Model LD5–RT8 and LE5–RT8
8 RTD or AD590 Input
Display/Controller
Operation and Instruction Manual

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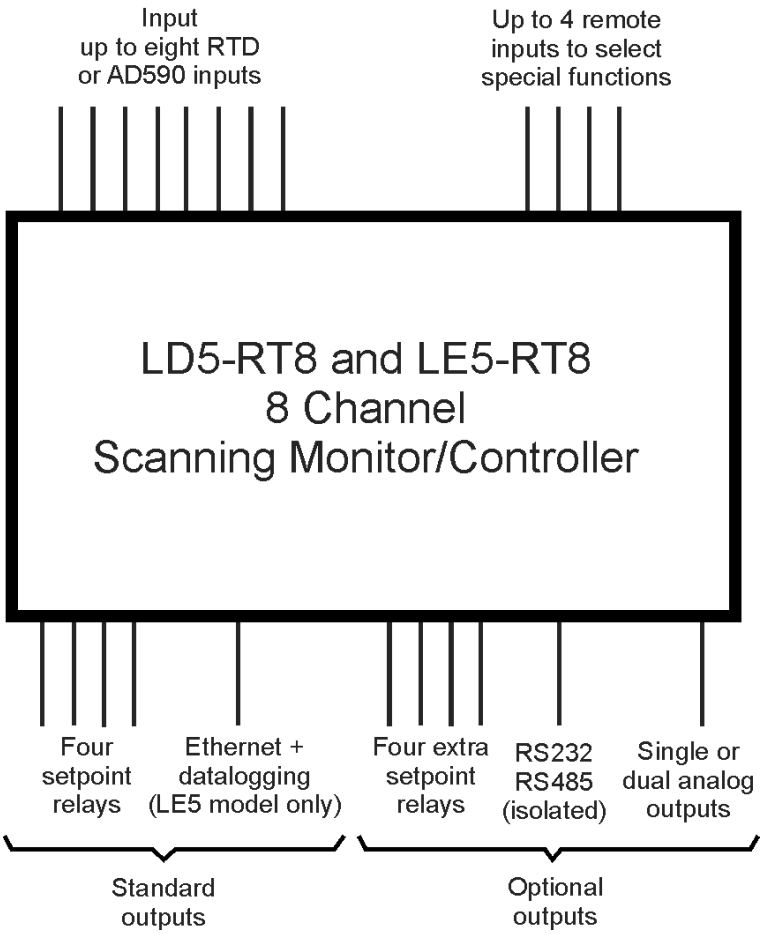
1 Introduction

This manual contains information for the installation and operation of the LD5-RT8 and LE5-RT8 RTD or AD590 input temperature display. The LE5-RT8 version is supplied with Ethernet and 8MB data logger memory.



Features

Inputs
Sensor inputs - The instrument has eight sensor input channels. Each channel can individually be programmed to accept a Pt100 or Pt1000 RTD (2 or 3 wire) or AD590 sensor using the **I nP 1** to **I nP8** functions.

Digital inputs - Four digital inputs are provide for remote inputs. Each input can be assigned on of the available functions e.g. Peak hold, display hold etc. Use the **F.I nP** functions to set the remote input operations. Input types can be voltage free switches or switched voltages up to 24VDC depending on type chosen in the function settings for each input.

Outputs - note optional outputs are available in set combinations only, not all optional outputs can be supplied in one unit.

Alarms and relays - 4 relays are fitted as standard an extra 4 relays are optionally available. The first 4 relays comprise of 3 off form A relays and 1 off form C relay. The optional extra 4 relays comprise of 4 off form A relays. All relays are rated at 240VAC, 5A into a resistive load. Alarms 1 and/or 2 using relays 1 and 2 can be allocated as PI control relays if required (pulse width or frequency PI control).
Using the **AL 1** to **AL 8** functions up to 8 alarms can be set (low and/or high alarms) and each alarm can be allocated to one or more relays. The relays can be set to automatically reset when

out of alarm condition or to latch requiring the operator to push the front F button (where fitted) to allow the relay to reset when out of alarm condition. The P button and/or a remote input can also be programmed to acknowledge a latching alarm thereby allowing it to reset when out of alarm condition. If a relay has been set to require acknowledgement with automatic reset and is in an activated condition an acknowledgement will reset the relay even if it is still in an alarm condition.

Relay operation - to enable a relay to operate several steps are required, below is a list showing the steps required to enable input 1 to use relay 1 to operate as a high alarm using alarm 1:

- At the AL CnE function ensure that at least one alarm is enabled.
- At the AL 1H, 9h function set the required high alarm and ensure that the AL 1Lo function is set to OFF.
- Set the AL 1HYSt, AL 1tr, P and AL 1rSt as required.
- At the AL 1rLYS function set rLY 1 to On.
- At the AL 1OPEr function select Hi, .Lo.
- At the AL 1Ch function select CH 1.
- Set AL 1LtCh, rL 1rLY and rL 1AcK functions as required.
- Set the rL 1bool function to Or.

Alarm disable - The alarms for selected input channels or calculation channels can be disabled using a remote input or where fitted the front P pushbutton or by disabling the channel or channels required in function settings. This feature allows alarms to be shut down when channels are not in use or whilst changing sensors etc. A message A.OFF will be seen on the display next to the selected channel alternating with the channel reading when the alarm has been forced off and the A.On message will appear once briefly with the channel reading if the alarm is toggled back on again. See the r.1 nP section for and the alarm disable (A.d, S) functions for individual input channels for further description.

Calibration

Functions are provided to allow calibration of each input channel. Refer to each function in the "Explanation of Functions" chapter for further details. A basic description of these functions is given below.

The 1 nP 1 to 1 nP8 U.CAL functions allow each channel to be "uncalibrated". The uncalibration process overwrites any previous calibrations and returns the instrument to its default calibration.

The 1 nP 1 to 1 nP8 CAL 1 and 1 nP 1 to 1 nP8 CAL2 functions are the two calibration functions for each channel. CAL 1 should be undertaken at a known temperature and CAL2 should be undertaken at a temperature at least 10% of the full range of the sensor higher than CAL 1.

The 1 nP 1 to 1 nP8 OFSt function allows an adjustment across the whole range of the channels display reading. For example if it is discovered that the temperature reading is 2 degrees high across the whole range then this function can be used to offset the reading back to the correct reading.

Analog output - Isolated single or dual analog outputs are optionally available in 12 bit (4-20mA only) or 16 bit (4-20mA, 0-1VDC or 0-10VDC). Analog outputs can be selected as retransmission or PI control outputs. Use the rO 1 to rO2 functions to set the analog output operation.

Communications outputs - Isolated RS232, isolated RS485, USB and/or Ethernet are optionally available. The RS485 and RS232 outputs can be configured for ASCII or Modbus RTU or Modbus TCP (Ethernet only) operation.

Datalogging - on board 8MB data logger memory is supplied with the Ethernet option. The data logger option also includes PC software to allow viewing and downloading of logged data. One of the serial output options must also be fitted if the data logger is to be used.

Web page - a web page is optionally available and can be used on instruments fitted with the Ethernet plus datalogger options. The web page allows remote viewing of the scanning monitor readings and setup and if permission is allowed it will also allow some settings to be remotely changed.

Calculation channels
In addition to the 8 physical input channels up to eight "calculation" channels can be selected. These calculation channels are memory locations which hold the result of an available arithmetic operation. For example calculation channel 1 memory could be set to hold the value of the average of the temperatures of inputs 1, 3 and 5.

The value stored in the calculated channel memory can also be used in arithmetic operations with other inputs or calculated channels and can also be used as an alarm value to activate relays. For example the user could program relay 2 to active if the average temperature from inputs 1, 3 and 5 exceeds 150 degrees.

Choose the calculation operation at the **CC 1** to **CC 8 Func** function and the channels to which this function will apply at the **CC 1** to **CC 8 ChAn SEL** functions.

1.1 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.

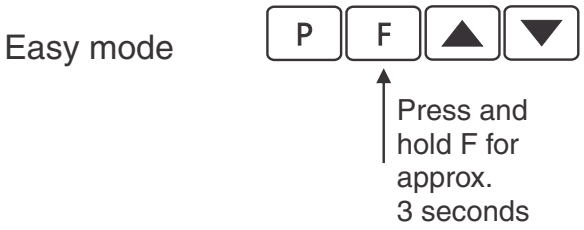
As as summary the methods available are:

- **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.

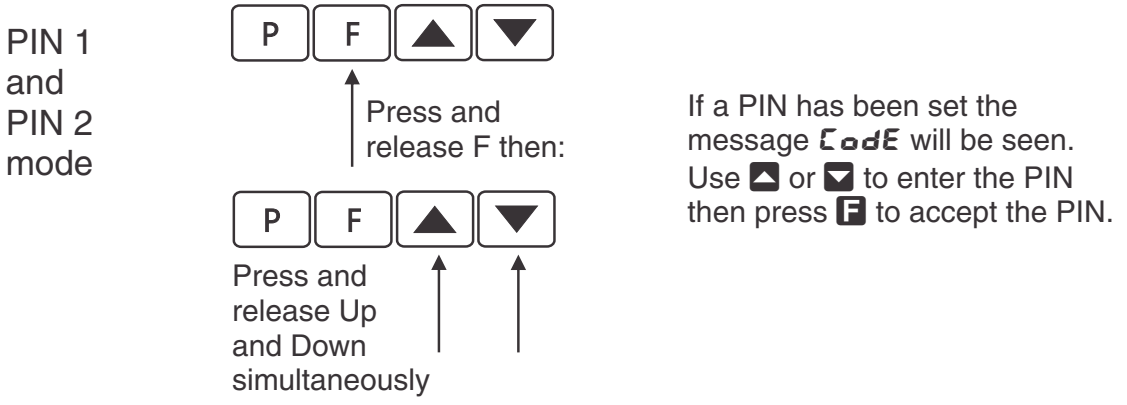
- **Easy mode** - Allows access to the level set by the function in the **ACCS** menu. By default the Easy access is set to **CAL** level allowing access to all setup functions.
  The Easy mode simply requires that the **F** button is held pressed until the message **FUNC**

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.



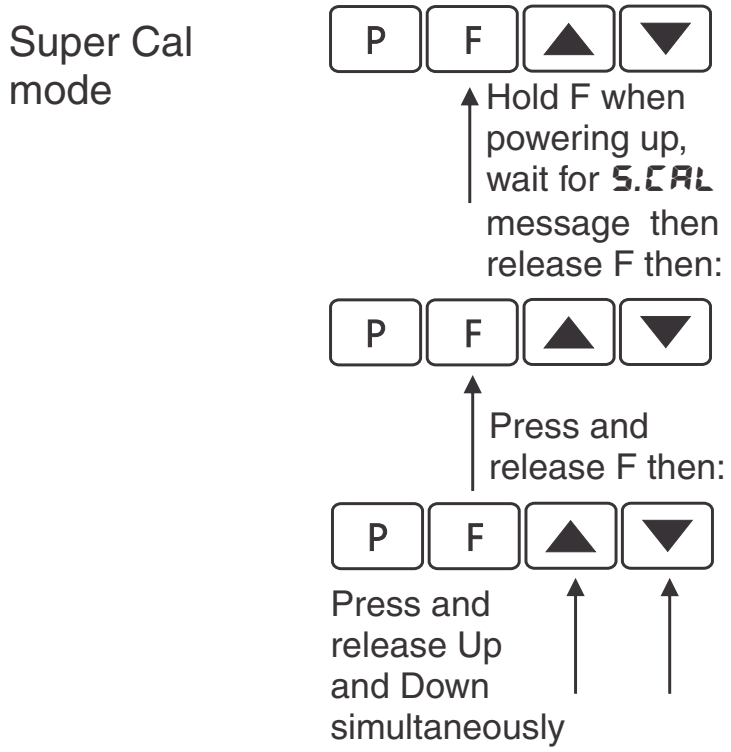
- **Remote input mode** - Allows access to the level set by the function in the ACCS menu. For example if the Remote input access is set to CAL level then access to all setup functions will be allowed when the selected remote input is closed.
  The remote input mode uses the same access method as the 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 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 Pin.1 CodE function in the ACCS menu. A setting of 0 disables the PIN which means that there is no need to enter the PIN. If the 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 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.

