IT6810/IT6811/IT6812 IMPACT TRANSMITTER

Installation Manual

IT6810

IT6811

IT6812

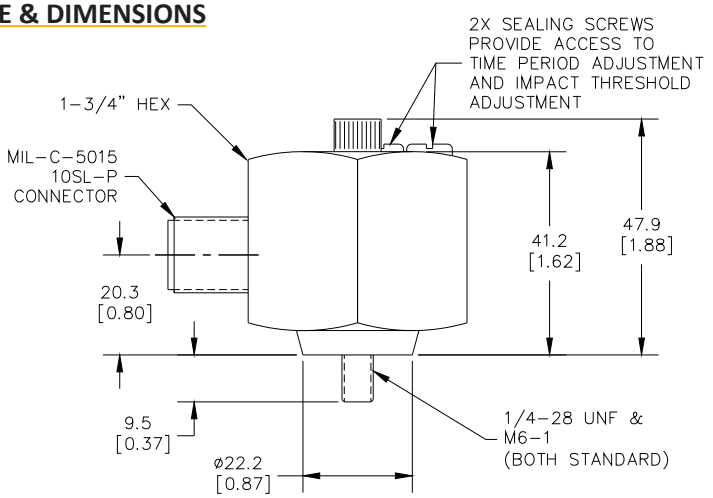
OVERVIEW

The Model IT6810/IT6811/IT6812 Impact Transmitter uses new technology to measure impact severity on reciprocating machinery. Impact is a proven method of detecting mechanical looseness on large reciprocating compressors. The Impact Transmitter combines the benefits of this measurement with the convenience of 4-20 mA loop powered sensor technology. It has a built-in piezoelectric crystal sensing element, and uses a timing function as part of its severity determination. An impact event counter and memory device is used to record events meeting a preset amplitude threshold level.

This manual should be used by experienced personnel as a guide to the installation of the Model IT6810/IT6811/IT6812 Impact Transmitter. Selection or installation of equipment should always be accompanied by competent technical assistance. We encourage you to contact the Metrix Instrument Co. or its local representative if you require further information..

NOTE: Before proceeding to install and wire the transmitter, read and thoroughly understand these instructions. Confirm that the hazardous area rating of the transmitter meets or exceeds that of the area the unit is to be installed in.

OUTLINE & DIMENSIONS



UNITS: mm [in]
Aprox. Weight: 0.3 kg (0.66 lbs)

Refer to Metrix Datasheet 1009518 for specifications, ordering information, and outlines.

MECHANICAL

Mounting Location

The Impact Transmitter is designed to detect mechanical looseness, not vibration. Therefore, it is mounted with its center bolt perpendicular to the direction of rod motion (figure 1), on top of the crosshead or extension piece, or for a power cylinder (figure 2) mounted on the side of the cylinder, where it will be out of the way of routine inspection or maintenance.

The Impact Transmitter includes both a 1/4-28 and a metric M6 x 1 threaded bolt. Once threaded through the top half of the housing, the bolt becomes captive and will not inadvertently fall out. It can be bolted to a machined surface, using a 9338 spot face kit, or it can be attached using an optional 1/4-18 NPT threaded adapter. Tighten or remove any loose items on or near the compressor cylinder. Never install on bolted covers or access doors. Since the Impact Transmitter detects mechanical looseness, “rattle noise” from loose external parts can be mistaken for internal loose parts. This will result in false indications of compressor running condition. Ensure that the maximum ambient temperature is not exceeded.

The Impact Transmitter should be mounted such that the recommended baseline reading is 500 mV (rms) or less. For example, in Figure 1 the Separable Compressor (engine separate from compressor), the optimum location for mounting the Impact Transmitter would be on the Crosshead, however, if the baseline reading is greater than 500 mV it is recommended to move the Impact Transmitter to the Distance Piece as shown in Figure 1. For Integral Reciprocating Compressors (engine is integrated with the compressor), Figure 2, shows the typical mounting locations of the Impact Transmitters. The same methodology for the Compression Cylinder is used for the Integral Compressor as the Separable Compressor. For the Power Cylinder the Impact Transmitter should be mounted on the side of each cylinder, preferably in a location with a baseline reading of 500 mV or less, with height at the top of the travel of the wrist pin (see figure 2). In some applications locating the Impact Transmitters on top of each end of the cylinder banks has proven effective at identifying stuck engine valves.

