PHYSICAL ACOUSTICS CORPORATION

A member of MISTRAS Holdings Group

PAC Product Bulletin

1276 *Intrinsically Safe*

Acoustic Emission Preamplifier and Sensor Series

ATEX/CENELEC Certification to: II, 1, G, D, EEx ia, IIC, TC

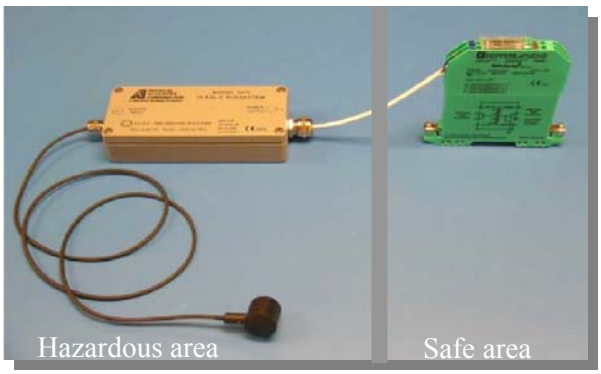
For use in *Hazardous* and *Gaseous* Environments

In many cases, processes and plant conditions need to be monitored with the help of acoustic emission technique to provide a real time warning and alarm for any abnormal status. And in many cases, some of the working environments are with hazardous and gaseous. The best solution for any equipment to be used in these environments is to design the product to be intrinsically safe.

The 1276 intrinsically safe product series, i.e. sensors, preamplifier, subsystem and barrier are specifically designed for this purpose and have been certified by the ATEX and CENELEC to be complier with ATEX/CENELEC II, 1, G, D, Eex ia, IIC, TC.

1276 Intrinsically Safe Product Series

Type	Model	Description
Preamplifier	1276-0	Low noise intrinsically safe preamplifier with 20/40 dB gain and 2 p-p volt output
Subsystem	1276-1	Low noise intrinsically safe subsystem with 4-20 mA current loop output
Sensor	ISR4.5	7.4 KHz resonant frequency intrinsically safe sensor
	ISR1.5	15 KHz resonant frequency intrinsically safe sensor
	ISR3	30 KHz resonant frequency intrinsically safe sensor
	ISR6	60 KHz resonant frequency intrinsically safe sensor
	ISR15	150 KHz resonant frequency intrinsically safe sensor
	ISR30	300 KHz resonant frequency intrinsically safe sensor
	ISR50	500 KHz resonant frequency intrinsically safe sensor
	ISWD	Wideband intrinsically safe sensor
	ISD9203B	High frequency intrinsically safe sensor
Barrier	1276B	12 volt intrinsically safe Zener barrier
Cable	1276C	Low capacitance 4-conductor cable with individually shielded twisted pairs.



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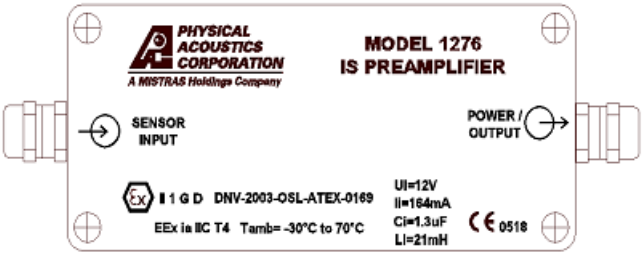
Revision Date: October 22, 2003

1276-0 *Intrinsically Safe* Preamplifier

ATEX/CENELEC Certification to: II, 1, G, D, EEx ia, IIC, TC

The 1276 series IS Preamplifier and sensors are designed for use in hazardous, gaseous environments that require ATEX group II Category 1 class IIC, Intrinsically Safe (IS) apparatus. The Preamplifier is enclosed in an IP65 rated case with gland connectors on both the input and the output. Available with a wide variety of Intrinsically Safe sensors and selectable filters. Electronics are housed in a shielded metal case providing for a low noise operation. May be used with commercially available barriers and cable.



Features:

- Intrinsically safe
- Wide dynamic range
- Low noise
- High input impedance
- Input protection
- Separate Power and Output connections
- Selectable filter ranges
- Work with different type of IS sensors

Other Specifications:

IS certification:	ATEX/CENELEC II, 1, G, D, EEx ia, IIC, TC
Dynamic range:	> 90 dB @ 20 dB gain
Noise:	< 2 µV
Output:	2 V p-p into 50 Ω
Gain:	Selectable 20/40 dB ± 0.5%
Power:	11 – 11.5 VDC
Operating current:	20 mA
Operating temperature:	-30°C to +70°C
Dimension:	5.92”(L)x2.50”(W)x1.38”(H) 15.04cmx6.35cmx3.50cm
Weight:	0.81 lb (360 grams)

Noise (RMS rti):

