

ADT Series

AMELEC

SIGNAL CONDITIONING

Compact 'A' Series

SIGNAL TRANSMITTERS, TRIP AMPLIFIERS, ARITHMETIC UNITS



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Cochran Close, Crownhill (Industry), Milton Keynes

MK8 0AJ

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:



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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!"

AD SERIES GENERAL 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 115 / 230 VAC $\pm 20\%$

DC models 24VDC $\pm 2.5V$

2 wire 12- 60VDC

Consumption

Transmitter / Trip amplifier 3VA

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.

Typical response time for a Trip with 4-20mA input; <150uS for 1% step change and <100mS for 100% step change.

Relay specification

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

Vibration

1g at 15Hz to 150Hz.

ELECTRICAL STANDARDS

Insulation Input-output-contacts-earth

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 will fit onto a low profile 35mm DIN rail or be surface mounted by corner fixing holes. Option 'K' and 'DI' enclosures are suitable for DIN rail or panel mounting.

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

<01% error for 50Hz input at 5% of span amplitude.

Common mode rejection

<01% 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

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 meet the CE requirements. However, for additional RFI protection, 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

Trip amplifiers

ADT110 series, thermocouple and millivolt

These units will accept input from any BS4937 and ISA B,E,J,K,S,R,T or Pallaplat thermocouple, or millivolt source.

Thermocouple input units have automatic cold junction compensation.

Normal minimum span 4mV, lower ranges available to special order.

Source resistance up to 1000ohms for specified performance.

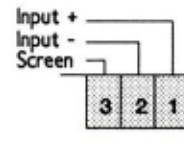
Open circuit response may be specified as upscale or downscale.

Input impedance 1Mohm, shunted by burnout drive.

Models available

| INPUT | Single trip | Double trip |
|--------------|-------------|-------------|
| Thermocouple | ADT111 | ADT112 |
| Millivolts | ADT115 | ADT116 |

INPUT WIRING



For output and supply wiring please turn to page 14.

ADT120 series, resistance temperature sensor

These units will accept input from any 2, 3 or 4 wire resistance temperature sensor.

Third wire compensation is standard to overcome lead resistance variation.

Normal minimum span 10 ohms, lower ranges available to special order.

Open circuit response is normally upscale but may be specified downscale.

Input and third wire drives are constant current, for improved linearity.

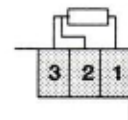
Differential operation may be specified, using 2 x 2 wire sensors.

Models available

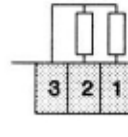
| INPUT | Single trip | Double trip |
|--------------|-------------|-------------|
| Single | ADT121 | ADT122 |
| Differential | ADT125 | ADT126 |

INPUT WIRING

Single Input



Differential Input



For output and supply wiring please turn to page 14.

ADT130 series, process

These units will accept input from any standard DC voltage or current source.

On voltage units, input impedance is 1Mohm.

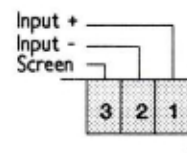
On current input units, the shunt resistor absorbs a maximum of 400mV allowing many units to be used in series, even on a modest loop.

Input currents from 0-100uA to 0-100mA or voltages from 0-400mV to 0-200V may be used and any input may carry a 20% offset

Models available

| Single trip | Double trip |
|-------------|-------------|
| ADT131 | ADT132 |

INPUT WIRING



For output and supply wiring please turn to page 14.

Trip amplifiers

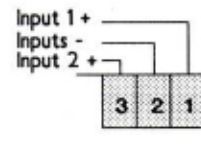
ADT139, process input deviation trip

INPUT WIRING

This unit will compare two inputs which need not necessarily be of the same type but do share a common 0V.

The upper trip will change state when Input 1 exceeds Input 2 by more than the level set on the upper potentiometer. The lower trip will change state when Input 2 exceeds Input 1 by more than the level set on the lower potentiometer. Potentiometers represent 0-50% of span.

Adjustable deadband may also be fitted, controlled by blindset potentiometers, to accurately control the point at which the trip relays return to normal. Deadband potentiometers represent 1-20% of span. (To special order only)



For output and supply wiring, please turn to page 14.

