Hazardous Area Embedment Sensors

Overview

Install miniature sensors in or beneath the babbitt layer of bearing shoes. They monitor metal temperature—the most reliable indicator of bearing condition—to give early warning of oil film breakdown. With predictive maintenance, machines can be shut down and the problem corrected before catastrophic failure occurs.

While no larger than many bare ceramic elements, these RTDs have metal cases and insulated leads to withstand rough handling and harsh environments. They are easy to install in drilled holes for general purpose sensing.

Agency Certifications

Certified for use in hazardous areas to IECEx, ATEX, North America (CSAc-us), KCs (Korea), PESO (India), and CCC (China) requirements. These wide-ranging certifications allow users to cover many potential certification requirements with one sensor product, thus increasing flexibility and reducing inventory. For more information see the Certifications box to the right.

Specifications

Temperature range: -60°C to 200°C (-76°F to 392°F),

Reducing to 180°C (356°F) for FEP jacket on cable options;
Reducing to 125°C (257°F) for elastomer filled cable options;
Reducing to -20°C to 149°C (-4°F to 300°F) for feedthrough options.

Babbitt tip: Factory applied babbitt tip, available on case style A, reduces the danger of overheating the sensor when installed in babbitt layer.

Time constant: 3.0 seconds (case style A) to 1.5 seconds (case style D), typical value in moving water.

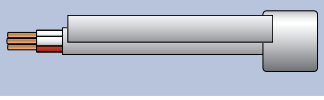
Insulation resistance: 10 megohms min. at 100 VDC, leads to case and to stainless steel braid and feedthrough cases when specified.

Dielectric strength: 600 Volts RMS at 60 Hz for 2 seconds with a maximum leakage of 5mA, leads to case and to stainless steel braid and feedthrough cases when specified.

Lead wire colors can be specified in part number make up per IEC 60751 or Minco standard lead wire conventions.

Special options: Calibration data and tagging options are also available; contact MOD-TRONIC for details.

Case Styles

Case	Specifications
	**Case Style A** Case L: 0.250" (6.4 mm) Case Ø: 0.275" (7.0 mm)
	**Case Style B** Case L: 0.250" (6.4 mm) Case Ø: 0.188" (4.8 mm) Flange Ø: 0.250" (6.4 mm)
	**Case Style B Short** Case L: 0.188" (4.8 mm) Case Ø: 0.188" (4.8 mm) Flange Ø: 0.250" (6.4 mm)
	**Case Style C** Case L: 0.300" (7.6 mm) Case Ø: 0.125" (3.2 mm)
	**Case Style D** Case L: 0.300" (7.6 mm) Case Ø: 0.080" (2.0 mm)

Certifications

IECEx (IEC 60079):
Ex ia IIC Ga
Ex eb IIC Gb
Ex ic ec IIC Gc

SIL2 IEC 61508-2:2010

ATEX (EN 60079):
II 1 G Ex ia IIC Ga
II 2 G Ex eb IIC Gb
II 3 G Ex ic ec IIC Gc

CSA Canada (CSA C22.2): Ex ia IIC T6...T2 Ga
Ex eb IIC T6...T2 Gb
Ex ic ec IIC T6...T2 Gc
IS Cl I, Div 1, Grp ABCD T6... T2
Cl I, Div 2, Grp ABCD T6... T2

CSA US (NFPA 70 Art 500 & 505):
Cl I, Zone 0 AEx ia IIC T6... T2 Ga
Cl I, Zone 1, AEx eb IIC T6...T2 Gb
Cl I, Zone 2, AEx ic ec IIC T6...T2 Gc
IS Cl 1, Div 1, Grp ABCD T6...T2
Cl 1, Div 2, Grp ABCD T6...T2

Korea (KOSHA Art. 84/Art. 110):
Ex ia IIC Ga
Ex eb IIC Gb
Ex IC ec IIC Gc

China (GB/T 3836):
Ex ia IIC Ga
Ex eb IIC Gb
Ex ic ec IIC Gc

India (Petroleum Rules 2002):
Ex ia IIC Ga
Ex eb IIC Gb
Ex ic ec IIC Gc

Sensor Options

Customize the sensor to best fit application needs

Overview

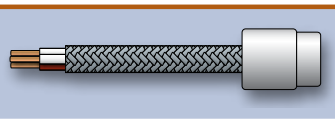
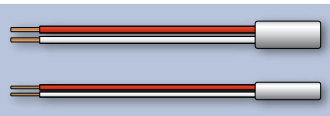
Minco Miniature RTD and Thermocouple temperature sensors can be configured for best fit to your application.

