

NEXUS Conditioning Amplifier for Very High Input Types 2692-C and 2692-D

NEXUS™ Conditioning Amplifiers are equally suited for laboratory and field use. They are compact and self-contained with an optional rechargeable battery, weighing around 3 kg (6.6 lb) including battery.

NEXUS Conditioning Amplifier Types 2692-C and 2692-D are designed for applications where very high charge inputs can occur. They contain four charge channels with comprehensive high- and low-pass filtering facilities. Type 2692-D includes single and double integration filters, which are optional for Type 2692-C.



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Uses and Benefits

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| Uses <ul style="list-style-type: none">• Specially suitable for applications where shocks and impulses occur such as gas turbine or munitions testing• General signal conditioning amplifiers for use with charge accelerometers, hydrophones and force transducers | Benefits <ul style="list-style-type: none">• Compact robust design and battery operation make the conditioning amplifiers also suitable for use in the field• Serial control interface (RS-232) allows for computer control of setup and test functions. A large number of amplifiers can be controlled from a single PC• Supports transducers with TEDS according to IEEE 1451.4• Built-in, patented Mounted Resonance Testing (MRT)• Wide range of filters that can be set up for specific tasks• Frames for rack-mounting available |
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Charge Channels

NEXUS Conditioning Amplifier Types 2692-C and 2692-D are designed to handle high charge inputs (up to 100 nC) and contain four charge channels. Each channel has comprehensive high- and low-pass filtering facilities. TNC input connectors are used and TNC to 10–32 UNF (microdot) adaptors are provided. Input can be single-ended or floating.

The built-in MRT facility is available on each channel. It is very useful for obtaining information about the mounting of the associated charge accelerometer and general errors in the measurement setup.

Note: For information on other NEXUS channel configurations, refer to Product Data [BP 1702](#)

Reliable Design

Since all NEXUS amplifiers are built for both indoor and outdoor use, they meet strict requirements for temperature and humidity. The operating temperature range extends from –10 to +55 °C (+14 to +131 °F). The instrument will withstand rain if kept with the front panel facing upwards. However, because of the sockets on the back panel, it is not watertight.

Reference and Test Generators

A reference generator is included in the hardware and can be used as an excitation signal for your measurement setup. The output signal is sinusoidal at 159.2 Hz ($\pm 1\%$) with a level of 1 V RMS. A 159.2 Hz ($\pm 1\%$) sinusoidal test tone is also available. It is applied in parallel with the charge input signal. The level depends on the selected output sensitivities.

Built-in Filters

A number of filters are provided with NEXUS. The filters are low-pass filters with -1 dB (-10%) cut-off frequencies of 0.1, 1, 3, 10, 22.4, 30 and 100 kHz (40 dB/decade, 2-pole) and -1 dB (-10%) high-pass filters with 0.1, 1 and 10 Hz cut-off frequencies (10 Hz/80 dB/decade).

Computer Control

Serial RS–232 Interface

All functions, including power on/off, can be controlled via the serial RS–232 interface.


Controlling Several Amplifiers

You can “daisy-chain” up to 99 channels. Each unit can be automatically addressed from an optional PC-program.

NEXUS Setup and Control Software Type 7749

Type 7749 is a PC-based software package for setup and control of the NEXUS range of conditioning amplifiers. It is supplied with each instrument and automatically detects IEEE 1451.4 capable transducers with standardized TEDS.

