

# **Piezotron coupler**

Туре 5125С...

# Acoustic emission coupler for safe or hazardous locations ATEX/IEC/EX and CSA

The AE-Piezotron coupler processes the high frequency output signals from Type 8152C... Kistler Piezotron acoustic emission sensors. Type 5125C0xxx is designed for use in industrial hazardous locations, ATEX/IEC/Ex and CSA. Gain and integration time constant of the built-in RMS converter can be configurable upon order. Types 5125C2 and 5125C3 are designed for standard industrial applications. Gain, filters, and integration time constant of the built-in RMS converter are designed as configurable parameters. This allows for the best possible adaptation to the particular monitoring function.

- Piezotron acoustic emission sensor high frequency amplifier
- Built-in RMS converter and alarm monitor
- Rugged case, vibration-proof construction
- IP57 protection
- Selectable gain: x1, x10, x100, x1 000 (for Types 5125C2 and 5125C3)
- Selectable time constant: 0.12, 1.2, 12, 25 ms (for Types 5125C2 and 5125C3)
- Selectable filters: 1 ... 1 000 kHz (for Types 5125C2 and 5125C3)

## Description

The AE-Piezotron coupler, with built-in RMS converter and alarm switch, has been specially designed for the processing of high frequency sound emission signals from Kistler AE-Piezotron sensors. In the case of standard Type 5125C2 and 5125C3, the unit is delivered with a gain set to x10, while the gain can be set with jumpers to x1, x100 or x1 000 by the user depending on the signal amplitude. In the case of the IS/ATEX version, this must be configured upon order and cannot be changed later on.

The amplifier has two series connected second order filters defaulted with a 50 kHz highpass filter and a 1 MHz low-pass filter. In the case of standard version Type 5125C2 and 5125C3, the low-pass and high-pass filters can be modified by plugging in alternate filters. The integration time constant of the RMS converter can be freely selected by the user and has a default value of 1.2 ms as delivered. In the case of the ATEX/IS version, the RMS time constant must be configured upon order and cannot be modified by the user.





Outline drawing for Types 5125C... (units in mm [in])

The alarm switch is set with a potentiometer. The switching threshold set point can be monitored by monitoring the voltage at the switch level output with a DMM. The output of the alarm switch is electrically isolated by an optocoupler. On a standard Type 5125C2 and 5125C3, three analog output signals (Filtered Raw AE Out [0 $\pm$ 5 Vpeak], RMS Out [0... 10 V or 4... 20 mA Out]), as well as a digital output signal (alarm switch), are available at the connectors. On an IS/ATEX version, only RMS, 4...19 mA and alarm switch outputs are offered.

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#### Application

The AE-Piezotron coupler Types 5125C..., in conjunction with the Kistler Piezotron acoustic emission sensor Type 8152C..., are well-suited for the monitoring of machines and tools in industrial production or leakage monitoring in petrochemical industries and/or hazardous locations, IEC/Ex and CSA). For more details on various possible configurations and suitable type numbers, please refer to page 2 or Type 8152C sensor and Wide Band Zener Barrier Type 5252A datasheets.

#### Connection

The AE-Piezotron sensor is connected directly to the terminals inside the AE-Piezotron coupler in accordance with the wiring diagram on the underside of the cover. The coupler can be supplied to be compatible with cable gland or conduit adaptor sensor connection to provide a leak-tight connection. Additional wiring instructions are detailed in page 3 below when an IEC/Ex and CSA Zener Barrier are in use.

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Measuring configurations - for Type 8852A system, Type 8152C sensor, Type 5125C coupler and Type 5252A wide band IS barriers

#### Configuration 1: Standard AE measuring chain



**Configuration 2: Type 8152C sensor in hazardous area zone 0, Type 5125C coupler in a safe area** – Real-time AE output and RMS output available.



\*Special Condition for Safe Use: The free ends of the cable must be terminated such that they are afforded a degree of protection of not less than IP20.

