AMOT 130

COMBINED OVERTEMPERATURE TRIP AND

AUTO MANUAL STATION

USER INSTRUCTIONS

Caledon Controls Ltd

Unit2 Block4, Castlehill Ind. Est., Carluke, Lanarkshire, ML8 5UF
Telephone 01555 773355 Facsimile 01555 772212

AMOT 130 COMBINED OVERTEMPERATURE TRIP AND AUTO MANUAL STATION

GENERAL OPERATING INSTRUCTIONS AND USER CONTROLS.

This instrument combines the functions of a furnace over-temperature trip and auto/manual station. If the furnace temperature exceeds the setpoint set on the left-hand temperature scale, the red 'alarm' lamp will light, and power to the furnace is removed until the temperature has fallen back within safe limits. The horizontal bargraph beneath temperature setpoint indicates the level of the furnace temperature relative to the cut-out setpoint. Normally two green LEDs will be lit, indicating that the temperature is more than 3% of instrument span below cut-out temperature. As the temperature rises the green LEDs extinguish, and when the furnace is on the verge of cut-out only the central yellow LED will be lit. If the temperature rises above the cut-out temperature 1 or 2 red LEDs will light and the alarm will come on. The bargraph must fall back to indicate yellow before the alarm is reset. If the thermocouple becomes open-circuit, the instrument will indicate an over-temperature, and the alarm will be activated. The vertical bargraph on the right of the instrument indicates the power being delivered to the furnace. If the small push button next to the hand symbol is out, and the corresponding lamp is unlit, this power is being controlled by the main temperature controller. If the button is pressed and the lamp is on, the furnace power is controlled manually by means of the potentiometer. If the over-temperature trip is activated power to the furnace is cut and the power bargraph will fall to zero. When switching from auto to manual a 'bumpless' transfer may be achieved by setting the potentiometer to the same power level as the furnace is currently drawing before depressing the button. To do this adjust the potentiometer until the two illuminated arrows marked + and -, which indicate the relative levels of the main controller and potentiometer power demand, are both of equal brightness.

SPECIFICATION

This instrument has been designed and tested to comply with European directives for electromagnetic compatibility and electrical safety; the EMC directive (89/336/EEC) and the low voltage directive (73/23/EEC). The instrument should be installed and commissioned by suitably qualified personnel. It is the responsibility of the user to ensure that the equipment of which this instrument forms a part complies with relevant requirements. The following specifications are provided to facilitate such compliance.

ENVIRONMENTAL

Ambient operating temperature	0-50°C.
Relative humidity	5-95% non condensing.

ELECTRICAL

Supply

Supply Voltage	230V +/- 10% AC 50/60 Hz or 115V +/-10% AC 50/60Hz (User selectable)
Power consumption	8VA
Fusing	Internally protected by automatically resetting thermistor. External wiring should be fused in accordance with local regulations. The maximum recommended fuse is 5A. (See figure2)

Isolation (EN61010-1 : 1993)

Between supply circuit and other circuits	Reinforced isolation, rated 300V RMS or DC, overvoltage category 3, pollution degree 2.
Between relay contacts and Other circuits	Reinforced isolation, rated 300V RMS or DC, overvoltage category 3, pollution degree 2.
Between thermocouple and control circuits	Reinforced isolation, rated 300V RMS or DC, overvoltage category 2,pollution degree 2.

It is intended that the control circuits should be operated at or near ground potential. The thermocouple should not normally be 'live', but in the event of a fault the above insulation characteristics will enable safe operation if the external wiring is suitably insulated. It is important to note that pollution degree 2 excludes conductive pollution; eg from conductive dust or condensation.

The control circuits, ie Control input, Control output, Inhibit output, are not isolated from each other. The -ve side of these functions shares a common rail.

Relay Contacts

Rating	250V AC 2A, or 30V DC 2A.
Fusing	Circuits wired to the relay contacts must be fused with a maximum fuse of 5A

The normally open contacts (These are closed in the non-alarm state) are internally suppressed with a 0.047uF capacitor in series with 100ohm. The normally closed contacts are not suppressed.

ELECTOMAGNETIC COMPATIBILITY

Compliance with the European EMC Directive
This instrument complies with the requirements of EN 50 082 part 2 (Generic immunity standard for an industrial environment), and EN 50 081 part 1 (Generic emissions standard for residential, commercial and light industry). This means that the instrument meets immunity and emissions standards for both types of environment. Note that a small shift in calibration may occur while in the presence of radiated fields at 10V/m. This will not be greater than 1 LED band (2% of span). Please read the notes on wiring practice in the section on installation and commissioning. Note: An industrial environment is distinguished as one supplied from its own distribution transformer, to which other consumers are not connected.

INSTALLATION AND COMMISSIONING INSTRUCTIONS

Mounting
The instrument is intended for panel mounting in a DIN standard cut-out of 92mm x 92mm, +0mm, -0.5mm. The instrument is a push fit in the cut-out. 150mm should be allowed behind the front panel, to ensure adequate clearance behind the connector screws.

