USER GUIDE

G01A02

Portable Constant Current Source for IEPE Sensors

Single-channel · ×1 / ×10 gain · 9 V battery or external DC powered

1. Overview

The G01A02 is a compact, low-noise constant current source designed to power IEPE (Integrated Electronics Piezo-Electric) sensors, including accelerometers, force sensors and pressure sensors. It is compatible with IEPE sensors from LNS and from other manufacturers.

The unit provides a regulated 4 mA excitation current (adjustable from 2 to 10 mA at the factory) at a 23 V compliance voltage, and passes the sensor signal to any voltmeter, oscilloscope, data acquisition system or analyzer. A selectable ×10 gain stage is available for low-level signals.

Housed in an integrated, surface-mount design, the G01A02 runs from a standard 9 V battery, making it well suited to field testing where a mains-powered signal conditioner is impractical.

Key features

- Portable, low-noise design (0.01 mV rms at ×1)
- 0.1 Hz – 100 kHz frequency range
- Selectable ×1 / ×10 gain
- AC- and DC-coupled outputs
- LED status and battery indication
- 9 V battery or 7 – 24 V DC external supply

2. Technical Specifications

Parameter	Units	×1 gain	×10 gain
Constant current	mA	2 – 10 (factory set to 4 mA unless otherwise specified)	
Compliance (supply) voltage	V DC	23	
Frequency range	Hz	0.1 – 100 k	0.1 – 50 k
Noise	mV rms	0.01	0.1
Gain accuracy	%	±1	
Output range	V	±6	
Power supply		9 V battery, or 7 – 24 V DC external supply	
Input / output connectors		BNC	
AC-coupling capacitor	µF	10	
Dimensions (L × W × H)	mm	97 × 61 × 27	

Specifications are subject to change without notice.

3. Panel Controls and Connections

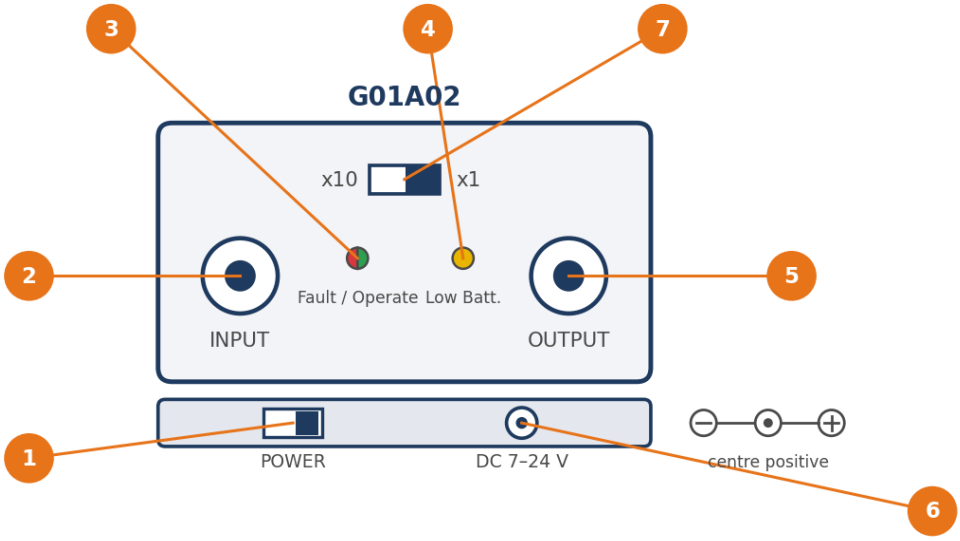

Figure 1 — Front and end panel layout

No.	Item	Function
1	**Power switch**	Switches the unit on and off.
2	**INPUT (BNC)**	Constant-current excitation output (23 V / 4 mA) — connect to the IEPE sensor. Also serves as the DC-coupled signal output when used with a BNC tee.
3	**Fault / Operate LED (red / green)**	Red: no sensor connected, or the sensor / cable is faulty (open or short circuit). Green: sensor bias voltage is within the normal range and the system is ready to measure.
4	**Low Battery LED (yellow)**	Battery voltage has fallen below 7 V — replace the battery.
5	**OUTPUT (BNC)**	AC-coupled signal output with the DC bias removed. Connect to a voltmeter, oscilloscope, DAQ or other readout instrument.
6	**External power socket**	Accepts a 7 – 24 V DC regulated supply via a 5.5 mm OD × 2.1 mm ID barrel plug. Polarity: center positive, outer sleeve negative.
7	**Gain switch (×1 / ×10)**	Selects unity gain or ×10 amplification for low-level signals.

4. Operation

4.1 Power supply

The G01A02 may be powered from a 9 V laminated (PP3) battery fitted in the battery compartment on the underside of the unit, or from a regulated 7 – 24 V DC supply connected to the external power socket (5.5 mm × 2.1 mm barrel plug, centre positive).