WARNING: Only ATEX Sensors Type 8152C... with serial number SN 4944583 and higher are compatible with the Type 5252A1 Wideband Zener Barrier.

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Configuration 3: Type 8152C sensor in hazardous area zone 0, Type 5125C sensor in hazardous area zone 0 – only RMS output available.



**Configuration 4: Type 8152C sensor in hazardous area zone 2, Type 5125C coupler in a safe area** – Real-time AE output and RMS output available.



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Configuration 5: Type 8152C sensor in hazardous area zone 2, Type 5125C sensor in a hazardous area zone 2 – only RMS output available.



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#### Technical data for IS/ATEX Type 5125C0xxx coupler

Туре	Unit	5125C01xx	5125C02xx	5125C03xx	5125C04xx	5125C05xx	5125C06xx			
Environmental										
Operating temperature range	C° [°F]		-40 82 [-40 180]							
Vibration (20 Hz 2,000 Hz)	<b>g</b> <sub>pk</sub>				10					
Shock (1ms)	g				200					
Ingress protection, IEC EN 60529	rating				IP57					
Hazardous atmosphere, IEC EN 60079-0	group			IIC, F	Hydrogen					
CE zone (probability of occurance)	rating	512	5C0x0x: Zone 0	Continuous; 512	25C0x2x: Zone 2	2 Non-Continuo	us Faults			
Electrical protection concept, IEC EN 60079-11 & EN 60079-15	code		Instri	nsically Safe Ex(i	a); Non-Incendiv	ve Ex(nA)				
Physical										
Housing/Base	material			Aluminum,	die cast, painted					
Weight	grams			1	,100					
Connection, input, output	type		Cable Glan	ds, Screw Termir	nal & Optional C	onduit Adaptor				
Ground isolation	MΩ				≥1					
Conoral electrical data										
Dynamic range	dB				>90					
Gain selections	eo/ei	1	10	100	1	10	100			
Output 1: 419 mA	mA	4	419 mA for 0	57 dB or 0 4	48 dB (dependin	g on 8152C t	ype)*			
Output 2: RMS 0 10 VDC max.	VDC		0 9 V for 0	. 57 dB or 0 4	8 dB (depending	on 8152C ty	pe)*			
Output 3: alarm switch	switch closure		NPN (	DC at set level (s	ee "Alarm Switc	h" below)				
Offset (voltage)	mV			<	<±20					
Noise	mV				<2					
Dielectric isolation	VAC			500 for 60 seco	nds, leakage <3	mA				
Power	VDC			13	3 15					
Operating current	mA			26	5 max.					
RMS time constant	msec	1.2	1.2	1.2	0.12	0.12	0.12			

#### **AE-Piezotron sensor**

Current for Piezotron (±10 %)	mA	4.3
Input voltage	V	0 6
Input voltage, max	Vpp	1.6

#### Filter

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Filter characteristic		Butterworth
Slope	dB	40
Bandpass HP	kHz	50
Bandpass LP	kHz	1,000

#### Alarm Switch

1 g = 9.80665 m/s <sup>2</sup> , 1 in = 25.4 mm, 1 (	Gram = 0.03527 oz	, 1 lbf-in = 0.113 N·m * dBref 1V / (m/s)	Page 6/11
Hysteresis	mV	20	
Delay	s	1.3	
OptoCoupler high, on	kΩ	>10	
OptoCoupler low	kΩ	<3	
OptoCoupler output			

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#### Technical data for standard Type 5125C2 and 5125C3 couplers