ADT140 series, slidewire and potentiometer

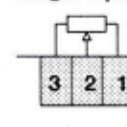
These will accept input from any 2 or 3 wire slidewire or potentiometer. Third wire compensation is standard to overcome lead resistance variation. Normal minimum span 100 ohms, lower ranges available to special order. Open circuit response is normally upscale but may be specified downscale. Input and third wire drives are constant current, for improved linearity. Differential operation may be specified, using 2 x 2 wire sensors.

Models available

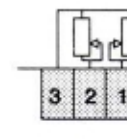
| INPUT | Single trip | Double trip |
|--------------|-------------|-------------|
| Single | ADT141 | ADT142 |
| Differential | ADT145 | ADT146 |

INPUT WIRING

Single Input



Differential Input



For output and supply wiring please turn to page 14.

ADT180 series, pulse

INPUT WIRING

These units will monitor the frequency of any regular repetitive pulse train.

Any waveform may be used provided the positive peak levels exceed the threshold

The threshold level is adjustable over a wide range to help suppress input noise.

Any input frequency between 0-25Hz and 0-20,000Hz may be specified.

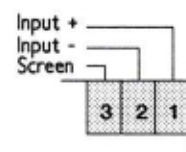
Input level may be anywhere between 50mV and 30V p-p.

Response time is determined by input frequency. Typically it is less than 500ms but for full scale frequencies under 1000Hz it will be proportionately increased.

Unit may be AC coupled where large DC levels have to be accommodated.

Models available

| Single trip | Double trip |
|-------------|-------------|
| ADT181 | ADT182 |



For output and supply wiring please turn to page 14.

Options

Option 'DI', digital display

This 3½ digit indicator is available in 12.5mm LCD and is fitted to the top panel. It will display any level from -1999 to +1999 and has its own internal gain and offset controls allowing, for instance, full scale indication over a small portion of actual input span.

When this option is specified for use with a trip amplifier, 'READ' pushbuttons are fitted for each trip point.

Under normal conditions, the display will indicate the input to the unit, either as a percentage of total input or in engineering units. When a pushbutton is pressed, the display will indicate that tripset level, in the same units, allowing very accurate adjustment.

When using this option, the standard plastic enclosure is replaced with an extruded aluminium enclosure with an Alocrome finish. This is available in either DIN rail or panel mount versions.

Option 'M', power supply

This is very similar to the ADP901/1 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.

This option is available with a restricted range of products. Please contact the Technical Sales Department for further details.

Other options

| Suffix | Description |
|--------|---|
| /J★ | Input test injection jack. |
| /K★ | RFI protection to BS6667 Part 3. |
| /L | Latched relay. |
| /P★ | Calibration test point. |
| /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

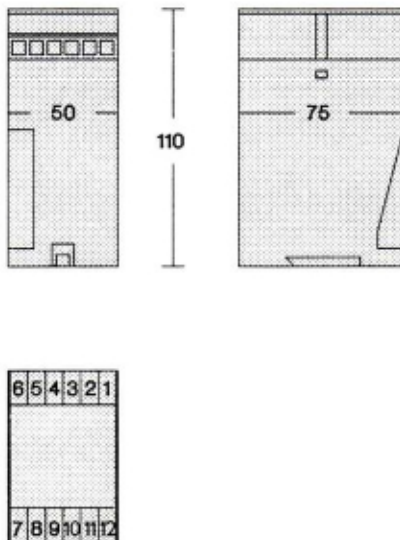
The standard method of mounting, unless options 'DI' or 'K' are specified, is a two-part plastic enclosure which is primarily designed for mounting to a low profile DIN rail, conforming to EN 50 022. Alternatively, the two external fixing holes may be used for securing the unit to a flat surface. These two holes are suitable for screws up to 4mm.

No tools are required when fitting a unit to a DIN rail. The moulded lugs at the base are simply hooked over one edge of the rail and, when the unit pressed firmly home, it will latch into place and be securely retained by a spring loaded metal clip. A screwdriver, or similar tool, should be used when removing the unit from a rail. It should be used to ease back the spring loaded metal clip, allowing the unit to be unhooked from the rail.

All input, output and supply connections are made via leaf type screw terminal blocks, which are integrally mounted just below the front panel. When wiring, provision must be made for a unit to be withdrawn from an enclosure without disturbing the wiring to adjacent units or the main wiring loom.

In the following drawings, all dimensions are in mm. Figures in brackets show the increased length of the option 'K' enclosure.

