PRODUCT DATA

Charge to CCLD Converter Types 2647-A, -B, -C, -D, -D-001, -D-002, -D-003, -D-004, and -E

This family of charge to CCLD converters is designed to connect charge transducers to CCLD inputs. All types support IEEE 1451.4 and contain a unique identification code (ID) and a transducer electronic data sheet (TEDS).*

160223

Features and Benefits

Features

General

- Converts charge transducers for use with CCLD power supplies. Compatible with ICP, ISOTRON, PIEZOTRON, CCLD, etc.
- Supports IEEE 1451.4: unique identification code and TEDS
- Can also be used with CCLD conditioning amplifiers that do not support IEEE 1451.4
- Fixed sensitivity:
  - 1 mV/pC: Types 2647-A, -D, -D-001, -D-002, -D-003, -D-004
  - 10 mV/pC: Type 2647-B
  - 0.1 mV/pC: Type 2647-C
  - 5 mV/pC: Type 2647-E

Types 2647-D-001 and 2647-D-003

- For use with transducers that have a 2-pin TNC connector
- 2-pin TNC (F) to BNC (F)
- 10 m integral cable

Type 2647-D-004

- For use with transducers that have a 2-pin TNC connector
- For use with Types 2250 or 2270
- 2-pin TNC (F) to LEMO (M)
- 10 m integral cable

Benefits

- Reduces:
  - Setup and measurement time
  - Human error during measurements
- Compatible with a wide range of transducers for a smaller instrument pool
- Plug and play between charge transducer/converter pairs
- Easy field installation and configuration
- Charge transducers can be given identification via TEDS
- Individual production/calibration data stored in TEDS

* CCLD: Constant current line drive, also known as DeltaTron (IEPE compatible)

Brüel & Kjær

Description

Types 2647-A, 2647-B, 2647-C, 2647-D, 2647-D-001, 2647-D-002, 2647-D-003, 2647-D-004 and 2647-E are charge to CCLD converters. They are designed to connect charge transducers to CCLD inputs. They have various fixed sensitivities to adapt a wide range of charge transducers to the vibration levels being measured, thereby reducing the amount of instruments in your instrument pool. These converters support IEEE 1451.4 and contain both a unique ID and TEDS for quick identification and setup, as well as access to individual production and calibration data.

These converters feature stainless steel housing (∅ 7 mm, length 37.7 mm), weigh less than 6.3 g and have 10−32 UNF connectors at each end. A special mounting clip (included with Types 2647-A, -B, -C, -D, -D-002 and -E) can be used to hold and insulate the converter from the supporting surface. The clips can be fixed together in order to keep the measurement setup tidy. Types 2647-A, -B, -C, -D and -E are delivered in boxed sets of up to 4 units.

Table 1 *Overview of the Type 2647 family of converters, typical values*

Type	Gain (mV/pC)	Typical Limiting Frequencies		Connector A (to transducer)	Connector B (to front end)	Cable-integrated
		Lower (Hz)	Upper (kHz)			
2647-A	1	0.17	50	10−32 UNF	10−32 UNF	No
2647-B	10	0.17	50	10−32 UNF	10−32 UNF	No
2647-C	0.1	1	10*	10−32 UNF	10−32 UNF	No
2647-D	1	1	10*	10−32 UNF	10−32 UNF	No
2647-D-001†	1	1	10*	2-pin TNC	BNC (F)	Yes
2647-D-002	1	80	10*	10−32 UNF	10−32 UNF	No
2647-D-003†	1	80	10*	2-pin TNC	BNC (F)	Yes
2647-D-004‡	1	80	10*	2-pin TNC	LEMO	Yes
2647-E	5	0.17	50	10−32 UNF	10−32 UNF	No

