LD5-SSI and LE5-SSI
Large Digit Displays
Operation and Instruction Manual

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

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1 Introduction

General description

This manual contains information for the installation and operation of the LD5-SS and LE5-SS display. These displays can accept an SSI signal input of up to 32 bits in binary or Gray code. The LE5-RS version adds Ethernet communications. The SSI data transmission is initiated by clock pulses generated by the instrument. Typical SSI output devices include absolute position encoders and distance measuring equipment. Data transmission distances of up to 1.2km are possible when using SSI data communications. The display can be scaled in engineering units e.g. mm by one of the methods below:
1. By entering values at the I nPt and SCL functions (F.SCL mode, see I nPt CAL OPEr function), These values work together with the output value from the encoder in a formula used to calculate the required display scaling.
2. By entering the values required at two known points (U.CAL mode, see I nPt CAL OPEr function). This method also allows the use of a calibration offset.

1.1 Selecting and altering access levels

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

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

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

The access levels available are:

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

1.2 Accessing setup functions

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

As as summary the methods available are:

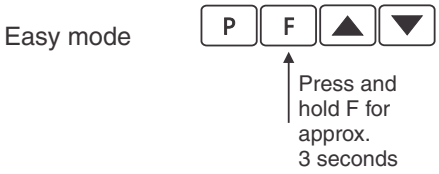
- **Easy mode** - this is the easiest access mode simply requiring the F button to be pressed for 3

seconds. This mode would normally be used to gain access to functions which require frequent adjustment.

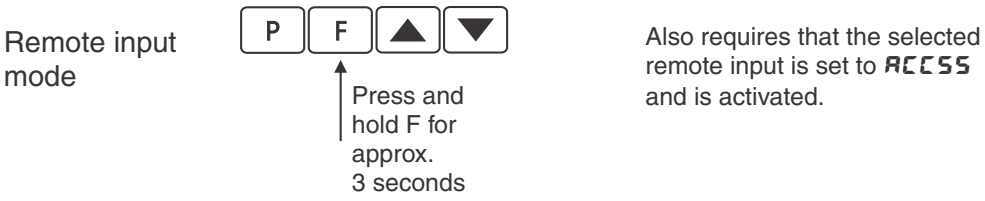
- **Remote input mode** - this uses the Easy method of access but also requires the use of a remote input switch.
- **PIN 1 mode** - this method allows a PIN to be set with access via PIN entry.
- **PIN 2 mode** - this method also requires a PIN and would generally be use to allow a higher access level than the first PIN.
- **Super Cal mode** - this method requires a power up procedure and will allow access to all functions.

These modes are explained in more detail below.

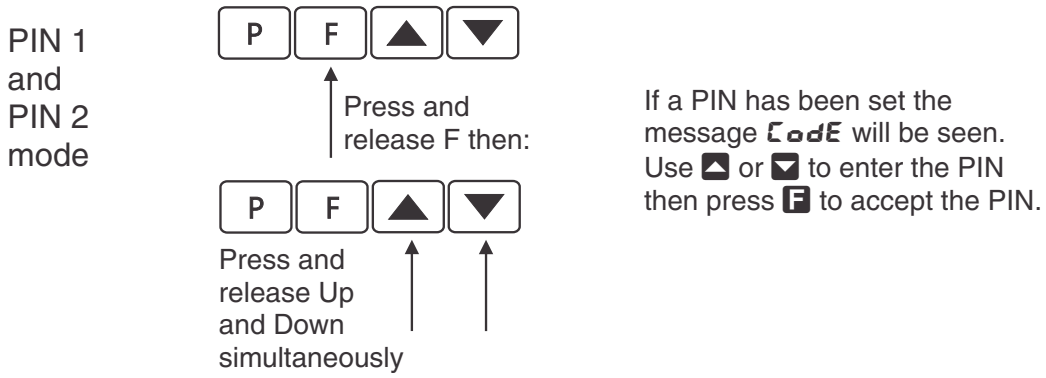
- **Easy mode** - Allows access to the level set by the **EASYLEVL** function in the **ACCS** menu. By default the Easy access is set to **NONE** level i.e. no access.
  The Easy mode simply requires that the **F** button is held pressed until the message **FUNC** is seen followed by the first function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



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

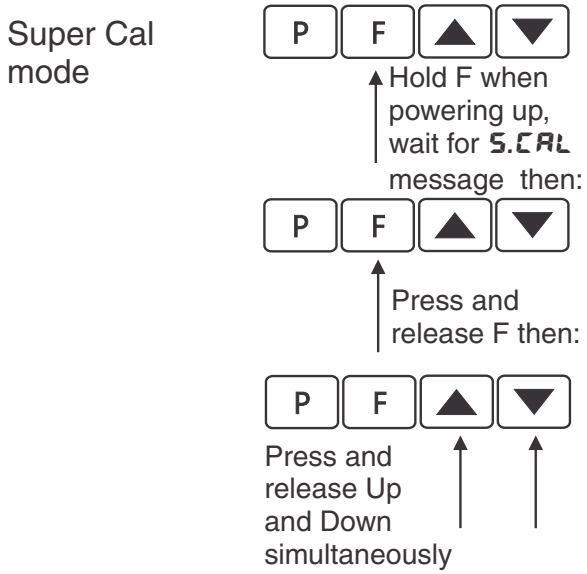


- **PIN 1 mode** - Allows access to the level set by the **USr. 1LEVL** function in the **ACCS** menu. The PIN 1 mode requires the **F** button is pressed and released then within 2 seconds press the ▲ and ▼ buttons at the same time. The PIN can be set via the **P1 n. 1CodE** function in the **ACCS**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



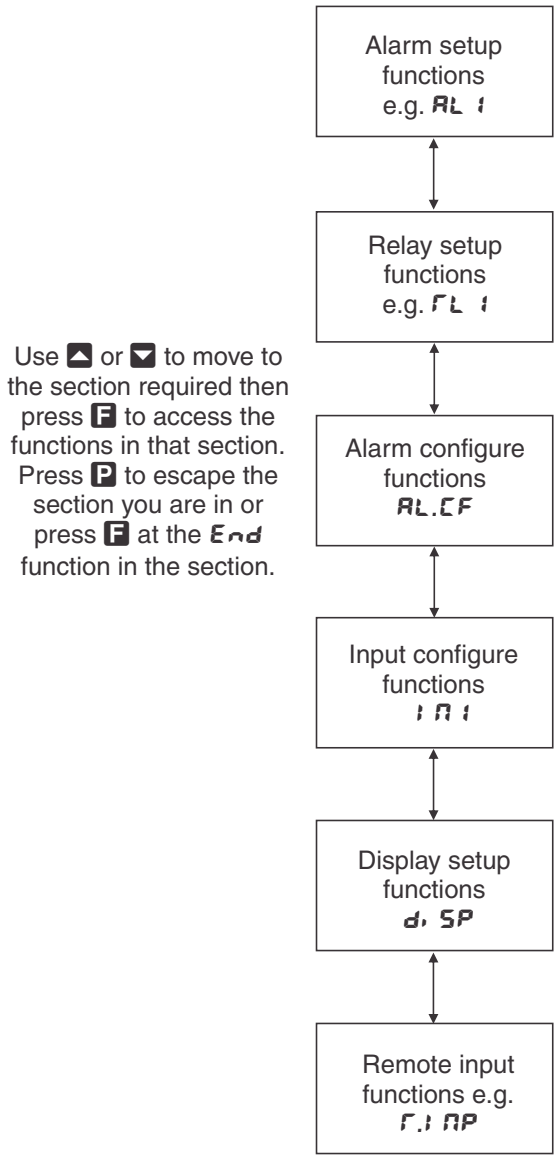
- **PIN 2 mode** - Allows access to the level set by the USr.2LEUL function in the ACCS menu. This method uses the same access method as PIN 1 mode above. A P1 n.2CodE setting of nonE disables the PIN. If the USr. 1LEUL or a USr.2LEUL function has been set to a number other than nonE then the first function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

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

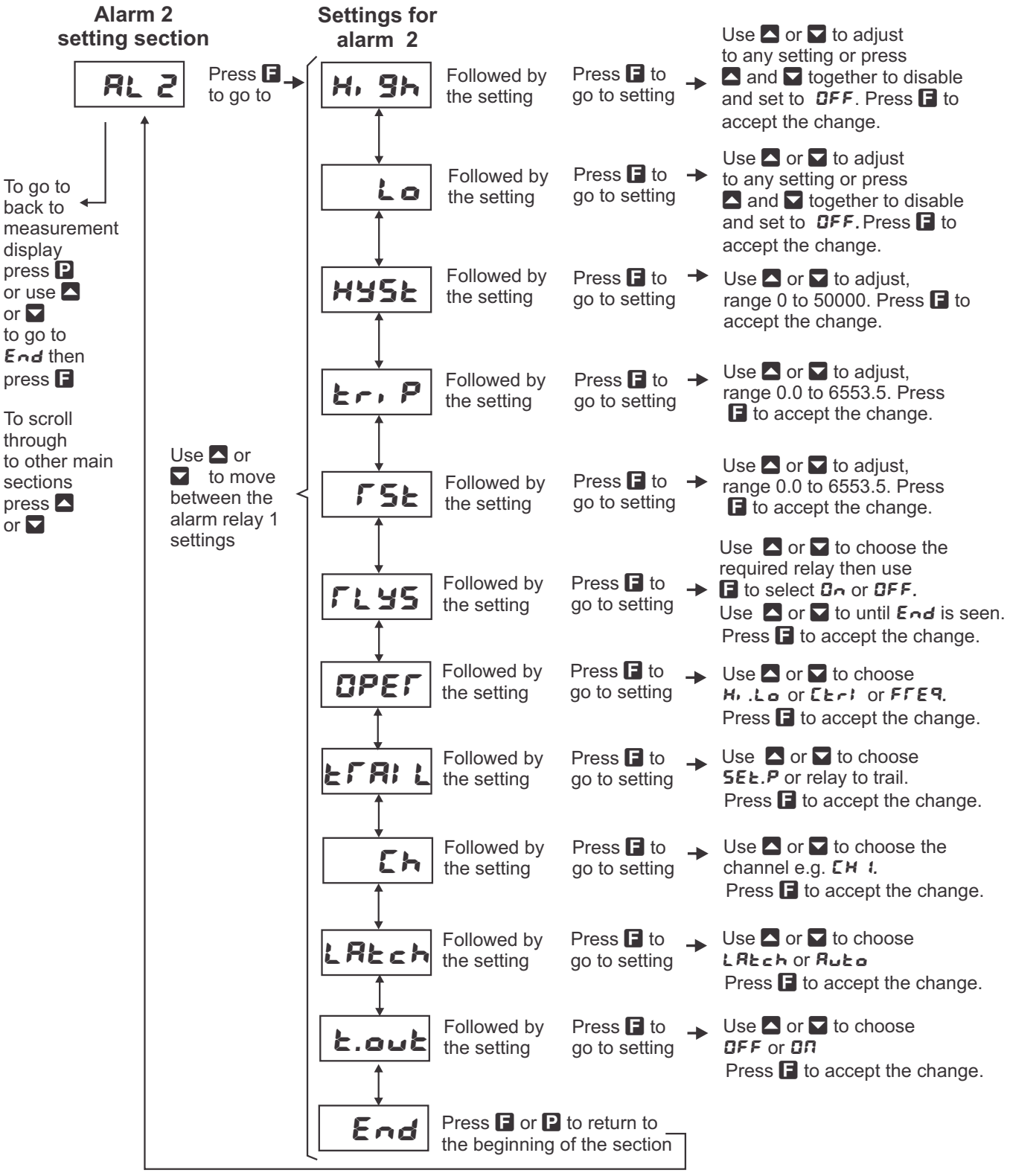


The setup functions are organised in blocks or sections e.g. all the settings for channel 1 alarms are in the AL 1 section. Once access to setup functions has been gained use the ▲ and ▼ buttons to select the section required then press F to enter this section and again us the ▲ and ▼ buttons to select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

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



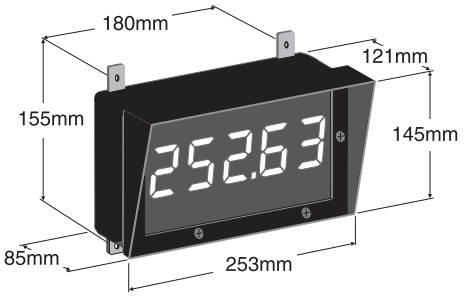
The example in the flowchart (for 4 digit display) below shows the method using alarm relay 1 setup function.