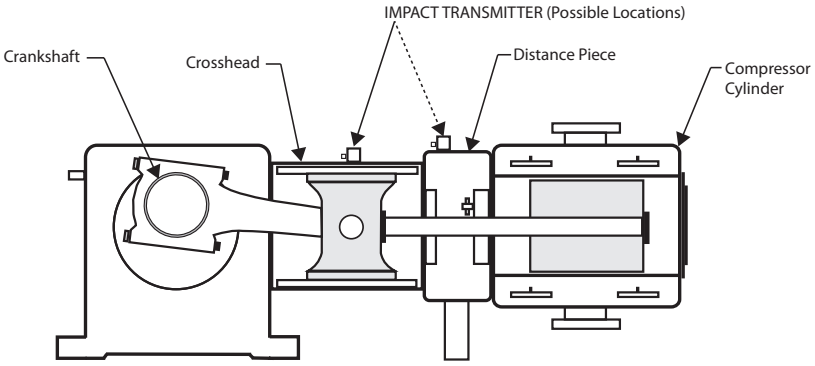


Figure 1: Sketch of a separable compressor cylinder showing Impact Transmitter location

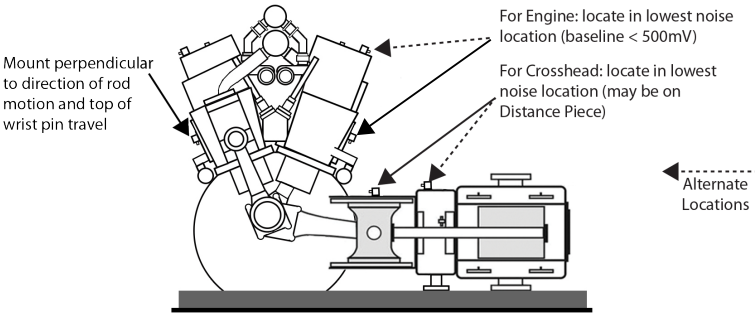


Figure 2: Sketch of an internal compressor cylinder and engine with Impact Transmitter locations

Machined surface

Prepare a flat surface using an aircraft counter bore* with a minimum 1.0 inch diameter and then tap the center hole for a ¼-28 or M6 x 1 thread allowing for a minimum threaded depth of 3/8 inch (10mm). The tapped hole must be perpendicular to the flat surface within 1.0 degree. Apply a small amount of grease to the mating surface of the transmitter to allow for proper machine contact. With the connector pointed in a convenient direction, thread the appropriate mounting bolt through the housing and into the tapped hole. Torque the bolt to 75 inch-pounds maximum.

NPT Threaded Adapter

This method allows a standard pipe thread to be drilled and tapped into the compressor body. The threaded adapter (Metrix Part Number 9272) has the needed machined surface to insure proper mounting of the transmitter. Install the transmitter as described in the previous paragraph.

Explosion-proof housing for IT6812:

The Metrix p/n 9288-XXX explosion-proof housing allows the transmitter to be installed into a Class I, Div. 1 (Groups B, C, D) area without the use of an intrinsically safe barrier. This housing is available from Metrix. Install the transmitter and housing in a similar manner as described in the previous sections.

*Aircraft counter bores are available from most machine tool suppliers.

ELECTRICAL

The transmitter is a two-wire, 4-20 mA loop powered device and is wired like any other such field transmitter. One difference, however, is that rigid conduit cannot be connected directly to the transmitter. If conduit is required, use flexible conduit and provide a service loop to avoid any conduit strain on the transmitter. A simple wiring diagram is shown below.

