SensorsX

SX-EEDNB Series

Eddy Current Displacement Sensor System

Non-Contact Shaft Position & Vibration Monitoring



1 – 30 mm Standard Range (0.04 – 1.18 in)	**< 1% / < 1.5%** Non-Linearity	**DC – 10 kHz** Frequency Response (−3 dB)
IP68 Probe Protection	**API 670** Compliant	**24 V DC ± 10%** Preamplifier Supply

■ PRODUCT OVERVIEW

The SX-EEDNB Series is a non-contact eddy current displacement measurement system for monitoring shaft position and vibration in rotating machinery. Each system consists of a probe, an extension cable and a matched preamplifier, providing a voltage output that represents the gap between the probe tip and an electrically conductive metal target.The system supports static position and dynamic vibration measurements. Probe size, measuring range and total cable length must be selected as a compatible configuration. Frequency response depends on the selected measuring range.



■ KEY FEATURES

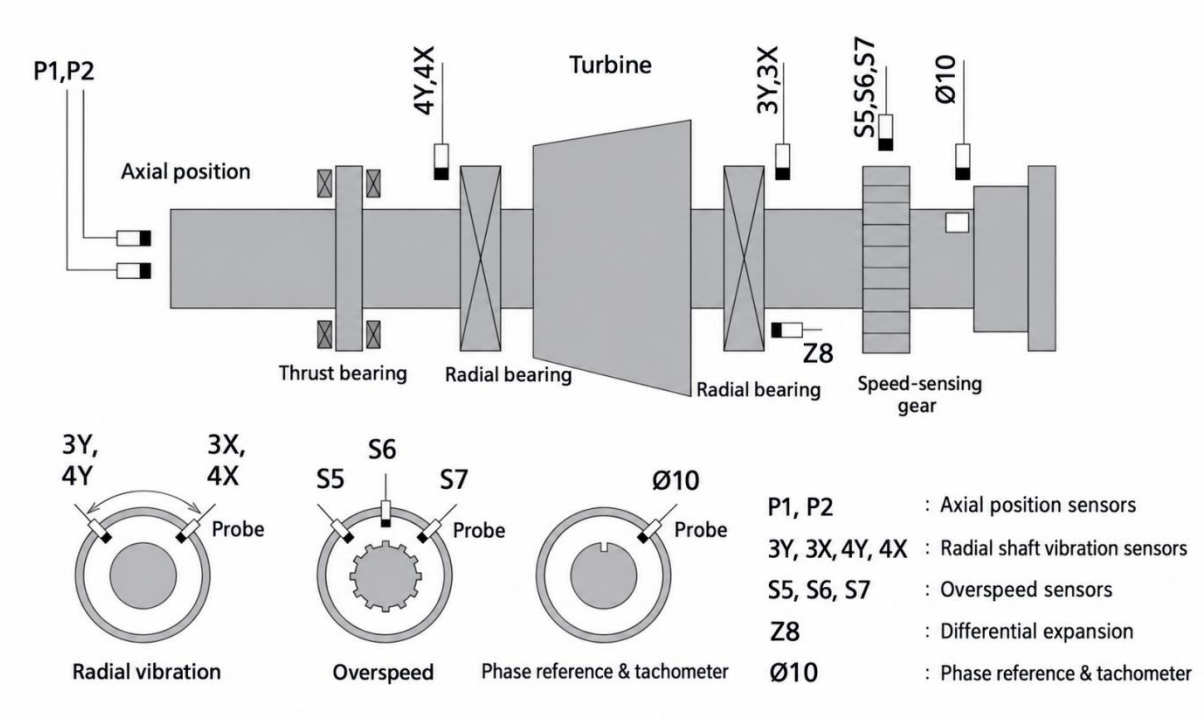
◆ Interchangeable probes, extension cables, and preamplifiers within compatible system configurations	◆ Probe operating temperature from −40 to +170 °C, with IP68 ingress protection
◆ Frequency response up to 10 kHz (−3 dB), depending on the measuring range	◆ Customizable probe dimensions and measuring ranges

