SEN X Series Eddy Current Transducers

Datasheet

GENCON Monitoring Solutions



- LED indication of selected length.
- Double screened cable for high noise immunity.
- Snap lock and shake proof cable connection.
- Low profile driver for easy local integration to machine.
- Excellent repeatability on replacement of probe, extension or driver.

DS.2202 Iss.1

- Compliant with standard API 670.
- Multi Hazardous Area Approved.
- Designed for Reliability, Accuracy and Flexibility.

Description

The SEN X Series eddy current transducer systems consist of a calibrated probe, extension cable and driver. Utilising the eddy current principle, this combination forms a tuned circuit with the target material and variations in probe face to target distance are detected in this circuit by the driver, providing a linearised voltage output proportional to target gap. This measurement system provides highly accurate (resolution typically less than one micro-meter) vibration and relative positional measurements, for harsh environments up to 180 °C.

The driver unit offers a front panel green LED for indicating the system length. The cable system incorporates snap lock connectors which require no torquing and provide a shake proof solution important for heavy industrial applications. The double screened cable offers robustness in combination with high immunity to interference and optional stainless steel convoluted armour is available for applications or environments where cable protection is paramount.



General Information

STRAIGHT MOUNT PROBES

- Suitable for shaft vibration and shaft / thrust position measurements.
- Robust stainless steel threaded case in various lengths and threads.
- Encapsulated tip impervious to oil or water ingress.
- Measurement ranges of 2.5 mm, 4.0 mm and 8.0 mm.
- Supplied with free running locknut for forward or reverse mounting
- Intrinsically safe options available.
- Choice of cable lengths with or without armouring connecting directly to driver unit or to extension cable.
- Operating temperature range, -30 °C to +180 °C.



PROBESREVERSE MOUNT PROBES

- Suitable for shaft vibration and shaft / thrust position measurements.
- Robust stainless steel threaded case with integral locknut.
- Measurement ranges of 2.5 mm and 4.0 mm.
- Suitable for reverse mounting into a standard probe holder.
- Encapsulated tip impervious to oil or water ingress.
- Intrinsically safe options available.
- Choice of cable lengths with or without armouring connecting directly to driver unit or to extension cable.
- Operating temperature range, -30 °C to +180 °C.



DISC PROBES

- Suitable for a range of rotor expansion and shaft position measurements.
- Robust stainless steel body with 2 or 3 mounting holes.
- Measurement ranges of 12.0 mm and 30.0 mm.
- Encapsulated tip impervious to oil or water ingress.
- Range of adjustable bracketry available for standard and dual probe mounting for steam turbine differential expansion measurement applications.
- Choice of cable lengths with or without armouring connecting directly to driver unit or to extension cable.
- Operating temperature range, -30 °C to +180 °C.



EXTENSION CABLES

- Triaxial 750hm Coaxial
- Double screened cable with snap lock connectors.
- FEP outer jacket with 3.2 mm outer diameter.
- Available in 'tuned' lengths of 3.5 m, 4.0 m, 4.5 m, 6.0 m, 6.5 m, 7.5 m, 8.0 m and 8.5 m. With or without stainless steel convoluted armouring.
- Excellent system repeatability on replacement of extension cable.
- Operating temperature range, -30 °C to +180 °C.



DRIVER UNITS - Voltage Output

- 5 m, 7 m and 9 m systems with LED indication.
- Low profile for easy local integration.
- Universal mounting with both DIN rail and Baseplate.
- -16.0 Vdc to -28.0 Vdc power supply range.
- API 670 compliant interface.
- Operating temperature range -30 °C to +90 °C.



DRIVER UNITS - Dual Outputs

- Direct 4-20mA loop powered processed output.
- Dynamic signal output
- Double screened cable for high noise immunity.
- Snap lock and shake proof cable connection.
- Compliant with standard API 670.
- Operating temperature range -30 °C to +90 °C.

INTEGRATED PROBES

- Proximity Probe with built in driver.
- Robust stainless steel threaded case in various lengths and threads.
- 2.5mm measurement range.
- Excellent linearity and stability.
- Suitable for operation up to +90 °C
- Compliant with standard API 670.
- Suitable for relative vibration and shaft position measurements.

General Specifications

PROBES

General specifications of SEN X Series Probes are shown in Table 1.

Table 1. Probes General Specifications									
Probe Series	Probe Tip Diameter (mm)	Measurement Range mm	Nominal Sensitivity mV/µm	Frequency Response Hz	Available System Lengths, m	Available body lengths mm	Minimum target size		
XPR02	5.0	0.0 to 2.0	7.87 (1)	DC to 10k					
XPR04	8.0	0.0 to 2.0	7.87 (1)		DC to 10k	DO +- 401-	5, 7, 9	20 to 250	10
XPR04(2)	8.0	0.0 to 4.0	3.94					16mm	
PRI04	8.0	0.0 to 2.0	7.87 (1)		N/A	80 to 150			
XPR08	20.0	0.0 to 8.0	1.97	DC to 5k		50 to 050	40mm		
XPR12	25.0	0.0 to 12.0	1.38		DC to 5k	F 7 0	50 to 250	50mm	
XPD12	25.0	0.0 to 12.0	1.38			DC 10 5K	5, 7, 9	Fired Dies	40mm
XPD25	50.0	0.0 to 25.0	0.63			Fixed Disc	50mm		

