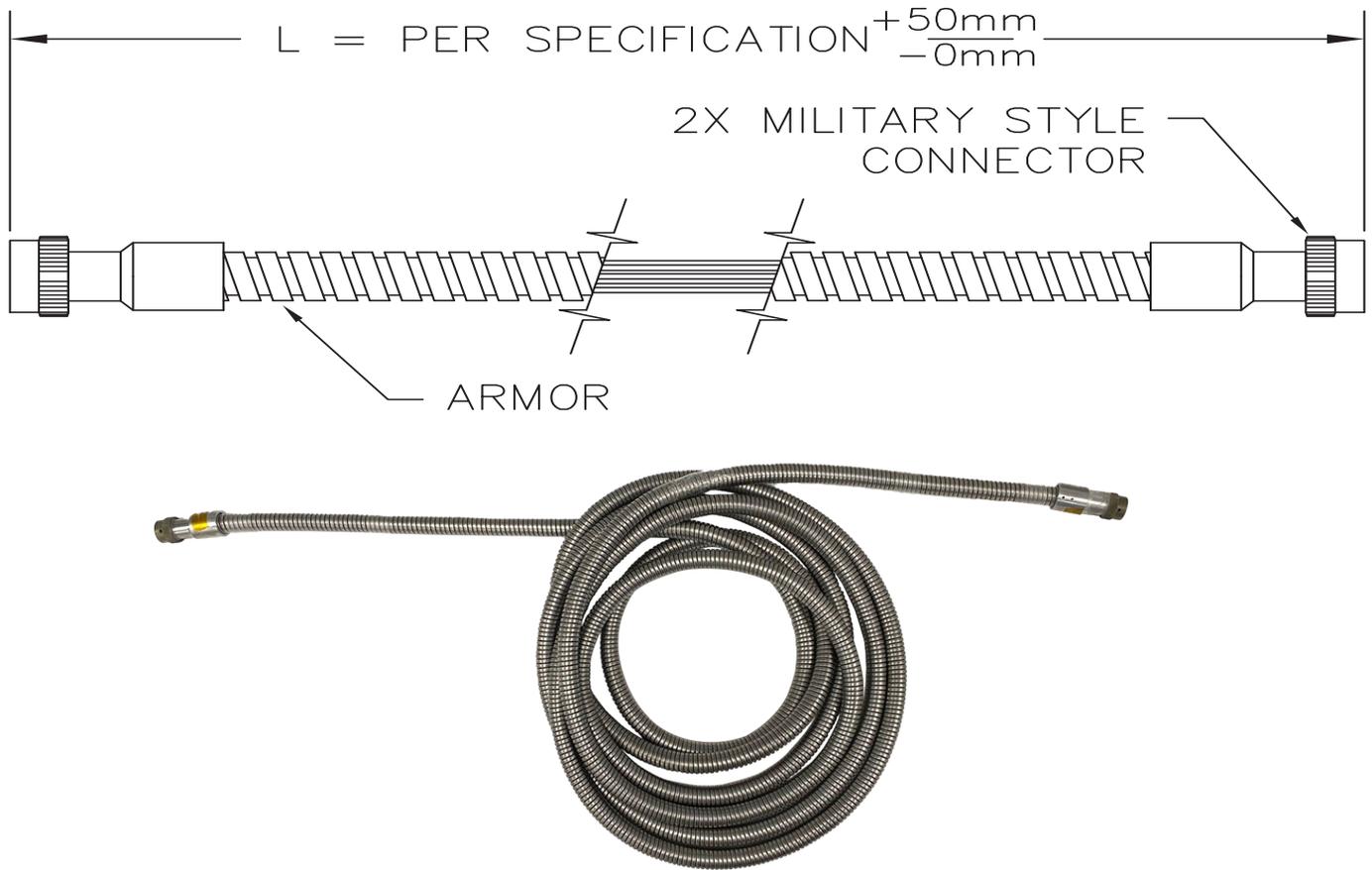
SPECIAL MX8031 CABLES AND FEEDTHROUGHS

Primary Transition Cable - Probe to High Pressure Feedthrough Connection



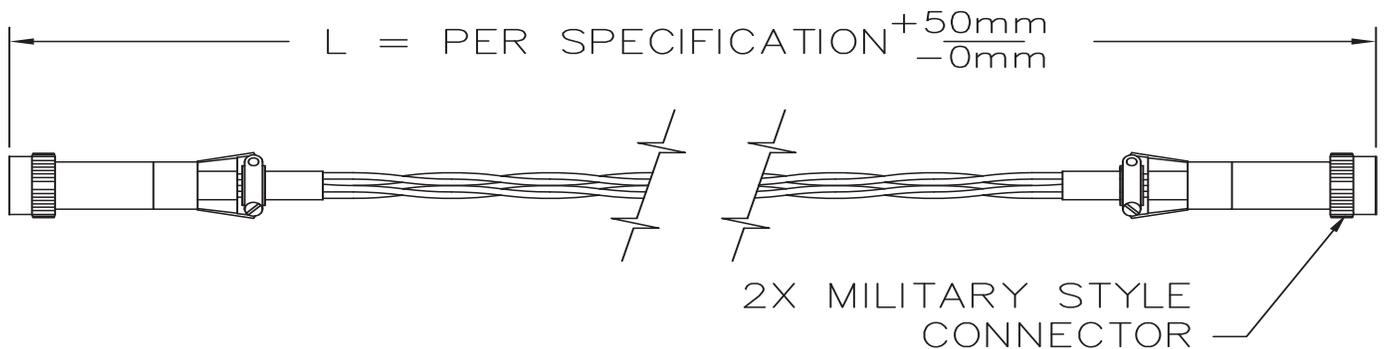
The Primary Transition Cable connects the standard MX8030 probes observing position or speed to the first bulkhead transition or feedthrough. The Primary Transition cable can be constructed from two to five individual MX8031 Extension Cables in standard lengths of 250mm, 400mm and 500mm, all with female Viblock™ connectors. Other lengths are available upon request.

Intank Cable – Connection from one bulkhead High Pressure Feedthrough to another bulkhead High Pressure Feedthrough



