SIGNAL CONDITIONER

Type B12-3

User Guide

Continuous development may necessitate
changes in these details without notice

Document Ref: UDB12-3.vp Rev 0

PROCESS MEASUREMENT, CONTROL & DISPLAY INSTRUMENTATION

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Contents

WARNING!

It is important that this guide is read and fully understood before attempting installation or commissioning of the instrument. Instructions appearing in this document, and current safety legislation, must be observed to ensure personal safety and to prevent damage to the instrument or equipment connected to it.

The instrument should be installed, commissioned and operated *only* by suitably qualified and authorised personnel.

Safety and EMC information

Safety: EN61010 -1
Immunity: EN50082-1
Emissions: EN50081-1
CE certified

The specifications for the instrument must not be exceeded. If the instrument is used in a manner not specified, the protection provided by the instrument may be compromised.

The instrument must be installed in an enclosure that provides adequate protection against electric shock.

Ensure that power to the instrument is switched off and signal wiring isolated from hazardous voltages before carrying out installation or maintenance.

The instrument is designed for installation in a clean, dry environment (Pollution degree 1).

Stroud Instruments Ltd strongly recommends that repairs and re-calibration work are done on a return to factory basis in order that our quality standards, product specifications and safety precautions are not compromised.

The instrument is double insulated

Note: Clean with a moist cloth - USE NO SOLVENTS.

Installation

WARNING: Installation should be conducted by appropriately skilled and authorised personnel only.

WARNING: Ensure that power to the instrument is switched off and signal wiring isolated from hazardous voltages before carrying out installation.

WARNING: The instrument must be installed in an enclosure that provides adequate protection against electric shock.

Location

- ☐ The instrument is designed for installation in a clean, dry environment
- ☐ Do not install near to switch gear, motor controllers or other sources of strong magnetic fields.
- ☐ Avoid exposure to direct sunlight and ensure the ambient temperature inside the enclosure that the unit is mounted in will not exceed our specification.

Fixing

B12 Series Modules are designed to be fitted to a flat dry surface using two 4mm screws. Alternatively, by fitting an optional DIN clip, they may be clipped to a rail conforming to BS5584:1978, EN50 022, DIN46277-3.

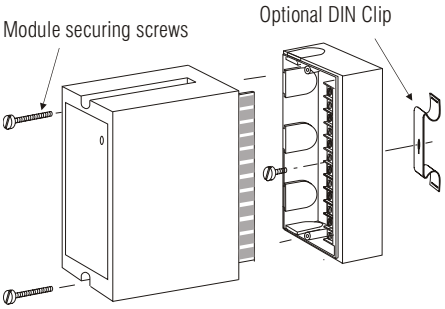
Grommets are provided on three sides of the base section and there are two rear entry knock outs in the bottom.

To gain access to fixing points:

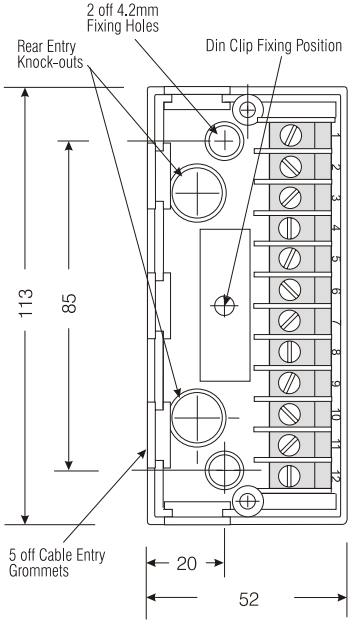
(i) Remove the plug-in module securing screws.

(ii) Gently pull away the plug-in module from the base section.

(iii) To refit the module, align the module edge connectors with the socket in the base and carefully press home.
NB do not overtighten the module securing screws.



Dimensions and fixing positions



Depth of unit 106mm

Wiring and connections

☐ Segregate power supply and signal wiring.

☐ Use screened cable for all signal wiring with the screen earthed at instrument end only.

