

# **ANALOGUE SUMMATOR**

Type B12-6

**User Guide**

Continuous development may necessitate  
changes in these details without notice

Document Ref: UDB12-6.vp Rev 0



**PROCESS MEASUREMENT, CONTROL & DISPLAY INSTRUMENTATION**

**STROUD INSTRUMENTS LTD**

36-40 Slad Road, Stroud, Gloucestershire GL5 1QW England

Tel: +44 (0)1453 765433 Fax: +44 (0)1453 764256

sales@sil.co.uk <http://www.sil.co.uk>

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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 that the unit is mounted in will not exceed our specification.

## Fixing

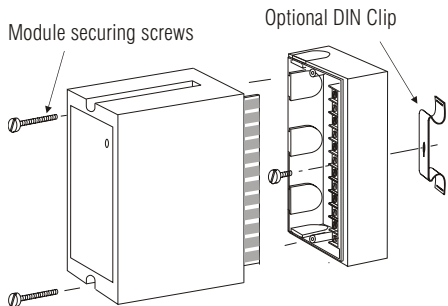
B12 Series Modules are designed to be fitted to a flat dry surface using two 4mm screws. Alternatively, by fitting an optional DIN clip, they may be clipped to a rail conforming to BS5584:1978, EN50 022, DIN46277-3.

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

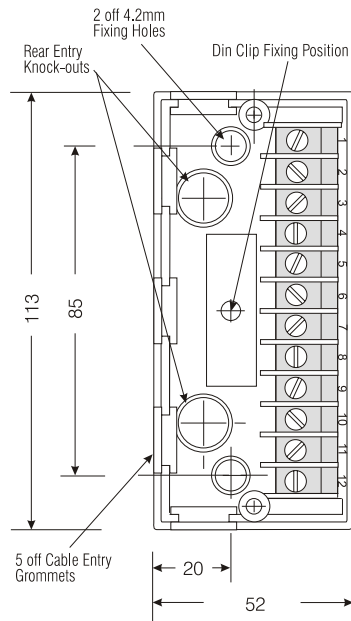
To gain access to fixing points:

- (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.

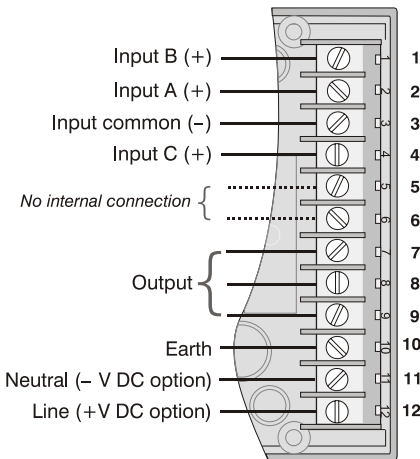
Screw terminals are provided - wire capacity  $2 \times 1.5\text{mm}^2$  (approx. 16 AWG).

## Access to terminals



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

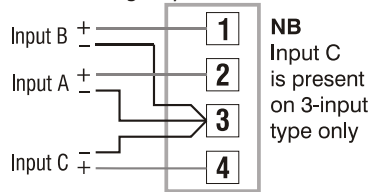
Loosen the two module securing screws. Gently pull away the top section of the module from its base to expose the fixing points and wiring terminals. To refit the module, align the module edge connectors with the socket in the base and carefully press home. **NB** do not over tighten the module securing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



## Input connections

The Summator (*two or three input type*) is configured during manufacture to suit the application specified. - *see label on enclosure for details.* **Note: All inputs must be able to share a common connection.** If they cannot be connected together, a Signal Isolator e.g. type B12-3, must be used to isolate the inputs.

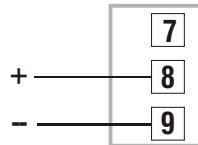
*Current or voltage inputs*



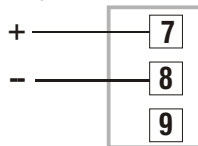
## Output connections

Outputs are calibrated to order and are not user configurable - *see data label on enclosure for calibration details.* A change in the type of output will require a return to factory for re-configuration.

