

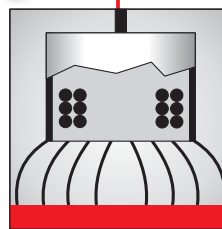
ADVANTAGES

PRINCIPLES

NCDT



non-contact eddy-current displacement and position measurement



Highest performance

Active temperature compensation

Field calibration capability

Extreme repeatability

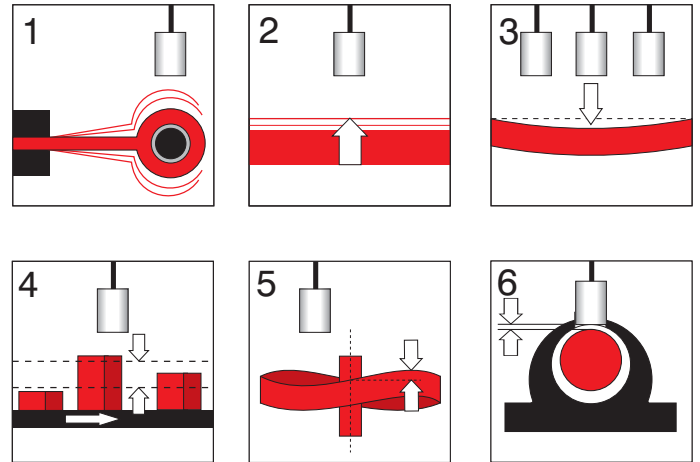
Ideal for OEM

eddyNCDT 3010

Non-Contact Displacement Measuring Systems

The eddyNCDT 3010 (Non-Contacting Displacement Transducers) is a non-contacting displacement measuring system operating on the eddy current principle. It is used for measuring targets made of electrically conductive materials which may be either ferromagnetic or non-ferromagnetic.

A high-frequency alternating current flows through a coil cast in the sensor housing. The electromagnetic coil field induces eddy currents in the conductive target which alters the AC resistance of the coil. This change in impedance produces a linear electrical signal proportional to the distance of the target from the sensor. Temperature-dependent measuring errors are reduced to a minimum by a unique electronic compensation method.



ADVANTAGES

- Wear and maintenance free
- Excellent linearity <math><0.25\% \text{ FSO}</math>
- Active temperature compensation (<math><150 \text{ ppm/F}</math>)
- Flexible field calibration
- Multi-channel applications by synchronization

Temperature Compensation

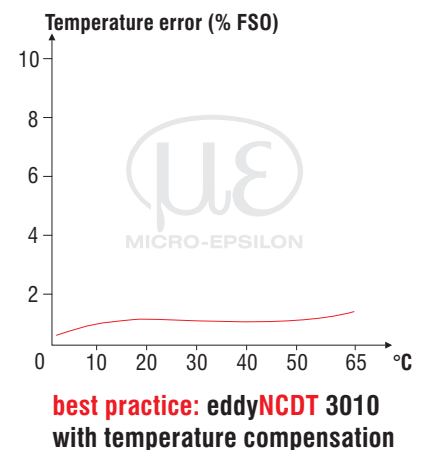
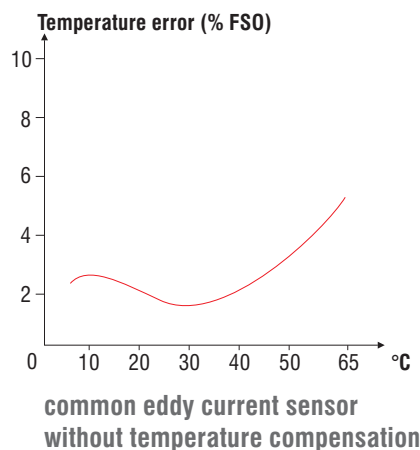
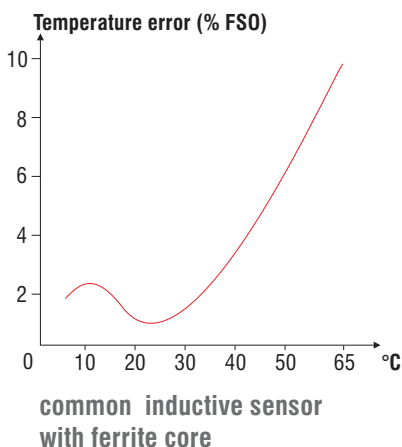
The temperature operating range of the 3010 sensors ranges from $-50\text{ }^{\circ}\text{C}$ up to $150\text{ }^{\circ}\text{C}$. In the case of fluctuating ambient temperatures a stable output signal is very important for reliable measurements. Due to a patented temperature compensation method the eddyNCDT series 3010 offers a unique thermal stability, which no other system can offer.

