LD-SS Large Digit

SSI (Synchronous Serial Interface)

Operation & Instruction Manual

AMALGAMATED INSTRUMENT CO PTY LTD

ACN: 001 589 439

Unit 5, 28 Leighton Place Hornsby
NSW 2077 AUSTRALIA

Telephone: +61 2 9476 2244
Facsimile: +61 2 9476 2902

e-mail: sales@aicpl.com.au
Internet: www.aicpl.com.au

Table of Contents

1 Introduction

This manual contains information for the installation and operation of the LD-SS monitor. The input to this instrument is a Synchronous Serial Interface (SSI) up to 31 bits binary or Gray code selectable. The SSI data transmission is initiated by clock pulses generated by the LD-SS monitor. 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.

There are 3 alternative methods which can be used to scale the display:

1. The first method uses the INPt and SCLE functions to enter input value and then indicate the display scale for that input.

2. The second method (U.SCL) allows a single point live input to be allocated a value.

3. The third method (USEr SCLE) allows two live input points (CAL 1 & CAL2) to be entered, this method also allows for an offset adjustment to the scaling.

Unless otherwise specified at the time of order, your LD-SS has been factory set to a standard configuration. Like all other LD series instruments the configuration and setup is easily changed by the user.

The LD series instruments are designed for high reliability in industrial applications. The high brightness LED display provides good visibility, even in areas with high ambient light levels.

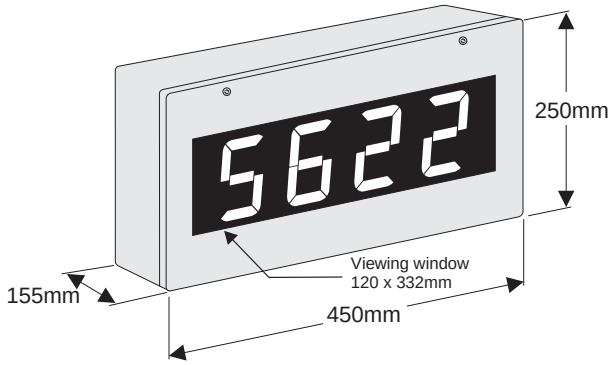
1 .1 Displaying and changing functions

The LD-SS setup functions are configured through a push button sequence. Two levels of access are provided for setting up and calibrating:- FUNC (function) mode (simple push button sequence) allows access to commonly set up functions such as alarm setpoints. CAL mode (power up sequence plus push button sequence) allows access to all functions including calibration parameters.

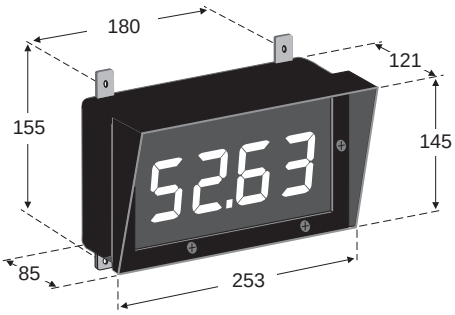
The push buttons located at the top edge of the circuit board or at the front of the display on some display types are used to alter settings. Once you have entered either CAL or FUNC mode you step through the functions by pressing and releasing the F push button until the required function is reached.

2 Mechanical installation

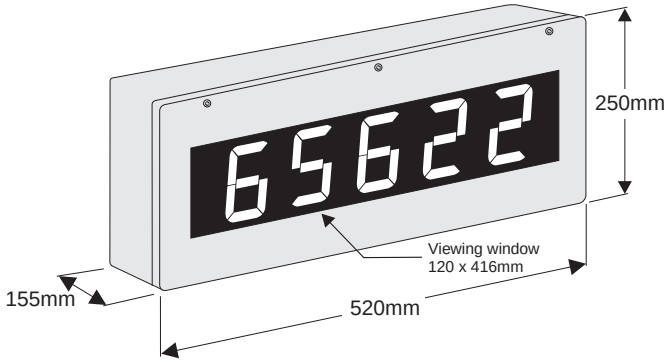
100mm 4 digit LED or Electromagnetic



38mm 6 digit LED, 45mm 5 digit & 57mm 4 digit LED

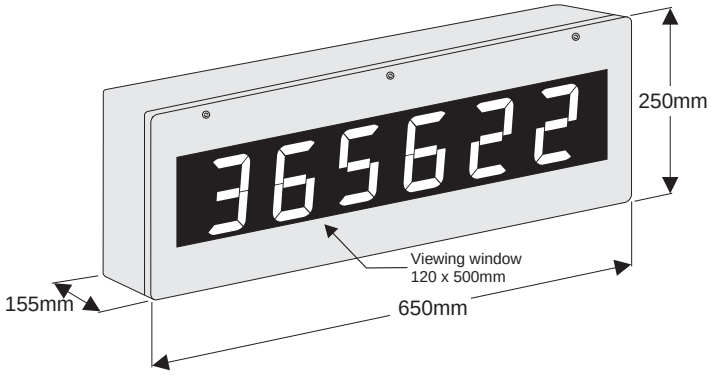


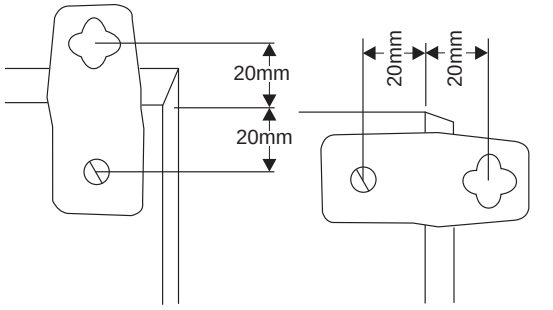
100mm 5 digit Electromagnetic only



Four mounting kit brackets are supplied for use with 100 & 200mm display models. Diagrams below illustrate vertical and horizontal installation. If mounting without the brackets is preferred then the 9mm dia. case holes provided for the brackets can be used as alternative mounting holes. If the supplied brackets are not used in mounting these holes should be sealed against dust and water.