Filter Frequency Response Hz	20dB *With Sensor*	40dB *With Sensor*	20dB *Input Shorted*	40dB *Input Shorted*
30k-100k	2.5 µV	2.4 µV	1.8 µV	1.5 µV
100k-200k*	2.1 µV	1.9 µV	1.5 µV	1.3 µV
100k-1.0M	2.8 µV	2.7 µV	2.5 µV	2.4 µV

**Standard filter*

Barrier and Cable Requirements:

Barrier requirements**:** 10 V ≤ Vo ≤12 V, Io ≤ 163 Ma, Po ≤ 0.49 W
Suggested Barrier: Pepperl + Fuchs P/N: Z966.H

Cable requirements: Total capacitance ≤ 0.2uF, L/R Ratio ≤ 75 uH/ohm
Suggested Cable: Quabbin P/N 8604

Order information:

1276-0_ _

50	KHz LP filter	[1] [1] 3	KHz HP filter
100	KHz LP filter	[2] [2] 10	KHz HP filter
200	KHz LP filter	[3] [3] 30	KHz HP filter
400	KHz LP filter	[4] [4] 100	KHz HP filter
1000	KHz LP filter	[5] [5] 200	KHz HP filter

Sensors Available:

ISR.45, ISR1.5, ISR3, ISR6, ISR15, ISR30, ISR50, ISWD, ISD9203

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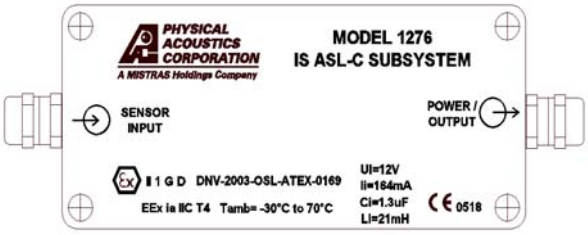
1276-1 *Intrinsically Safe* ASL-C Subsystem

ATEX/CENELEC Certification to: II, 1, G, D, EEx ia, IIC, TC



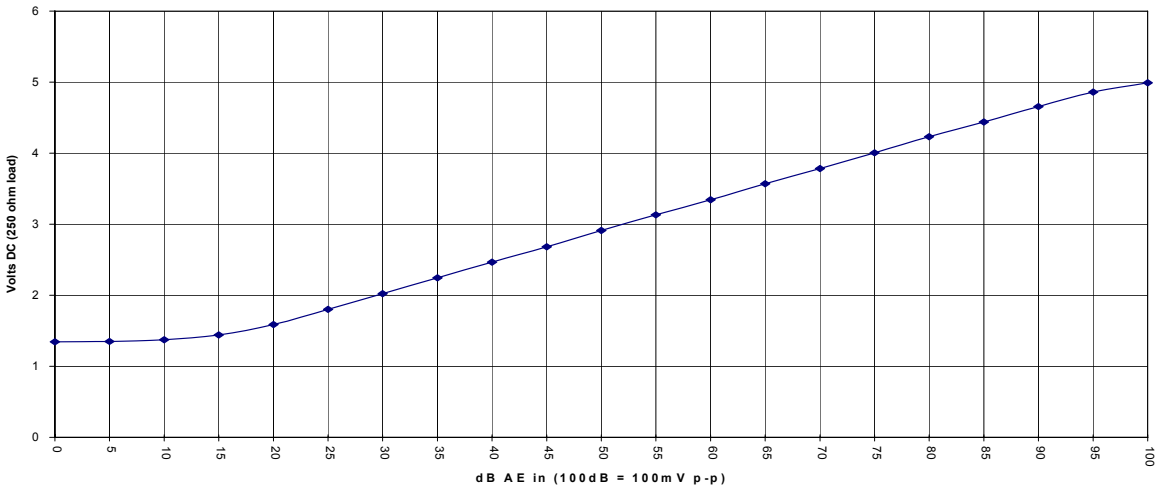
The 1276 series IS ASL-C Subsystem and sensors are designed for use in hazardous, gaseous environments that require ATEX group II Category 1 class IIC, Intrinsically Safe (IS) apparatus. The Subsystem is enclosed in an IP65 rated case with gland connectors on both the input and output. Available with a wide variety of Intrinsically Safe sensors and selectable filters. Contains a low noise internal preamplifier and a 4-20mA current loop output. Electronics are housed in a shielded metal case providing for a low noise operation. May be used with commercially available barriers and cable.