TYPICAL APPLICATIONS

- 1 - vibration, amplitude, clearance, run-out
- 2 - displacement, distance, position, elongation
- 3 - deflection, deformation, waviness, tilt
- 4 - dimensions, measuring tolerances, sorting, part recognition
- 5 - stroke, deformation, axial shaft oscillation
- 6 - bearing oscillations, lubricating gap, wear, displacement

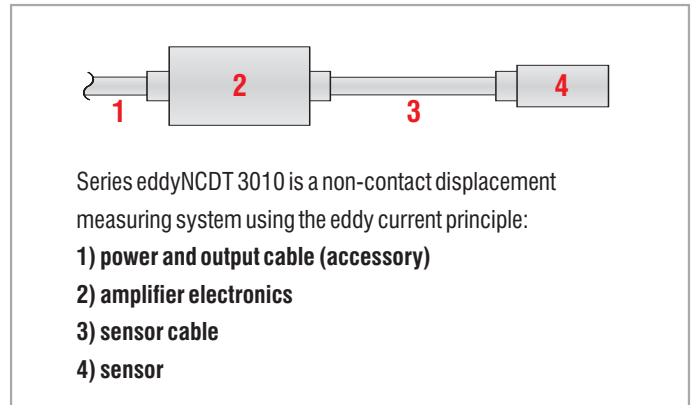
The eddyNCDT 3010 is designed for industrial use in production plants, for machine control and for measuring and testing during in-process quality assurance. Illustrated are examples showing only a small selection of the numerous possibilities.

Temperature error by comparison



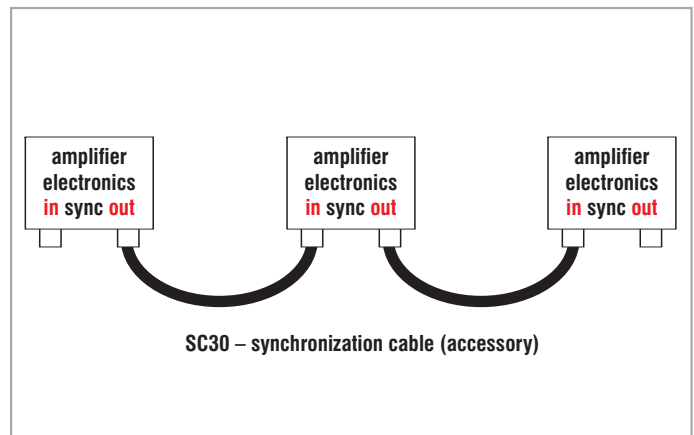
System structure

The eddyNCDT 3010 is a compact, single-channel system consisting of an eddy current sensor, a sensor connecting cable and an amplifier electronics (signal conditioning unit). In multi-channel set-ups, synchronization of separate channels is possible. The system is matched to a reference target material (aluminum or steel AISI 4130) and is adjustable for ferro- or non-ferromagnetic material.



