

# AHC Series

**AMELEC**  
*Signal* ✓ *Conditioning*

## INDUSTRY STANDARD 'AH' RANGE SIGNAL TRANSMITTERS, TRIP AMPLIFIERS, ARITHMETIC UNITS



- Suitable for input from thermocouple, millivolt, RTD, slidewire or process signals.
- Transmitters available for single output, some with trip. Trip amplifiers for single or double trip. Arithmetic units with various functions.
- Trip points set by multiturn potentiometer. These, and other major controls, are accessible through the front panel. Other controls internally accessible.
- Supply voltages of 120VAC, 240VAC, or 24VDC available at no additional cost. All units individually fused and front panel supply indicators fitted.
- Digital indication of input and trip points may be specified, scaled as a percentage of input span or in engineering units. Mounted separately in the rack.
- RFI protection to BS6687, Part 3 available for all units.
- Manufactured and tested to BS5750, Part 2.
- AMELEC standard 10 year guarantee.

## About Us

Originally formed in February 1975, AMELEC remains a wholly owned British manufacturing company celebrating our 35th year anniversary. In 2010 & 2011 we were awarded **100% score** in **quality** accreditation by the Achilles-UVDB verify scheme.

The instrumentation that AMELEC offers to the market place is based on analogue techniques, using readily available discrete components. The instruments contain no time dependent or microprocessor circuitry, are suitable for use in SIL 1, 2 or 3 rated safety systems/loops & all covered by up to 10 Year warranty.

Our design & everyday application engineering principles used in the instruments are based on well tried, proven in use for over thirty years, linear operational amplifier circuitry. Each instrument can be considered as a number of functional blocks assembled together to produce a specific control function.

A Signal Conditioner / Transmitter would comprise of an input circuit; a modulator / demodulator stage; an output circuit and the power supply/regulation circuitry. A trip amplifier might use the same input circuit, this time a comparator and relay driver stage plus the power supply / regulation circuitry.

By combining these functional blocks together we have produced a comprehensive range of Trip Amplifiers, Transmitters, Signal Converters / Isolators, Signal Splitters/Boosters, combined Trip Transmitters, Arithmetic (Add / Subtract / Select / Multiply / Divide) units, Power Supplies, Strain Gauge, Frequency & AC I/V Transducers, as well as Hart compatible units. The circuit building blocks we use today are essentially the same as the ones we have used for the last thirty years.

To confirm that the instruments are compliant with the latest standards, AMELEC have submitted a range of instruments with all the various circuit blocks in them to the test houses. The reference / standards used at the test houses have been:- the CEGB's EES1989, the BS6667, IEC801 and more recently the IEC61000. All instrumentation produced by AMELEC is controlled under our Lloyds approved **ISO 9001:2008 Quality system**.

Our vast client base is spread across all process industry sectors; originally to the likes of the CEGB, BNFL, GEC, British Gas, ICI, BP & Shell, today AMELEC continues to supply quality instrumentation to the Nuclear, Power Generation, Oil & Gas, Chemical, Pharmaceutical, Petrochem, Utilities, Food & Brewery sectors, as well as to many other general manufacturing industries & the Water Authorities throughout.

### Here are some of our clients:



Tel: 01908-567003

E-mail: sales@amelec-uk.com

www.amelec-uk.com

Fax: 01908-566735

Cochran Close, Crownhill (Industry), Milton Keynes

MK8 0AJ



**Client Feedback**

*"I recently had one of your trip amplifiers go faulty on me. The said item is at least 21 years old, and had been in service for all this time. I was really pleased when you told me that you could supply me with a direct replacement that would not need any modifications done to make it fit. It is very rare for electronic equipment not to be obsolete after a couple of years, never mind 21 years!"*

*In all my dealings with your company I have always been impressed with the quality of your products. The manuals provided with each item are excellent, as is your after sales technical help. I think that your 10 years warranty speaks volumes about your faith in your products. I would never hesitate I recommending your company to anyone"*



*"Many thanks for your prompt response.....Great Service!"*



*"Thanks for the fast response."*



*"Thank you for the great service."*



*"Thanks again for the prompt response."*



*"Thanks for your support."*



*"This is just what we needed, so many many thanks."*



*"Many thanks for your very prompt service...we thank you for helping us on this urgent request, it is much appreciated."*



*"Thank you very much...please say thanks to Oscar & David."*



*"I'd like to thank you for your quick response to our request, and for getting the item to us on time"*



*"I just want to say thanks to you and your staff for your speedy response and efforts, received the unit yesterday and works a treat!"*

# 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 2.5mm<sup>2</sup>.

### 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

## AHC811, scale and bias transmitter

Models may be specified for input from thermocouple, millivolt, RTD, slidewire or process source.