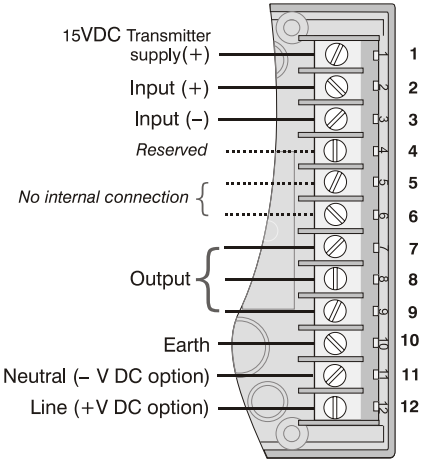
☐ All connections should be made using ferrules.

Screw terminals are provided - wire capacity 2 x 1.5mm2 (approx. 16 AWG).

Access to terminals

WARNING: Ensure that power to the instrument is switched off and signal wiring isolated from hazardous voltages

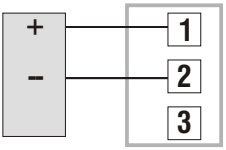
Loosen the two module securing screws. Gently pull away the top section of the module from its base to expose the fixing points and wiring terminals. To refit the module, align the module edge connectors with the socket in the base and carefully press home. **NB** do not over tighten the module securing screws.



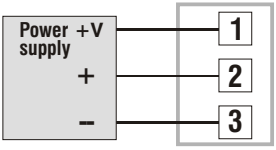
Input connections

Inputs are factory configured for one type of input only - *see data label on enclosure for details of the type fitted.* The input type is not user configurable.

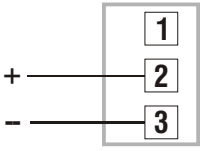
Two-wire transmitter



Three-wire transmitter



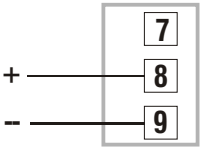
Voltage and current



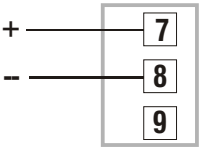
Output connections

For changing the type of output, see Output configuration.

Voltage output

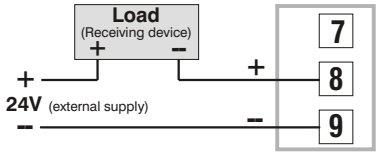


Current output



Outputs continued >

Current sink output



Power supply connections

This instrument is supplied in *one* of two power supply versions.

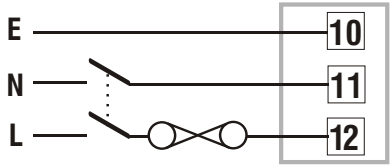
1. AC mains supply either: 110V, 220V or 230V ± 50/60Hz, 5VA.
2. Low voltage supply: 11-32VDC 4W / 12-24VAC.

WARNING: Check that the supply voltage on the data label (on side of instrument) is suitable for the application.

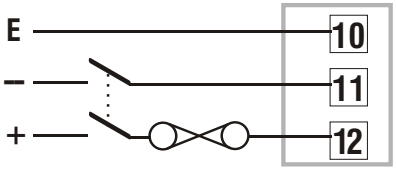
WARNING: Ferrules must be used for AC mains power wiring

Power supply wiring to the instrument should be protected by a suitable fuse and double pole switch - *see below*. The switch should be clearly marked as the isolating switch for the instrument.

AC supply



DC supply



Span and Zero adjustment

NB The instrument is supplied accurately calibrated and under normal circumstances adjustments to Span and Zero are not required.

The Span and Zero controls, accessed through the holes in the front panel, will enable small adjustments to the calibration to be made.

(i) ***Set output Zero****:* with the input signal at its zero setting, monitor the output signal with a suitable instrument and adjust the zero control.

(ii) ***Set output Span****:* with the input at full scale adjust the span control.

(iii) Repeat steps (i) and (ii) readjusting if necessary.

Output configuration

Changing the output configuration requires adjustments to be made to internal links and switches.

Access to internal settings

WARNING: Switch off all supplies and isolate signal and other wiring from dangerous voltages before proceeding.

(i) Remove plug-in module as described in Access to Terminals in the Installation section.

(ii) The plate with the terminal connections label can now be removed by easing apart the longer sides of the module to release the interlocking tongue and groove.

(iii) Note the location of the printed circuit board which must be replaced in the same position. Slide out the board.

Selecting the output range

Please refer to Figs. 1 and 2.

