

TRIP AMPLIFIERS

B12 Series

User Guide

Continuous development may necessitate
changes in these details without notice

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PROCESS MEASUREMENT, CONTROL & DISPLAY INSTRUMENTATION

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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/control panel in which the unit is located, will not exceed our specification.

Fixing

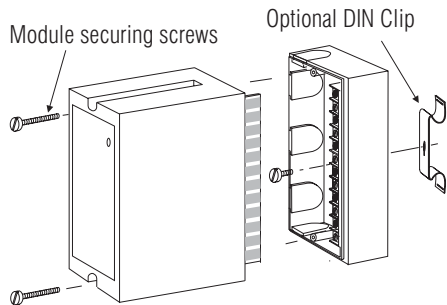
B12 Series Modules are designed to be fitted to a flat dry surface using two 4mm screws. Alternatively, by fitting an optional DIN clip, they may be clipped to a rail conforming to BS5584:1978, EN50 022, DIN46277-3.

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:

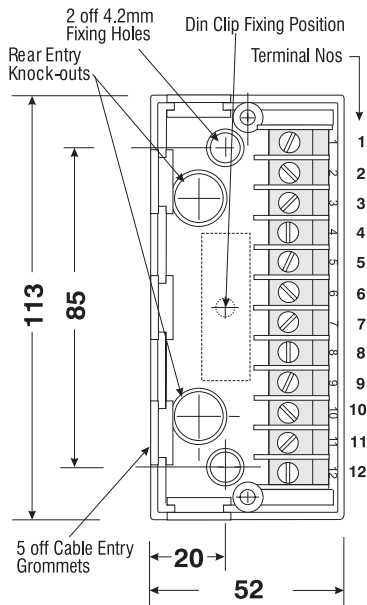
1. Remove the plug-in module securing screws.

2. Gently pull away the plug-in module from the base section.
3. To refit the module, align the 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

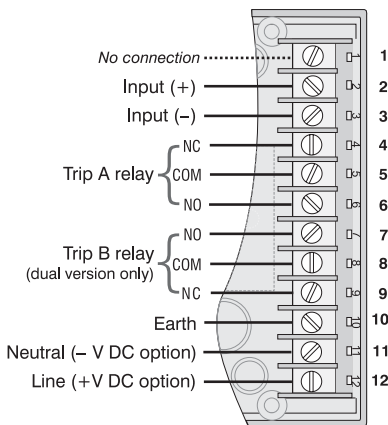
- Segregate power supply and signal wiring.
- Use screened cable for all signal wiring with the screen earthed at *one* end only.
- All connections should be made using ferrules.

Screw terminals are provided - wire capacity 2 x 1.5 mm² (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.

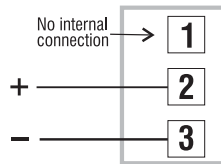


NOTE: Units with mA inputs are supplied with a component connected between terminals 2 and 3. This maintains the signal loop when the instrument is unplugged from its base section.

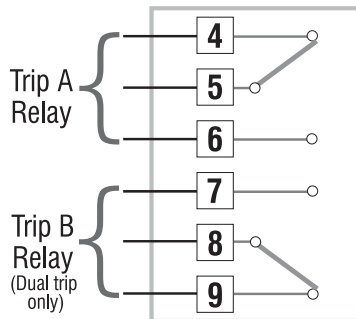
Input connections

Inputs are configured during manufacture to suit the application specified - see *data label on enclosure*. A change in the type of input from voltage to current or vice versa will require a return to factory for reconfiguration.

Voltage and mA inputs



Output connections



Power supply connections

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

1. AC mains supply: either 110V, 200V, 220V or 240VAC, 50/60Hz, 3VA.
2. Low voltage 24VAC
3. DC supply: either 12V, 24V or 48VDC, 3.5W



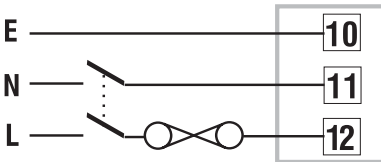
WARNING: Check that the supply voltage on the data label (on top of instrument) is suitable for the application.



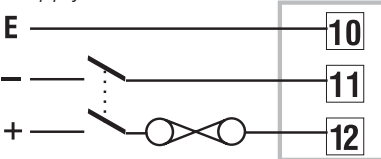
WARNING: Ferrules must be used for AC mains power wiring

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 Mains



DC Supply



Please note:

The unit cannot be changed by the user from one type of power supply version to

another. This conversion can only be done on a return to factory basis.