Typical input resistor values used in PLCs, monitors and DCS's are 50 Ω, 100 Ω or 250 Ω. The maximum resistance value that can be used in the current loop is a function of the supply voltage (VDC).

WIRING DIAGRAM FOR NORMAL OPERATION

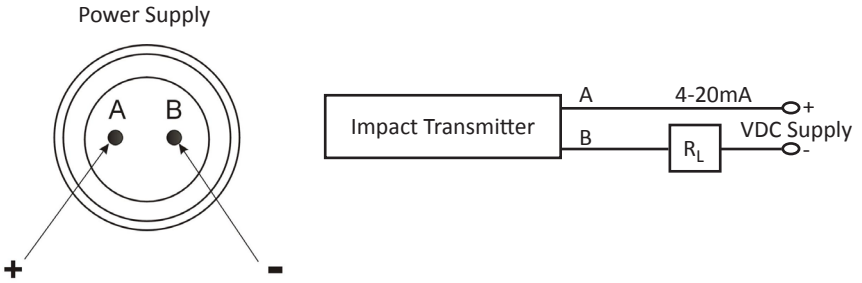


Figure 2: Basic connection diagram for normal operation

R_L maximum = 50 Ω/V (VDC-15V) Ω

Example: R_L MAX = 50 Ω/V (24V-15V) Ω = 450 Ω

MODEL	TERMINAL	COLOR
IT6811	A	WHITE
IT6811	B	BLACK
IT6812	A	RED
IT6812	B	BLACK

The connection to the transmitter can be made weather tight by using silicon grease in the connector.

FIELD ADJUSTMENTS

The impact level threshold adjustment and the impact counter reset-time adjustment should be made in the field. Adjustments are usually done during initial installation and normally do not have to be changed. Both of these adjustments are made by removing the small cap screws located on the top of the transmitter. Small potentiometers become visible when you remove these screws. A miniature screwdriver (Jewelers 1.4 mm slotted) is required to make adjustments to these potentiometers.

Adjustments to the Impact Transmitter should only be made while it is connected to the 6850 Impact Meter.

Figure 3: Transmitter top view, illustrating adjustment cover screw locations.

Setting Threshold Level

With the impact transmitter installed with the Impact Meter (6850-001) connected to it, and the compressor running, measure the baseline Peak in mV (rms) of the impact transmitter. Each cylinder, whether power or compression, will have its own unique baseline value. Do not average or guess at the value, one needs to measure baseline Peak value in each impact transmitter application. This value should be less than 500 mV. If the baseline Peak value is greater than 500 mV an alternative location for the impact transmitter is recommended, or a different impact transmitter may be required.

Assuming a smooth running compressor, adjust the Threshold Level to 2 to 3 times the baseline Peak value. For high baseline Peak locations (>400 mV) a 2x the baseline would be a better starting point and for lower baseline Peak locations (<300 mV) a 3x baseline Peak value would be appropriate. Remember use the actual baseline Peak value measured for the particular measurement location to obtain the Threshold Level.

Examples: An impact transmitter measuring the impact on a compression cylinder has a baseline Peak value of 250 mV as measured with the Impact Meter (6850-001), the Threshold Level should be set at 750 mV (3 x 250 mV = 750 mV). An impact transmitter measuring the impact on a power cylinder has a baseline Peak value of 350 mV as measured with the Impact Meter (6850-001), the Threshold Level should be set at 875 mV (2.5 x 350 mV = 875 mV). An impact transmitter measuring the impact on a power cylinder has a baseline Peak value of 450 mV as measured with the Impact Meter (6850-001), the Threshold Level should be set at 900 mV (2 x 450 mV = 900 mV). Note: The Threshold Level has a maximum setting of 1200 mV.

Setting Reset Time

Use the Impact Meter (6850-001) to adjust the reset time. This setting is used to allow for the predominant running speed of the machine, that is, the speed that it runs most of the time. The transmitter is factory set to one of the three compressor speed ranges shown in the following table.