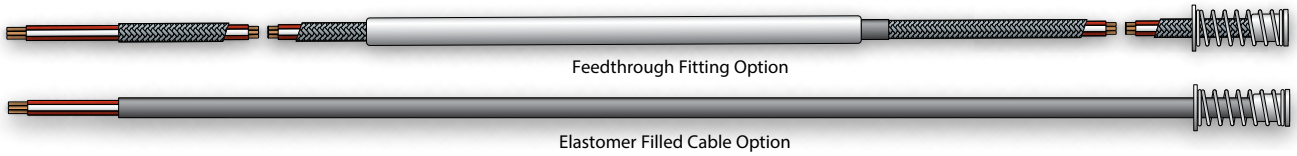
Case Styles: Three basic case configurations (A, B/Short B and C/D) allow for different mounting methods, but all are designed to minimize the distance between the bearing surface and sensing element for optimum response and temperature measurement accuracy.

Preventing Oil Leakage: Two methods are available for applications where oil leakage/wicking occurs along the lead wires and through the access hole in the machine housing:

- **Feedthroughs** are stainless steel tubes potted at a fixed location on the lead wire. The feedthrough is sealed around the lead wires and pressure seal fittings can seal around the feedthroughs, preventing oil from moving along the lead wire.
- **Elastomer Filled Cables** have silicone rubber fill between lead wires, stainless steel braid sleeving and the outer FEP (Teflon) jacket. The elastomer filled cable can be sealed with the compression of pressure seal fittings to prevent oil from moving along the lead wire.

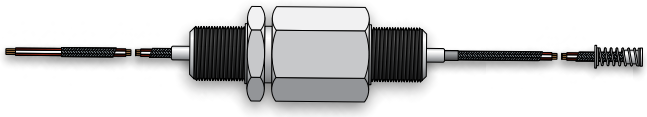
Sensor Options

Case	Specifications
	Case Style A with babbitt tip-installed placing sensor just below babbitt layer and puddling babbitt metal over sensor tip.
	Case Style B (or short B) with ring and spring for spring-loaded installation.
	Case Styles C and D are most commonly epoxy potted in place.

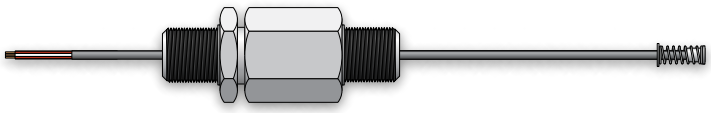


Feedthrough Fitting Option

Elastomer Filled Cable Option



Feedthrough Fitting Option with Optional Pressure Seal Fitting (ordered separately)



Elastomer Filled Cable with Optional Pressure Seal Fitting (ordered separately)

Both feedthroughs and elastomer filled cables can be sealed with pressure seal fittings such as Minco FG1015, FG3015 and FG4015. The FG4015 is an Ex rated fitting. FG4015 and FG3015 accept feedthroughs and cables up to 0.220 inch diameter while FG1015 accepts up to 0.257 inches. Multiple feedthroughs can pass through a single fitting as the fitting grommets can be configured for different diameter tubing and numbers of feedthroughs. Refer to Minco.com for fitting ordering information.

The primary difference between feedthroughs and elastomer filled cable is that feedthroughs are permanently fixed in place on the lead wire while elastomer filled cable can be sealed anywhere along the entire length of elastomer which allows flexibility in positioning the pressure seal fitting. This is particularly useful if exact dimensioning or cable run inside your equipment is not known at time of order.