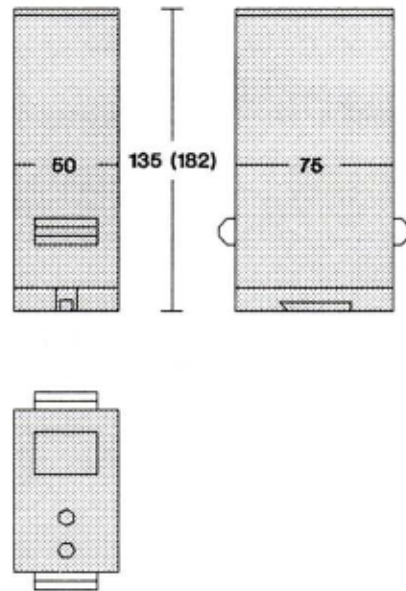
Standard mounting



Option 'DI' and 'K' units are supplied in an extruded Anodised or Achromed aluminium enclosure and is available in two mounting options. Both of these are basically a 50mm X 75mm section extrusion with a display and/or any customer accessible controls/indicators accessible at the front. When both standard and 'DI' units are ordered, the standard units may be specified in matching metal enclosures.

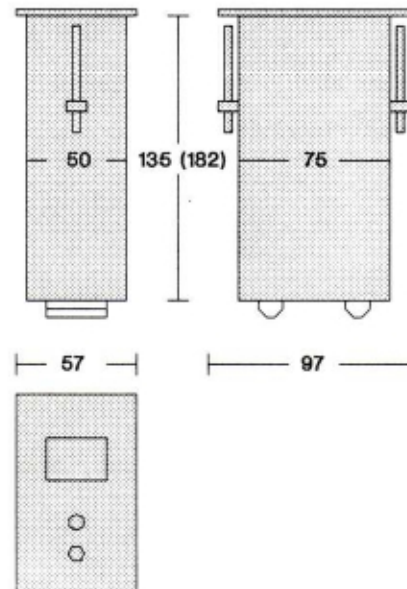
The first option is for surface mounting and is primarily for mounting to a low profile DIN rail. This option has two leaf type screw terminal blocks, which are mounted on the upper and lower surfaces of the enclosure (As seen when the unit is wall mounted to a horizontal DIN rail).

DI & K DIN rail mounting



The unit is fitted to, and removed from, a DIN rail in much the same manner as a standard enclosure.

DI & K Panel mounting



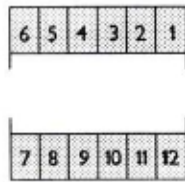
The second option is very similar to the above but is designed for panel mounting. This has a 57mm X 97mm front panel and the leaf type terminal blocks are mounted at the rear of the unit. These blocks will also accept cables up to 2.5mm².

Only a screwdriver is required when fitting a unit to a panel. After the unit has been passed through the hole, from the front of the panel, the two fixing devices are clipped to the upper and lower surfaces of the unit and the screws are tightened against the rear of the panel.

Mounting and wiring

Types of termination

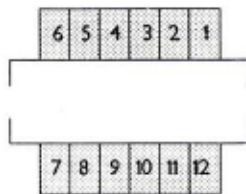
Standard unit



Shown above is a front view of the terminal blocks on a standard plastic enclosure. The terminals are integral to the upper, removable, part of the enclosure.

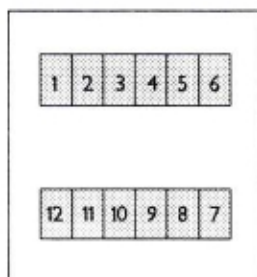
Under normal conditions, the terminal screw heads are protected by an engraved cover, which is retained by two compression clips. The cover has holes to allow access to controls and indicators.

'Dl' and 'K' DIN rail mounting



This is a view from the front, or top, of the terminals on the digital display or RFI rejection enclosure.

'Dl' and 'K' panel mounting



When viewed from the rear, the terminals are numbered clockwise from the top left rather than anti-clockwise from the top right.

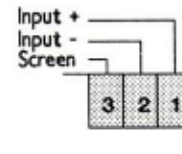
Throughout this catalogue, including on this page, all wiring drawings are shown based on the standard enclosure terminal layout.

When wiring a panel mounting unit, the terminal numbers should be regarded as more important than their physical location.

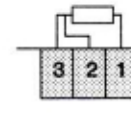
Input wiring

Where input is specific to a particular unit, details are given in the individual specification sheet. Where a unit is specified for multiple input, details are given below.