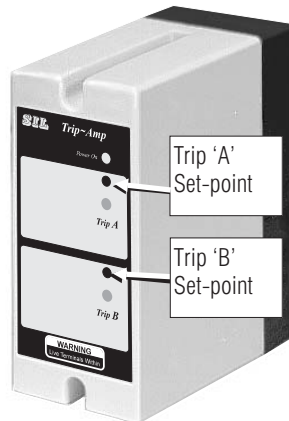
Operation

The B12 Series of trip amplifiers have one input and, depending on the type of unit supplied, either one or two set-points. Output relay(s) change state when the input signal passes the level set by the set-point control. A LED indicator is provided for each output relay. The indicator illuminates when the relay is energised.

Input

Units with current inputs have a zener diode installed between terminals 2 and 3 which provides a 'No-Break Signal' facility. This enables the module to be unplugged without breaking the current loop.

Universal input types (B12-ST and B12-DT) will accept any input signal in the range up to 20 mA span (current input type) or up to 5 volts span (voltage input type). Inputs may be raised or true zero.



Ten-turn Dial Types (B12-ST/K and B12-DT/K) are calibrated to suit the required input.

Set-points

B12-ST (Single Set-Point) and B12-DT (Dual Set-Point)

With these Trip Amplifiers, the trip-point is set up by multi-turn trim pot(s) accessed through holes in the front panel. Trimming of these controls should be carried out using a proprietary insulated trimming tool.

B12-ST/K (Single Set-Point) and B12-DT/K (Dual Set-Point)

These Trip Amplifiers are provided with front panel mounted ten-turn dials scaled 0-100% of the full scale input signal.

Hysteresis

B12 Series Trip Amplifiers have a factory-set hysteresis of approximately $\pm 1\%$ of input signal span.

Trip amplifier configuration

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(s) which must be replaced in the same position. Slide out the board(s).

NB on B12-DT/K and B12-ST/K types the printed circuit board will remain attached to the front panel controls and care must be taken not to apply any strain to the interconnecting wiring.

Re-assembly

- (i) Recheck your link selections.
- (ii) Replace the printed circuit board into the case ensuring that the main board is located in the slots under the LED indicator windows.
- (iii) Replace the bottom plate by first engaging the side with the two tongues into the slots in the case and then press the plate home to engage the side with the single tongue.
- (iv) Plug the reassembled module into the base section and secure with the two captive screws provided - *do not overtighten*.

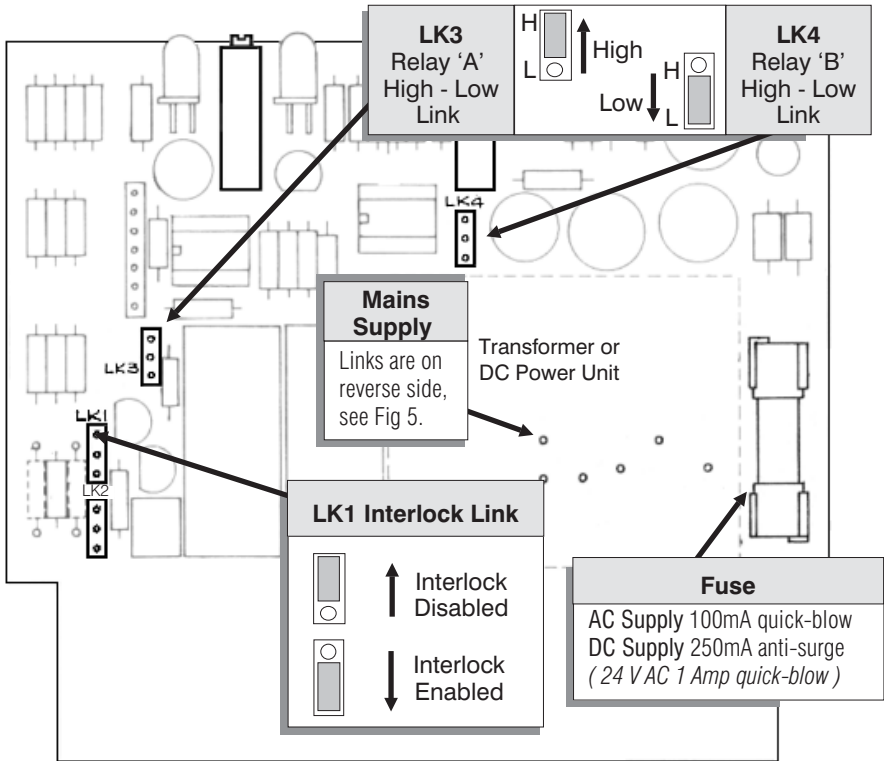
High - Low selection

The High - Low settings determine whether the output relay energises when the input signal falls below the trip point (LOW setting) or when it rises above the trip point (HIGH setting) - see Fig 1.