* Depends on input load capacitance. Figures correspond to a capacitance of 1.1 nF, resulting from a 1 nF accelerometer capacitance supplied by a 1 m cable with capacitance 0.09 nF/m (1.1 ≈ 1.09 = 1 + (1 × 0.09))
† For connecting accelerometers with 2-pin TNC connectors to equipment with BNC connectors
‡ For connecting accelerometers with 2-pin TNC connectors to Hand-held Analyzer Types 2250 and 2270 with LEMO connectors

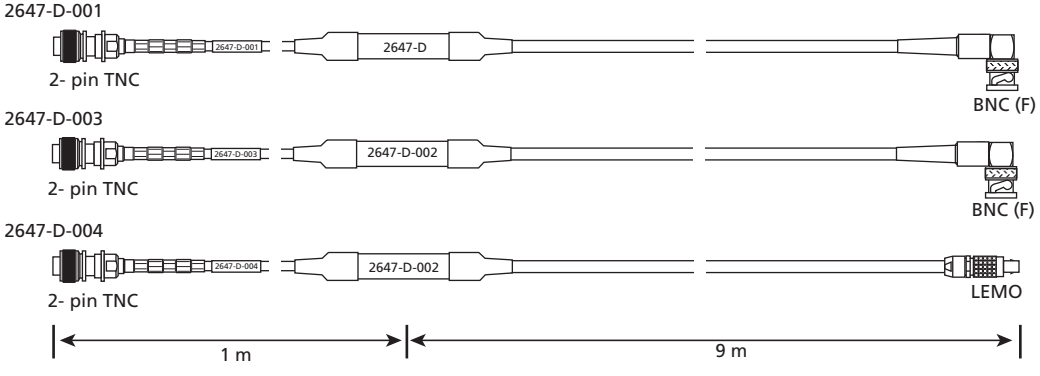
Types 2647-D-001, 2647-D-003 and 2647-D-004

Types 2647-D-001, 2647-D-003 and 2647-D-004 are cable-integrated converters. The converter is moulded into a 10 m length of cable. Type 2647-D is the converter used in Type 2647-D-001, and Type 2647-D-002 is the converter used in Types 2647-D-003 and 2647-D-004.

Note: Type 2647-D-004 terminates with a LEMO connector for for use with Hand-held Analyzer Types 2250 and 2270.

160224

Fig. 1 *Cable-integrated converter Type 2647-D-004*

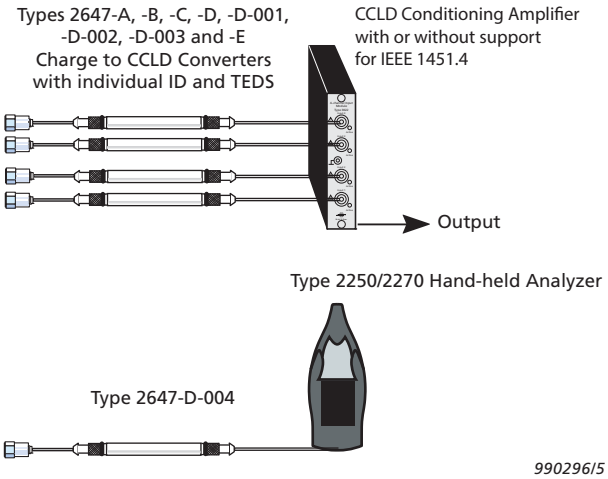


160225

Fig. 2 *Assembly of cable-integrated converters*

IEEE 1451.4 is a mixed-mode smart transducer communication protocol based on existing analogue connections using a coaxial cable. It also specifies TEDS formats for interfacing analogue transducers with additional smart features to legacy systems. The scope of this standard is to allow analogue transducers to communicate digital information with an IEEE 1451 object. Over 20 templates have been defined to date. The general template used in Types 2647-A, -B, -C, -D and -E is unique template identifier (UTID) 257.

