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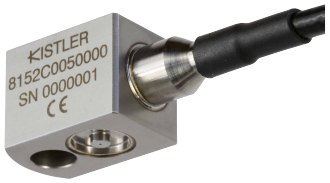
Acoustic Emission Sensor

for High Temperature & Hazardous Areas

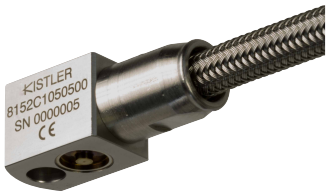
Type 8152C...

The Piezotron® Acoustic Emission Sensor with an integral impedance converter can be used for measuring acoustic emission (AE) above 50 kHz in bearing based machine structures, high pressure vessel, compressor or valves. With its small size, it easily mounts near the source of emission to optimally capture the signal. A M6 or ¼-28" bolt is all that is needed. Available in both intrinsically or non-intrinsically safe versions, this very rugged sensor has a welded housing for degree of protection IP65 with high temperature operation up to 165 °C.

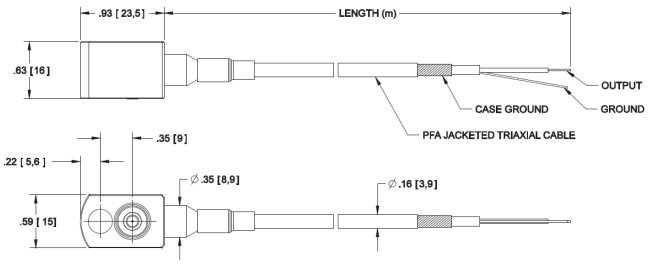
- Standard, ATEX/CSA Zone 0 or ATEX/CSA Zone 2 versions available
- High sensitivity and wide frequency range
- Inherent high-pass characteristic
- Insensitive to electric and magnetic noise fields
- Robust, for industrial use (IP65)
- High operating temperature range: –55 ... 165 °C
- Ground isolated: prevents ground loops
- Conforming to CE



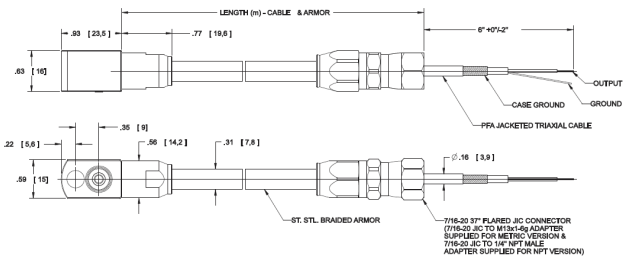
Type 8152Cxyy00xx with PFA jacketed cable



Type 8152Cxyyyyxx with braided cable



Outline drawing for Type 8152Cxyy000x with yy m of PFA jacketed cable and no armor conduit. (units in [mm])



Outline drawing for Type 8152Cxyyyyx with yy m of PFA jacketed cable and yy m of armor conduit. (units: in [mm])

Description

The Piezotron AE Sensor consists of the sensor housing, the piezoelectric sensing element, and the built-in impedance converter. The sensing element, made of piezoelectric ceramic, is mounted on a thin steel diaphragm. Its construction determines the sensitivity and frequency response of the sensor. The coupling surface of the diaphragm welded into the housing is slightly protruded to measure the AE signals. Thus, a precisely defined coupling force results when mounting. This assures a constant and reproducible coupling for the AE transmission. The sensing element is acoustically isolated from the housing by design and therefore well protected against external noise. Kistler AE sensors feature a very high sensitivity for surface (Rayleigh) and longitudinal waves over a broad frequency range and are designed to withstand high energy waves. Type 8152C0… covers 50 ... 400 kHz and Type 8152C2… covers 100 ... 900 kHz. Type 8152Cxyy00... will exist only in a PFA cable where Type 8152Cxyyyy... will provide a protective conduit with a length yy. This conduit can be terminated with ¼ NPT Male or M13x1-6g to adapt to your system. Finally, Type 8152C...1 is provided with a Zone 0 Certification in Europe & North America where Type 8152C...2 is provided with a Zone 2 Certification.
A non-ATEX version, Type 8152C...0, is also available for lower cost application where a non-intrisically safe solution is accepted. A miniature impedance converter is built into the Piezotron AE Sensor, giving an output low-impedance voltage signal. The AE Piezotron Coupler is used to supply power to the sensor and for signal processing. Different coupler options are offered depending on the ATEX or non-ATEX requirement (please refer respectively to the corresponding Type 5125C0x1x/5125C0x2x or Type 5125C0/1 data sheets). Special highly insulating and low noise connecting cables are not required.

