LD5-RTT and LE5-RTT
Real Time Clock/Temperature Display
Operation and Instruction Manual

AMALGAMATED INSTRUMENT CO *ABN: 80 619 963 692*
Unit 5, 28 Leighton Place Hornsby *Telephone: +61 2 9476 2244* *e-mail: sales@aicpl.com.au*
NSW 2077 Australia *Facsimile: +61 2 9476 2902* *Internet: www.aicpl.com.au*

Table of Contents

1 Introduction

General description

This manual contains information for the installation and operation of the LD5-RTT and LE5-RTT displays. This instrument may be used as a 12 or 24 hour clock or may be set to display day/month/year. The ▲ and ▼ pushbuttons located at the front of the display or on the main circuit board can be used to force the display to toggle between the date, time display and temperature. In a 6 digit display a total of seven display options are available, these are:

month.day.year (m.d.Y) day.month.year (d.m.Y) hours.min.secs (H.m.S) month.day (mm.dd) day.month (dd.mm) days (ddd) hours.minutes (HH.mm)

The exact display choice will depend on the number of digits in the chosen display, see dI SP rnGE function in the “Explanation of functions” chapter.

Timers allow for selection of the number of seconds for temperature display followed by the number of seconds for time display.

Alarms can be set for time or temperature operation. Up to 32 alarms can be set for time and 8 for temperature. For each time alarm the start time, alarm duration, day or days of the week and relay or relays to be activated can be set. When an alarm is set functions in the temperature alarm section or time alarm section allow a relay or relays to be chosen to operate with these alarms.

An inbuilt light sensor allows the clock to automatically change its brightness level to suit the ambient light level. Alternatively the display brightness level can be set to a fixed value or toggled between a low and high brightness value via an external switch.

1.1 Selecting and altering access levels

This subsection details the use ”access levels”. Access levels can be used to obtain easy access to functions which are regularly required and to limit access to functions which are not required or which restricted access is required. These access level settings can be ignored if no restrictions to access are required and no easy access to selected functions is required.

Each setup function has a default access level allocated to it, for example the ascending alarm 1 function AL.A 1 is allocated a default level of 2. There is a facility for the user to change the access levels for a limited number of functions to make them either easier to access or harder to access as required, see the Fn. 1CodE function.

There are different ways of accessing setup functions, these are explained in the following section. Each mode allows a selection of access levels i.e. allows some choice of which functions are accessible.

The access levels available are:

None - no access to functions
1 - access to functions allocated to level 1
2 - access to functions allocated to level 2
3 - access to functions allocated to level 3
4 - access to functions allocated to level 4
5 - access to functions allocated to level 5
6 - access to functions allocated to level 6
CAL - access to all normal operation functions

1.2 Accessing setup functions

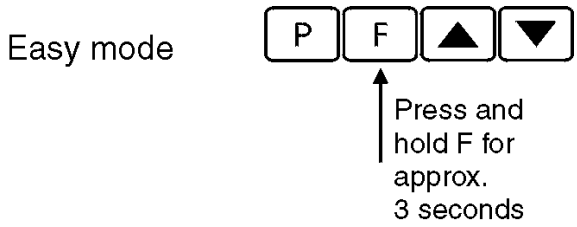
The setup functions allow adjustment of the instruments operation functions. There are five different ways of accessing setup functions. Each mode allows a selection of access levels i.e. allows some choice of which functions are accessible.

As as summary the methods available are:

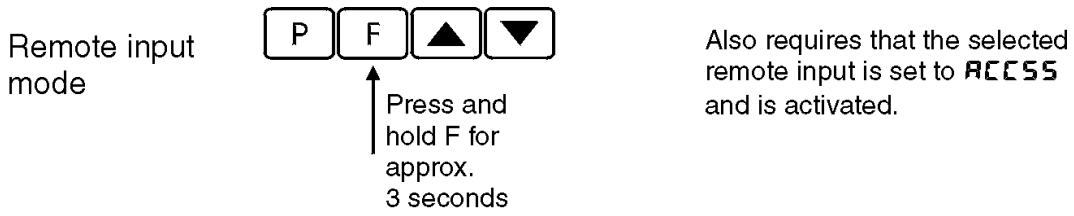
- **Easy mode** - this is the easiest access mode simply requiring the F button to be pressed for 3 seconds. This mode would normally be used to gain access to functions which require frequent adjustment.
- **Remote input mode** - this uses the Easy method of access but also requires the use of a remote input switch.
- **PIN 1 mode** - this method allows a PIN to be set with access via PIN entry.
- **PIN 2 mode** - this method also requires a PIN and would generally be use to allow a higher access level than the first PIN.
- **Super Cal mode** - this method requires a power up procedure and will allow access to all functions.

These modes are explained in more detail below.

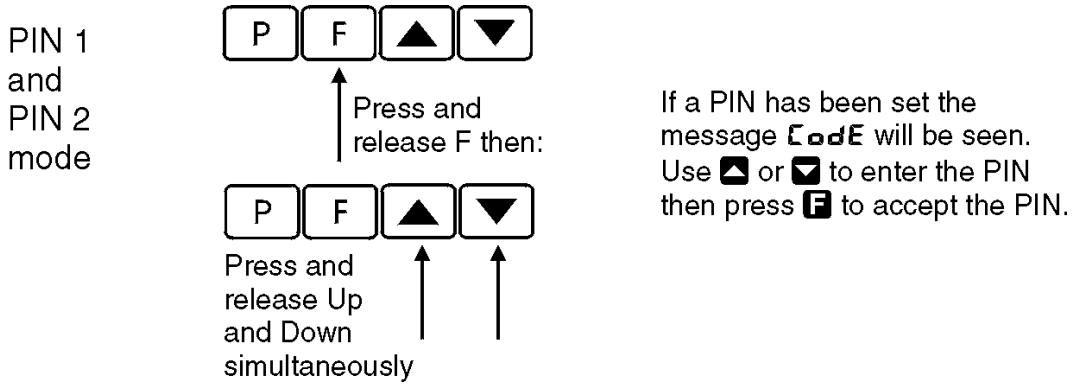
- **Easy mode** - Allows access to the level set by the EASYLEVL function in the ACCS menu. By default the Easy access is set to NONE level i.e. no access.
  The Easy mode simply requires that the F button is held pressed until the message FUNC is seen followed by the first function message, this should take approximately 3 seconds. If the message FUNC End or no response is seen at this point it means that the access level has been set to NONE.
  The default access for this level is NONE so the access level will need to be changed if access via this method is required.



- **Remote input mode** - Allows access to the level set by the r.i nPLEVL function in the ACCS menu. By default the Remote input access is set to CAL level allowing access to all setup functions. The remote input mode uses the same access method as the Easy mode but also requires that one of the available remote inputs is set to ACCS and that the selected remote input is activated i.e. shorted to GND. The default access for this level is NONE so the access level will need to be changed if access via this method is required.

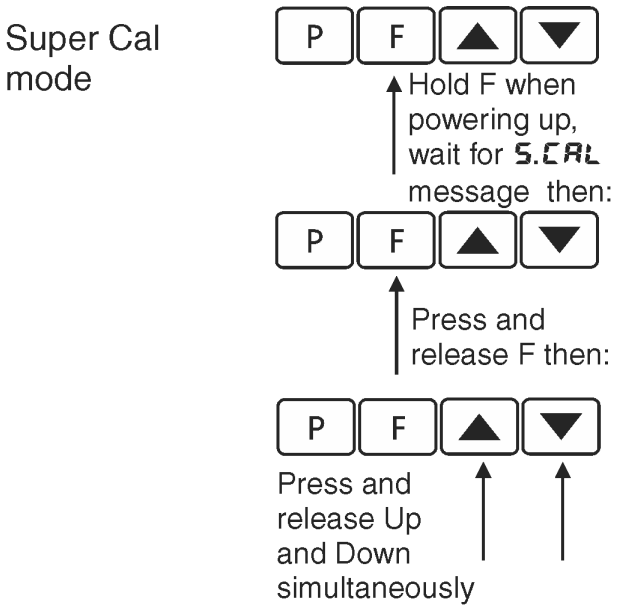


- **PIN 1 mode** - Allows access to the level set by the **USr. 1LEUL** function in the **ACCS** menu. The PIN 1 mode requires the **F** button is pressed and released then within 2 seconds press the ▲ and ▼ buttons at the same time. The PIN can be set via the **P1 n. 1CodE** function in the **ACCS** menu. A **USr. 1LEUL** setting of **0** disables the PIN which means that there is no need to enter the PIN. If the **USr. 1LEUL** function has been set to a number other than **NONE** then the first function seen when entering via PIN 1 mode will be the function **CodE**. When this function is seen the PIN value set at the **USr. 1LEUL** function must be entered via the ▲ or ▼ pushbuttons followed by pressing **F** to accept the PIN before the user can progress to the setup functions.



- **PIN 2 mode** - Allows access to the level set by the **USr.2LEUL** function in the **ACCS** menu. This method uses the same access method as PIN 1 mode above. A **P1 n.2CodE** setting of **NonE** disables the PIN. If the **USr. 1LEUL** or a **USr.2LEUL** function has been set to a number other than **NonE** then the first function seen when entering via PIN 1/PIN2 mode will be the function **CodE**. When this function is seen the PIN value set at the **USr. 1LEUL** function can be entered for access to the level set at the **P1 n. 1ACCS** function or enter the **USr.2LEUL** PIN to gain access to the level set at the **P1 n.2ACCS** function. A correct code will allow access to the functions at the selected level. An incorrect code will result in the **FUNC End** message being seen indicating that access to setup functions has been refused and the display will return to normal measurement mode.

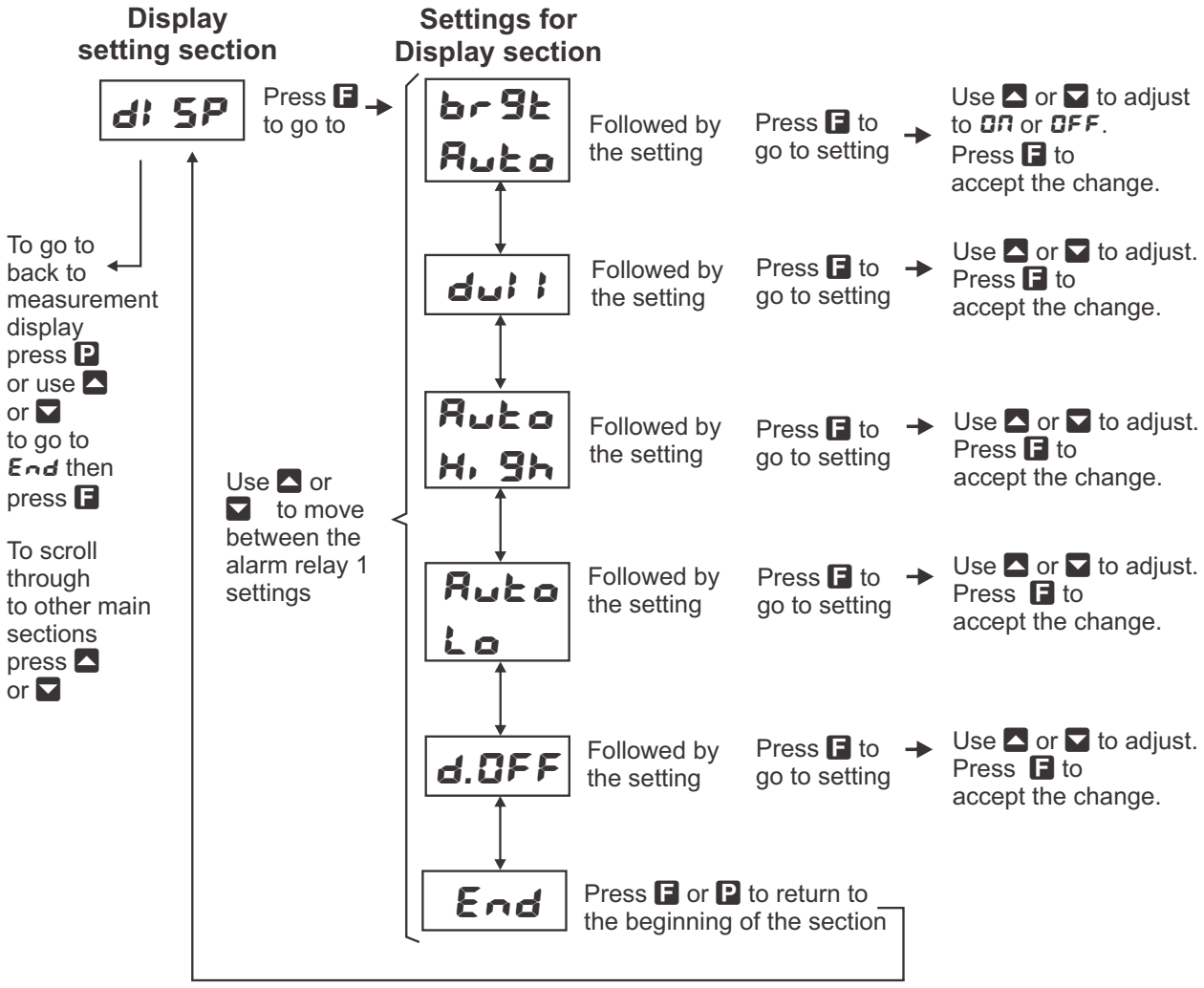
- **Super Cal mode** - This method can be used to gain access to all functions. If a PIN has been set and forgotten use this method to access the PIN functions to check the settings. To access via Super Cal mode with the instrument switched off hold in the **F** button whilst the instrument powers up. Keep the button pressed until the **S.CAL** message is seen, you can then release the **F** button. Next press and release **F** then within 2 seconds press and release the ▲ and ▼ pushbuttons simultaneously.



The setup functions are organised in blocks or sections e.g. all the settings for channel 1 alarms are in the AL 1 section. Once access to setup functions has been gained use the ▲ and ▼ buttons to select the section required then press F to enter this section and again us the ▲ and ▼ buttons to select the required function for alteration and press F to allow alteration of this function.

Typical sections for a basic instrument are illustrated below. In any particular instrument additional sections may appear depending on the part number and any optional outputs fitted.

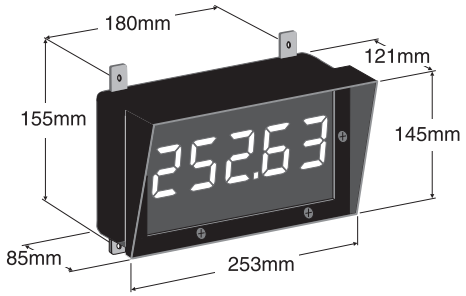
The example in the flowchart (for 4 digit display) below shows the method using display setup functions.



2 Mechanical installation

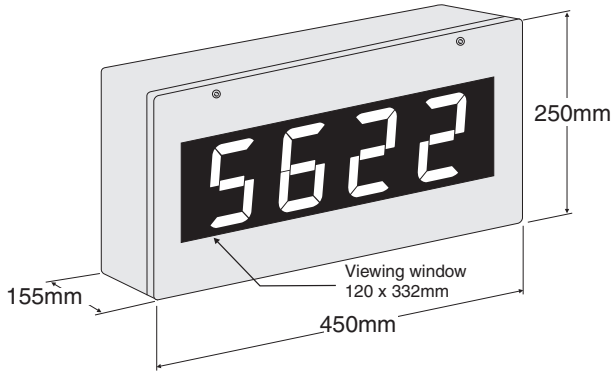
2.1 20mm, 38mm, 45mm, 57mm and 58mm LED

An optional panel mount kit is available for these size displays. Panel cut out size is 240 x 130mm (-0.0mm / +0.5mm). Weight: All types 1.6kg approx.