2 Mechanical installation

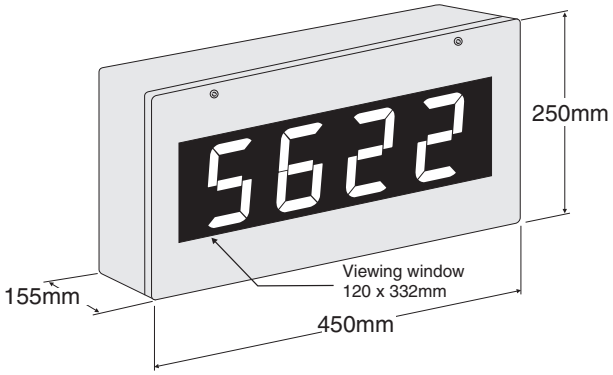
2.1 20mm, 38mm, 45mm, 57mm and 58mm LED

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



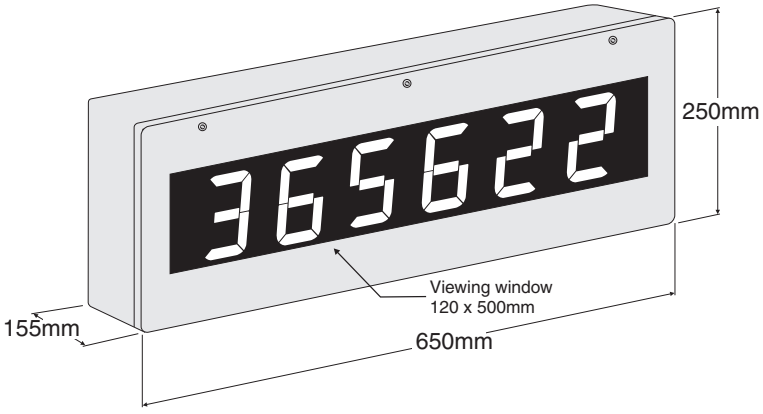
2.2 100mm 4 digit LED

Weight 10kg (LED)



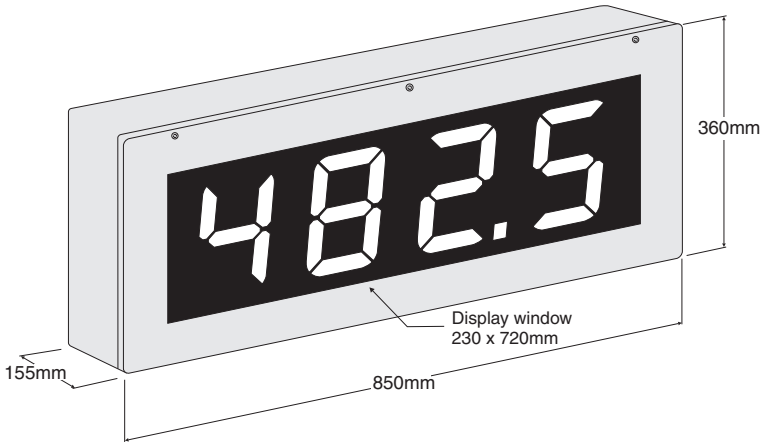
2.3 100mm 6 digit LED

Weight 14kg (LED)



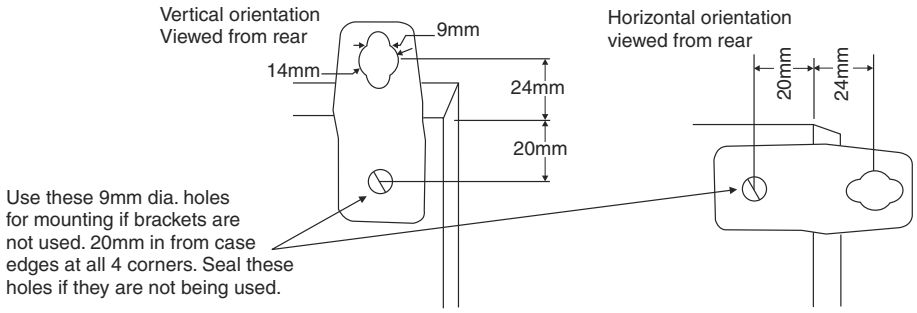
2.4 200mm 4 digit LED

Weight 14kg.



2.5 Cable entry and Mounting brackets

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

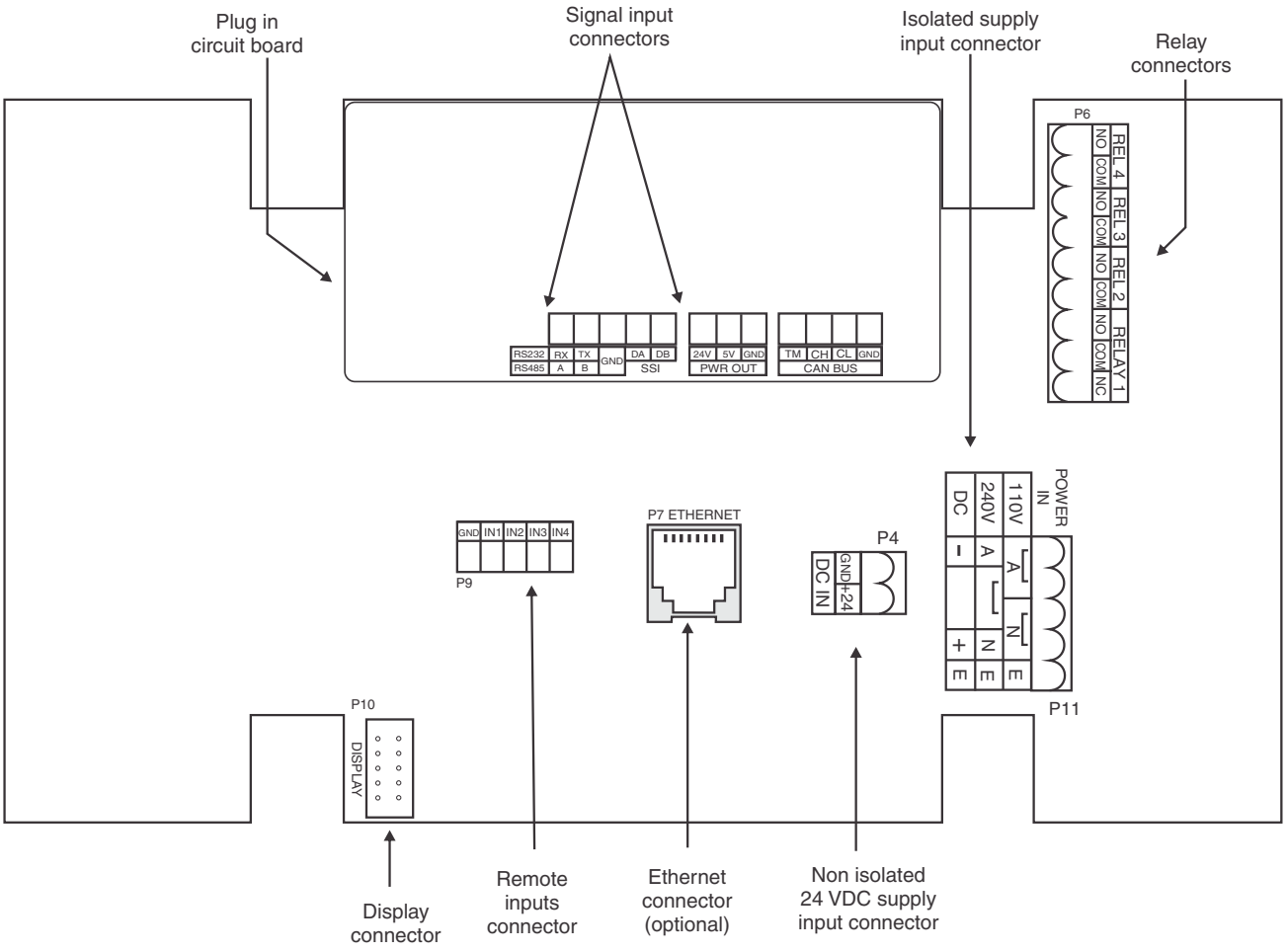


3 Electrical Installation

The display is designed for continuous operation and therefore no mains/power switch is fitted to the unit. It is recommended that an external switch and fuse be provided to allow the unit to be removed for servicing. To install cables remove six front panel retaining screws. Remove front panel taking care not to damage the ribbon cable (ribbon cable joins the front display circuit board to the main circuit board). Connect power and input cables to the plug in terminal blocks located within the enclosure. The terminals are clearly labeled and unplug for ease of installation, please take care to connect them correctly. The terminal blocks allow for wires of up to 2.5mm^2 to be fitted (relays and power) and 1.5mm^2 for 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 8 Channel Scanning Monitor Output Addendum” booklet for wiring details of any optional outputs not covered in this instruction manual.