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Technical Data

Type	Unit	8152C0...0	8152C1...0	8152C0...1	8152C1...1	8152C0...2	8152C1...2
Dynamic							
Frequency range ±10 dB	kHz	50 ... 400	100 ... 900	50 ... 400	100 ... 900	50 ... 400	100 ... 900
Sensitivity	dB ref 1V/(m/s)	57	48	57	48	57	48
Environmental							
Overload shock (0.5 ms pulse)	g pk	2 000					
Operating temperature range	°C	–55 ... 165					
Electrical – Output							
Bias, nom.	VDC	2,2					
Impedance	Ω	<10					
Voltage full scale	V	5±2					
Current	mA	2 ... 4					
Source							
Voltage (Coupler)	VDC	5 ... 36					
Constant current	mA	3 ... 6					
Construction							
Sensing element	type	ceramic					
Housing/base	material	stainless steel					
Protection-housing/connector		IP65 (EN 60529 @ NEMA 4X)					
Ground isolation	MΩ	>1		>1 MΩ, Isolation Test Voltage (≥1 min.; 5 mA) ≥500 VAC			
PFA/armor cable lengths	m	standard length of 3 m, 5 m, 10 m, 15 m, or 20 m					
PFA cable bend radius	mm	25					
Armor conduit bend radius	mm	38					
Weight (head without cable)	g	29					
Mounting torque	N·m	9±1					
Certification & Standards							
CE - EMC		EMC compliant with EN 61236-1:2006					
Hazardous Areas		Non-Intrinsically safe		ATEX Zone 0 II 1GD, Ex ia IIC T6/T4/T3 Ga (–55°C≤Ta≤+75°C/ +125°C/+165°C) per EN 60079-0:2012, EN 60079-11: 2012		ATEX Zone 2 II 3G, Ex nA IIC T6/T4/T3 Gc (–55°C≤Ta≤+75°C/ +125°C/+165°C) per EN 60079-0:2012, EN 60079-15:2010	

1 g = 9,80665 m/s^2, 1 Inch = 25,4 mm, 1 Gram = 0,03527 oz, 1 lbf-in = 0,113 N·m

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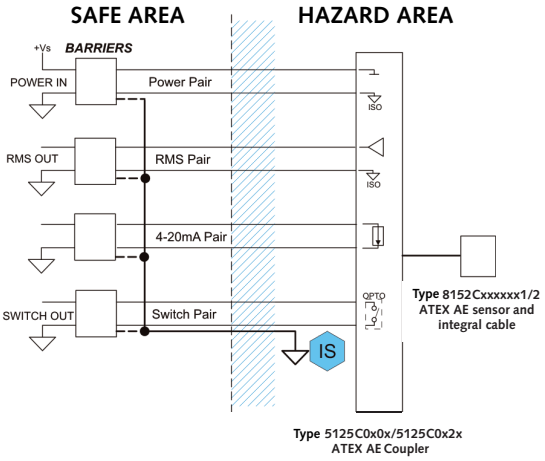
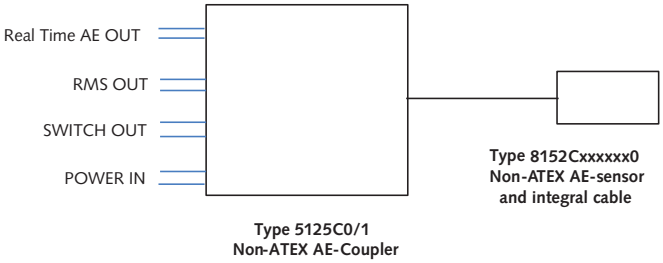
Measuring Chains – Type 8852A... (for more information. refer to respective Type 5125C... data sheets)

