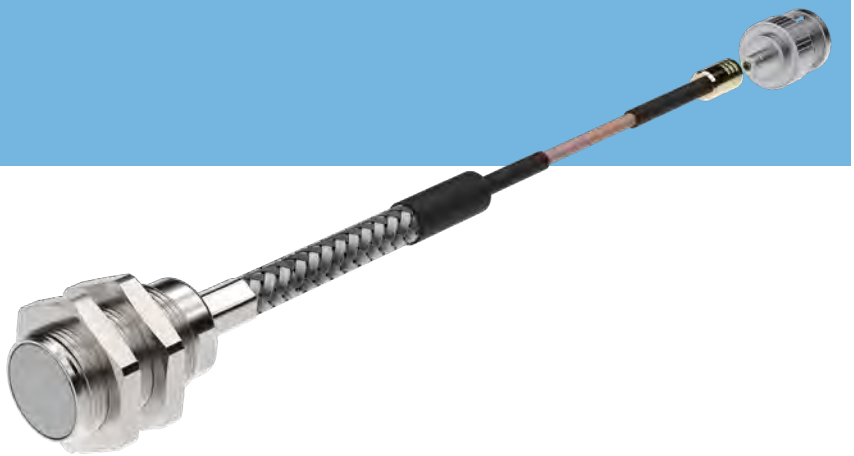
DATASHEET

HM 2408

CT SERIES | EDDY CURRENT PROBES

Pressure-resistant sensors for extremely harsh conditions



- Heavy-duty construction
- Ceramic front surface
- Pressurised, sealed housing, IP68/69K
- Cable protection
- Flush installation possible

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eddylab

INTRODUCTION

Eddy current probes are particularly suitable devices for non-contact measurements on metallic targets. Typical applications are measurements on rotating shafts for the detection of imbalance, vibration, out-of-roundness, air gap, radial/axial run-out, and much more besides. The extremely high resolution up to a level of 20 nm enables the smallest of amplitudes to be detected. eddylab probes are designed for temperatures up to 200 °C and are optimized for the entire temperature range with regard to temperature drift.

CT SERIES

The CT series is designed for extreme applications under harsh environmental conditions. All sensors are shielded and unaffected by the surrounding material. This makes flush mounting possible. At the same time, the shielding focuses the field lines so that the size of the measurement object is minimized. The sensor head is made of ceramics (zirconia) and the housing is pressured. The CT series is the perfect choice for demanding applications like pressurized chambers or machines, where the complete sensor with cable is inside the pressure area. The cable can be protected by two different kinds of hoses (standard and heavy duty).

