

Arithmetic units

AHC812, square root extractor

This unit is designed to operate with any standard process voltage or current source.

It regards both input and output span - which need not necessarily be the same - as 0-1 and will convert 0.01 - 1 (1-100%) of input span to 0.1 - 1 (10-100%) of output span, using a square root law.

Since output accuracy is not specified below 1% input (10% output) a zero cut-off is fitted which will operate when the input moves into this region. It is normally preset to 0.5% and, while the input is between 0% and this level, the output will remain at 0%.

ACCURACY: <0.25% while input remains between 1% and 100%

LINEARITY: <0.25% while input remains between 1% and 100%.

RESPONSE TIME: <1Sec for the output to settle within tolerance after an input step change from 5% to 95%.

Options

Option 'DI', digital display

This is a 3½ digit indicator which is available in 8mm red or green LED or 12mm LCD. It will display any level from -1999 to +1999 and has it's own internal gain and offset controls allowing, for instance, full scale indication over a small portion of actual input span.

The digital display is a separate triple (12E) width module which is mounted at the right hand end of the rack. Under normal conditions, the display will indicate zero. It will indicate the input, output or trip level on any module in the rack, or any connected rack, when the appropriate pushbutton on the module is pressed.

Indication may be either as a percentage of actual input span or in engineering units,

Available with most of the options listed below.

Other options

Suffix	Description
/J★	Input test injection jack.
/K★	RFI protection to BS6667 Part 3.
/L	Latched relay - normally reset by pushbutton on front panel.
/P★	Calibration test point.
/S	Sealed relay.
/V	Variable deadband (1-20% of span. To special order only).

Some combinations of options are physically incompatible. If in doubt, please contact our Technical Sales. Those options marked with an asterisk are also suitable for 2-wire transmitters.

Specification

INPUT DATA

Input source

For details see individual specification

Open circuit response

For details see individual specification.

Input Impedance (Voltage input)

>1Mohm at amplifier input. This will be shunted by burnout drive or input conditioning components.

SUPPLY DATA

Power supplies

AC models	115VAC \pm 20%
	230VAC \pm 20%
DC models	24VDC \pm 2.5V
2 wire	12 - 60VDC

Consumption

Single transmitter	3VA
Trip amplifier	3VA
Transmitter/trip	5VA
2 Wire transmitter	250mW

OUTPUT DATA

Output signals

Standard units

Any constant current from 0-100uA to 0-20mA (at up to 20V loop) or any constant voltage from 0-1V to 0-10V (at up to 20mA loading).

2-wire units

4-20mA or 10-50mA as modulation of supply voltage.

Response time

<400mSec. Unless otherwise stated.

Relay specification

DP/DT or SP/DT for each trip, unless otherwise stated. Contacts are rated at 250VAC, 2A, 100VA (Resistive).

Relay function

Selected by PC link. Default is normally energised, relay to de-energise on trip (fail safe operation).

Relay status

Indicated by a red LED for each trip, mounted on the front panel. Lit when relay is energised.

Controls

ZERO	\pm 25%
SPAN	\pm 50%
TRIP (When fitted)	0-100%
DEADBAND (When fitted)	1-20%

CONDITIONS

Ambient temperature

Working	-20°C to +60°C
Storage	-40°C to +70°C

Humidity

From 5% to 95% R.H.

Vibration

1g at 15Hz to 150Hz.

ELECTRICAL STANDARDS

Insulation Input-output-contacts-earth-channel

1000V RMS continuous. 2000V for 20uSec. Derate to 500VDC for option 'K' enclosures.

Fusing

Power supply fused.

WIRING AND MOUNTING

Terminals

For conductors up to 2.5mm².

Weight

<1kg per module.

Position

Any position is acceptable.

Mounting

Standard units have a 3U by 4E front panel and up to 21 of these may be mounted in a 19" rack. Some units are double width and a 19" rack will accept up to 10 of these. Both types may be freely intermixed.

Additional protection

Enclosures are available to NEMA 12 oiltight, NEMA 4 watertight and IP54 for N-protection.

PERFORMANCE

Input/output linearity

<0.1% error, unless otherwise stated.

Series mode rejection

<0.1% error for 50Hz input at 5% of span amplitude.