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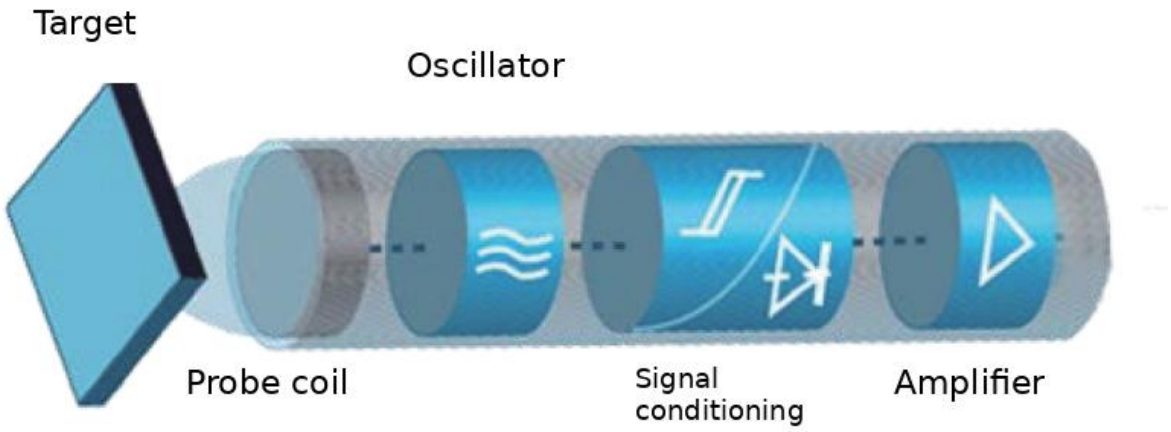
■ TYPICAL APPLICATIONS

- Shaft axial position
- Phase reference and speed measurement
- Radial shaft vibration
- Differential expansion
- Shaft speed / overspeed detection
- Turbine and rotating machinery monitoring and protection systems

Typical Turbine Monitoring Arrangement



■ WORKING PRINCIPLE



The high-frequency oscillation circuit in the preamplifier generates a high-frequency signal, which is sent through the cable to the coil at the probe tip, producing an alternating magnetic field at the probe tip. When an electrically conductive metal target enters the sensing field, induced currents (eddy currents) are generated on its surface; these eddy currents produce an alternating magnetic field opposite in direction to that of the probe coil. As a result, the amplitude and phase of the high-frequency current in the probe coil change (the effective impedance Z of the coil changes). Through the demodulation circuit of the preamplifier, the change of coil impedance Z — i.e. the change of distance D between the probe coil and the metal conductor — is converted into a voltage output signal, thereby measuring displacement, vibration and other parameters.

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■ PERFORMANCE SPECIFICATIONS

Standard Range	1 mm	2 mm	4 mm	10 mm	30 mm
Probe System	⌀5 mm	⌀8 mm	⌀11 mm	⌀18 mm	⌀25 mm
Measurement & Electrical Performance					
Measuring Principle	Eddy current				
Calibration Target Material	Grade 45 steel				
Standard Measuring Range	0.25–1.75 mm	0.5–2.5 mm	1–5 mm	0.5–10.5 mm	1–11 mm
Max. Customizable Range	2 mm	3 mm	6 mm	10 mm	16 mm
Standard Sensitivity	8 mV/μm (203 mV/mil)	4 mV/μm (102 mV/mil)	2 mV/μm (51 mV/mil)	0.8 mV/μm (20.3 mV/mil)	0.26 mV/μm (6.6 mV/mil)
Sensitivity Error	≤ ±2%	≤ ±3%	≤ ±3%	≤ ±2%	≤ ±1%
Sensitivity Interchangeability Error	≤ ±5%	≤ ±5%	≤ ±5%	≤ ±3%	≤ ±3%
Non-Linearity	< 1%	< 1%	< 1%	< 1.5%	< 1.5%
Resolution	±1 μm	±1 μm	±2 μm	±10 μm	±10 μm
Frequency Response	DC–10 kHz (−3 dB)	DC–10 kHz (−3 dB)	DC–10 kHz (−3 dB)	DC–3 kHz (−3 dB)	DC–1 kHz (−3 dB)
System Temperature Drift	±3% F.S. (−20 to +80 °C / −4 to +176 °F)				

Note 1: All measuring ranges and maximum customizable ranges are specified in millimeters (1 mm ≈ 0.0394 in).

Note 2: Sensitivity interchangeability error is the deviation from the nominal sensitivity after replacement of a probe, extension cable or preamplifier with a compatible component of the same type.

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■ ELECTRICAL SPECIFICATIONS

Standard Range	1 mm	2 mm	4 mm	10 mm	30 mm
Output Voltage Range	0–10 V	0–10 V	0–10 V	0–10 V	0–10 V
Max. Output Voltage	−23 V	−23 V	−23 V	−23 V	−23 V
Output Resistance	100 Ω	100 Ω	100 Ω	100 Ω	100 Ω
Recommended Initial Gap Voltage	−10 V	−10 V	−10 V	−6 V	−6 V
Preamplifier Supply	24 V DC ±10%	24 V DC ±10%	24 V DC ±10%	24 V DC ±10%	24 V DC ±10%
Max. Current Consumption	≤ 20 mA	≤ 20 mA	≤ 20 mA	≤ 20 mA	≤ 20 mA
Probe Resistance	8.2 ± 0.3 Ω	4.9 ± 0.3 Ω	6.5 ± 0.3 Ω	4.2 ± 0.3 Ω	0.9 ± 0.3 Ω