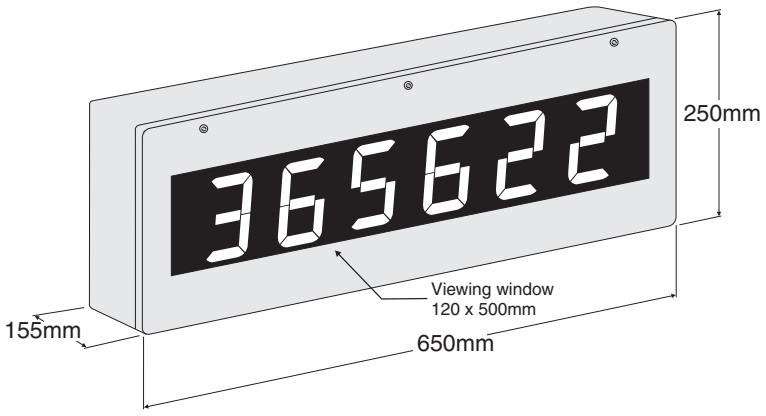
2.2 100mm 4 digit LED

Weight 10kg (LED)



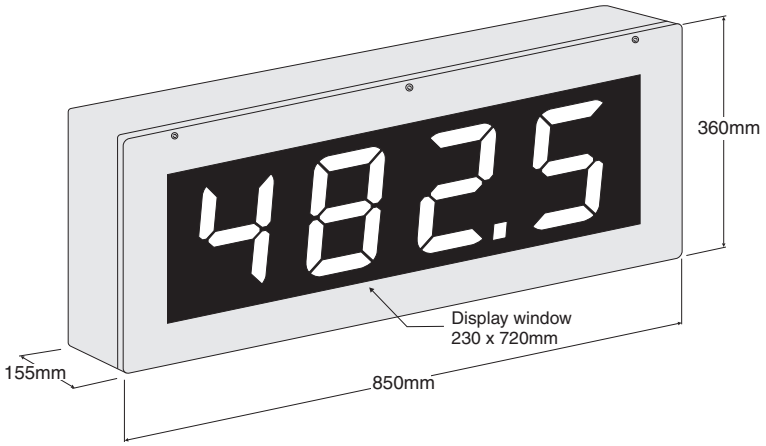
2.3 100mm 6 digit LED

Weight 14kg (LED)



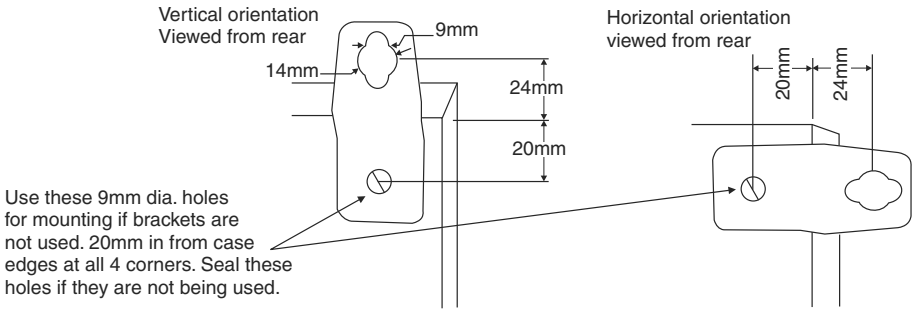
2.4 200mm 4 digit LED

Weight 14kg.



2.5 Cable entry and Mounting brackets

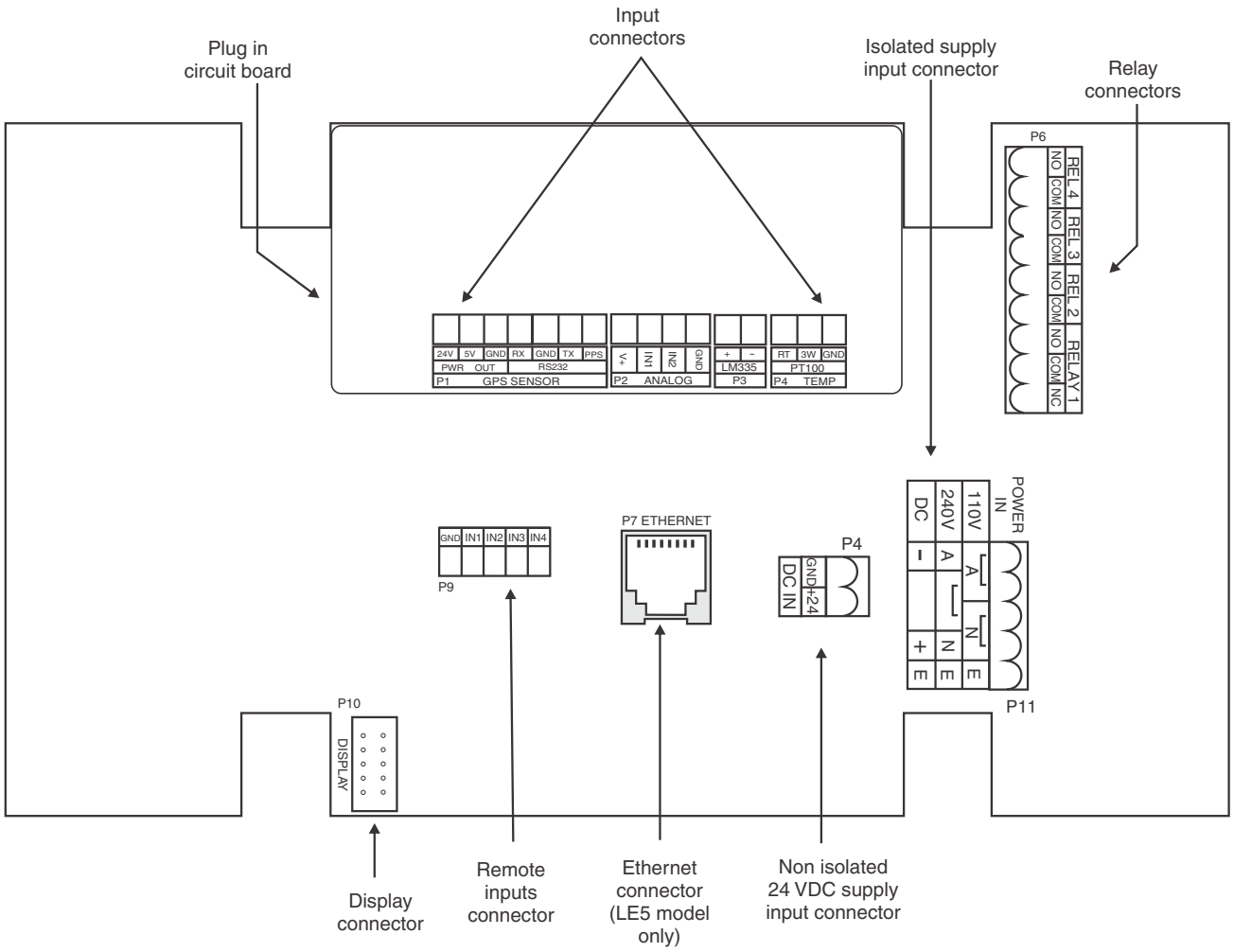
For 20 to 58mm displays no holes are pre drilled. For all 100mm and 200mm displays 3 off 20mm holes are drilled at the bottom of the case, these are fitted with 2 x IP65 grommets and 1 x air vent which allows moisture to exit the case but not enter. Four mounting brackets and four blind grommets are supplied for use with all metal case large digit displays. Diagrams below illustrate vertical and horizontal installation for mounting brackets. If mounting without the brackets is preferred then the 9mm dia. case holes provided for the brackets can be used as alternative mounting holes. Any rear holes not used for mounting should be sealed.



3 Electrical Installation

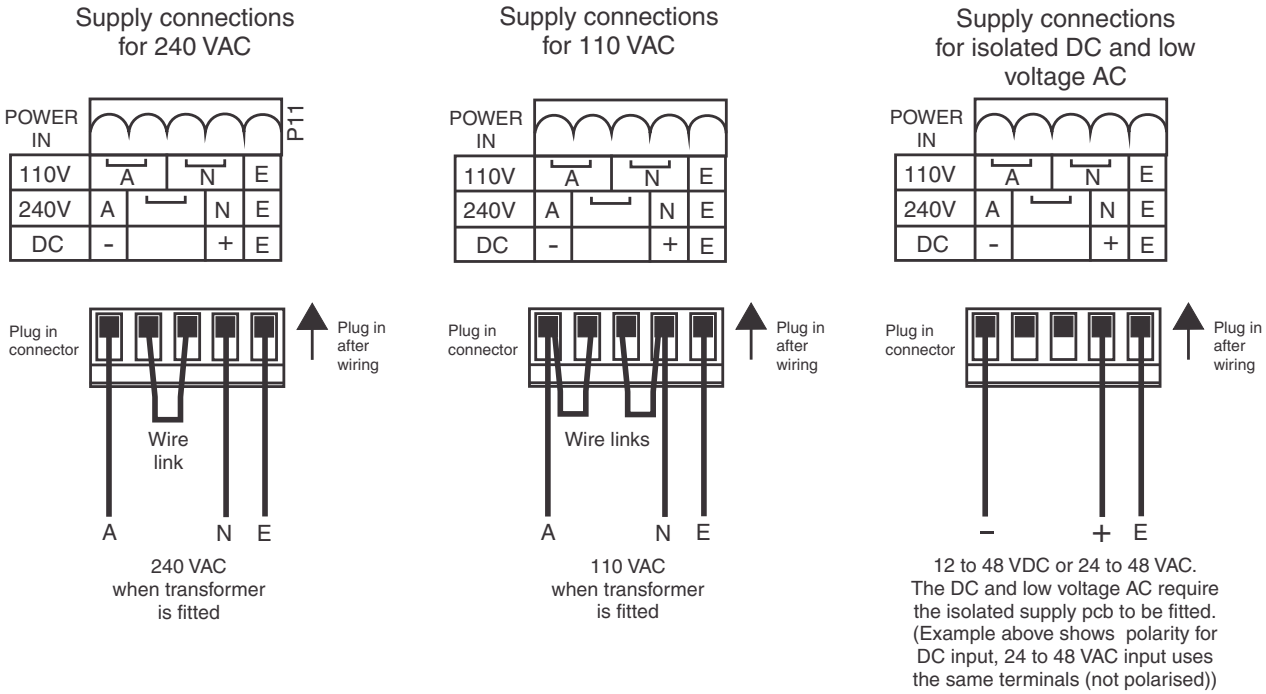
The display is designed for continuous operation and therefore no mains/power switch is fitted to the unit. It is recommended that an external switch and fuse be provided to allow the unit to be removed for servicing. To install cables remove six front panel retaining screws. Remove front panel taking care not to damage the ribbon cable (ribbon cable joins the front display circuit board to the main circuit board). Connect power and input cables to the plug in terminal blocks located within the enclosure. The terminals are clearly labeled and unplug for ease of installation, please take care to connect them correctly. The terminal blocks allow for wires of up to 2.5mm^2 to be fitted (relays and power) and 1.5mm^2 for inputs. When power is applied the instrument will cycle through a display sequence, indicating the software version and other status information, this indicates that the instrument is functioning.

Input board layout

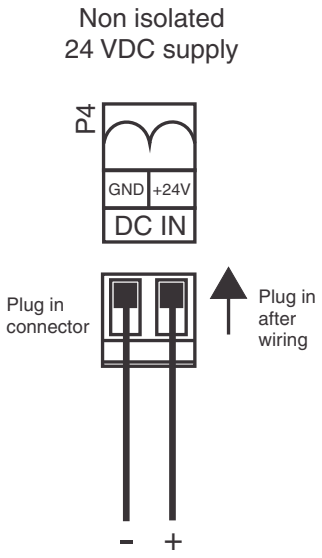


3.1 Power supply connections

3.2 AC supply or isolated DC supply (38, 45, 57 and 58mm displays only)



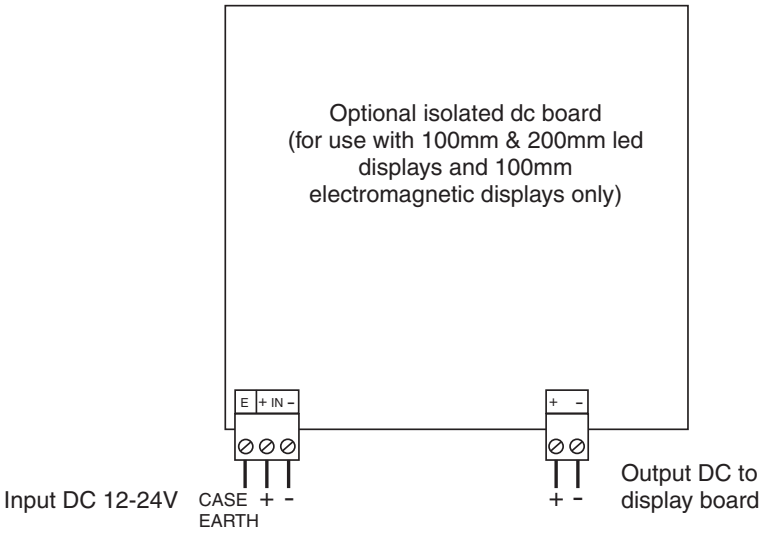
3.3 Non isolated DC supply (38, 45, 57 and 58mm displays only)



3.4 100mm, 200mm LED and 100mm electromagnetic display power supplies

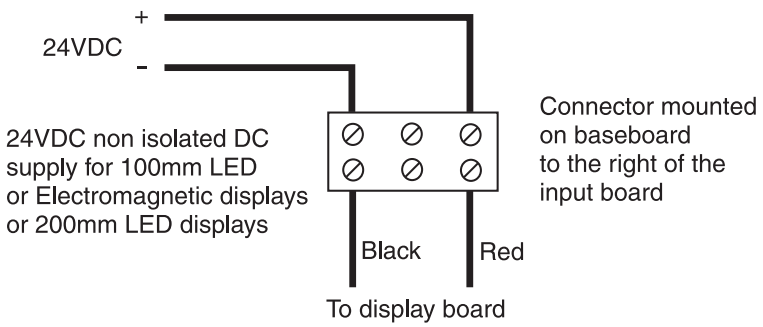
Isolated DC supplies (12 to 24VDC) connect to the isolated supply pcb on the base board. AC supplies connect to the transformer primary on the base board. The base board is located under the input circuit board.

Optional isolated DC supply (100 and 200mm displays only)



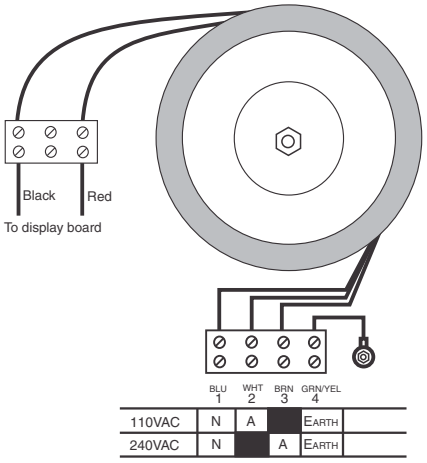
Non isolated DC power supplies (100 and 200mm displays only

Non isolated DC supplies (24VDC) are wired to a connector on the baseboard as shown below.