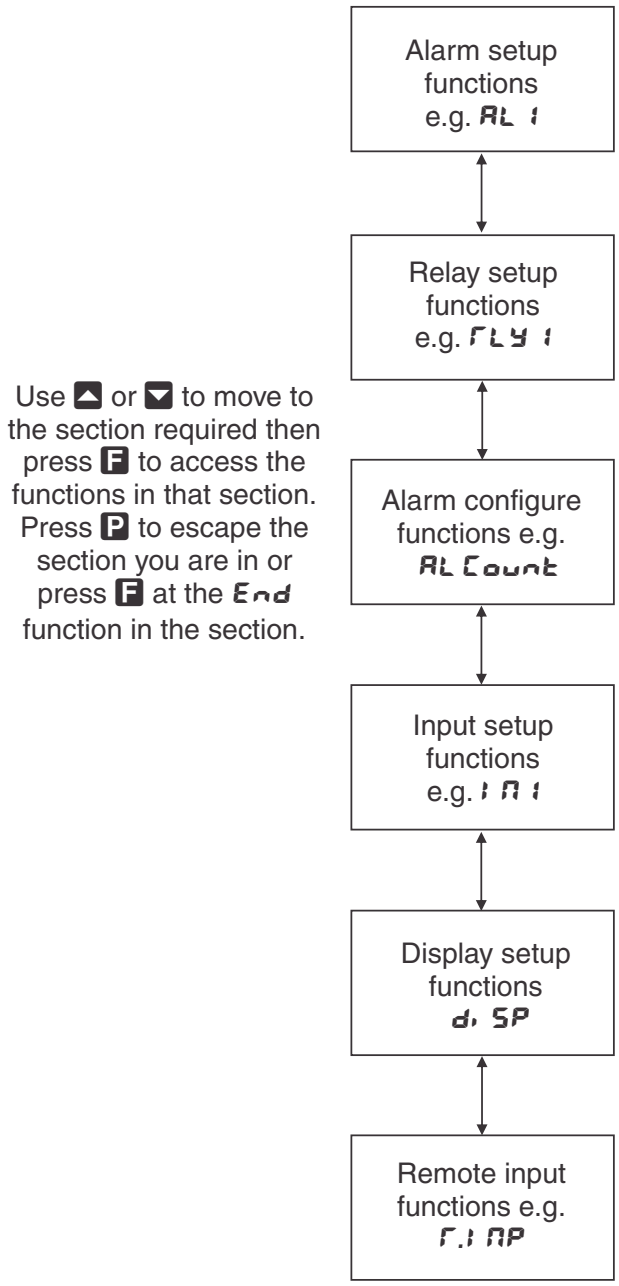


- **PIN 2 mode** - Allows access to the level set by the function in the **ACCS** menu. This method uses the same access method as PIN 1 mode above. A **P1 n.2CodE** setting of **nonE** disables the PIN. If the or a function has been set to a number other than **nonE** then the first function seen when entering via PIN 1/PIN2 mode will be the function **CodE** . When this function is seen the PIN value set at the function can be entered for access to the level set at the **P1 n. 1ACCS** function or enter the 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.

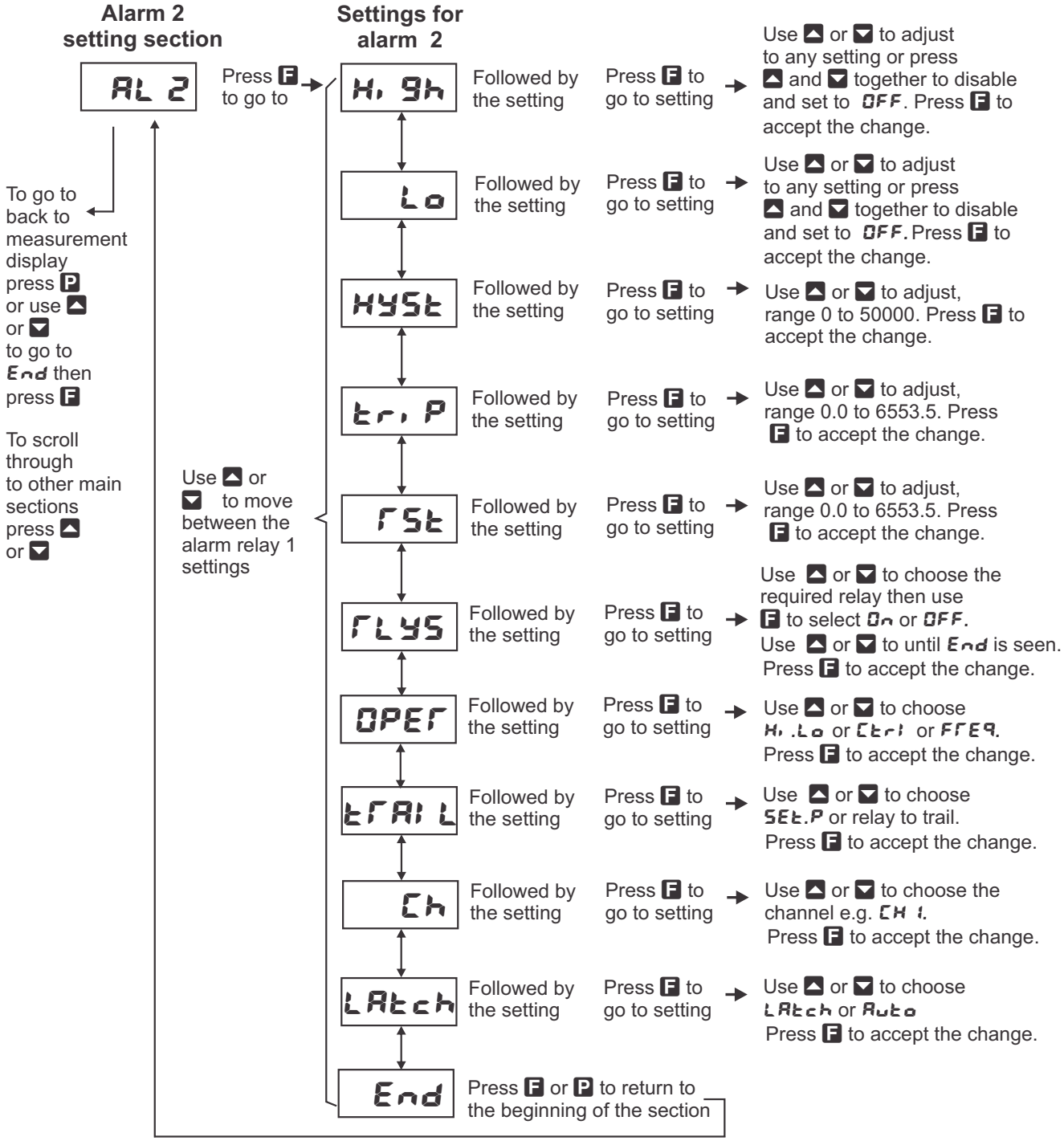
- **Super Cal mode** - This method can be used to gain access to all functions. If a PIN has been set and forgotten use this method to access the PIN functions to check the settings. To access via Super Cal mode with the instrument switched off hold in the F button whilst the instrument powers up. Keep 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 alarms are in the alarms sections e.g. AL 1 block contains the alarm 1 functions. 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.



The example in the flowchart below shows the method using alarm 2 setup functions.



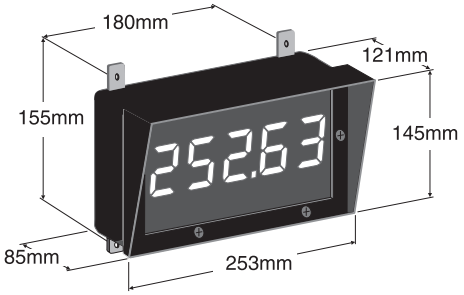
1.2 Error Messages

A display under range message (**-du-**) will be seen if the input indicates an input which is less than the range of the RTD or AD590 sensor and a display over range message (**-Or-**) will be seen if the input is higher than the range of the sensor. The **rtd Err** message indicates an error with the RTD input on the indicated channel or from a calculated channel using that input e.g. an open circuit. The **3.Err** message indicates that the third wire input is missing from the indicated input channel or from a calculated channel using and input with a missing third wire.

2 Mechanical installation

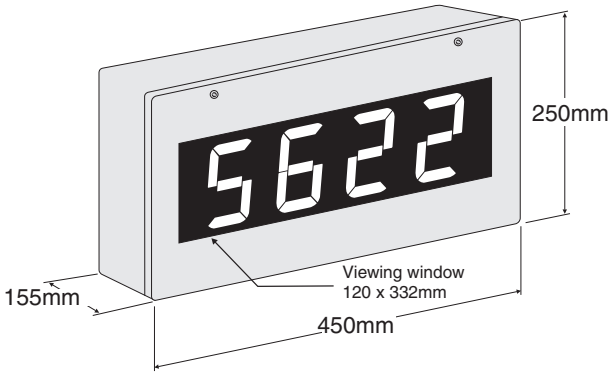
2.1 20mm, 38mm, 45mm, 57mm and 58mm LED

Surface mounting tabs are provided. 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.



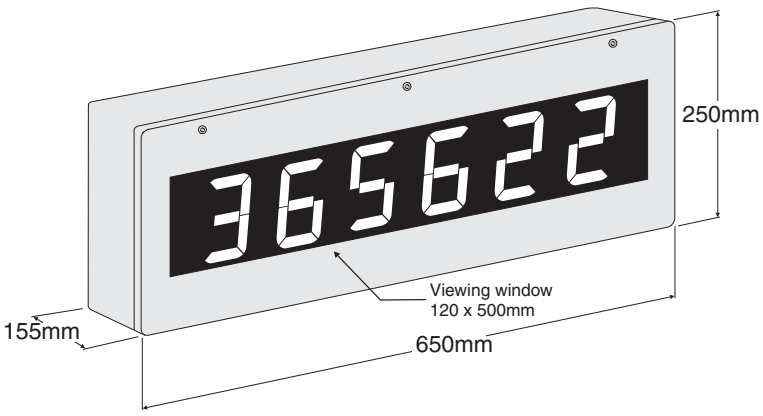
2.2 100mm 4 digit LED

Weight 10kg - mounting brackets provided



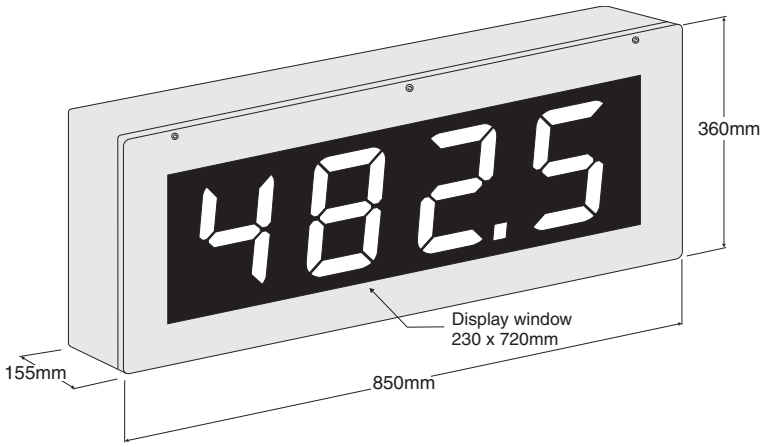
2.3 100mm 6 digit LED

Weight 13kg - mounting brackets provided



2.4 200mm 4 digit LED

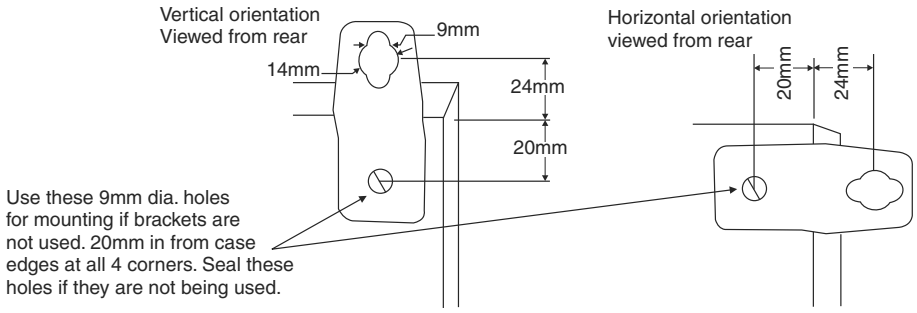
Weight 13kg - mounting brackets provided



2.5 Cable entry and Mounting brackets

For 20 to 58mm display types 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 are supplied for use with all 100mm and 200mm display 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.