Hazardous Area Embedment Sensors

RTD Sensing Element

Code	Element	TCR Ω/Ω/°C
CA	Copper, 10 Ω ±0.2% (10.02/9.98) at 25°C	0.00427
NA	Nickel, 120 Ω ±0.5% (120.60/119.40) at 0°C	0.00672
NB	Nickel, 100 Ω ±0.22% (100.22/99.78) at 0°C (Meets Din 43760)	0.00618
PA	Platinum, 100 Ω ±0.36% (100.36/99.64) at 0°C	0.00392
PD	Platinum, 100 Ω ±0.12% (100.12/99.98) at 0°C (Meets EN60751, Class B)	0.00385
PE	Platinum, 100 Ω ±0.36% (100.36/99.64) at 0°C	0.00385
PF	Platinum, 1000 Ω ±0.12% (1001.2/998.8) at 0°C (Meets EN60751, Class B)	0.00385
PM	Platinum, 100 Ω ±0.06% (100.06/99.94) at 0°C (Meets EN60751, Class A)	0.00385

	Feedthrough Options
C	Feedthrough designator
36	Feedthrough distance from sensor case in inches
J	Feedthrough diameter code: H = .188" DIA (same as AC958) J = .215" DIA (same as AC717) M = .250" DIA (same as AC718) N = .375" DIA (same as AC961)
40	Feedthrough length in .1" increments (40 = 4.0") (Standard lengths: 20, 25, 30, 35, 40, 45)
Sample part number: S711PDZS72A1C36J40	

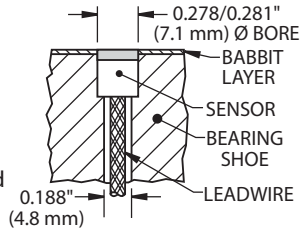
Specifications and Options — RTD

S7	Model number
1	Number of RTD sensing elements: 1 = 1 sensing element (single) 2 = 2 sensing elements (dual) — no duals available in Case Style D, NA and NB duals also not available in Case Style C, CA dual only available in Case Style A
1	Case: 0 = Case Style A, copper alloy, tin plated 1 = Case Style B, copper alloy, tin plated 2 = Case Style C, copper alloy, nickel plated 3 = Case Style Short B, copper alloy, tin plated 4 = Case Style D, type 303 stainless steel
PD	RTD sensing element: CA, NA, NB, PA, PD, PE, PM or PF (from table on this page)
Z	Number of leads and lead color*: Single Element Y = 2 leads, RW Z = 3 leads, RWW (Minco U.S. lead colors) W = 3 leads, WRR (IEC 60751 lead colors) X = 4 leads, RRWW Dual Element Y = 2 leads per element, RW/BlY (Minco U.S. lead colors) V = 2 leads per element, WR/YBk (IEC 60751 lead colors) Z = 3 leads per element, RWW/BlYY (Minco U.S. lead colors) W = 3 leads per element, WRR/YBkBk (IEC 60751 lead colors) X = 4 leads per element, RRWW/BlBlYY) (Minco U.S. lead colors) - only Case Style B U = 4 leads per element, WWRR/YYBkBk (IEC 60751 lead colors) - only Case Style B
S	Leadwire configuration/covering: T = PTFE insulated leads only (no covering) F = FEP jacket over PTFE insulated leads S = Stainless steel braid over PTFE insulated leads R = FEP jacket over stainless steel braid and PTFE insulated leads E = FEP jacket over stainless steel braid and PTFE insulated leads, with elastomer f ll
72	Lead length in inches
A1	Optiontional Installation/Accessories - skip for Case Styles C and D A1 = AC171 spring/AC172 series ring - Case Style B only A2 = AC171 spring/AC1038 rings (Qty of 2) - Case Style B only A3 = AC171 spring/AC915-1 ring - Case Style B only A4 = AC672 spring/AC172 series ring - Case style Short B only A5 = AC672 spring/AC1038 ring (Qty of 2) - Case style Short B only A6 = AC672 spring/AC915-1 ring - Case Style Short B only B0 = No babbitt or no accessory - Case Style A B0 = No accessory or feedthrough - Case Styles B and Short B B1 = Babbitt layer applied to case tip, .100" MIN - Case Style A only
TO ORDER WITHOUT FEEDTHROUGH STOP HERE TO ORDER WITH FEEDTHROUGH CONTINUE IN NEXT COLUMN	