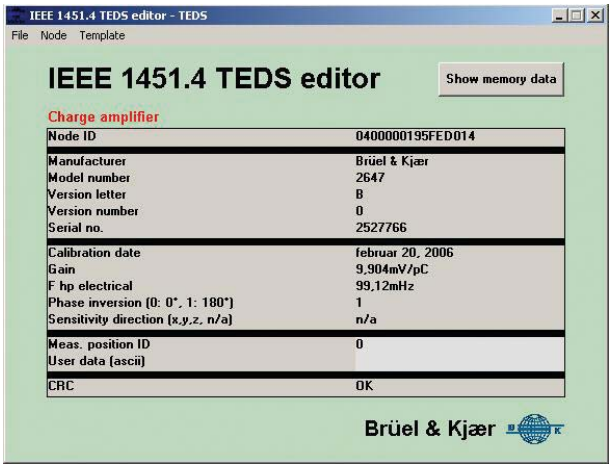
Fig. 3
This family of converters can be used with conditioning equipment regardless of whether or not it supports IEEE 1451.4



This family of converters supports IEEE 1451.4 but they can be used with CCLD equipment that does not support IEEE 1451.4 such as CCLD Power Supply WB-1372, Accelerometer Power Supply ZG-0328 and Measuring Amplifier Type 2525.

Note: If you are using these converters with NEXUS or the family of Conditioning Amplifiers Type 2694, you need to enter the combined sensitivity of the charge transducer and the converter using the same procedure as for transducers that do not support TEDS. This is because NEXUS and Type 2694 only support IEEE 1451.4 for transducers.

Fig. 4
Use TEDS editor BZ-5294 to view the contents of the TEDS



TEDS Editor

With a TEDS editor (see Fig. 4), the contents of the TEDS can be viewed. The built-in, unique ID enables location and verification of a given converter in your measurement setup. There is also space to write a comment (up to 15 ASCII characters).

Compliance with Standards

	The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME China RoHS mark indicates compliance with administrative measures on the control of pollution caused by electronic information products according to the Ministry of Information Industries of the People's Republic of China WEEE mark indicates compliance with the EU WEEE Directive
Safety	EN/IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use. ANSI/UL 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use.
EMC Emission	EN/IEC 61000–6–3: Generic emission standard for residential, commercial and light industrial environments. EN/IEC 61000–6–4: Generic emission standard for industrial environments. EN/IEC 61326: Equipment for measurement, control and laboratory use – EMC requirements. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Complies with the limits for a Class B digital device.
EMC Immunity	EN/IEC61000–6–1: Generic standards – Immunity for residential, commercial and light industrial environments. EN/IEC 61000–6–2: Generic standards – Immunity for industrial environments. EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements. **Note:** The above is only guaranteed using accessories listed in this Product Data sheet.
Temperature	IEC 60068–2–1 & IEC 60068–2–2: Environmental Testing. Cold and Dry Heat. Operating Temperature: –40 to +85 °C (–40 to +185 °F) Storage Temperature: –40 to +85 °C (–40 to +185 °F) IEC 60068–2–14: Change of Temperature: –10 to + 55 °C (2 cycles, 1 °C/min.)
Humidity	IEC 60068–2–3: Damp Heat: 90% RH (non-condensing at 40 °C (104 °F)).
Mechanical	Operating (peak values) MIL–STD–819C: Vibration: 12.7 mm, 15 m/s^2, 5–500 Hz Non-operating: IEC 60068–2–6: Vibration: 1 mm, 150 m/s^2, 10–500 Hz IEC 60068–2–27: 30 km/s^2/250 µs IEC 60068–2–29: Bump: 4000 bumps at 400 m/s^2 IEC 60068–2–32: Drop: 10 times in 3 directions
Enclosure	IEC 60529 (1989): Protection provided by enclosures: IP 43.

