5485C HIGH-TEMPERATURE VELOCITY TRANSDUCER

Installation Manual

2-PIN CONNECTOR VERSION
(requires mating Model 4850-XXXX cable)

FIXED ARMORED CABLE VERSION

OVERVIEW

The Metrix 5485C High-Temperature Velocity Sensor is suitable for use in temperatures up to 375ºC. It is designed for gas turbines and other machinery with high surface temperatures where a velocity signal is desired. The sensor's moving-coil design requires no external power as it self-generates a signal proportional to vibration velocity.

FEATURES

- Self generating, no power required
- Stainless Steel Housing
- Zero friction - infinite analog resolution

APPLICATIONS

- Large industrial gas turbines
- Furnace fan monitoring

HAZARDOUS AREAS

UL intrinsically safe for Class 1, Div. 1, Grps (A-D); Non-incendive for Class 1, Div. 2, Grps. (A-D). CSA intrinsically safe for: Class 1, Div. 1, Grps (A-D); ATEX/IECEx intrinsically safe for: EEx ia IIC T1-T6 Ga.

INSTALLATION

The sensitive axis of the transducer can be oriented in any direction. To ensure clean response to high frequency vibrations, the transducer must be securely mounted to a flat machined surface using four #6 (or 3mm) socket head screws. If a bracket is required, it should be of rigid construction to prevent spurious mechanical resonances in the pass band.

WIRING

In ordinary, nonhazardous locations the transducer should be wired according to Page 4 (drawing 7623, Sheet 2).

In hazardous locations the wiring method depends upon the area classification.

1. In Class I, Div 1, Groups A, B, C & D or IEC Zone 0, Group IIC hazardous locations, the transducer may be connected through a zener diode safety barrier to the safe area receiver in accordance with Page 5 (drawing 7623, Sheet 3).

2. In Class I, Div 2, Groups A, B, C & D locations the transducer may be wired as in (1), or it can be wired without a safety barrier if wired in accordance with Page 6 (drawing 8096).

ATEX/IECEx INPUT ENTITY PARAMETERS

- $\mathbf{U_i}$= 28v
- $\mathbf{I_i}$= 120mA
- $\mathbf{P_i}$= 625 mW
- $\mathbf{C_i}$= 0
- $\mathbf{L_i}$= 0.88mH max.

SPECIFIC CONDITIONS OF USE

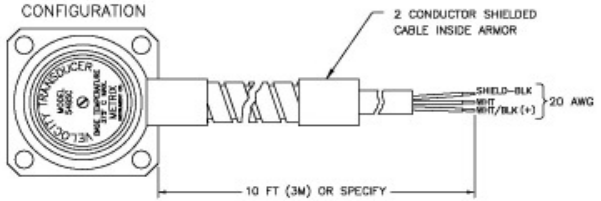
In order to ensure temperature classification and safety, the power supply must adhere to the following:

- $\mathbf{U_o} \leq 28V$
- $\mathbf{I_o} \leq 120mA$
- $\mathbf{P_o} \leq 0.625W$

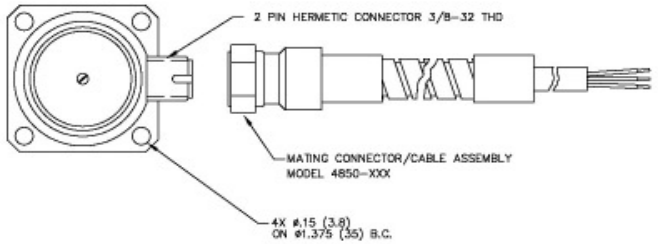
The temperature classifications and ambient temperature range can vary as follows:

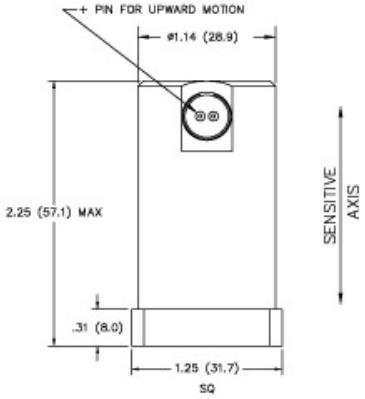
Max. Low Ambient Temp.	Max. High Ambient Temp.	Temp. Classification
-54°C	45°C	T6
	60°C	T5
	95°C	T4
	160°C	T3
	260°C	T2
	375°C	T1

FIXED CABLE CONFIGURATION



CONNECTOR CONFIGURATION





SPECIFICATIONS

TYPE: SPRING SUSPENDED DUAL COIL BOBBIN IN PERMANENT MAGNETIC FIELD. NO SLIDING PARTS. ZERO FRICTION.