Factory settings:

Model No.	Speed Range		Reset Time/Pulse Time
IT68XX-001	Low	300 RPM	3.2 sec.
IT68XX-002	Medium	600 RPM	1.6 sec.
IT68XX-003	High	1200 RPM	0.8 sec.

Other compressor speeds can be accommodated by interpolating the data in the table or by applying the following guideline:

- Calculate: 960/ RPM = Reset Time in seconds
- For a compressor that normally runs at 300 RPM, then:960/300 = 3.2 sec. Reset Time
- One turn of the 'TIME' potentiometer provides approximately 0.3 seconds change in the time period. The time delay can be set from 0.8 to 3.2 seconds.

USING IMPACT SEVERITY

In normal operation the loop current from the Impact Transmitter is proportional to the number of impacts which exceed the threshold level during the reset time period. The current will increase 1mA for each impact above the threshold level up to a maximum of 20mA. The current output is updated at the end of the each reset time period. The Impact Transmit ter is not synchronized with the machine rotation. The loop current may vary from one time period to the next. On a smooth running machine the output current should remain at 4mA for extended operating periods. In the illustration below, the transmitter's internal impact counter reset pulses and threshold level are superimposed on the machine's vibration signal. This illustrates that only vibration impacts that exceed the previously set threshold level are counted by the impact counter. The reset pulses are not present on the current loop in normal operation. As a safety feature, if sixteen or more impacts above the threshold level are detected before the end of the reset time period the current will immediately go to 20mA.

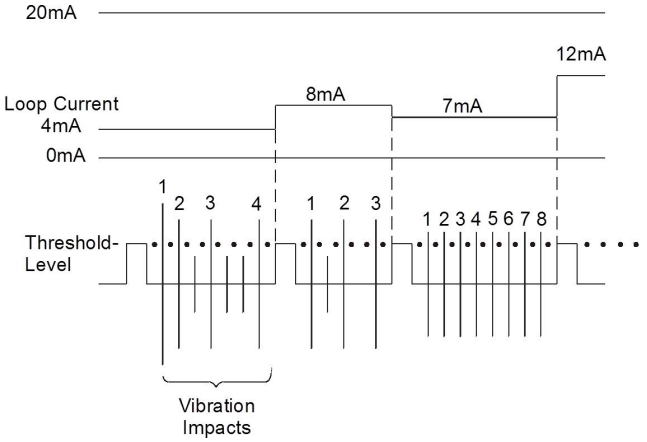
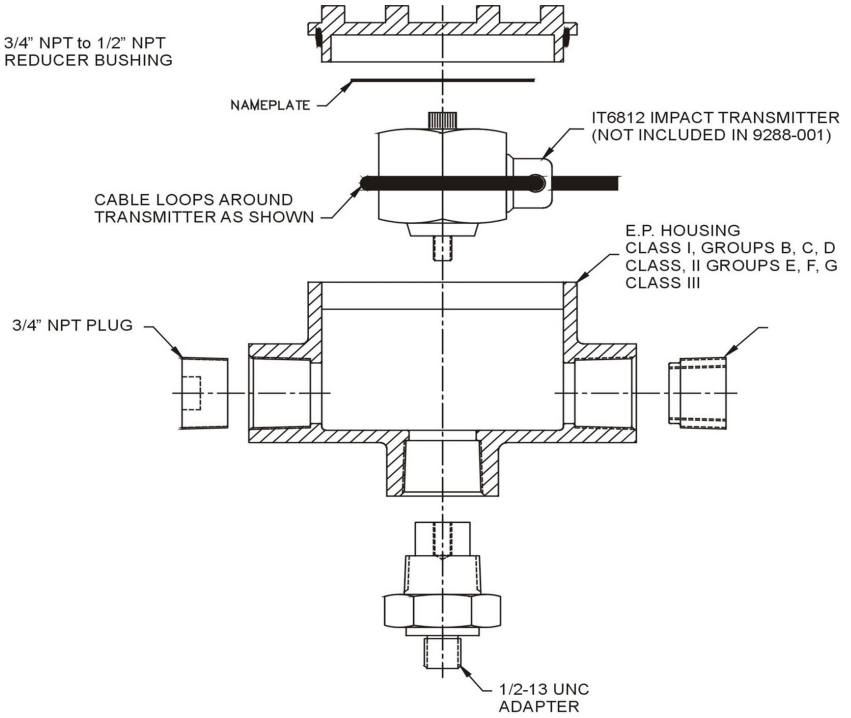


Figure 4: Example of current output vs. number of impacts per time period.