	Table	1. Probes Ge	eneral Specifications	(con't)		
Probe Series	Linearity % of FS	Resolution mm	Interchangeability Error	Operating Temp Range	Storage Temp Range	Intrinsic Safety
XPR02						
XPR04	± 1%, -1.0 V to -19.0 V ± 2%, 0°C to +150°C @-10.0V	<0.001	<±5%	-30°C to +180°C	-40°C to +180°C	Optional
XPR04(2)	1270, 0 0 10 1 100 0 @ 10.00					
PRI04	± 2%, -1.0 V to -19.0 V ± 5%, 0°C to +90°C @-10.0V		N/A	-30°C to +120°C	-40°C to +120°C	
XPR08		<0.002	<±5%	-30°C to +180°C	-40°C to +180°C	
XPR12	± 1%, -1.5 V to -17.5 V ± 2%, -1.0V to -17.5 V ± 2%, 0°C to +150°C @-10.0V	<0.003				
XPD12						None
XPD25						None

Note: (1) API670.

(2) Half sensitivity option.

Other common general specifications for probes are as below.

Probe tip material: PPS 40 % Glass Filled
 Probe Pody Material: 203 etaiplese steel

Probe Body Material: 303 stainless steel
Magnetic field effect: <1 % at 110 mT

Reference Target Material: ANSI 4140

Maximum Cable Length: 330 m based on 120 pF/m at

<10 kHz and 500 um pk-pk. 3000 m based on 120 pF/m at <1 kHz and 500 um pk-pk

Connector (except PRI04): Female Miniature Coaxial

EXTENSION CABLES

Probes integral cables and the extension cables, except used for PRI04 probes, are of customised triaxial 75 Ohm RF coaxial cable with FEP outer jacket. Armoured option is convoluted stainless steel with 7.0 mm outer diameter. Cable length tolerances are as below.

• Probe (0.5 metre): 0.5 m to 0.8 m

Probe (1 metre): 1.0 m to 1.5 m

Probe (1.5 metre): 1.5 m to 2.0 m

Cable Extension (4 metre): 4.0 m to 4.4 m

Cable Extension (4.5 metre): 4.5 m to 5.0 m

• Cable Extension (6 metre): 6.0 m to 6.6 m

• Cable Extension (6.5 metre): 6.5 m to 7.2 m

• Cable Extension (7.5 metre): 7.5 m to 8.2 m

• Cable Extension (8 metre): 8.0 m to 8.8 m

• Cable Extension (8.5 metre): 8.5 m to 9.5 m

The cable used for PRI04 probes is as below.

• 3-wire 19/0.15 PTFE outer jacket

• 3.2 mm outer diameter

Armoured option: Stainless Steel Overbraid

DRIVERS

General specifications of SEN X Series Voltage Output Drivers are shown in Table 2.

	Table 2. Voltage Output Drivers General Specifications					
Driver Series	Measurement Range, mm	Nominal Sensitivity, mV/µm	Frequency Response, Hz	Linear Voltage Range		
XED02	0.0 to 2.5	7.87	DC to 10k	-1.0V to -19.0V for 0.25mm to 2.5mm		
XED04	0.0 to 2.5	7.87		-1.0V to -19.0V for 0.25mm to 2.5mm		
XED04(2)	0.0 to 4.0	3.94		-1.0V to -16.0V for 0.25 mm to 4.0mm		
XED08	0.0 to 8.0	1.97	DC to 5k	-2.0V to -18.0V for 0.5mm to 8.5mm		
XED12	0.0 to 12.0	1.38		-1.0V to -17.5V for 0.63mm to 12.7mm		
XED25	0.0 to 25.0	0.63		-1.0V to -18.0V for 1.26mm to 26.7mm		

Note: (1) API670.

(2) Half sensitivity option.

Other common general specifications for voltage output drivers are as below.

Available System Lengths: 5, 7, 9 m
 Interchangeability Error: <±5%

System length indication: Green LED lamp
 Power supply range: -16.0 Vdc to -28.0 Vdc
 Power supply sensitivity: < 0.3 mVout / Vsupply

Power consumption: 3 mA typ, 7 mA max

• Output impedance: 75 Ohms

Monitor Output Impedance: 10 kOhm

Sensor Connector type: Self Locking Miniature Male Coaxial

• Mounting: Universal with both Din Rail and Baseplate

Mass: 250 grams

Operating Temp Range: -30 °C to +90 °C
 Storage Temp Range: -40 °C to +90 °C

General specifications of SEN X Series Dual Output Drivers are shown in Table 3.