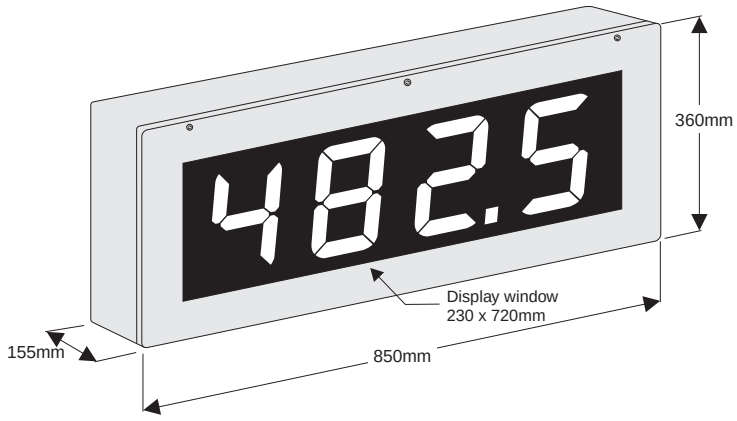
100mm 6 digit LED or Electromagnetic





Vertical Orientation Horizontal Orientation

200mm 4 digit LED

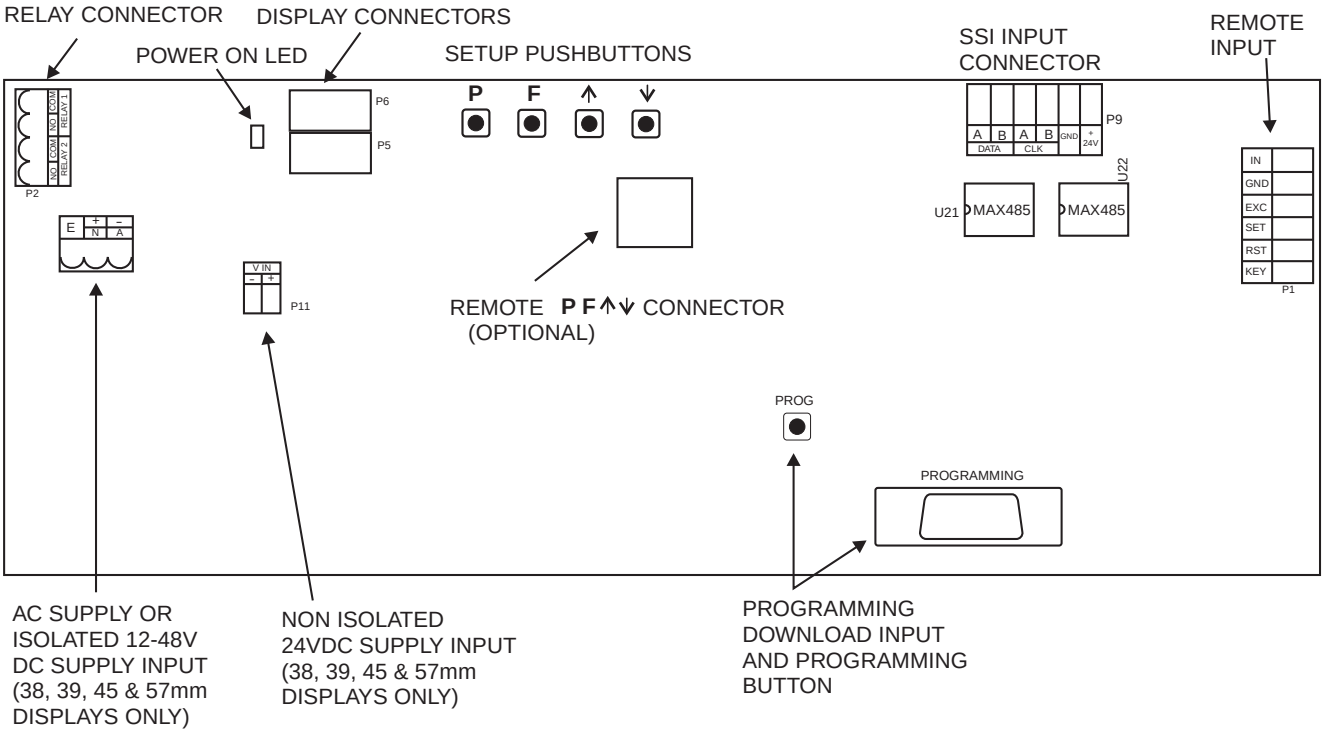


3 Electrical Installation

The LD-SS instrument is designed for continuous operation and no 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.

The terminal blocks are plug in screw type for ease of installation and allow for wires of up to 1.5mm^2 (2.5mm^2 for relay, AC or isolated DC supply connections) to be fitted. Connect the wires to the appropriate terminals as indicated below. Refer to other details provided in this manual to confirm proper selection of voltage, polarity and input type before applying power to the instrument. When power is applied the instrument will cycle through a display sequence, indicating the software version and other status information.