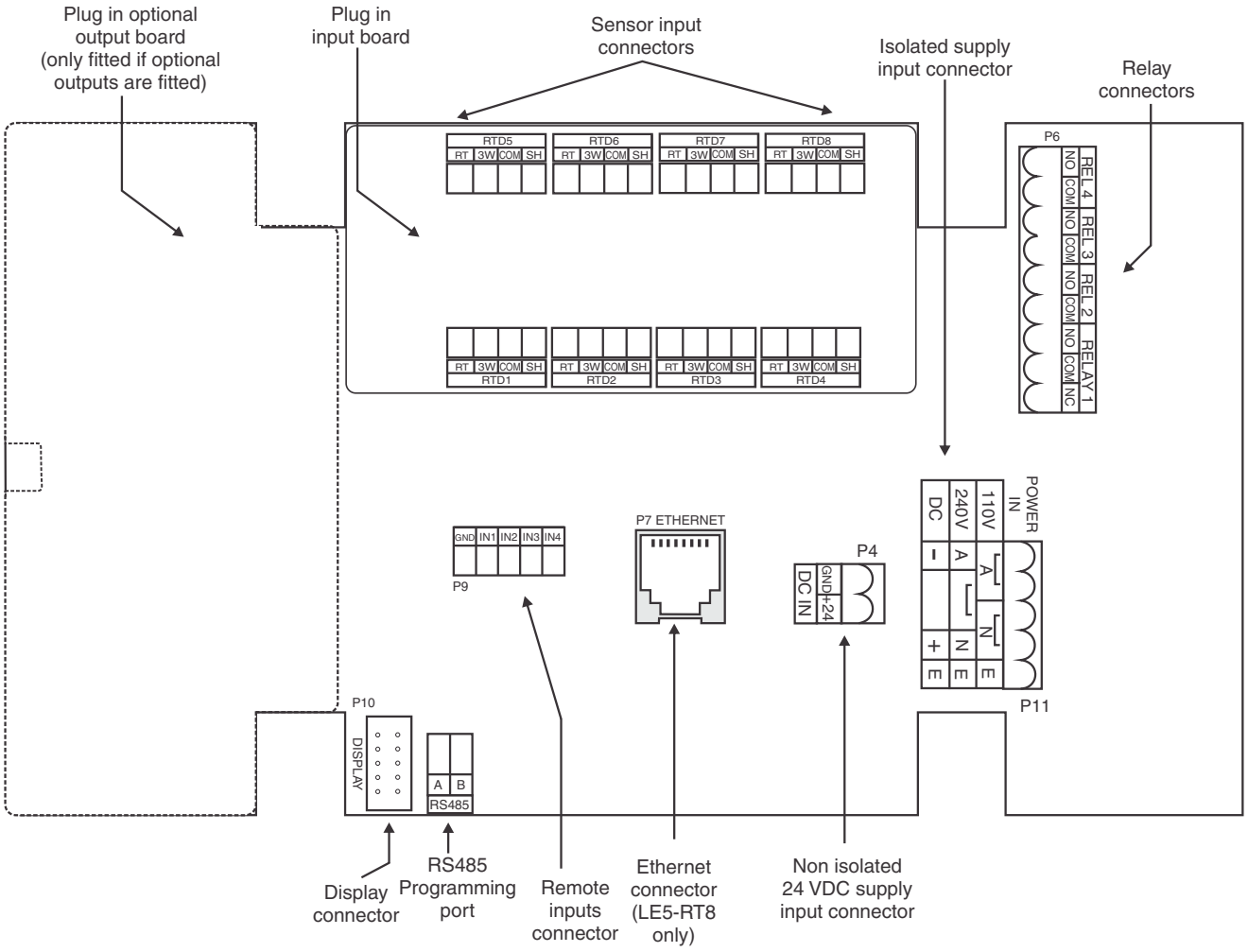


3 Electrical Installation

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 remote 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.

See the "LD5 Series Large Digit Display Output Addendum" booklet for wiring details of any optional outputs not covered in this instruction manual.

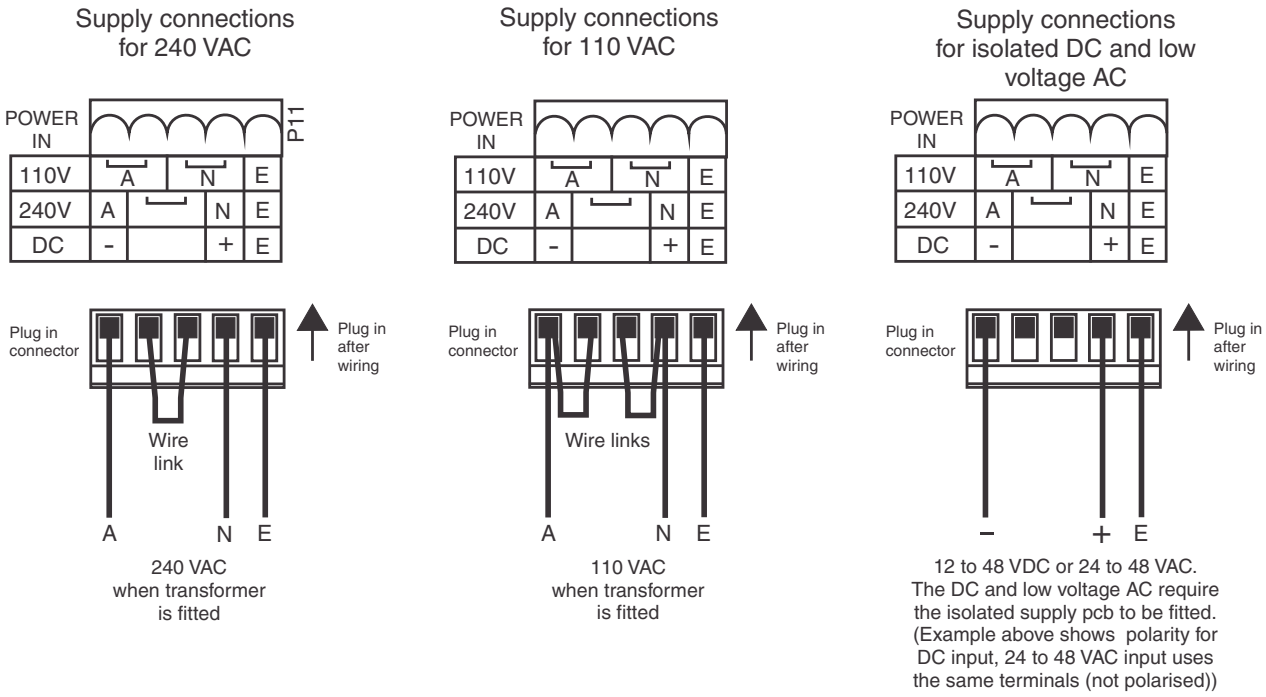
Input board layout



3.1 Power supply connections

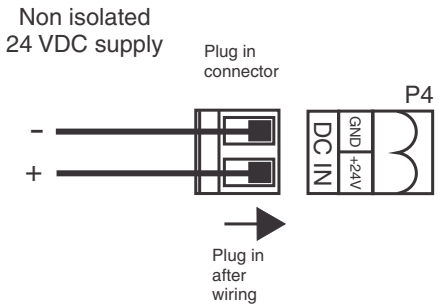
The power supply for the instrument is factory fitted and is of a fixed type. Check power supply type before connecting. Non isolated 24VDC supply instruments use the DC IN connector P4 shown on the diagram above. AC supply and isolated DC supply instruments use connector P11.

3.2 AC supply or isolated DC supply - for displays digits less than 100mm



3.3 Non isolated DC supply - for displays digits less than 100mm

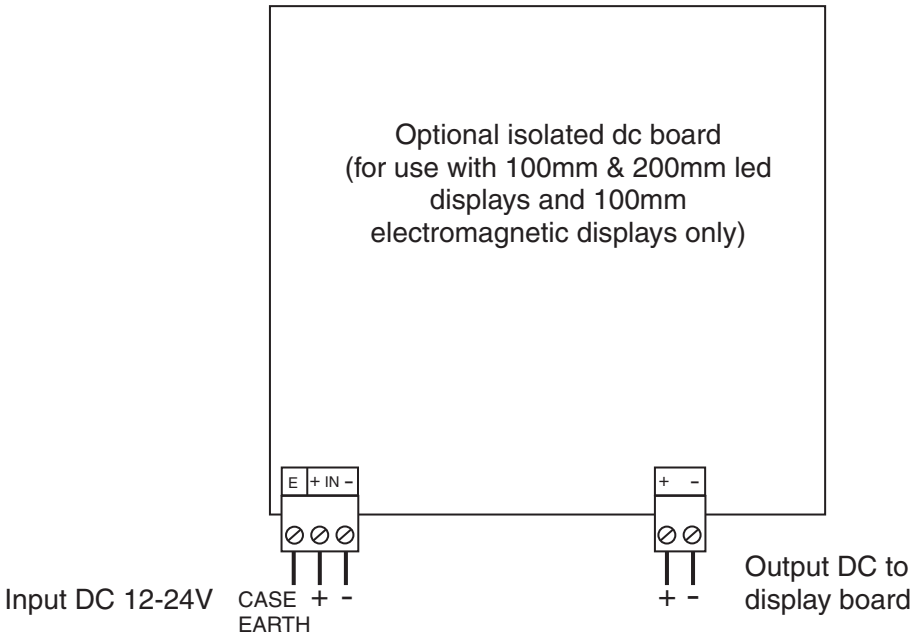
24VDC ±10% non isolated DC supply connections.



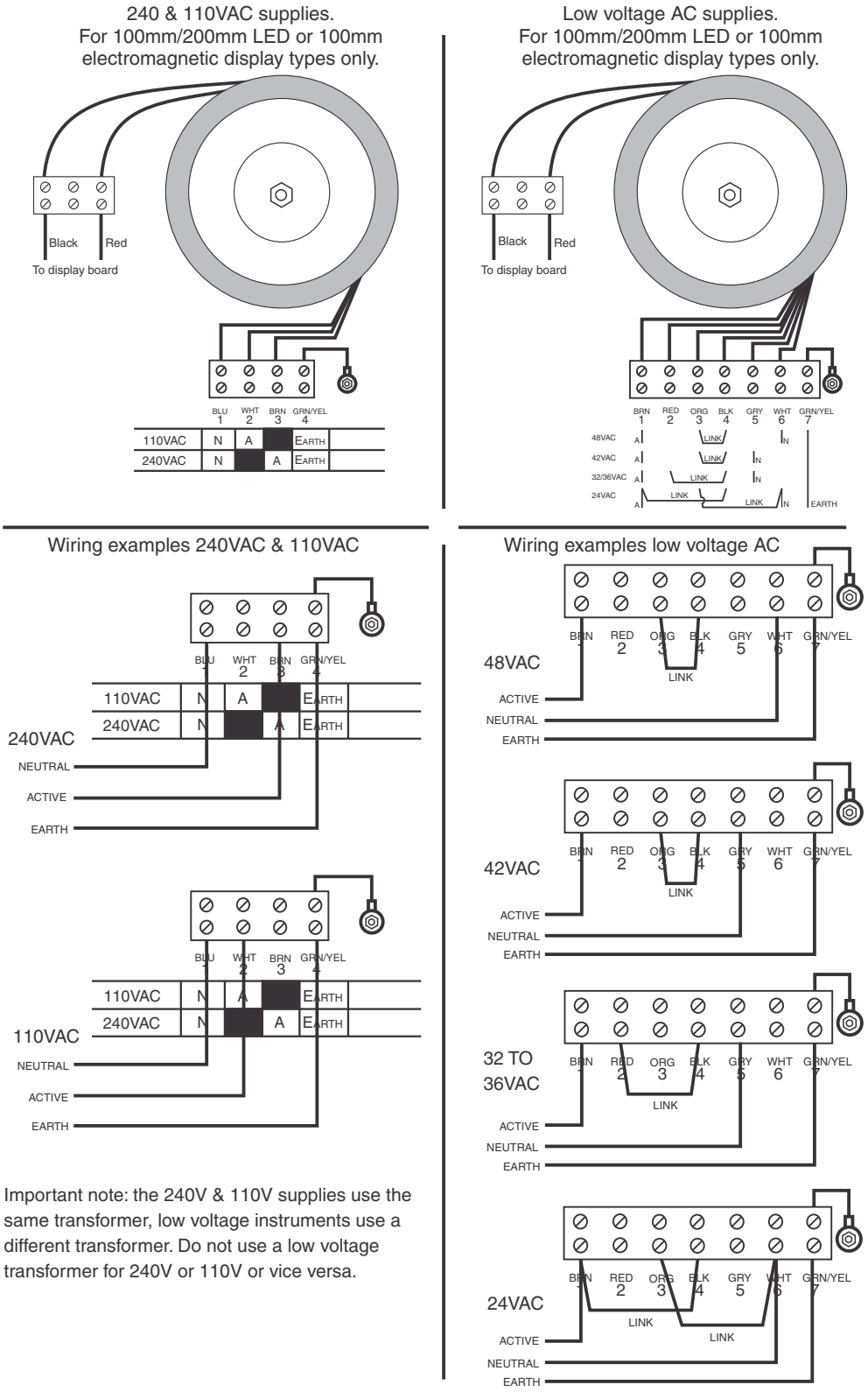
3.4 100mm and 200mm display power supplies

Optional isolated DC supply - 100mm and 200mm displays

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 inside the case. Supply type is factory configured.