The Intank Cable includes two Military Style connectors at each end that would connect to either a six pin or ten pin High Pressure Feedthrough. The armor cable helps protect the MX8031 triaxial cables from the active flow stream in the cryogenic fluid. The Intank Cable includes 3 to 5 MX8031 Extension Cables with standard lengths of 5100mm and 4000mm. Other lengths available upon request.

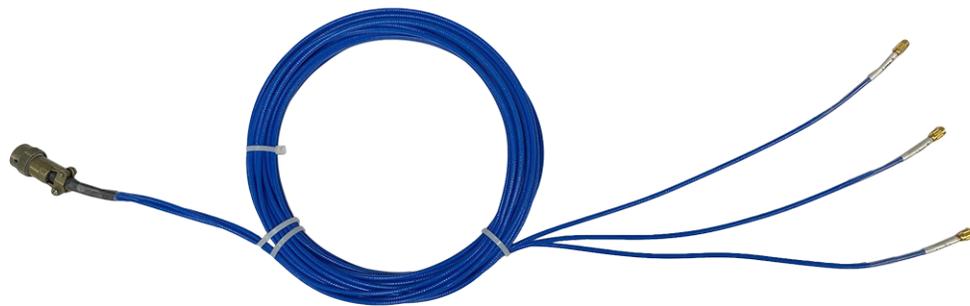
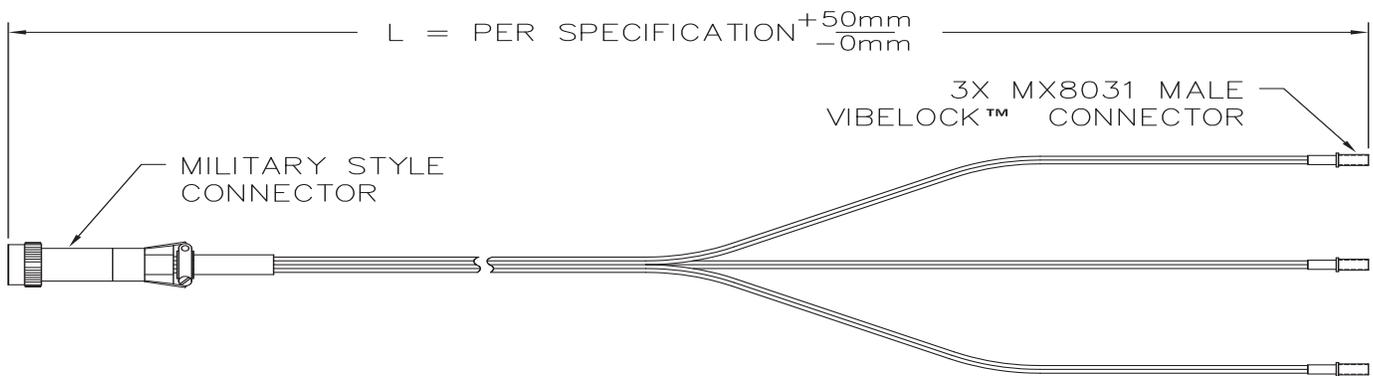
Purge Tank Cable - Connection from one bulkhead High Pressure Feedthrough to another bulkhead High Pressure Feedthrough in the purge space.