Features:

- Intrinsically safe
- Wide dynamic range
- Low noise
- High input impedance
- Input protection
- Separate Power and Output connections
- Selectable filter ranges
- Work with different type of IS sensors

Other Specifications:

IS certification:	ATEX/CENELEC II, 1, G, D, EEx ia, IIC, TC
Dynamic range:	> 90 dB
Noise:	< 2 µV
Output:	4-20 mA corresponding to 0-100 dB AE
Power:	11 – 11.5 VDC
Operating current:	35 mA
Operating temperature:	-30°C to +70°C
Dimension:	5.92”(L)x2.50”(W)x1.38”(H) 15.04cmx6.35cmx3.50cm
Weight:	0.81 lb (360 grams)



Barrier and Cable Requirements:

Barrier requirements**:** 10 V ≤ Vo ≤12 V, Io ≤ 163 Ma, Po ≤ 0.49 W
Suggested Barrier: Pepperl + Fuchs P/N: Z966.H

Cable requirements: Total capacitance ≤ 0.2uF, L/R Ratio ≤ 75 uH/ohm
Suggested Cable: Quabbin P/N 8604

Order information:

1276-1_ _

50	KHz LP filter	[1]	[1] 3 KHz HP filter
100	KHz LP filter	[2]	[2] 10 KHz HP filter
200	KHz LP filter	[3]	[3] 30 KHz HP filter
400	KHz LP filter	[4]	[4] 100 KHz HP filter
1000	KHz LP filter	[5]	[5] 200 KHz HP filter

Sensors Available:

ISR.45, ISR1.5, ISR3, ISR6, ISR15, ISR30, ISR50, ISWD, ISD9203

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Intrinsically Safe Sensors

ATEX/CENELEC Certification to: II, 1, G, D, EEx ia, IIC, TC

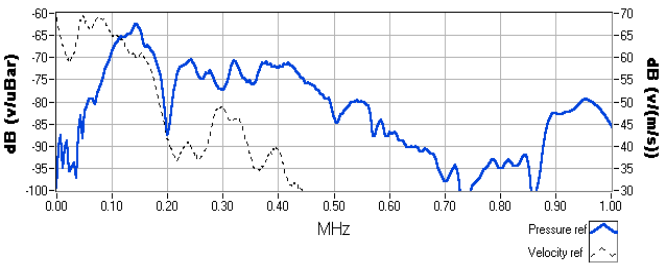
The intrinsically safe sensors were designed specially to meet Intrinsic Safety (IS) requirements and IP65 environmental requirements. The sensors were certified as Intrinsic Safety (IS) with 1276 IS preamplifier and 1276 IS ASL-C subsystem. The sensor has a thicker ceramic wear-plate and an epoxy coating completely covering the sensor and cable exit. An IS voltage spike protection circuit is built into the sensor. A standard one-meter long differential cable with extruded TPE jacket is integrated to the sensor. A pigtail is the standard at the other side of the cable. The sensors have similar frequency response as other standard sensors. The maximum operating temperatures of the sensor is 125 °C.

Intrinsically Safe Sensor Series:

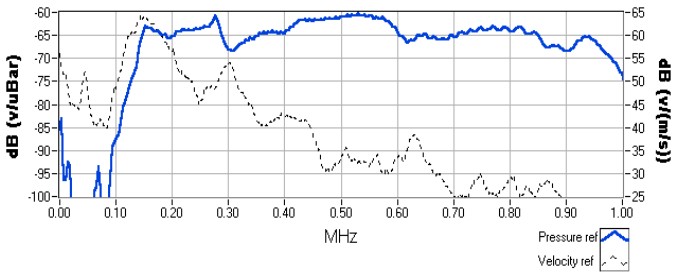
Model	Dimension	Weight with cable (gm)	Peak sensitivity Ref(V/(m/s)/ [V/mbar])	Frequency range (KHz)	Resonant frequency (KHz)
ISR.45	1.3"Dx1.7"H 3.3cmx4.32cm	155	87/[N/A]	3 - 30	7
ISR1.5	1.3"Dx1.4"H 3.3cmx3.56cm	120	87/[N/A]	5 - 20	15
ISR3	1.3"Dx1.4"H 3.3cmx3.56cm	120	62/[-65]	100 - 170	100[500]
ISR6	0.9"Dx0.8"H 2.3cmx2.03cm	33	76/[-63]	35 - 100	50[850]
ISR15	0.9"Dx0.8"H 2.3cmx2.03cm	27	69/[-62]	50 - 200	75[150]
ISR30	0.9"Dx0.8"H 2.3cmx2.03cm	27	58/[-64]	100 - 400	300/[350]
ISR50	0.9"Dx0.8"H 2.3cmx2.03cm	27	62/[-65]	100 - 700	100/[500]
ISWD	0.9"Dx0.8"H 2.3cmx2.03cm	27	55/[-63]	100 - 1000	125/[650]
ISD9203B	0.9"Dx0.8"H 2.3cmx2.03cm	27	65/[-60]	150 - 1000	175/[500]

Common Features:

Case material:	SS/Epoxy
Face material:	Ceramic
Connector type:	Pigtail
Connector location:	Side
Seal type:	Case grounded
Shock limit:	1000 g
Operating temperature:	-45°C - +125°C
Directionality:	±1.5 dB
Standard able length:	1 meter
Optional cable length:	up to 5 meter



Calibration of ISR15



Calibration of ISD9203B

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