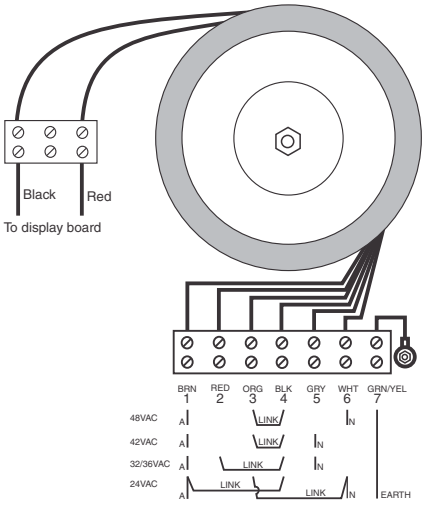


High and low voltage AC supplies (100 and 200mm displays only

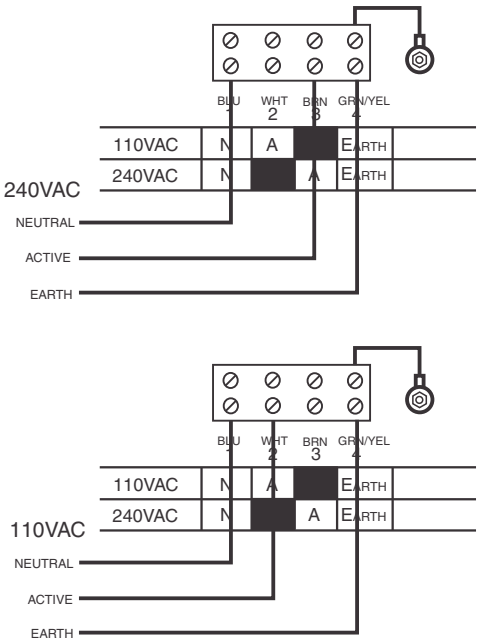
240 & 110VAC supplies.
For 100mm/200mm LED or 100mm electromagnetic display types only.



Low voltage AC supplies.
For 100mm/200mm LED or 100mm electromagnetic display types only.

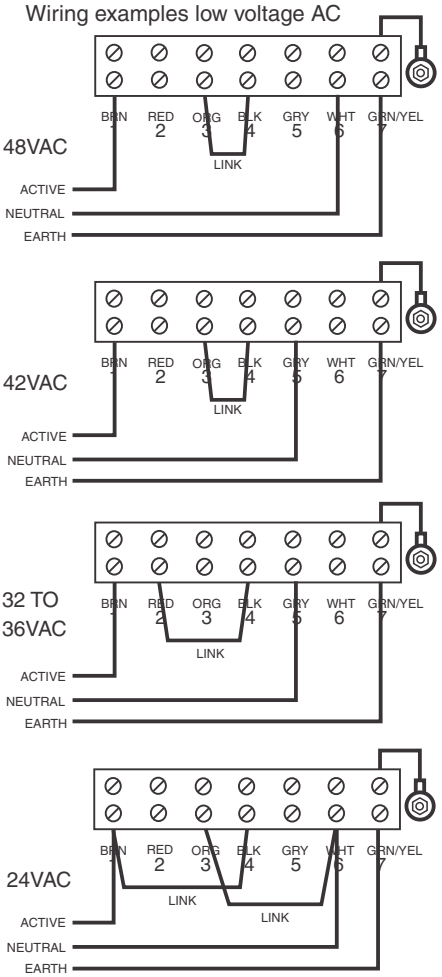


Wiring examples 240VAC & 110VAC

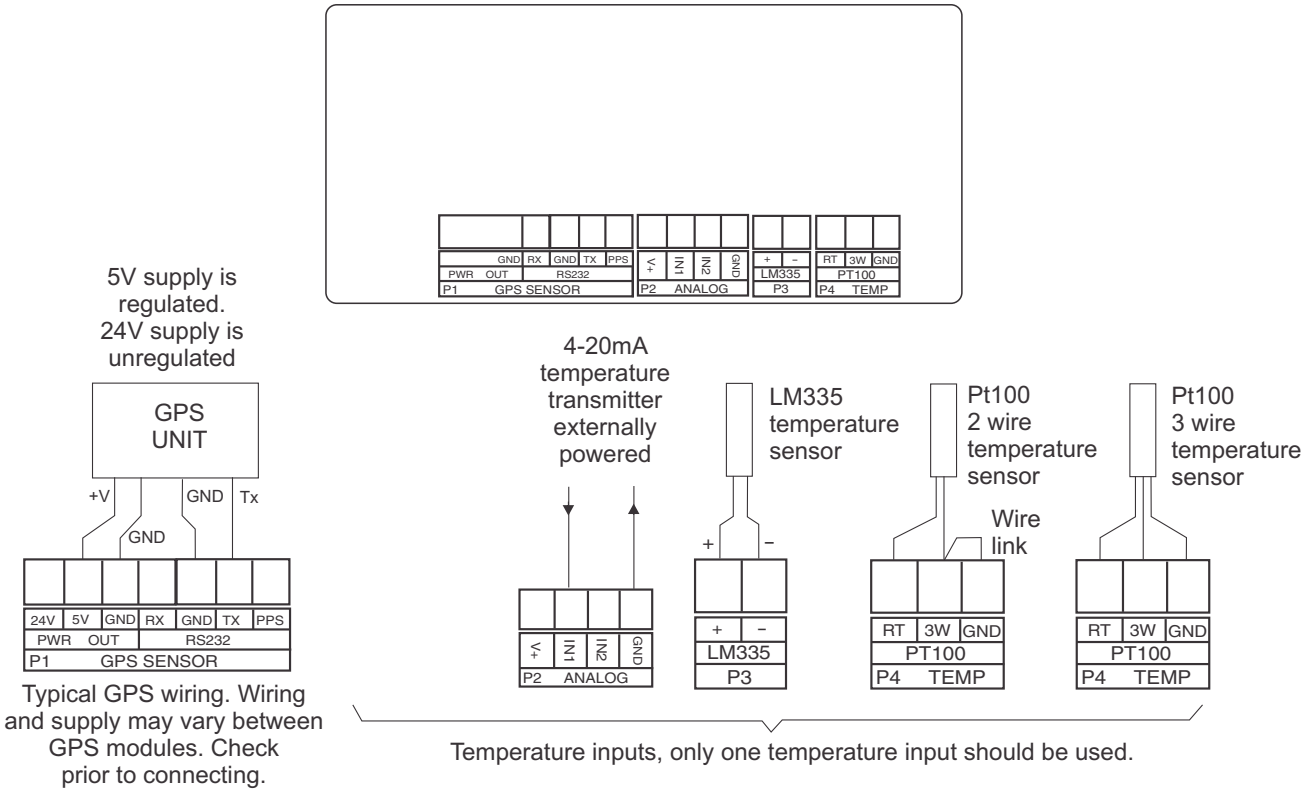


Important note: the 240V & 110V supplies use the same transformer, low voltage instruments use a different transformer. Do not use a low voltage transformer for 240V or 110V or vice versa.

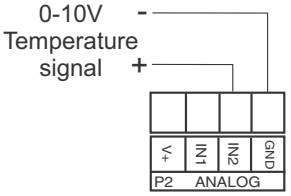
Wiring examples low voltage AC



3.5 Temperature sensor and GPS input connections

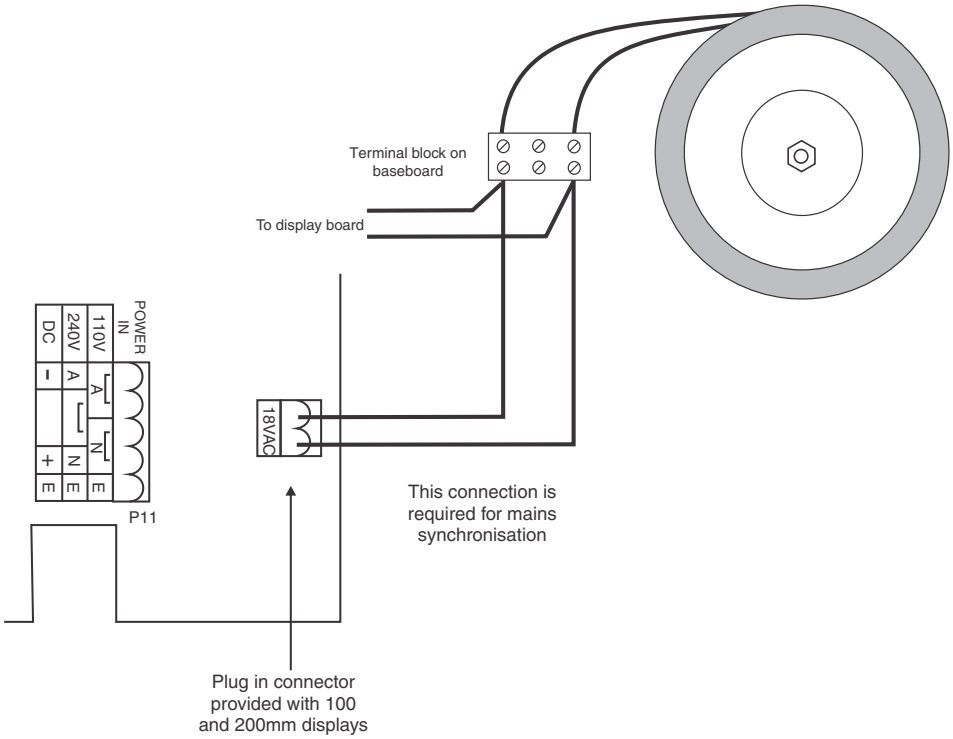


Non standard 0-10V temperature signal input (IN2).
Available only to special order.
When fitted software functions for the selection and calibration of a 0-10V temperature signal will be seen. To avoid problems with noise pickup at 0V use a voltage above 0V e.g. 1V as the first calibration point.



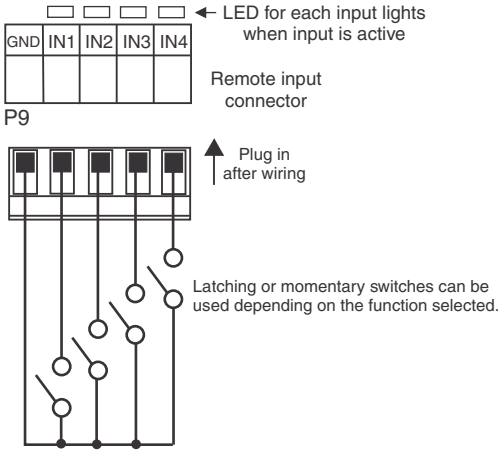
3.6 Mains synchronisation for 100 and 200mm displays

For 100mm and 200mm displays the wiring below will be provided and will be used when main synchronisation is selected. For smaller AC powered display this connection is automatically provided via the transformer on the main board.



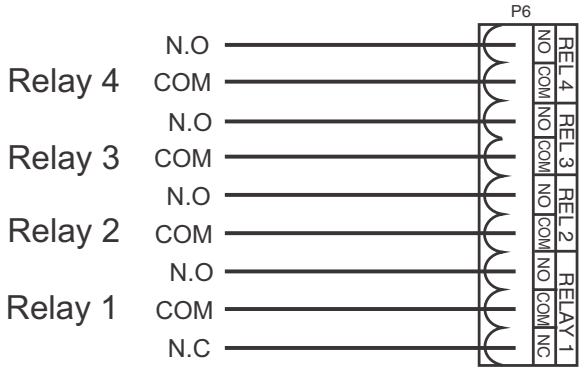
3.6.1 Remote/Digital inputs

The digital inputs will accept voltage free contact closure inputs or up to 24VDC signal. The electrical configuration for these inputs is configured by digital input functions, see the **d.I n** section functions. The function of these inputs are set at the remote input functions e.g. **r.I nP** for remote input 1. Alternatively the remote inputs can be used to enable/disable the time alarm, see the **At 1** to **At 32 d.I n** function.



3.6.2 Relays

Relays are rated at 240VAC 5A into a resistive road. Relay 1 is form C type. Relays 2, 3 and 4 are form A type.



4 Function tables - summary of setup functions

Note: the order in which the functions appear on the display may not be exactly as shown below. The availability and order of functions is determined by choice of function settings and options fitted.

Actual messages seen on the display may vary slightly depending on the number of display digits.

4.1 Clock adjustment function table

Display	Function	Range	Default	Your record	Ref/Page
AJSt SECS	Adjust seconds	Any display value secs	0.0		5.1 / 27
AJSt Hour	Adjust hours	-24 to 24 hrs	0		5.2 / 27

4.2 Setup function table

Display	Function	Range	Default	Your record	Ref/Page
rtc rtc	Clock mode	12Hr, 24Hr	24Hr		5.3 / 27
rtc rtc SYNC	Clock synchronisation	NonE, 50Hz, 60Hz, GPS	NonE		5.4 / 28
rtc GPS bAud	Baud rate for GPS input	1200, 2400, 4800, 9600, 19.2, 38.4, 57.6, 115.2	9600		5.5 / 28
rtc d, SP rnGE	Clock display format	HH.nn, ddd, dd.nn, nn.dd	HH.nn		5.6 / 28
rtc rtc AJSt	Clock adjustment easy access	OFF or On	On		5.7 / 29
rtc utc oFSt	Universal time offset	LOCL, -12, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 3:30, 4, 4:30, 5, 5:30, 6, 7, 8, 9, 9:30, 10, 11, 12, 13	10		5.8 / 29
rtc SEt YEAr	Set year	2010 to 2099	n/a		5.9 / 29

rtc SEt mon	Set month	JAn, FEb, mAr, APr, mAY, Jun, JI Y, Aug, SEP, Oct, Nou, dEc	n/a		5.10 / 29
rtc SEt dAY	Set day	1 to 31	n/a		5.11 / 30
rtc SEt t, mE	Set time	0 to 86399 secs	n/a		5.12 / 30
rtc dSt	Automatic daylight saving enable	OFF or On	On		5.13 / 30
rtc dS.on dAY	Daylight saving start day	1.Sun, 2.Sun, 3.Sun, 4.Sun, L.Sun	1.Sun		5.14 / 30
rtc dS.on mon	Daylight saving start month	JAn, FEb, mAr, APr, mAY, Jun, JI Y, Aug, SEP, Oct, Nou, dEc	Oct		5.15 / 31
rtc dS.oF dAY	Daylight saving end day	1.Sun, 2.Sun, 3.Sun, 4.Sun, L.Sun	1.Sun		5.16 / 31
rtc dS.oF mon	Daylight saving end month	JAn, FEb, mAr, APr, mAY, Jun, JI Y, Aug, SEP, Oct, Nou, dEc	Oct		5.17 / 31
rtc No.AL	Number of time alarms	0 to 32	8		5.18 / 31
rtc AL UnI t	Time alarm units	SECS, mI nS	SECS		5.19 / 32