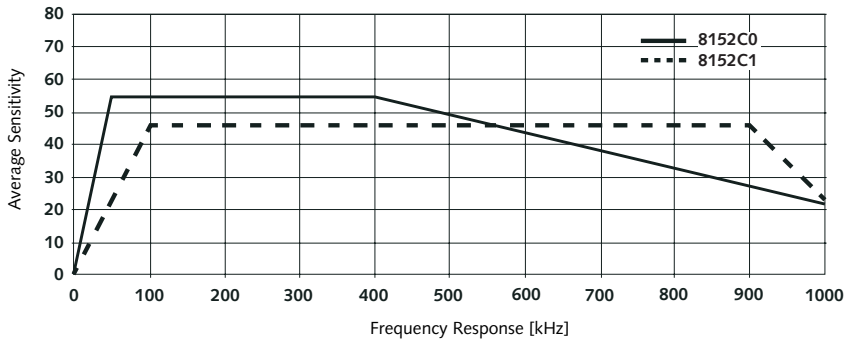
AE Measuring Chain for Hazardous Areas

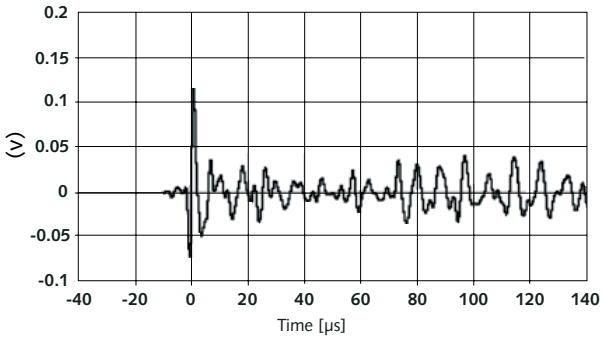


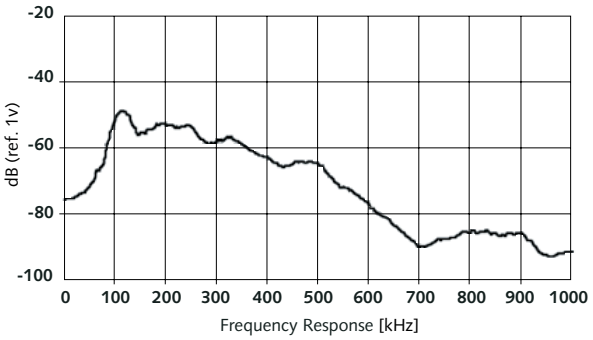
Standard AE Measuring Chain

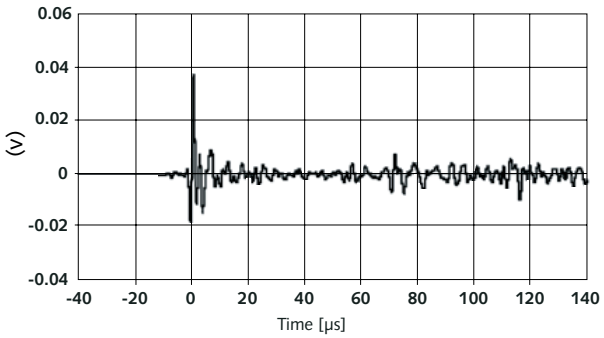


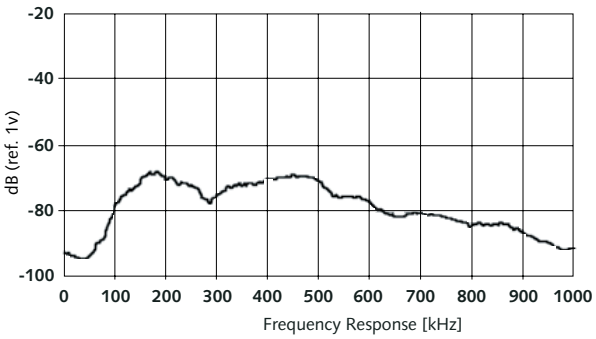
Frequency Response











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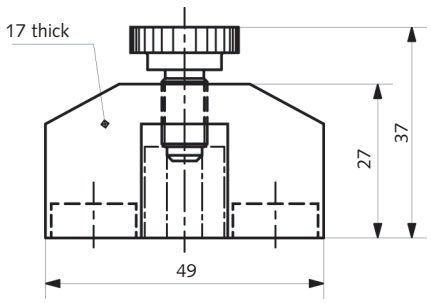
Application

The AE measuring chain is dedicated to the industrial customers from Automotive, Petrochemical, Power Generation and Aerospace, for example, who need to monitor bearing based machinery, pressure vessels or flow turbulence with high frequency acoustic signatures. AE measuring can be used where vibration sensors cannot due to the high energy provided by the emitted elastic waves. It also allows for separation of high vibration environment from fatigue and failure signals of interest.
The measuring chain, for example, be used for non-destructive testing or permanent online monitoring of continuous processes for conditional and preventive maintenance. The high temperatures up to 165 °C and the ATEX certifications option allows for usage in hazardous environments such as processing industries application where explosive gas and dust is always present.

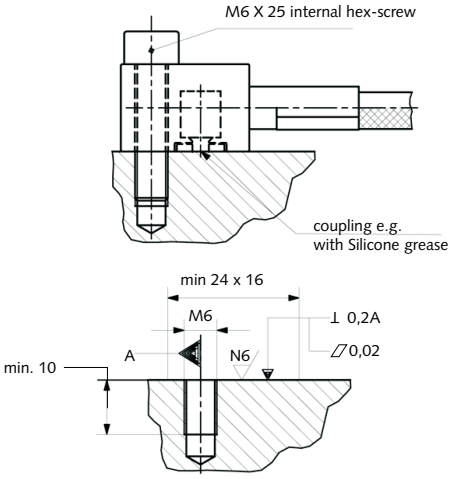
Mounting