When RTD or slidewire input is specified, third wire compensation is standard to reduce the effect of lead resistance. Thermocouple units have automatic cold junction compensation.

The output span may represent any portion of the input span, with control of offset and gain being by multiturn potentiometers, accessible through the front panel.

Output may follow input (rising input = rising output) or have a reversed characteristic (rising input = falling output).

Many other combinations are possible since the unit is designed to be customised to suit individual applications. Please consult our Technical Sales Department for further details.

## 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%.

## AHC814, averager/adder/subtractor

This unit will accept up to four current or voltage inputs, which need not necessarily be of the same type but do share a common 0V. These inputs may carry any sensible weighting, to suit specific requirements.

The unit may be configured to perform a wide variety of addition and subtraction functions and these are best explained with typical examples:-

$$(a) \quad O/P = \frac{I/P1 + I/P2 + I/P3}{3} \quad (b) \quad O/P = \frac{I/P2}{2} + \frac{I/P3}{3} + (5 \times I/P4) - I/P1$$

$$(c) \quad O/P = (.3 \times I/P1) + (.2 \times I/P2) + (.6 \times I/P3) - (.5 \times I/P4)$$

$$(d) \quad O/P = \frac{I/P2}{2} + \frac{I/P4}{4} + 0.5$$

Many other combinations are possible since the unit is designed to be customised to suit individual applications. Please consult our Technical Sales Department for details.

This is a double (8E) width unit.

### INPUT WIRING

TB1	
Input 1 +	1
Input 1 -	2
Input 2 +	3
Input 2 -	4
Input 3 +	5
Input 3 -	6
Input 4 +	7
Input 4 -	8
Screen	9

# Arithmetic units

## AHC816, high/low limiter

Models may be specified for input from thermocouple, millivolt, RTD, slidewire or process source.

When RTD or slidewire input is specified, third wire compensation is standard to reduce the effect of lead resistance. Thermocouple units have automatic cold junction compensation.

Under normal conditions, the output will follow the input. However, two additional controls are fitted to establish upper and lower limits on the output.

The HIGH limit may be adjusted over the range 40% to 100% and the LOW limit over the range 0% to 60%. Both these controls are blindset potentiometers, accessible through the front panel.

## AHC819, sample/hold transmitter

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

When the unit is in 'SAMPLE' mode, the output will follow the input with little or no delay but, when put into 'HOLD' mode, the output will remain at the level it was at, when put into this mode, indefinitely. Digital techniques are employed to ensure that the held output will not 'droop', no matter how long the unit is kept in this mode.

'HOLD' or 'RESET' control may be by normally open or normally closed contact or by normally high or normally low voltage drive of between 5V and 12V.

Control is effected with a single drive, wired to the 'HOLD' input, with the customer specifying which mode is required for which control condition.

This unit may also be supplied as a peak detector, where the output will follow the input all the while it is rising but will remain at the highest level so far attained if the input falls. When used in this mode, the 'RESET' input will set the output to zero, regardless of input.

This is a double (8E) width unit.

### INPUT WIRING

	TB2
Input +	A
Input -	B
HOLD +	C
HOLD -	D
RESET +	E
RESET -	F
	G
	H

For output and supply wiring, see page 14.

## AHC821, lead/lag transmitter

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

When operated in 'LAG' mode, the output will follow the input with a limit on the output rate of change. This limit is digitally derived and is extremely linear.

When operated in 'LEAD' mode, if the input undergoes a step change, the output will also make a step change, in the same direction, then ramp to the new output level at the desired rate. The output step change may be set anywhere in the range 10% - 1000%.