Туре	Unit	5125C2 and 5125C3
Environmental		
Operating temperature range	C° [°F]	-40 100 [-40 212]
Vibration (20 2,000 Hz)	gpk	10
Shock (1 ms)	g	200
Ingress protection, IEC EN 60529	rating	IP57
Physical	1	
Housing/base	material	Aluminum diecast nainted
Weight	grams	
Connection input output	Type	5125C2 = cable gland pigtail: 5125C3 = conduit adaptor
Ground isolation	MO	>1
	10122	21
General electrical data		
Dynamic range	dB	> 100 at Raw AE Output
Gain	eo/ei	Default = 10 (adjustable by user = 1, 100 or 1 000)
Output 1: 4 20 mA	mA	
Output 2: RMS, 0 10 VDC max.	VDC	Gain = 1: 0 to 1 000 mVrms IN => 0 to 10 OUT (8152C0: 0 57 dB; 8152C1: 0 48 dB AE)*   Gain = 10: 0 to 100 mVrms IN => 0 to 10 OUT (8152C0: 0 37 dB; 8152C1: 0 28 dB AE)*   Gain = 100: 0 to 10 mVrms IN => 0 to 10 OUT (8152C0: 0 17 dB; 8152C1: 0 8 dB AE)*   Sain = 100: 0 to 10 mVrms IN => 0 to 10 OUT (8152C0: 0 17 dB; 8152C1: 0 8 dB AE)*
Output 2 : alarm quitch	switch closure	Gain = 1 000: 0 to 1 mVrms IN => 0 to 10 OUT (8152C0: 03dB; 8152C1: 012dB AE)
	SWITCH CIOSULE	
	VAC	Gain = 10: 0 to 1000 mVrms IN >> 0 to 1 Vrms OUT (8152C0: 0 57 db; 8152C1: 0 48 db AE)*   Gain = 100: 0 to 100 mVrms IN >> 0 to 1 Vrms OUT (8152C0: 0 37 db; 8152C1: 0 28 db AE)*   Gain = 100: 0 to 10 mVrms IN >> 0 to 1 Vrms OUT (8152C0: 0 37 db; 8152C1: 0 28 db AE)*   Gain = 1 000: 0 to 10 mVrms IN => 0 to 1 Vrms OUT (8152C0: 0 17 db; 8152C1: 0 48 db AE)*   Gain = 1 000: 0 to 1 mVrms IN => 0 to 1 Vrms OUT (8152C0: 0 3db; 8152C1: 0 12db AE)
Offset (voltage)	mV	<±20
Noise	mV	<2
Power	VDC	18 35
Operating current	mA	30 max.
RMS time constant	msec	Default = 1.2 (adjustable by user = 0.12, 12 or 25)
AE-Piezotron sensor		
Current for Piezotron (±10 %)	mA	4.3
Input voltage	V	0 6
Input voltage, max	Vpp	1.6
	1	
Filter characteristic	I	Buttenworth
Slope	dB	40
Bandpass HP +30 %		Default – 50 (modifiable by user)
Bandpass I P +30 %		Default = 1 000 (modifiable by user)
	KI IZ	Default = 1,000 (modifiable by user)
Limit switch OptoCoupler output		
OptoCoupler low	kΩ	<3
OptoCoupler on max.	kΩ	>10
Delay	s	1.3
Hysteresis	mV	20
1 g = 9.80665 m/s <sup>2</sup> , 1 Inch = 25.4 mm, 1 Gram = 0.	03527 oz, 1 lbf-in =	e 0.113 N·m * dBref 1V / (m/s) Page 7/11

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#### Wiring diagram for IS/ATEX Type 5125C0xxx coupler



#### Wiring diagram for standard Type 5125C2 and 5125C3 couplers



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## Type 5125C... Frequency response vs. Gain



#### Type 5125C... Coupler normalized frequency response

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#### Accessories and ordering keys associated with IS/ATEX Type 5125C0xxx coupler

#### **Optional accessories**

- AE sensor
- Magnet

**Type** 8152C... 8443B...

#### Ordering key

#### IS/ATEX acoustic emission coupler

	Туре 5125С 0 📃 🗖
RMS time constant/gain type	ĪĪ
1.2 ms, gain = 1	1
1.2 ms, gain = 10	2
1.2 ms, gain = 100	3
0.12 ms, gain = 1	4
0.12 ms, gain = 10	5
0.12 ms, gain = 100	6
Label	
ATEX zone 0/zone 20	0
ATEX zone 2	2