Compliance with Standards

	<p>The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives</p> <p>RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME</p> <p>China RoHS mark indicates, that the Environment Friendly Use Period (EFUP) is 25 years according to the Ministry of Information Industries of the People's Republic of China</p> <p>WEEE mark indicates compliance with the EU WEEE Directive</p>
Safety	<p>EN/IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use</p> <p>ANSI/UL 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use</p>
EMC Emission	<p>EN/IEC 61000–6–3: Generic emission standard for residential, commercial and light industrial environments</p> <p>EN/IEC 61000–6–4: Generic emission standard for industrial environments</p> <p>EN/IEC 61326-1: Electrical equipment for measurement, control and laboratory use - EMC requirements</p> <p>CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits.</p>
EMC Immunity	<p>EN/IEC61000–6–1: Generic standards – Immunity for residential, commercial and light industrial environments</p> <p>EN/IEC 61000–6–2: Generic standards – Immunity for industrial environments</p> <p>EN/IEC 61326-1: Electrical equipment for measurement, control and laboratory use - EMC requirements</p> <p>ISO 7637–1, 7637–2 and 7637–3: Road Vehicles – Electrical Disturbance by Conduction and Coupling</p> <p>Note 1: Refer to “Environmental Susceptibility” in specifications</p> <p>Note 2: The above is guaranteed using the accessories in this Product Data only</p>
Temperature	<p>IEC 60068–2–1 & IEC 60068–2–2: Environmental Testing. Cold and Dry Heat</p> <p>Operating Temperature: -10 to $+55$ °C ($+14$ to $+131$ °F)</p> <p>Storage Temperature: -25 to $+70$ °C (-13 to 158 °F)</p> <p>IEC 60068–2–14: Change of Temperature: -10 to $+55$ °C (2 cycles, 1 °C/min.)</p>
Humidity	<p>IEC 60068–2–3: Damp Heat: 90% RH (non-condensing at 40 °C (104 °F))</p>
Mechanical	<p>Operating (peak values):</p> <p>MIL–STD–810C: Vibration: 12.7 mm, 15 m/s², 5 – 500 Hz</p> <p>Non-operating:</p> <p>IEC 60068–2–6: Vibration: 0.3 mm, 20 m/s², 10–500 Hz</p> <p>IEC 60068–2–27: Shock: 1000 m/s²</p> <p>IEC 60068–2–29: Bump: 1000 bumps at 250 m/s²</p>
Enclosure	<p>IEC 60529 (1989): Protection provided by enclosures: IP 43</p>

Charge Input

Connector: TNC (TNC to 10–32 UNF adaptor JP-0162 included)

Grounding: Single-ended or floating

MAXIMUM INPUT

Differential Charge: 100 nC (peak)

Common Mode Voltage: 4.2 V (peak)

At gain ≥ 0.316 mV/pC (-10 dB gain with 1 nF transducer capacitance)

INPUT PROTECTION

Differential Charge: ≤ 300 nC (peak)

Common Mode Voltage: ≤ 15 V (peak)

COMMON MODE REJECTION RATIO

>50 dB (typical) (50 to 60 Hz with 1 nF transducer capacitance)

AMPLIFIER GAIN

0.01 mV/pC to 10 V/pC (-40 to $+80$ dB gain with 1 nF transducer capacity, $+80$ dB only recommended with 10 Hz LP-filter selected)

ACCEPTABLE TRANSDUCER SENSITIVITY RANGE

10^{-19} to 10^{-6} C/MU (MU = mechanical units: m/s^2 , g, N, Pa)

CALIBRATED OUTPUT

Selectable in 10 dB steps. 120 dB attenuator range, 10^{-14} to 10^7 V/MU $\pm 1\%$ for $0^\circ\text{C} \leq T_a \leq +40^\circ\text{C}$ and $\pm 2\%$ for $-10^\circ\text{C} \leq T_a \leq +55^\circ\text{C}$

Frequency range from $5 \times f_l$ to $0.2 \times f_u$, where

f_l = lower freq. limit: 0.1, 1.0 or 10 Hz

f_u = upper freq. limit: 0.1, 1, 3, 10, 30 or 100 kHz

FREQUENCY RANGE (-10%)

Acceleration: 0.1 Hz to 100 kHz (transducer cable length < 10 m)

Velocity (optional): 1.0 Hz to 10 kHz

Displacement (optional): 1.0 Hz to 1 kHz

LOW-PASS FILTER (-10%)