■ ENVIRONMENTAL SPECIFICATIONS

Temperature	
Probe & Extension Cable Operating Temp.	−40 to +170 °C (−40 to +338 °F)
Preamplifier Operating Temp.	−40 to +80 °C (−40 to +176 °F)
Protection	
Probe Ingress Protection Rating	IP68
Preamplifier Ingress Protection Rating	IP40

■ PROBE, CABLE & MATERIAL SPECIFICATIONS

Standard Range	1 mm	2 mm	4 mm	10 mm	30 mm
Probe Cap Material	PPS	PPS	PPS	PEEK	PEEK
Probe Cap Diameter	5.5 mm (0.22 in)	8.4 mm (0.33 in)	11.2 mm (0.44 in)	16.7 mm (0.66 in)	27.0 mm (1.06 in)
Probe Thread (customizable)	M8 or M10	M10	M14	M20 (M18 custom)	M30

Common	
Probe Body Material	Stainless steel
Probe & Extension Cable	Triaxial cable
Cable Length	Probe cable + extension cable = 5 m or 9 m (16.4 or 29.5 ft), customizable
Cable Jacket Material	FEP
Cable Min. Bending Radius	30 mm (1.18 in)
Preamplifier Material	Die-cast aluminum alloy (ADC12)

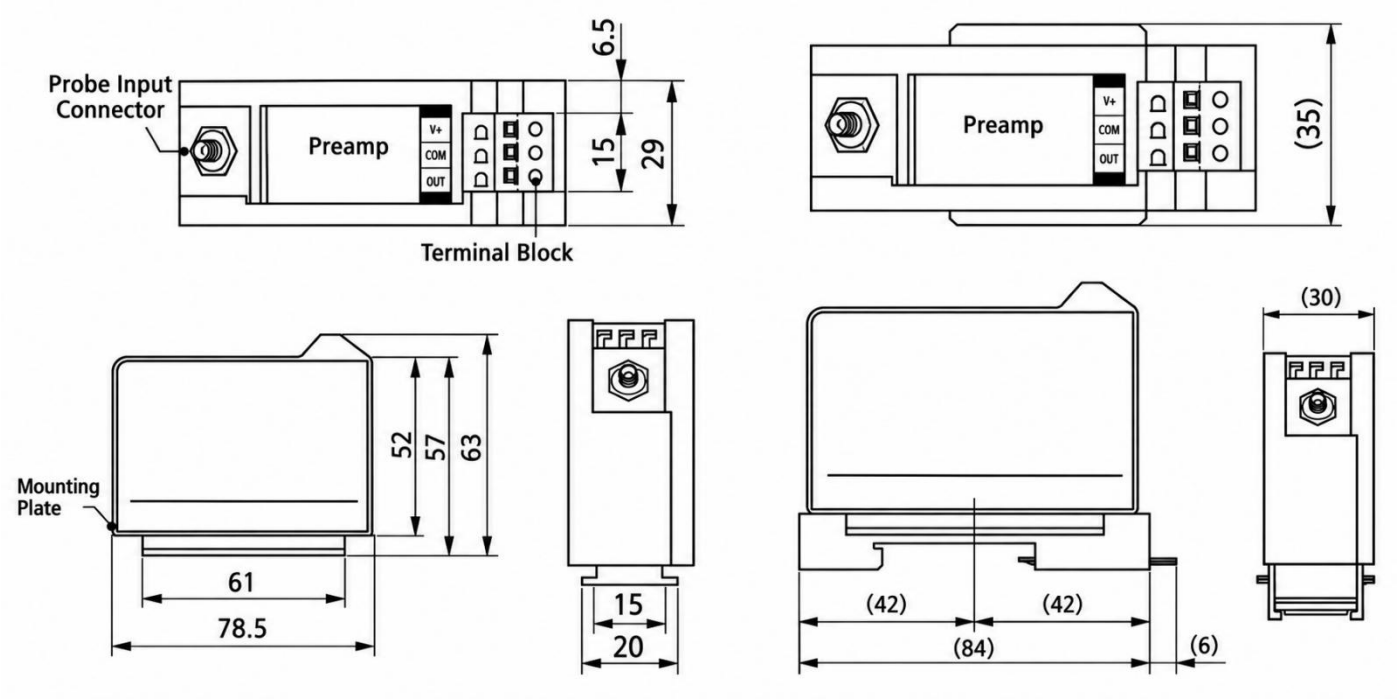
■ STANDARDS & COMPLIANCE

EMC	EN 61000-6-2, EN 61000-6-4
Machinery Protection	API 670

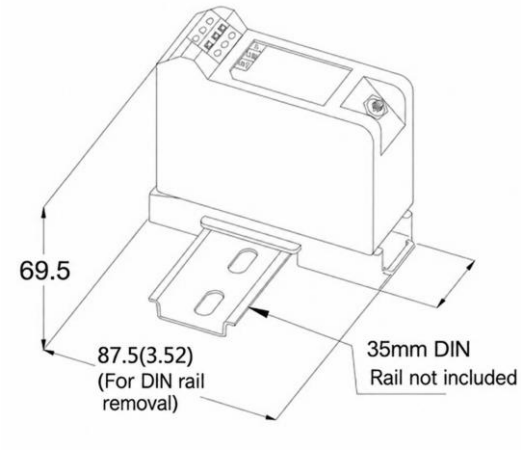
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■ MECHANICAL DIMENSIONS

Preamplifier Housing and Mounting Plate



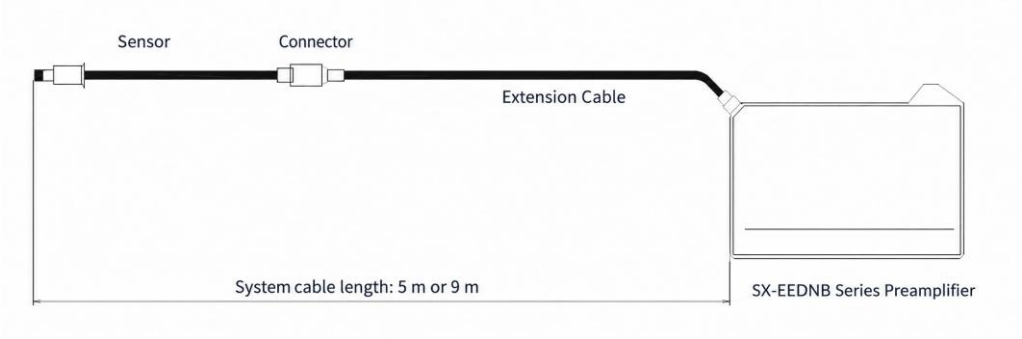
Preamplifier DIN-Rail Mounting



Note: All dimensions are millimeters unless otherwise specified.

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■ SYSTEM COMPOSITION



The eddy current sensor consists of three parts: probe, extension cable and preamplifier.

Probe



The probe typically consists of a coil, protective cap, stainless steel housing, coaxial cable and high-frequency connector. Probes of different diameters can be selected for different measuring ranges, e.g. ⌀5 mm, ⌀8 mm, ⌀11 mm, ⌀18 mm, ⌀25 mm. Different mounting styles can be selected for different installation requirements, e.g. forward, reverse or unthreaded. The probe cable length can be selected according to installation conditions, e.g. 1 m (3.3 ft) or 0.5 m (1.6 ft).