Two separate digital ramp generators are included, each adjustable from 1 Sec to 6000 Secs for a 100% output change. It is therefore possible, in both modes, to have different rates of change for rising and falling outputs; allowing, for instance, a very slow increase of current into an actuator but a very rapid decrease in current, should the input to the unit drop.

The AHC821, in 'LAG' mode, replaces the analogue version of this product, the AHC818.

# Arithmetic units

## AHC853, linear integrator

### INPUT/OUTPUT WIRING

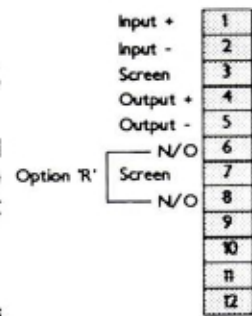
This unit is designed to accept input from any standard voltage or current source.

It will provide continuous integration and totalisation of quantities such as; flow, BTU, watt/hours volt/hours, etc.

Output pulses are 24V, 30mSec and are suitable for driving most electro-mechanical counters. If option 'R' is specified, output is also 30mSec pulses from a set of voltage free contacts. When this option is specified, the unit must be mounted with the front panel vertical.

Output pulse rate is continuously adjustable from 0 - 50 to 0 - 50000 pulses per hour.

To ensure that spurious pulses are not generated at very low input levels, a zero cut-off control is fitted. This may be adjusted from 0 - 2% of input but is normally preset to .5%.



For supply wiring, please see page 14.

## AHC854, square root integrator

### INPUT/OUTPUT WIRING

This unit is designed to accept input from any standard voltage or current source.

It will provide continuous integration and totalisation of the output of devices such as; d/p flow transmitters, etc and, since it uses a square root law, enables total flow to be displayed in engineering units,

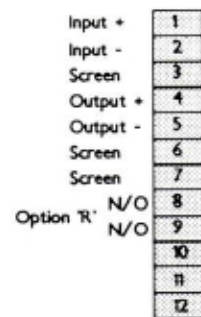
Output pulses are 24V, 30mSec and are suitable for driving most electro-mechanical counters. If option 'R' is specified, output is also 30mSec pulses from a set of voltage free contacts. When this option is specified, the unit must be mounted with the front panel vertical.

Output pulse rate is continuously adjustable from 0 - 50 to 0 - 50000 pulses per hour.

To ensure that spurious pulses are not generated at very low input levels, a zero cut-off control is fitted. This may be adjusted from 0 - 2% of input but is normally preset to .5%.

LINEARITY: <0.25% for inputs from 1 - 100%. Below 1% input, output is not specified.

This is a double (8E) width unit.



For supply wiring, please see page 14.

## AHC871, rate of change

This unit will accept input from any standard process voltage or current source.

The unit will monitor the rate of change of a rising or falling input ramp. This ramp may be anywhere in the range 0 - 10 Secs to 0 - 4000 Secs for a 100% change. Response time is dependant on ramp rate; the unit monitoring period being set to 1% of total ramp time.

Output may be proportional to a rising input, a falling input or both. In this latter case, the output is normally set to be 50% with no input change; rising to 100% for a maximum rate rising ramp and falling to 0% for a maximum rate falling ramp.

ACCURACY: <1%

LINEARITY: <1%

This is a double (8E) width unit.

# 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 seperate 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.

## Option 'M', power supply

This is very similar to the AHP901/1 described on page 8 but is mounted internally. When fitted, it allows a standard unit to provide power to an external device, such as a strain gauge, input pre-amplifier or a 2-wire transmitter.

The output is adjustable over the range 2-25V at any current up to 25mA by an internal potentiometer which may, optionally, be fitted to the front panel. Load variation is better than 10mV over the full current range.

Depending on application, the output of this power supply may be wired to terminal block 2 or to unused terminals on terminal block 1. When used to power a 2-wire transmitter, the power supply output is wired internally on the unit in series with the current sensing shunt resistor, allowing full 2-wire operation.

Use of this option will normally add 4E to the width of a unit.