The output signal type and range are selected using a combination of switches. SW1 selects the output type i.e. mA or Volts. SW2 selects the range.

Example:

Output signal required is 4-20mA

SW1 to 'I' position

SW2 positions 2 and 3 to 'ON'

SW2 position 1, 4, 5 & 6 to 'OFF'

Replacing module cover

(i) Replace the printed circuit board ensuring correct location in the module cover slots.

(ii) Replace the plastic plate by locating the side with the two tongues around the protruding printed circuit board and engaging into the mating grooves.

(iii) Press the plate home to engage the single tongue.

Final adjustments

After returning the module to its base section, Span and Zero (*front panel adjustments*) should be checked and trimmed if necessary (*see 'Span and Zero Adjustment' on previous page*). Typical error without trimming will be in the order of 1% of FSD.

Fuse replacement and power supply adjustments

WARNING: Switch off all supplies and isolate signal and other wiring from dangerous voltages before proceeding.

Please note: the operating supply voltage on DC and 24V AC powered versions cannot be changed by the user.

For access to mains supply tappings and fuse, refer to 'Access to internal settings'

Fuse replacement

The fuse holder is located at the edge of the circuit board adjacent to the mains transformer or low voltage power unit (*see Fig 1*).

Fuse size: 20mm x 5mm dia.

Fuse ratings:

AC supply - 100mA Quick Blow

DC supply - 250mA Anti-surge

Changing AC supply voltage

Mains powered units can be adapted for operation on 110V, 220V or 230V supplies.

WARNING: Links for 110VAC and 220VAC must be insulated with silicon rubber sleeving.

Fig 3 provides details of the required link settings which are effected by soldered tinned copper wire links.

Fig 1. Location of output configuration switches

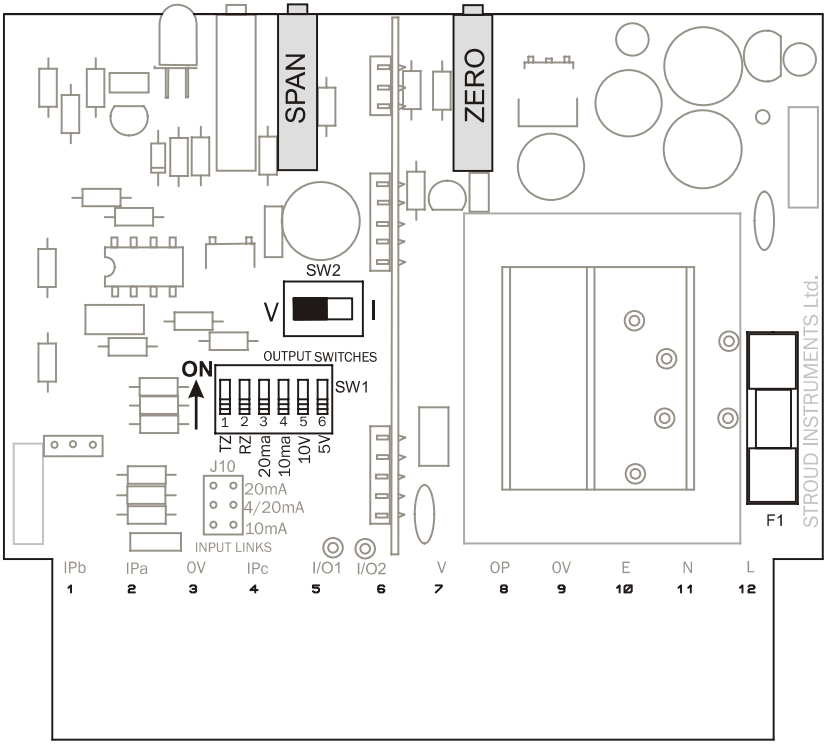
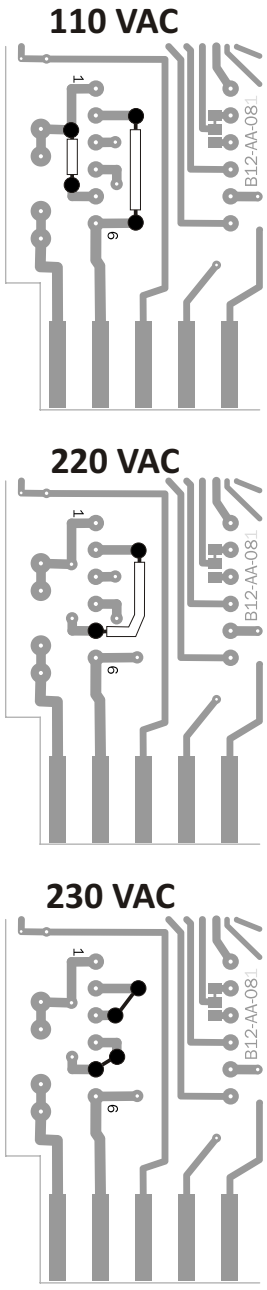