4.3 Temperature function table

Display	Function	Range	Default	Your record	Ref/Page
tEMP tYPE	Temperature sensor type	nonE, rtd, L335, 4-20, 0-10	nonE		5.20 / 32
tEMP °C SECS	Temperature display time	0 to 100 secs	2		5.21 / 32
tEMP rtc SEC	Time display time	0 to 100 secs	2		5.22 / 32
tEMP AL Cnt	Number of temperature alarms	0, 1, 2, 3, 4, 5, 6, 7, 8	2		5.23 / 33
tEMP U.CAL rtd	Uncalibrate Pt100	n/a	n/a		5.24 / 33
tEMP CAL 1 rtd	Pt100 temperature calibration first point	n/a	n/a		5.25 / 33
tEMP CAL2 rtd	Pt100 temperature calibration second point	n/a	n/a		5.26 / 34
tEMP OFSt rtd	Pt100 temperature calibration offset	n/a	n/a		5.27 / 34
tEMP U.CAL L335	Uncalibrate LM335	n/a	n/a		5.28 / 34
tEMP CAL 1 L335	LM335 temperature calibration first point	n/a	n/a		5.29 / 35
tEMP CAL2 L335	LM335 temperature calibration second point	n/a	n/a		5.30 / 35
tEMP OFSt L335	LM335 temperature calibration offset	n/a	n/a		5.31 / 36
tEMP En4	Enter 4mA temperature display value	n/a	n/a		5.32 / 36
tEMP En20	Enter 20mA temperature display value	n/a	n/a		5.33 / 36
tEMP U.CAL 1n1	Uncalibrate 4-20mA temperature display	n/a	n/a		5.34 / 37
tEMP CAL 1 1n1	4-20mA temperature calibration first point	n/a	n/a		5.35 / 37

tEMP CAL2 in1	4-20mA temperature calibration second point	n/a	n/a		5.36 / 37
tEMP OFSt in1	4-20mA temperature calibration offset	n/a	n/a		5.37 / 38
tEMP U.CAL in2	Uncalibrate 0-10V temperature display	n/a	n/a		5.38 / 38
tEMP CAL 1 in2	0-10V temperature calibration first point	n/a	n/a		5.39 / 39
tEMP CAL2 in2	0-10V temperature calibration second point	n/a	n/a		5.40 / 39
tEMP OFSt in2	0-10V temperature calibration offset	n/a	n/a		5.41 / 40
tEMP °C.dP	Temperature display decimal point	0, 0.1	0		5.42 / 40
tEMP °C Unit	Temperature unit display	°C, °, C	°C		5.43 / 40
tEMP °C FiLtr	Temperature display filter	0, 1, 2, 3, 4, 5, 6, 7, 8	8		5.44 / 41

4.4 Temperature function table

Display	Function	Range	Default	Your record	Ref/Page
AL 1 to AL 8 Hi SP	High setpoint value for designated alarm relay	Any display value or OFF	OFF	See 4.12	5.45 / 41
AL 1 to AL 8 Lo	Low setpoint value for designated alarm relay.	Any display value or OFF	OFF	See 4.12	5.46 / 42
AL 1 to AL 8 HYSt	Alarm relay hysteresis (deadband)	0 to 65535	10	See 4.12	5.47 / 42
AL 1 to AL 8 trIP	Trip time delay for the designated alarm relay	0 to 6553.5 secs	0.0	See 4.12	5.48 / 43
AL 1 to AL 8 rSt	Reset time delay for the designated alarm relay	0 to 6553.5 secs	0.0	See 4.12	5.49 / 43
AL 1 to AL 8 rLYS	Relay selection On or OFF	On or OFF	OFF	See 4.12	5.50 / 44

AL 1 to AL 8 trL	Alarm trailing or setpoint mode	SEt.P, tL 1, tL 2, tL 3, tL 4, tL 5, tL 6, tL 7	SEt.P	See 4.12	5.51 / 44
AL 1 to AL 8 Ltch	Alarm relay latching operation	Auto, Ltch, A.b, L.b	Auto	See 4.12	5.52 / 44

4.5 Relay settings function table

Display	Function	Range	Default	Your record	Ref/Page
rL 1 to rL 8 rLy	Alarm relay *x* action to normally open (de-energised) or normally closed (energised)	n.o, n.c	n.o	See 4.12	5.53 / 45
rL 1 to rL 8 AcK	Relay acknowledge	OFF or On	OFF	See 4.12	5.54 / 45
rL 1 to rL 8 bool	Temperature alarm relay Boolean logic operation	Or, And	Or	See 4.12	5.55 / 45

4.6 Time alarm function table

Display	Function	Range	Default	Your record	Ref/Page
At 1 to At 32 On	Alarm on time	0 to 1439 mins	n/a	See 4.12	5.56 / 46
At 1 to At 32 dur	Alarm duration	0 to Maximum display value secs	n/a	See 4.12	5.57 / 46
At 1 to At 32 dAy	Alarm days	non, tuE, UEd, thu, Fri, SAt, Sun	n/a	See 4.12	5.58 / 46
At 1 to At 32 rLy	Alarm relays	rLy. 1, rLy.2, rLy.3, rLy.4	n/a	See 4.12	5.59 / 47
At 1 to At 32 d.i n	Remote input alarm enable	d.i n. 1, d.i n.2, d.i n.3, d.i n.4	n/a	See 4.12	5.60 / 47

4.7 Display function table

Display	Function	Range	Default	Your record	Ref/Page
di SP brGt Auto	Automatic display brightness	OFF or On	On		5.61 / 47
di SP brGt	Display brightness	1 to 63	63		5.62 / 48
di SP dull	Dimmed display brightness	0 to 63	7		5.63 / 48
di SP Auto Hi Gh	Auto display brightness high level	15 to 63	63		5.64 / 48
di SP Auto Lo	Auto display brightness low level	1 to 63	7		5.65 / 48
di SP d.OFF	Display dim timer	0 to Maximum display value mins	0		5.66 / 49

4.8 Remote inputs function table

Display	Function	Range	Default	Your record	Ref/Page
r.1 nP P.but	Front P button operation mode	NONE, P.Hi , P.Lo, Hi .Lo, AL.Ac	NONE		5.67 / 49
r.1 nP r.1 n. 1	Remote input 1 operation mode	NONE, P.HI d, d.HI d, P.Hi , P.Lo, Hi .Lo, AL.Ac, ACCS, P.but, F.but, U.but, d.but, dull , b.I nc, b.dEc	NONE		5.68 / 49
r.1 nP r.1 n.2	Remote input 2 operation mode	NONE, P.HI d, d.HI d, P.Hi , P.Lo, Hi .Lo, AL.Ac, ACCS, P.but, F.but, U.but, d.but, dull , b.I nc, b.dEc	NONE		5.69 / 50

r.1 nP r.1 n.3	Remote input 3 operation mode	nONE, P.HI d, d.HI d, P.H, , P.Lo, H, .Lo, AL.Ac, ACCS, P.but, F.but, U.but, d.but, dul I , b.I nc, b.dEc	nONE		5.70 / 51
r.1 nP r.1 n.4	Remote input 4 operation mode	nONE, P.HI d, d.HI d, P.H, , P.Lo, H, .Lo, AL.Ac, ACCS, P.but, F.but, U.but, d.but, dul I , b.I nc, b.dEc	nONE		5.71 / 51

4.9 Remote inputs configuration function table

Display	Function	Range	Default	Your record	Ref/Page
d.I n d.I n. 1 P.UP	Remote input (digital inputs) 1 pull up/down operation	OPEn, H, 9h, Lo	H, 9h		5.72 / 51
d.I n d.I n. 1 LuI	Remote input (digital inputs) 1 input level	H, 9h, Lo	Lo		5.73 / 51
d.I n d.I n.2 P.UP	Remote input (digital inputs) 2 pull up/down operation	OPEn, H, 9h, Lo	H, 9h		5.74 / 52
d.I n d.I n.2 LuI	Remote input (digital inputs) 2 input level	H, 9h, Lo	Lo		5.75 / 52
d.I n d.I n.3 P.UP	Remote input (digital inputs) 3 pull up/down operation	OPEn, H, 9h, Lo	H, 9h		5.76 / 52
d.I n d.I n.3 LuI	Remote input (digital inputs) 3 input level	H, 9h, Lo	Lo		5.77 / 53
d.I n d.I n.4 P.UP	Remote input (digital inputs) 4 pull up/down operation	OPEn, H, 9h, Lo	H, 9h		5.78 / 53
d.I n d.I n.4 LuI	Remote input (digital inputs) 4 input level	H, 9h, Lo	Lo		5.79 / 53

4.10 Serial option function table

Display	Function	Range	Default	Your record	Ref/Page
SEri OPEr	Serial output operation mode (*Optional)	nONE, Cont, Poll, A.buS, di SP, Ā.buS, UPdt	nONE		5.80 / 53
SEri bAud	Serial baud rate (*Optional)	1200, 2400, 4800, 9600, 19.2, 38.4, 57.6, 115.2	9600		5.81 / 54
SEri PrtY	Serial parity (*Optional)	8n, 8E, 8O, 7E, 7O	8n		5.82 / 55
SEri Unit Addr	Serial address (*Optional)	1 to 127	1		5.83 / 55
SEri Err di SP	Send error display	OFF or On	On		5.84 / 55

4.11 Access function table

Display	Function	Range	Default	Your record	Ref/Page
ACCES EASY LEUL	Easy access mode	nONE, 1, 2, 3, 4, 5, 6, CAL	nONE		5.85 / 55
ACCES r.inP LEUL	Remote input access mode	nONE, 1, 2, 3, 4, 5, 6, CAL	nONE		5.86 / 56
ACCES USr. 1 Pin	PIN code 1	0 to 65535	0		5.87 / 56
ACCES USr. 1 LEUL	PIN code 1 access level	nONE, 1, 2, 3, 4, 5, 6, CAL	nONE		5.88 / 56
ACCES USr.2 Pin	PIN code 2	0 to 65535	0		5.89 / 57
ACCES USr.2 LEUL	PIN code 2 access level	nONE, 1, 2, 3, 4, 5, 6, CAL	nONE		5.90 / 57
ACCES Fn. 1 CodE	User assignable access function 1	0000 to FFFF hex.	0000		5.91 / 57
ACCES Fn. 1 LEUL	User assignable access 1 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.92 / 58

ACCES Fn.2 CodE	User assignable access function 2	0000 to FFFF hex.	0000		5.93 / 58
ACCES Fn.2 LEUL	User assignable access 2 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.94 / 58
ACCES Fn.3 CodE	User assignable access function 3	0000 to FFFF hex.	0000		5.95 / 58
ACCES Fn.3 LEUL	User assignable access 3 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.96 / 59
ACCES Fn.4 CodE	User assignable access function 4	0000 to FFFF hex.	0000		5.97 / 59
ACCES Fn.4 LEUL	User assignable access 4 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.98 / 59
ACCES Fn.5 CodE	User assignable access function 5	0000 to FFFF hex.	0000		5.99 / 59
ACCES Fn.5 LEUL	User assignable access 5 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.100 / 60
ACCES Fn.6 CodE	User assignable access function 6	0000 to FFFF hex.	0000		5.101 / 60
ACCES Fn.6 LEUL	User assignable access 6 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.102 / 60
ACCES Fn.7 CodE	User assignable access function 7	0000 to FFFF hex.	0000		5.103 / 60
ACCES Fn.7 LEUL	User assignable access 7 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.104 / 61
ACCES Fn.8 CodE	User assignable access function 8	0000 to FFFF hex.	0000		5.105 / 61
ACCES Fn.8 LEUL	User assignable access 8 level value	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFlt		5.106 / 61

4.12 Alarm and relay tables

Note: 4 relays are provided as standard - 4 extra relays are optionally available

Record your time alarm settings in the table below. See next page for temperature alarm table and relay table.

Display	On	dur	day	rly	d.in
At 1					
At2					
At3					
At4					
At5					
At6					
At7					
At8					
At9					
At 10					
At 11					
At 12					
At 13					
At 14					
At 15					
At 16					
At 17					
At 18					
At 19					
At20					
At21					
At22					
At23					
At24					
At25					
At26					
At27					
At28					
At29					
At30					
At31					
At32					

Record your temperature alarm settings in the table below.

Display	HI SH	LO	HYST	TRIP	RST	RLYS	TRL	LTCH
AL 1								
AL2								
AL3								
AL4								
AL5								
AL6								
AL7								
AL8								

Record your relay settings in the table below.

Display	Relay 1	Relay 2	Relay 3	Relay 4	Relay 5	Relay 6	Relay 7	Relay 8
RLY								
AcK								
bool								

5 Explanation of functions

The setup and calibration functions are configured through a push button sequence. The push buttons located at the front of the instrument or on the main circuit board are used to alter settings.

Display messages shown are those which would appear on a display with 4 digits for the process reading, these display messages may in some cases vary slightly for other display types.

Note: default access levels for each function are shown in this section but the access levels are not applicable to this software version.

Explanation of Functions

5.1 Adjust seconds

Section:	AJSt
Display:	SECS
Range:	Any display value secs
Default Value:	0.0
Default Access Level	dFLt
Function number	780C

Allows addition or subtraction of a number seconds and tenths of seconds from the current time e.g. if the display is 5 seconds fast select -5.0 at this function to adjust the time.

5.2 Adjust hours

Section:	AJSt
Display:	Hour
Range:	-24 to 24 hrs
Default Value:	0
Default Access Level	dFLt
Function number	780d

Allows addition or subtraction of a number hours from the current time e.g. if the display is 1 hour slow select 1 at this function to adjust the time.

5.3 Clock mode

Section:	rtc
Display:	rtc
Range:	12Hr, 24Hr
Default Value:	24Hr
Default Access Level	4
Function number	7802

This function allows the clock to be set either as a 12 hour or 24 hour clock display

5.4 Clock synchronisation

Section:	rtc
Display:	rtc SYNC
Range:	NonE, 50H2, 60H2, GPS
Default Value:	NonE
Default Access Level	4
Function number	7803

This function allows the clock to synchronisation be set as one of the following:
NonE - internal clock synchronised
50H2 - 50Hz reference taken from AC supply (not applicable to DC supply models)
60H2 - 60Hz reference taken from AC supply (not applicable to DC supply models)
GPS - GPS synchronisation (requires suitable external GPS module)
NtP - NTP synchronisation from internet connection (LE5 version only)
A SYNC FAIL message will be seen if the synchronisation input is not found.

5.5 Baud rate for GPS input

Section:	rtc
Display:	GPS baud
Range:	1200, 2400, 4800, 9600, 19.2, 38.4, 57.6, 115.2
Default Value:	9600
Default Access Level	4
Function number	0433

Sets the baud rate for GPS input. Select the required baud rate to match the GPS output. For the Garmin GPS18X-LVC model commonly supplied with this clock the baud rate must be set to 4800.

5.6 Clock display format

Section:	rtc
Display:	d. SP range
Range:	HH.nn, ddd, dd.nn, nn.dd
Default Value:	HH.nn
Default Access Level	4
Function number	7804

Formats available depend on number of display digits, examples shown below are for a 6 digit display. This function allows the clock to be set to display in the following modes:
H.n.S - hours.minutes.seconds
HH.nn - hours,minutes
ddd - days
dd.nn - day.month
nn.dd - month.day
d.n.Y - day.month.year
n.d.Y - month.day.year

5.7 Clock adjustment easy access

Section:	rtc
Display:	rtc AJSt
Range:	OFF or On
Default Value:	On
Default Access Level	4
Function number	7809

The functions AJSt SECS and AJSt hour are placed at the beginning of the function table to give easy access for basic adjustment. When set to On the operator may gain access to the first two functions simply by entering via FUNC mode (see the “Accessing setup functions” section in th Introduction chapter).When set to OFF the operator must enter via S.CAL mode to gain access to these functions.