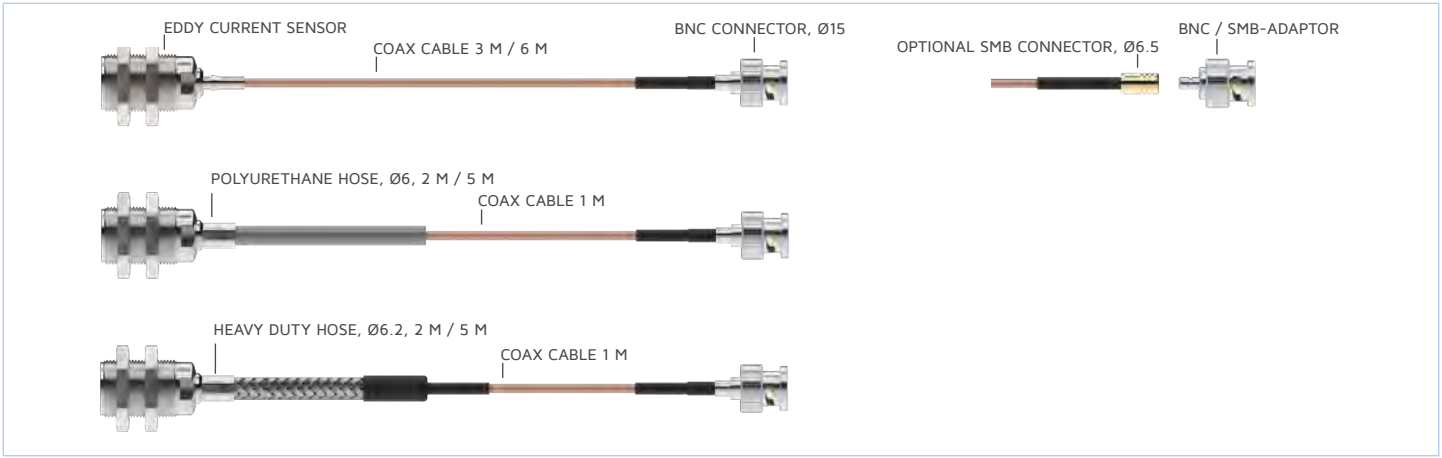
TECHNICAL DATA PROBES

PROBE	CT2	CT4	CT5	CT7	CT10
range [mm]	0...2	0...4	0...5	0...7	0...10
offset gap (blind range)	~ 0.01 mm				
pressure resistant [bar]	220	80	50	30	10
linearity	±0.15% of range				
resolution reg. corner frequency [% FS]*	valid for middle of range				
10 Hz	0.01	0.007	0.007	0.006	0.006
100 Hz	0.015	0.008	0.007	0.007	0.007
1 kHz	0.035	0.014	0.014	0.015	0.015
10 kHz	0.061	0.033	0.047	0.045	0.045
35 kHz	0.088	0.064	0.075	0.078	0.078
temperature range sensor	-60...200°C				
temperature coefficient sensor	< 0,05% full scale				
sensor cable PTFE-COAX	ø2,5 mm (max. 2,7 mm)				
cable length	standard length 3 m / 6 m, customised length up to 20 m				
min. bend radius static/dynamic	15/37 mm				
protection hose					
PUR	polyurethane, ø6, bending radius 30 mm, max. temperature +120 °C				
heavy duty	stainless steel / PTFE ø 6.2, bending radius 50 mm, max. temperature +200 °C				
protection class	IP68/IP69K				
vibration	20 g, DIN EN 60068-2-6				
shock	100 g / 6 ms, DIN EN 60068-2-27				
check resistance [Ω]	6	8	9	10	12
housing material	stainless steel 1.4305, front surface ceramics (circonia)				

* 98.5% confidence interval (confidence limit), middle of range as % of range. Resolution dependent on the distance.

CABLE CONFIGURATION

The CT series uses an RG316 coaxial cable, which can optionally be protected by two different hoses. A polyurethane hose should be used for protection against liquids, dirt and light pressure. A heavy-duty hose with stainless steel braiding can withstand mechanical loads and liquids with higher pressure. As an option, the cable end can be provided with an SMB connector, which makes installation easier, especially in tight spaces and pressure feed-throughs.
Please note that the BNC/SMB adaptor must be ordered in addition. Available cable lengths are 3 m or 6 m in total. The protection hoses end 1 m before the connector. Other cable lengths are available on request.



TECHNICAL DATA ELECTRONICS

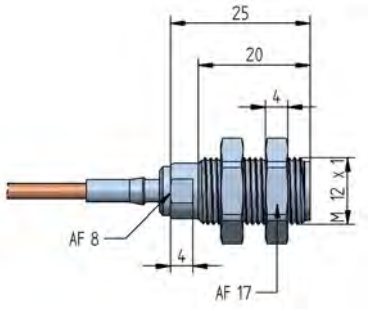
EDDY CURRENT PROBE DRIVER	TX 1/2	AX 1/2
channels	1 or 2 channel	1 or 2 channel
operating temperature range	-40...+85 °C	
storage temperature range	-50...+100 °C	
humidity	95 % (no condensation)	
vibration	5 g, DIN EN 60068-2-6	
shock	15 g / 11 ms, DIN EN 60068-2-27	
protection class	IP40	IP40, optional IP68
housing	anodised aluminium	
housing size	195 x 116 x 29,5 mm (l x w x h)	134 x 65 x 30 mm (l x w x h)
Supply		
supply voltage	10,5...36 VDC wide input	24 VDC ±10%
current consumption	300 mA (12V)	80 mA
Output		
output signal	voltage / current / CAN / USB	0...10 V / 0...5 V / 4...20 mA
linearity*	±0,15 % of range	±1-3 % of range