**Lead wire color code: R = red, W - white, Bl = blue, Y = yellow, Bk = black*

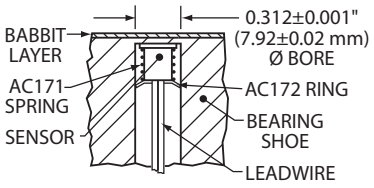
Installation and Accessories

Case style A



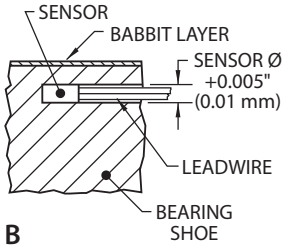
Install case style A sensor just below the babbitt layer, then puddle the babbitt metal over the sensor tip and smooth. Read Engineering Instruction #164 and Engineering Instruction #167 for complete details.

Case style B



The "top hat" flange shape allows spring loading with the AC171 spring and AC172 or AC915 retaining ring (order separately). Choose the economical AC172 style for lowest cost. The AC915 style allows removal and reinstallation. Slide the spring and ring over the leads, insert the sensor tip into a milled hole, and push down on the retaining ring to compress the spring and secure the sensor. Read Engineering Instruction #180 and Engineering Instruction #181.

Case styles C and D



Pot with epoxy inside small bearing shoes. Locate near the babbitt face for best readings. Read Engineering Instruction #184.

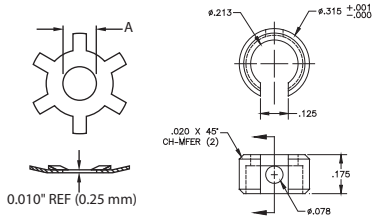
AC171 spring for case style B

Stainless steel. Outside diameter 0.240" (6.1 mm). Compressed length 0.22" (5.6 mm). To be used in conjunction with AC172 or AC915 for spring loading case style B

Feedthroughs

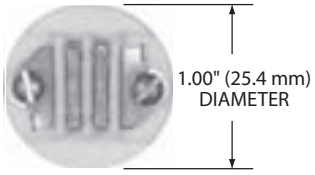
Feedthroughs provide an oil tight seal where a cable exits a machine housing. The stainless steel tube is epoxy filled and each wire is sealed to the individual conductor. This prevents wicking of oil inside the wires as well as leakage around the wire insulation. Pressure rating to 25 psi (1.7 bar).
See page 3-12 for more information.

AC172 and AC915 retaining ring for case style B



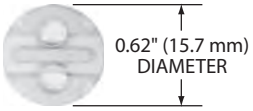
Model	"A" diameter	Hole I.D.
AC172	sized to fit leadwires	0.312" (7.92 mm)
AC172-3	0.175" (4.45 mm)	0.375" (9.53 mm)
AC915-1	0.213" (5.4 mm)	0.312" (7.92 mm)

AC190 terminal block



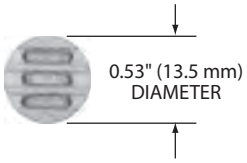
Two tin-plated brass terminals. PTFE body. Meets MIL-T-17600. For instructions, read Installation Instruction #107.

AC191 terminal block



Two tin-plated brass terminals. PTFE body. Meets MIL-T-17600. Read Installation Instruction #121 for instructions.

AC192 terminal block

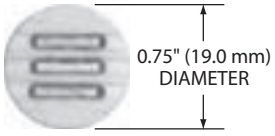


Three tin-plated brass terminals. Glass-filled PTFE body.

AC195 terminal block

Same as AC192 except polyamide-imide body for radiation resistance to 10^9 rads.

AC197 terminal block



Three tin-plated brass terminals. Glass-filled PTFE body.

AC196 terminal block

Same as AC197 except polyamide-imide body for radiation resistance to 10^9 rads.

▼= *STANDARD OPTIONS*
Specifications subject to change