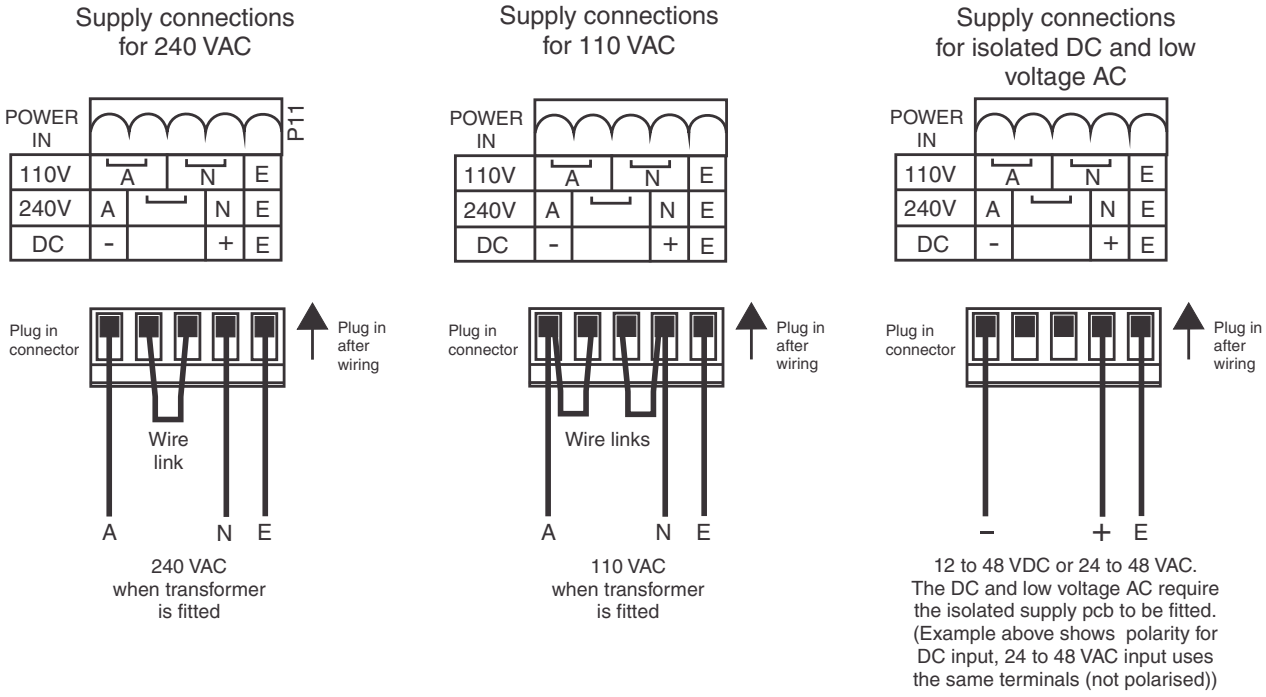
Input board layout



3.1 Power supply connections

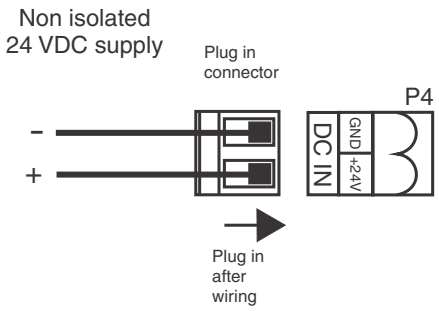
The power supply for the instrument is factory fitted and is of a fixed type. Check power supply type before connecting. Non isolated 24VDC supply instruments use the DC IN connector P4 shown on the diagram above. AC supply and isolated DC supply instruments use connector P11.

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

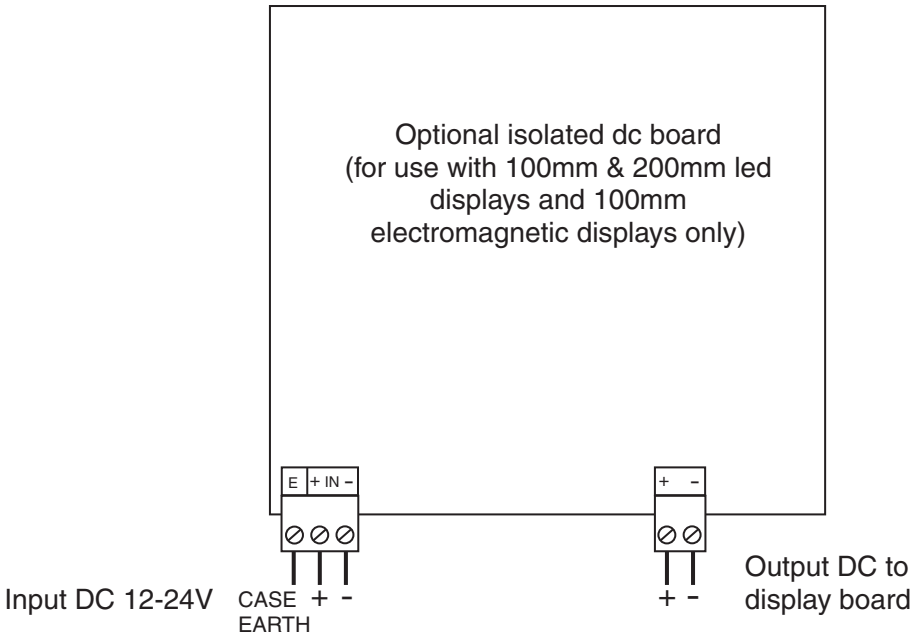
24VDC ±10% non isolated DC supply connections.



3.4 100mm and 200mm display power supplies

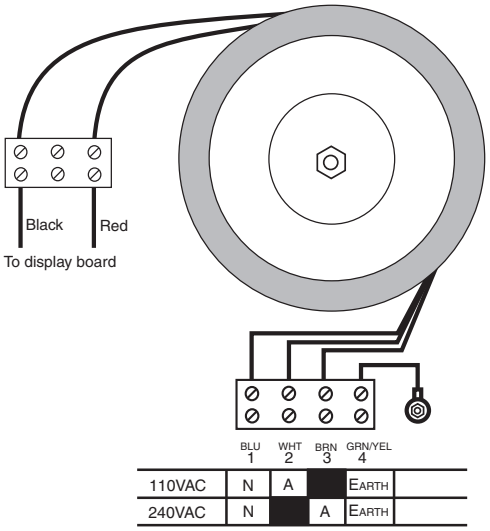
Optional isolated DC supply - 100mm and 200mm displays

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.

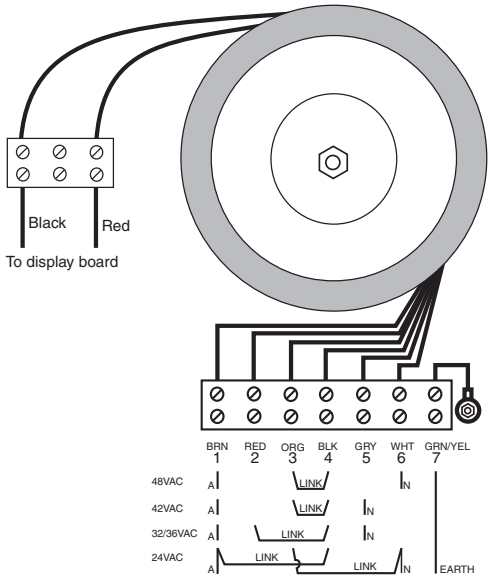


AC supplies - 100mm and 200mm displays. AC supplies connect to the transformer primary on the base board inside the case. Supply type is factory configured.

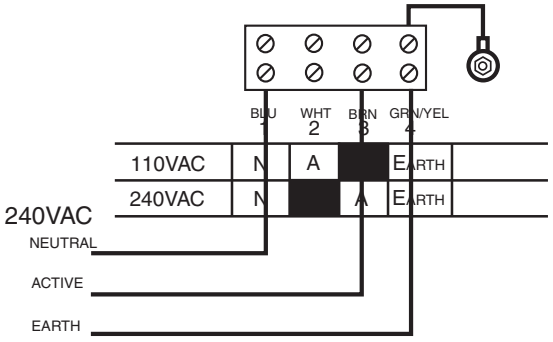
240 & 110VAC supplies.
For 100mm/200mm LED or 100mm electromagnetic display types only.

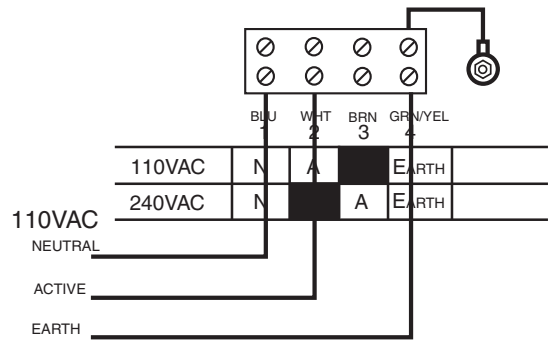


Low voltage AC supplies.
For 100mm/200mm LED or 100mm electromagnetic display types only.



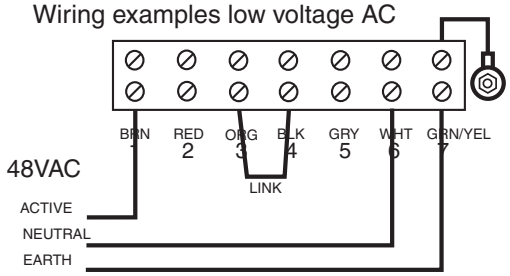
Wiring examples 240VAC & 110VAC

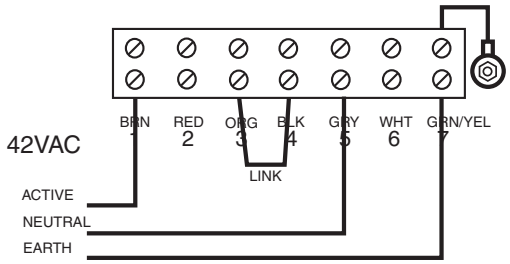


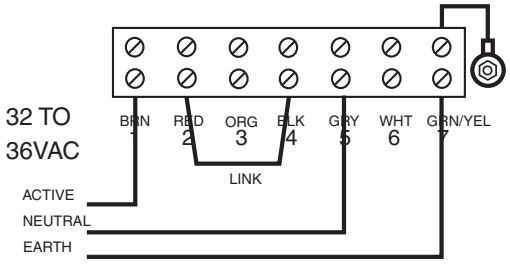


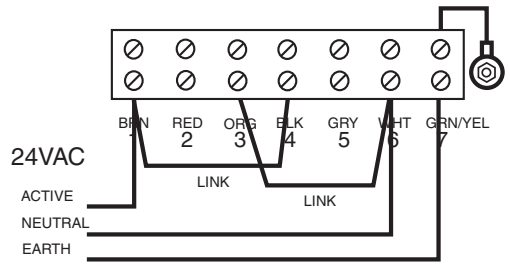
Important note: the 240V & 110V supplies use the same transformer, low voltage instruments use a different transformer. Do not use a low voltage transformer for 240V or 110V or vice versa.