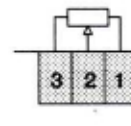
Thermocouple, millivolt, process input



Resistance temperature sensor

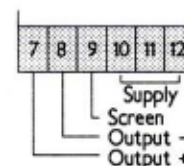
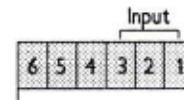


Slidewire or potentiometer

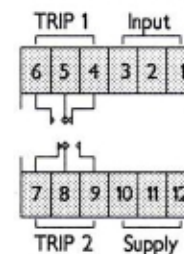


Output wiring

Transmitter, arithmetic unit

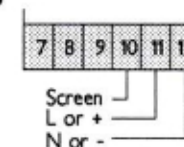


Trip amplifier



On a single trip unit, both sets of relay contacts are operated by the single trip. On a double trip unit, each set of contacts is operated by its individual trip.

Supply wiring



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

Notes: Good Practice when installing any Din Rail mounted instrumentation

To increase the life expectancy of your din rail mounted instruments, we recommend that the following guidelines are adhered to:

Mounting Instruments along a Din Rail

Any signal conditioning/process control units will contain electronics which in certain conditions have to lose their excess energy as HEAT. Suppliers of such instruments cannot predict the site conditions or situations, so to make sure that hot spots do not occur it is recommended that electronic instruments are not bunched together horizontally in groups of more than FIVE units.

A space of 5-10mm every five units max will minimise temperature rise within that group of instruments.

If mounted vertically it is recommended that no more than two instruments are stacked together, then a minimum 5mm spacer between adjacent units/pairs.

Cabling/Relay Transient Suppression

The electronics in process control units are generally mounted in a small enclosure, which by the very size means that the wiring entering and leaving each enclosure is physically close together. To avoid interference from one port to another we recommend the following rules of thumb:

- a) Power cables and wires that carry transients are routed separately to the signal wiring, ideally crossing at 90° to each other.
- b) Low level signal cables are kept as screened or twisted pairs where possible. On screened cables only earth the screen at one end.
- c) Relay contacts that switch inductive loads or other arcing devices should be suppressed, ideally at or across the inductance or other source.

On dc circuits a free wheeling diode should be used, it is PIV at least 4 times the working voltage.

On ac circuits, use an RC network, the values of the R and C chosen to match the L and R value of the coil itself.

These rules are very general, so if you encounter any specific problems please contact our sales support team for further assistance.

Amelec product

The Amelec din rail mounted units are available in a number of product packages:-

The Plastic enclosures, which can be DIN rail or individually Surface mounted. They can be surface mounted by the corner fixing holes or clipped to the TS35 rail (light or heavy duty).

