

Product Data

Industrial Transducer Overview

Industrial Accelerometers — Types 4391, 8315, 8324, 8325

Intrinsically-Safe / Explosion-Proof Accelerometers — Types 4391E, 5704, 5874, 8326

Underwater Accelerometer — Type 5958

Accelerometer Accessories

USES:

- Permanently installed and portable system vibration monitoring of a wide variety of machines in severe industrial environments

FEATURES:

- Specialized environmental applications – Types available that are certified as intrinsically safe or explosion-proof for explosive environments, and can tolerate high radiation, high temperatures, strong electromagnetic fields or underwater environments
- Effective piezoelectric element configuration – The Delta Shear[®] configuration used on some accelerometers provides low sensitivity to environmental influences

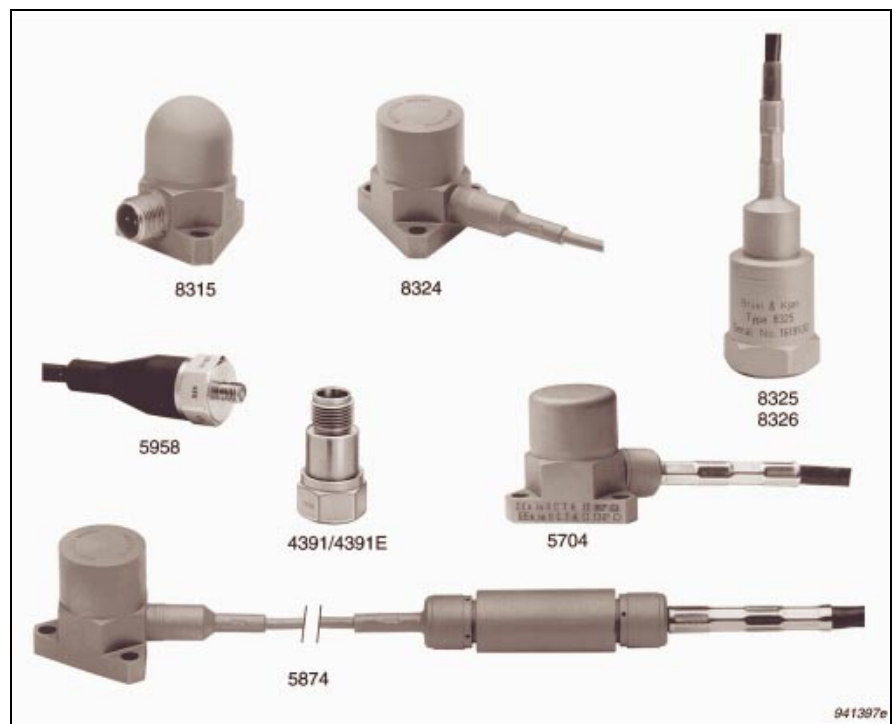
- Rugged physical construction – All products have an exceptionally solid, robust construction that resists rough handling and wet, dusty conditions
- Integral preamplifier – Accelerometers with DeltaTron[®] allow inexpensive cables to be used.
- Interchangeability – Most accelerometers have Uni-Gain[®] sensitivity, which means they are pre-adjusted to within a small percentage of a nominal value, so they can be interchanged with minimal effort
- Transducer Accessories – Charge amplifiers, barriers, junction boxes and a wide range of cables, connectors and mounting plates are available to suit different applications

Brüel & Kjær's industrial transducers are ruggedly constructed and designed specifically for use in the "severe" environments found in industry.

They are intended to be the "front-end" components to a permanent or portable machine condition monitoring system, such as the Type 3540 COMPASS, Type 2526 Data Collector, or other system.

This product data sheet only provides an overview of the industrial transducers and accessories. For specific information on these products, please refer to the respective product data sheets.

Accelerometers and accessories for applications other than industrial are described in other product data sheets.



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General Applications

The industrial transducers are intended to be front-end components to a machine condition monitoring system, and consist of piezoelectric accelerometers and accessories specifically designed for severe applications. They are well suited to portable data collection and permanent monitoring for a wide variety of machines.

Each product is ruggedly constructed and designed to withstand the kind of rough handling you would expect in industrial applications. Most are also sealed against wet, dusty, oily environments and are designed to resist strong electromagnetic fields.

For severe environments, however, each of the accelerometers is specifically designed to resist one or more of the following harsh environmental conditions:

- Explosive environments
- High radiation
- Underwater conditions
- High temperatures

This specialization allows for successful monitoring to be done in many industrial severe-environment applications, such as the petrochemical industry, power (including nuclear), steel, paper etc.