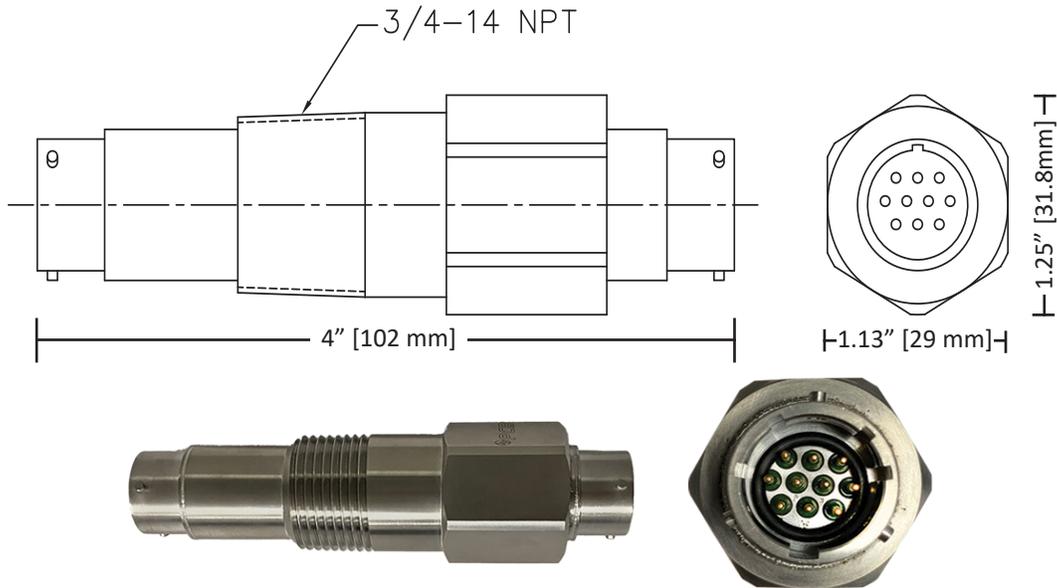
The Purge Tank Cable includes two Military Style connectors at each end that would connect to either a six pin or ten pin High Pressure Feedthrough inserted into the bulkhead penetrations. The Purge Tank Cable includes 3 to 5 MX8031 Extension Cables with standard lengths of 400mm and 500mm. Other lengths available upon request.