## 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.



# 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.

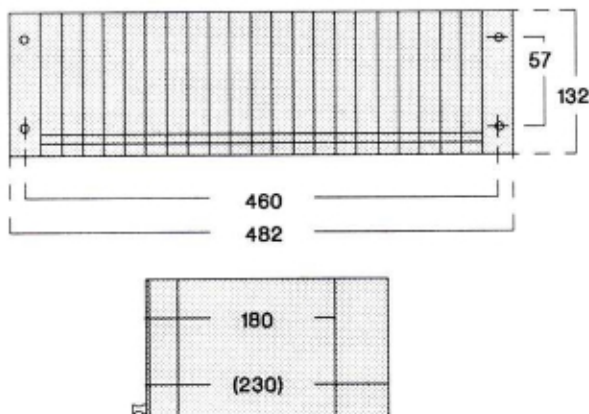
All input, output and supply connections are made via DIN41612 male connectors which are mounted at the rear of the printed circuit boards. These mate with suitable connector assemblies mounted at the rear of the rack.

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.

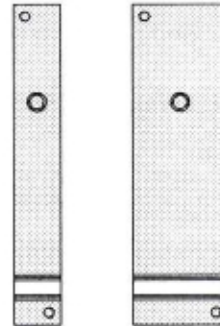
In the following drawing, all dimensions are in mm. Figures in brackets show the added depth of the 'K' rack to house the RFI protection components.

## 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.

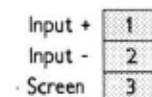
The front of the handle has a recess to allow for the fitting of an identification or tag label.

## Input wiring

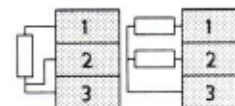
In many cases, particularly with multiple input units, input wiring details are given in the individual instrument specification sheets. However, many units are specified for single input from process, millivolt, RTD or thermocouple sources. Details of all types of standard input are given below.

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.

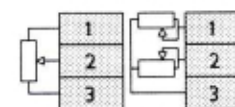
### Thermocouple, millivolts, process.



### Resistance temperature sensor (RTD)



### Slidewire or potentiometer

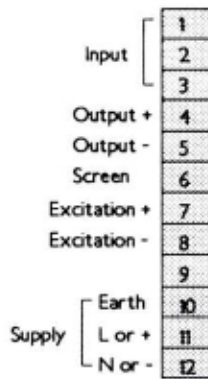


The latter two drawings show the alternative wiring for single and differential input.

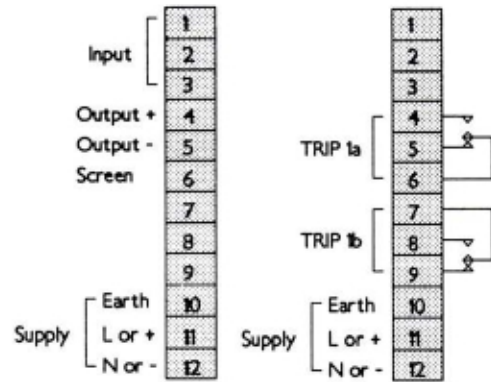
# Mounting and wiring

## Output/relay/supply wiring

### Transmitters



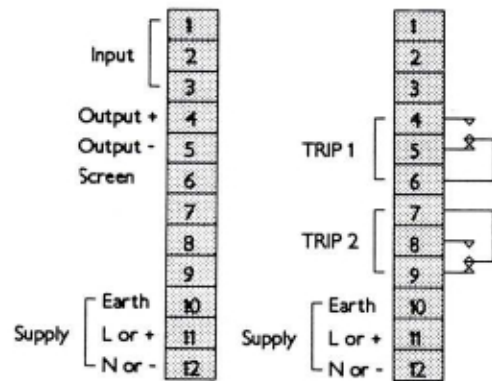
### Transmitter/single trip



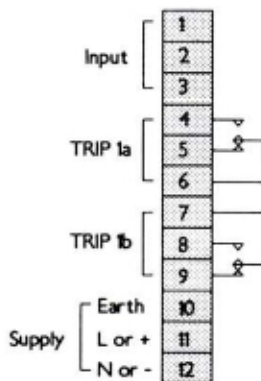
The 'screen' terminal shown above is not necessarily connected to earth. It may, however, be used as an earth bonding point since it will not be internally connected elsewhere.