	ations of SEN A Series Di		put Drivers General Specifications	3	
Driver Series	Measurement & Range	Hi / Lo Output	Linearity	Current Loop Sensitivity	Resolution
DNX8031 Relative Vibration	0 to 100µm pk–pk 0 to 125µm pk–pk 0 to 250µm pk-pk	4.0 to 20.0mA Loop Powered	± 1% (% of FS) ± 2%, 0°C to +150°C @-10.0V	6.25 µm/mA ±1% 7.81 µm/mA ±1% 7.81 µm/mA ±1%	<0.001 mm
DNX8033 Position	-1.00mm to +1.00mm -0.60mm to +0.60mm	4.0 to 20.0mA Loop Powered	± 1% (% of FS) ± 2%, 0°C to +150°C @-10.0	125 µm/mA ± 1% 75 µm/mA ± 1%	<0.001 mm
DNX8038 Speed	0 to 5,000 RPM 0 to 10,000 RPM	4.0 to 20.0mA +24Vdc 3-wire system	±1% (% of FS)	312.5 RPM/mA ±1% 725 RPM /mA ±1%	1 RPM

Table 3. Dual Output Drivers General Specifications (con't)								
Driver Series	Frequency Response Hz	Probe Gap Working Rang mm	Volt	Signal Output Impedance	Intrinsic Safety			
DNX8031	2 to 5 k	0.25 – 1.50	8.0 V / mm ± 2% with 10 M Ohm Load	2.0 V to 12.0 V for 0.25mm to 1.50mm	10 K Ohm	Optional		
DNX8033	0 to 1 k	0.25 – 2.25	4.0 V / mm ± 2% with 10 M Ohm Load	2.0 V to 12.0 V for 0.25mm to 2.25mm	10 K Ohm	Optional		
DNX8038	40 to 10 k	0.5 – 1.50	N/A	TTL+ / TTL High > 3.3 V, Low < 0.35 V	N/A	None		

Other common general specifications for dual output drivers are as below.

Maximum loop resistance: 1000 Ohms at +35.0V
 0.0 Ohms at +15.0V

50 x (V – 15) Ohms

Input Voltage Range: +15.0 to +35.0 Vdc

• Recommended Power: +24.0 Vdc

• Interchangeability Error: <±5%

• Driver Failure: S/C or O/C, Loop Current <3.8mA (out of range)

Sensor Connector type: Self Locking Miniature Male Coaxial

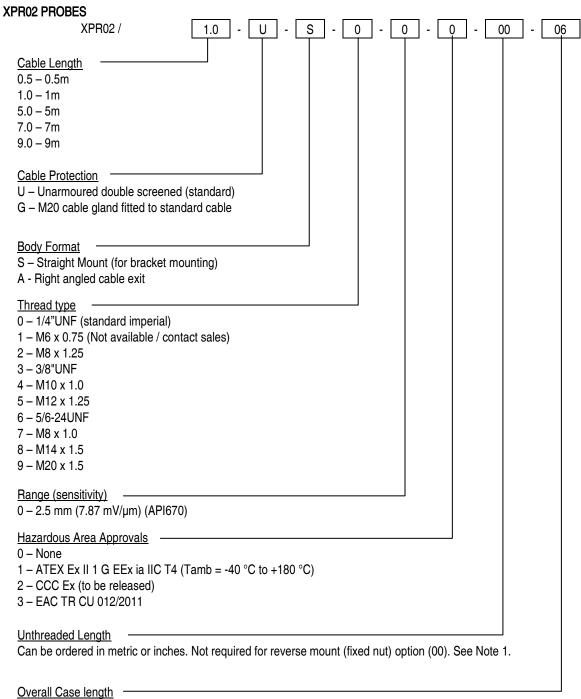
Mounting: Universal with both Din Rail and Baseplate

Mass: 250 grams

• Operating Temp Range: -40 °C to +80 °C

Storage Temp Range: -40 °C to +90 °C

Ordering Information



Can be ordered in metric or inches. See Note 2.

Note 1 - Unthreaded Length Option

Imperial Case

Unthreaded length must be at least 0.8 inches less than the case

length. Order in increments of 0.1 in. Maximum unthreaded length: 8.8 in. Minimum unthreaded length: 0.0 in.

Example: 04 = 0.4 in.

Metric Case

Unthreaded length must be at least 20 mm less than the case

length. Order in increments of 10 mm. Maximum unthreaded length: 230 mm. Minimum unthreaded length: 0 mm.

Example: 06 = 60 mm.

Note 2 - Overall Case Length Option

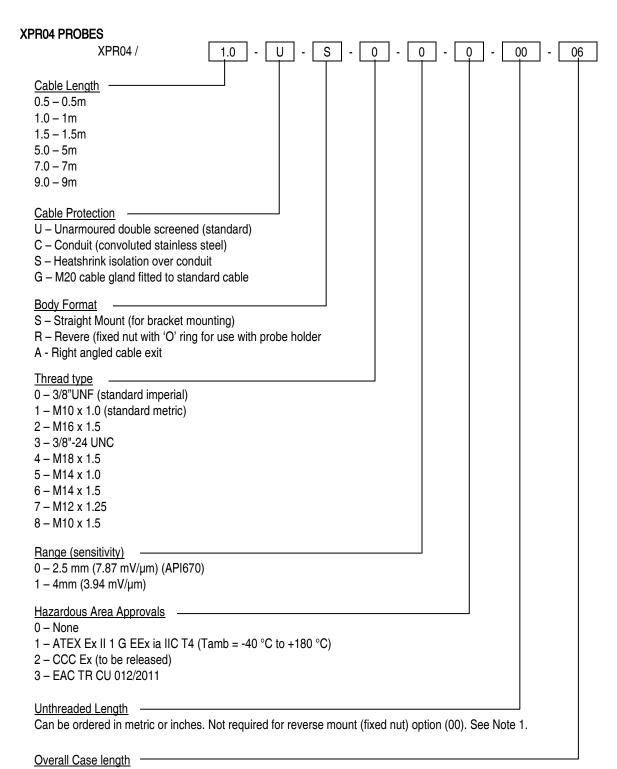
Imperial Case

Order in increments of 0.1 in. Maximum case length: 9.6 in Minimum case length: 0.8 in Example: 24 = 2.4 in

Example: E1 = E.