0.1, 1, 3, 10, 22.4, 30 or 100 kHz, attenuation slope 40 dB/decade

HIGH-PASS FILTER (-10%)

Acceleration: 0.1, 1.0 or 10 Hz

Velocity (optional): 1.0 or 10 Hz

Displacement (optional): 1.0 or 10 Hz

INHERENT NOISE (2 Hz TO 22.4 kHz)

< 5 fC referred to input, $-10^\circ\text{C} \leq T_a \leq +40^\circ\text{C}$

< 10 fC referred to input, $+40^\circ\text{C} \leq T_a \leq +55^\circ\text{C}$

(amplifier sensitivity (>20 dB) with 1 nF transducer capacitance)

HARMONIC DISTORTION AND NOISE

(2 Hz to 22.4 kHz, $Q_{in} \leq 20$ nC peak, $V_{out} \leq 3.16$ V peak)

$< 0.01\%$ (80 dB) for amplifier gain ≤ 0.1 V/pC (< 40 dB gain with 1 nF transducer capacitance)

ENVIRONMENTAL SUSCEPTIBILITY (REFERRED TO INPUT)

Magnetic Field: < 0.2 fC/(A/m)

Electromagnetic Field: < 20 fC/(V/m) or < 4 fC/V

Vibration (10 to 500 Hz): < 30 fC/(m/s^2)

MOUNTED RESONANCE TESTING*

EP Patent 715.722, US Patent 5.753.793

Mounted resonance testing of the accelerometer and cable interconnection, controllable from front panel and RS–232 interface

TEST TONE OSCILLATOR

$\omega = 1000$ rad/s (159.2 Hz), sinusoidal

Test Level: 1 mV to 10 V ($\pm 1\%$). Controllable from front panel and RS–232 interface

REFERENCE TONE

1 V (RMS), ($\pm 1\%$), 159.2 Hz

RISE TIME

> 7.5 V/ μ s (100 kHz bandwidth)

CHANNEL TO CHANNEL PHASE-MATCH

Between equal channels in the same NEXUS unit

$2.1^\circ - 0.1^\circ \times (f/f_l)$ from f_l to $20 \times f_l$

0.1° from $20 \times f_l$ to $0.1 \times f_u$

$(f/f_u)^\circ$ from $0.1 (f_u)$ to f_u

where:

f_l = lower freq. limit = 10 Hz

f_u = upper freq. limit = 0.1, 1, 3, 10, 30 or 100 kHz

With 100 kHz filter

$2.2^\circ - 0.1^\circ \times ((20 \times f)/f_l)$ from f_l to $20 \times f_l$

0.2° from $20 \times f_l$ to 2 kHz

$(f/100 \text{ kHz}) \times 5^\circ$ from 2 kHz to 100 kHz

where:

f_l = lower freq. limit = 10 Hz

FILTERS

2692-D: Single and double integration filters included

2692-C: Single and double integration filters optional

Power Supply

INTERNAL BATTERY (NOT INCLUDED)

Nickel metal hydride rechargeable battery supporting SMBus and on-battery charge level meter. Typically provides 15 hours of continuous use with a single channel and 4 hours with four channels without backlighting and without optional filters. With backlighting on, and with optional filters, battery typically provides 3 hours of continuous use. If NEXUS is not used for more than a month, please remove the battery to prevent discharging. Charging time is approximately 4 hours

EXTERNAL DC POWER INPUT

Complies with ISO 7637–1 (12 V) and 7637–2 (24 V)

Input Range: 10 to 33 V DC

MAINS SUPPLY

Supported via Mains Adaptor ZG-0426 (included), 90–264 V AC, 40–65 Hz

* Brüel & Kjær patent

Digital Control Interface

SERIAL INTERFACE

Conforms to EIA/TIA-574 (RS-232)