Fig 2. Output Ranging - Switch 1 (SW1) settings

Output signal	SW1-Position ('1' = ON)						SW2 Position
	1	2	3	4	5	6	
0-10 Volts	1	0	0	0	1	0	V
2-10 Volts	0	1	0	0	1	0	V
0-5 Volts	1	0	0	0	0	1	V
1-5 Volts	0	1	0	0	0	1	V
0-10 mA	1	0	0	1	0	0	I
0-20 mA	1	0	1	0	0	0	I
4-20 mA	0	1	1	0	0	0	I

Fig 3 AC mains supply links



Specifications

Notes:

1. Inputs and outputs, other than those shown, including reverse acting (e.g. 4-20mA to 20-4mA) are possible - our sales team will be pleased to advise.
2. Input ranges are factory calibrated for one type of signal and not user configurable.

Inputs

Current from 0-1mA to 0-30mA and Voltage from 0-1V to 0-250V. Typical inputs: 0-10mA (100R), 0-20mA (50R),
4-20 mA (62R), 0-5V, 1-5V, 0-10V, 2-10V (>200k)
Input impedances shown in brackets.

Input Signal No-break Loop Facility

mA input signal loops are maintained when the unit is unplugged from the base section.

Input Overrange Protection

Voltage Inputs: 250 volts RMS or DC, Current Inputs: 50mA

Outputs (user selectable)

0-10mA (2000R), 0-20 mA (1000R), 4-20 mA (1000R)
High impedance output drive options: 0-10mA (5000R), 0-20 mA (2500R), 4-20 mA (2500R)
Maximum output impedances in ohms shown in brackets.
0-5v, 1-5V, 0-10V, 2-10V (500R minimum)
Current sink 4-20mA @ 50 volts max.

Transmitter Excitation Supply

15VDC @ 20mA maximum

Response Time

1 sec as standard.

Isolation

The input and output are isolated from each other and from the power supply.
Maximum Voltage 250V RMS or 400V DC
Resistance between input, output or power supply
50 x 10^6 ohms measured at 1000V DC.

Calibrated Accuracy

± 0.1% FSD at 100% when factory calibrated.
NB Error introduced by User output range changes, typically 1% but may be corrected by span control.

Linearity Error

± 0.1% FSD

Suppression / Elevation Error

± 0.1% FSD

Output Ripple

0.2% RMS of FSD

Load Resistance Effect

0.001% of span / 100 ohm change

Stability

Over 24 hours ± 0.1% FSD,
Over 1 year ± 0.25% FSD

Interference Rejection

Filtering is incorporated to attenuate R.F. and other industrial noise.

Common Mode Rejection

<0.2% error for 250V RMS 50/60 Hz, or 400V DC, common mode signals.

Temperature Coefficients

Zero: ± 0.02% span / °C, Span: ± 0.02% span / °C

Environmental

Temperature: operating -10 to +60°C,
storage -20 to +70°C
Humidity: 0 – 95% RH non-condensing

Power Supply

AC Supply: 110, 220 or 230V ±10% 50/60Hz 5VA
Fuse: 100mA quick-blow (internal)

Low voltage: 11-32VDC 4 W / 12-24VAC
Fuse: 250mA anti-surge (internal)

Supply Voltage Rejection

Span change: <0.02% span / % supply change.

Mechanical

Weight: approx. 0.5kg
Enclosure: Fire retardent materials - PPO base, ABS cover
Screw terminal wire capacity: 2 x 1.5mm^2