Applications Information
The instrument is installed in the control circuit between temperature controller and (normally) thyristor stack or Caledon 'Powermaster' power controller (see figure1) and information supplied with the thyristor stack). In auto the instrument accepts an input from the temperature controller of (link selectable) 0-5V, 0-10V or 1-5V. 0-20mA or 4-20mA may be used by connecting a 250 ohm burden resistor externally across the input terminals, to develop 0-5V or 1-5V. The signal is retransmitted as (link selectable) 0-5V, 1-5V, 0-20mA or 4-20mA. Any combination of input and output may be selected. In manual the output signal is controlled by the front mounted potentiometer. Temperature is monitored independently, and when the temperature exceeds the alarm setpoint three events occur;

1 The control output signal is set to zero.
2 The open collector 'inhibit' output is de-energised. This output may be connected to the 'enable ' input of a Caledon Powerstack or 'Powermaster', but this is not strictly necessary.
3 After a short delay the alarm relay is de-energised. The N/O contacts of the relay may be wired in series with the coil of a contactor used to break the main current supply to the thyristor stack, or the contactor in a 'Powermaster' combination. Alternatively it may be used to operate an undervoltage release on the main power circuit breaker.The delay ensures that if there is no fault in the thyristor, then the contactor does not have to break the load current.

This also ensures synchronised switch off of the load by the thyristor stack. The use of a contactor or circuit breaker with undervoltage release provides an independent means of switching off the power in the event that the overtemperature is caused by a short circuit thyristor.

The instrument alarm functions reset automatically on removal of the overtemperature.

Unless specified otherwise at the time of ordering, instruments are shipped with control input and output set to 0-5V. To change these settings refer to figure3 and set the internal jumper links as required. To gain access to the links, remove the connector plugs, undo the 4 rear panel retaining screws and remove the rear panel. DO NOT PULL THE PRINTED CIRCUIT BOARDS OUT OF THE BOX, as re-engagement of the plug/socket connections to the front board may be awkward.

Connections

All electrical connections are made to rear mounted multi way terminal plugs. These may be removed for instrument replacement or maintenance without having to unwire the panel. Caution! Isolate the power supply before removing the terminals.Suitable wire size is 0.75mm^2 to 1.5mm^2. Only one wire should be inserted in each terminal.
Terminal assignments are as follows:-

1. INSTRUMENT SUPPLY LIVE
2. SUPPLY VOLTAGE SELECTION LINK
3. LINK 2 TO 3 FOR 230V OPERATION (SEE FIGURE)
4. LINK 2 TO 4 FOR 115V OPERATION (SEE FIGURE)
5. INSTRUMENT SUPPLY NEUTRAL
6. NO CONNECTION
7. INHIBIT OUTPUT + (NPN OPEN COLLECTOR)
8. INHIBIT OUTPUT -
9. CONTROL OUTPUT +
10. CONTROL OUTPUT -
11. CONTROL INPUT +
12. CONTROL INPUT -
13. ALARM RELAY COMMON OUTPUT
14. ALARM RELAY N/O OUTPUT.(OPEN IN ALARM)
15. ALARM RELAY N/C OUTPUT.(CLOSED IN ALARM)
16. NO CONNECTION
17. THERMOCOUPLE INPUT +
18. THERMOCOUPLE INPUT -

General Wiring Practice
Cables should be insulated for the voltage category of the maximum voltage connected to the instrument, normally the mains supply.

EMC tests have been performed on a representative instrument, wired without using screened cables. However it is only sensible to observe good wiring practice, and in particular not to route signal cables for long runs parallel to mains supply or relay control circuits. The instrument has no earth connection. If screened cables are used for thermocouple and signal wires, this will only be effective for EMC purposes if the screen is earthed to the panel metalwork in the proximity of the instrument, which is not particularly practical. This is because interference signals are mainly generated in common mode, with reference to the local ground plane. A more effective solution is to pass signal cables through a ferrite core close to the instrument, but this should not be required except possibly on the thermocouple input.

We would recommend the following:-

1 External to the panel use screened cables for control and thermocouple wiring, and earth the screen effectively at the entry to the panel using a suitable gland.

2 Within the panel take care to segregate signal cables from supply cables or cables associated with contactors and relays as far as possible. In particular avoid parallel runs greater than 1 metre. Run the signal cable feed and return as pairs.

3 Always run the feed and return of 4-20mA loops side by side or as a twisted pair, and do not run the loop as an open 'ring'.