AXIS ORIENTATION: ANY

SENSITIVITY: SEE TABLE A (+/− 5% AT 100 Hz)

CROSS AXIS SENSITIVITY: LESS THAN 10%

EXTERNAL FIELD SENSITIVITY: < .005 IPS/GAUSS AT 60Hz

COIL RESISTANCE: (25°C) = SEE TABLE A

TEMPERATURE LIMITS:
CONTINUOUS: −54°C TO 375°C
INTERMITTENT: −54°C TO 400°C

FREQUENCY RANGE: 15 Hz TO 2000 Hz

DISPLACEMENT LIMIT: 0.07 (1.8) PK − PK

SENSITIVITY SHIFT VS POSITION: 5% MAX.

SENSITIVITY VS TEMPERATURE: −.02%/°C, MAX.

ACCELERATION LIMITS: 0 TO 50 G's

DAMPING (ELECTRO-MAGNETIC):
AT 20°C: 0.8
AT 200°C: 0.55
AT 375°C: 0.4

CASE TO COIL ISOLATION:
AT 20°C: 100 MEGOHMS, MIN.
AT 375°C: 10 MEGOHMS MIN.

CASE MATERIAL: STAINLESS STEEL, HERMETIC SEAL

WEIGHT: 7.5 OZ. (.21 KG)

HAZARD RATING: SEE SHEET 3

SEE SHEETS 2 AND 3 FOR WIRING.

TABLE A

MODEL	SENSITIVITY	COIL RESISTANCE	TERMINATION
5485C-001-XXX *	105MV/IPS	73 OHMS	FIXED CABLE
5485C-002	105MV/IPS	73 OHMS	CONNECTOR
5485C-003-XXX *	145MV/IPS	102 OHMS	FIXED CABLE
5485C-004	145MV/IPS	102 OHMS	CONNECTOR
5485C-005-XXX *	200MV/IPS	135 OHMS	FIXED CABLE
5485C-006	200MV/IPS	135 OHMS	CONNECTOR
5485C-007-XXX *	150MV/IPS	105 OHMS	FIXED CABLE
5485C-008	150MV/IPS	105 OHMS	CONNECTOR

* −XXX INDICATES CABLE LENGTH IN FEET
(EX: −010 = 10 FEET)