Secondary Transition Cable - Probe to High Pressure Feedthrough Connection



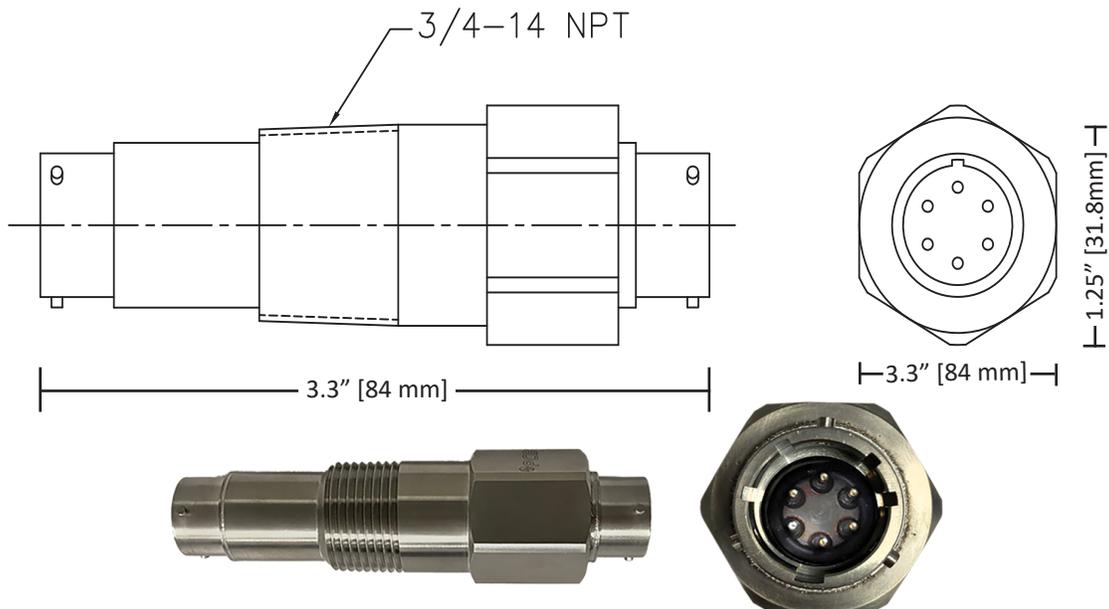
The Secondary Transition Cable connects the high pressure feedthrough to the MX2033 Proximity Driver or the MX2034 Proximity Transmitter. The Secondary Transition cable can be constructed from two to five individual MX8031 Extension Cables with standard lengths of 5200mm and 1158mm, all with male Viblock™ connectors. Other lengths are available upon request.

10-Pin High Pressure Feedthrough



The 10-Pin High Pressure Feedthrough is rated for 150 bar (2175 psi) at -192°C (-313°F) and fits between the above listed cables, for 4 and 5 Probe Proximity Systems.

6-Pin High Pressure Feedthrough



The 6-Pin High Pressure Feedthrough is rated for 150 bar (2175 psi) at -192°C (-313°F) and fits between the above listed cables for 2 and 3 Probe Proximity Systems.

ORDERING

Metrix builds these systems to order, and we can make these systems to your exact needs.

Typical 18-meter 3 Probe Speed Measurement System – Transmitter Based

Suitable for input to a Control System

LINE	QTY	PART NUMBER	DESCRIPTION	
1.1	1	MX8031-8071006-102-00250	Cable, 3 Lines, Triax, 250 mm	Primary
1.2	1	MX8031-8071006-104-05100	Cable, 3 Lines, Armored, Triax, 5100 mm	Intank
1.3	1	MX8031-8071006-105-00400	Cable, 3 Lines, Triax, 400 mm	Purge
1.4	1	MX8031-8071006-108-11558	Cable, 3 Lines, Triax, 11558 mm	Secondary
1.5	3	99541-100-KIT	Adapter, Feedthru, Hermetic, 6 Pin	
2	3	MX8030-01-000-030-05-05	Proximity Probe, MX8030	
3	3	MX2034-01-8-18-5-3-602-08	DPS, 2 Wire Prox 4-20 mA Transmitter	

Typical 18-meter 3 Probe Speed Measurement System – Sensor Based

Suitable input to a Monitoring System

LINE	QTY	PART NUMBER	DESCRIPTION	
1.1	1	MX8031-8071006-102-00250	Cable, 3 Lines, Triax, 250 mm	Primary
1.2	1	MX8031-8071006-104-05100	Cable, 3 Lines, Armored, Triax, 5100 mm	Intank
1.3	1	MX8031-8071006-105-00400	Cable, 3 Lines, Triax, 400 mm	Purge
1.4	1	MX8031-8071006-108-11558	Cable, 3 Lines, Triax, 11558 mm	Secondary
1.5	3	99541-100-KIT	Adapter, Feedthru, Hermetic, 6 Pin	
2	3	MX8030-01-000-030-05-05	Proximity Probe, MX8030	
3	3	MX2033-01-08-18-05	DPS, 3 Wire Prox Driver	