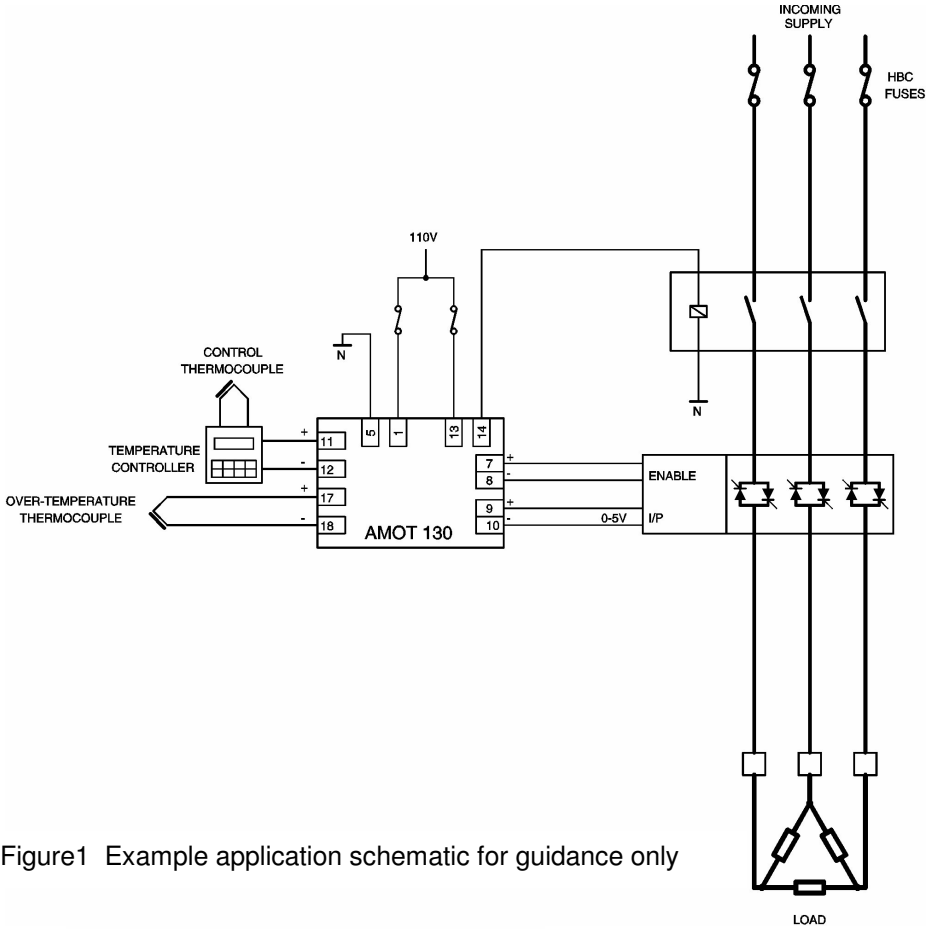

Figure1 Example application schematic for guidance only

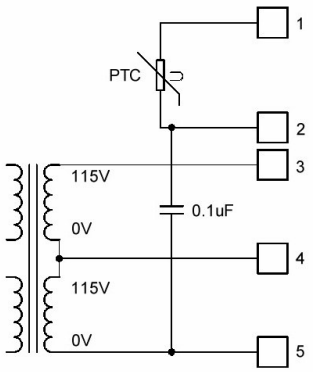

Figure2 Internal thermistor supply protection

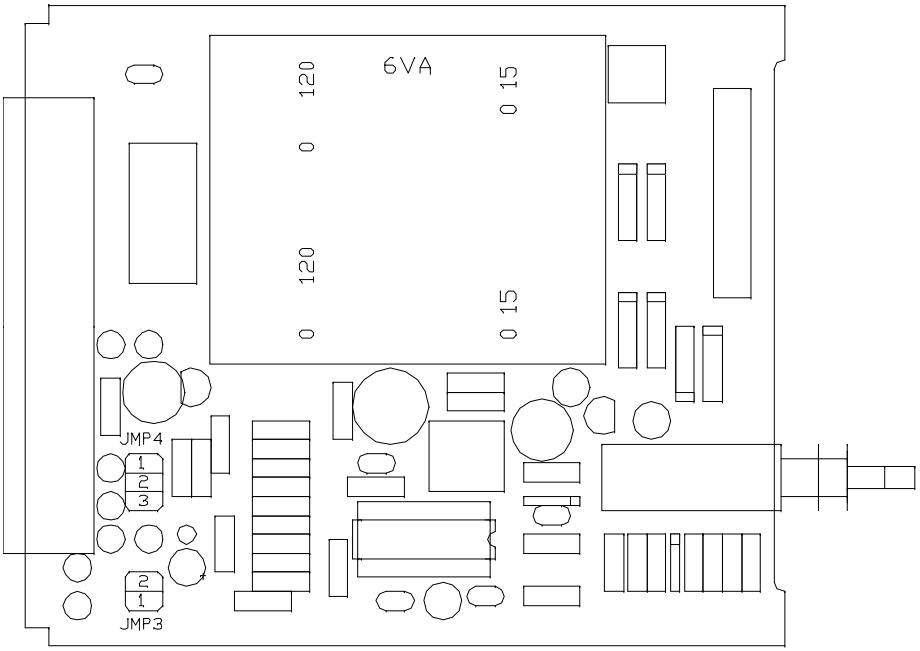

Figure3 Jumper positions for control signal input and output types

JUMPER OPTIONS

Input options	Fit jumps
0-5v	JMP3:2
1-5v	JMP3:1

Output options	Fit jumps
0-5v	None
1-5v	JMP4:3
0-20mA	JMP4:1, 4:2
4-20mA	JMP4:1, 4:2, 4:3