Extension Cable



Both ends of the extension cable are fitted with SMA self-locking connectors. The connector-to-cable junctions are covered with oil-resistant heat-shrink tubing to help prevent oil ingress and improve connection reliability.

Note: The combined length of the probe cable and extension cable must be 5 m or 9 m (16.4 ft or 29.5 ft).

Preamplifier



The preamplifier incorporates oscillation, linear detection, filtering, linearity compensation, and amplification circuits. Preamplifiers are available in configurations matched to five probe diameters: ⌀5 mm, ⌀8 mm, ⌀11 mm, ⌀18 mm, and ⌀25 mm. Each configuration supports a total system cable length of either 5 m or 9 m (probe cable plus extension cable).

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ORDERING INFORMATION — SX-EEDNB

Complete model number example: SX-EEDNB-041311

Standard Range	
01	1 mm (0.039 in)
02	2 mm (0.079 in)
04	4 mm (0.157 in)
10	10 mm (0.394 in)
30	30 mm (1.181 in)
Non-Linearity	
1	1% *[Requires Standard Range = 01 / 02 / 04]*
2	1.5% *[Requires Standard Range = 10 / 30]*
Probe Thread Size	
1	M8
2	M10
3	M14
5	M20 (M18 customizable)
6	M30
Output	
1	0–10 V
Cable Length	
1	5 m (16.4 ft)
2	9 m (29.5 ft)
Customization Option	
D	Custom configuration — specify requirements when ordering

Note: Probe thread options depend on the selected measuring range: M8 or M10 for 1 mm, M10 for 2 mm, M14 for 4 mm, M20 for 10 mm (M18 available upon request), and M30 for 30 mm.

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