AGENCY APPROVED PRODUCT

DO NOT DEVIATE FROM DOCUMENTED CONSTRUCTION OR LISTED PARTS

MATERIAL

FINISH

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

FRACTIONS: ±1/64 DECIMALS: .XX ±.01 .XXX ±.005

ANGLES: ±1°

SURFACE FINISH 64

APPROVALS	DATE
DRAWN BY: J.T.	01-26-80
DESIGNED BY: JAM	01-11-80
APPROVED BY: R.L. MORRISON	11-10-99

NEXT ASSY | USED ON: 5485C
APPLICATION

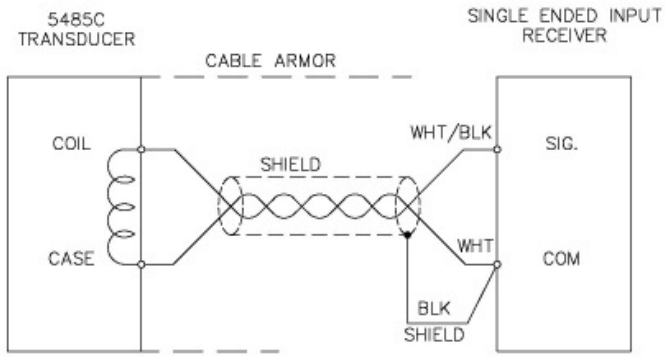
DO NOT SCALE DRAWING

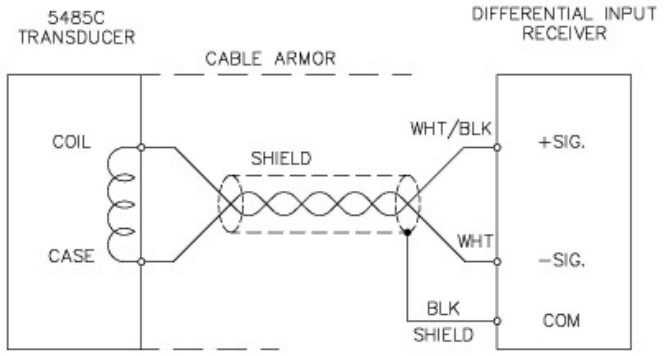
METRIX
HOUSTON, TEXAS U.S.A.

SPECIFICATION, MODEL 5485C, HIGH TEMPERATURE VELOCITY TRANSDUCER

SIZE C | DRAWING NO. 7623 | REV U

SHEET: 1 of 3





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DO NOT DEVIATE FROM DOCUMENTED CONSTRUCTION OR LISTED PARTS

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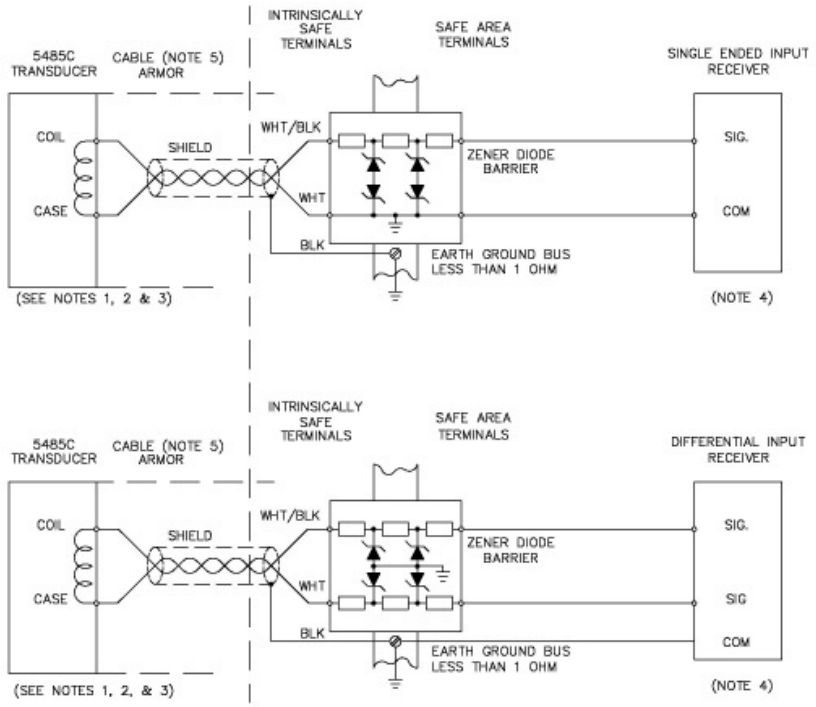
HOUSTON, TEXAS U.S.A.

SPECIFICATION, MODEL 5485C,
HIGH TEMPERATURE
VELOCITY TRANSDUCER
WIRING (ORDINARY LOCATIONS)

SIZE	DRAWING NO.	REV.
C	7623	U
SCALE	SHEET: 2 of 3	



WARNING: TO PREVENT IGNITION OF FLAMMABLE OR COMBUSTIBLE ATMOSPHERE, DISCONNECT POWER BEFORE SERVICING

AGENCY APPROVED PRODUCT

DO NOT DEVIATE FROM DOCUMENTED CONSTRUCTION OR LISTED PARTS

NOTES:

1. UL LISTED AND CSA CERTIFIED AS INTRINSICALLY SAFE (CLASS I, GROUPS A, B, C, & D) WHEN USED WITH ZENER DIODE BARRIER HAVING A MAXIMUM OPEN CIRCUIT VOLTAGE OF 28 Vdc OR A MAXIMUM SHORT CIRCUIT CURRENT OF 0.25 A ACROSS THE INTRINSICALLY SAFE TERMINALS.