5.8 Universal time offset

Section:	rtc
Display:	utc oFSt
Range:	LOCL, -12, -11, -10, -9, -8, -7, -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 3:30, 4, 4:30, 5, 5:30, 6, 7, 8, 9, 9:30, 10, 11, 12, 13
Default Value:	10
Default Access Level	4
Function number	0443

Universal time offset for GPS synchronisation (-12 to +13 hours) - sets the offset in hours from universal time. When using optional GPS synchronisation the time signal transmitted uses a “universal time”. The offset function allows the local offset from this “universal” time to be input in minutes. For example if local time is 10 hours ahead of GPS universal time then set utc oFSt to 10.

5.9 Set year

Section:	rtc
Display:	SEt YEAr
Range:	2010 to 2099
Default Value:	n/a
Default Access Level	4
Function number	7808

This function is used to set the current year. This is necessary when a year display is required and for correct automatic daylight saving adjustment.

5.10 Set month

Section:	rtc
Display:	SEt mon
Range:	JAn, FEb, mAr, APr, mAY, Jun, JI Y, Aug, SEP, Oct, Nov, dEc
Default Value:	n/a
Default Access Level	4
Function number	7807

This function is used to set the current month.

5.11 Set day

Section:	rtc
Display:	SEt dAY
Range:	1 to 31
Default Value:	n/a
Default Access Level	4
Function number	7806

This function is used to set the current day.

5.12 Set time

Section:	rtc
Display:	SEt tiME
Range:	0 to 86399 secs
Default Value:	n/a
Default Access Level	4
Function number	7805

This function is used to set the current time.

5.13 Automatic daylight saving enable

Section:	rtc
Display:	dSt
Range:	OFF or On
Default Value:	On
Default Access Level	4
Function number	0446

Daylight saving time automatic adjustment (ON or OFF) - If automatic daylight saving time adjustment is not required set this function to OFF. If automatic daylight saving time adjustment is required set this function to On.

5.14 Daylight saving start day

Section:	rtc
Display:	dS.on dAY
Range:	1.Sun, 2.Sun, 3.Sun, 4.Sun, L.Sun
Default Value:	1.Sun
Default Access Level	4
Function number	0444

Daylight saving time start day. Select the first, second, third, fourth or last Sunday in the month as the start day for daylight saving.

5.15 Daylight saving start month

Section:	rtc
Display:	dS.on mon
Range:	JAn, FEb, mAr, APr, mAY, Jun, JI Y, Aug, SEP, Oct, Nou, dEc
Default Value:	Oct
Default Access Level	4
Function number	0446

Daylight saving time start month. Select the required start month for daylight saving adjustment.

5.16 Daylight saving end day

Section:	rtc
Display:	dS.oF dAY
Range:	1.Sun, 2.Sun, 3.Sun, 4.Sun, L.Sun
Default Value:	1.Sun
Default Access Level	4
Function number	0445

Daylight saving time end day. Select the first, second, third, fourth or last Sunday in the month as the end day for daylight saving.

5.17 Daylight saving end month

Section:	rtc
Display:	dS.oF mon
Range:	JAn, FEb, mAr, APr, mAY, Jun, JI Y, Aug, SEP, Oct, Nou, dEc
Default Value:	Oct
Default Access Level	4
Function number	0447

Daylight saving time end month. Select the required end month for daylight saving adjustment.

5.18 Number of time alarms

Section:	rtc
Display:	No.AL
Range:	0 to 32
Default Value:	8
Default Access Level	4
Function number	780A

Sets the number of time alarms required, maximum is 32.

5.19 Time alarm units

Section:	rtc
Display:	AL UNIt
Range:	SECS, nI nS
Default Value:	SECS
Default Access Level	4
Function number	180E

Selects if the time alarm units are to be in seconds or minutes. These are the units which will be used by the alarm duration function e.g. AL 1dUr function.

5.20 Temperature sensor type

Section:	tEmP
Display:	tYPE
Range:	nonE, rtd, L335, 4-20, 0- 10
Default Value:	nonE
Default Access Level	4
Function number	18 10

This function is used to select the type of temperature sensor to be used. Select nonE if no temperature sensor is used. Select rtd for 2 or 3 wire Pt100 temperature sensor or select L335 for LM335 type sensor, or select 4-20 for 4-20mA type input. A non standard 0-10V temperature input can be fitted to order, if this has not been fitted the 0- 10 choice will not be seen. See the “Electrical Installation” chapter for details of connectors and wiring to be used.

5.21 Temperature display time

Section:	tEmP
Display:	°C SECS
Range:	0 to 100 secs
Default Value:	2
Default Access Level	4
Function number	18 11

This function is used to select the number of second for which the temperature will be displayed before the display toggles to the time display. A setting of 0 will disable the temperature display.

5.22 Time display time

Section:	tEmP
Display:	rtc SEC
Range:	0 to 100 secs
Default Value:	2
Default Access Level	4
Function number	18 12

This function is used to select the number of second for which the time will be displayed before the display toggles to the temperature. A setting of 0 will disable the time display.

5.23 Number of temperature alarms

Section:	tEMP
Display:	AL Cnt
Range:	0, 1, 2, 3, 4, 5, 6, 7, 8
Default Value:	2
Default Access Level	4
Function number	437d

This function is used to select the number of alarms allocated for temperature operation. Up to 8 alarms can be selected at this function.

5.24 Uncalibrate Pt100

Section:	tEMP
Display:	U.CAL rtd
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0620

This function is used to clear the calibration of the Pt100 temperature sensor and return it to the default factory scaling. To uncalibrate go to the U.CAL rtd function and press F then use the ▲ pushbutton to select YES and press F again to accept the uncalibration. A message will be seen to indicate that the uncalibration has ended. If the temperature reading is not close to actual temperature it can be useful to uncalibrate the temperature before attempting a new calibration. If the temperature reading is not close to actual temperature after uncalibration check the temperature sensor and wiring.

5.25 Pt100 temperature calibration first point

Section:	tEMP
Display:	CAL 1 rtd
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0600

A 2 point calibration is available for the Pt100 temperature sensor for fine adjustment of the temperature reading. The procedure for performing the temperature sensor first calibration point is:

1. Place the temperature sensor in a known low temperature environment e.g. an ice slurry will give a temperature of 0^oC.
2. Allow the temperature reading time to stabilise.
3. At the CAL 1 rtd function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.
4. Press F, the display will show the message tEMP CAL 1SCLE followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.
5. Press F to accept the change. The message CAL End should be seen. If any error message is seen check all connections to the temperature sensor and try calibration again.
6. Now perform the second calibration, see next function below.

5.26 Pt100 temperature calibration second point

Section:	tEMP
Display:	CAL2 rtd
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0610

A second point using a different temperature input is required to complete the temperature calibration. The procedure is as follows://

1. Place the temperature sensor in a known temperature environment at least 10 degrees higher than the first point calibration temperature.
2. Allow the temperature reading time to stabilise.
3. At the CAL2 rtd function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.
4. Press F, the display will show the message tEMP CAL2 SCLE followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.
5. Press F to accept the change. The message CAL End should be seen. If any error message is seen check all connections to the temperature sensor and try calibration again.

5.27 Pt100 temperature calibration offset

Section:	tEMP
Display:	OFSt rtd
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0660

When the temperature reading has an error across its measuring range e.g. reading 2 degrees high across its whole range the temperature reading can be altered by the “offset” method rather than needing to perform a 2 point calibration. The procedure is as follows://

1. At the OFSt rtd function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.
2. Press F, the display will show the message tEMP OFSt followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.
3. Press F to accept the change. The message OFSt End should be seen. I

5.28 Uncalibrate LM335

Section:	tEMP
Display:	U.CAL L335
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0621

This function is used to clear the calibration of the LM335 temperature sensor and return it to the default factory scaling. To uncalibrate go to the U.CAL rtd function and press F then use the ▲ pushbutton to select YES

and press F again to accept the uncalibration. A message will be seen to indicate that the uncalibration has ended. If the temperature reading is not close to actual temperature it can be useful to uncalibrate the temperature before attempting a new calibration. If the temperature reading is not close to actual temperature after uncalibration check the temperature sensor and wiring.

5.29 LM335 temperature calibration first point

Section:	tEMP
Display:	CAL 1 L335
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	060 1

A 2 point calibration is available for the LM335 temperature sensor for fine adjustment of the temperature reading. The procedure for performing the temperature sensor first calibration point is:

1. Place the temperature sensor in a known low temperature environment e.g. an ice slurry will give a temperature of 0^{o}C.
2. Allow the temperature reading time to stabilise.
3. At the CAL 1 rEd function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.
4. Press F, the display will show the message tEMP CAL 1SCLE followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.
5. Press F to accept the change. The message CAL End should be seen. If any error message is seen check all connections to the temperature sensor and try calibration again.
6. Now perform the second calibration, see next function below.

5.30 LM335 temperature calibration second point

Section:	tEMP
Display:	CAL2 L335
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	061 1

A second point using a different temperature input is required to complete the temperature calibration. The procedure is as follows://

1. Place the temperature sensor in a known temperature environment at least 10 degrees higher than the first point calibration temperature.
2. Allow the temperature reading time to stabilise.
3. At the CAL2 rEd function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.
4. Press F, the display will show the message tEMP CAL2 SCLE followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.
5. Press F to accept the change. The message CAL End should be seen. If any error message is seen check all connections to the temperature sensor and try calibration again.

5.31 LM335 temperature calibration offset

Section:	tEMP
Display:	OFSt L335
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0661

When the temperature reading has an error across its measuring range e.g. reading 2 degrees high across its whole range the temperature reading can be altered by the “offset” method rather than needing to perform a 2 point calibration. The procedure is as follows://

1. At the OFSt rEd function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.
2. Press F, the display will show the message tEMP OFSt followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.
3. Press F to accept the change. The message OFSt End should be seen. I

5.32 Enter 4mA temperature display value

Section:	tEMP
Display:	En4
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	4700

This method can be used as an alternative to the live input calibration for 4-20mA temperature inputs. This method allows the user to simply enter a temperature value to be displayed for a 4mA input. At the En4 function press F the display value will flash, use the ▲ or ▼ pushbutton to change the value displayed to that required for a 4mA input then press F to accept the change.

5.33 Enter 20mA temperature display value

Section:	tEMP
Display:	En20
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	4710

This method can be used as an alternative to the live input calibration for 4-20mA temperature inputs. This method allows the user to simply enter a temperature value to be displayed for a 20mA input. At the En20 function press F the display value will flash, use the ▲ or ▼ pushbutton to change the value displayed to that required for a 4mA input then press F to accept the change.

5.34 Uncalibrate 4-20mA temperature display

Section:	tEMP
Display:	U.CAL IN 1
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0622

This function is used to clear the calibration of the 4-20mA (IN 1) temperature sensor and return it to the default factory scaling. To uncalibrate go to the U.CAL IN 1 function and press F then use the ▲ pushbutton to select YES and press F again to accept the uncalibration. A message will be seen to indicate that the uncalibration has ended. Once uncalibrated a 4mA input will show a temperature of 4 degrees C and a 20mA input will show a temperature of 20 degrees C.

5.35 4-20mA temperature calibration first point

Section:	tEMP
Display:	CAL 1 IN 1
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0602

A 2 point calibration is available for the 4-20mA temperature input (IN1) for fine adjustment of the temperature reading. The procedure for performing the temperature sensor first calibration point is:

1. Apply an input of a known temperature.
2. At the CAL 1 IN 1 function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.
3. Press F, the display will show the message tEMP CAL ISCLE followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.
4. Press F to accept the change. The message CAL End should be seen. If any error message is seen check all temperature input connections and try calibration again.
5. Now perform the second calibration, see next function below.

5.36 4-20mA temperature calibration second point

Section:	tEMP
Display:	CAL2 IN 1
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0612

A 2 point calibration is available for the 4-20mA temperature input for fine adjustment of the temperature reading. The procedure for performing the temperature sensor second calibration point is:

1. Apply an input of a known temperature different by at least 10 percent to that of the signal applied at CAL 1 IN 1.

2. At the CAL2 IN1 function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.

3. Press F, the display will show the message TEMP CAL2 SCLE followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.

4. Press F to accept the change. The message CAL End should be seen. If any error message is seen check all temperature input connections and try calibration again.

5.37 4-20mA temperature calibration offset

Section:	TEMP
Display:	OFST IN1
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0662

When the temperature reading has an error across its measuring range e.g. reading 2 degrees high across its whole range the temperature reading can be altered by the “offset” method rather than needing to perform a 2 point calibration. The procedure is as follows://

1. At the OFST IN1 function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.

2. Press F, the display will show the message TEMP OFST followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.

3. Press F to accept the change. The message OFST End should be seen.

5.38 Uncalibrate 0-10V temperature display

Section:	TEMP
Display:	U.CAL IN2
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0624

Only seen if the special hardware modification for 0-10V input for temperature display has been fitted. This function is used to clear the calibration of the 0-10V (input 2) temperature input and return it to the default factory scaling. To uncalibrate go to the U.CAL IN2 function and press F then use the ▲ pushbutton to select YES and press F again to accept the uncalibration. A message will be seen to indicate that the uncalibration has ended. Once uncalibrated a 0V input will show a temperature of 0 degrees C and a 10V input will show a temperature of 100 degrees C. Note since a 0V input is effectively ground the display may give an error message until the input is slightly above 0V.

5.39 0-10V temperature calibration first point

Section:	tEMP
Display:	CAL 1 IN2
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0604

Only seen if the special hardware modification for 0-10V input for temperature display has been fitted. A 2 point calibration is available for the 0-10V temperature input (IN2) for fine adjustment of the temperature reading. Since a zero volt input can be prone to noise pickup it is best to perform the first calibration point above zero volts e.g. 1V. A 0V input may show as an error message on the display. The procedure for performing the temperature sensor first calibration point is:

1. Apply an input of a known temperature.
2. At the CAL 1 IN2 function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.
3. Press F, the display will show the message tEMP CAL 1SCLE followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.
4. Press F to accept the change. The message CAL End should be seen. If any error message is seen check all temperature input connections and try calibration again.
5. Now perform the second calibration, see next function below.

5.40 0-10V temperature calibration second point

Section:	tEMP
Display:	CAL2 IN2
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0614

Only seen if the special hardware modification for 0-10V input for temperature display has been fitted. A 2 point calibration is available for the 0-10V temperature input for fine adjustment of the temperature reading. The procedure for performing the temperature sensor second calibration point is:

1. Apply an input of a known temperature different by at least 10 percent to that of the signal applied at CAL 1 IN2.
2. At the CAL2 IN2 function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.
3. Press F, the display will show the message tEMP CAL2 SCLE followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.
4. Press F to accept the change. The message CAL End should be seen. If any error message is seen check all temperature input connections and try calibration again.