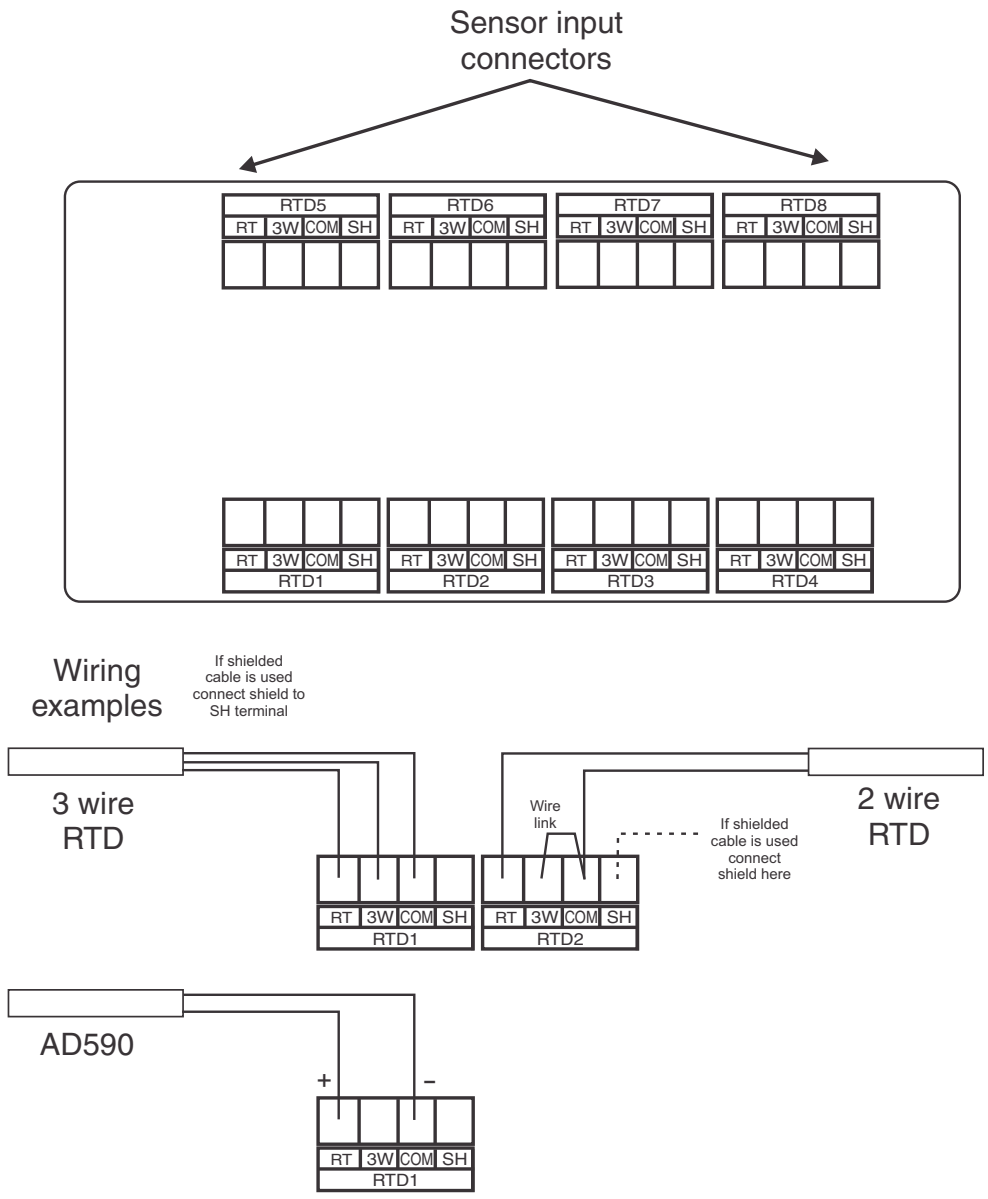
AC supplies - 100mm and 200mm displays. AC supplies connect to the transformer primary on the base board inside the case. Supply type is factory configured.



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.

3.5 Input connections

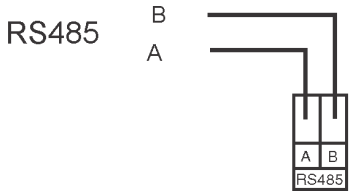
The RTD inputs are on a small pcb on top of the main pcb. Up to eight 2 or 3 wire Pt100 or Pt1000 RTDs can be connected.



The optional ethernet connection is via the RJ45 connector P7 on the main board.

3.5.1 RS485 programming port

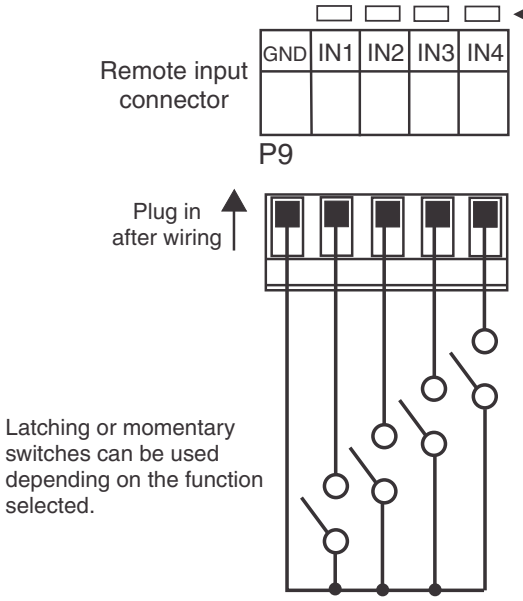
The non isolated RS485 programming connections are on connector P12 at the bottom of the main board. This port can be used to update software in the instrument when required via a suitable RS485 converter.



For RS485 the A terminal connects to other A terminal and the B terminal connects to other B terminals. Use twisted pair shielded cable for RS485.

3.5.2 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 operation mode of the digital inputs are controlled by separate functions for each input, see the **F.I nP** section functions. The electrical configuration for these inputs is configured by digital input functions, see the **d.I n** section functions. Wiring example showing voltage free contacts below. The table below shows the operation of the remote inputs when one or more of the remote inputs is set for analog output digital control (**F.SEl** mode).



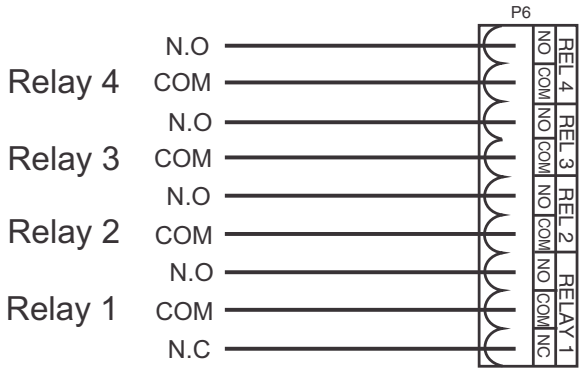
When allocated for use as analog output channel selection switches the binary inputs are:

IN1	IN2	IN3	IN4	Channel selected
0	0	0	0	Channel 1
1	0	0	0	Channel 2
0	1	0	0	Channel 3
1	1	0	0	Channel 4
0	0	1	0	Channel 5
1	0	1	0	Channel 6
0	1	1	0	Channel 7
1	1	1	0	Channel 8
0	0	0	1	Calc. Channel 1
1	0	0	1	Calc. Channel 2
0	1	0	1	Calc. Channel 3
1	1	0	1	Calc. Channel 4
0	0	1	1	Calc. Channel 5
1	0	1	1	Calc. Channel 6
0	1	1	1	Calc. Channel 7
1	1	1	1	Calc. Channel 8

Note: 0 = open circuit switch when the digital input is set for high pull up with low level

3.5.3 Relays 1 to 4

Optional relays 1 to 4 are rated at 240VAC 5A into a resistive road. Relay 1 is form C type. Relays 2, 3 and 4 are form A type. These relays are fitted onto the main board when supplied. See the "LD5 Series Large Digit Display Output Addendum" for wiring details of optional relays 5 to 8.



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.

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

4.1 Configuration function table

Display	Function	Range	Default	Your record	Ref/Page
CONF CHAN CnE	Number of input channels	1, 2, 3, 4, 5, 6, 7, 8	8		5.1 / 27
CONF CALC CnE	Number of calculation channels	0, 1, 2, 3, 4, 5, 6, 7, 8	0		5.2 / 27
CONF AL CnE	Set number of alarms	0, 1, 2, 3, 4, 5, 6, 7, 8	2		5.3 / 27
CONF SCAN dLY	Set display rotation time per channel	0 to 200 secs	6		5.4 / 28
CONF Unit	Set the temperature display units	C, F, K, r	C		5.5 / 28

4.2 Alarm function table. Note: Relays are optional on this model

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 4.13	5.6 / 28
AL 1 to AL 8 Lo	Low setpoint value for designated alarm relay.	Any display value or OFF	OFF	See 4.13	5.7 / 29
AL 1 to AL 8 HYSt	Alarm relay hysteresis (deadband)	0 to 65535	10	See 4.13	5.8 / 30
AL 1 to AL 8 tr.P	Trip time delay for the designated alarm relay	0 to 6553.5 secs	0.0	See 4.13	5.9 / 30
AL 1 to AL 8 rSt	Reset time delay for the designated alarm relay	0 to 6553.5 secs	0.0	See 4.13	5.10 / 31
AL 1 to AL 8 rLyS	Relay selection On or OFF	On or OFF	OFF	See 4.13	5.11 / 31
AL2 to AL8 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 4.13	5.12 / 31
AL 1 to AL2 OPEr	Relay operation mode	Hi.Lo, Ctrl or FrEq	Hi.Lo	See 4.13	5.13 / 32

AL 1 to AL 8 Ch	Alarm input channel selection	CH 1, CH2, CH 3, CH4, CH5, CH6, CH 7, CH 8, CC 1, CC2, CC 3, CC 4, CC 5, CC 6, CC 7, CC 8	CH 1	See 4.13	5.15 / 33
AL 1 to AL 8 Ltch	Alarm relay latching operation	Auto, Ltch, A.b, L.b	Auto	See 4.13	5.16 / 33

4.3 Relay PI function table. See separate Addendum booklet

Display	Function	Range	Default	Your record	Ref/Page
AL 1 to AL 8 SPAN	Relay PI control span	Any display value	1000	See 4.13	Addendum
AL 1 to AL 8 SEtP	Relay PI control setpoint	Any display value	1000	See 4.13	Addendum
AL 1 to AL 8 P.9	Relay PI control proportional gain value	Any display value	0.0 10	See 4.13	Addendum
AL 1 to AL 8 I.9	Relay PI control integral gain value	Any display value	0.000	See 4.13	Addendum
AL 1 to AL 8 I.H	Relay PI control integral high limit value	0 to 100.0 %	0.000	See 4.13	Addendum
AL 1 to AL 8 I.L	Relay PI control integral low limit value	0 to 100.0 %	100.0	See 4.13	Addendum
AL 1 to AL 8 b, AS	Relay PI control bias	0 to 100.0 %	50.0	See 4.13	Addendum
AL 1 to AL 8 duty SECS	Relay PI control duty cycle	0 to 6553.5 secs	10.0	See 4.13	Addendum
AL 1 to AL 8 on SECS	Relay PI frequency control “on” time	0 to 6553.5 secs	1.0	See 4.13	Addendum

4.4 Relay function table. Note: Relays are optional on this model

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 4.13	5.18 / 34
rL 1 to rL 8 AcK	Relay acknowledge	OFF or On	OFF	See 4.13	5.19 / 34
rL 1 to rL 8 bool	Alarm relay Boolean logic operation	Or, And	Or	See 4.13	5.20 / 35

4.5 Input function table

Display	Function	Range	Default	Your record	Ref/Page
inP 1 to inP8 d.Pnt	Input channel decimal point selection	0, 0.1	0		5.21 / 35
inP 1 to inP8 d.rnd	Input channel display rounding selection	1 to 5000	1		5.22 / 35
inP 1 to inP8 FLtr	Input filter	0, 1, 2, 3, 4, 5, 6, 7, 8	2		5.23 / 36
inP 1 to inP8 tYPE	Sensor input type	100r, 1000, A590	100r		5.24 / 36
inP 1 to inP8 COPY to	Copy channel settings to another channel	nonE, 2, 3, 4, 5, 6, 7, 8	nonE		5.25 / 36
inP 1 to inP8 U.CAL	Uncalibrate the input channel	n/a	n/a		5.26 / 37
inP 1 to inP8 CAL 1	First calibration point for selected input	n/a	n/a		5.27 / 37
inP 1 to inP8 CAL2	Second calibration point for selected input	n/a	n/a		5.28 / 38
inP 1 to inP8 OFSt	Calibration offset	n/a	n/a		5.29 / 38
inP 1 to inP8 A.di S	Alarm disable	A.On, A.OFF	A.On		5.30 / 39

4.6 Calculated channel configure table

Display	Function	Range	Default	Your record	Ref/Page
CC 1 to CC8 Func	Calculation channel function	Hi , Lo, diFF, AVG, d.AVG, P.AVG, n.AVG or S.diFF	Hi		5.31 / 39
CC 1 to CC8 d.Log	Calculation channel data log	OFF or On	OFF		5.32 / 40
CC 1 to CC8 diSP	Calculation channel display on/off	OFF or On	OFF		5.33 / 41
CC 1 to CC8 d.Pnt	Calculation channel decimal point	0, 0.1	0		5.34 / 41
CC 1 to CC8 d.rnd	Calculation channel display rounding	1 to 5000	1		5.35 / 41
CC 1 to CC8 ChAn SEL	Calculation channel selection. Set each channel On or OFF	CH 1, CH2, CH 3, CH4, CH5, CH6, CH 7, CH 8, CC 1, CC2, CC 3, CC 4, CC 5, CC6, CC 7, CC8	n/a		5.36 / 42
CC 1 to CC8 A.diS	Alarm disable	A.On, A.OFF	A.On		5.37 / 42