Accelerometers

A brief description of each piezoelectric accelerometer is given below. For

detailed specifications, please refer to the respective accelerometer product data sheet.

Type 4391 Industrial and 4391E Intrinsically Safe Accelerometers

Sealed construction yet light and versatile, these accelerometers are particularly well suited to off-line monitoring by a data collector. Both are certified intrinsically safe (EEx ia IIA T4-T6 for 4391, ia I/IIC T4-T6 for 4391E) for use in explosive environments. The 4391/4391E has an insulated base and uses the Delta Shear® piezoelectric element configuration and Uni-Gain® sensitivity.

Type 5704 Intrinsically Safe Accelerometer

Certified as intrinsically safe (EEx ia IIC T4, T6) for use in explosive environments for permanent monitoring installations. The 5704 is an electrically balanced and insulated charge accelerometer that uses Uni-Gain® sensitivity.

Type 5874 Explosion-proof Accelerometer

Certified as a flame-proof enclosure (EEx d IIC 400 °C) for use in explosive environments for permanent monitoring installations. The 5874 is designed for high temperature applications. The 5874 is an electrically balanced and insulated charge accelerometer that uses Uni-Gain® sensitivity.

Type 5958 Underwater Accelerometer

This rugged accelerometer is designed specifically for wet, sub-

merged, and oily environments, up to 400 m depth. The 5958 has a DeltaTron® integral preamplifier. It also employs the Delta Shear® piezoelectric element configuration and the case is insulated and internally shielded.

Type 8315 Industrial Accelerometer

This exceptionally rugged accelerometer is designed for use in elevated temperature environments up to 250 °C for permanent monitoring installations. The 8315 is electrically balanced and insulated and uses the Delta Shear® piezoelectric element configuration and Uni-Gain® sensitivity.

Type 8324 Industrial Accelerometer

Specifically designed for use in both high radiation and high temperature environments for permanent monitoring installations. Accumulated radiation of several MGy and up to 10¹⁹ thermal neutrons/cm² can be tolerated. The sealed version can tolerate wet or dusty conditions and withstand temperatures of up to 300 °C, and the "micro-vented" version can be operated up to 400 °C. The 8324 is electrically balanced and insulated and uses Uni-Gain® sensitivity.

Type 8325 Industrial Accelerometer

A general purpose accelerometer that has a sealed construction for use in wet and dusty environments for permanent installation monitoring. The 8325 has a DeltaTron® integral preamplifier and the case is electrically insulated and double shielded.







Accelerometer Type No.	Sensitivity		Frequency Range (Hz)	Mounted Resonance (kHz)	Application†	Temperature Range (°C)	Preamplifier	Sealing
	(mV/ms ⁻²)	(pC/ms ⁻²)						
4391		1	0.1 to 12000	40		-60 to 180		
4391E		1	0.1 to 12000	40		-60 to 125		
5704		10	1 to 10000	30		-60 to 130		
5874		1	1 to 9000	30		-60 to 400		
5958	1		1 to 14000	45		-50 to 100	DeltaTron®	Underwater
8315		10	0.1 to 8100	27		-74 to 250		
8324		1	1 to 9000	30		-60 to 400‡		IP 67‡
8325	10		1 to 10000	25		-54 to 125	DeltaTron®	IP 67
8326	10		1 to 10000	25		-54 to 125	DeltaTron®	IP 67

Table 1 Brüel & Kjær industrial accelerometers

* Up to +10%

† Refers to certification for EEx explosive environments and/or radiation service

‡ The sealed version (IP 67) can withstand 300 °C. The "microvented" version (not sealed) can be used in applications where dust or liquid is not forced into the accelerometer by pressure or thermal variations and can withstand 400 °C