Wiring examples low voltage AC



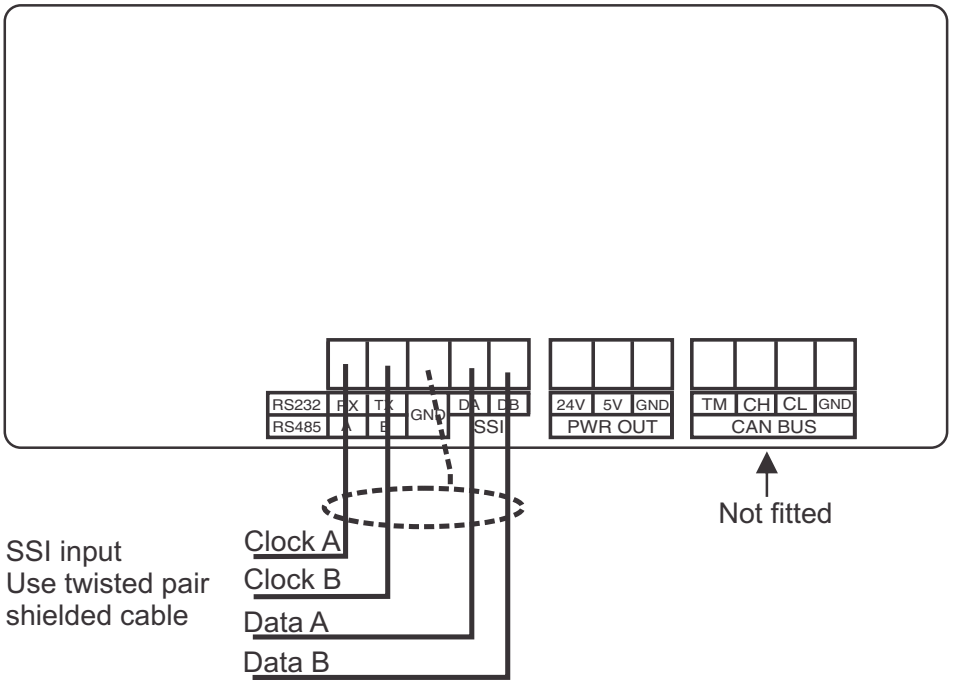






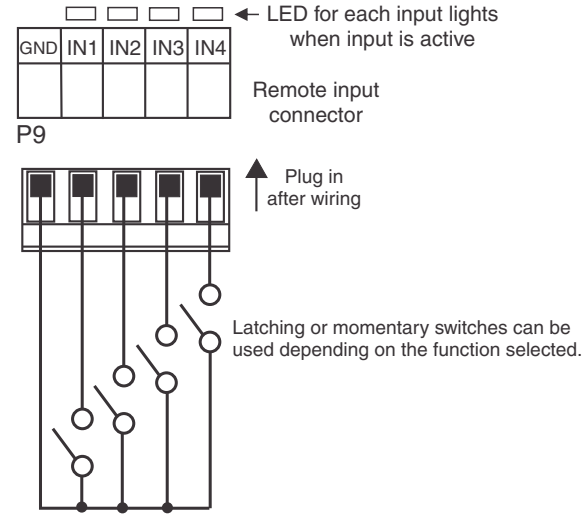
3.5 SSI input

The SSI clock and data connections are on a small pcb on top of the main pcb.



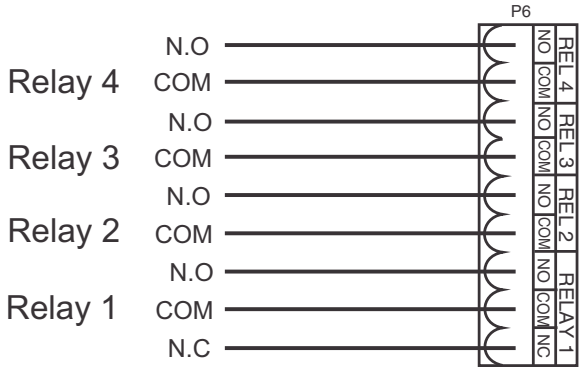
3.5.1 Remote/Digital inputs

The digital inputs will accept voltage free contact closure inputs or up to 24VDC signal. The electrical configuration for these inputs is configured by digital input functions, see the d.1 n section functions. The operation mode of the digital inputs are controlled by separate functions for each input, see the F.1 nP section functions. The electrical configuration for these inputs is configured by digital input functions, see the d.1 n section functions. Wiring example showing voltage free contacts below.



3.5.2 Relays 1 to 4

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 8 Channel Scanning Monitor 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.

Any functions which rely on options being fitted will be denoted by an asterisk *.

Some of the functions shown in the table below require access via Super Cal **S.CAL** mode.

4.1 Alarm relay function table

Display	Function	Range	Default	Your record	Ref/Page
AL 1 to **AL 8** **HI SH**	High setpoint value for designated alarm relay	Any display value or **OFF**	**OFF**	See 4.10	5.1 / 25
AL 1 to **AL 8** **LO**	Low setpoint value for designated alarm relay.	Any display value or **OFF**	**OFF**	See 4.10	5.2 / 26
AL 1 to **AL 8** **HYST**	Alarm relay hysteresis (deadband)	**0** to **655.35**	**0.10**	See 4.10	5.3 / 26
AL 1 to **AL 8** **TR1 P**	Trip time delay for the designated alarm relay	**0** to **6553.5** secs	**0.0**	See 4.10	5.4 / 27
AL 1 to **AL 8** **RST**	Reset time delay for the designated alarm relay	**0** to **6553.5** secs	**0.0**	See 4.10	5.5 / 27
AL 1 to **AL 8** **SPAN**	Relay PI control span	Any display value	**10.00**	See 4.10	5.6 / 28
AL 1 to **AL 8** **SETP**	Relay PI control setpoint	Any display value	**10.00**	See 4.10	5.7 / 28
AL 1 to **AL 8** **P.G**	Relay PI control proportional gain value	Any display value	**0.010**	See 4.10	5.8 / 28
AL 1 to **AL 8** **I.G**	Relay PI control integral gain value	Any display value	**0.000**	See 4.10	5.9 / 28
AL 1 to **AL 8** **I.H**	Relay PI control integral high limit value	**0** to **100.0** %	**0.000**	See 4.10	5.10 / 29
AL 1 to **AL 8** **I.L**	Relay PI control integral low limit value	**0** to **100.0** %	**100.0**	See 4.10	5.11 / 29

(*__Optional__)—this function will only be accessible if the relevant option is fitted

AL 1 to AL 8 bi AS	Relay PI control bias	0 to 100.0 %	50.0	See 4.10	5.12 / 29
AL 1 to AL 8 duty SECS	Relay PI control duty cycle	0 to 6553.5 secs	10.0	See 4.10	5.13 / 29
AL 1 to AL 8 on SECS	Relay PI frequency control “on” time	0 to 6553.5 secs	1.0	See 4.10	5.14 / 30
AL 1 to AL 8 rLyS	Relay selection On or OFF	On or OFF	OFF	See 4.10	5.15 / 30
AL2 to AL 8 trL	Alarm trailing or setpoint mode	SEt.P, tL 1, tL 2, tL 3, tL 4, tL 5, tL 6, tL 7	SEt.P	See 4.10	5.16 / 30
AL 1 to AL 8 OPEr	Alarm relay operating mode	Hi .Lo, Ctrl , FrEq	Hi .Lo	See 4.10	5.17 / 31
AL 1 to AL 8 Ch	Alarm relay operation input selection	CH 1	CH 1	CH 1	5.18 / 31
AL 1 to AL 8 Ltch	Alarm relay latching operation	Auto, Ltch, A.b, L.b	Auto	See 4.10	5.19 / 32
AL 1 to AL 8 tout	Serial input timeout alarm	OFF or On	OFF	See 4.10	5.20 / 32

(*__Optional__)—this function will only be accessible if the relevant option is fitted

4.2 Relay function table

Display	Function	Range	Default	Your record	Ref/Page
rL 1 to rL8 rLy	Alarm relay *x* action to normally open (de-energised) or normally closed (energised)	n.o, n.c	n.o	See 4.10	5.21 / 32
rL 1 to rL8 Ack	Relay acknowledge	OFF or On	OFF	See 4.10	5.22 / 33
rL 1 to rL8 bool	Alarm relay Boolean logic operation	Or, And	Or	See 4.10	5.23 / 33

(*__Optional__)—this function will only be accessible if the relevant option is fitted

4.3 Relay function table

Display	Function	Range	Default	Your record	Ref/Page
rL 1 to rL8 rLy	Alarm relay *x* action to normally open (de-energised) or normally closed (energised)	n.o, n.c	n.o	See 4.10	5.21 / 32
rL 1 to rL8 Ack	Relay acknowledge	OFF or On	OFF	See 4.10	5.22 / 33
rL 1 to rL8 bool	Alarm relay Boolean logic operation	Or, And	Or	See 4.10	5.23 / 33

(*__Optional__)—this function will only be accessible if the relevant option is fitted

4.4 Input function tables

Display	Function	Range	Default	Your record	Ref/Page
inPt inPt bits	SSI input bits	1 to 32	24		5.25 / 34
inPt dAtA bits	SSI data bits	1 to 32	24		5.26 / 34
inPt S.Sn	SSI signed data	OFF or On	OFF		5.27 / 34
inPt CodE	SSI data type	b.n, Gray	b.n		5.28 / 35
inPt dP	Display decimal point	0, 0.1, 0.02, 0.003	0		5.29 / 35

(*__Optional__)—this function will only be accessible if the relevant option is fitted

I nPt d.rnd	Display value rounding	0.01 to 50.00	0.01		5.30 / 35
I nPt FLtr	Digital filter	0, 1, 2, 3, 4, 5, 6, 7, 8	0		5.31 / 35
I nPt CAL OPEr	Display scaling method	F.SCL, U.CAL	F.SCL		5.32 / 36
I nPt I nPt	Input scale value	0 to Maximum display value	1		5.33 / 37
I nPt SCL	Scale value	Any display value	0.01		5.34 / 37
I nPt t.OUt	Timeout	OFF or On	On		5.35 / 37
I nPt SLAU	Slave display	OFF or On	OFF		5.36 / 37
I nPt dUAL rEAd	Dual read	OFF or On	OFF		5.37 / 38
I nPt U.CAL	Uncalibrate	n/a	n/a		5.38 / 38
I nPt CAL 1	First calibration point	n/a	n/a		5.39 / 38
I nPt CAL2	Second calibration point	n/a	n/a		5.40 / 38
I nPt SEt 2Er0	Set zero	n/a	n/a		5.41 / 39
I nPt OFSt	Display scale offset	n/a	n/a		5.42 / 39
I nPt CLr 2Er0	Clear zero	n/a	n/a		5.43 / 39

(*__Optional__)—this function will only be accessible if the relevant option is fitted

4.5 Analog output function table

Display	Function	Range	Default	Your record	Ref/Page
r0 1 to r02 OutP	Analog retransmission outputs (*__Optional__)	4-20, 0- 1.0, 0- 10	4-20		5.44 / 40
r0 1 to r02 I nPt	Analog retransmission input channel (*__Optional__)	Any available channel	CH 1		5.45 / 40
r0 1 to r02 P.CtI	Analog output PI control (*__Optional__)	no or YES	no		5.46 / 40