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

### Transmitter/double trip



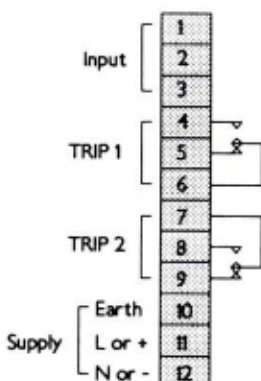
### Trip amplifier (Single trip)



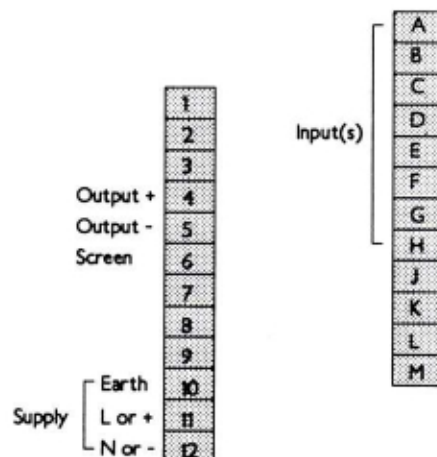
As with single width units, the 'screen' terminal is not necessarily connected to earth but does provide a convenient earth bonding point.

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.

# Additional information

## Expansion to the range

The 'AH' range is still comparatively recent and is constantly being expanded. If the application you require is not covered in this catalogue, please contact our Technical Sales Department as the product may already be in process of being engineered.

## AGS products

Over the years, Amelec have been called upon to solve a wide variety of process control problems. Many of the resultant products have proved so successful they have become part of our standard range. Indeed, some appear in this catalogue as standard products.

Other products, however, are specifically designed to solve a particular problem. These models do not have sufficient demand to become standard products but, since they are manufactured to the same standard, they are kept on file, ready to solve similar problems for subsequent clients.

If you have a process control problem, please ask for our shortform AGS list. Alternatively, contact our Technical Sales Department, giving full details of the problem and they will either recommend an existing AGS product or design one to suit your particular application.

## Warranty and service

All Amelec products are guaranteed for ten years against faulty components or manufacture but not against misuse.

To claim under this warranty, equipment should be returned, carriage paid by the customer, to Amelec Instruments, Cochran Close, Crownhill, Milton Keynes, MK8 0AJ, together with details of the fault.

Attempted repairs or component replacement during the warranty period may render the warranty null and void, unless authorised by Amelec.

Amelec will undertake any repairs and will also supply replacement printed circuit board assemblies on an exchange price basis. Please contact the Technical Sales Department for further details.

Where the reported fault is a site problem, Amelec will make their own technical staff available to offer assistance. This service will be charged to the customer at the rate currently in force.