3 .1 Main circuit board layout



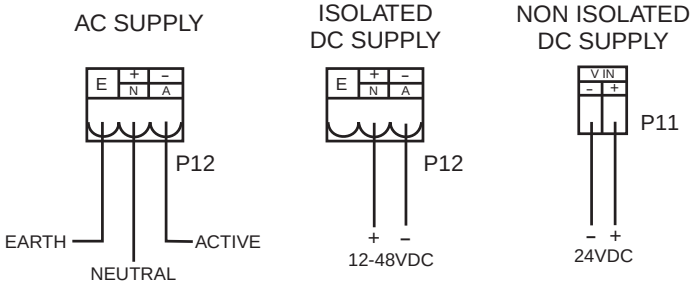
3 .2 Power supply connections

3 .3 Electromagnetic display power supplies

AC power connections use a plug in connector with screw terminals at P12 (2.5mm^2 max. wire diameter). Isolated DC supplies (12-48VDC) use the same terminals.

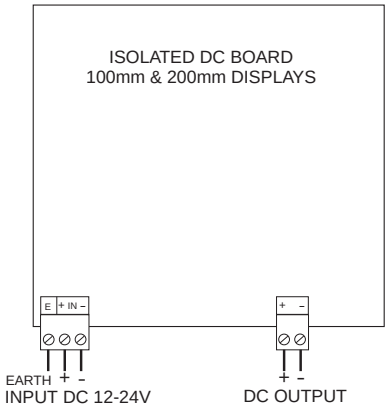
Non isolated DC supplies (24VDC only) may be connected directly to the main circuit board power supply connector via the plug in connector terminals at P11 (1.5mm^2 max wire diameter).

38mm LED, 45mm LED, 57mm LED or 39mm ELECTROMAGNETIC DISPLAYS ONLY

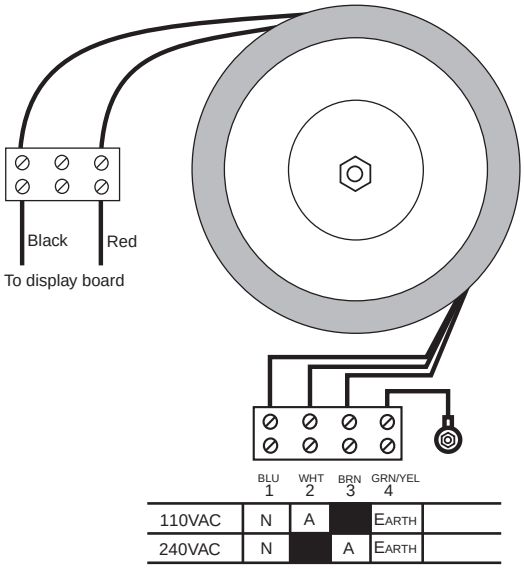


3 .4 100mm & 200mm LED & 100mm electromagnetic display isolated DC power supplies

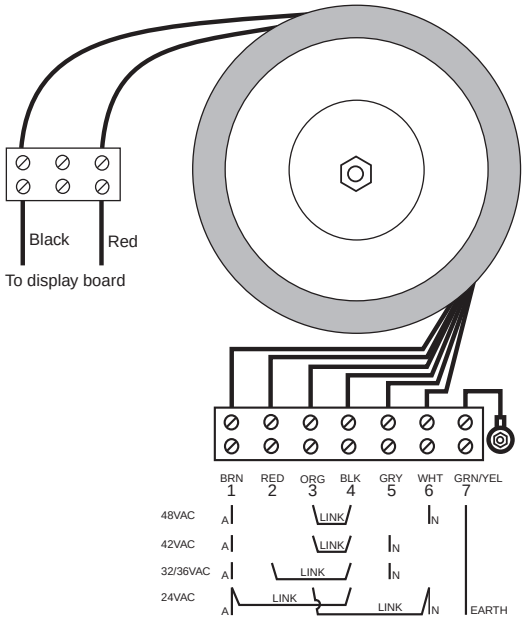
Isolated DC supplies (12 to 24VDC) connect to the isolated supply pcb on the base board. AC supplies connect to the transformer primary on the base board. The base board is located under the input circuit board.



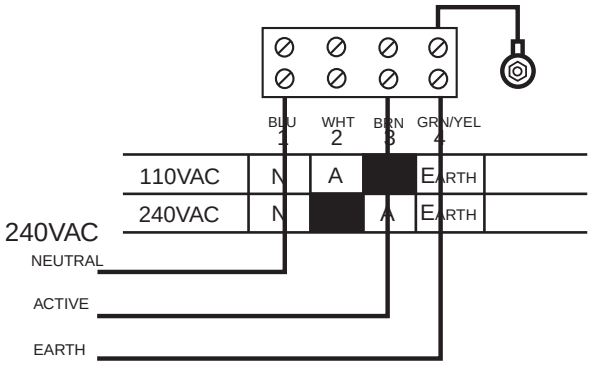
240 & 110VAC supplies.
For 100mm/200mm LED or 100mm electromagnetic display types only.

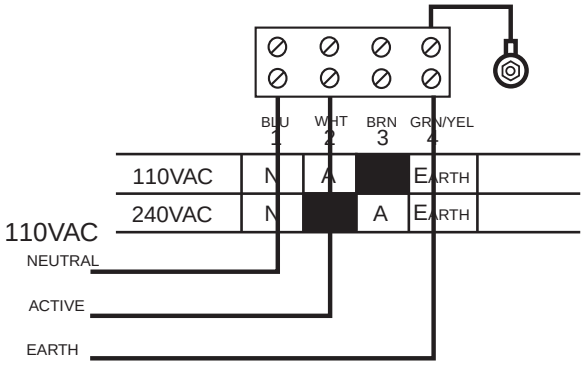


Low voltage AC supplies.
For 100mm/200mm LED or 100mm electromagnetic display types only.