4.7 Display function table

Display	Function	Range	Default	Your record	Ref/Page
diSP brgt Auto	Automatic display brightness	OFF or On	On		5.38 / 42
diSP brgt	Display brightness	1 to 63	63		5.39 / 43
diSP dull	Dimmed display brightness	0 to 63	7		5.40 / 43
diSP Auto Hi 9h	Auto display brightness high level	15 to 63	63		5.41 / 43
diSP Auto Lo	Auto display brightness low level	1 to 63	7		5.42 / 43
diSP d.OFF	Timer for low brightness level	0 to Maximum display value mins	0		5.43 / 44

4.8 Analog output function table. See separate Addendum booklet

Display	Function	Range	Default	Your record	Ref/Page
r01 to r02 OutP	Analog retransmission outputs (*Optional)	4-20, 0-1.0, 0-10	4-20		5.45 / 44
r01 to r02 inPt	Analog retransmission input channel (*Optional)	Any available channel, or calculated channel or digital select	CH1		5.46 / 44

Display	Function	Range	Default	Your record	Ref/Page
r01 to r02 P.Ctl	Analog output PI control (*Optional)	no or YES	no		Addendum
r01 to r02 SEtP	Analog output PI control setpoint (*Optional)	Any display value	0		Addendum
r01 to r02 SPAn	Analog output PI control span (*Optional)	Any display value	1000		Addendum
r01 to r02 P.g	Analog output PI control proportional gain (*Optional)	Any display value	1.000		Addendum
r01 to r02 I.g	Analog output PI control integral gain (*Optional)	Any display value	0.000		Addendum
r01 to r02 I.H	Analog output PI control integral high limit (*Optional)	0 to 100.0 %	100.0		Addendum
r01 to r02 I.L	Analog output PI control integral low limit (*Optional)	0 to 100.0 %	100.0		Addendum
r01 to r02 bIAS	Analog output PI control bias (*Optional)	0 to 100.0 %	50.0		Addendum
r01 to r02 Lo	Analog retransmission low display value (*Optional)	Any display value	0		Addendum
r01 to r02 Hi gh	Analog retransmission high display value (*Optional)	Any display value	1000		Addendum

4.9 P button and remote inputs function table

Display	Function	Range	Default	Your record	Ref/Page
r.i nP P.but	Front P button operation mode	none, P.Hi , P.Lo, Hi .Lo, AL.Ac, S.Hi d, A.OFF	none		5.49 / 45
r.i nP r.i n. 1	Remote input 1 operation mode	none, P.Hi d, d.Hi d, P.Hi , P.Lo, Hi .Lo, AL.Ac, ACCS, dui i , S.Hi d, r.SEt , A.OFF	none		5.50 / 45
r.i nP r.i n.2	Remote input 2 operation mode	none, P.Hi d, d.Hi d, P.Hi , P.Lo, Hi .Lo, AL.Ac, ACCS, dui i , S.Hi d, r.SEt , A.OFF	none		5.51 / 47
r.i nP r.i n.3	Remote input 3 operation mode	none, P.Hi d, d.Hi d, P.Hi , P.Lo, Hi .Lo, AL.Ac, ACCS, dui i , S.Hi d, r.SEt , A.OFF	none		5.52 / 47
r.i nP r.i n.4	Remote input 4 operation mode	none, P.Hi d, d.Hi d, P.Hi , P.Lo, Hi .Lo, AL.Ac, ACCS, dui i , S.Hi d, r.SEt , A.OFF	none		5.53 / 47

4.10 Digital inputs 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, Hi 9h, Lo	Hi 9h		5.54 / 47
d.i n d.i n. 1 Lui	Remote input (digital inputs) 1 input level	Hi 9h, Lo	Lo		5.55 / 48
d.i n d.i n.2 P.UP	Remote input (digital inputs) 2 pull up/down operation	OPEn, Hi 9h, Lo	Hi 9h		5.56 / 48
d.i n d.i n.2 Lui	Remote input (digital inputs) 2 input level	Hi 9h, Lo	Lo		5.57 / 48

d.i n d.i n.3 P.UP	Remote input (digital inputs) 3 pull up/down operation	OPEn, Hi 9h, Lo	Hi 9h		5.58 / 48
d.i n d.i n.3 Lui	Remote input (digital inputs) 3 input level	Hi 9h, Lo	Lo		5.59 / 49
d.i n d.i n.4 P.UP	Remote input (digital inputs) 4 pull up/down operation	OPEn, Hi 9h, Lo	Hi 9h		5.60 / 49
d.i n d.i n.4 Lui	Remote input (digital inputs) 4 input level	Hi 9h, Lo	Lo		5.62 / 50

4.11 Serial communications function table

Display	Function	Range	Default	Your record	Ref/Page
SEri OPEr	Serial output operation mode	nonE .Cont. Poll .Rbus. dI SP or M.bus	nonE		5.63 / 50
SEri bAud	Serial baud rate	1200, 2400, 4800, 9600, 19.2, 38.4, 57.6, 115.2	9600		5.64 / 51
SEri PrtY	Serial parity	8n, 8E, 8o, 7E, 7o	8n		5.65 / 51
SEri Uni t Addr	Serial address	1 to 127	1		5.66 / 51

4.12 User 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		5.67 / 51
ACCES r.i nP LEUL	Remote input access mode	nonE, 1, 2, 3, 4, 5, 6, CAL	nonE		5.68 / 52
ACCES USr. 1 P. n	PIN code 1	0 to 65535	0		5.69 / 52
ACCES USr. 1 LEUL	PIN code 1 access level	nonE, 1, 2, 3, 4, 5, 6, CAL	nonE		5.70 / 52
ACCES USr.2 P. n	PIN code 2	0 to 65535	0		5.71 / 53

ACCES USr.2 LEUL	PIN code 2 access level	NONE, 1, 2, 3, 4, 5, 6, CAL	NONE		5.72 / 53
ACCES Fn.1 CodE	User assignable access function 1	0000 to FFFF hex.	0000		5.73 / 53
ACCES Fn.1 LEUL	User assignable access 1 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.74 / 54
ACCES Fn.2 CodE	User assignable access function 2	0000 to FFFF hex.	0000		5.75 / 54
ACCES Fn.2 LEUL	User assignable access 2 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.76 / 54
ACCES Fn.3 CodE	User assignable access function 3	0000 to FFFF hex.	0000		5.77 / 54
ACCES Fn.3 LEUL	User assignable access 3 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.78 / 55
ACCES Fn.4 CodE	User assignable access function 4	0000 to FFFF hex.	0000		5.79 / 55
ACCES Fn.4 LEUL	User assignable access 4 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.80 / 55
ACCES Fn.5 CodE	User assignable access function 5	0000 to FFFF hex.	0000		5.81 / 55
ACCES Fn.5 LEUL	User assignable access 5 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.82 / 56
ACCES Fn.6 CodE	User assignable access function 6	0000 to FFFF hex.	0000		5.83 / 56
ACCES Fn.6 LEUL	User assignable access 6 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.84 / 56
ACCES Fn.7 CodE	User assignable access function 7	0000 to FFFF hex.	0000		5.85 / 56
ACCES Fn.7 LEUL	User assignable access 7 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.86 / 57
ACCES Fn.8 CodE	User assignable access function 8	0000 to FFFF hex.	0000		5.87 / 57
ACCES Fn.8 LEUL	User assignable access 8 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.88 / 57

4.13 Relay tables

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

Record your relay settings in the table below

Display	Alarm 1	Alarm 2	Alarm 3	Alarm 4	Alarm 5	Alarm 6	Alarm 7	Alarm 8
HI SP								
LO								
HYST								
TRIP								
RST								
SPAN			n/a	n/a	n/a	n/a	n/a	n/a
SETP			n/a	n/a	n/a	n/a	n/a	n/a
P.G			n/a	n/a	n/a	n/a	n/a	n/a
I.G			n/a	n/a	n/a	n/a	n/a	n/a
I.H			n/a	n/a	n/a	n/a	n/a	n/a
I.L			n/a	n/a	n/a	n/a	n/a	n/a
BIAS			n/a	n/a	n/a	n/a	n/a	n/a
DUTY SECS			n/a	n/a	n/a	n/a	n/a	n/a
ON SECS			n/a	n/a	n/a	n/a	n/a	n/a
RLYS								
TRL								
OPER								
CH								
LTCH								

Record which relays are allocated to which alarms and other relay settings in the table below

Display	Relay 1	Relay 2	Relay 3	Relay 4	Relay 5	Relay 6	Relay 7	Relay 8
Alarm 1								
Alarm 2								
Alarm 3								
Alarm 4								
Alarm 5								
Alarm 6								
Alarm 7								
Alarm 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 temperature reading, these display messages may in some cases vary slightly for other display types.

Explanation of Functions

5.1 Number of input channels to be used

Section:	CONF
Display:	CHAN Cnt
Range:	1, 2, 3, 4, 5, 6, 7, 8
Default Value:	8
Default Access Level	4
Function number	4380

Allows selection of the number of input channels required. Up to 8 channels can be selected. For example if 6 channels are selected then inputs 1 to 6 will be used and these 6 input channels (plus any calculation channels) will be displayed.

5.2 Number of calculation channels to be used

Section:	CONF
Display:	CALC Cnt
Range:	0, 1, 2, 3, 4, 5, 6, 7, 8
Default Value:	0
Default Access Level	4
Function number	438d

Allows selection of the number of calculation channels required. Calculation channels are not physical inputs but are the results of the chosen arithmetic operation between selected input or other calculated channels. Up to 8 calculated channels can be selected. If required calculated channels can be made show up on the display following the physical channel readings. See the CC 1 to CC 8 functions for details of calculation channel setup.

5.3 Set number of alarms

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

Allows setting of the number of alarms from 0 to 8 alarms. Each alarm can be allocated to respond from one or more input channels or calculated channels. If relays are fitted then one or more relays can be allocated to each alarm.

5.4 Set display rotation time per channel

Section:	CONF
Display:	SCAN dLY
Range:	0 to 200 secs
Default Value:	6
Default Access Level	4
Function number	4385

Allows setting of the number of seconds between each channel display rotation. For example if set to 2 seconds each channel will be displayed for 2 seconds before the display automatically changes to the next higher channel. A setting of 0 will disable the automatic scanning meaning that the ▲ or ▼ pushbuttons will have to be used to view each channel. If a scan time is set but a channels are selected by the ▲ or ▼ pushbuttons the display will stay on the selected channel for approximately 20 seconds and will then automatically begin scanning again. If a channel is selected manually and the pushbutton held for 3 seconds then that display will remain on the selected channel for 1 hour before resuming scanning. Inputs are scanned internally and acted upon even if the automatic display scanning is stopped.

5.5 Set the temperature display units

Section:	CONF
Display:	Unit
Range:	C, F, K, r
Default Value:	C
Default Access Level	4
Function number	43A0

Allows setting of the temperature display units. Choices are C for a degrees Celcius display, F for a display in degrees Fahrenheit, K for a display in degrees Kelvin or r for a display in degrees Rankine.

5.6 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.

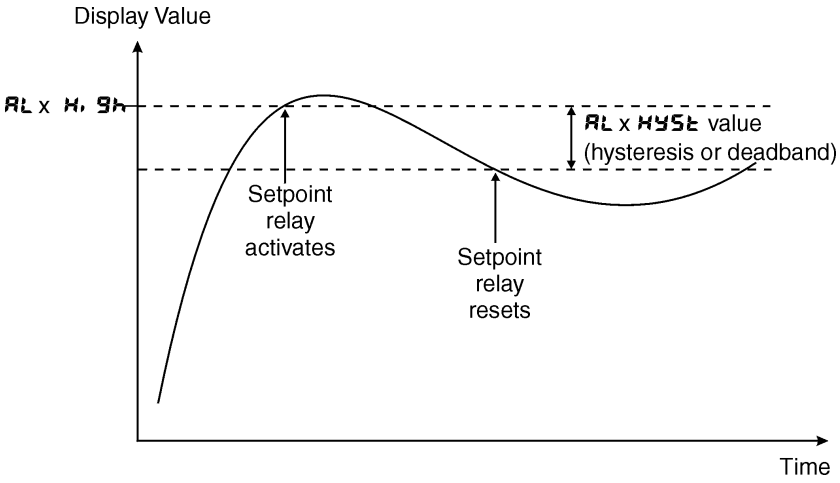
To set the high alarm value go to the Hi SP function, press F and when you see a digit of the value flash use the ▲ or ▼ push buttons to set the required value then press F to accept this selection. The high alarm setpoint may be disabled by pressing the ▲ and ▼ push buttons simultaneously. When the 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 9h** 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.