## Ordering

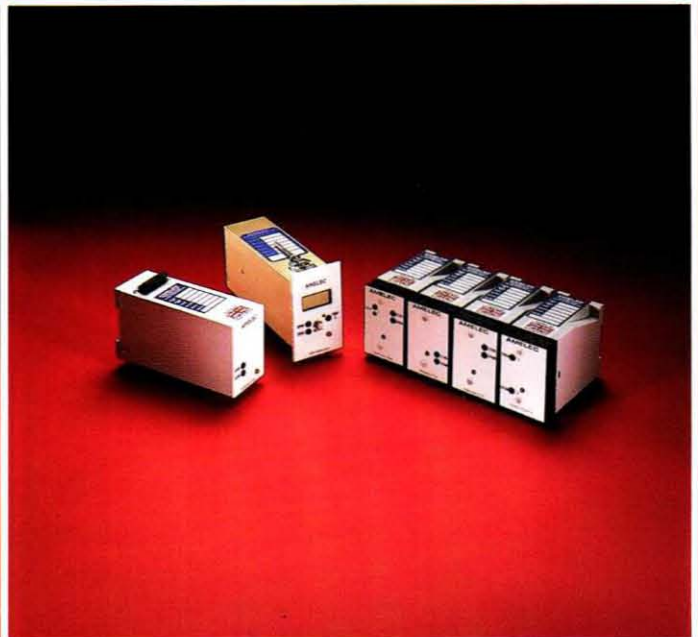
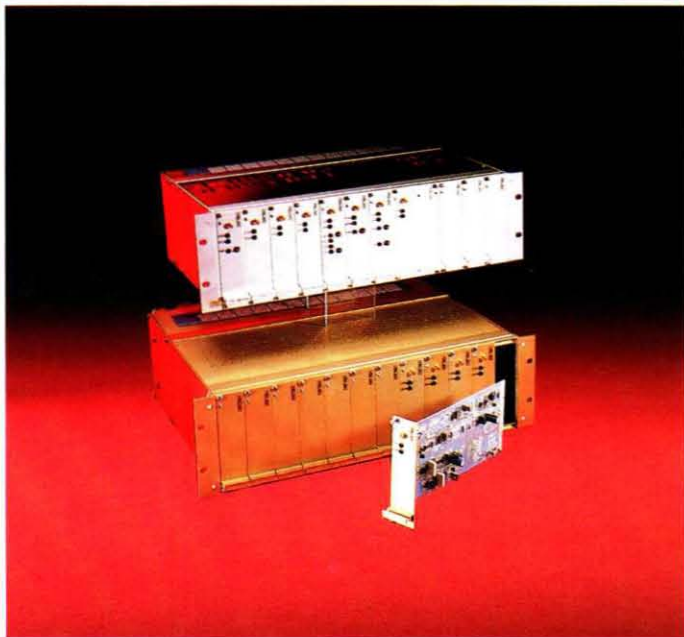
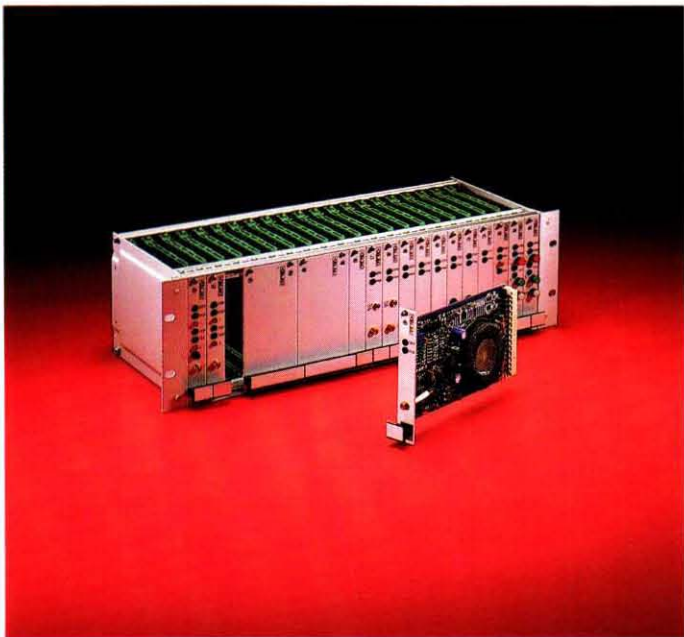
**When ordering, please give the following details:-**

1. Model number
2. Supply voltage and frequency
3. Mounting - Surface, Panel, Single end access or Rack
4. Input span, output span, offset and source
5. Open circuit response - If not specified, default is upscale for thermocouple, millivolt and resistance input units, downscale for process
6. Relay status and mode - If not specified, default is normally energised and single trips are set to Hi, double trips to Hi/Lo. LEDs are lit when relays are energised
7. Any options required
8. Information appropriate to any options ordered

A complete range of Trip amplifiers, Signal conditioners and Arithmetic units are also available in these complementary ranges:-

**A** 4U X 12E Surface, Panel, SEA and Rack **AB** 3U X 7E Rack. **AD** DIN rail and Surface. **AH** 3U X 4E Rack

Please ask for our other catalogues



Cochran Close Crownhill Milton Keynes MK8 0AJ

[www.amelec-uk.com](http://www.amelec-uk.com) Tel: 01908 567003 Fax: 01908 566735 [sales@amelec-uk.com](mailto:sales@amelec-uk.com)