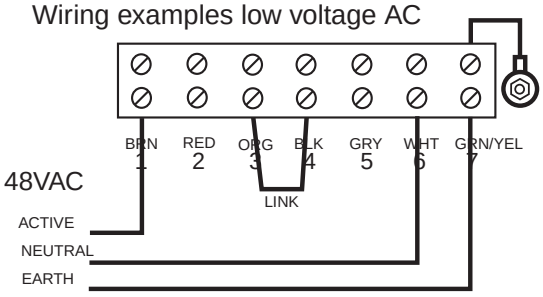
Wiring examples 240VAC & 110VAC

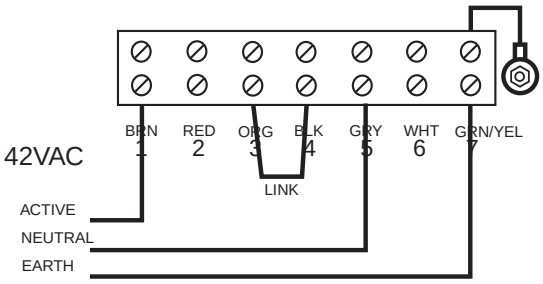


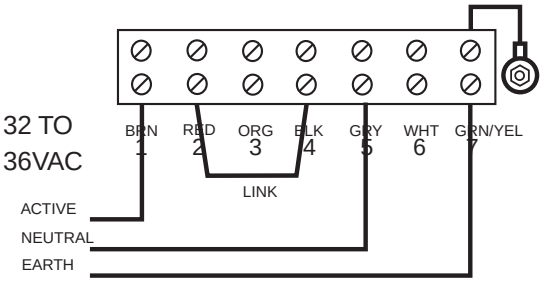


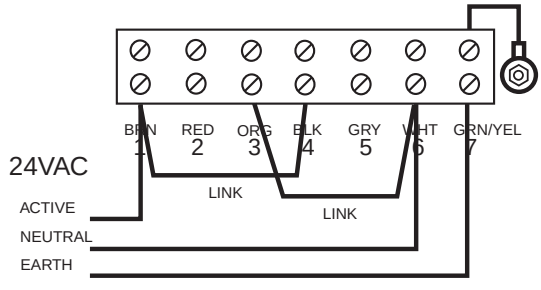
Important note: the 240V & 110V supplies use the same transformer, low voltage instruments use a different transformer. Do not use a low voltage transformer for 240V or 110V or vice versa.

Wiring examples low voltage AC



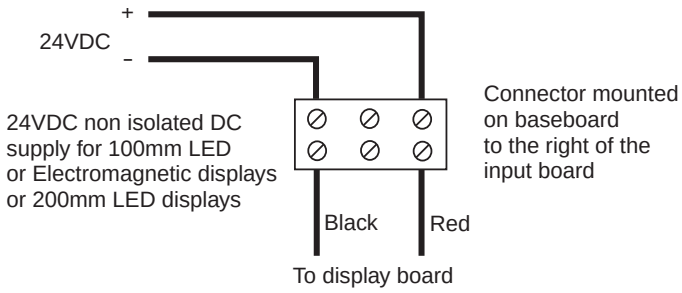






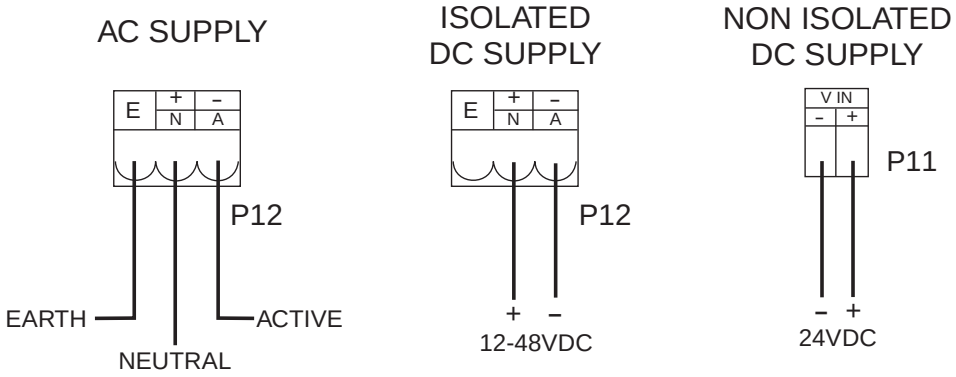
3 .5 100mm, 200mm LED & 100mm electromagnetic non isolated DC power supplies

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



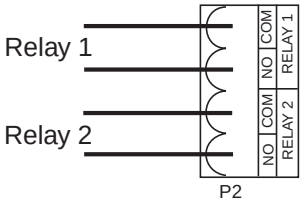
3 .6 38mm, 45mm & 57mm LED power supplies