   ENTITY PARAMETERS OF TRANSDUCER:
   MAX. VOLTAGE (Vmax) = 28 Vdc
   MAX. CURRENT (Imax) = 0.25 A
   UNPROTECTED INTERNAL CAPACITANCE (Ci) = 0 uF
   UNPROTECTED INTERNAL INDUCTANCE (Li) = 0.88 mH MAX.
   MAX. POWER (Pimax) = 0.625 W (UL ONLY)

   SUCH THAT THE FOLLOWING CONDITIONS ARE SATISFIED:

   Voc ≤ Vmax La ≥ Li + Lcable Pmax ≥ Po
   Isc ≤ Imax Ca ≥ Ci + Ccable

   IF Po OF THE ASSOCIATED APPARATUS IS NOT KNOWN, IT MAY BE CALCULATED USING THE FORMULA Po = (Voc * Isc)/4 = (Uo * Io)/4.

2. CSA CERTIFIED INTRINSICALLY SAFE SYSTEM WHEN USED WITH CSA CERTIFIED BARRIER RATED 14 VOLTS MAX., 50 OHMS MIN.; OR 22 VOLTS MAX., 300 OHMS MIN.

3. CENELEC (LCIE) CERTIFIED EEx ia IIC T6

TRANSDUCER SENSITIVITY	ENTITY PARAMETERS OF TRANSDUCER: Vmax	Leq	Ri
105 mV/ips	28 Vdc	.39 mH	46 ohms
145 mV/ips	28 Vdc	.77 mH	66 ohms
150 mV/ips	28 Vdc	.82 mH	68 ohms
200 mV/ips	28 Vdc	1.50 mH	87 ohms

4. THE RECEIVER MUST NOT BE SUPPLIED FROM, NOR CONTAIN A SOURCE OF POTENTIAL WITH RESPECT TO GROUND UNDER NORMAL OR FAULT CONDITIONS EXCEEDING 250 VRMS.

5. CABLE LENGTH BETWEEN TRANSDUCER AND ZENER DIODE BARRIER SHALL NOT EXCEED 1000 FT. (300 m).

6. ASSOCIATED AND INTRINSICALLY SAFE APPARATUS MUST BE INSTALLED IN ACCORDANCE WITH ITS MANUFACTURER'S CONTROL DRAWING AND ARTICLE 504 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.

7. WHEN REQUIRED BY THE MANUFACTURER'S CONTROL DRAWING, THE ASSOCIATED APPARATUS MUST BE CONNECTED TO A SUITABLE GROUND ELECTRODE PER THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70), THE CANADIAN ELECTRICAL CODE, OR OTHER LOCAL INSTALLATION CODES, AS APPLICABLE. THE RESISTANCE OF THE GROUND PATH MUST BE LESS THAN 1 OHM.

8. WHERE MULTIPLE CIRCUITS EXTEND FROM THE SAME PIECE OF INTRINSICALLY SAFE EQUIPMENT TO ASSOCIATED APPARATUS, THEY MUST BE INSTALLED IN SEPARATE CABLES OR IN ONE CABLE HAVING SUITABLE INSULATION. REFER TO ARTICLE 504.30(B) OF THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND INSTRUMENT SOCIETY OF AMERICA RECOMMENDED PRACTICE ISA RP12.6 FOR INSTALLING INTRINSICALLY SAFE EQUIPMENT.