5.41 0-10V temperature calibration offset

Section:	tEMP
Display:	OFSt 1n2
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0664

Only seen if the special hardware modification for 0-10V input for temperature display has been fitted. When the temperature reading has an error across its measuring range e.g. reading 2 degrees high across its whole range the temperature reading can be altered by the “offset” method rather than needing to perform a 2 point calibration. The procedure is as follows://

1. At the OFSt 1n2 function press F and then press ▲ to toggle the display to YES and press F again. The display will give a live temperature reading which should be stable.
2. Press F, the display will show the message tEMP OFSt followed by a value. If necessary use the ▲ or ▼ button to change this value to the known temperature at the probe.
3. Press F to accept the change. The message OFSt End should be seen.

5.42 Temperature display decimal point

Section:	tEMP
Display:	°C.dP
Range:	0, 0.1
Default Value:	0
Default Access Level	4
Function number	7813

The temperature display can be set for zero or one decimal point display resolution. When set for one decimal place (0.1 setting) it may be necessary to change the units display at the °C Unit in order to fit the temperature reading on the display if a 4 digit display is used, see the °C Unit for further details.

5.43 Temperature unit display

Section:	tEMP
Display:	°C Unit
Range:	°C, °, C
Default Value:	°C
Default Access Level	4
Function number	781F

The temperature display can be set to show the units °C, ° or C after the temperature. When a temperature display resolution of 0.1 degrees is selected at the °C.dP function the temperature range will be allow from -1.9°C to 9.9°C or -19.9° to 99.9° or -19.9C to 99.9C for a 4 digit display.

5.44 Temperature display filter

Section:	tEMP
Display:	°C FiLtr
Range:	0, 1, 2, 3, 4, 5, 6, 7, 8
Default Value:	8
Default Access Level	4
Function number	7822

The temperature display filter can be used to reduce display variation due to noise pickup from the sensor, if fluctuations occur increase the value of the filter.

5.45 Alarm relay high setpoint

Section:	AL 1 to AL 8
Display:	Hi SP
Range:	Any display value or OFF
Default Value:	OFF
Default Access Level	2
Function number	4000 to 4007

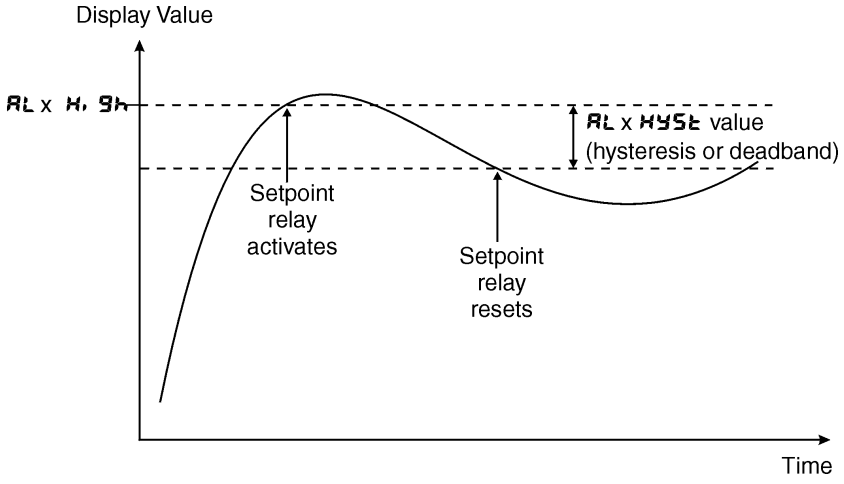
Displays and sets the high setpoint value for the designated alarm relay. Use this high setpoint function if a relay operation is required when the display value becomes equal to or more than the low setpoint value.

To set the high alarm value go to the Hi SP function, press F and when you see a digit of the value flash use the ▲ or ▼ push buttons to set the required value then press F to accept this selection. The high alarm setpoint may be disabled by pressing the ▲ and ▼ push buttons simultaneously. When the alarm is disabled the display will indicate OFF. If the relay is allocated both a low and high setpoint then the relay will activate when the value displayed moves outside the band set by the low and high setpoints. The value at which the relay will reset is controlled by the HYSt function.

Overlapping alarms - if the Hi SP value is set lower than the Lo value then the alarm will activate in the band between the two values.

If the display has annunciator leds for the relay then the annunciator will initially flash in alarm condition, if the alarm is acknowledged by pressing the F button (where fitted) or has been acknowledged by a P button or remote input operation the annunciator will be solidly lit until the display moves out of alarm condition.

Example:
If Hi SP under AL 1 is set to 100 then relay 1 will activate when the display value is 100 or higher.



Note if the high alarm value is set lower than the low alarm value the relay will activate between the two i.e. activate in the band between the two values.

5.46 Alarm relay low setpoint

Section:	RL 1 to RL 8
Display:	Lo
Range:	Any display value or OFF
Default Value:	OFF
Default Access Level	2
Function number	40 10 to 40 17

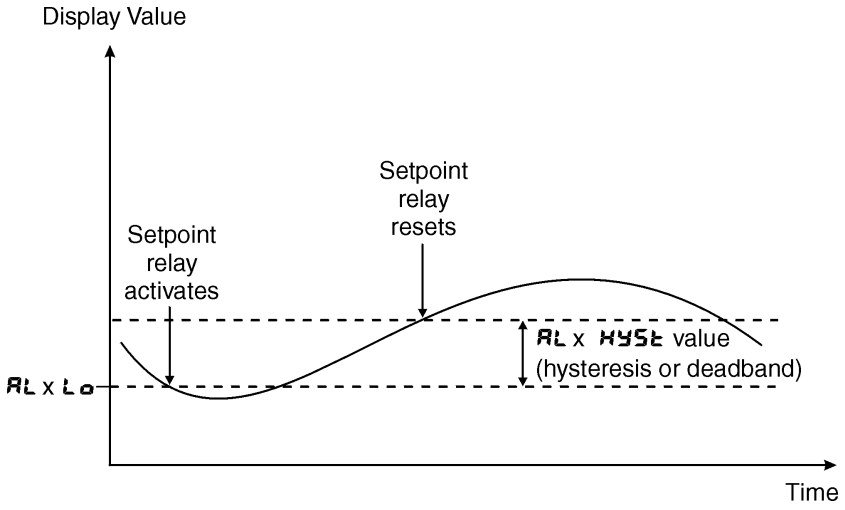
Displays and sets the low setpoint value for the designated alarm relay. Use this low setpoint function if a relay operation is required when the display value becomes equal to or less than the low setpoint value.

To set the low alarm value press F and when you see a digit of the value flash use the ▲ or ▼ push buttons to set the required value then press F to accept this selection.

The low alarm setpoint may be disabled by pressing the ▲ and ▼ push buttons simultaneously. When the alarm is disabled the display will indicate OFF. If the relay is allocated both a low and high setpoint then the relay will activate when the value displayed moves outside the band set by the low and high setpoints. The value at which the relay will reset is controlled by the Hysteresis function.

If the display has annunciator leds for the relay then the annunciator will initially flash in alarm condition, if the alarm is acknowledged by pressing the F button (where fitted) or has been acknowledged by a P button or remote input operation the annunciator will be solidly lit until the display moves out of alarm condition.

Example:
If Lo under RL 1 is set to 10 then relay 1 will activate when the display value is 10 or less.



5.47 Alarm relay hysteresis (deadband)

Section:	RL 1 to RL 8
Display:	HYSt
Range:	0 to 65535
Default Value:	10
Default Access Level	3
Function number	4020 to 4027

Displays and sets the alarm relay hysteresis limit for the selected channel. To set a relay hysteresis value go to the HYSt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value. The hysteresis value is common to Fault, Low and High setpoint values. The hysteresis value may be used to prevent too frequent operation of the relay when the measured value is rising and falling around setpoint value.

The hysteresis setting operates as follows: For the ascending alarms, once the alarm is activated the input must fall

below the setpoint value minus the hysteresis value to reset the alarm. e.g. if **AL 3 Hi SP** is to **50.0** and **AL 3 HYST** is set to **3.0** then the channel 4 alarm will activate once the display value goes to **50.0** or above and will reset when the display value goes below **47.0** i.e. at **46.9** or below.

For the descending alarms, once the alarm is activated the input must rise above the setpoint value plus the hysteresis value to reset the alarm. e.g. if **AL 2 Hi SP** is to **0.0** and **AL 2 HYST** is set to **10.0** then the channel 5 alarm will activate when the display value falls below **0.0** and will reset when the display value goes above **10.0** i.e at **10.1** or above. The hysteresis units are expressed in displayed engineering units.

5.48 Alarm relay trip time

Section:	**AL 1** to **AL 8**
Display:	**trIP**
Range:	**0** to **6553.5** secs
Default Value:	**0.0**
Default Access Level	**3**
Function number	**4040** to **4047**

Displays and sets the alarm trip time in seconds. The trip time is common for both alarm high and low setpoint values. The trip time provides a time delay before the alarm relay will activate when an alarm condition is present. The alarm condition must be present continuously for the whole trip time period before the alarm will activate. If the input moves out of alarm condition during this period the timer will reset and the full time delay will be restored. This trip time delay is useful for preventing an alarm trip due to short non critical deviations from setpoint. The trip time is selectable over **0.0** to **6553.5** seconds.

To set the trip time value go to the **trIP** function, press **F** and when you see a digit of the value flash use the ▲ or ▼ push buttons to set the required value then press **F** to accept this selection.

Example: If **trIP** is set to **5.0** seconds then the display must indicate an alarm value for a full 5 seconds before the relay will activate.

5.49 Alarm relay reset time

Section:	**AL 1** to **AL 8**
Display:	**rSt**
Range:	**0** to **6553.5** secs
Default Value:	**0.0**
Default Access Level	**3**
Function number	**4050** to **4057**

Displays and sets the alarm reset delay time in seconds. The reset time is common for both alarm high and low setpoint values. With the alarm condition is removed the alarm relay will stay in its alarm condition for the time selected as the reset time. If the input moves back into alarm condition during this period the timer will reset and the full time delay will be restored. The reset time is selectable over **0.0** to **6553.5** seconds.

To set the reset time value go to the **rSt** function, press **F** and when you see a digit of the value flash use the ▲ or ▼ push buttons to set the required value then press **F** to accept this selection.

Example: If **rSt** is set to **10.0** seconds then the resetting of alarm relay will be delayed by 10 seconds.

5.50 Relay selection

Section:	AL 1 to AL 8
Display:	rLYS
Range:	On or OFF
Default Value:	OFF
Default Access Level	4
Function number	4330 to 4337

Allows a relay to be allocated to an alarm. For example if a high alarm value has been selected at the AL 1H, 9h function this alarm could be allocated to relay 3 by selecting rLY3 On at this function. Press the F button to enter this function then use the ▲ or ▼ pushbuttons to choose the required relay then press the F button to toggle to On or OFF as required. When relay PI control is used alarm 1 is dedicated to relay 1 and alarm 2 is dedicated to relay 2 so no selection choice will appear when set for PI control.

5.51 Alarm trailing or setpoint mode

Section:	AL 1 to AL 8
Display:	trL
Range:	SEt.P, tL 1, tL 2, tL 3, tL 4, tL 5, tL 6, tL 7
Default Value:	SEt.P
Default Access Level	4
Function number	4060 to 4067

Each alarm, except alarm 1, may be programmed to operate with an independent setpoint value (SEt.P selected) or may be linked to operate at a fixed difference to one or more other alarms, known as trailing operation. The operation is as follows: The operation of each alarm is selectable by selecting, for example, (Alarm 4) AL4 SEt.P = alarm 4 normal setpoint or AL4 tL 1 = alarm 4 trailing alarm 1 or AL4 tL2 = alarm 4 trailing alarm 2 or AL4 tL3 = alarm 4 trailing relay 3. For trailing set points the setpoint value is entered as the difference from the setpoint being trailed.

If the trailing setpoint is to operate ahead of the prime setpoint then the value is entered as a positive number and if operating behind the prime setpoint then the value is entered as a negative number.

Notes: If a high (AL *x* h, 9h) trailing alarm is set then this will only follow the high alarm setting of the alarm it is set to trail. Similarly a low alarm will only trail a low alarm of the alarm it is set to trail. It is possible to use trailing alarms with both high and low alarm settings used for each relay.

Example 1 - High alarm: With alarm 2 set to trail alarm 1, if AL 1H, 9h is set to 1000 and AL2 H, 9h is set to 50 then alarm 1 will activate at 1000 and alarm 2 will activate at 1050 (i.e. 1000 + 50). If alarm 2 had been set at -50 then alarm 2 would activate at 950 (i.e. 1000 – 50) or above.

Example 2 - Low alarm: With alarm 2 set to trail alarm 1, if AL 1Lo is set to 600 and AL2 Lo is set to 200 then alarm 1 will activate at 600 and alarm 2 will activate at 800 (i.e. 600 + 200). If alarm 2 had been set at -200 then alarm 2 would activate at 400 (i.e. 600 – 200) or below.

5.52 Alarm relay latching operation

Section:	AL 1 to AL 8
Display:	Ltch
Range:	Auto, Ltch, A.b, L.b
Default Value:	Auto
Default Access Level	4
Function number	4170 to 4177

Allows selection of alarm latching operation. If set to Auto the alarm relays will not latch i.e. they will automati-

cally reset when the display moves out of alarm condition. If set to LAtch the relay will latch and will not reset until the display value is out of alarm condition and either the F button is pressed to clear the latch condition or if power is removed. The relay hysteresis, trip time and reset time settings still apply to latching relays.

In latching mode the alarm annunciator (if annunciators are fitted) will flash when the display goes into alarm condition. If the display goes out of alarm condition without being acknowledged the flashing period will change to give a longer “off” time. If the alarm is acknowledged by pressing the F button then the annunciator will change from flashing to solidly lit. Once the alarm has been acknowledged the relay will be free to reset once the display value moves out of alarm condition.

5.53 Alarm relay normally open/closed

Section:	rL 1 to rL8
Display:	rLy
Range:	no, nc
Default Value:	no
Default Access Level	4
Function number	4030 to 4037

Displays and sets the setpoint alarm relay *x* action to normally open (de-energised) or normally closed (energised), when no alarm condition is present. Since the relay will always open when power is removed a normally closed alarm is often used to provide a power failure alarm indication. To set the alarm relay for normally open or closed go to the rL 1 to rL8 rLy function and use the ▲ or ▼ push buttons to set the required operation then press F to accept this selection. **Example:**
If set to A 1no alarm relay 1 will be open circuit when the display is outside alarm condition and will be closed (short circuit across COM and N/O terminals) when the display is in alarm condition.

5.54 Relay acknowledge

Section:	rL 1 to rL8
Display:	Ack
Range:	OFF or On
Default Value:	OFF
Default Access Level	4
Function number	4320 to 4327

If an alarm has been set to latching operation it will not reset until the reading is outside its alarm condition and the operator has acknowledged the alarm by pressing the F button (where fitted) or when programmed for this purpose using a P button or remote input to acknowledge the alarm. If the Ack is set to On the operator can acknowledge the alarm whilst still in alarm condition allowing the alarm to reset automatically when the reading moves outside the alarm condition.

5.55 Temperature alarm relay Boolean logic operation

Section:	rL 1 to rL8
Display:	bool
Range:	Or, And
Default Value:	Or
Default Access Level	4
Function number	4310 to 4317

This function allows a Boolean logic AND (And) or OR (Or) function to be applied to temperature alarms. If two or more alarms use the same relay and that relay is set to operate as an OR operation then this effectively puts the

alarms in parallel. If two or more alarms use the same relay that relay is set to operate on an AND operation then this effectively puts the alarms in series.