38mm, 45mm, & 57mm LED DISPLAY POWER CONNECTIONS

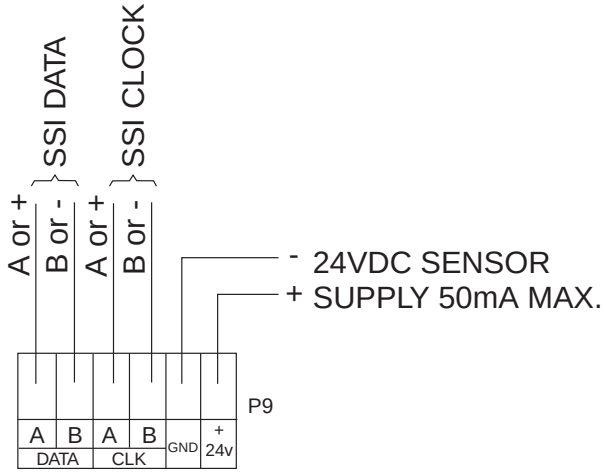


3 .7 Relay connections

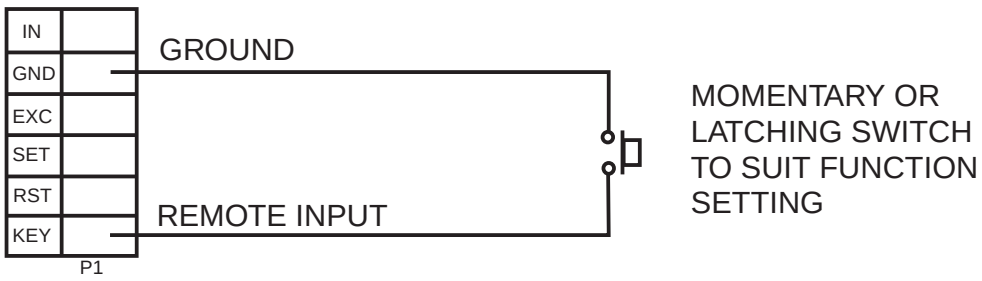
The LD is supplied with two alarm relays as standard with connections on terminals P2. The relays are single pole, single throw types and are rated at 5A, 240VAC into a resistive load. The relay contact is voltage free and may be programmed for normally open or normally closed operation.



3 .8 Input connections & sensor supply



3 .9 Remote input connection

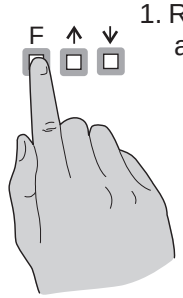


4 Explanation of Functions - SSI Input

The LD setup functions are configured through a push button sequence. Two levels of access are provided for setting up and calibrating:- FUNC (function) mode (simple push button sequence) allows access to commonly set up functions such as alarm setpoints. CAL mode (power up sequence plus push button sequence) allows access to all functions including calibration parameters.

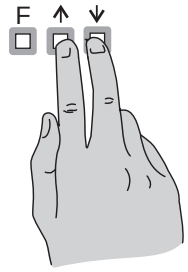
The push buttons located at the top edge of the circuit board are used to alter settings. Once you have entered either CAL or FUNC mode you step through the functions by pressing and releasing the F push button until the required function is reached. See flow chart examples on the following page.

Entering CAL Mode



1. Remove power from the instrument and wait 5 seconds . Hold in the F button and reapply power. The display will indicate CAL as part of the "wake up messages" when the CAL message is seen you can release the button.
Move to step 2 below.

2. When the "wake up" messages have finished and the display has settled down to its normal reading press, then release the F button.
Move to step 3 below.



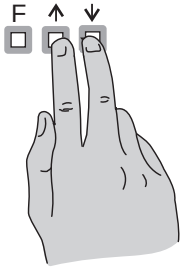
3. Within 2 seconds of releasing the F button press, then release the ▲ and ▼ buttons together. The display will now indicate FUNC followed by the first function.

Notes: If step 1 above has been completed then the instrument will remain in this CAL mode state until power is removed. i.e. there is no need to repeat step 1 when accessing function unless power has been removed. The instrument should show all 8's on power up e.g. 8.8.8.8. if the instrument does not reset then these numbers will not be seen. Switch off the instrument and allow a longer time delay before powering up again.

Entering FUNC Mode

No special power up procedure is required to enter FUNC mode.

1. When the "wake up" messages have finished and the display has settled down to its normal reading press, then release the F button.
Move to step 2 below.

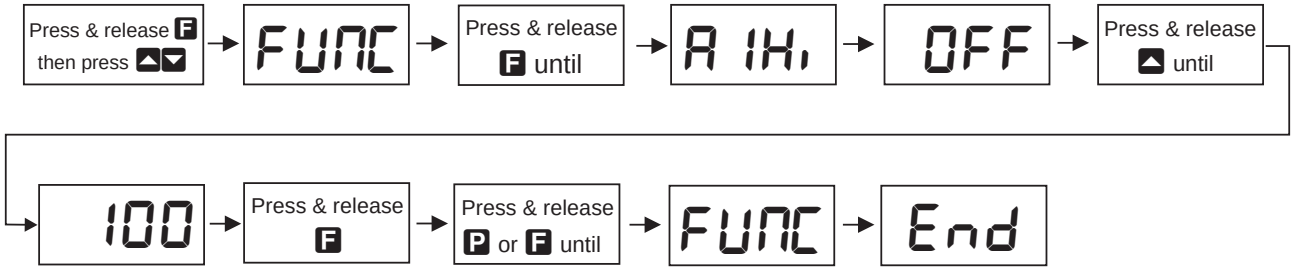


2. Within 2 seconds of releasing the F button press, then release the ▲ and ▼ buttons together. The display will now indicate FUNC followed by the first function.