Impacts	mA
0	4
1	5
2	6
3	7
4	8
5	9
6	10
7	11
8	12
9	13
10	14
11	15
12	16
13	17
14	18
15	19
16	20

NOTE: Setting high alarm/shut down levels on the PLC or DCS
The early warning (high alarm) should be set to respond to a current value at or above 8.0 mA (4 impacts). An urgent warning (high-high alarm or trip) should be set to respond to a current value at or above 12.0 mA (8 impacts). Operating experience might provide data supporting some variance from these values. Remember, the threshold level that is set will affect the number of impact counts. If the threshold is set low, then set the count criterion for alarms higher.

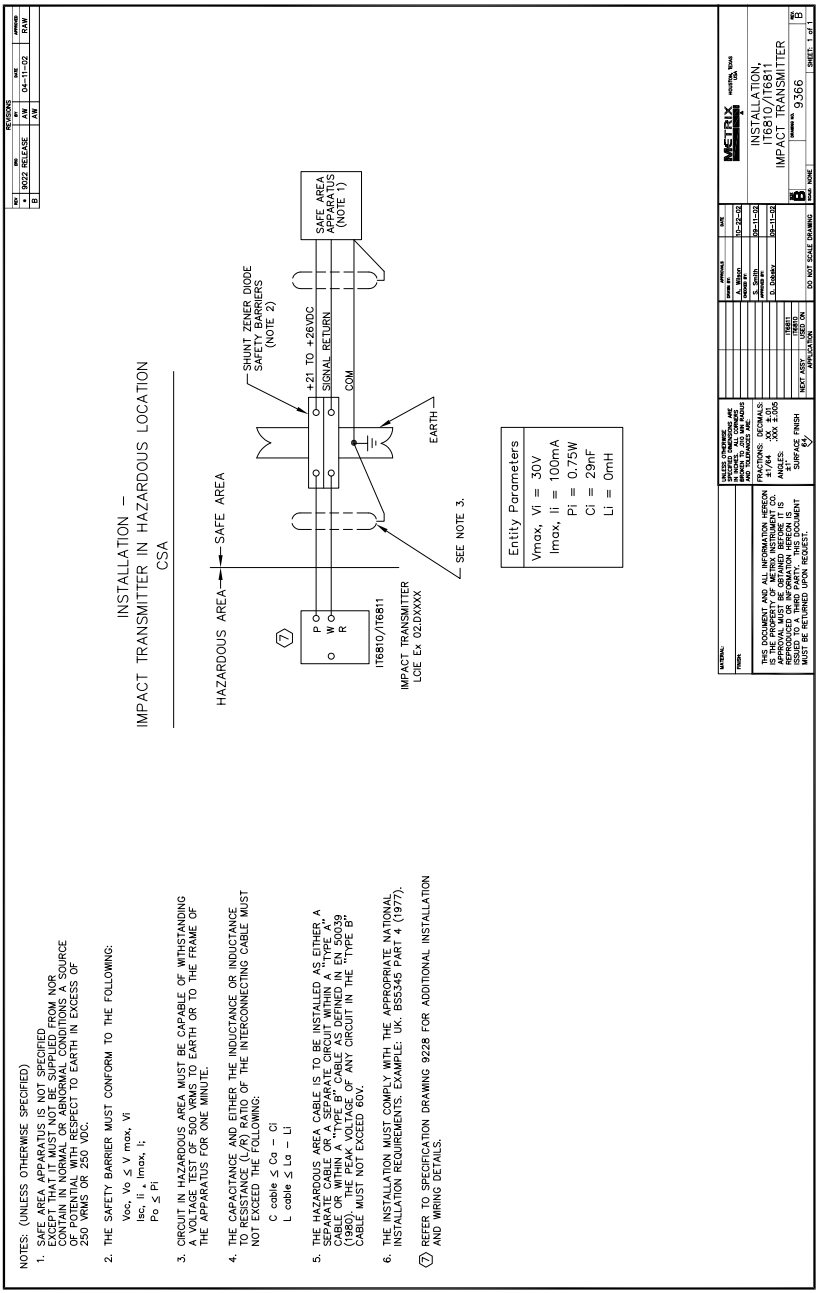
After setting reset time and threshold level, return the proper power connections to the trasmitter. After applying power, a simple check can be performed by tapping the transmitter with a coin or small screw driver. The 4-20 mA signal should increase proportionally with the rate of tapping.