* driver and sensor are matched and calibrated pairs

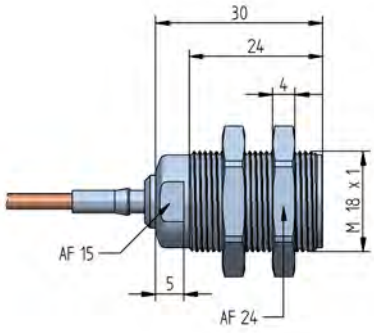
Note: For detailed information regarding the eddy current drivers, please refer to the TX datasheet / AX datasheet or contact us directly.

TECHNICAL DRAWINGS

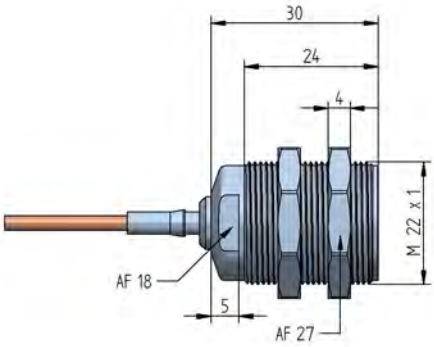
CT2-G-KA



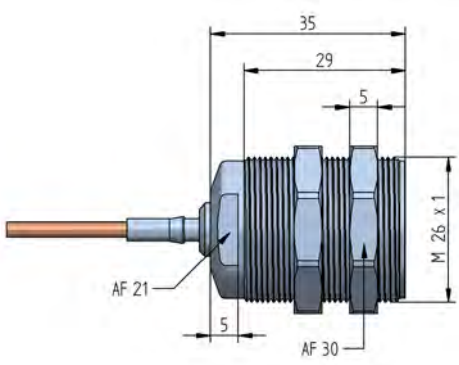
CT4-G-KA



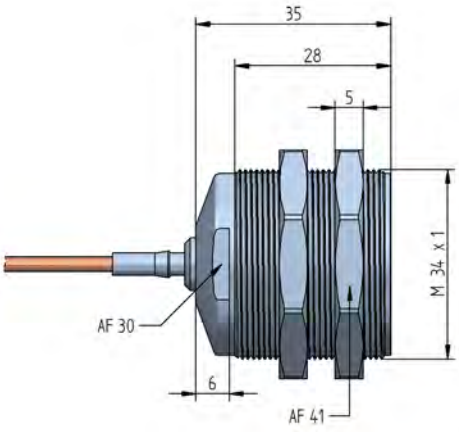
CT5-G-KA



CT7-G-KA



CT10-G-KA



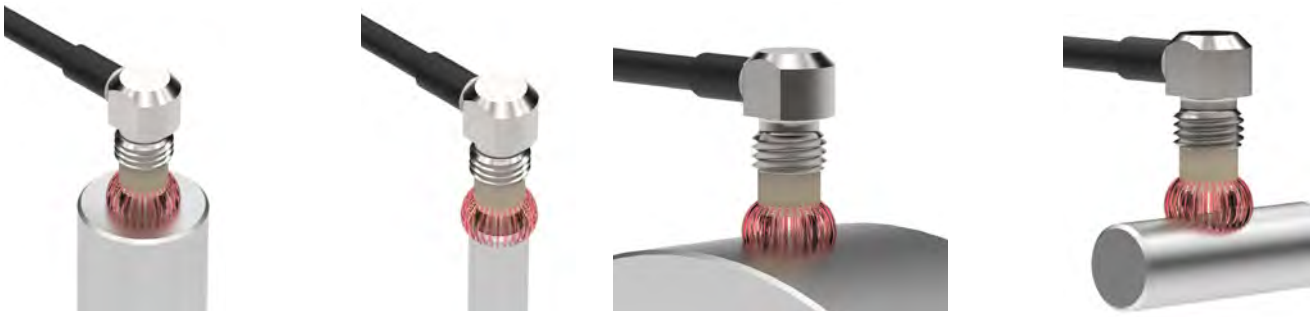
INSTALLATION

OBJECT SIZE AND EDDY CURRENT MEASUREMENT FIELD

The sensing electromagnetic field (illustrated in red) is emitted elliptically from the probe and is greater than the probe head in terms of its spatial expansion. For standard-calibrated probes a surface with a target diameter 2-3 times greater than the probe head diameter is necessary for measurement. If the object is too small, only a part of the measurement field enters the material, and the output signal becomes larger. If the diameter is too small, the object appears to be further away from the sensor. A similar effect takes place in the case of round objects.

However, if other conductive objects collide with the sensing electromagnetic field the output signal is reduced due to pre-attenuation. The actual object appears to be closer to the probe. If this signal alteration is not desired, we provide a customer-specific linearisation for such applications. In this case, the probe is calibrated within the pre-attenuating environment. The measuring system will fulfill the standard specification. The object (shape, material) is documented in the calibration document.

The following pictures provide an overview of various geometrical arrangements:



A **B** **C** **D**

- **A** Optimum object surface preferably 2-3 times greater than the probe head diameter. The sensing field is captured by the object entirely.
- **B** Reduced object surface - a part of the sensing field remains outside the object. The probe displays a greater distance signal than the actual distance. The measurement area is reduced in size. Lateral object movements can influence the distance signal. eddylab can perform a customer-specific linearisation in order to correct the measuring range and the linearity.