Synchronization

If several channels of series 3010 operate simultaneous close to one another, a mutual interference is possible because of slight differences in the oscillator frequencies. This can be avoided by synchronization. Two SMC-connectors at the electronic box, one for oscillator signal output (sync out) and one for input (sync in) are standard equipment. The electronics operate independently as long as they are not interconnected. If connected together, they automatically switch to synchronized operation and are controlled by the first electronics (master). Any quantity of units can be synchronized by serial connection.



Technical specifications

Technical specifications are valid for the aluminum or mild steel AISI 4130 reference materials at 20 °C (70 °F). The data may deviate for other materials.

Linearization and Calibration

eddyNCDT 3010 systems can be individually linearized and calibrated by simple 3-point adjustment. Therefore optimum accuracy can always be achieved even with special target materials or critical sensor mounting conditions.

The adjustment is carried out at 3 distances (1, 2, 3) which are measured by an independent reference.

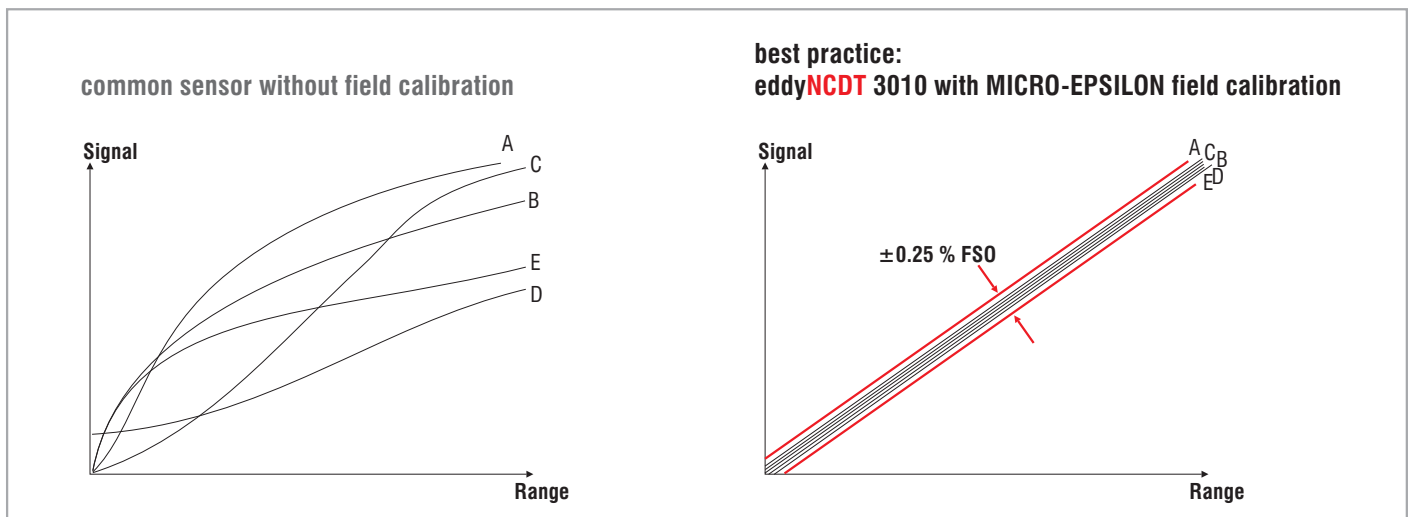
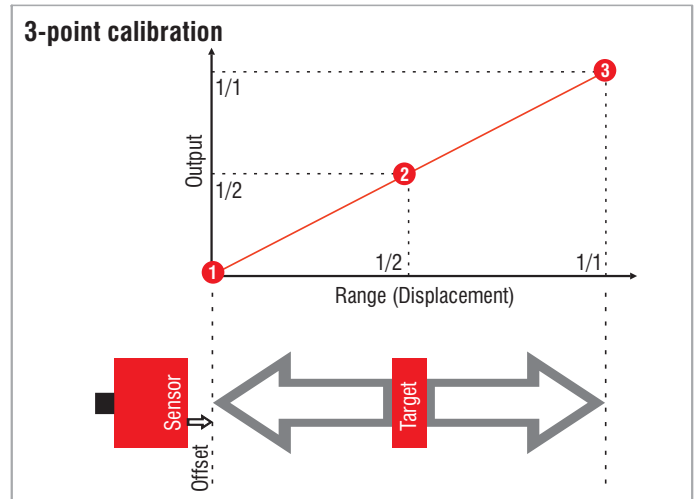
Accessory: Micrometer calibration device

Why is field calibration needed?