## Type 8152C... sensor termination

Cable gland (pigtail)	0	
Conduit adaptor	1	

#### IS/ATEX acoustic emission system

	3852A					][
Type 8152C sensor sensitivity		Ī	Ī	Ī	Ī	Ī
57 dBref 1 V/ (m/s)	0					
48 dBref 1 V/ (m/s)	1					
Type 8152C sensor PFA integral cable length in m:						
yy = standard length 03, 05, 10, 15, 20 m	уу					
Type 8152C sensor armor conduit						
No conduit	00					
yy = standard length 03, 05, 10, 15, 20 m	уу					
Type 5125C input connector						
No armor conduit	0					
No armor conduit Conduit adaptor	0					
No armor conduit Conduit adaptor Intrinsically safe certification	1					
No armor conduit Conduit adaptor Intrinsically safe certification Zone 0 Certification in Europe & N.A.	0					

1.2 ms, gain = 1	1	
1.2 ms, gain = 10	2	
1.2 ms, gain = 100	3	
0.12 ms, gain = 1	4	
0.12 ms, gain = 10	5	
0.12 ms, gain = 100	6	
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Accessories included



#### Accessories and ordering keys associated with standard Type 5125C2 and 5125C3 couplers

Туре

•	High-pass filter 50 kHz	5325A50
•	Low-pass filter 1,000 kHz	5327A1000
•	Integration time constant 1.2 ms	5328A1.2
•	Chokes for EMI protection x 4	320-1010-001
0	ptional accessories	Туре
•	Filter bridge (no filtering)	5324A0
•	50 700 kHz high-pass filter	5325A
•	100 1,000 kHz low-pass filter	5327A
•	0.12 25 ms integration time constant	5328A
•	Set of filter modules and time	5330A2
	constant (one of each):	
	Types 5325A50, 5325A100, 5325A200,	
	5325A500, 5327A100, 5327A200,	
	5327A500, 5327A1000,5328A0.12,	
	5328A12, 5328A25	
•	AE sensor	8152C
•	AE sensor mounting magnet	8443B
•	Wideband zener barrier	5252A1

# Filters and time constants

Frequency	Filter Type	Type No.
50 kHz	high-pass	5325A50
100 kHz	high-pass	5325A100
200 kHz	high-pass	5325A200
300 kHz	high-pass	5325A300
400 kHz	high-pass	5325A400
500 kHz	high-pass	5325A500
700 kHz	high-pass	5325A700
100 kHz	low-pass	5327A100
200 kHz	low-pass	5327A200
500 kHz	low-pass	5327A500
600 kHz	low-pass	5327A600
800 kHz	low-pass	5327A800
900 kHz	low-pass	5327A900
1000 kHz	low-pass	5327A1000
0.12 ms	RMS time constant	5328A0.12
12 ms	RMS time constant	5328A12
25 ms	RMS time constant	5328A25

#### Ordering key

Standard acoustic emission coupler

#### Type 5125C Type 8152C... sensor termination Cable gland (pigtail) 2 Conduit adaptor 3

#### Standard or mixed acoustic emission system

Туре 8	8852A					
Type 8152C sensor sensitivity		Ĩ	ĪĪ	Ī	Ī	
57 dBref 1 V/ (m/s)	0					
48 dBref 1 V/ (m/s)	1					
Type 8152C sensor PFA integral cable length in m:						
yy = standard length 03, 05, 10, 15, 20 m	уу					
Type 8152C sensor armor conduit						
No conduit	00					
yy = standard length 03, 05, 10, 15, 20 m	уу					
Type 5125C input connector						
No armor conduit	2					
Conduit adaptor	3					
Intrinsically safe certification						
None	N					
Mixed non-ATEX coupler, ATEX zone 2 sensor	н					
Mixed non-ATEX Coupler, ATEX zone 0 sensor	м					
RMS time constant/gain	,					
1.2 ms time constant: 10x gain	2					

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