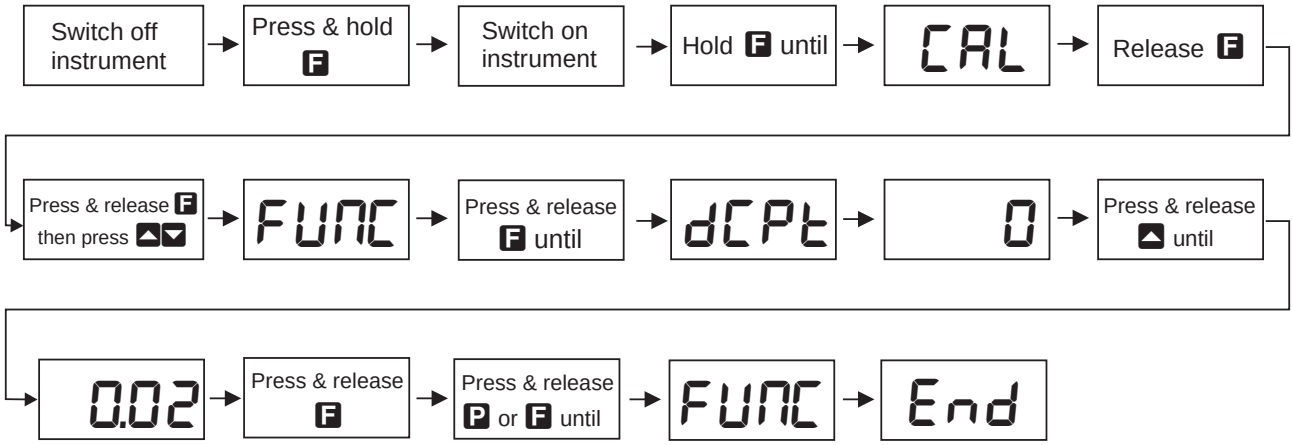
Alternative CAL Mode Entry

This alternative method allows CAL mode entry without the need to remove power:
1. Enter FUNC mode using the 2 steps above
2. When the first function appears press and hold the P button until you see the message FUNC followed by CAL (the P button will have to be held pressed for approximately 2 seconds)
3. You should now return to the function you were in but have full access to CAL mode functions
Note: when you exit back to live reading the display will remain in CAL mode for approximately 4 minutes, after this time you will need to repeat this process to enter CAL mode.

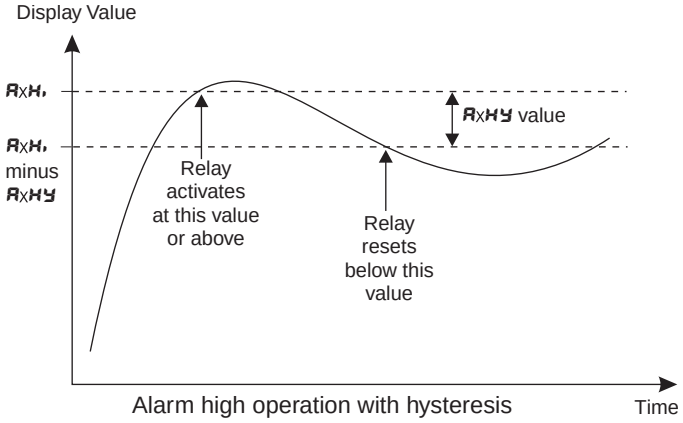
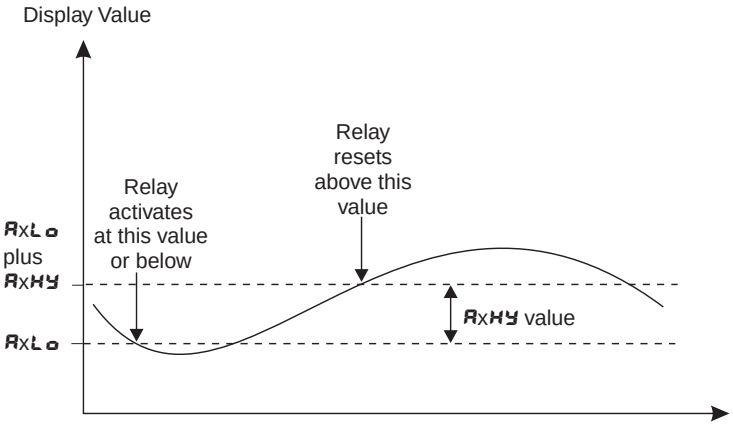
Example: Entering FUNC mode to change alarm 1 high function A 1H, from OFF to 100



Example: Entering CAL mode to change decimal point dCPt function from 0 to 0.02



Function	Range	**Description**
A 1Lo	Value or OFF	Alarm relay 1 low setpoint - Displays and sets the alarm 1 low setpoint value. The low alarm setpoint may be disabled by pressing the ▲ and ▼ pushbuttons simultaneously. When the alarm is disabled the display will indicate OFF. Relay 1 will activate when the displayed value is lower than the A 1Lo setpoint value.
A 1H,	Value or OFF	Alarm relay 1 high setpoint - Displays and sets the alarm 1 high setpoint value. The high alarm setpoint may be disabled by pressing the ▲ and ▼ pushbuttons simultaneously. When the alarm is disabled the display will indicate OFF. Relay 1 will activate when the displayed value is higher than the A 1H, setpoint value.
A2Lo	Value or OFF	Alarm relay 2 low setpoint - Displays and sets the alarm 2 low setpoint value. The low alarm setpoint may be disabled by pressing the ▲ and ▼ pushbuttons simultaneously. When the alarm is disabled the display will indicate OFF. Relay 2 will activate when the displayed value is lower than the A2Lo setpoint value.
A2H,	Value or OFF	Alarm relay 2 high setpoint - Displays and sets the alarm 2 high setpoint value. The high alarm setpoint may be disabled by pressing the ▲ and ▼ pushbuttons simultaneously. When the alarm is disabled the display will indicate OFF. Relay 2 will activate when the displayed value is higher than the A2H, setpoint value.