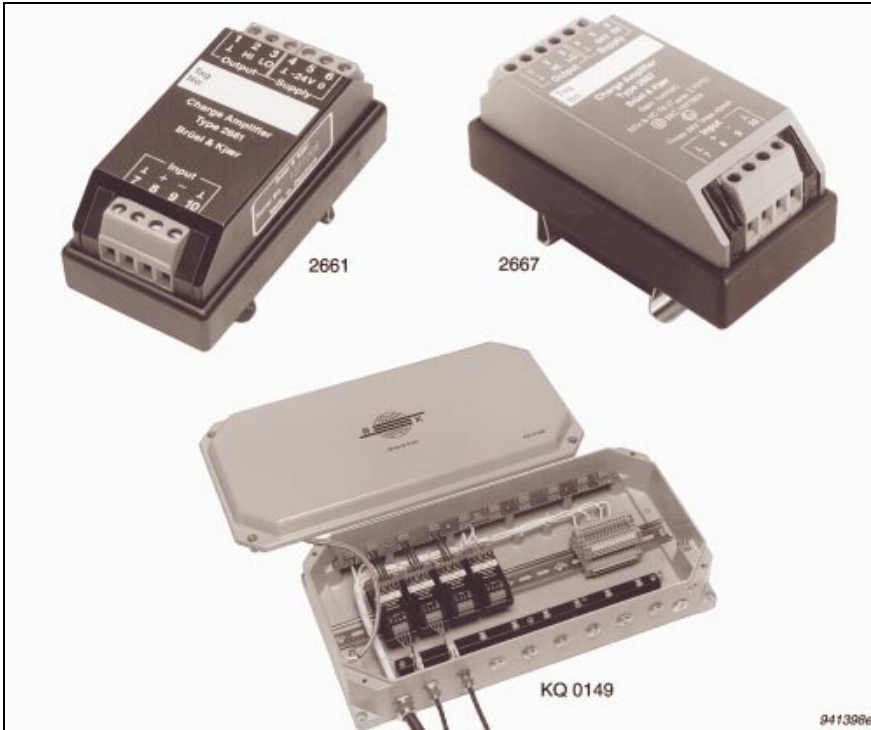


Fig1 Charge amplifiers (Type 2661 and Ex-model Type 2667) and Junction box

Type 8326 Intrinsically Safe Accelerometer

Similar to the Type 8325 industrial accelerometer but is certified as intrinsically safe (EEx ia IIC T4, T5, T6) for use in explosive environments for both permanent monitoring installations and off-line data collectors.

Junction Boxes

These house and protect transducer signal condition circuitry on a DIN-mounting rail, such as for Brüel & Kjær's Type 2661 and 2667 Charge Amplifiers.

Brüel & Kjær offers several types, such as the KQ 0149 and the

WB 0465, which is available in three versions; 3-channel (WH 2832), 6-channel (WH 2834), and 8-channel (WH 2908), all of which are of a rugged construction and sealed against harsh environmental conditions.

Barriers

The particular barrier you can use depends on the local regulations in your area. For general applications, we recommend the barriers indicated in Table 2.

Cables

A wide range of cables and connectors are available for many different applications. See the respective accelerometer Product Data sheet to find out which cables, cable lengths, and connector combinations are offered as standard and optional accessories to the particular accelerometer.

Standard low-noise cables offered are listed in Table 5. For extra cable

Product Type No.	Barrier No.	EEx gas group
2667	ZZ 0223	IIB
5704	WQ 0886	IIB
5874	WQ 0886	IIB
8326	EQ 2094	IIB

Table2 Examples of Brüel & Kjær barriers

Accessories

A detailed description of the available accessories for specific accelerometers are described in the respective accelerometer product data sheet, while general accessories such as the charge amplifiers and junction boxes are described in their respective product data sheets.

Charge Amplifiers

Accelerometers without the integral DeltaTron® preamplifier require an external preamplifier. Charge amplifiers are recommended since these permit long lengths of cable to be used.

Brüel & Kjær offers several types; 2661 for standard service, and the 2667 certified for explosive environments (EEx ib IIC T6), both for -24 V. A ±8 V charge amplifier is also available (WB 0693) in different user-specified versions.