5.7 Alarm relay low setpoint

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

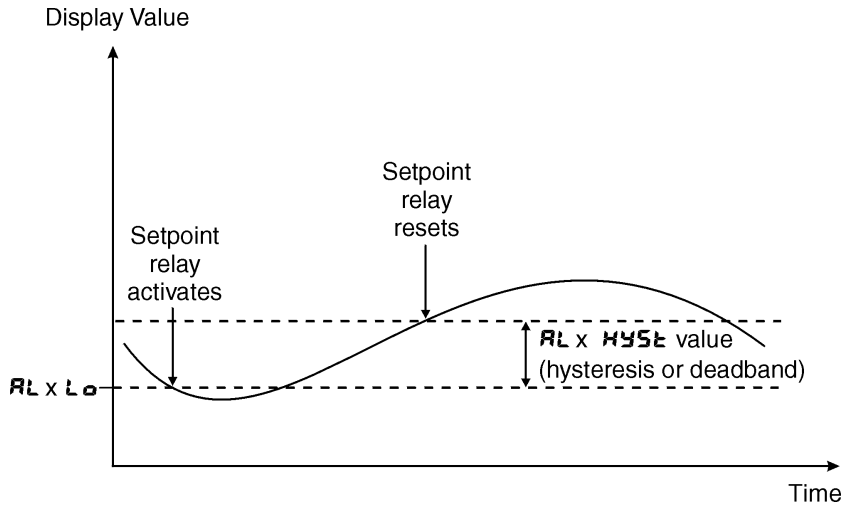
Displays and sets the low setpoint value for the designated alarm relay. Use this low setpoint function if a relay operation is required when the display value becomes equal to or less than the low setpoint value.

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 **AL 1** is set to **10** then relay 1 will activate when the display value is 10 or less.



5.8 Alarm relay hysteresis (deadband)

Section:	AL 1 to AL 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 AL3 Hi SP is to 50.0 and AL3 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 AL2 Hi SP is to 0.0 and AL2 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.

5.9 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 **trP** 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 **trP** is set to **5.0** seconds then the display must indicate an alarm value for a full 5 seconds before the relay will activate.

5.10 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.

5.11 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 1 Hi 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.

5.12 Alarm trailing or setpoint mode

Section:	**AL2** to **AL8**
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**

This function will not be seen unless relays are fitted to the instrument. 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:

- Alarm 1 (AL 1) is always independent.
- Alarm 2 (AL2) may be independent or may be linked to alarm 1 (tL 1).
- Alarm 3 (AL3) may be independent or may be linked to alarm 1 (tL 1) or alarm 2 (tL2).
- Alarm 4 (AL4) may be independent or may be linked to alarm 1 (tL 1), alarm 2 (tL2) or alarm 3 (tL3).
- Alarm 5 (AL5) may be independent or may be linked to alarm 1 (tL 1), alarm 2 (tL2), alarm 3 (tL3) or alarm 4 (tL4).
- Alarm 6 (AL6) may be independent or may be linked to alarm 1 (tL 1), alarm 2 (tL2), alarm 3 (tL3), alarm 4 (tL4) or alarm 5 (tL5).
- Alarm 7 (AL7) may be independent or may be linked to alarm 1 (tL 1), alarm 2 (tL2), alarm 3 (tL3), alarm 4 (tL4), alarm 5 (tL5) or alarm 6 (tL6)
- Alarm 8 (AL8) may be independent or may be linked to alarm 1 (tL 1), alarm 2 (tL2), alarm 3 (tL3), alarm 4 (tL4), alarm 5 (tL5), alarm 6 (tL6) or alarm 6 (tL7)

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 Hi 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 1 Hi 9h is set to 1000 and AL2 Hi 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 1 Lo 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.

5.13 Relay operation mode

Section:	AL 1 to AL2
Display:	OPEr
Range:	Hi .Lo, Ctrl or FrEq
Default Value:	Hi .Lo
Default Access Level	4
Function number	4 160 to 4 167

The relay operation can be set for simple on/off operation from a high and or low setpoint value Hi .Lo of can be set for PI control operation (Ctrl or FrEq). The alarm operation mode is only available for alarms 1 and 2 using relays 1 and 2.

5.14 Relay PI control functions

See the "LD5 Series Large Digit Display Output Addendum" booklet for details of PI control functions available for relays 1 and 2.

5.15 Alarm input channel selection

Section:	AL 1 to AL 8
Display:	Ch
Range:	CH 1, CH2, CH3, CH4, CH5, CH6, CH 7, CH8, CC 1, CC 2, CC 3, CC 4, CC 5, CC 6, CC 7, CC 8
Default Value:	CH 1
Default Access Level	4
Function number	4070 to 4077

Allows selection of which channel the alarm will operate from. A physical input channel CH 1 to CH8 or a calculation channel CALC 1 to CALC8 can be chosen as the channel whose value will be used for the alarm. To select the channel go to the required alarm and press the F button to enter the alarm setup then use the ▲ or ▼ pushbutton until the display shows the required channel and then press the F button to accept this selection and store it in memory.

For example to select alarm 1 to operated from calculated channel 2 go to the AL 1Ch function and press the F button, use the ▲ or ▼ until the CALC 2 channel is on the display then press the F button to accept this selection and store it in memory.

5.16 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 automatically 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.

5.17 Alarm relay Boolean logic operation

Section:	rL 1 to rL 8
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 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.

5.18 Alarm relay normally open/closed

Section:	rL 1 to rL 8
Display:	rLy
Range:	n.o, n.c
Default Value:	n.o
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 rL 8 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 in.o 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.

5.19 Relay acknowledge

Section:	rL 1 to rL 8
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.

5.20 Alarm relay Boolean logic operation

Section:	rL 1 to rL 8
Display:	bool
Range:	Or, And
Default Value:	Or
Default Access Level	4
Function number	43 10 to 43 17

This function allows a Boolean logic AND (**And**) or OR (**Or**) function to be applied to 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.

5.21 Input channel decimal point selection

Section:	In 1 to In8
Display:	d.Pnt
Range:	0, 0.1
Default Value:	0
Default Access Level	4
Function number	4 100 to 4 107

This function allows the user to select the decimal point for the input channel displays. In temperature displays the choice will be **0** (no decimal point) or **0.1** (one decimal point).

5.22 Input channel display rounding selection

Section:	In 1 to In8
Display:	d.rnd
Range:	1 to 5000
Default Value:	1
Default Access Level	4
Function number	4360 to 4367

This function allows the user to select the display rounding for the input channel display. Display rounding allow the resolution of the display to be reduced to an acceptable level whilst minimising any distracting changing of display value at each sample. For example with this function set to **5** the value displayed will be rounded up or down and will change in multiples of 5 only e.g. 0, 5, 10, 15 etc. and values in between will not be shown.

5.23 Input filter

Section:	I nP 1 to I nP8
Display:	FLtr
Range:	0, 1, 2, 3, 4, 5, 6, 7, 8
Default Value:	2
Default Access Level	4
Function number	43C0 to 43C7

Displays and sets the digital filter value. Digital filtering uses a weighted average method of determining the display value and is used for reducing display value variation due to short term interference. The digital filter range is selectable from 0 to 8, where 0 = none and 8 = most filtering. Use ▲ or ▼ at the FLtr function to alter the filter level if required. Note that the higher the filter setting the longer the display may take to reach its final value when the input is changed, similarly the relay operation and any output options will be slowed down when the filter setting is increased. To set the digital filter value go to the FLtr function and use the ▲ or ▼ push buttons to set the required value then press F to accept this selection.

5.24 Sensor input type

Section:	I nP 1 to I nP8
Display:	tYPE
Range:	100r, 1000, AS90
Default Value:	100r
Default Access Level	4
Function number	410 to 417

This function allows the user to select the RTD input type for each channel. Choices are 100 (Pt100) or 1000 (Pt1000) type or AS90 (AD590 semiconductor temperature sensor).

5.25 Copy channel settings to another channel

Section:	I nP 1 to I nP8
Display:	COPY to
Range:	nonE, 2, 3, 4, 5, 6, 7, 8
Default Value:	nonE
Default Access Level	4
Function number	20E0 to 20E7

This function allows selected channel settings of decimal point, display rounding, digital filter and input type to be to be copied to another channel e.g. if I nP5 COPY to function is selected as 7 is chosen in this function then channel 5 settings will be copied to channel 7. Once completed another channel may be chosen i.e. if all channels are to have the same input settings it is possible to set one channel then copy these settings to all other channels one at a time. Once the copy to channel is chosen press the F button, the display will then return to nonE but the settings will have been copied. The calibration will not be copied.

5.26 Uncalibrate the input channel

Section:	**INP 1** to **INP8**
Display:	**U.CAL**
Range:	n/a
Default Value:	n/a
Default Access Level	**CAL**
Function number	**0620** to **0627**

This function allows the user to clear the calibration memory for the selected channel. If calibration problems have been encountered on a particular channel it is recommended that the channel be uncalibrated and then the reading checked before any new calibration attempt is made. If the display reading after uncalibration is not close to the expected reading then this indicates that there is a problem (e.g. a problem with the input sensor) which should be investigated before a new calibration is attempted. To uncalibrate go to the **U.CAL** function for the input channel required and press **F** then toggle the display to show **YES** using the ▲ or ▼ pushbuttons and then press **F** again to accept the uncalibration. The display will show an uncal end message such as **U.CAL End**.

5.27 First calibration point for selected input

Section:	**INP 1** to **INP8**
Display:	**CAL 1**
Range:	n/a
Default Value:	n/a
Default Access Level	**CAL**
Function number	**0600** to **0607**

This function as the first calibration point of a two point temperature calibration. See also the **U.CAL** and **OFSt** functions. If calibration problems are encountered use the **U.CAL** to uncalibrate i.e. clear the previous calibration memory. Once the calibration memory has been cleared check the temperature reading prior to calibrating, if a large error exists then do not proceed with calibration until this has been corrected, check that the correct sensor type has been selected and that the sensor output and wiring are correct.

The calibration procedure for the first calibration point is:

- With the temperature probe at known low temperature allow time for the temperature to settle then go to the **CAL 1** function for the required input channel e.g. **INPt6 CAL 1** when calibrating input 6.
- The display should show **NO**. Press the **F** pushbutton, the **NO** should flash. Press the ▲ or ▼ pushbutton until the display changes to a flashing **YES** then press the **F** button.
- The display should show **CAL 1** followed by the channel number followed by a live temperature reading. Press the **F** pushbutton.
- The display should show **SCLE** followed by a value which is flashing. Use the ▲ or ▼ pushbutton to make the display show the required known temperature then press the **F** button.
- The display should show the message **CAL End** and return to the input menu.

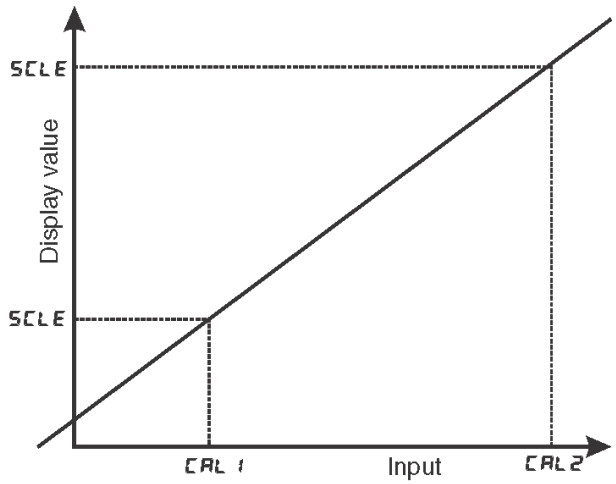
5.28 Second calibration point for selected input

Section:	INP 1 to INP8
Display:	CAL2
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0610 to 0617

This function as the second calibration point of a two point temperature calibration. See also the CAL 1first point calibration function.

The calibration procedure for the second calibration point is:

- With the temperature probe at known higher temperature than the first calibration point (must be at least 10% of the sensor full range change in temperature) allow time for the temperature to settle then go to the CAL2function for the required input channel e.g. INPt 6 CAL2when calibrating input 6.
- The display should show NO. Press the F pushbutton, the NO should flash. Press the ▲ or ▼ pushbutton until the display changes to a flashing YES then press the F button.
- The display should show CAL2 followed by the channel number followed by a live temperature reading. Press the F pushbutton.
- The display should show SCLE followed by a value which is flashing. Use the ▲ or ▼ pushbutton to make the display show the required known temperature then press the F button.
- The display should show the message CAL End and return to the input menu.