(*__Optional__)—this function will only be accessible if the relevant option is fitted

r01 to r02 SEtP	Analog output PI control setpoint (*__Optional__)	Any display value	0		5.47 / 40
r01 to r02 SPAn	Analog output PI control span (*__Optional__)	Any display value	1000		5.48 / 41
r01 to r02 P.g	Analog output PI control proportional gain (*__Optional__)	Any display value	1.000		5.49 / 41
r01 to r02 I.g	Analog output PI control integral gain (*__Optional__)	Any display value	0.000		5.50 / 43
r01 to r02 I.H	Analog output PI control integral high limit (*__Optional__)	0 to 100.0 %	100.0		5.51 / 44
r01 to r02 I.L	Analog output PI control integral low limit (*__Optional__)	0 to 100.0 %	100.0		5.52 / 44
r01 to r02 bIAS	Analog output PI control bias (*__Optional__)	0 to 100.0 %	50.0		5.53 / 45
r01 to r02 Lo	Analog retransmission low display value (*__Optional__)	Any display value	0		5.54 / 45
r01 to r02 HIgh	Analog retransmission high display value (*__Optional__)	Any display value	1000		5.55 / 46

(*__Optional__)—this function will only be accessible if the relevant option is fitted

4.6 Display function table

Display	Function	Range	Default	Your record	Ref/Page
diSP brgt Auto	Automatic display brightness	OFF or On	On		5.56 / 46
diSP brgt	Display brightness	1 to 64	63		5.57 / 46
diSP dull	Dimmed display brightness	0 to 63	7		5.58 / 46
diSP Auto HIgh	Auto display brightness high level	16 to 64	63		5.59 / 47
diSP Auto Lo	Auto display brightness low level	1 to 64	7		5.60 / 47

(*__Optional__)—this function will only be accessible if the relevant option is fitted

4.7 Serial communications functions

Display	Function	Range	Default	Your record	Ref/Page
SEri OPEr	Serial output operation mode	nONE, Cont, Poll, A.buS, d. SP, Ā.buS	nONE		5.61 / 47
SEri bAud	Serial baud rate	1200, 2400, 4800, 9600, 19.2, 38.4, 57.6, 115.2	9600		5.62 / 48
SEri PrtY	Serial parity	8n, 8E, 8O, 7E, 7O	8n		5.63 / 48
SEri Unit Addr	Serial address	1 to 127	1		5.64 / 49

(*__Optional__)—this function will only be accessible if the relevant option is fitted

4.8 P button and remote inputs function table

Display	Function	Range	Default	Your record	Ref/Page
F.1 nP P.but	Front P button operation mode	nONE, P.Hi, P.Lo, Hi .Lo, AL.Ac	nONE		5.65 / 49
F.1 nP F.1 n. 1	Remote input 1 operation mode	nONE, P.HI d, d.HI d, P.Hi, P.Lo, Hi .Lo, AL.Ac, ACCS, dUAL	nONE		5.66 / 49
F.1 nP F.1 n.2	Remote input 2 operation mode	nONE, P.HI d, d.HI d, P.Hi, P.Lo, Hi .Lo, AL.Ac, ACCS, dUAL	nONE		5.67 / 50
F.1 nP F.1 n.3	Remote input 3 operation mode	nONE, P.HI d, d.HI d, P.Hi, P.Lo, Hi .Lo, AL.Ac, ACCS, dUAL	nONE		5.68 / 51
F.1 nP F.1 n.4	Remote input 4 operation mode	nONE, P.HI d, d.HI d, P.Hi, P.Lo, Hi .Lo, AL.Ac, ACCS, dUAL	nONE		5.69 / 51

(*__Optional__)—this function will only be accessible if the relevant option is fitted

4.9 Access control 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		5.70 / 51
ACCES r.I nP LEUL	Remote input access mode	NONE, 1, 2, 3, 4, 5, 6, CAL	NONE		5.71 / 52
ACCES USr. 1 P. n	PIN code 1	0 to 65535	0		5.72 / 52
ACCES USr. 1 LEUL	PIN code 1 access level	NONE, 1, 2, 3, 4, 5, 6, CAL	NONE		5.73 / 52
ACCES USr.2 P. n	PIN code 2	0 to 65535	0		5.74 / 53
ACCES USr.2 LEUL	PIN code 2 access level	NONE, 1, 2, 3, 4, 5, 6, CAL	NONE		5.75 / 53
ACCES Fn. 1 CodE	User assignable access function 1	0000 to FFFF hex.	0000		5.76 / 53
ACCES Fn. 1 LEUL	User assignable access 1 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.77 / 54
ACCES Fn.2 CodE	User assignable access function 2	0000 to FFFF hex.	0000		5.78 / 54
ACCES Fn.2 LEUL	User assignable access 2 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.79 / 54
ACCES Fn.3 CodE	User assignable access function 3	0000 to FFFF hex.	0000		5.80 / 55
ACCES Fn.3 LEUL	User assignable access 3 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.81 / 55
ACCES Fn.4 CodE	User assignable access function 4	0000 to FFFF hex.	0000		5.82 / 55
ACCES Fn.4 LEUL	User assignable access 4 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.83 / 55
ACCES Fn.5 CodE	User assignable access function 5	0000 to FFFF hex.	0000		5.84 / 56

(*__Optional__)—this function will only be accessible if the relevant option is fitted

ACCES Fn.5 LEUL	User assignable access 5 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.85 / 56
ACCES Fn.6 CodE	User assignable access function 6	0000 to FFFF hex.	0000		5.86 / 56
ACCES Fn.6 LEUL	User assignable access 6 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.87 / 56
ACCES Fn.7 CodE	User assignable access function 7	0000 to FFFF hex.	0000		5.88 / 57
ACCES Fn.7 LEUL	User assignable access 7 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.89 / 57
ACCES Fn.8 CodE	User assignable access function 8	0000 to FFFF hex.	0000		5.90 / 57
ACCES Fn.8 LEUL	User assignable access 8 level value	dFLt, 1, 2, 3, 4, 5, 6, CAL, S.CAL	dFLt		5.91 / 57

(* **Optional**)—this function will only be accessible if the relevant option is fitted

4.10 Relay table

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.9			n/a	n/a	n/a	n/a	n/a	n/a
I.9			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								
tout								

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 process reading, these display messages may in some cases vary slightly for other display types.

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

Explanation of Functions

5.1 Alarm relay high setpoint

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

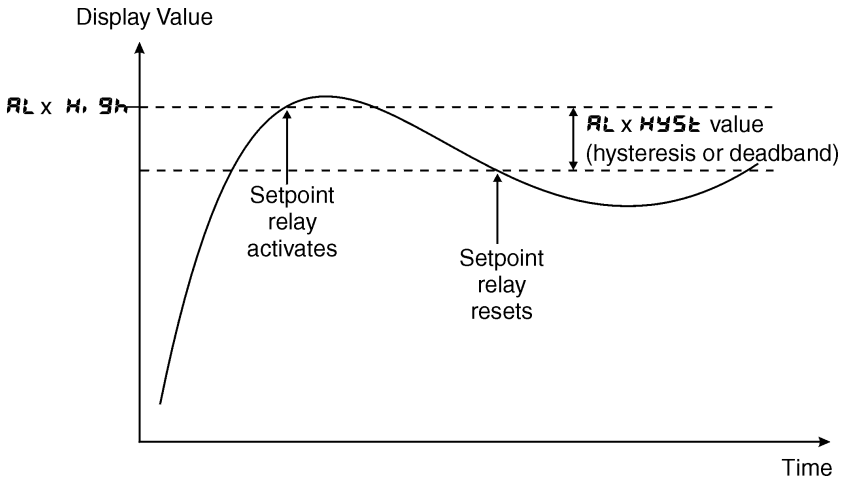
Displays and sets the high setpoint value for the designated alarm relay. Use this high setpoint function if a relay operation is required when the display value becomes equal to or more than the low setpoint value.

To set the high alarm value go to the Hi SH 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 SH 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 SH 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.

5.2 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

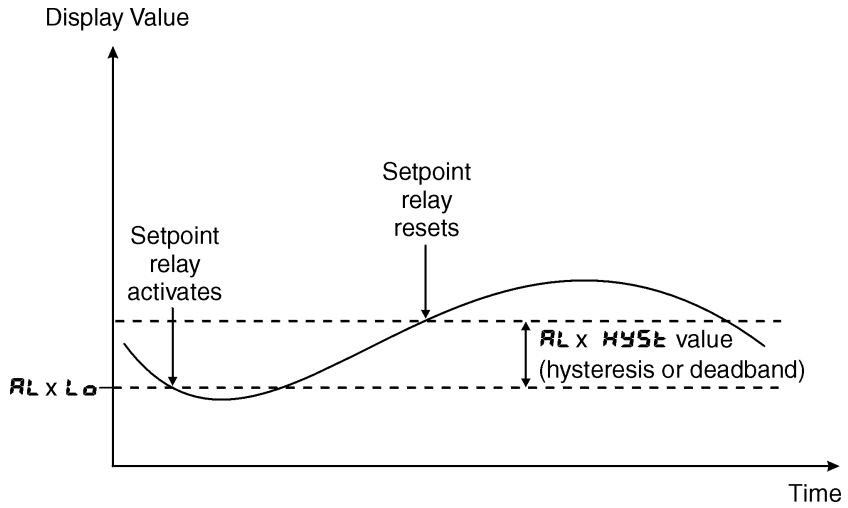
Displays and sets the low setpoint value for the designated alarm relay. Use this low setpoint function if a relay operation is required when the display value becomes equal to or less than the low setpoint value.

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.



5.3 Alarm relay hysteresis (deadband)

Section:	AL 1 to AL 8
Display:	HYSt
Range:	0 to 655.35
Default Value:	0.10
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.

5.4 Alarm relay trip time

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

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

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

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

5.5 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.

5.6 Relay PI control span

Section:	AL 1 to AL 8
Display:	SPAN
Range:	Any display value
Default Value:	10.00
Default Access Level	4
Function number	4290 to 4297

Allows setting of the control span, refer to “Setting up the relay PI control” chapter in the Addendum booklet.

5.7 Relay PI control setpoint

Section:	AL 1 to AL 8
Display:	SEtP
Range:	Any display value
Default Value:	10.00
Default Access Level	4
Function number	4200 to 4207

Allows setting of the control setpoint, refer to “Setting up the relay PI control” chapter in the Addendum booklet.

5.8 Relay PI control proportional gain value

Section:	AL 1 to AL 8
Display:	P.9
Range:	Any display value
Default Value:	0.0 10
Default Access Level	4
Function number	42 10 to 42 17

Allow the relay PI control proportional gain to be set, refer to “Setting up the relay PI control” chapter in the Addendum booklet.

5.9 Relay PI control integral gain value

Section:	AL 1 to AL 8
Display:	I .9
Range:	Any display value
Default Value:	0.000
Default Access Level	4
Function number	4220 to 4227

Allow the relay PI control integral gain to be set, refer to “Setting up the relay PI control” chapter in the Addendum booklet.

5.10 Relay PI control integral high limit value

Section:	AL 1 to AL 8
Display:	1.H
Range:	0 to 100.0 %
Default Value:	0.000
Default Access Level	4
Function number	4240 to 4247

Allow the relay PI control integral high limit to be set, refer to “Setting up the relay PI control” chapter in the Addendum booklet.

5.11 Relay PI control integral low limit value

Section:	AL 1 to AL 8
Display:	1.L
Range:	0 to 100.0 %
Default Value:	100.0
Default Access Level	4
Function number	4250 to 4257

Allow the relay PI control integral low limit to be set, refer to “Setting up the relay PI control” chapter in the Addendum booklet.