Interlocked output

This mode, available only in dual trip versions, is enabled by link LK1 (see Fig 1). Two modes of interlock operation are possible and are selected by Links LK3 and LK4. See the *Interlocked Operation* section for a detailed explanation of this function.

Fig 1 User selectable options



Please note: the position of Link 'LK2' is factory set and must not be adjusted.

Interlocked operation

1. Interlocked output triggered by a low level

This mode of operation will enable one relay to energise and not switch off until the input signal reaches the high trip point. (see Fig 3). This mode could be used for controlling a pump filling a tank. Relay 'B' would control the pump circuit - an empty tank would require the pump to be switched on and stay on until the high level was reached when it would switch off. The pump would then remain switched off until the low trip point was reached.

To set up the unit to operate with an interlock triggered by a Low Level set the High - Low programming links as follows:-

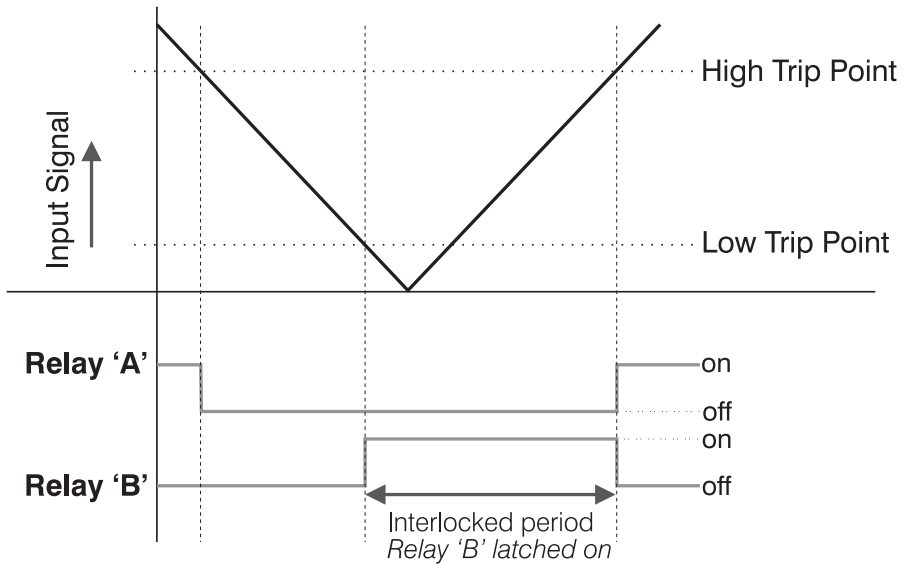
1. Set Link 3 to High ('H')
2. Set Link 4 to Low ('L')
3. Set Link 1 to 'Interlock Enabled'

The front panel controls function as follows:-

- For the High Set Point use the control for Trip Point 'A'
- For the Low Set Point use the control for Trip Point 'B'

Relay 'B' is energised during the interlock period.

Fig 3 Interlock set by low level



2. Interlocked output triggered by a high level

This mode of operation is the inverse of the previous one. In this mode the input signal reaching the high trip point energises Relay 'B' which will not switch off until the low trip point is reached (see Fig 4).

To set up the unit to operate with an interlock triggered by a High Level set the High - Low programming links as follows:-

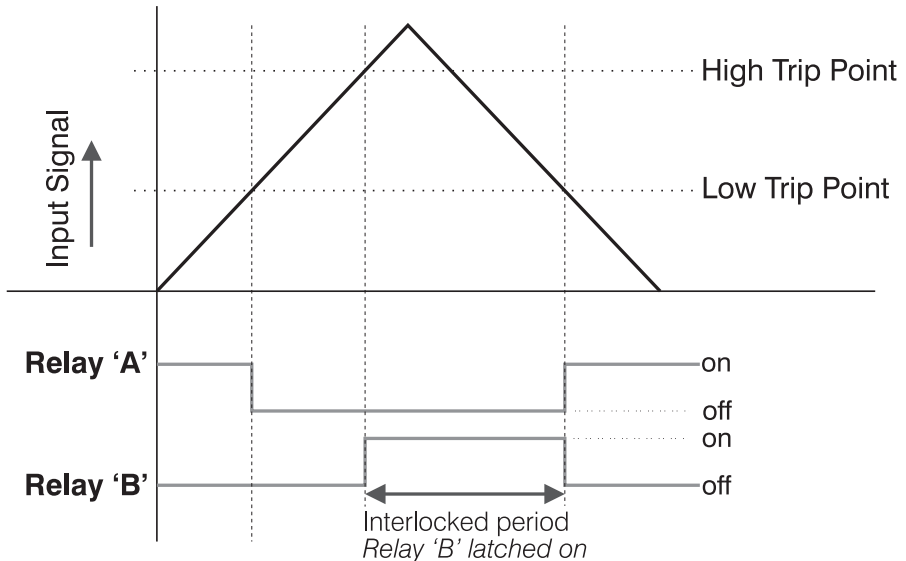
1. Set Link 3 to Low ('L')
2. Set Link 4 to High ('H')
3. Set Link 1 to 'Interlock Enabled'

The front panel controls function as follows:-

- For the Low Set Point use the control for Trip Point 'A'
- For the High Set Point use the control for Trip Point 'B'

Relay 'B' is energised during the interlock period.