9288-001 E.P. HOUSING FOR IT6812 IMPACT TRANSMITTER

Special Conditions for Safe Use:

In order to ensure temperature classification and safety, the power supply should adhere to the following: Uo ≤ 30V, Io ≤ 100mA, and Po ≤ 0.75W



REVISIONS				
REV	ORD	BY	DATE	APPROVED
A	9332 RELEASE	AW	8-2-05	

NOTES: (UNLESS OTHERWISE SPECIFIED)

1. Nonincendive Equipment Entity Parameters:
   V max = 30 V dc
   I max = 100 mA
   Pi = .75 W
   Ci = 29 nF
   Li = 0 mH

2. Associated Nonincendive Field Wiring Apparatus may be in a Division 2 location if so approved.

   Selected Associated Nonincendive Field Wiring Apparatus must be third party listed as providing nonincendive safe circuits for the application, and have Voc not exceeding Vmax, Isc not exceeding Imax, and the Po of the Associated Nonincendive Field Wiring Apparatus must be less than or equal to the Pmax or Pi of the nonincendive equipment, as shown in Table 1.

3. Capacitance and inductance of the field wiring from the nonincendive equipment to the Associated Nonincendive Field Wiring Apparatus shall be calculated and must be included in the system calculations as shown in Table 1. Cable capacitance, Ccable, plus nonincendive equipment capacitance, Ci, must be less than the marked capacitance, Ca, shown on any Associated Nonincendive Field Wiring Apparatus used. The same applies for inductance (Lcable, Li and La, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: Ccable = 60 pF/ft., Lcable = 0.2 µH/ft.

   TABLE 1:

Nonincendive Equipment	Associated Nonincendive Field Wiring Apparatus
V max	≥ Voc
I max	≥ Isc
P max	≥ Po
Ci	≤ Ccable Ca
Li	≤ Lcable La

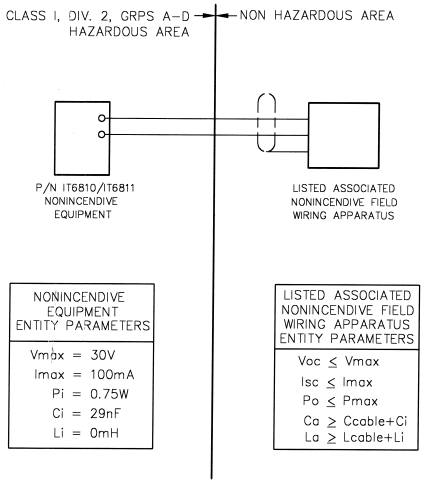
   If Po of the Associated Nonincendive Field Wiring Apparatus is not known, it may be calculated using the formula Po = (Voc * Isc)/4 = (Uo * Io)/4.

4. Associated Nonincendive Field Wiring Apparatus must be installed in accordance with its manufacturer's control drawing and Article 501 of the National Electrical Code (ANSI/NFPA 70) for installation in the United States, or Section 18 of the Canadian Electrical Code for installations in Canada.

5. Where multiple circuits extend from the same piece of nonincendive equipment or Associated Nonincendive Field Wiring Apparatus, they must be installed in separate cables or in one cable having suitable insulation. Refer to Article 501.10(B)(3) of the National Electrical Code (ANSI/NFPA 70).