5.12 Relay PI control bias

Section:	AL 1 to AL 8
Display:	b, AS
Range:	0 to 100.0 %
Default Value:	50.0
Default Access Level	4
Function number	4260 to 4267

Allow the relay PI control bias to be set, refer to “Setting up the relay PI control” chapter in the Addendum booklet.

5.13 Relay PI control duty cycle

Section:	AL 1 to AL 8
Display:	duty SECS
Range:	0 to 6553.5 secs
Default Value:	10.0
Default Access Level	4
Function number	4270 to 4277

Allows the relay PI control duty cycle to be set, refer to “Setting up the relay PI control” chapter in the Addendum booklet.

5.14 Relay PI frequency control “on” time

Section:	AL 1 to AL 8
Display:	on SECS
Range:	0 to 6553.5 secs
Default Value:	1.0
Default Access Level	4
Function number	4280 to 4287

Allows the relay PI frequency control “on” time to be set, refer to “Setting up the relay PI control” chapter in the Addendum booklet.

5.15 Relay selection

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

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

5.16 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

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 (**AL 8**) may be independent or may be linked to alarm 1 (**tL 1**), alarm 2 (**tL 2**), alarm 3 (**tL 3**), alarm 4 (**tL 4**), alarm 5 (**tL 5**), alarm 6 (**tL 6**) or alarm 6 (**tL 7**)

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.

5.17 Alarm relay operating mode

Section:	**AL 1** to **AL 8**
Display:	**OPEr**
Range:	**Hi .Lo**, **CtrI** , **FrEq**
Default Value:	**Hi .Lo**
Default Access Level	**4**
Function number	**4 160** to **4 167**

Sets the operating mode for the selected relay, refer to “Setting up the relay PI control” chapter in the Addendum booklet.

5.18 Alarm relay operation input selection

Section:	**AL 1** to **AL 8**
Display:	**Ch**
Range:	**CH 1**
Default Value:	**CH 1**
Default Access Level	**4**
Function number	**4070** to **4077**

Sets the input from which the selected alarm relay will operate. The only selection available in this software version is **CH 1** - relay operates from value of channel 1 i.e. the SSI display value.

5.19 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.

5.20 Serial input timeout alarm

Section:	AL 1 to AL 8
Display:	tout
Range:	OFF or On
Default Value:	OFF
Default Access Level	4
Function number	41d0 to 41d7

Allows the selected relay to be used to give an alarm indication (**t.out**) if the serial input string ceases. Note that this can be used in addition to the high and low setpoints.

5.21 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 1n.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.

5.22 Relay acknowledge

Section:	rL 1 to rL 8
Display:	Ac K
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 using a **P** button of remote input to acknowledge the alarm. If the Ac K 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.

5.23 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.

5.24 Select number of alarms

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

Allows selection of the number of alarms required from 0 (0) to 8 (8).

5.25 SSI input bits

Section:	INPt
Display:	INPt bits
Range:	1 to 32
Default Value:	24
Default Access Level	CAL
Function number	496

This function allows selection of number of bits for the SSI input i.e. the number of bits which are used to transmit the position data. See also **dAtA bits** which follows.

5.26 SSI data bits

Section:	INPt
Display:	dAtA bits
Range:	1 to 32
Default Value:	24
Default Access Level	CAL
Function number	492

This function allows selection of total number of data bits for the SSI input e.g. a 32 bit encoder may have 24 bits of position data and 8 bits of other data which is not used in the actual display value. It is important that the correct value is entered for both the **INPt bits** and **dAtA bits** since this allows the display to detect if a genuine message is being received.

5.27 SSI signed data

Section:	INPt
Display:	S. Sn
Range:	OFF or On
Default Value:	OFF
Default Access Level	CAL
Function number	493

Displays and sets the sign bit enabling. With the **SI Sn** function set to **on** the data is interpreted as a twos compliment signed number, masked to the number of bits set by the **INPt bits** function. See the **INPt bits** function above for the effect of the **SI Sn** setting on the values displayed for a given number of input bits.

The table which follows gives some examples of the effect of **INPt**, **SCLE**, **SSI bits** and **SI Sn** settings.

INPt	SCLE	SSI bits	SI Sn	Viewable display range
1	1	12	OFF	0 to 4095
1	-1	12	OFF	0 to -4095
1	1	12	on	-2048 to 2047
1	-1	12	on	-2047 to 2048
1	2	12	OFF	0 to 8191
2	1	12	OFF	0 to 2047
1	1	13	OFF	0 to 8191
1	1	14	OFF	0 to 16383
1	1	20	OFF	0 to 1048575
1	1.00	20	OFF	0 to 1048.58
8192	1000	12	OFF	0 to 500

5.28 SSI data type

Section:	INPt
Display:	CodE
Range:	bIn, grAY
Default Value:	bIn
Default Access Level	CAL
Function number	49E4

The input data type can be set to bIn for binary or to grAY for gray code SSI to match the output type from the sensor.

5.29 Display decimal point

Section:	INPt
Display:	dP
Range:	0, 0.1, 0.02, 0.003
Default Value:	0
Default Access Level	4
Function number	4100

This function sets the number of decimal points to be displayed.

5.30 Display value rounding

Section:	INPt
Display:	d.rnd
Range:	0.01 to 50.00
Default Value:	0.01
Default Access Level	4
Function number	4360

Displays and sets the display rounding value. This value may be set to 1 - 5000 displayed units. Display rounding is useful for reducing the instrument resolution without loss of accuracy in applications where it is undesirable to display to a fine tolerance.
Example: If set to 10 the display values will change in multiples of 10 only i.e. display moves from 10 to 20 to 30 etc.

5.31 Digital filter

Section:	INPt
Display:	FLtr
Range:	0, 1, 2, 3, 4, 5, 6, 7, 8
Default Value:	0
Default Access Level	4
Function number	43C0

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.

5.32 Display scaling method

Section:	I NPt
Display:	CAL OPEr
Range:	F.SCL, U.CAL
Default Value:	F.SCL
Default Access Level	CAL
Function number	495

Displays and sets the method to be used to scale the display. Choices are:

- F.SCL - this method uses the I NPt and SCL functions to scale the display.
  If the relevant details of the encoder and display requirements are known the easiest way to find the I NPt and SCL values is to use the maximum output value from the encoder as the I NPt value and the display value for this maximum output value as the SCL value. For example a 16 bit encoder has an output of 0 to 65535. If you wish this to display 0 to 1500 over the full range of the encoder then set the I NPt value to 65535 and the SCL value to 1500.

  The display value is calculated in the following manner:

$$\text{Display value} = \frac{\text{Value sent from encoder} \times \text{SCLE}}{\text{I NPt}}$$

  Example: A 12 bit SSI encoder will give an output in the range 0 to 4095 (if only positive values are used). The display is to be scaled to show 0.0 to 359.9 over this 12 bit range. With 1 decimal point the I NPt value could be set to 4095 and the SCLE value set to 359.9 to achieve this i.e. at one quarter output from the encoder (i.e. 1024) the display value is calculated from:

$$\text{Display value} = \frac{1024 \times 359.9}{4095}$$

  i.e. Display value = 90.0

- U.CAL

  This method allows selection of two point live input calibration and allows scaling without the need to calculate the required scaling from the SSI encoder/sensor data.

  The CAL 1 and CAL2 functions described below can then be used to scale the display. If required the OFSt function can be used to make an adjustment to add or subtract an offset value across the display range. The CAL 1, CAL2 will only be seen if the CAL OPEr function is set to U.SCL.

  Setting the first calibration point To scale the display using this method get the encoder output to a known position and go to the CAL 1 function. Press F then press ▲ to toggle to YES and press the F button again. The display will show a value based on the previous scaling. Press F and the display will show the message SCLE CAL 1 followed by a value. Use the ▲ or ▼ pushbutton to set this to the value required for this first position then press F button. The display should show CAL End indicating that the first calibration point has been accepted.

  Setting the second calibration point Get the encoder output to a second known position and go to the CAL2 function. Press F then press ▲ to toggle to YES and press the F button again. The display will show a value based on the previous scaling. Press F and the display will show the message SCLE CAL2 followed by a value. Use the ▲ or ▼ pushbutton to set this to the value required for this first position then press F . The display should show CAL End indicating that the first calibration point has been accepted.

5.33 Input scale value

Section:	I NPt
Display:	I NPt
Range:	0 to Maximum display value
Default Value:	1
Default Access Level	CAL
Function number	49E0

When the CAL OPEr function is set to SCL the I NPt factor and the SCL factor are used to scale the display to read in engineering units e.g. metres. The SCL value must always be a whole number, see CAL OPEr function for formula used.

5.34 Scale value

Section:	I NPt
Display:	SCL
Range:	Any display value
Default Value:	0.0 1
Default Access Level	CAL
Function number	49E 1

When the CAL OPEr function is set to F.SCLE the I NPt factor and the SCL factor are used to scale the display to read in engineering units e.g. metres. The SCL value must always be a whole number, see CAL OPEr function for formula used.

5.35 Timeout

Section:	I NPt
Display:	t.OUt
Range:	OFF or On
Default Value:	On
Default Access Level	CAL
Function number	49F0

This function allows a display timeout visual and/or alarm warning that the input signal has failed. If set to On the display will flash the message t.out if the input signal fails. If the AL 1 to AL 8 tout function is also set to On the selected alarm or alarms will also activate along with any relays allocated to these alarms when the input signal fails.

5.36 Slave display

Section:	I NPt
Display:	SLAU
Range:	OFF or On
Default Value:	OFF
Default Access Level	CAL
Function number	49EF

When set to On the display will act as a slave display and may be connected to a master PM5-SSI or LD5-SSI display. When used as a slave display the clock output from the unit is turned off and the clock and data line from the master are connected to the slave.

5.37 Dual read

Section:	INPt
Display:	duAL rEAd
Range:	OFF or On
Default Value:	OFF
Default Access Level	CAL
Function number	49EE

Some SSI encoders have the ability to double send the position value. If this duAL rEAd function is set to On the display will read the value twice and if there is a miss match in the readings it will trigger an error message of dAtA Err on the display.

5.38 Uncalibrate

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

When the CAL OPEr is set to the U.SCL mode the display scaling can be cleared (i.e. reset) at this function. To clear the scaling at this function press the F button then use the ▲ button to toggle to YES. The display should show the message U.CAL End and the scaling the scaling will revert to revert to a 1:1 equivalent i.e. the raw output value from the encoder.

5.39 First calibration point

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

Allows entry of a first calibration scaling point when the CAL OPEr function is set to U.SCL. Refer to the CAL OPEr function for details of this method of scaling.

5.40 Second calibration point

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

Allows entry of a second calibration scaling point when the CAL OPEr function is set to U.SCL. Refer to the CAL OPEr function for details of this method of scaling.

5.41 Set zero

Section:	INPt
Display:	SEt ZERO
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	0640

Only seen if the INPt CAL OPEr function is set to U.CAL. This function allows an alternative method of zeroing the display. To zero the display press F then press ▲ to toggle to YES and press the F button again, the display will now show the current display value (the value which will become zero if the process is completed). Press F to continue, the display should show the message ZERO End to indicate that the zero operation has been completed.