Typical 10-meter 4 Probe Speed Measurement System – Transmitter Based

Suitable for input into a Control System

LINE	QTY	PART NUMBER	DESCRIPTION	
1.1	1	MX8031-8071018-102-04000	Cable, 4 Lines, Individual Armor, Triax, 4000 mm	Primary
1.2	1	MX8031-8071018-104-02000	Cable, 4 Lines, Armored, Triax, 2000 mm	Intank
1.3	1	MX8031-8071018-105-01000	Cable, 4 Lines, Triax, 1000 mm	Purge
1.4	1	MX8031-8071018-106-2000	Cable, 4 Lines, Triax, 2000 mm	Secondary
1.5	3	99541-101-KIT	Adapter, Feedthru, Hermetic, 10 Pin	
2	4	MX8030-01-000-030-10-05	Proximity Probe, MX8030	
3	4	MX2034-01-8-10-5-3-602-08	DPS, 2 Wire Prox 4-20 mA Transmitter	

Typical 10-meter 4 Probe Speed Measurement System – Sensor Based

Suitable input into a Monitoring System

LINE	QTY	PART NUMBER	DESCRIPTION	
1.1	1	MX8031-8071018-102-04000	Cable, 4 Lines, Individual Armor, Triax, 4000 mm	Primary
1.2	1	MX8031-8071018-104-02000	Cable, 4 Lines, Armored, Triax, 2000 mm	Intank
1.3	1	MX8031-8071018-105-01000	Cable, 4 Lines, Triax, 1000 mm	Purge
1.4	1	MX8031-8071018-106-2000	Cable, 4 Lines, Triax, 2000 mm	Secondary
1.5	3	99541-101-KIT	Adapter, Feedthru, Hermetic, 10 Pin	
2	4	MX8030-01-000-030-10-05	Proximity Probe, MX8030	
3	4	MX2033-01-08-10-05	DPS, 3 Wire Prox Driver	

Typical 9-meter 2 Probe Position Measurement System – Transmitter Based

Suitable for input to a Control System

LINE	QTY	PART NUMBER	DESCRIPTION	
1.1	1	MX8031-3059244-02-00400	Cable, 2 Lines, Triax, 400 mm	Primary
1.2	1	MX8031-3059244-05-06900	Cable, 3 Lines, Armored, Triax, 6900 mm	Intank
1.3	1	MX8031-3059244-06-01000	Cable, 3 Lines, Individual Armor, Triax, 1000 mm	Secondary
1.4	2	99541-100-KIT	Adapter, Feedthru, Hermetic, 6 Pin	
2	2	MX8030-01-000-030-05-05	Proximity Probe, MX8030	
3	2	MX2034-01-08-09-05-02-052-08	DPS, 3 Wire Prox Driver	

Typical 9-meter 2 Probe Position Measurement System – Sensor Based

Suitable input to a Monitoring System

LINE	QTY	PART NUMBER	DESCRIPTION	
1.1	1	MX8031-3059244-02-00400	Cable, 2 Lines, Triax, 400 mm	Primary
1.2	1	MX8031-3059244-05-06900	Cable, 3 Lines, Armored, Triax, 6900 mm	Intank
1.3	1	MX8031-3059244-06-01000	Cable, 3 Lines, Individual Armor, Triax, 1000 mm	Secondary
1.4	2	99541-100-KIT	Adapter, Feedthru, Hermetic, 6 Pin	
2	2	MX8030-01-000-030-05-05	Proximity Probe, MX8030	
3	2	MX2033-01-08-09-05	DPS, 3 Wire Prox Driver	

Metrix builds these systems to order. Systems that differ from the above necessitate a Metrix Tooling Charge that allows Metrix to build a model system to be used to create other systems or spare parts.

Metrix proximity systems, using the MX2033 Proximity System Driver, are compatible with the standard monitoring systems that accept 7.87 mV/um (200 mV/mil) or 3.93 mV/um (100 mV/mil) proximity systems (e.g. BN 3500, BN Orbit 60, Setpoint, Alta Solutions, Shinkawa, Meggitt and many other Monitoring Systems).

Note: Metrix is continuously improving our products. Please refer to our website to download the latest version of this document.

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