To gain best performance the eddyNCDT 3010 supports a field calibration. This is necessary to get best measuring results in respect to

- A: different target materials
- B: target size (measuring spot)
- C: target shape
- D: side load
- E: target tilt

Also with the field calibration the measuring range can be extended.



Technical data



| Sensor model | | U05 | U1 | S1 | S2 | U3 | U6 | U15 |
|--|------|--|-------|-------|-------|-------|-------|-------|
| DT3010-A | | Non-ferromagnetic target (reference target: alu) | | | | | | |
| DT3010-M | | Ferromagnetic target (reference target: ST37) | | | | | | |
| Measuring range * | mm | 0.5 | 1 | 1 | 2 | 3 | 6 | 15 |
| | inch | 0.02 | 0.04 | 0.04 | 0.08 | 0.12 | 0.25 | 0.60 |
| Offset distance | mm | 0.05 | 0.1 | 0.1 | 0.2 | 0.3 | 0.6 | 1.5 |
| | inch | 0.002 | 0.004 | 0.004 | 0.008 | 0.012 | 0.025 | 0.060 |
| Linearity | | ≤±0.25% FSO | | | | | | |
| Static repeatability | μm | 0.05 | 0.1 | 0.1 | 0.2 | 0.3 | 0.6 | 1.5 |
| Resolution ¹ | μm | 0.025 | 0.05 | 0.05 | 0.1 | 0.15 | 0.3 | 0.75 |
| | | 0.005 % FSO | | | | | | |
| Frequency response | | 25 kHz (-3dB) | | | | | | |
| Temperature range sensors and cables | | Operation: -50 to 150 °C / -60 to 300 °F Storage: -50 to 150 °C / -60 to 300 °F | | | | | | |
| Temperature stability sensors (≤ midrange) | | ≤0.025% FSO / °C • ≤0.015% FSO / °F | | | | | | |
| Temperature compensation range | | 10 to 65 °C / 50 to 150 °F | | | | | | |
| Temperature range electronics | | Operation: 10 to 50 °C / 50 to 125 °F Storage: -25 to 75 °C / -15 to 170 °F | | | | | | |
| Temperature stability electronics (≤ midrange) | | ≤0.05% FSO / °C • ≤0.03% FSO / °F | | | | | | |
| Signal output | | 0 ... 10 V / 10 mA and 4 ... 20 mA | | | | | | |
| Power supply | | 24 VDC (9 ... 30 V) / 205 mA | | | | | | |
| Electromagnetic compatibility (EMC) | | acc. EN 50081-2 • EN 50082-2 | | | | | | |
| Synchronization | | with cable SC 30 (accessory) | | | | | | |
| Protection class | | Electronics IP 54 Sensors IP 65 | | | | | | |

FSO = Full Scale Output

1) static resolution at midrange

| Sensor model * | | U05 | U1 | S1 | S2 | U3 | U6 | U15 |
|-------------------------------------|-------|------|------|-----|-----|------|-----|------|
| Shielded sensors | | | | • | • | | | |
| Unshielded sensors | | • | • | | | • | • | • |
| Sensor weight (appr.) without cable | g | 0.6 | 1.5 | 5 | 9 | 7.5 | 22 | 24 |
| | ounce | 0.02 | 0.05 | 0.2 | 0.3 | 0.25 | 0.8 | 0.85 |
| Standard sensor cable length | m | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| | ft | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| Optional sensor cable length | m | 6 | 6 | 6 | 6 | 6 | 6 | 6 |
| | ft | 20 | 20 | 20 | 20 | 20 | 20 | 20 |

* customized sensors / ranges available

Sensors and sensor cables

The **unshielded sensors U05, U1, U3 and U6**, are designed with a coil located directly behind the face of a non-metallic cylinder. They provide maximum sensitivity in non-flush installations.