5.42 Display scale offset

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

Only seen if the INPt CAL OPEr function is set to U.CAL. This function allows an offset scaling to be undertaken. For example if the display is reading a value of 5 low across the entire scale an offset scaling can be used to adjust the reading. To perform an offset scaling at the OFSt function press the F button then use the ▲ button to toggle to YES, the display will then show the current value. Press the F button again, the display value will flash and can be adjusted to show the new required value using the ▲ and ▼ pushbuttons. When the new required value is on the display press F again, the display should show the message OFSt End to indicate that the offset scaling is complete.

5.43 Clear zero

Section:	INPt
Display:	CLr ZERO
Range:	n/a
Default Value:	n/a
Default Access Level	CAL
Function number	49E8

When the INPt CAL OPEr function is set to F.SCL this clear zero function allows clearing of any zero operation undertaken e.g. display zero through the P button zero operation or a remote input zero. To clear the zero and reset to press F then press ▲ to toggle to YES and press the F button again. This function does not work if the INPt CAL OPEr function is set to U.CAL.

5.44 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.

5.45 Analog retransmission input channel

Section:	rO 1 to rO2
Display:	I nPt
Range:	Any available channel
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 if the instrument has more than one input channel. For example to select analog output 1 to follow input channel 3 set the rO 1 I nPt function to CH3. Alternatively when d.SEL is chosen (where available) 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.

5.46 Analog output PI control

Section:	rO 1 to rO2
Display:	P.Ct1
Range:	no or YES
Default Value:	no
Default Access Level	4
Function number	4600 to 4601

This function allows the analog output to be set to retransmission or PI control. To use the analog output as retransmission set the P.Ct1 function to no, the PI control functions will not be seen if the P.Ct1 function is set to no.

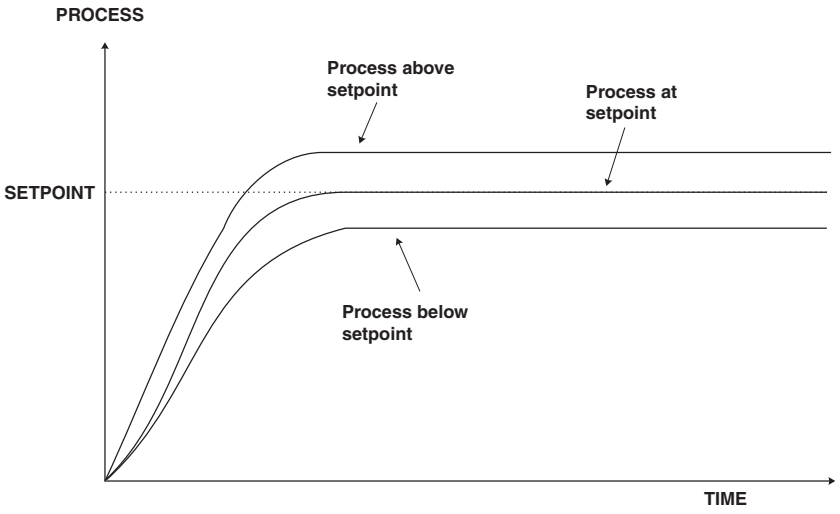
To use the analog output as a PI control output set the P.Ct1 function to YES, the PI control functions will be seen if the P.Ct1 function is set to YES and the retransmission functions will not be seen.

5.47 Analog output PI control setpoint

Section:	rO 1 to rO2
Display:	SEtP
Range:	Any display value
Default Value:	0
Default Access Level	4
Function number	46 10 to 46 11

This function allows selection of the PI control setpoint. The control setpoint is set to the value in displayed units

required for control of the process. The controller will attempt to vary the control output to keep the process variable at the setpoint.



5.48 Analog output PI control span

Section:	rO 1 to rO2
Display:	SPAn
Range:	Any display value
Default Value:	1000
Default Access Level	4
Function number	4618 to 4619

This function allows selection of the PI control span. The control span determines the points at which the control process cuts in and cuts out. For example a control setpoint of 100 with a control span of 40 with zero integral gain and a proportional gain of 1.000 will have its output fully on at 80 or below and fully off at 120 or above. Between the values of 80 and 120 the output will change to try to maintain the setpoint.

5.49 Analog output PI control proportional gain

Section:	rO 1 to rO2
Display:	P.9
Range:	Any display value
Default Value:	1.000
Default Access Level	4
Function number	4620 to 4621

Allows selection of the PI control proportional gain.

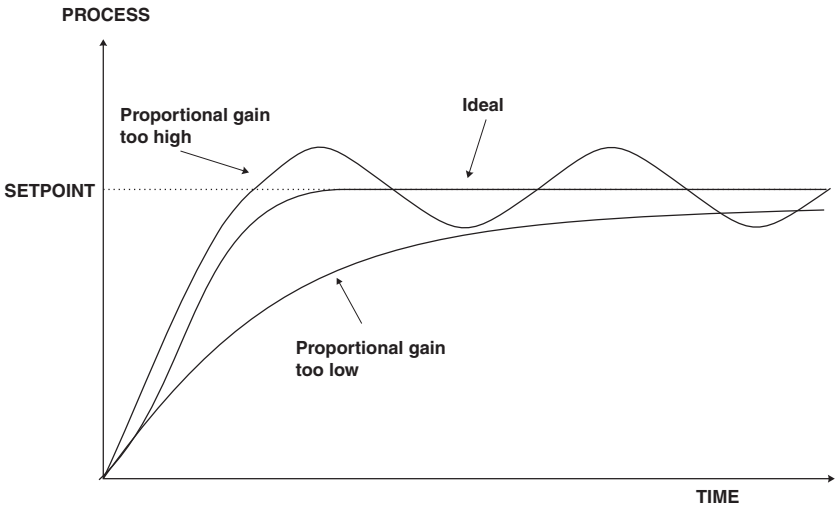
The proportional gain is the ratio between the change in measured input and change in control output. Too much proportional gain will result in instability.

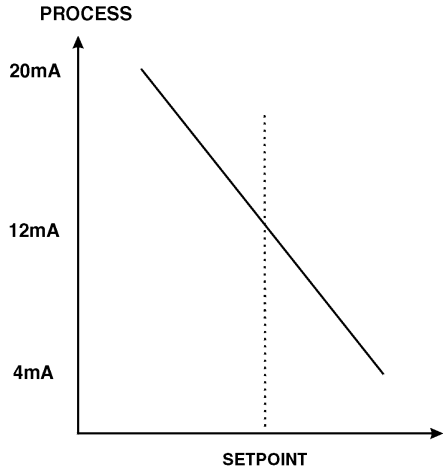
Example 1 - if the proportional gain is set to 1.000 and the measured input changes by 100% of the span set in SPAn then the output will change by 100%.

Example 2 - if the proportional gain is set to 2.000 and the measured input changes by 50% of the range set in SPAn then the output will change by 100%.

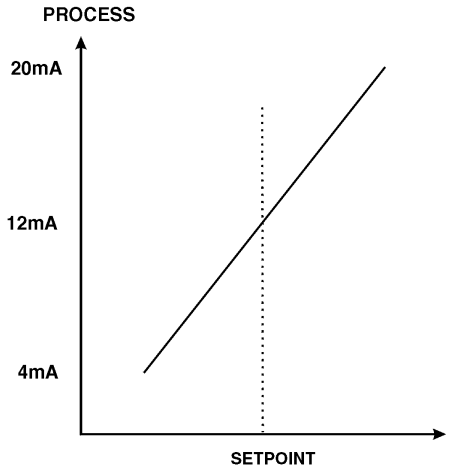
Example 3 - if the proportional gain is set to 2.000 and the measured input changes by 25% of the range set in SPAn then the output will change by 50%.

Setting a negative proportional gain will reverse the control output.





Positive P.9 value e.g. 1.000



Negative P.9 value e.g. -1.000

This table shows the effect of the output current of changing proportional gain and offset with the following settings: SPAn = 20.00, i.9 = 0.000			
SEtP	P.9	b.AS	**Effect on analog output (4-20mA used in this example)**
70.00	1.000	0.000	Reading of 50.00 or below - 20mA output Reading of 50.00 to 70.00 - mA output decreasing as reading approaches 90.00 Reading 70.00 or above - 4mA output
70.00	1.000	1.000	Reading of 70.00 or below - 20mA output Reading of 70.00 to 90.00 - mA output decreasing as reading approaches 9.00 Reading 90.00 or above - 4mA output
70.00	1.000	0.500	Reading of 60.00 or below - 20mA output Reading of 60.00 to 80.00 - mA output decreasing as reading approaches 80.00 with 12mA output at 70.00 Reading 80.00 or above - 4mA output
70.00	0.500	0.500	Reading 50.00 or below - 20mA output Reading 50.00 to 90.00 - mA output decreasing as reading approaches 90.00 with 12mA output at 70.00 Reading 90.00 or above - 4mA output
70.00	-1.000	0.500	Reading of 60.00 or below - 4mA output Reading of 60.00 to 80.00 - mA output increasing as reading approaches 80.00 with 12mA output at 70.00 Reading 80.00 or above - 20mA output

5.50 Analog output PI control integral gain

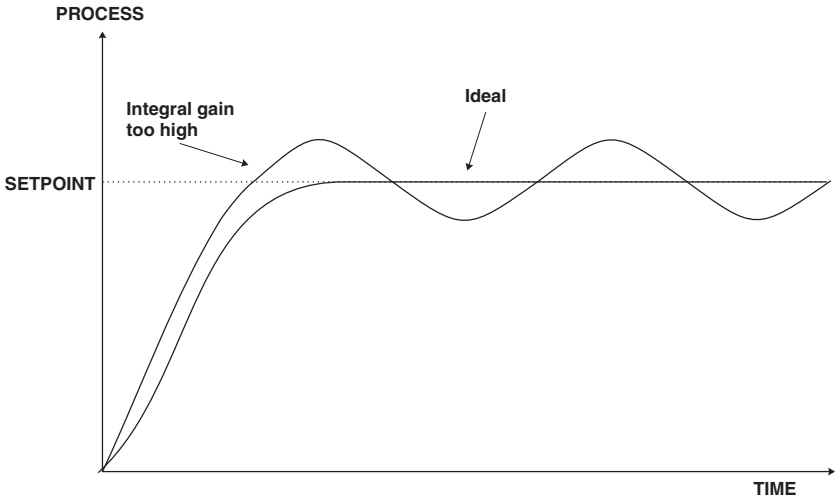
Section: rO1 to rO2
Display: i.9
Range: Any display value
Default Value: 0.000
Default Access Level 4
Function number 4628 to 4629

The integral control action will attempt to correct any offset which the proportional control action is unable to correct (e.g. errors due to a changing load). When the integral gain is correctly adjusted the control output is ramped up or down to maintain control by keeping the process variable at the same value as the control setpoint. An integral gain which is too large will cause a rapid response to any error but can also lead to overshooting and oscillation. An integral gain which is too small will slow the time taken to reach the setpoint. The optimum value chosen will depend on the lag time of the process and other control settings. Start with a low figure and increase until a satisfactory response time is reached. The integral gain figure has units of gain/minute. Setting a negative integral gain will reverse the integral control action. If introduction of an integral gain figure causes the error to increase i.e. the process value is moving further away from the setpoint then check the sign of the integral gain e.g. if it is negative change it to a positive value. Note that the sign of the integral gain value should be the same as the proportional gain value i.e. they should either both be positive or both be negative.