Metric Case

Order in increments of 10 mm. Maximum length: 250 mm. Minimum length: 20 mm. Example: 06 = 60 mm.



Can be ordered in metric or inches. See Note 2.

Note 1 - Unthreaded Length Option

Imperial Case

Unthreaded length must be at least 0.8 inches less than the case

length. Order in increments of 0.1 in. Maximum unthreaded length: 8.8 in. Minimum unthreaded length: 0.0 in.

Example: 04 = 0.4 in.

Metric Case

Unthreaded length must be at least 20 mm less than the case

length. Order in increments of 10 mm. Maximum unthreaded length: 230 mm. Minimum unthreaded length: 0 mm.

Example: 06 = 60 mm.

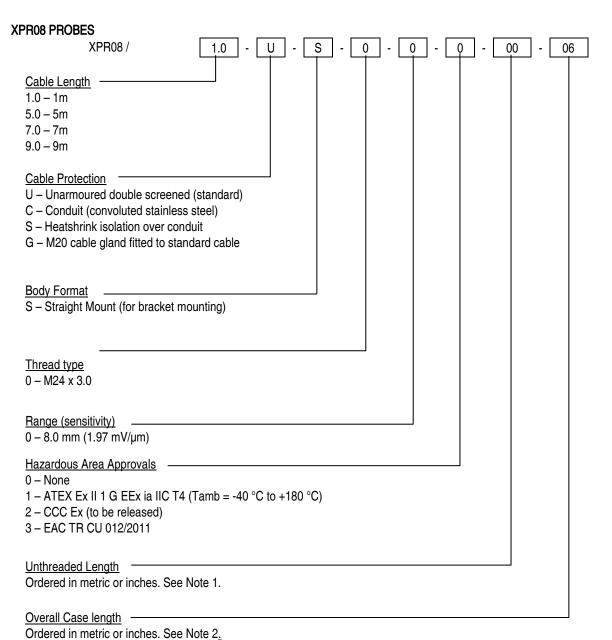
Note 2 - Overall Case Length Option

Imperial Case

Order in increments of 0.1 in. Maximum case length: 9.6 in Minimum case length: 0.8 in Example: 24 = 2.4 in

Metric Case

Order in increments of 10 mm. Maximum length: 250 mm. Minimum length: 20 mm. Example: 06 = 60 mm.



Note 1 - Unthreaded Length Option

Metric Case

Unthreaded length must be at least 20 mm less than the case

length. Order in increments of 10 mm.

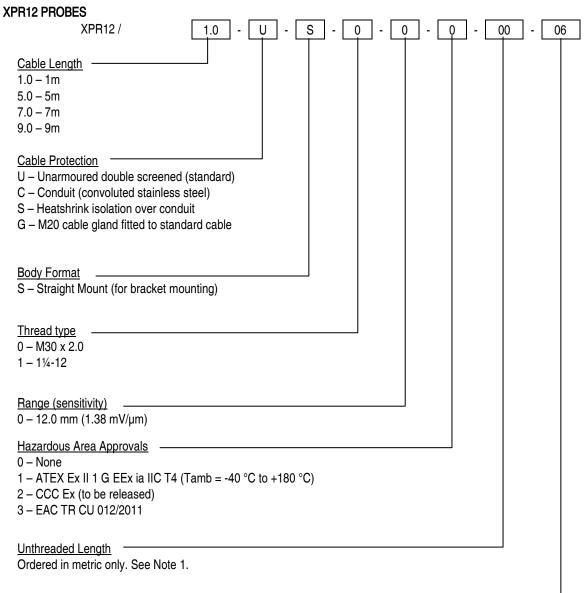
Maximum unthreaded length: 230 mm.

Minimum unthreaded length: 0 mm.

Example: 06 = 60 mm.

Note 2 - Overall Case Length Option Metric Case

Order in increments of 10 mm. Maximum length: 250 mm. Minimum length: 50 mm. Example: 08 = 80 mm.



Overall Case length -

Ordered in metric only. See Note 2.

Note 1 - Unthreaded Length Option

Imperial Case

Unthreaded length must be at least 0.8 inches less than the case

length. Order in increments of 0.1 in.

Maximum unthreaded length: 7.2 in.

Minimum unthreaded length: 0.0 in.

Example: 04 = 0.4 in.

Metric Case

Unthreaded length must be at least 20 mm less than the case

length. Order in increments of 10 mm.

Maximum unthreaded length: 180 mm.

Minimum unthreaded length: 0 mm.