Baud Rate: 2400, 4800, 9600

Parity: None

Data Bits: 8

Stop Bits: 1

Handshake: X-on/X-off

“Plug and play” interface coupling

Communication Speed for a Baud Rate of 9600:

- Transmission time for one command of 5 characters is ~ 4 ms
- Transmission time for one command of 5 characters and to receive an echo after each character is ~ 8 ms
- Execution time for one command is 100 ms to several seconds
- Time to configure a complete 4-channel NEXUS using short-form setup with approx. 600 characters requires transmission time of 2 to 3 s (4 to 6 s with echo after each character)
- Execution time in NEXUS is from 40 to 60 s
- For setups with over 1000 characters, the transmission time will be increased by at least 30 s due to delay in emptying receiver buffer
- Response time after requesting a status of one load is <0.5 s
- Response time after requesting a peak meter reading is <0.5 s

Display Interface

Display: 128 × 64 pixel graphical display with back-lighting on/off

Overload Detection: On both common-mode and differential signals applied before filters. LED overload indication at the front panel and overload indication via RS-232 control interface

Peak Meter

Dynamic Range: -30 to +10 dBV (peak)

Resolution: 1 dB

Analogue Output

Connector: BNC

Grounding: Single-ended or floating

Output Impedance: 50 Ω || 500 pF

Max. Output (differential voltage): 10 V peak (20 V peak to peak)

Max. DC Offset: ±25 mV, typically <2 mV

OUTPUT PROTECTION

Differential Voltage: ≤50 V (peak)

Common Mode Voltage: ≤15 V (peak)

Common Mode Rejection: >50 dB (50 to 60 Hz) for common mode voltage ≤2 V peak (voltage injected into instrument)

Output Drive Capacity: 100 m of cable (100 pF/m) to 20 kHz
1000 m of cable (100 pF/m) to 2 kHz

Channel Separation: better than -100 dB at 1 kHz

Dimensions and Weight

Height: 90 mm (3.5")

Width: 144 mm (5.7")

Depth: 230 mm (9.1")

Weight: Approx. 3 kg (6.6 lb), for a 4-channel unit including battery

Note: All values are typical at 25 °C (77 °F), unless measurement uncertainty is specified. All uncertainty values are specified at 2σ (that is, expanded uncertainty using a coverage factor of 2)

Calibration

NEXUS amplifiers are supplied with a Manufacturer's Certificate of Conformance. An initial calibration can be supplied as an option.

Type	Initial Calibration	Recalibration
2692-C	2692-A-CAI	2692-A-CAF

Ordering Information

Types 2692-C, -D Conditioning Amplifier

includes the following accessories:

- ZG-0426: Mains Adaptor, 90 – 264 V AC
- LK-0013: Ferrite Cable Clamp
- Type 7749: CD-ROM for NEXUS Setup and Control Software
- AO-1440: RS – 232 interface cable

OPTIONAL ACCESSORIES

AO-0537-x-yyy* 7-pin Brüel & Kjær mic. plug to 7-pin LEMO
Adaptor cable for split mic. supply

AO-0546 Supply cable with cigarette lighter to LEMO
connector (3 m)

* x = D (decimetres) or M (metres)

yyy = length in decimetres or metres

Please specify cable length when ordering

BZ-5294

BZ-5294-MS4

BZ-5294-MS5

QB-0048

UA-1482

UA-1590

UL-0250

WA-0876

WA-0877

WH-3219

WH-3345

ZE-0794

ZE-0788

TEDS Editor

TEDS Calibration License

TEDS Developer's License

Nickel metal hydride rechargeable battery DR 35

Rack shelf, holds 1 or 2 NEXUS units

Fast Charger Kit

Adaptor, RS-232 to USB

TEDS Editor Calibration Kit

TEDS Editor Development Kit

Upper Limiting Frequency 140 kHz

Constant Power On

A-, B-, C- and D-weighting filters

Integration, single and double (contact
Brüel & Kjær for a configured system)

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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

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