A 1HY	0 to 9999	Alarm relay 1 hysteresis [deadband]) - Displays and sets the alarm hysteresis limit and is common for both high and low setpoint values. The hysteresis value may be used to prevent too frequent operation of the setpoint relay when the measured value stays close to the setpoint. Without a hysteresis setting (AxHY set to zero) the alarm will activate when the display value goes above the alarm setpoint (for high alarm) and will reset when the display value falls below the setpoint, this can result in repeated on/off switching of the relay at around the setpoint value. The hysteresis setting operates as follows: In the high alarm mode, once the alarm is activated the input must fall below the setpoint value minus the hysteresis value to reset the alarm. e.g. if A 1H, is set to 50.0 and A 1HY is set to 3.0 then the setpoint output relay will activate once the display value goes above 50.0 and will reset when the display value goes below 47.0 (50.0 minus 3.0).  Alarm high operation with hysteresis In the low alarm mode, once the alarm is activated the input must rise above the setpoint value plus the hysteresis value to reset the alarm. e.g. if A 1Lo is set to 20.0 and A 1HY is set to 10.0 then the alarm output relay will activate when the display value falls below 20.0 and will reset when the display value goes above 30.0 (20.0 plus 10.0).  Alarm low operation with hysteresis The hysteresis units are expressed in displayed engineering units.
A2HY	0 to 9999	Alarm relay 2 hysteresis [deadband]) - Displays and sets the alarm 2 hysteresis limit (see A 1HY for further description).
A 1tt	0 to 60 seconds	Alarm relay1 trip time - Displays and sets the alarm 1 trip time and is common for both alarm 1 high and low setpoint values. The trip time is the delay before the alarm will trip. The alarm condition must be present continuously for the trip time period before the alarm will trip. This function is useful for preventing an alarm trip due to short non critical deviations from setpoint
A2tt	0 to 60 seconds	Alarm relay 2 trip time - Displays and sets the alarm 2 trip time (other details as per A 1tt).
A 1rt	0 to 60 seconds	Alarm relay 1 reset time - Displays and sets the alarm 1 relay reset time. With the alarm condition is removed the alarm relay will stay in its alarm condition for the time selected as the reset time.

A2rt	0 to 60 seconds	Alarm relay 2 reset time - Displays and sets the alarm 2 relay reset time. With the alarm condition is removed the alarm relay will stay in its alarm condition for the time selected as the reset time. Reset time is selectable over 0 to 60 seconds.
A 1n.o or A 1n.c	A 1n.o or A 1n.c	Alarm relay 1 normally open or normally closed - Displays and sets the alarm relay 1 action to normally open (de-energised) or normally closed (energised), when no alarm condition is present.
A2n.o or A2n.c	A2n.o or A2n.c	Alarm relay 2 normally open or normally closed - Displays and sets the alarm relay 2 action to normally open (de-energised) or normally closed (energised), when no alarm condition is present.
A2.SP or A2.t 1	A2.SP or A2.t 1	Alarm relay 2 operation independent setpoint or trailing - Alarm relay 2 may be programmed to operate with an independent setpoint setting or may be linked (or trailing) to operate at a fixed difference to relay 1 setpoint. Alarm 1 (A1) is always independent. Select A2.SP for an independent setting or A2t1 for a trailing setpoint. For trailing set points, the setpoint value is entered as the difference from the alarm 1 setpoint. If the trailing setpoint is to operate ahead of alarm 1 then the value is entered as a positive number and if operating behind alarm 1 setpoint then the value is entered as a negative number. For example, with Alarm 2 set to trail alarm 1, if A 1H, is set to 1000 and A2H, is set to 50 then Alarm 1 will trip at 1000 and alarm 2 will trip at 1050 (i.e. 1000 + 50). If Alarm 2 had been set at -50 then alarm 2 would trip at 950 (i.e. 1000 - 50). For trailing operation both relays must be set to the same mode i.e. either both set for low (A 1Lo & A2Lo) or both set to high (A 1H, & A2H,).
brgt	1 to 63	Manual display brightness - not seen if brgt AUt0 is set to on. Displays and sets the digital manually set display brightness. The display brightness is selectable from 1 to 63, where 1 = lowest intensity and 63 = highest intensity. This function is useful for reducing glare in low light environments.
dULL	0 to 63	Remote input controlled display brightness (not applicable to electromagnetic displays) - this function will not be seen unless the r.I nP function is set to dULL and brgt AUto is OFF. Displays and sets the level for remote input brightness switching, see r.I nP function. When the remote input function is set to dULL the remote input can be used to switch between the display brightness level set by the brgt function and the display brightness set by the dULL function. The display brightness 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.
The following functions can only be viewed when the instrument is powered up in CAL mode, see the first page of this chapter for details or if the ACCS function is set to ALL.		
brgt AUto	on or OFF	Automatic display brightness adjustment. The automatic brightness adjustment uses the internal light sensor to gauge the required brightness level for the environment. The high and low brightness limits are set at the brgt HI 9H and brgt Lo functions described below. If the optional light sensor is not fitted this function should be set to OFF.
brgt HI 9H	1 to 63	Automatic brightness high level - seen only when brgt AUto is set to on. The high brightness level sets the maximum brightness which the automatic brightness control can achieve with 63 being the highest intensity.
brgt Lo	1 to 63	Automatic brightness low level - seen only when brgt AUto is set to on. The low brightness level sets the minimum brightness which the automatic brightness control can achieve with 63 being the highest intensity.
drnd	1 to 5000 display units	Display rounding - Displays and sets the display rounding value. This value may be set from 1- 5000 displayed units (e.g. 0.00 1 to 5.000 if decimal point set to 3 places). 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 instrument display will increment in multiples of 10). The display rounding will also affect the alarm setpoint settings in that the alarms will also operate on multiples of the display rounding figure.