Guaranteed Frequency Response*				
Type Number	Lower Limiting Frequency (LLF)		Upper Limiting Frequency (ULF)	
	(–5%, –0.5 dB)	(–10%, –1 dB)	(–5%, –0.5 dB)	(–10%, –1 dB)
2647-A	0.4 Hz	0.25 Hz	32.0 kHz	47.0 kHz
2647-B				
2647-C	1.8 Hz	1.25 Hz	5.7 kHz	8.5 kHz
2647-D				
2647-D-001				
2647-D-002	115 Hz	65 Hz	5.6 Hz	7.3 Hz
2647-D-003				
2647-D-004				
2647-E	0.4 Hz	0.25 Hz	32.0 kHz	47.0 kHz

* At 1.5 nF transducer capacitance, 4 mA supply current and 2 V peak out

Common Specifications

Phase: Inverted
Phase Match (between units with the same range selected and with the same environmental conditions)**:**
- **2647-A, -B:** ±1° (3 Hz to 1 kHz)
- **2647-C, -D, -D-001, -E:** ±1° (15 to 200 Hz)

Current Range: 4 to 20 mA
Supply Voltage (Unloaded): 24 to 28 V_{DC} for full specification range and 18 V_{DC} with reduced measuring range
Bias Voltage: 13 ±1 V over the full temperature and current range
Max. Output Voltage Swing: 14 V, peak to peak
Output Impedance: < 40 Ω

ENVIRONMENTAL
Susceptibility to Vibration (10 to 500 Hz): Typically <50 mV/ms^{-2}, referred to output
Susceptibility to 50/60 Hz Magnetic Fields: <30 mV/T (3 mV at 80 A/m), referred to output
Radiation: 10^4 RAD (γ), non-destructive

TRANSFER
Nominal Sensitivity:
- **2647-A, -D, -D-00x:** 1 mV/pC ±2.5%
- **2647-B:** 10 mV/pC ±2.5%
- **2647-C:** 0.1 mV/pC ±2.5%
- **2647-E:** 5 mV/pC ±2.5%

The actual sensitivity values as delivered from production are present in the TEDS.
Temperature Coefficient: 0 ±100 ppm/K

Inherent Noise Voltage Referred to Input*			
	0.1 mV/pC	**1 mV/pC**	**10 mV/pC**
1 Hz – 22.4 kHz	Typ. 300 µV	Typ. 10 µV	Typ. 6 µV
22.4 Hz – 22.4 kHz	<40 µV, Typ. 2.5 µV	<8 µV, Typ. 4.5 µV	<5 µV, Typ. 2.5 µV

* At 1 nF input load capacitance

Inherent Noise Voltage Density Referred to Input*		
0.1 mV/pC	**1 mV/pC**	**10 mV/pC**
Typ. 6 µV/Hz$^{1/2}$	Typ. 400 nV/Hz$^{1/2}$	Typ. 200 nV/Hz$^{1/2}$ at 10 Hz
Typ. 400 nV/Hz$^{1/2}$	Typ. 100 nV/Hz$^{1/2}$	Typ. 50 nV/Hz$^{1/2}$ at 100 Hz
Typ. 250 nV/Hz$^{1/2}$	Typ. 50 nV/Hz$^{1/2}$	Typ. 25 nV/Hz$^{1/2}$ at 1 kHz

* at 1 nF input load capacitance

THD (2 Hz to 22 kHz): <0.1% at 1 V_{RMS} output
Recovery Time from Overload (bias within ± 1 V of final value):
- <100 s at 10 mV/pC sensitivity
- <10 s at 1 mV/pC sensitivity
- <2 s at 0.1 mV/pC sensitivity

IEEE 1451.4
Includes ID and TEDS
User Comment Field: Up to 15 ASCII characters

Input

TYPES 2647-A, -B, -C, -D, -D-002, -E
- Coaxial (10–32 UNF) female, stainless steel
- Single ended for piezoelectric charge transducers
- Protected to max. 300 nC peak, and against input/output reversal (input marked with a ring)

TYPES 2647-D-001, -D-003, -D-004
- 2-pin TNC (F), stainless steel

Output

TYPES 2647-A, -B, -C, -D, -D-002, -E
- Coaxial (10–32 UNF) female, stainless steel
- Single ended CCLD

TYPES 2647-D-001, -D-003
- BNC (F), stainless steel

TYPES 2647-D-004
- LEMO (M)