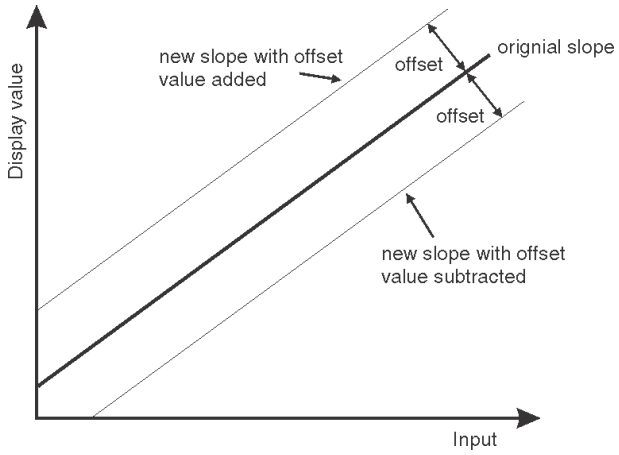


5.29 Calibration offset

Section:	INP 1 to INP8
Display:	OFSt
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0660 to 0667

The offset can be used to adjust for a consistent error in the display reading. The offset allows a value to be added or subtracted from the displays previously values. The offset procedure is:

- Go to the OFSt function for the required channel and press F the display will flash no use the ▲ pushbutton to toggle to YES and press F again.
- The display will show the live display reading. Press F the display will now eventually show a value with the last digit flashing. Use the ▲ or ▼ button to adjust the value to the reading required for the input present at this time.
- When the new value is displayed press F the message OFSt End should be displayed and the display will then return to the input menu.



5.30 Alarm disable

Section:	InP 1 to InP8
Display:	A.d, S
Range:	A.On, A.OFF
Default Value:	A.On
Default Access Level	4
Function number	4360 to 4367

Allows alarm disable for the selected channel. When set to A.On any alarm for the selected channel will be able to operate as normal. When set to A.OFF any alarms for the selected channel will be ignored. Disabling the alarms for selected channels allows the user to shut down channels when they are not being used or whilst a sensor is being changed etc. Note as an alternative a remote input or P button function can also set to allow disabling of the alarms.

5.31 Calculation channel function

Section:	CC 1 to CC 8
Display:	Func
Range:	Hi , Lo, diFF, AVG, d.AVG, P.AVG, n.AVG or S.diFF
Default Value:	Hi
Default Access Level	4
Function number	4E 10 to 4E 17

Allows selection of the function to be used for each calculated channel. Options are:
Hi - calculated channel shows the highest positive value from all of the selected input channels.
Lo - calculated channel shows the lowest value from all of the selected input channels.
diFF - calculated channel shows the difference in value between the highest and lowest selected input channel readings.
AVG - calculated channel shows the average of all selected input channel readings.
d.AVG - calculated channel shows a value equal to the biggest difference from the average of all selected channels

P.AVG - calculated channel shows a value equal to the highest positive value and the average of the selected channels.
n.AVG - calculated channel shows a value equal to the average minus the lowest value of the selected channels.
S.dI FF - calculated channel shows the difference (positive or negative) between the first two selected active channels.

Example 1: To program calculated channel 1 to activate relay 1 and 2 to operate on an highest value if the value of any of the 8 inputs exceeds 120 the basic settings are:

- At the **CONF CHAN CnL** function ensure that at least one calculation channel is set
- Set **AL 1 Hi 9h** to **120**
- Set **AL 1 rLYS** to **rLY 1 On** and **rLY2 On**
- Set **AL 1 OPEr** to **Hi .Lo**
- Set **AL 1 Ch** to **CC 1**
- Set **CC 1 Func** to **Hi**
- Set **CC 1 ChAn SEL** to **Ch 1 On**, **Ch2 On**, **Ch3 On**, **Ch4 On**, **Ch5 On**, **Ch6 On**, **Ch7 On** and **Ch8 On**

Relays 1 and 2 will now activate if any of the 8 inputs exceeds a value of 120 and if annunciators are fitted annunciator 1 will flash. In the example above if **AL 1 Lo** had been set to **120** with the high alarm set to **OFF** then the relays would activate if any of the inputs falls below 120.

Example 2: To program calculated channel 1 to activate relay 1 to operate on a difference value if the difference between inputs 1 and 2 exceeds a value of 20 the basic settings are:

- At the **CONF CHAN CnL** function ensure that at least one calculation channel is set
- Set **AL 1 Hi 9h** to **20**
- Set **AL 1 rLYS** to **rLY 1 On**
- Set **AL 1 OPEr** to **Hi .Lo**
- Set **AL 1 Ch** and to **CC 1**
- Set **CC 1 Func** to **di FF**
- Set **CC 1 ChAn SEL** to **Ch 1 On** and **Ch2 On**

Relay 1 will now activate if the difference between input channels 1 and 2 exceeds a value of 20 and if annunciators are fitted annunciator 1 will flash. In the example above if **AL 1 Lo** had been set to **20** with the high alarm set to **OFF** then the relay would activate if the difference between the two inputs was less than 20.

5.32 Calculation channel data log

Section:	**CC 1** to **CC 8**
Display:	**d.Log**
Range:	**OFF** or **ON**
Default Value:	**OFF**
Default Access Level	**4**
Function number	**4E50** to **4E57**

Applicable only when the internal data logger option is fitted. This function allows the calculated channel

values to be added to the values logged by the data logger when set to **On** or stops the values being added to the logged values when set to **OFF**.

5.33 Calculation channel display on/off

Section:	**CC 1** to **CC 8**
Display:	**di SP**
Range:	**OFF** or **On**
Default Value:	**OFF**
Default Access Level	**4**
Function number	**4E60** to **4E67**

This function allows the user to select whether or not the calculated channel is shown on the display along with the input channels during an automatic display scan. Each calculated channel can be independently set to **On** or **OFF** i.e. it is possible to select only those channels you wish to see during the automatic display scan. If set to **OFF** the calculated channel selected will not be displayed. If set to **On** the calculated channel selected will be displayed and will show a **c** on the display e.g. a display of **123c4** would indicate the calculated channel 4 value is 123. The calculated channel can still be seen if the channels are manually scanned via the ▲ or ▼ pusbuttons even if this function is set to **OFF**.

5.34 Calculation channel decimal point

Section:	**CC 1** to **CC 8**
Display:	**d.Pnt**
Range:	**0**, **0.1**
Default Value:	**0**
Default Access Level	**4**
Function number	**4E70** to **4E77**

This function allows the user to select the decimal point for the calculated channel display. In temperature displays the choice will be **0** (no decimal point) or **0.1** (one decimal point). In other displays this may go up to **0.003** (3 decimal points). The decimal points for the calculated channel do not need to match those of the physical input channels but allowances need to be made for the number of display digits available.

5.35 Calculation channel display rounding

Section:	**CC 1** to **CC 8**
Display:	**d.rnd**
Range:	**1** to **5000**
Default Value:	**1**
Default Access Level	**4**
Function number	**4E80** to **4E87**

This function allows the user to select the display rounding for the calculated channel display. Display rounding allow the resolution of the display to be reduced to an acceptable level whilst minimising any distracting changing of display value at each sample. For example with this function set to **5** the value displayed will be rounded up or down and will change in multiples of 5 only e.g. 0, 5, 10, 15 etc. and values in between will not be shown.

5.36 Calculation channel selection

Section:	CC 1 to CC 8
Display:	ChAn SEL
Range:	CH 1, CH2, CH3, CH4, CH5, CH6, CH 7, CH8, CC 1, CC2, CC3, CC 4, CC5, CC6, CC 7, CC8
Default Value:	n/a
Default Access Level	4
Function number	4E20 to 4E27

This function allows the user to select which the available channels the calculated channel will use by turning each channel on (On) or off (OFF). For example if you wish to display the highest input from physical inputs 2, 4 and 6 on calculated channel 1 then at the CC 1 ChAn SEL function set CH2, CH4 and CH6 to On and set all other channels to OFF.
Note this function allows both physical input channels and other calculated channels to be used as inputs for the calculated result. e.g. in the example above it would also be possible to choose to display the highest value from CH2, CH4, CH6 or CC2 (calculated channel 2).
See the Func function for a list of the mathematical calculations available.

5.37 Alarm disable - calculation channel

Section:	CC 1 to CC 8
Display:	A.di S
Range:	A.On, A.OFF
Default Value:	A.On
Default Access Level	4
Function number	4EE0 to 4EE7

Allows alarm disable for the selected calculation channel using a remote input or the front P pusbutton where fitted. Note the required remote input of P button function must be also set to A.OFF to enable this feature. When set to A.On any alarm for the selected calculated channel will be able to operate as normal. When set to A.OFF any alarms for the selected calculated channel will be ignored. Disabling the alarms for selected calculated channels allows the user to shut down channels when they are not being used or whilst a sensor is being changed etc.

5.38 Automatic display brightness

Section:	di SP
Display:	brgt 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 Sh and Auto Lo functions described below.

5.39 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).

5.40 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.

5.41 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.

5.42 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.

5.43 Timer for low brightness level

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 select the number of minutes for the automatic display dulling (brightness falls to the level set at the dul l function). If set to 0 the auto display blanking is disabled and the display will remain on. If set to a number other than 0 then the display will switch off in the number of minutes set. When the display blanks the alarm annunciators, the input reading and the channel number will all be blanked. Timing for the auto blanking starts from the last keypad operation i.e. from the last time the P, F, ▲ or ▼ button was pressed. To turn the display back on or to restart the timing process simply press any of these buttons. The instrument will continue to measure input, operate alarms etc. even if the display is blank. The display blanking is provided primarily to reduce power consumption in battery powered applications .

5.44 Optional analog output functions

See the "LD5 Series Large Digit Display Output Addendum" booklet for details of the optional analog retransmission PI control functions available

5.45 Analog retransmission outputs

Section:	rO 1 to rO2
Display:	OutP
Range:	4-20, 0- 1.0, 0- 10
Default Value:	4-20
Default Access Level	4
Function number	4 140 to 4 141

One or two analog outputs are optionally available in either 12 or 16 bit versions. The 12 bit version output is fixed at 4-20mA. With the 16 bit version the user can select 4-20mA, 0-1VDC or 0-10VDC output at this function.

5.46 Analog retransmission input channel

Section:	rO 1 to rO2
Display:	1 nPt
Range:	Any available channel, or calculated channel or digital select
Default Value:	CH 1
Default Access Level	4
Function number	43E0 to 43E 1

This function allows selection of which channel the selected analog output is to follow. The output can follow any input channel or and calculation channel. For example to select analog output 1 to follow input channel 3 set the rO 1 1 nPt function to CH3. Alternatively when d.SEL is chosen the output channel can be set to selected via the remote inputs. See the remote input functions and electrical installation chapter remote input details. Note that if the d.SEL mode is selected all input channels and calculated channels selected for retransmission must have the same decimal point setting.

5.47 Analog retransmission low display value

Section:	r01 to r02
Display:	Lo
Range:	Any display value
Default Value:	0
Default Access Level	4
Function number	4120 to 4121

This function can be used to set the analog retransmission signal output low value in displayed engineering units. For example to set analog output 1 to retransmit 4mA (or 0V if available) for a display value of zero set r01 Lo to 0.

5.48 Analog retransmission high display value

Section:	r01 to r02
Display:	Hi 9h
Range:	Any display value
Default Value:	1000
Default Access Level	4
Function number	4130 to 4131

This function can be used to set the analog retransmission signal output high value in displayed engineering units. For example to set analog output 1 to retransmit 20mA (or 1V or 10V if available) for a display value of 200 set r01 Lo to 200.

5.49 Front P button operation mode

Section:	r.1 nP
Display:	P.but
Range:	nonE, P.Hi , P.Lo, Hi .Lo, AL.Ac, S.Hi d, A.OFF
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.1 n. 1 to r.1 n.4 functions.

5.50 Remote input 1 operation mode

Section:	r.1 nP
Display:	r.1 n. 1
Range:	nonE, P.Hi d, d.Hi d, P.Hi , P.Lo, Hi .Lo, AL.Ac, AcCS, dut1 , S.Hi d, r.SEt , A.OFF
Default Value:	nonE
Default Access Level	r.1 n. 1
Function number	4721

Sets the operation mode for remote input 1 terminal. Choices are as follows:

- nonE - If this option is selected then remote input 1 will have no function.
- P.Hol d - peak hold. The display will show the peak value (highest positive value) only whilst the remote input terminals are short circuited i.e. the display value can rise but not fall whilst the input terminals are short circuited. The message P.Hi d will appear briefly every 8 seconds whilst

the input terminals are short circuited to indicate that the peak hold function is active. All active channels will be peak held when this mode is chosen and activated.

- **d.Hol d** - display hold. The display value will be held whilst the remote input terminals are short circuited. The message **d.HLd** will appear briefly every 8 seconds whilst the input terminals are short circuited to indicate that the display hold function is active. All active channels will be display held when this mode is chosen and activated.

- **P.Hi** - peak memory. The peak value stored in memory will be displayed if the remote input terminals are short circuited, if the short circuit is momentary then the display will return to normal measurement after 20 seconds. If the short circuit is held for 2 to 3 seconds or the power is removed from the instrument then the memory will be reset, a **rSt** message will be seen if the memory is reset by holding a short circuit for 2 to 3 seconds. The peak high mode will operate on all active channels.