The AE Sensor is simply mounted with an M6, 1/4-28 screw or a Type 8443B magnetic clamp onto the surface of the structure. A minimum tightening torque is sufficient for a reproducible and constant coupling. The smoother the mounting surface, the better the result. The use of a highly viscous grease (e.g. silicone grease) between the coupling surfaces is recommended.

Type 8443B Magnetic Clamp



Mounting AE Sensor



Included Accessories	Type
• Mounting screw, 1/4-28 x 1"	431-0500-001
• Mounting screw, M6 x 25 mm	431-0497-001

Optional Accessories	Type
• Magnetic clamp	8443B
• Non Intrinsically Safe Piezotron AE coupler	5125C0, 5125C1
• Intrinsically Safe Piezotron AE coupler (ATEX/CSA Zone 0)	5125C0x0x
• Intrinsically Safe Piezotron AE coupler (ATEX/CSA Zone 2)	5125C0x2x

Ordering Key

Type 8152C □□□□□□

Sensitivity	
57 dBref 1 V(m/s)	**0**
48 dBref 1 V(m/s)	**1**

PFA Cable Length in m:	
yy = standard length 03, 05, 10, 15, 20 m	**yy**

Armor Conduit	
No Conduit	**00**
yy = standard length 03, 05, 10, 15, 20 m (similar to PFA cable)	**yy**

Cable Termination	
Pigtail or 7/16-20 conduit adaptor (for connection to Type 5125C...)	**0**
¼ NPT Male conduit adaptor & pigtail cable termination (for connection to customer system)	**1**
M13x1-6 g conduit adaptor & pigtail cable termination (for connection to customer system)	**2**

Intrinsically Safe Certification	
None	**0**
Zone 0 Certification in Europe & North America	**1**
Zone 2 Certification in Europe & North America	**2**