Mechanical

TYPES 2647-A, -B, -C, -D, -D-002
Dimensions: ∅ 7 × 37.7 mm (∅ 0.27 × 1.48″)
Housing: Stainless steel
Weight (with holder): Max. 6.3 g (0.25 oz)

TYPES 2647-D-001, -D-003, -D-004
Housing: Stainless steel
Weight: Max. 580 g (20.5 oz)

Ordering Information

Type 2647-A Charge to CCLD Converter (1 mV/pC, LLF 0.17 Hz)
Type 2647-B Charge to CCLD Converter (10 mV/pC, LLF 0.17 Hz)
Type 2647-C Charge to CCLD Converter (0.1 mV/pC, LLF 1.0 Hz)
Type 2647-D Charge to CCLD Converter (1 mV/pC, LLF 1.0 Hz)
Type 2647-D-002 Charge to CCLD Converter (1 mV/pC, LLF 80 Hz)
Type 2647-E Charge to CCLD Converter (5 mV/pC, LLF 0.17 Hz)

Include the following:
- KE-4317: Carrying Box
- DV-0476: Mounting Clip
- Manufacturer's Certificate of Performance

Type 2647-D-001 Cable Integrated Charge to CCLD Converter (1 mV/pC, LLF 1.0 Hz, 2-pin TNC to BNC)
Type 2647-D-003 Cable Integrated Charge to CCLD Converter (1 mV/pC, LLF 80 Hz, 2-pin TNC to BNC)

Include the following:
- UA-1555: Adaptor, 10–32 UNF to BNC
- Manufacturer's Certificate of Performance

Type 2647-D-004 Cable Integrated Charge to CCLD Converter (1 mV/pC, LLF 80 Hz, 2-pin TNC to LEMO)

Includes the following:
- Manufacturer's Certificate of Performance

Supported Brüel & Kjær Accessories

TEDS EDITING

BZ-5294	TEDS Editor
WA-0877	TEDS Editor Development Kit

CABLING

JP-0145	Plug adaptor, 10–32 UNF (Female) to BNC (Male)
UA-1555	Adaptor, 10–32 UNF (Male) to BNC (Female)
AO-0531-x-yyy*†	Flexible cable, 10–32 UNF to BNC, –5 to +70 °C (+23 to +158 °F)
AO-0463-x-yyy*†	Flexible cable, 10–32 UNF connectors, –5 to +70 °C (+23 to +158 °F)
AO-0038-x-yyy*†	Super low-noise, single-screened cable, 10–32 UNF connectors, 250 °C (482 °F)
AO-0122-x-yyy*	Super low-noise, double-screened cable, 10–32 UNF connectors, 250 °C (482 °F)
AO-0406-x-yyy*	Low-noise, double-screened cable, 10–32 UNF connectors, 250 °C (482 °F). Includes JP-0145
AO-0440-x-yyy*	Triaxial cable with LEMO to BNC connectors, 85 °C (185 °F)
AO-1419-x-yyy*†	Low-noise, single-screened cable AC-0066, 10–32 UNF connectors, 250 °C (482 °F)
AO-1382-x-yyy*	Low-noise, double-screened cable AC-0104, 10–32 UNF connectors, 250 °C (482 °F)

MOUNTING

UA-2025	Mounting Clip DV-0476, set of 24

Calibration Services

2647-CAI	Accredited initial calibration
2647-CTI	Traceable initial calibration
2647-CAF	Accredited calibration

* x = D (decimetres) or M (metres)
yyy = length in decimetres or metres
Please specify cable length when ordering
† Limited compliance with EMC standards

BP 1874 – 16 2016-08

Brüel & Kjær Sound & Vibration Measurement A/S
DK-2850 Nærum · Denmark · Telephone: +45 77 41 20 00 · Fax: +45 45 80 14 05
www.bksv.com · info@bksv.com
Local representatives and service organizations worldwide

Brüel & Kjær