- **C** Large round objects (diameter > 8 x probe head diameter) such as cranks or shafts can be captured without significant signal alterations. The probe outputs the medium distance via the captured surface. The measuring range will be reduced by < 10%. To correct this an optional customer-specific linearisation is available.
- **D)** Small round objects such as shafts or wire (diameter < 2 x probe head diameter) can only be captured with a significantly smaller measuring range as long as customer-specific linearisation has not taken place. For example: shaft diameter < 2 x probe head diameter ➪reduction in the measuring range of ~ 25%, linearity ~ 5%. In this case we recommend a linearisation.

METALLIC OBJECTS IN THE SENSING FIELD

Please note that conductive objects such as screw heads, bolts, etc., located in the sensing field in both - radial and axial direction (or which cross the sensing field during rotation) can become disturbance variables in the signal.

PRECAUTIONS

- **Never shorten the probe's coaxial cable. The probe, cable and electronic system form a coordinated oscillating circuit.**
- **Lay the cable so that it is protected and avoid running it along objects with sharp edges. A cable that has been squashed or damaged in another manner can tamper with the signal or render the probe unusable.**
- **Please note that the sensors have been aligned with the electronic system. The alignment can be found in the calibration certificate or on the label on the unit, identified by the serial number. Do not switch the channels.**
- **Avoid placing the cable under tensile or torsional stress. Never turn the probes in the holders inwards or outwards without first loosening the fastenings.**
- **Note the minimum bending radius for dynamic and static installation as specified in the datasheet. Avoid bending the cable.**
- **Protect the plug connections in the coaxial line against humidity and wetness.**
- **The sensors may not be used in strong radioactive environment (nuclear power plant).**

ORDER CODE

SENSOR

CT X – G – KA – X X X
a b c d

a measuring range

2	=	2 mm
4	=	4 mm
5	=	5 mm
7	=	7 mm
10	=	10 mm

b cable length

1	=	3M: 3 m
2	=	6M: 6 m

c connector type

1	=	BNC (standard)
2	=	SMB

d cable protection

1	=	-
2	=	PUR hose, ø 6
3	=	heavy-duty hose, ø 6.2

version: 19.01.2024| Subject to change without prior notice

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