Examples: 1. If alarms 1, 2 and 3 all use relay 1 and relay 1 is set for **Or** operation then relay 1 will activate if the display value for the selected channels for these alarms causes either alarm 1 or alarm 2 or alarm 3 to go into alarm condition. i.e. relay 1 will activate if any of the alarms is in alarm condition.

2. If alarms 1, 2 and 3 all use relay 1 and relay 1 is set for **And** operation then relay 1 will activate if the display value for the selected channels for these alarms causes alarm 1 and alarm 2 and alarm 3 to go into alarm condition. i.e. all 3 alarms must be in alarm condition for relay 1 to activate.

5.56 Alarm on time

Section:	**AL 1** to **AL32**
Display:	**On**
Range:	**0** to **1439** mins
Default Value:	n/a
Default Access Level	**2**
Function number	**7840** to **785F**

Up to 32 alarm times can be set To set a time alarm a start time, duration and the days on which the alarms are to operate must be set, also the relay or relays to be activated during an alarm must be set. This function is used to set the time at which the alarm is to begin. The **dUr** function which follows sets the length of time the alarm is active. The **dAY** function sets which day or days the alarm is to operate on and the **rLY** function allows selection of relay or relays to be activated.

5.57 Alarm duration

Section:	**AL 1** to **AL32**
Display:	**dUr**
Range:	**0** to Maximum display value secs
Default Value:	n/a
Default Access Level	**2**
Function number	**7880** to **789F**

The alarm duration is the length of time from the **On** time for which the chosen relay or relays will activate. The time can be set in units of minutes or seconds with the selection being made at the **AL UnIt** function.

5.58 Alarm days

Section:	**AL 1** to **AL32**
Display:	**dAY**
Range:	**non**, **tuE**, **UEd**, **thu**, **Fri** , **SAt**, **Sun**
Default Value:	n/a
Default Access Level	**2**
Function number	**78C0** to **78dF**

For each alarm the days of the week on which the alarm will operate is set at this function. Use the ▲ or ▼ pushbutton to select the day required then press the **F** button to toggle between **OFF** (alarm does not operate on this day) and **On** (alarm does operate on this day). Continue using the ▲ or ▼ pushbutton to choose more days if required and when finished press **F** when the display shows **End** to exit this section.

5.59 Alarm relays

Section:	AL 1 to AL32
Display:	rLY
Range:	rLY. 1, rLY.2, rLY.3, rLY.4
Default Value:	n/a
Default Access Level	2
Function number	7900 to 791F

For each alarm the relay or relays on which the alarm will operate is set at this function. Use the ▲ or ▼ pushbutton to select the relay required then press the F button to toggle between OFF (alarm does not operate this relay) and On (alarm does operate this relay). Continue using the ▲ or ▼ pushbutton to choose more relays if required and when finished press F when the display shows End to exit this section.

5.60 Remote input alarm enable

Section:	AL 1 to AL32
Display:	d.I n
Range:	d.I n. 1, d.I n.2, d.I n.3, d.I n.4
Default Value:	n/a
Default Access Level	2
Function number	7940 to 795F

For each alarm there is the option of requiring an extra enabling input form one of the four remote (digital) inputs on the main board. Use the ▲ or ▼ pushbutton to select the digital input required then press the F button to toggle between OFF (alarm does not require this input) and On (alarm does require this input). Continue using the ▲ or ▼ pushbutton to choose more digital inputs if required and when finished press F when the display shows End to exit this section. For example if an alarm has d.I n.3 set to On then the alarm will only operate if digital input 3 is active when the alarm on time is reached. If the remote input becomes active or inactive during the alarm period it can cause the relays selected to activate and de activate in response. Ensure that the remote input functions in the r.I nP section do not conflict with these settings as the remote input terminals can also be set to operate from remote input function selection i.e. do not select 2 operations for the same remote input.

5.61 Automatic display brightness

Section:	dI SP
Display:	br9t Auto
Range:	OFF or ON
Default Value:	On
Default Access Level	2
Function number	22FC

Automatic display brightness adjustment. Applies only to instruments with light sensor fitted. The automatic brightness adjustment uses the optional light sensor to gauge the required brightness level for the environment. The high and low brightness limits are set at the Auto Hi 9h and Auto Lo functions described below.

5.62 Display brightness

Section:	dISP
Display:	brgt
Range:	1 to 63
Default Value:	63
Default Access Level	2
Function number	22Fb

Allows manual adjustment of the display brightness from 1 (lowest brightness) to 63 (highest brightness).

5.63 Dimmed display brightness

Section:	dISP
Display:	dull
Range:	0 to 63
Default Value:	7
Default Access Level	2
Function number	22EC

Displays and sets the manually set level for remote input brightness switching. When a remote input is set to dull the remote input can be used to switch between the display brightness level set by the brgt function and the dimmed display brightness set by the dull function. The display dull level is selectable from 0 to 63, where 0 = lowest intensity and 63 = highest intensity. This function is useful in reducing glare when the display needs to be viewed in both light and dark ambient light levels.

5.64 Auto display brightness high level

Section:	dISP
Display:	Auto Hi gh
Range:	15 to 63
Default Value:	63
Default Access Level	2
Function number	22EA

Automatic brightness high level - seen only when brgt Auto is set to ON. The high brightness level sets the maximum brightness which the automatic brightness control can achieve with 64 being the highest intensity.

5.65 Auto display brightness low level

Section:	dISP
Display:	Auto Lo
Range:	1 to 63
Default Value:	7
Default Access Level	2
Function number	22Eb

Automatic brightness low level - seen only when brgt Auto is set to ON. The low brightness level sets the minimum brightness which the automatic brightness control can achieve with 64 being the highest intensity and 0 being the lowest intensity.

5.66 Display dim timer

Section:	dI SP
Display:	d.OFF
Range:	0 to Maximum display value mins
Default Value:	0
Default Access Level	2
Function number	22EE

This function can be used to set a timer in minutes for automatic dimming of the display to reduce current consumption. When set to 0 the timer is disabled and there is no automatic dimming. When set to a value in minutes the display will automatically dim with the timer starting from the last time a pushbutton on the display was pressed. The timer operates on an accuracy of +/- 1 minute so timing is approximate. When the display dims it dims to the brightness level set at the dul I function. Note this timer is independent from the master unit d.OFF timer i.e. the dulling operation for the slave unit cannot be controlled by the master unit. The normal brightness will resume and the timer will be reset when any of the slave displays pushbuttons is pressed.

5.67 Front P button operation mode

Section:	r.I nP
Display:	P.but
Range:	nonE, P.Hi , P.Lo, Hi .Lo, AL.Ac
Default Value:	nonE
Default Access Level	4
Function number	4720

Sets the operation mode for front P button. Functions available are identical to the same functions used in the r.I n. 1 to r.I n.4 functions.

5.68 Remote input 1 operation mode

Section:	r.I nP
Display:	r.I n. 1
Range:	nonE, P.HI d, d.HI d, P.Hi , P.Lo, Hi .Lo, AL.Ac, ACCS, P.but, F.but, U.but, d.but, dul I , b.I nc, b.dEc
Default Value:	nonE
Default Access Level	4
Function number	4721

The remote inputs 1 to 4 can be set to be used for various operations as described below. Ensure that the remote input settings in the At 1 to At32 d.I n section do not conflict with the settings in this section as the remote input terminals can also be set to enable/disable the time alarms i.e. do not select 2 operations for the same remote input.

- nonE - If this option is selected then remote input 1 will have no function.
- P.Hol d - not applicable to this software version.
- d.Hol d - not applicable to this software version.
- P.Hi - not applicable to this software version.
- P.Lo - not applicable to this software version.
- Hi Lo - not applicable to this software version.

- **AI .AC** - alarm acknowledge. Allows the remote input to be used to acknowledge a temperature alarm. If the alarm is set for latching operation the acknowledgment will allow the alarm and any relays allocated to that alarm to reset when the alarm condition is removed. If the alarm is set for automatic reset the acknowledgment will allow the alarm and any relays allocated to that alarm to reset even if the alarm condition still exists this could typically be used to silence a siren controlled by a relay even though the alarm condition is still present. The acknowledge will operate on all alarms programmed to require acknowledgement.
- **ACCS** - remote input access. Allows the remote input to be used for setup function access control purposes. Refer to the " Accessing setup functions" in the Introduction chapter.
- **P.but** - allows the selected remote input to act as the **P** pushbutton.
- **F.but** - allows the selected remote input to act as the **F** pushbutton.
- **U.but** - allows the selected remote input to act as the **▲** pushbutton.
- **d.but** - allows the selected remote input to act as the **▼** pushbutton.
- **dull** - remote dulling of the display. When activated the display brightness will fall to the level set by the **dull** level. This is generally used to reduce current consumption in battery powered applications or for switching between day and night brightness levels.
- **b.Inc** - display brightness increment. Allows the selected remote input to be used to increment the display brightness. If no other remote input is set to **b.dEc** then once maximum brightness is reached the brightness will start again from lowest brightness and increment. If auto brightness is turned on then when powered up the display will go to its auto brightness level and can be adjusted from there. If auto brightness is turned off then the display will remember its last brightness setting on power up. The maximum brightness reached will be the brightness level set by the **brgt** function is auto brightness is turned off or the brightness level set by the **Auto Hi gh** if the auto brightness is turned on. The minimum brightness reached will be the brightness level set by the **dull** function if auto brightness is turned off or the brightness level set by the **Auto Lo** function if auto brightness is turned on.
- **b.dEc** - display brightness decrement. Allows the selected remote input to be used to decrement the display brightness. If no other remote input is set to **b.Inc** then once minimum brightness is reached the brightness will start again from lowest highest brightness and decrement. If auto brightness is turned on then when powered up the display will go to its auto brightness level and can be adjusted from there. If auto brightness is turned off then the display will remember its last brightness setting on power up. The maximum brightness reached will be the brightness level set by the **brgt** function is auto brightness is turned off or the brightness level set by the **Auto Hi gh** if the auto brightness is turned on. The minimum brightness reached will be the brightness level set by the **dull** function if auto brightness is turned off or the brightness level set by the **Auto Lo** function if auto brightness is turned on.

5.69 Remote input 2 operation mode

Section:	**r.1 nP**
Display:	**r.1 n.2**
Range:	**nonE**, **P.HI d**, **d.HI d**, **P.Hi** , **P.Lo**, **Hi .Lo**, **AL.Ac**, **ACCS**, **P.but**, **F.but**, **U.but**, **d.but**, **dull** , **b.Inc**, **b.dEc**
Default Value:	**nonE**
Default Access Level	**4**
Function number	**4722**

Remote input 2 functions. Same choices as **r.1 nP r.1 n. 1** apply.

5.70 Remote input 3 operation mode

Section:	r.i nP
Display:	r.i n.3
Range:	nonE, P.Hi d, d.Hi d, P.Hi , P.Lo, Hi .Lo, AL.Ac, ACCS, P.but, F.but, U.but, d.but, dui i , b.i nc, b.dEc
Default Value:	nonE
Default Access Level	4
Function number	4723

Remote input 3 functions. Same choices as r.i nP r.i n. 1 apply.

5.71 Remote input 4 operation mode

Section:	r.i nP
Display:	r.i n.4
Range:	nonE, P.Hi d, d.Hi d, P.Hi , P.Lo, Hi .Lo, AL.Ac, ACCS, P.but, F.but, U.but, d.but, dui i , b.i nc, b.dEc
Default Value:	nonE
Default Access Level	4
Function number	4724

Remote input 4 functions. Same choices as r.i nP r.i n. 1 apply.

5.72 Remote input (digital inputs) 1 pull up/down operation

Section:	d.i n
Display:	d.i n. 1 P.UP
Range:	OPEn, Hi 5h, Lo
Default Value:	Hi 5h
Default Access Level	4
Function number	4A50

This function sets the voltage level present on the digital input terminal. If set to Hi 5h a 5VDC voltage will be placed on the input terminal via a pull up resistor and a short circuit to ground or voltage below 2V will be required to activate the remote input. If set to Lo then the input terminal will be connected to ground via a pull down resistor and a voltage between 5 and 24VDC will be required at the input to activate the remote input. If set to OPEn then both the pull up and pull down resistors will be taken out of circuit and the terminal voltage will be “floating”, this choice can be used when input devices are used which may supply their own voltage to the digital input terminal, maximum acceptable voltage is 24VDC.

5.73 Remote input (digital inputs) 1 input level

Section:	d.i n
Display:	d.i n. 1 LuL
Range:	Hi 5h, Lo
Default Value:	Lo
Default Access Level	4
Function number	4A58

This function sets the input level required to activate the remote input. A setting of Lo means that a low voltage usually 0V or a short circuit to ground will activate the remote input. A setting of Hi 5h means that a voltage of 5 to 24V is required to activate the remote input.

5.74 Remote input (digital inputs) 2 pull up/down operation

Section:	d.in
Display:	d.in.2 P.UP
Range:	OPEn, Hi 5h, Lo
Default Value:	Hi 5h
Default Access Level	4
Function number	4A51

This function sets the voltage level present on the digital input terminal. If set to Hi 5h a 5VDC voltage will be placed on the input terminal via a pull up resistor and a short circuit to ground or voltage below 2V will be required to activate the remote input. If set to Lo then the input terminal will be connected to ground via a pull down resistor and a voltage between 5 and 24VDC will be required at the input to activate the remote input. If set to OPEn then both the pull up and pull down resistors will be taken out of circuit and the terminal voltage will be “floating”, this choice can be used when input devices are used which may supply their own voltage to the digital input terminal, maximum acceptable voltage is 24VDC.

5.75 Remote input (digital inputs) 2 input level

Section:	d.in
Display:	d.in.2 Lvl
Range:	Hi 5h, Lo
Default Value:	Lo
Default Access Level	4
Function number	4A59

This function sets the input level required to activate the remote input. A setting of Lo means that a low voltage usually 0V or a short circuit to ground will activate the remote input. A setting of Hi 5h means that a voltage of 5 to 24V is required to activate the remote input.

5.76 Remote input (digital inputs) 3 pull up/down operation

Section:	d.in
Display:	d.in.3 P.UP
Range:	OPEn, Hi 5h, Lo
Default Value:	Hi 5h
Default Access Level	4
Function number	4A52

This function sets the voltage level present on the digital input terminal. If set to Hi 5h a 5VDC voltage will be placed on the input terminal via a pull up resistor and a short circuit to ground or voltage below 2V will be required to activate the remote input. If set to Lo then the input terminal will be connected to ground via a pull down resistor and a voltage between 5 and 24VDC will be required at the input to activate the remote input. If set to OPEn then both the pull up and pull down resistors will be taken out of circuit and the terminal voltage will be “floating”, this choice can be used when input devices are used which may supply their own voltage to the digital input terminal, maximum acceptable voltage is 24VDC.

5.77 Remote input (digital inputs) 3 input level

Section:	d.in
Display:	d.in.3 Lvl
Range:	Hi 9h, Lo
Default Value:	Lo
Default Access Level	4
Function number	4A5A

This function sets the input level required to activate the remote input. A setting of **Lo** means that a low voltage usually 0V or a short circuit to ground will activate the remote input. A setting of **Hi 9h** means that a voltage of 5 to 24V is required to activate the remote input.