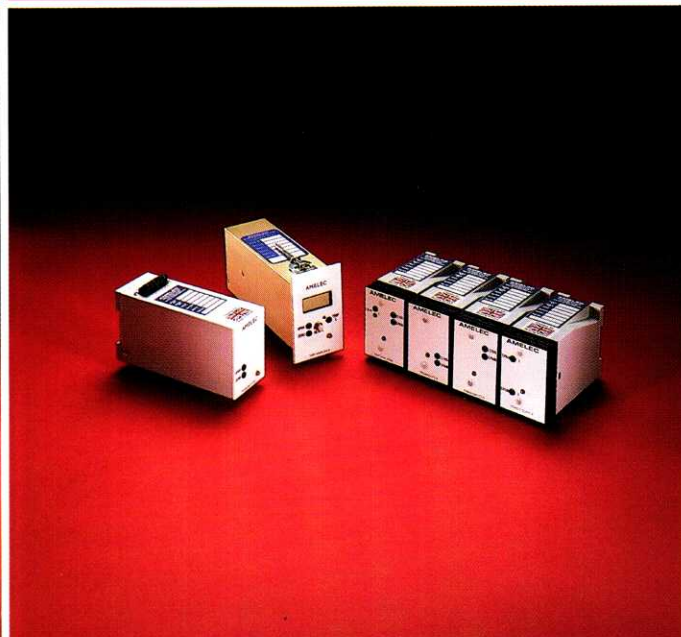
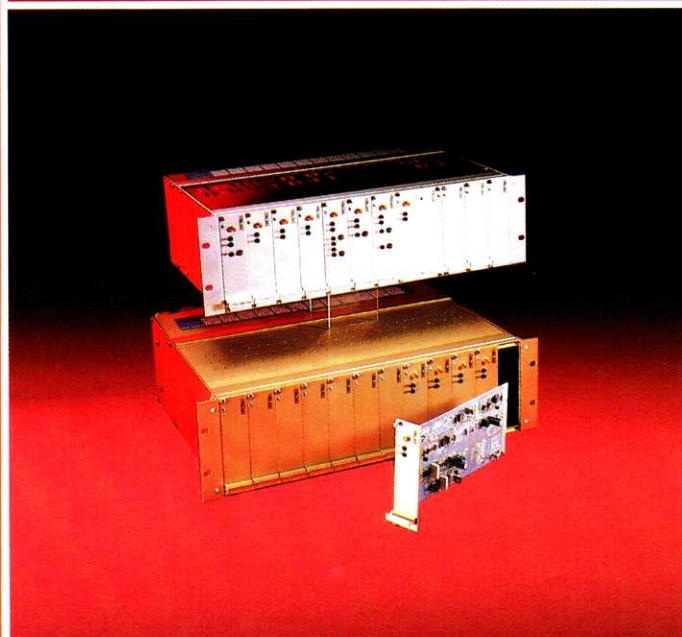
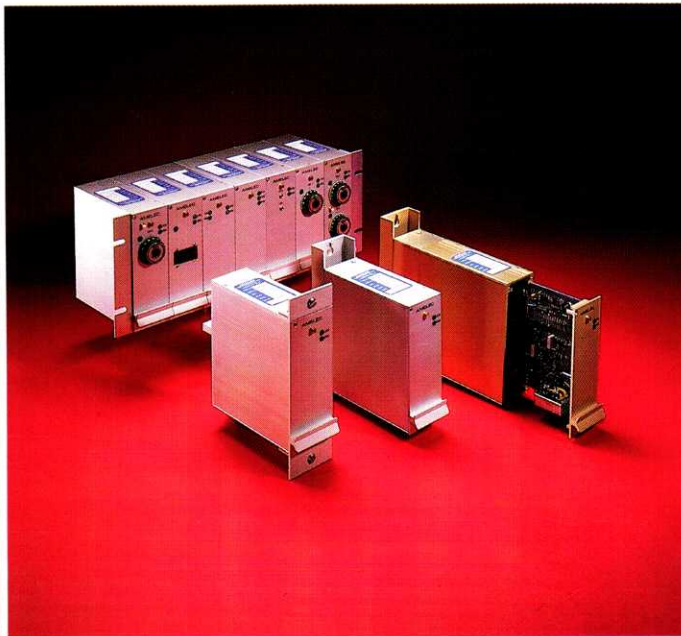
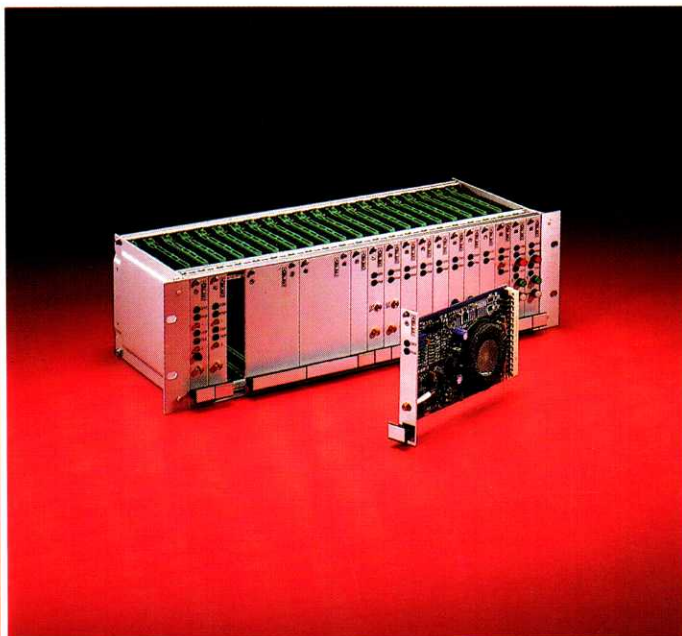
The Metal enclosure is supplied as standard for DIN rail mounting (TS35 heavy duty rail). An optional Keyhole plate is available to surface mount the instrument.

The Panel mounted enclosure is supplied in a metal enclosure. The panel cut out needs to be approximately 1mm more than the extrusion dimensions (50mm horizontally and 75mm vertically). Two brackets from inside your panel secure the units.

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

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