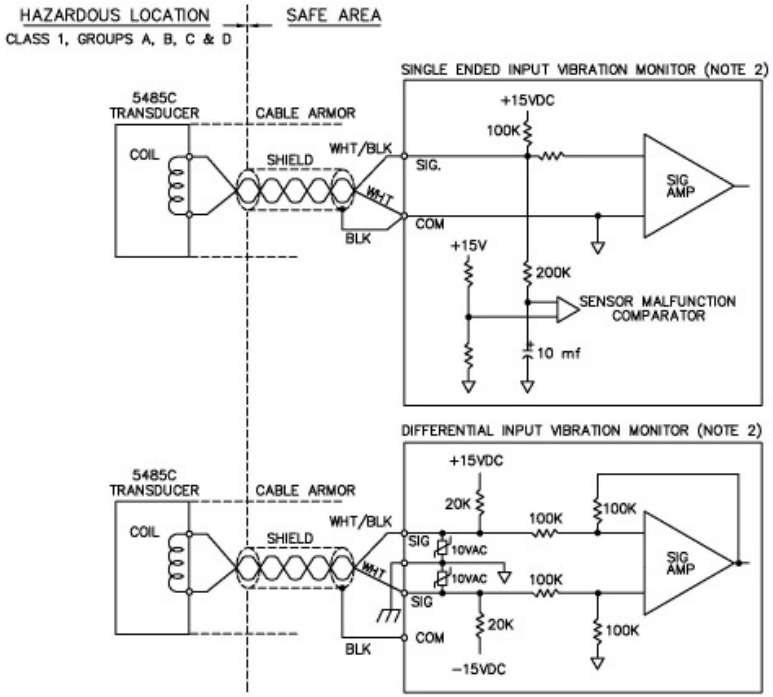
9. ASSOCIATED APPARATUS MUST NOT BE USED IN COMBINATION UNLESS PERMITTED BY THE ASSOCIATED APPARATUS CERTIFICATION

METRIX
HOUSTON, TEXAS U.S.A.

SPECIFICATION, MODEL 5485C, HIGH TEMPERATURE VELOCITY TRANSDUCER WIRING (HAZARDOUS LOCATIONS)

CAGE	DRAWING NO.	REV
C	7623	U

SHEET: 3 of 3



NOTES:

1. WARNING – THE VIBRATION MONITOR MUST PROVIDE A NON–INCENDIVE FIELD CIRCUIT TO TRANSDUCER, SO THAT IF THE WIRING BETWEEN THE TRANSDUCER AND MONITOR IS OPENED, SHORTED OR GROUNDED, THE CIRCUIT WILL REMAIN NON–INCENDIVE. MUST BE WIRED IN ACCORDANCE WITH THE NEC.
2. THE VIBRATION MONITOR SHALL PROVIDE A CIRCUIT HAVING MAXIMUM VOLTAGE AND MINIMUM RESISTANCE VALUES SHOWN IN THE SCHEMATIC DIAGRAMS.
3. TRANSDUCER CIRCUIT PARAMETERS:

V max	=	15 Vdc
I max	=	5 mA
LI	=	3.85 mH
CI	=	0 uF

4. CABLE LENGTH SHALL NOT EXCEED 1000' (300m).
5. ALTERNATELY, IN LIEU OF THE ACTUAL CIRCUIT PARAMETERS SHOWN HERE, IT IS ALSO ACCEPTABLE TO CONNECT THE TRANSDUCER TO A VIBRATION MONITOR WHICH HAS A "nL" (LIMITED ENERGY) APPROVAL TO EN 50021. NOT APPLICABLE TO U.L.

AGENCY APPROVED PRODUCT

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

FRACTIONS: ±1/64 DECIMALS: .XX ±.01 .XXX ±.005

ANGLES: ±1°

SURFACE FINISH

NEXT ASSY: 5485C USED ON APPLICATION

L. GREENWAY 01-15-90

JAM 02-13-90

R.L. MORRISON 02-13-90

DO NOT SCALE DRAWING

METRIX
HOUSTON, TEXAS U.S.A.

SPECIFICATION, MODEL 5485C, S/N ≥ 8000 HIGH TEMPERATURE VELOCITY TRANSDUCER WIRING (CLASS 1, DIV. 2)

SIZE C | DRAWING NO. 8096 | REV H

SHEET 1 of 1

SENSOR VERIFICATION CALIBRATION PROCEDURE

Mount the 5485C on a shaker table and verify the RMS output per table below.

CALIBRATION VERIFICATION TABLE 1 ips peak @ 150Hz		
Calibrated Sensitivity mV/in/s	**Calibrated Sensitivity mV/mm/s**	**RMS Output mV Min/Max.**
105	4.14	67/81
145	5.71	93/112
150	5.91	95/167
200	7.87	127/156

The test should be performed on a NIST traceable shaker at 1 ips, 150Hz.

Metrix recommends that this procedure be performed every 3 years.

NOTE: Due to the difficulties of field sensor verification, the +/- 5% sensitivity specification is relaxed to +/- 10%. The sensor should be returned to Metrix, Houston, Texas for metrology verification of factory calibration.

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 Service.

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