Fig 4 Interlock set by high level



Fuse replacement and 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.

See Fig 1 for location of the fuse and ratings.

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

Changing AC supply voltage

WARNING: Links for 110V, 200V and 220V operation must be insulated with silicon rubber sleeving.

Mains powered units can be adapted for operation on 110V, 200V, 220V or 240V supplies. Fig 5 provides details of the required link settings which are effected by soldered tinned copper wire links.

Fuse replacement

The fuse holder is located at the edge of the circuit board adjacent to the mains transformer or low voltage power unit.

Fuse size: 20mm x 5mm dia.

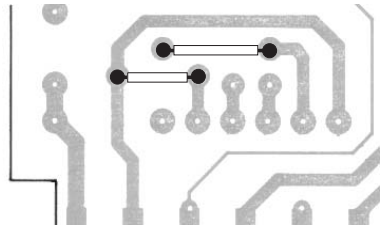
Fuse ratings:

AC supply - 100mA Quick Blow

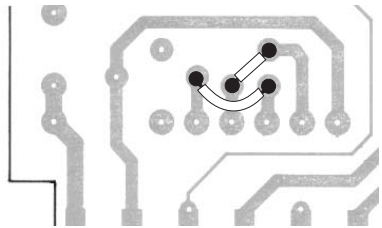
DC supply - 250mA Anti-surge

Fig. 5 AC mains supply links

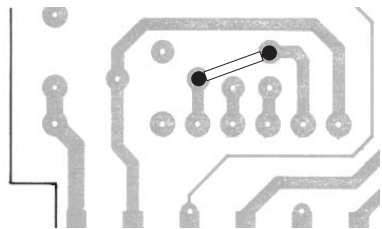
110 VAC



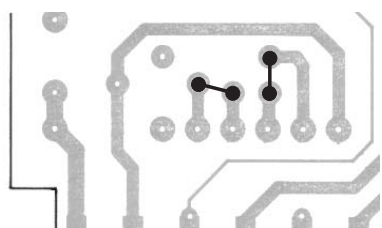
200 VAC



220 VAC



240 VAC



Specification

INPUTS *(other inputs available to order)*

B12-ST & B12-DT Current Input Types

Universal input accepts any signal within the range 0-20mA.

Input Impedance 50 ohms.

B12-ST & B12-DT Voltage Input Types

Universal input accepts any signal within the range 0-5V. Input impedance greater than 200 k ohms

B12-ST/K & B12-DT/K

(calibrated to specified Input Range)

0-10 mA into 100 ohms

0-20 mA into 50 ohms

4-20 mA into 62.5 ohms

0-5v into greater than 200 k ohms

1-5v into greater than 200 k ohms

OUTPUT

Relay with single pole changeover contact.

Contact rating: 5A @ 250V AC resistive
2.5A @ 24V DC resistive

HYSTERESIS

Approximately $\pm 1\%$ of span.

ISOLATION

The outputs are isolated from the supply and input.

REPEATABILITY

The switching point will repeat within $\pm 0.1\%$ of span.

INTERFERENCE REJECTION

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

SERIES MODE AC REJECTION

$< 0.2\%$ error is caused in the set point for 50/60 Hz series mode signals of peak to peak amplitude equal to $2\frac{1}{2}$ times full scale.

COMMON MODE REJECTION

$< 0.2\%$ error is caused in the set point for 250V RMS 50/60 Hz, or 400V DC, common mode signals.

INPUT OVERRANGE PROTECTION

Voltage Inputs: 240 volts RMS or DC

Current Inputs: 50mA

TEMPERATURE COEFFICIENTS

Zero: $\pm 0.02\%$ span/ $^{\circ}\text{C}$

Span: $\pm 0.02\%$ span/ $^{\circ}\text{C}$

TEMPERATURE RANGE

Operating: -10°C to $+60^{\circ}\text{C}$

Storage: -20°C to $+70^{\circ}\text{C}$

SUPPLY VOLTAGE REJECTION

Span change: $< 0.1\%$ span / % supply change.

WEIGHT

Approx. 0.5kg

SAFETY & EMC

Safety: EN61010-1

Immunity: EN50082-1

Emissions: EN50081-1

CE certified