Example: 06 = 60 mm.

Note 2 - Overall Case Length Option Imperial Case Order in increments of 0.1 in.

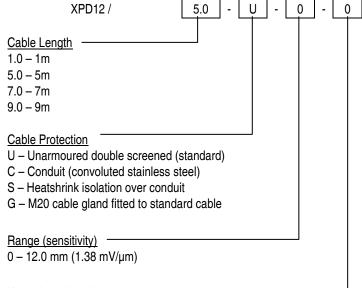
Maximum case length: 8.0 in Minimum case length: 2.0 in

Example: 24 = 2.4 in

Metric Case

Order in increments of 10 mm. Maximum length: 200 mm. Minimum length: 50 mm. Example: 06 = 60 mm

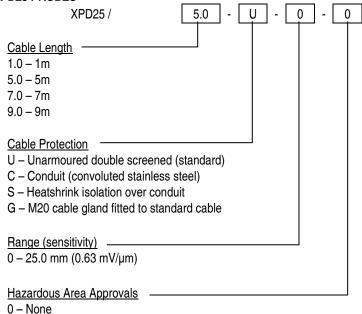


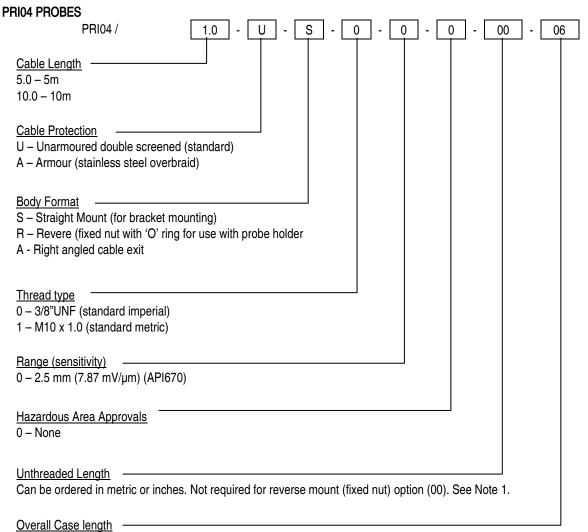


Hazardous Area Approvals

- 0 None
- 1 ATEX Ex II 1 G EEx ia IIC T4 (Tamb = -40 °C to +180 °C)
- 2 CCC Ex (to be released)
- 3 EAC TR CU 012/2011

XPD25 PROBES





Can be ordered in metric or inches. See Note 2.

Note 1 - Unthreaded Length Option

Imperial Case

Unthreaded length must be at least 0.8 inches less than the case length. Order in increments of 0.1 in.

Maximum unthreaded length: 5.1 in.

Minimum unthreaded length: 0.0 in.

Example: 04 = 0.4 in.

Metric Case

Unthreaded length must be at least 20 mm less than the case

length. Order in increments of 10 mm.

Maximum unthreaded length: 130 mm.

Minimum unthreaded length: 0 mm.

Example: 06 = 60 mm.

Note 2 - Overall Case Length Option Imperial Case

Order in increments of 0.1 in.

Maximum case length: 5.9 in

Minimum case length: 3.2 in

Example: 44 = 4.4 in

Metric Case

Order in increments of 10 mm.

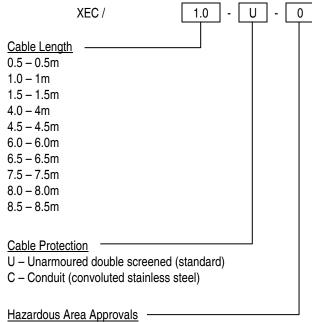
Maximum length: 150 mm.

Minimum length: 80 mm.

Example: 09 = 90 mm.

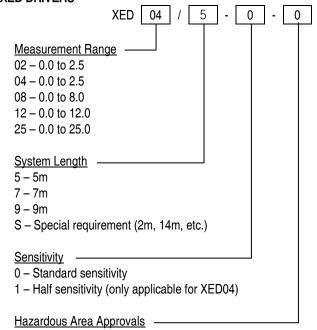
© Copyright 2022 GENCON Limited

XEC EXTENSION CABLES



- 0 None
- 1 ATEX Ex II 1 G EEx ia IIC T4 (Tamb = -40 °C to +180 °C)
- 2 CCC Ex (to be released)
- 3 EAC TR CU 012/2011

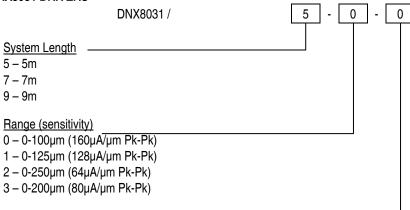
XED DRIVERS



- 0 None
- 1 ATEX Ex II 1 G EEx ia IIC T4 (Tamb = -40 $^{\circ}$ C to +80 $^{\circ}$ C)
- 2 CCC Ex (to be released)
- 3 EAC TR CU 012/2011