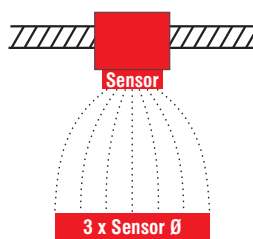
The **unshielded sensor U15** has to be mounted on a metal plate with a minimum diameter of 2 times the diameter of the sensor.

The **shielded sensors S1, and S2** are encased in a stainless steel housing with mounting thread right up to its face. This shields the coil from the influence of adjacent metal parts. These sensor models are especially suitable for mounting flush with metal surfaces.

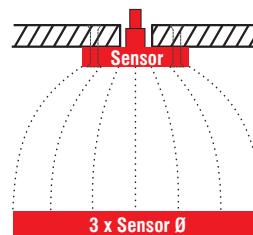
Sensor connecting cable

Systems equipped with sensors U1 and S1 have a 3 meter (10 ft) integral cable. All other sensors are connected by a 3 meter (10 ft) long coaxial cable with an SMC socket on both ends. Systems with a 6 meter (20 ft) sensor connecting cable are available optionally. All cables are tuned to the same capacitance and therefore have a tolerance of $\pm 15\%$ in length.

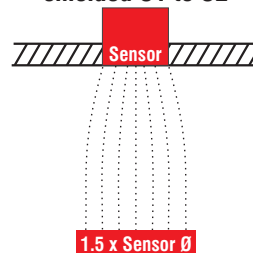
unshielded U05 to U6



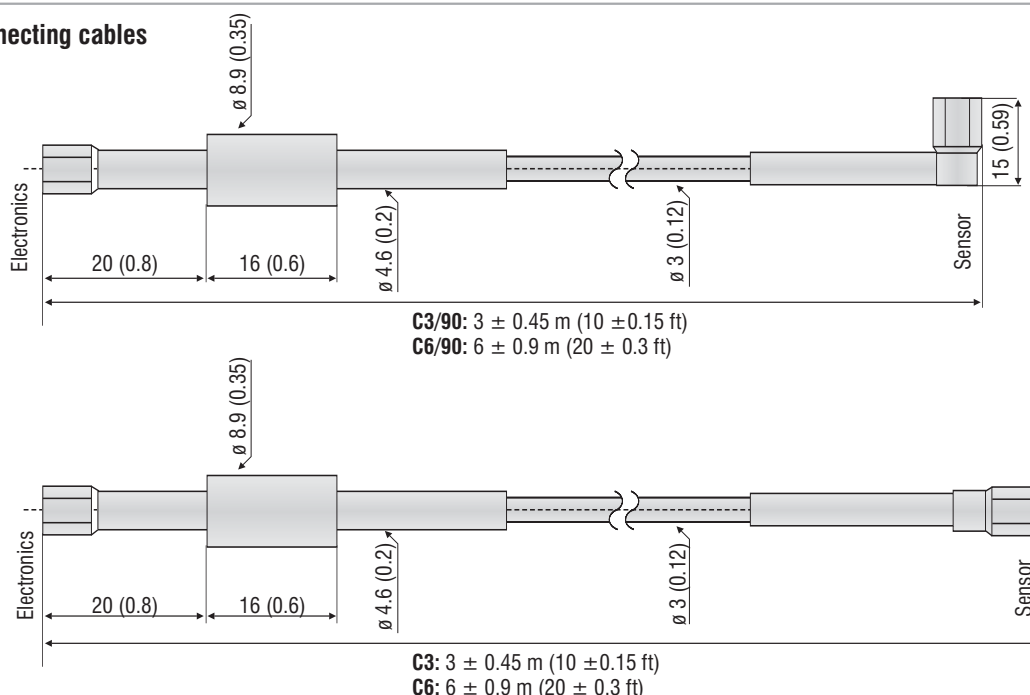
unshielded U15



shielded S1 to S2

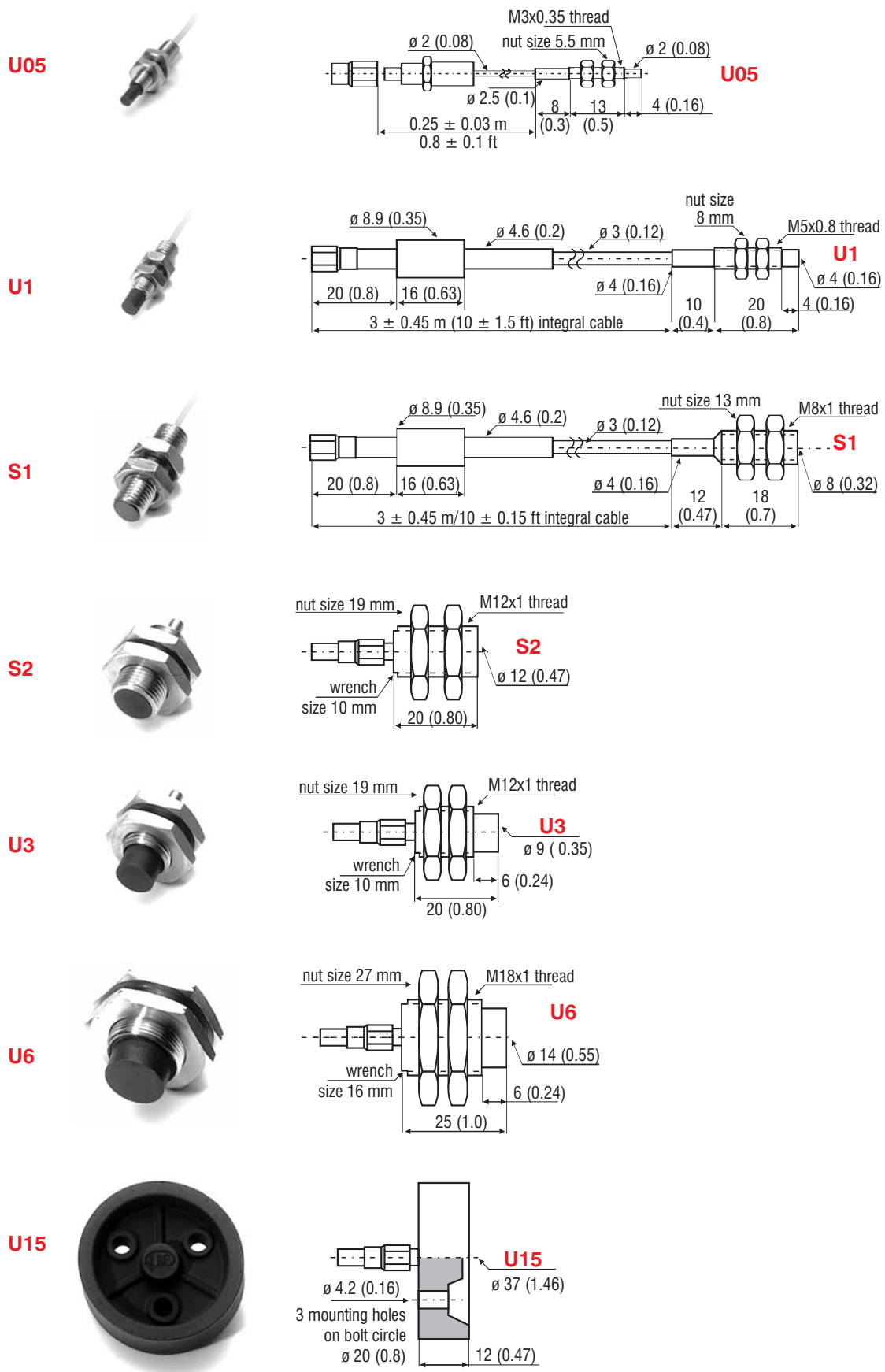


Connecting cables

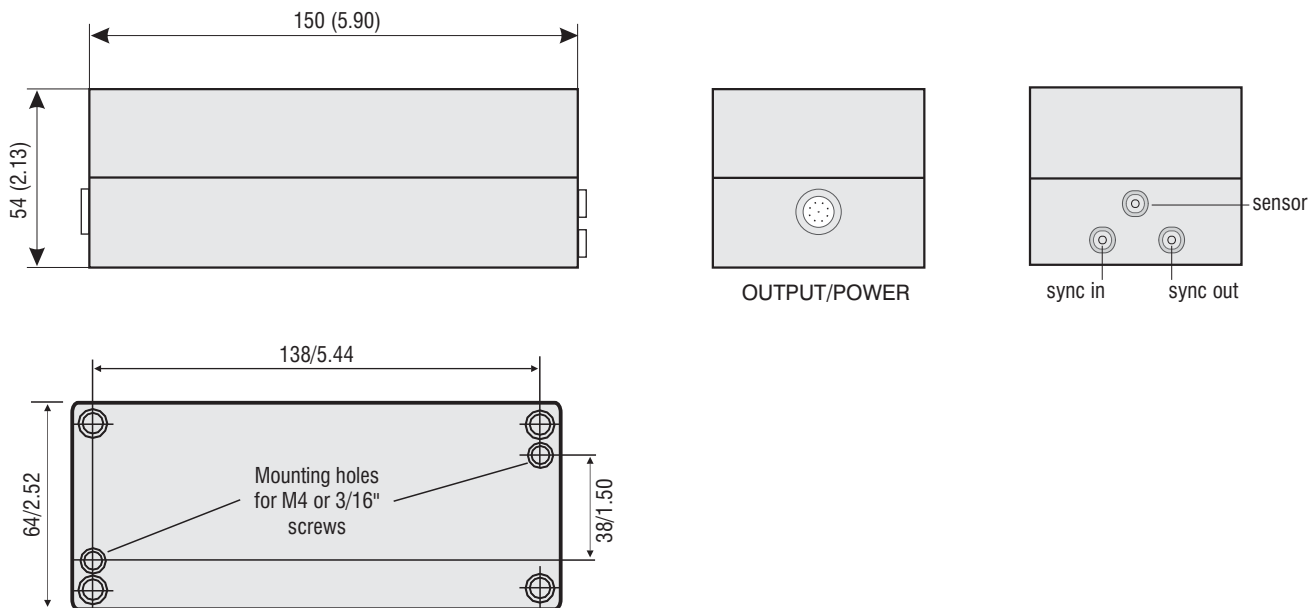


eddyNCDT 3010
sensor cables
models C3 and C6
for sensors U05,
S2, U3, U6, U15
dimensions (mm/inch)

eddyNCDT series 3010 sensor dimensions (mm/inch)



Electronics dimensions / Accessories Dimensions in mm (inch), not to scale - all inches are rounded



Accessories

PC3/8

Power- and output cable, 3 m / 10 ft long, 8-pin

SC30

Synchronization cable 30 cm / 1 ft long

CSP 301

Digital signal processing and display unit up to 2 channels

MC2.5 (E)

Micrometer calibration fixture range 0 to 25 mm / 0 to 1 inch (E), division 2 μm / 0.001 inch (E), adjustable offset (zero), for sensors U1 - U15

MC2.5

Micrometer calibration fixture range 0 to 2.5 mm / 0 to 0.1 inch, division 1 μm for sensors U05, U1, S1 and S2