- **P.Lo** - valley memory. The minimum value stored in memory will be displayed. Otherwise operates in the same manner as the **P.Hi** function described above. The peak low mode will operate on all active channels.

- **Hi Lo** - toggle between **Hi** and **Lo** displays. This function allows the remote input to be used to toggle between peak and valley memory displays. The first operation of the remote input will cause the peak memory value to be displayed, the next operation will give a valley memory display. **P.Hi** or **P.Lo** will flash before each display to give an indication of display type. The peak high/low mode will operate on all active channels.

- **AI .AC** - alarm acknowledge. Allows the remote input to be used to acknowledge an 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.

- **dull** - remote dulling of the display. When activated the display brightness will fall to the level set by the **dI SP dull** level. This is generally used to reduce current consumption in battery powered applications or for switching between day and night brightness levels.

- **S.Hld** - scan hold. Whilst the remote input is shorted to ground the scanning will be held and periodically the message **Hold** will flash i.e. the display will remain on the channel it was showing when the remote input was activated.

- **r.SEl** - remote selection of channel to be used for optional analog output. This function allows one or more remote inputs to be used to select the channel to be retransmitted via the analog output. See "Electrical Installation" chapter which gives a binary table for remote inputs 1, 2 3 and 4.

- **A.OFF** - allows the remote input to be used to disable alarms for selected input channels or calculation channels. The channel viewed at the time of remote input or **P** button operation will toggle between **A.OFF** and **A.On** to disable and enable the alarm for the channel being viewed. If using the **P** button method the button must be held pressed for 2 seconds each time to toggle, the remote input does not require a time delay.

5.51 Remote input 2 operation mode

Section:	r.i nP
Display:	r.i n.2
Range:	nonE, P.Hi d, d.Hi d, P.Hi , P.Lo, Hi .Lo, AL.Ac, ACCS, dui t , S.Hi d, r.SEt , A.OFF
Default Value:	nonE
Default Access Level	4
Function number	4722

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

5.52 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, dui t , S.Hi d, r.SEt , A.OFF
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.

5.53 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, dui t , S.Hi d, r.SEt , A.OFF
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.

5.54 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.

5.55 Remote input (digital inputs) 1 input level

Section:	d.in
Display:	d.in.1 Lvl
Range:	Hi, 9h, 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 9h** means that a voltage of 5 to 24V is required to activate the remote input.

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

Section:	d.in
Display:	d.in.2 P.UP
Range:	OPEn, Hi, 9h, Lo
Default Value:	Hi 9h
Default Access Level	4
Function number	4A51

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.

5.57 Remote input (digital inputs) 2 input level

Section:	d.in
Display:	d.in.2 Lvl
Range:	Hi, 9h, 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 9h** means that a voltage of 5 to 24V is required to activate the remote input.

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

Section:	d.in
Display:	d.in.3 P.UP
Range:	OPEn, Hi, 9h, Lo
Default Value:	Hi 9h
Default Access Level	4
Function number	4A52

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.

5.59 Remote input (digital inputs) 3 input level

Section:	**d.i n**
Display:	**d.i n.3 Lvl**
Range:	**Hi 5h**, **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 5h** means that a voltage of 5 to 24V is required to activate the remote input.

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

Section:	**d.i n**
Display:	**d.i n.4 P.UP**
Range:	**OPEn**, **Hi 5h**, **Lo**
Default Value:	**Hi 5h**
Default Access Level	**4**
Function number	**4A53**

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.

5.61 Remote input (digital inputs) 4 input level

Section:	**d.i n**
Display:	**d.i n.4 Lvl**
Range:	**Hi 5h**, **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 5h** means that a voltage of 5 to 24V is required to activate the remote input.

5.62 Remote input (digital inputs) 4 input level

Section:	d.i n
Display:	d.i n.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.

Serial communications functions.
Optional RS232, RS485 and Ethernet communications are available. Refer to the "LD5 Series Large Digit Display Output Addendum" booklet for further details and examples of serial communications commands.

5.63 Serial output operation mode

Section:	SEri
Display:	OPEr
Range:	nonE ,Cont ,Poll ,A.buS ,di SP or ñ.buS
Default Value:	nonE
Default Access Level	4
Function number	4480

Allows selection of the operating mode to be used for serial output communications. See the "LD5 Series 8 Channel Scanning Monitor Output Addendum" for more information and wiring details of optional isolated serial communications.

If using USB communications then **A.buS** must be chosen as the operating mode.

Choices are:

- **nonE** - no serial comms. required.
- **Cont** - sends ASCII form of display data at a rate typically 90% of the sample rate.
- **Poll** - controlled by computer or PLC etc. as host. The host sends command via RS232/485 and instrument responds as requested.
- **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.
- **di SP** - 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.
- **ñ.buS** output - Modbus RTU (RS232/RS485) or Modbus TCP if Ethernet is used. To poll for the display value via Modbus use address 0x1000 and 0x1001 hex (registers 44095 and 44096 decimal), Modbus function 3.

5.64 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.

5.65 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.

5.66 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.

5.67 Easy access mode

Section:	ACCES
Display:	EASY LEVL
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.

5.68 Remote input access mode

Section:	ACCES
Display:	r.I nP LEUL
Range:	NONE, 1, 2, 3, 4, 5, 6, CAL
Default Value:	NONE
Default Access Level	5.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.

5.69 PIN code 1

Section:	ACCES
Display:	USr. 1 P1 n
Range:	0 to 65535
Default Value:	0
Default Access Level	5.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 P1 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.

5.70 PIN code 1 access level

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

5.71 PIN code 2

Section:	ACCES
Display:	USr.2 P1 n
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 P1 n.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.

5.72 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.

5.73 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.2 CodE 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.

5.74 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.

5.75 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	0C11

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.

5.76 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.

5.77 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	0C12

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.

5.78 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.

5.79 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.

5.80 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.

5.81 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.

5.82 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	OC44

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.

5.83 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	OC 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.

5.84 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	OC45

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.

5.85 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	OC 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.

5.86 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.

5.87 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.

5.88 User assignable access 8 level value

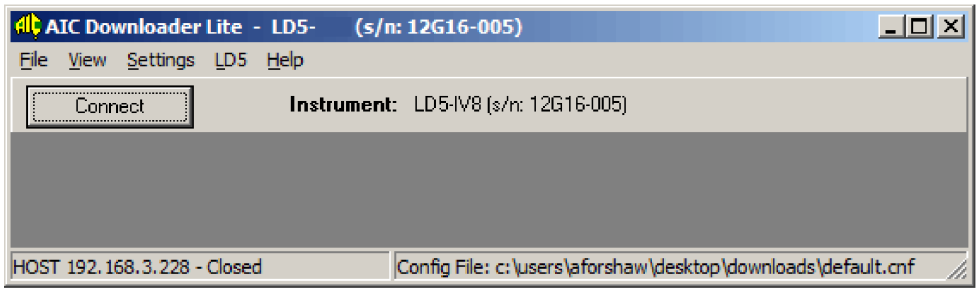
Section:	ACCES
Display:	Fn.8 LEUL
Range:	dFlt, 1, 2, 3, 4, 5, 6, CAL, S.CAL
Default Value:	dFlt
Default Access Level	S.CAL
Function number	0C47

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.

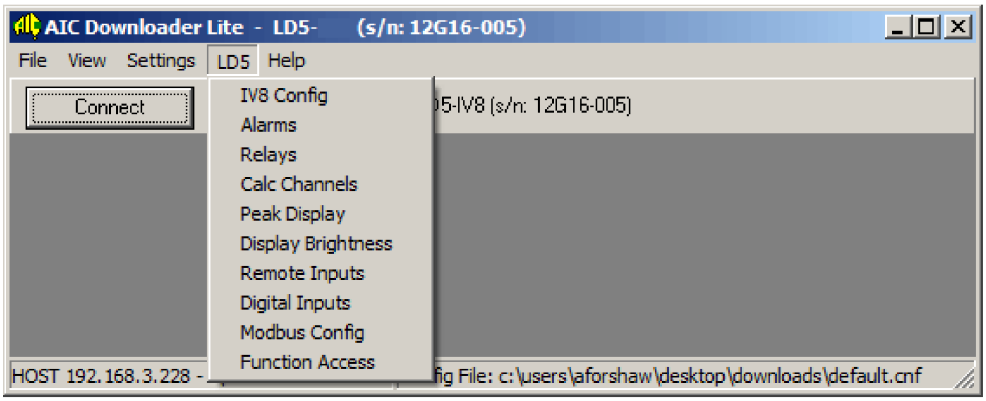
6 PC/Laptop software

A free software is available which will allow some operations including calibration and some configuration to be undertaken via PC or laptop when the instrument is fitted with optional RS232 or RS485 communications or has Ethernet fitted. Contact the supplier of this instrument for software downloading instructions. The software is designed to be used intuitively but this chapter gives a basic guide.

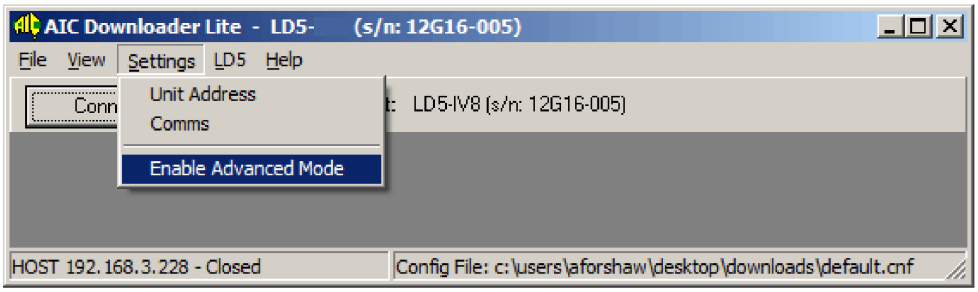
Once the software has been downloaded and run a main menu page as illustrated below will appear. With your LD5/LE5 connected via one of its optional communication ports or Ethernet connector click on **Settings** then **Comms** to bring up the communications options menu and set as required. Alteration of configuration and calibration require the entry of a password, go to **Tools** then **Enter Password** to enter the password. The default password is **Password** but this can be changed at the window accessed via **View** then **Password Configuration**. A separate user guide will be provided if the optional full version of this software has been obtained and is provided as standard with Ethernet/Datlogging models.



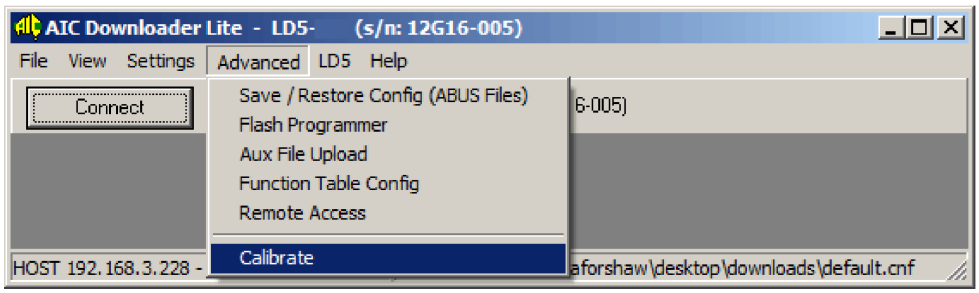
Software main menu



Some LD5 configuration options



To enable advanced operations such as Calibration hold "Ctrl" then click on **Settings** then click on **Enable Advanced Mode**



Some of the advanced operation options

7 Specifications

7.1 Technical specifications

Input types:	Up to 8 inputs Pt100 or Pt1000 2 or 3 wire or AD590 sensor
Accuracy:	Better than 0.1^{o}C when calibrated
Measuring range:	Pt100 up to 350 Ohms
	Pt1000 up to 3000 Ohms
	AD590 -55 to 155^{o}C
Sample rate:	3 samples per second (8 channels scanned in approx. 2.4 secs)
ADC Resolution:	Effective resolution 18.5 bits
Thermal stability:	25ppm per ^{o}C
Ambient temperature:	LED -10 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
Output (standard):	4 x relays, 1 x Form C, 3 x Form A rated 5A resistive.
	Programmable N.O. or N.C. Relays 1 and 2 can alternatively be set for PI control (frequency or pulse width)

Optional outputs - some options below are available in combination

Extra relays:	4 extra relays, form A
Analog retransmission:	Single 4 to 20mA 12 bit or 16 bit versions
	Single 4-20mA, 0-1VDC or 0-10VDC (user selectable), 16 bit
	(4-20mA will drive into resistive loads of up to 800Ω)
	Analog outputs can be configured for retransmission or PI control
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 (includes 8MB data logger memory), can be used with Modbus TCP
	Web page optional with Ethernet option
	USB port, type B

7.2 Physical characteristics

Refer to “Mechanical installation”, chapter 2 page 10 for size and weight specifications.

8 Guarantee and service

The product supplied with this manual is guaranteed against faulty workmanship for a period of 2 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 au 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.