The integral control output can be found from:

$$Integral\ control\ output = \frac{Error \times I.G \times time(secs)}{60} + previous\ integral\ control\ output$$

Where *I.G* is the integral gain is set by the i.9 function.



5.51 Analog output PI control integral high limit

Section:	[redacted] to [redacted]
Display:	[redacted]
Range:	[redacted] to [redacted] %
Default Value:	[redacted]
Default Access Level	[redacted]
Function number	[redacted] to [redacted]

Allows selection of the PI control integral high limit.

The high limit sets the maximum control output for the integral term i.e. puts a high level limit to the integral control current or voltage output. The limit is used to reduce available output swing and hence limit the effect of integral control output build up which can cause overshoot and instability in the system. If the process value is not close to the setpoint value then the integral control will see a large error. Since integral control output increases with time, the longer an error is seen the more the integral control output will build up. Unless the output is limited then once the process reaches the setpoint the integral control output can be very large (e.g. 100%) causing the process value to overshoot the control setpoint. A setting which is too high will result in allowing the integral control output to cause overshooting. A setting which is too low will result in the integral control output being limited to an extent which means that the setpoint cannot be reached. Start with a low figure e.g. 10.0 and increase the value until a satisfactory response is reached. Maximum setting is 100.0 (100%). Having separate high and low limits is particularly useful if the process response is very one directional. For example in temperature control a heater may be used to give a fast response in heating a tank of liquid when the temperature falls below the setpoint. The heat of the liquid rises quickly but any overshoot will mean that the temperature is too high. The heater will be switched off but the tank of liquid will take a long time to cool to the setpoint level.

5.52 Analog output PI control integral low limit

Section:	[redacted] to [redacted]
Display:	[redacted]
Range:	[redacted] to [redacted] %
Default Value:	[redacted]
Default Access Level	[redacted]
Function number	[redacted] to [redacted]

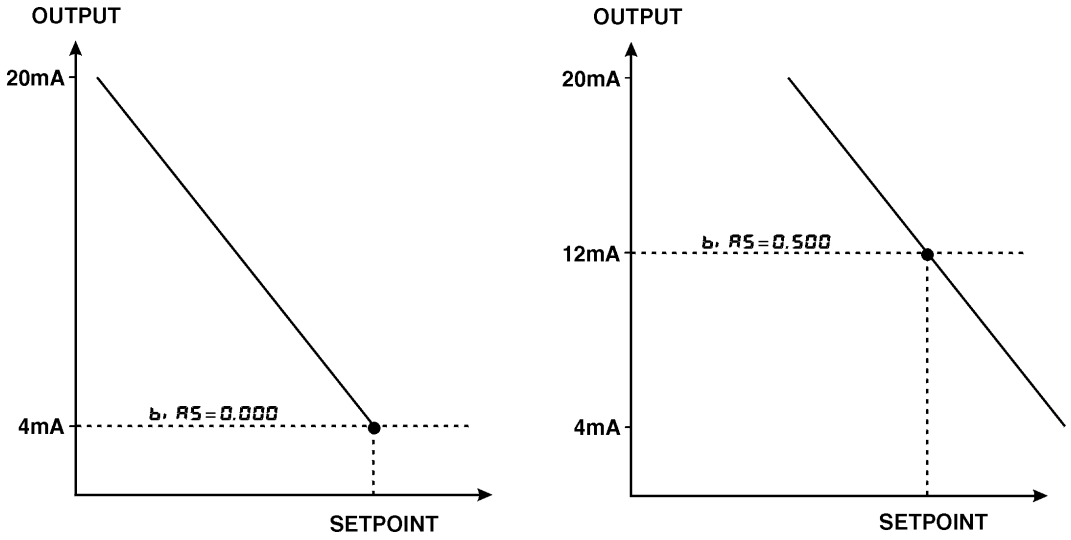
Allows selection of the PI control integral low limit.

This function sets the minimum control output for the integral term value and works in the same manner as I.H described above except that the setting controls the low swing.

5.53 Analog output PI control bias

Section:	rO 1 to rO2
Display:	b, AS
Range:	0 to 100.0 %
Default Value:	50.0
Default Access Level	4
Function number	4648 to 4649

Allows selection of the PI control bias. The bias is initially used to set the output value when operating the instrument as a proportional only controller. The bias determines what % of the proportional control output will be given when the process value reaches the setpoint value. If set to 0.000 then there will be zero output (e.g. 4mA for a 4-20mA output) when the process value reaches the setpoint value. If set to 0.500 then there will be a 50% output (e.g. 12mA for a 4-20mA output) when the process reaches the setpoint value. If set to 1.000 then there will be a 100% output (e.g. 20mA for a 4-20mA output) when the process reaches the setpoint value. If using proportional only control then when stable control is established there may be a difference between the process and the setpoint values. By altering the bias value the difference may be minimised.



5.54 Analog retransmission low display value

Section:	rO 1 to rO2
Display:	Lo
Range:	Any display value
Default Value:	0
Default Access Level	4
Function number	4 120 to 4 121

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 rO 1 Lo to 0.

5.55 Analog retransmission high display value

Section:	rO 1 to rO2
Display:	Hi 9h
Range:	Any display value
Default Value:	1000
Default Access Level	4
Function number	4 130 to 4 131

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 rO 1 Lo to 200.

5.56 Automatic display brightness

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

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

5.57 Display brightness

Section:	di SP
Display:	br9t
Range:	1 to 64
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).

5.58 Dimmed display brightness

Section:	di SP
Display:	dui 1
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

dul l the remote input can be used to switch between the display brightness level set by the **br9t** function and the dimmed display brightness set by the **dul l** 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.

5.59 Auto display brightness high level

Section:	**dl SP**
Display:	**Auto Hl 9h**
Range:	**16** to **64**
Default Value:	**63**
Default Access Level	**2**
Function number	**22EA**

Automatic brightness high level - seen only when **br9t 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.

5.60 Auto display brightness low level

Section:	**dl SP**
Display:	**Auto Lo**
Range:	**1** to **64**
Default Value:	**7**
Default Access Level	**2**
Function number	**22Eb**

Automatic brightness low level - seen only when **br9t 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.

5.61 Serial output operation mode

Section:	**SEr l**
Display:	**OPEr**
Range:	**nONE**, **Cont**, **Pol l** , **A.buS**, **dl SP**, **n.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.
- **dISP** - sends image data from the display without conversion to ASCII. This mode should only be used when the serial output is connected to another display from the same manufacturer.
- **M.bus** output - Modbus RTU (RS232/RS485) 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.

5.62 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.

5.63 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.

5.64 Serial address

Section:	SEr1
Display:	Uni t 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.

5.65 Front P button operation mode

Section:	F.1 nP
Display:	P.but
Range:	nONE, P.Hi , P.Lo, Hi .Lo, AL.Ac
Default Value:	nONE
Default Access Level	4
Function number	4720

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

5.66 Remote input 1 operation mode

Section:	F.1 nP
Display:	F.1 n. 1
Range:	nONE, P.Hi d, d.Hi d, P.Hi , P.Lo, Hi .Lo, AL.Ac, ACCS, dui 1
Default Value:	nONE
Default Access Level	4
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.Hoi 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.Hoi 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 **diSP dull** level. This is generally used to reduce current consumption in battery powered applications or for switching between day and night brightness levels.
- **2ERO** - zero the display. This mode allows the remote input to be used as a reset to zero input for the total seen in the **tOtL** and **both** modes.
- **g.rSt** - grand total reset. This mode allows the remote input to be used as a reset input for the grand total seen in the **tOtL** and **both** modes.
- **StoP** - totaliser inhibit - the total display value will be held and any input pulses ignored whilst the remote input is short circuited. Not applicable to rate display.

5.67 Remote input 2 operation mode

Section:	**rI nP**
Display:	**rI n.2**
Range:	**nonE**, **P.Hi d**, **d.Hi d**, **P.Hi** , **P.Lo**, **Hi .Lo**, **AL.Ac**, **ACCS**, **dull**
Default Value:	**nonE**
Default Access Level	**4**
Function number	**4722**

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

5.68 Remote input 3 operation mode

Section:	rI nP
Display:	rI n.3
Range:	nonE, P.HI d, d.HI d, P.HI , P.Lo, HI .Lo, AL.Ac, ACCS, dUAL
Default Value:	nonE
Default Access Level	4
Function number	4723

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

5.69 Remote input 4 operation mode

Section:	rI nP
Display:	rI n.4
Range:	nonE, P.HI d, d.HI d, P.HI , P.Lo, HI .Lo, AL.Ac, ACCS, dUAL
Default Value:	nonE
Default Access Level	4
Function number	4724

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

5.70 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.

5.71 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.

5.72 PIN code 1

Section:	ACCES
Display:	USr. 1 P, 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 P, n. 1AccS). If a PIN is not required leave the setting at 0. If a PIN other than 0 is chosen then this PIN must be entered to gain access to the the selected level.

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

5.73 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.

5.74 PIN code 2

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

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

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

5.75 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	S.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.

5.76 User assignable access 1 function number

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

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

lowest access level.

5.77 User assignable access 1 level value

Section:	ACCES
Display:	Fn.1 LEVL
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.

5.78 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.

5.79 User assignable access 2 level value

Section:	ACCES
Display:	Fn.2 LEVL
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.

5.80 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	OC 12

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

5.81 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.

5.82 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.

5.83 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.

5.84 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.

5.85 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.

5.86 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.

5.87 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.

5.88 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.

5.89 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	OC46

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.

5.90 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	OC 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.

5.91 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	OC47

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

6 Technical specifications

Display:	6 digit 38mm red LED or 5 digit 45mm red LED or 4 digit 57mm or 58mm red LED or 4 or 6 digit 100mm red LED or 4 digit 200mm red LED type Count/Rate High contrast versions 38mm 6 digit, 58mm 4 digit, 100mm 4 or 6 digit and 200mm 4 digit available in red, green, white or amber led.
Input :	Synchronous Serial Interface (SSI) selectable as binary or Gray code (up to 32 bits)
SSI Clock frequency:	140kHz
Ambient Temperature:	-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
DC output supply:	5 or 24VDC @ 50mA max.
Output (standard):	4 x relays, 1 x Form C, 3 x Form A rated 5A resistive. Programmable N.O. or N.C.

Optional outputs - some options below are available in combination

Extra relays:	4 extra relays, form A
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) Web page and 8MB data logger memory with Ethernet option Ethernet, can be used with Modbus TCP USB port, type B

Physical characteristics - see chapter 2

7 Guarantee and service

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

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

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

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

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

This product is designed and manufactured in Australia.