Common mode rejection

<0.1% error for 250V RMS.

Temperature effect on zero

<0.02% per °C.

Temperature effect on span

<0.01% of span per °C or <0.1°C per °C, whichever is the greater.

Temperature effect on suppression/elevation

<0.02% of suppression/elevation per °C.

Supply voltage effect

<0.01% per % input change.

Trip adjustment

Infinitely variable by multiturn potentiometers, which are accessible through the front panel.

Deadband

Standard 1%. Also available adjustable from 1 to 20% by multiturn potentiometer. (To special order only)

RFI rejection

Standard units have some RFI rejection due to their design and construction. However, for extra protection to BS6667, specify option 'K'.

Permissible input overload

mV input	20V
DC voltage input	200V
DC current input	500%
AC voltage input	200%
AC current input	500%
Resistance input	6V

Mounting and wiring

Units are designed for high density use, the front panel measuring only 3U high by 4E wide, or by 8E wide as double width units. These types may be freely intermixed with single width units up to the maximum width of 84E in an AMELEC supplied 19" rack. Thus, up to 21 standard or 10 double width units may be accommodated.

The racks are manufactured from Anodised aluminium extrusion and are normally supplied without top and bottom covers. However, when option 'K' is specified, all covers are fitted and the entire assembly has an Achroma finish. Additionally, the rear of the rack is extended to accommodate the RFI protection components.

Double width units consist of two printed circuit boards, which contain all the circuitry, at the front of which is mounted an anodised aluminium front panel. This contains two captive fixing screws, a handle and provides access to any customer accessible controls and indicators.

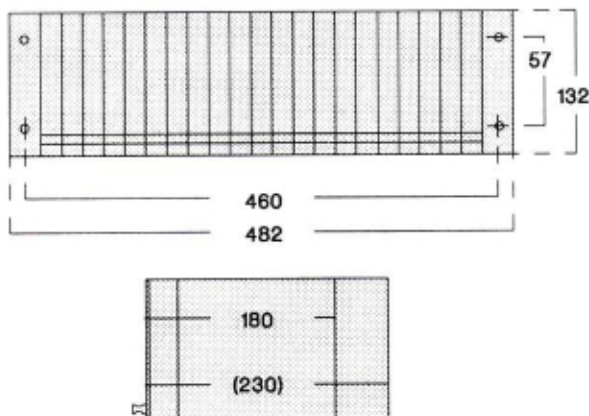
All input, output and supply connections are made via DIN41612 male connectors which are mounted at the rear of the printed circuit boards. These mate with suitable connector assemblies mounted at the rear of the rack.

The individual connector assemblies are built to suit the type of unit with which they will be used. The single width type is 20.3mm wide and contains a single DIN41612 connector and terminal block. The double width type is 40.6mm wide and contains two of each.

Both types of connector assembly are built on double sided, through plated, printed circuit board which transfer all connections between the edge connectors and terminal blocks. In the case of double width connector assemblies, this printed circuit board also carries all the inter-PCB connections.

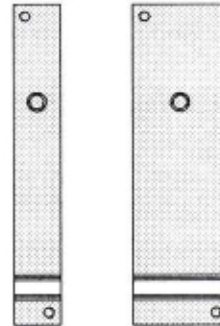
In the following drawing, all dimensions are in mm. Figures in brackets show the added depth of the 'K' rack to house the RFI protection components.

19" Rack mounting



Racks should not be mounted closer together than 485mm horizontally or 135mm vertically. They would normally be mounted further apart than this for ease of wiring. At least 180mm must be left at the front of the rack to allow for module withdrawal.

Front panels



Shown above are typical single and double width panels. The captive fixing screws, supply indicators and handles are shown but other controls are not, since the position of these will vary from module to module.

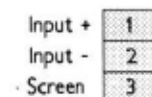
The front of the handle has a recess to allow for the fitting of an identification or tag label.

Input wiring

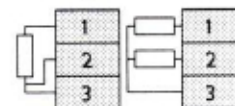
In many cases, particularly with multiple input units, input wiring details are given in the individual instrument specification sheets. However, many units are specified for single input from process, millivolt, RTD or thermocouple sources. Details of all types of standard input are given below.