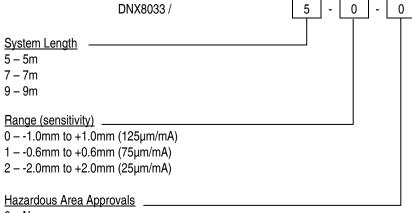
Not applicable for XED25

DNX8031 DRIVERS



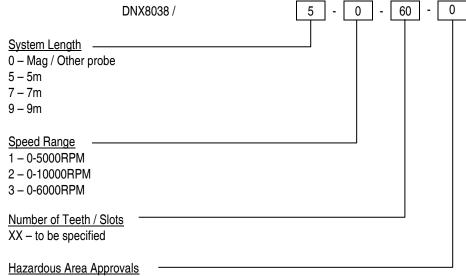
- Hazardous Area Approvals 0 - None
- 1 ATEX Ex II 1 G EEx ia IIC T4 (Tamb = -40 $^{\circ}$ C to +80 $^{\circ}$ C)
- 2 CCC Ex (to be released)
- 3 EAC TR CU 012/2011

DNX8033 DRIVERS



- 0 None
- 1 ATEX Ex II 1 G EEx ia IIC T4 (Tamb = -40 °C to +80 °C)
- 2 CCC Ex (to be released)
- 3 EAC TR CU 012/2011