6. Associated Nonincendive Field Wiring Apparatus must not be used in combination unless permitted by their certification(s).

CLASS I, DIV. 2 NONINCENDIVE INSTALLATION TRANSMITTER IN HAZARDOUS LOCATION



NONINCENDIVE EQUIPMENT ENTITY PARAMETERS
Vmax = 30V
Imax = 100mA
Pi = 0.75W
Ci = 29nF
Li = 0mH

LISTED ASSOCIATED NONINCENDIVE FIELD WIRING APPARATUS ENTITY PARAMETERS
Voc ≤ Vmax
Isc ≤ Imax
Po ≤ Pmax
Ca ≥ Ccable+Ci
La ≥ Lcable+Li

AGENCY APPROVED PRODUCT

DO NOT DEVIATE FROM DOCUMENTED CONSTRUCTION OR LISTED PARTS

MATERIAL:

FINISH:

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. ALL CORNERS BROKEN TO .010 MIN RADIUS AND TOLERANCES ARE:

FRACTIONS: DECIMALS:
±1/64 .XX ±.01
.XXX ±.005
ANGLES: ±1°
SURFACE FINISH 64

APPROVALS	DATE
DRAWN BY: A. Wilson	05-15-05
ENGINEER:	8-1-05
APPROVED BY:	8-17-05

IT6811
IT6810
NEXT ASSY USED ON
APPLICATION

DO NOT SCALE DRAWING

HOUSTON TEXAS

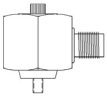
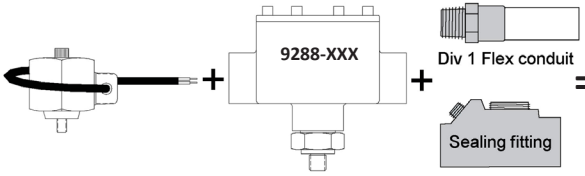
METRIX INSTRUMENT CO. U.S.A.

INSTALLATION, IT6810/IT6811, DIV. 2 IMPACT TRANSMITTER

SIZE	DRAWING NO.	REV
B	9683	A

SCALE: NONE SHEET: 1 of 1

HAZARDOUS AREA INSTALLATION GUIDELINES

Impact Transmitter	Installation Requirements	Hazardous Area Rating
IT6810 	**1 Armored Cable Assembly p/n 9334-211-XXXX or equal** Per drawing # 9683 (Page 10) **2 Intrinsic Safety Barriers** Per drawing # 9366(Page 9)	CSA/UL (US& CN) Class 1, Div 2, Groups A-D (Non-Incendive) CSA - Class I, Div 1, Groups A-D ATEX Ex ia IIC T4 Ga (-40°C ≤ Ta ≤ +100°C) (Intrinsically Safe)
IT6811 	**Wiring contained within Div 2 Flex & Rigid Conduit** Per drawing # 9683 (Page 10) **2 Intrinsic Safety Barries** Per drawing # 9366(Page 9) Div 2 Flex & Rigid Conduit	CSA/UL (US& CN) Class I, Div 2, Groups A-D (Non-Incendive) CSA - Class I, Div 1, Groups A-D ATEX Ex ia IIC T4 Ga (-40°C ≤ Ta ≤ +100°C) (Intrinsically Safe)
IT6812 		CSA - Class I, Div 1, Groups B-D (explosion-proof)

ENVIRONMENTAL INFORMATION

This electronic equipment was manufactured according to high quality standards to ensure safe and reliable operation when used as intended. Due to its nature, this equipment may contain small quantities of substances known to be hazardous to the environment or to human health if released into the environment. For this reason, Waste Electrical and Electronic Equipment (commonly known as WEEE) should never be disposed of in the public waste stream. The "Crossed-Out Waste Bin" label affixed to this product is a reminder to dispose of this product in accordance with local WEEE regulations. If you have questions about the disposal process, please contact Metrix Customer Services.

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