5.78 Remote input (digital inputs) 4 pull up/down operation

Section:	d.in
Display:	d.in.4 P.UP
Range:	OPEn, Hi 9h, Lo
Default Value:	Hi 9h
Default Access Level	4
Function number	4A53

This function sets the voltage level present on the digital input terminal. If set to **Hi 9h** a 5VDC voltage will be placed on the input terminal via a pull up resistor and a short circuit to ground or voltage below 2V will be required to activate the remote input. If set to **Lo** then the input terminal will be connected to ground via a pull down resistor and a voltage between 5 and 24VDC will be required at the input to activate the remote input. If set to **OPEn** then both the pull up and pull down resistors will be taken out of circuit and the terminal voltage will be “floating”, this choice can be used when input devices are used which may supply their own voltage to the digital input terminal, maximum acceptable voltage is 24VDC.

5.79 Remote input (digital inputs) 4 input level

Section:	d.in
Display:	d.in.4 Lvl
Range:	Hi 9h, Lo
Default Value:	Lo
Default Access Level	4
Function number	4A5b

This function sets the input level required to activate the remote input. A setting of **Lo** means that a low voltage usually 0V or a short circuit to ground will activate the remote input. A setting of **Hi 9h** means that a voltage of 5 to 24V is required to activate the remote input.

5.80 Serial output operation mode

Section:	SEri
Display:	OPEr
Range:	nonE, Cont, Poll , A.buS, d. SP, n.buS, UPdt
Default Value:	nonE
Default Access Level	4
Function number	4480

Allows selection of the operating mode to be used for RS232 or RS485 serial output communications. See the “LD5/LE5 Series Large Digit Display Output Addendum” for more information and wiring details of optional

isolated serial communications.

Choices are:

- **nonE** - no serial comms. required.
- **Cont** - sends ASCII form of displayed time. The time will be preceded by a start of text character and will terminate with a carriage return e.g. <STX>15:16<CR> for a displayed time of 16 minutes past 3 pm.
- **Poll** - controlled by computer or PLC etc. as host. The host sends command via RS232/485 and instrument responds as requested. The poll commands for the clock are:
  <STX>PA<CR> or <STX>SA<CR> or <STX>TA<CR> where:
  <STX> is the start of text character and <CR> is a carriage return character.
  A is the unit ASCII address set by the **Unit Addr** function offset by 32 decimal. e.g. ASCII code 33 decimal is the exclamation mark ! and this would be address 1.
  P is the primary display value i.e. the time displayed. The returned value will be in the same format as the continuous mode above but will include a copy of the command and address e.g. <STX>P! 15:16<CR> for a displayed time of 16 minutes past 3 pm (unit address 1).
  S is the secondary value which is the number of seconds and tenths of second since midnight e.g. <STX>S! 55108.1<CR>
  T is the tertiary value which is the date in year-month-day format e.g. <STX>T! 2020-10-23<CR>
- **A.bus** - this is a special communications mode used with Windows compatible PC download software. This mode must be used if communications via USB is used. Refer to the user manual supplied with this optional software.
- **dISP** - sends image data from the display without conversion to ASCII. This mode should only be used when the serial output is connected to another display from the same manufacturer.
- **M.bus** output - Modbus RTU (RS232/RS485) is used. To poll for the display value via Modbus use address 0x1000 and 0x1001 hex (registers 44095 and 44096 decimal), Modbus function 3.
- **UPdt** - this mode can be used in master/slave configurations. When used in this configuration the master clock must be set for **UPdt** and all the slave clocks must be set to **Poll** . The master clock will send its time via serial comms to the slave clocks every 60 seconds. As an example the format sent for a time of 15:44 with no hundredths displayed would be <ESC>T154400<CR>.

5.81 Serial baud rate

Section:	**SEr1**
Display:	**bAud**
Range:	**1200**, **2400**, **4800**, **9600**, **19.2**, **38.4**, **57.6**, **115.2**
Default Value:	**9600**
Default Access Level	**4**
Function number	**4484**

Allows the baud rate to be set for serial communications. Choices are:

1200, **2400**, **4800**, **9600**, **19.2**, **38.4**, **57.6**, **115.2**

Baud rates above 9600 are in k Baud.

5.82 Serial parity

Section:	SEr1
Display:	PrtY
Range:	8n, 8E, 8O, 7E, 7O
Default Value:	8n
Default Access Level	4
Function number	4482

Allows selection of the parity check. The parity check selected should match that of the device it is being communicated with. The choices are 8 bit with no parity, even parity or odd parity or 7 bit with even or odd parity.

5.83 Serial address

Section:	SEr1
Display:	Unit Addr
Range:	1 to 127
Default Value:	1
Default Access Level	4
Function number	0430

Allows selection of the unit address when the operation is set for POLL mode. The unit address is offset by 32(DECIMAL) to avoid clashing with ACSII special characters, therefore 42 (DECIMAL) or 2A (HEX) would be unit address 10.

5.84 Send error display

Section:	SEr1
Display:	Err diSP
Range:	OFF or On
Default Value:	On
Default Access Level	4
Function number	4483

When set to On the selected any error display will be sent via the serial comms. to any connected receiving device or slave display. When sent to OFF the error display will not be sent.

5.85 Easy access mode

Section:	ACCES
Display:	EASY LEUL
Range:	nonE, 1, 2, 3, 4, 5, 6, CAL
Default Value:	nonE
Default Access Level	5.CAL
Function number	0C00

Allows choice of the access level available when using the easy access method. For example if this function is set to 3 then functions with levels 1, 2 and 3 can be viewed and changed when access to setup functions is made using this method. To access setup functions using the easy access method press and hold the F button until the message FUnC is seen followed by the first function message, this should take approximately 3 seconds. If the message FUnC End or no response is seen at this point it means that the access level has been set to nonE and that access to setup functions has been refused.

5.86 Remote input access mode

Section:	ACCES
Display:	r.I nP LEVL
Range:	nonE, 1, 2, 3, 4, 5, 6, CAL
Default Value:	nonE
Default Access Level	S.CAL
Function number	0C01

This function allows choice of the access level available when using the remote input access method. To access setup functions using the remote input access method one of the remote inputs must be set to ACCSS and the chosen remote input must be shorted to ground. Press and hold the F button until the message FUNC is seen followed by the first function message, this should take approximately 3 seconds. If the message FUNC End is seen at this point it means that the access level has been set to nonE.

5.87 PIN code 1

Section:	ACCES
Display:	USr. 1 P, n
Range:	0 to 65535
Default Value:	0
Default Access Level	S.CAL
Function number	0C09

This function allows choice of the PIN code to be used for PIN code input access method. Associated with the PIN is an access level (see P, n. 1AccS). If a PIN is not required leave the setting at 0. If a PIN other than 0 is chosen then this PIN must be entered to gain access to the the selected level.

To access setup functions using the PIN code input access method press then release the F button then within 2 seconds press the ▲ and ▼ buttons at the same time. The message FUNC is seen followed by the message CodE. If the message FUNC End is seen at this point it means that the access level has been set to nonE. Use the ▲ and ▼ buttons to enter the PIN then press F to accept the PIN and proceed to the setup functions.

5.88 PIN code 1 access level

Section:	ACCES
Display:	USr. 1 LEVL
Range:	nonE, 1, 2, 3, 4, 5, 6, CAL
Default Value:	nonE
Default Access Level	S.CAL
Function number	0C02

This function allows choice of the access level available when using the PIN code 1 input access method. To access setup functions using the PIN code 1 input access method press and hold the F button until the message FUNC is seen followed by the first function message, this should take approximately 3 seconds. If the message FUNC End is seen at this point it means that the access level has been set to nonE.

5.89 PIN code 2

Section:	ACCES
Display:	USr.2 Pin
Range:	0 to 65535
Default Value:	0
Default Access Level	5.CAL
Function number	0C0A

This function allows choice of a second PIN code to be used for PIN code input access method. Associated with the PIN is an access level (see Pin.2AccS). The second PIN would normally be used to allow a second person to have a higher access to setup functions via a different PIN. If a second PIN is not required leave the setting at 0. If a PIN other than 0 is chosen then this PIN must be entered to gain access to the the selected level.

To access setup functions using the PIN code input access method press then release the F button then within 2 seconds press the ▲ and ▼ buttons at the same time. The message FUNC is seen followed by the message CodE. If the message FUNC End is seen at this point it means that the access level has been set to NonE. Use the ▲ and ▼ buttons to enter the PIN then press F to accept the PIN and proceed to the setup functions. Ony one CodE message will appear even though there can be a second PIN. If the number entered into the CodE at this point is the PIN code 1 number then access will be granted to the functions allocated to the first PIN. If the PIN code 2 value is entered then access will be granted to the functions allocated to the second PIN.

5.90 PIN code 2 access level

Section:	ACCES
Display:	USr.2 LEUL
Range:	NONE, 1, 2, 3, 4, 5, 6, CAL
Default Value:	NONE
Default Access Level	5.CAL
Function number	0C03

This function allows choice of the access level available when using the PIN code 2 input access method. To access setup functions using the PIN code 2 input access method press and hold the F button until the message FUNC is seen followed by the first function message, this should take approximately 3 seconds. If the message FUNC End is seen at this point it means that the access level has been set to NonE.

5.91 User assignable access 1 function number

Section:	ACCES
Display:	Fn. 1 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	5.CAL
Function number	0C 10

In addition to being assigned an access level each setup function is assigned an individual function number. This functions and the ones which follow (Fn.2CodE etc.) can be used to alter the access level for particular functions. For example if the user wishes to change the access level of the channel 1 display units (function number 43A0) from level 5 to level 1 then the value 43A0 would be entered at this function and the value 3 would be entered at the function which follows. This would then enable the channel 1 display unit functions to be accessed at the lowest access level.

5.92 User assignable access 1 level value

Section:	ACCES
Display:	Fn.1 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	0C40

Allows a new access level for the function with the number set in the function to be chosen. If dFlt is chosen then the level reverts back to the original default level.

5.93 User assignable access 2 function number

Section:	ACCES
Display:	Fn.2 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	0C 11

This function allows as second function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.94 User assignable access 2 level value

Section:	ACCES
Display:	Fn.2 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	0C41

Allows a new access level for the function with the number set in the function to be chosen. If dFlt is chosen then the level reverts back to the original default level.

5.95 User assignable access 3 function number

Section:	ACCES
Display:	Fn.3 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	0C 12

This function allows as third function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.96 User assignable access 3 level value

Section:	ACCES
Display:	Fn.3 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	OC42

Allows a new access level for the function with the number set in the function to be chosen. If dFlt is chosen then the level reverts back to the original default level.

5.97 User assignable access 4 function number

Section:	ACCES
Display:	Fn.4 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	OC 13

This function allows as fourth function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.98 User assignable access 4 level value

Section:	ACCES
Display:	Fn.4 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	OC43

Allows a new access level for the function with the number set in the function to be chosen. If dFlt is chosen then the level reverts back to the original default level.

5.99 User assignable access 5 function number

Section:	ACCES
Display:	Fn.5 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	OC 14

This function allows as third function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.100 User assignable access 5 level value

Section:	ACCES
Display:	Fn.5 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	0C44

Allows a new access level for the function with the number set in the function to be chosen. If dFlt is chosen then the level reverts back to the original default level.

5.101 User assignable access 6 function number

Section:	ACCES
Display:	Fn.6 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	0C 15

This function allows as third function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.102 User assignable access 6 level value

Section:	ACCES
Display:	Fn.6 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	0C45

Allows a new access level for the function with the number set in the function to be chosen. If dFlt is chosen then the level reverts back to the original default level.

5.103 User assignable access 7 function number

Section:	ACCES
Display:	Fn.7 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	0C 16

This function allows as third function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.104 User assignable access 7 level value

Section:	ACCES
Display:	Fn.7 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	0C46

Allows a new access level for the function with the number set in the function to be chosen. If dFlt is chosen then the level reverts back to the original default level.

5.105 User assignable access 8 function number

Section:	ACCES
Display:	Fn.8 CodE
Range:	0000 to FFFF hex.
Default Value:	0000
Default Access Level	S.CAL
Function number	0C 17

This function allows as fourth function access change and operates in the same manner as . Enter the function number required and then enter the new access level at the function which follows.

5.106 User assignable access 8 level value

Section:	ACCES
Display:	Fn.8 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	0C47

Allows a new access level for the function with the number set in the function to be chosen. If dFlt is chosen then the level reverts back to the original default level.

6 Technical specifications

Function:	Real time clock plus temperature display
Clock syncronisation:	50Hz, 60Hz or internal clock reference
Format:	12 hour or 24 hour
Display:	6 digit 20mm red LED or 6 digit 38mm red LED or 5 digit 45mm red LED or 4 digit 57mm red LED or 58mm red LED or 4 or 6 digit 100mm red LED or 4 digit 200mm red LED type High contrast versions 38mm 6 digit, 58mm 4 digit, 100mm 4 or 6 digit and 200mm 4 digit available in red, green, white or amber led.
Memory Retention:	Battery backed time memory
Temperature sensor:	Pt100 RTD or LM335 or 4-20mA or none 0-10VDC to special order
Temperature meas. range:	-9 to 99^{o}C (or -9.9 to 99.9^{o}C)
Ambient Temperature:	-9 to 60^{o}C
Humidity:	5 to 95% non condensing
Power supply:	100 and 200mm LED: AC 240 or 110V selectable, 50/60Hz or AC 48/42/32/24 selectable, 50/60Hz or DC isolated wide range 12 to 24V. 20mm, 38mm, 45mm, 57 or 58mm LED: AC 240/110V 50/60Hz or AC 24 to 48V 50/60Hz or DC 12 to 48V isolated or DC 24V non isolated Supply type is factory configured
DC output supply:	5VDC or 24VDC(unregulated) @ 50mA max.
Output (standard):	4 x relays, 1 x Form C, 3 x Form A rated 5A resistive. Programmable N.O. or N.C.

Optional outputs - some options below are available in combination

Extra relays:	4 extra relays, form A
Serial communications:	RS485 isolated 8 bit (ASCII or Modbus RTU functions 1 and 3) RS232 serial comms. 8 bit (ASCII or Modbus RTU functions 1 and 3) Ethernet, can be used with Modbus TCP

Physical characteristics - see chapter 2

7 Guarantee and service

The product supplied with this manual is guaranteed against faulty workmanship for a period of two years from the date of dispatch.

Our obligation assumed under this guarantee is limited to the replacement of parts which, by our examination, are proved to be defective and have not been misused, carelessly handled, defaced or damaged due to incorrect installation. This guarantee is VOID where the unit has been opened, tampered with or if repairs have been made or attempted by anyone except an authorised representative of the manufacturing company.

Products for attention under guarantee (unless otherwise agreed) must be returned to the manufacturer freight paid and, if accepted for free repair, will be returned to the customers address in Australia free of charge.

When returning the product for service or repair a full description of the fault and the mode of operation used when the product failed must be given. In any event the manufacturer has no other obligation or liability beyond replacement or repair of this product.

Modifications may be made to any existing or future models of the unit as it may deem necessary without incurring any obligation to incorporate such modifications in units previously sold or to which this guarantee may relate.

This product is designed and manufactured in Australia.