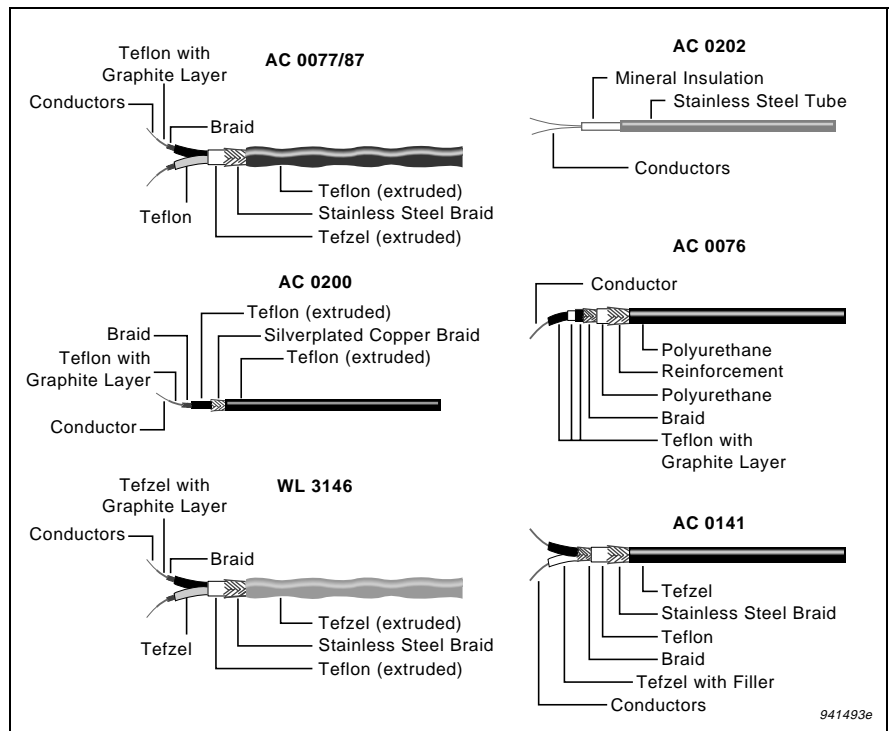


Fig.2 Accelerometer cable types

protection the spring conduit WQ 0084 can also be ordered to make an armoured cable system. Standard TNC-TNC coaxial cables are also offered for portable monitoring systems, such as AO 0193 (1.2 m) and AO 0268 (coiled, 1.1 m extending to 4 m, maximum temperature 85 °C).

Cable Connectors

Standard BNC and TNC connectors are offered together with special types for specific applications.

A description of the individual connector types for the accelerometers is given in Table 4.

Mounting Plates

A wide range of accelerometer mounting plates are available, as shown in Table 3. Maximum temperature for the mounting plates is 150 °C, which is limited by the epoxy-filler used (WQ 0732).

EMC — CE -marking

All transducers covered by this Product Data sheet comply with the requirements of the EMC-directive. However, only the types including electronic circuits that are subject to disturbances are provided with a CE mark. Please refer to the Product Data sheets for the respective types for further information about EMC.

Mounting Plate No.	Description	Applicable Accelerometer
EA 2000*	1/4" UNF stud mount	8325, 8326
EA 2003*	1/4" UNF, stud mount (does not involve cable twisting)	
YO 9029*	Glue-on plate for magnet	
UA 1282	Magnet, 20×YO 9029 and WQ 0732	4391, 4391E
UA 0642	Magnet	
WA 0601*	10-32 UNF stud or magnet mount	
WA 0622	Glue-on plate for magnet, 50 pcs. and WQ 0732	8315, 8324, 5874, 5704
WA 0113*	Arinc 554, conduit support	
WA 0581*	Arinc 554, insulated	
WS 0647*	Arinc 554	

Table 3 Accelerometer mounting plates

* Use with epoxy-filler WQ 0732, -50 to +150°, 100N/mm²

Connector No.	Name	No. of Poles	Type	Temp. Rating (°C)	Applicable Cables
WJ 0131	TNC	2	Plug	250	AC 0077/0087 AC 0200/0202 WL 3146
WJ 0085	KPT MIL	3	Plug	250	AC 0077/0087 WL 3146/3153 AC 0200/0202
WJ 0134	KPT MIL	3	Jack	250	
JP 0132	TNC	2	Plug	400	AC 0202

Table 4 Special Brüel & Kjær accelerometer cable connectors



Cable	Dia. and Min. Bending Radius (mm)		Temp. Range (°C)	PG7 Cable Gland	Application	Construction	Shielding	Accelerometers	Description
AC 0077	6	40	-70 to +250	DB 3116		Teflon insulated	Double	8315 8324	General purpose applications. Twisted pair, balanced.
AC 0087	6	40	-70 to +250	DB 3116	*	Teflon insulated	Double	5704 5874	Identical to AC 0077 but coloured blue for use in explosive areas.
AC 0141	6	40	-55 to +150	DB 3116		Tefzel insulated	Double	8325 8326	General purpose applications.
AC 0076	6	40	-50 to +100	—		Polyurethane insul.	Single	5958	Highly resistant to seawater and many kinds of oil.
AC 0200	3	40	-55 to +200	—		Teflon insul.	Double	4391	Used where more flexible cable is required. Coaxial
AC 0202	3	30	-200 to +800	DB 3115		Hardline	Single	8324	Can withstand more than to 10 ⁹ Rad. and be used in high pressure enclosures.
WL 3146	6	40	-200 to +150	DB 3116		Tefzel insul.	Double	8324	For use in radioactive areas up to 20 ⁸ Rad. (IEEE 383-1974)

Table 5 Accelerometer cables

* Complies with EEx standards, but is not certified

Brüel&Kjær reserves the right to change specifications and accessories without notice



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