When using an external supply, consider its electrical noise contribution to the measurement chain and select a low-noise (linear) supply wherever possible.

> **Important**
>
> The power switch must be in the OFF position when fitting or removing the battery, or when connecting an external supply. Failure to do so may damage the unit.
>
> Remove the battery if the unit will not be used for an extended period.

4.2 System connection

Two connection arrangements are possible, depending on whether an AC-coupled or a DC-coupled signal is required by the downstream instrument.

AC-coupled output (Figure 2)

Connect the IEPE sensor to the INPUT jack and the readout instrument to the OUTPUT jack. The OUTPUT signal is AC-coupled, so the sensor's DC bias voltage is removed and only the measurement signal is passed on. This is the standard arrangement for most applications.

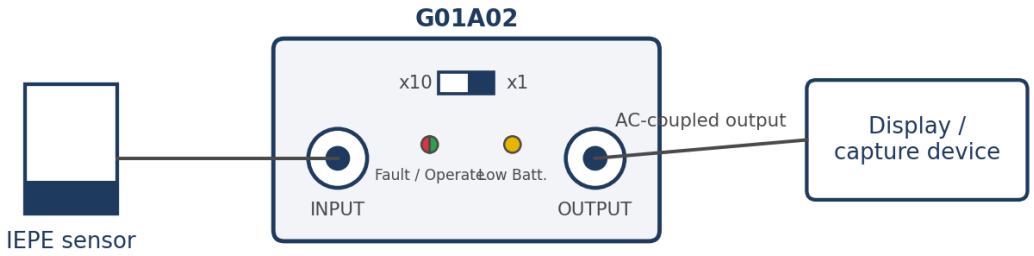

Figure 2 — AC-coupled output connection

The 10 µF coupling capacitor, together with the input impedance of the downstream instrument, forms a first-order high-pass filter. With a 1 MΩ input impedance (typical of most readout devices) the time constant is 10 s and the –5 % low-frequency limit is approximately 0.05 Hz. Instruments with a low input impedance (for example tape recorders) will shorten this time constant and raise the low-frequency cut-off; in such cases use the DC-coupled output instead.

DC-coupled output (Figure 3)

Fit a BNC tee to the INPUT jack. Connect the IEPE sensor to one side of the tee and the readout instrument to the other. The signal at this point retains the sensor's DC bias voltage and is suitable for very-low-frequency measurements, provided the downstream instrument can accept the bias level.

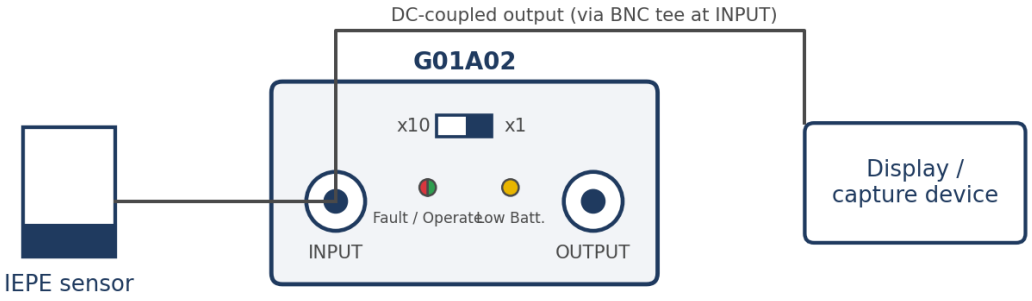

Figure 3 — DC-coupled output connection via BNC tee

4.3 Making a measurement

1. Connect the sensor and readout instrument as described in Section 4.2, then switch the unit on.
2. Confirm that the **Fault / Operate** LED is green. This indicates that the sensor bias voltage is within range and the system is ready. No further set-up is required.
3. Select ×1 gain for normal signals or ×10 gain for low-level signals. Remember to divide the reading by 10 when using ×10 gain.
4. Read the output voltage on the downstream instrument and convert to engineering units using the sensor's voltage sensitivity.

Worked example

Converting the reading to acceleration

Sensor sensitivity: 100 mV / (m/s²) Gain: ×1 Voltmeter reading: 3 500 mV

Acceleration = 3 500 mV ÷ 100 mV/(m/s²) = 35 m/s²

4.4 Status indicators

LED	Colour	Meaning
Fault / Operate	Red	Input not connected, or sensor / cable open or short circuit. Check connections.
Fault / Operate	Green	Sensor bias voltage normal — ready to measure.
Low Battery	Yellow	Battery below 7 V — replace the 9 V battery.

With the unit switched on and no sensor connected, the Fault / Operate LED shows red. Once a working sensor is connected it changes to green. The yellow Low Battery LED lights when the battery voltage falls below 7 V.