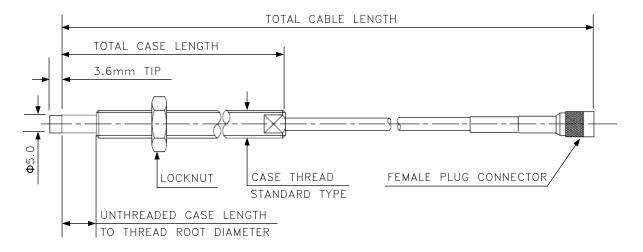
DNX8038 DRIVERS



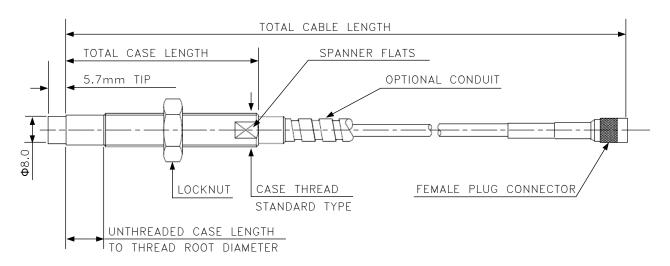
0 - None

Mechanical Configuration

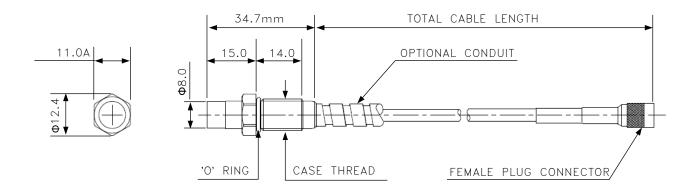
Straight Mount XPR02 Probe Case



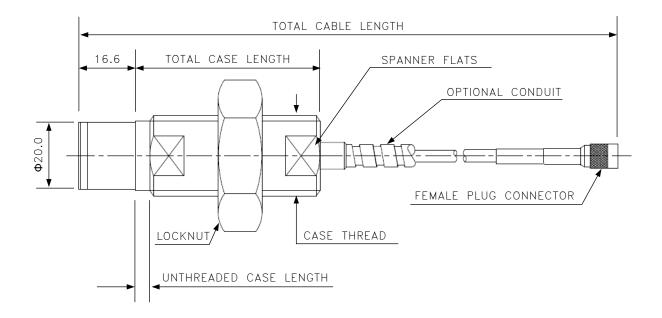
Straight Mount XPR04 Probe Case



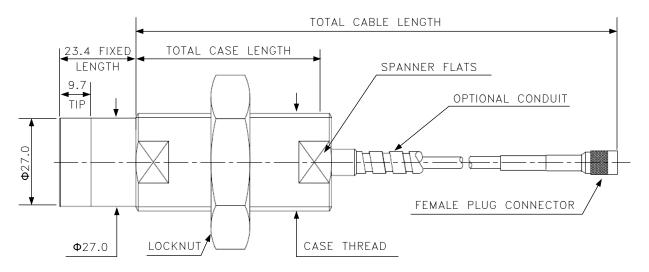
Reverse Mount XPR04 Probe Case



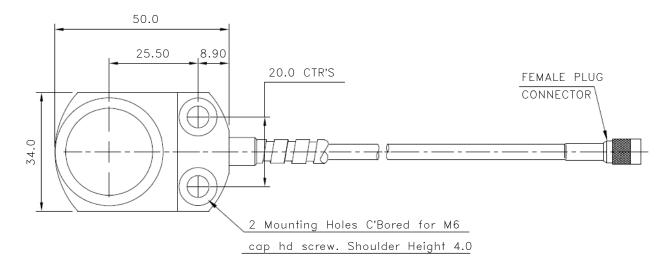
XPR08 Probe Case

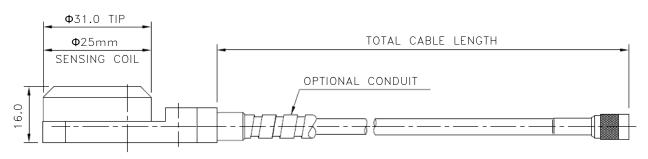


XPR12 Probe Case

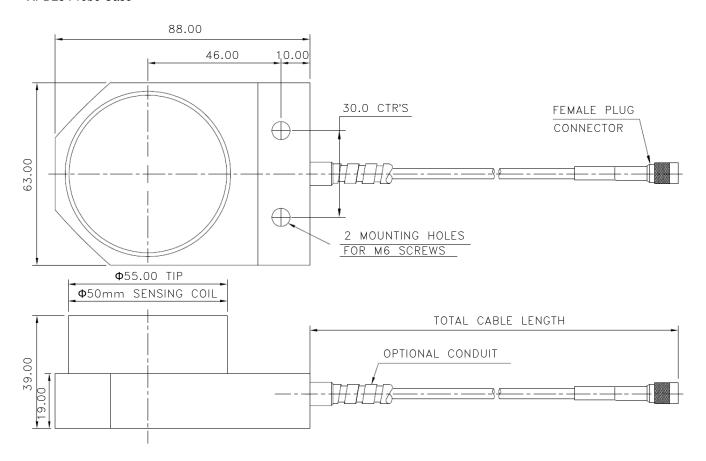


XPD12 Probe Case

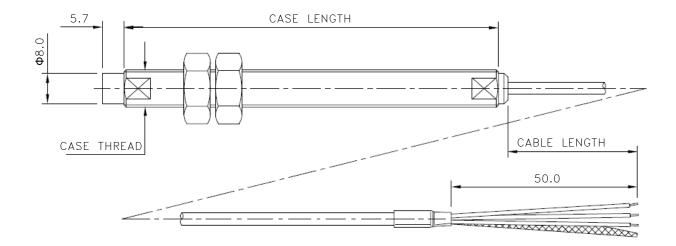




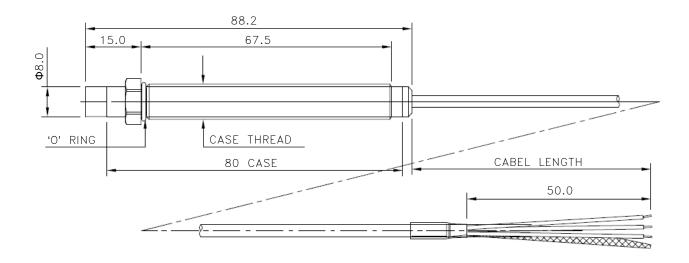