On single width modules, the input is wired to the upper three terminals on the terminal block. On double width modules, it is similarly wired to the right hand terminal block.

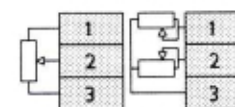
Thermocouple, millivolts, process.



Resistance temperature sensor (RTD)



Slidewire or potentiometer

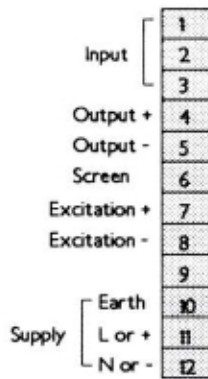


The latter two drawings show the alternative wiring for single and differential input.

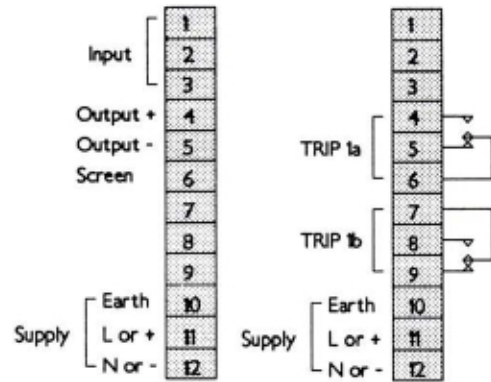
Mounting and wiring

Output/relay/supply wiring

Transmitters



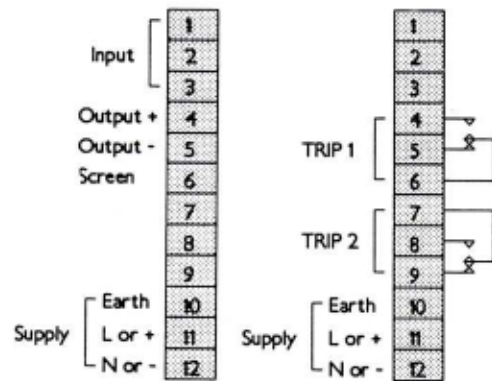
Transmitter/single trip



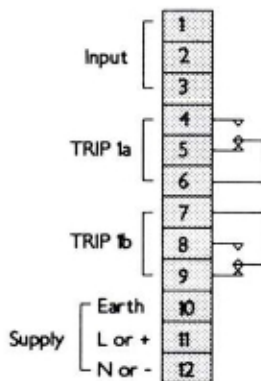
The 'screen' terminal shown above is not necessarily connected to earth. It may, however, be used as an earth bonding point since it will not be internally connected elsewhere.

Also shown is the excitation output; when option 'M' is specified and wired out to the field.

Transmitter/double trip



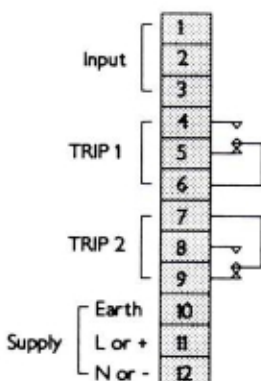
Trip amplifier (Single trip)



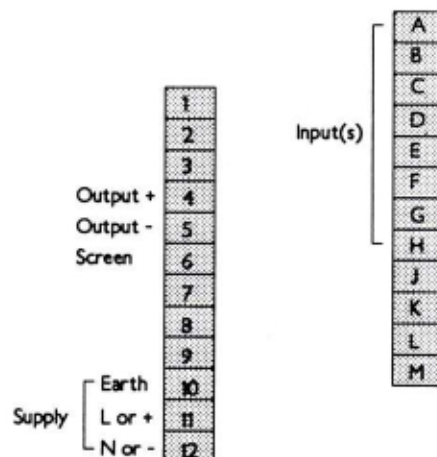
As with single width units, the 'screen' terminal is not necessarily connected to earth but does provide a convenient earth bonding point.

Trip/transmitters also have double pole contacts on single trip units and single pole contacts per trip on double trip units.

Trip amplifier (Double trip)



Double width arithmetic unit



WIRING ACCESS

From the above, it may be seen that a single trip has double pole relay contacts wired out while a double trip has single pole contacts per trip.

Wiring access is invariably from the left and this convention has been followed on all input, output and supply wiring drawings.