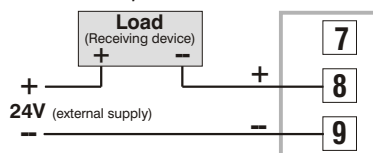
*Voltage output*



*Current output*



*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  $\pm$  50/60Hz, 5VA.
2. Low voltage supply: 11-32VDC 4W / 12-24VAC.



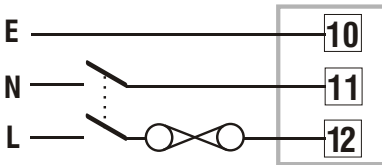
**WARNING:** Check that the supply voltage on the data label (on side of instrument) is suitable for the application.



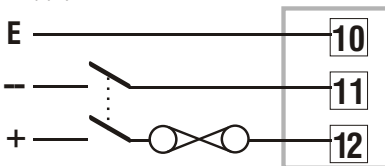
**WARNING:** Ferrules must be used for AC mains power wiring

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



## Operational notes

The output signal is proportional to the sum or difference of the input signals. With equal input ranges, this unit will perform an averaging function.

The summator is calibrated so that each input at full scale will give rise to a percentage of the output signal. As an illustration, typical calibrations would be as follows:

### Example 1 (in percentages)

Input A = 4-20mA giving an output of 0 to +33.33%

Input B = 1-10V giving an output of 0 to +66.67%

### Example 2 (in engineering units)

Input A = 4-20mA representing 0-1000m<sup>3</sup>/h

Input B = 1-10V representing 0-1500m<sup>3</sup>/h

Output = 4-20mA representing 0-2500m<sup>3</sup>/h

### Example 3 (3-input summator/subtractor)

Input A = 4-20mA giving an output of 0 to +70%

Input B = 4-20mA giving an output of 0 to +50%

Input C = 4-20mA giving an output of 0 to -20%

**NOTE:** During normal operation, inputs are required to be such that their sum (or difference) falls within the range of the output signal. In overrange, where input conditions require the output to exceed zero or fullscale, the output signal will be automatically limited to these values.

## 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.

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



# Specifications

## Notes:

1. Input and output ranges are factory calibrated for one type of signal and not user configurable.
2. **All inputs must be able to share a common connection.** If they cannot be connected together, a Signal Isolator e.g. type B12-3 must be used to isolate the inputs.

## 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.*

## Function

$kA \pm kB \pm kC = \text{Output}$ . (The output is always positive. The subtractor result must always be positive).

## Input Signal No-break Loop Facility

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

## Current Input Shunt Error

For current inputs, the summator is calibrated matched with the conditioning resistors mounted in the base section of the module. An error of  $\pm 0.1\%$  can be expected if the instrument is used with an unmatched input resistors.

## Input Overrange Protection

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

## Outputs

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.

## Isolation

The input and output are not isolated from each other but are isolated from the power supply.

## Calibrated Accuracy

$\pm 0.1\%$  FSD at 100%

## Linearity Error

$\pm 0.1\%$  FSD

## Suppression / Elevation Error

$\pm 0.1\%$  FSD

## Output Ripple

0.2% RMS of FSD

## Load Resistance Effect

0.001% of span / 100 ohm change

## Stability

Over 24 hours  $\pm 0.1\%$  FSD,

Over 1 year  $\pm 0.25\%$  FSD

## Interference Rejection

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

## Temperature Coefficients

Zero:  $\pm 0.02\%$  span / °C, Span:  $\pm 0.02\%$  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  $\pm 10\%$  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 retardant materials -  
PPO base, ABS cover

Screw terminal wire capacity: 2 x 1.5mm<sup>2</sup>