XPD25 Probe Case



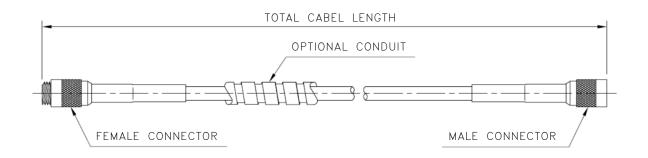
PRI04 Straight Mount Probe Case

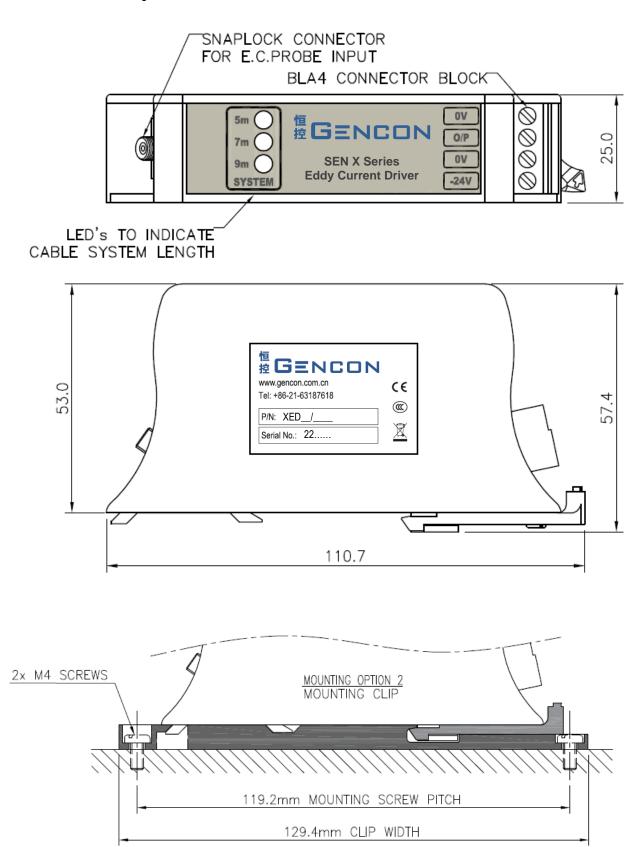


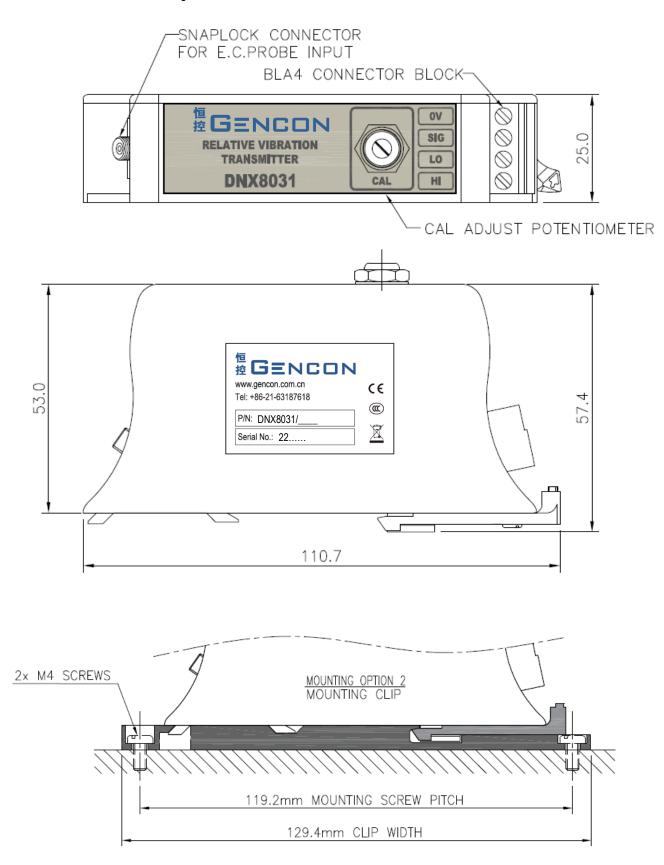
PRI04 Reverse Mount Probe Case

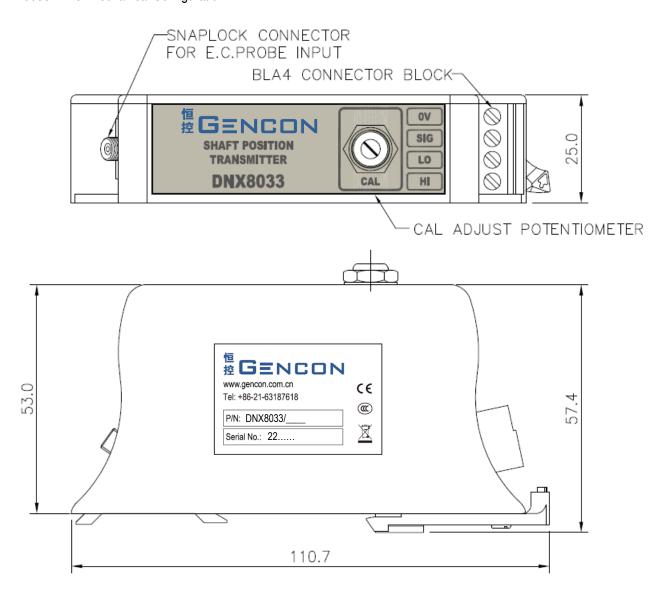


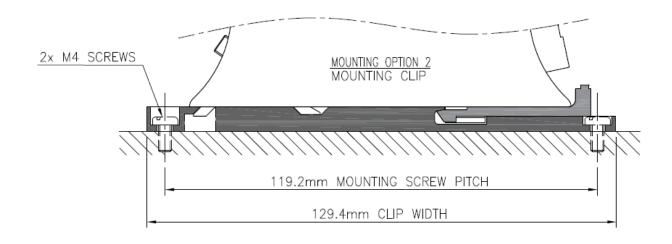
XEC Extension Cable Mechanical Drawing

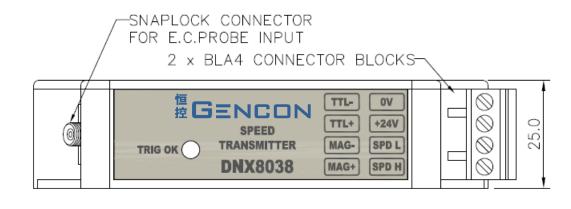


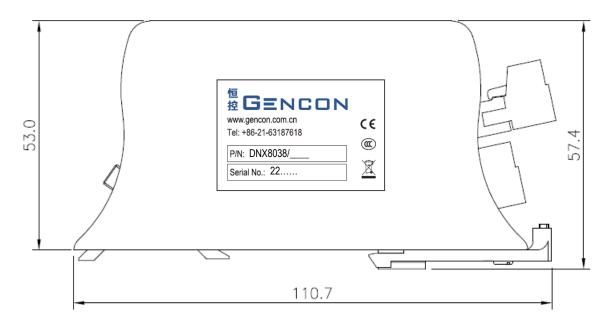


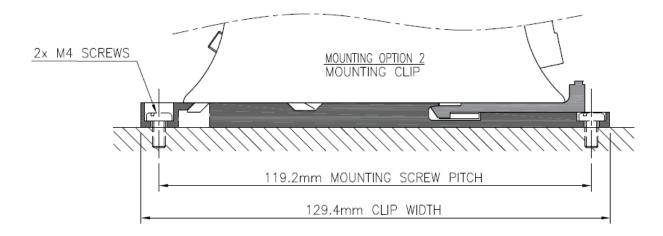














GENCON Limited

Room 1406, 1332 Lujiabang Road, Shanghai 200011, China Telephone: +86-21-63187618 Fax: +86-21-63186199 sales@gencon.com.cn www.gencon.com.cn