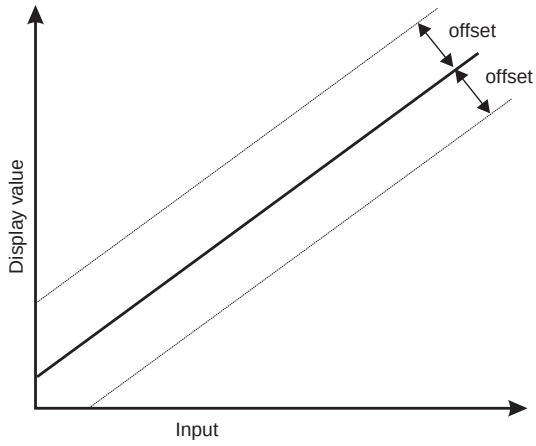
dCPt	0, 0.1, 0.02 etc	Period decimal point selection - Displays and sets the decimal point position on the display. **Note:** electromagnetic displays require the decimal point to be mechanically fixed in position, the decimal point functions are included for compatibility with incoming data which includes decimal points. For example selecting 0 will mean no decimal points (e.g. a display such as 25), 0.1 means 1 decimal point place (e.g. 25.4), 0.02 gives 2 decimal point places (e.g. 25.35) etc. The maximum number of decimal point places is one less than the number of digits on the display e.g. a 4 digit display can have 3 decimal points, a 6 digit display can have 5 decimal points etc.
FLtr	0 to 8	Digital filter - Displays and sets the digital filter value. Digital filtering is used for reducing susceptibility to short term interference such as electrical noise, interference is normally seen as unwanted display variations from the expected value. The digital filter range is selectable from 0 to 8, where 0 = none and 8 = most filtering. The higher the filter setting the slower the display update. A typical value for the digital filter would be 3.
P.but	nONE, Hi, Lo, Hi Lo, 2ERO or P.SEt	P button function - The P button may be set to operate some of the remote input functions. With the 2ERO function, to prevent accidental operation, the P button must be held pressed for 2-3 seconds before the display will zero. If both the remote input and P button function are operated simultaneously the P button will override the remote input. The functions below are as described in the r.inP function which follows. Functions available are: nONE, Hi, Lo, Hi Lo, 2ERO or P.SEt. Note: 2ERO and P.SEt will only operate if USCL or USEr SCLE is set to on.

r.1 nP	none, P.HLd d.HLd Hi , Lo, Hi Lo, 2Er0. SP.Ac . no.Ac . CAL.S, P.SEt or dULL	Remote input 1 functions. Terminals “GND” and “KEY” remote input 1 terminals. When these terminals are short circuited, via a pushbutton or keyswitch, the instrument will perform the selected remote input function. A message will flash to indicate which function has been selected when the remote input pins are short circuited. The remote input functions are as follows: **none** - no remote function required. **P.HLd** - peak hold. The display will show the peak value only whilst the remote input pins are short circuited. **d.HLd** - display hold. The display value will be held whilst the remote input pins are short circuited. **Hi** - peak memory. The peak value stored in memory will be displayed if the remote input pins 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 1 to 2 seconds or the power is removed from the instrument then the memory will be reset. **Lo** - valley memory. The minimum value stored in memory will be displayed. Otherwise operates in the same manner as the **Hi** function. **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. **PHi** or **PLo** will flash before each display to give an indication of display type. **2Er0** - zero (operates only if **USCL** or **USEr SCLE** function is set to **on**). The display can be made to zero at any time by short circuiting the remote input pins momentarily. The zero reading can be cleared via the **CLr 2Er0** function. **SP.AC** - setpoint access only. This blocks access to any functions except the alarm setpoint functions unless the remote input pins are short circuited or entry is made via **CAL** mode. This setting can also be used to allow "Easy Setpoint Access" - see page 10 for a description. **no.AC** - no access. This blocks access to all functions unless the remote input pins are short circuited or entry is made via **CAL** mode. **CAL.S** - calibration select. The remote input can be used to select between two sets of function settings for scaling. Two different sets of of certain functions can be entered in the LD-SS, one set with the remote input open circuit and another set with the remote input short circuit to ground. The remote input can then be used to switch between one set and the other. The functions **dCPt**, **I nPt**, **SCLE**, **SSI bi tS**, **SI 9n**, **SSI CodE** .**USCL** and **USEr SCLE** can be independently set and switched via the remote input all other functions are common to both sets. **Example:** With the remote input open circuit an input can be scaled (using **dCPt**, **I nPt** and **SCLE**) to display in metres with two decimal points. With the remote input shorted to ground the process can be repeated but this time with the display scaled to read in millimetres with no decimal points. Whenever the remote input terminals are open circuit the display will be in metres and whenever it is short circuited the display will be in millimetres. **P.SEt** - preset (operates only if **USCL** or **USEr SCLE** function is set to **on**). The remote input can be used to force the display to show the preset value no matter what the input value. The preset value is set at the **P.SEt** function. There is no "clear preset" function but the **CLr 2Er0** function can be used if it is required to set the display back to true zero. **dULL** - display brightness control. The remote input can be used to change the display brightness. When this mode is selected the display brightness can be switched, via the remote input, between the brightness level set at the **brgt** function and the brightness level set at the **dULL** function.

r.i n2 & r.i n3	Remote inputs 2 & 3, operate in the same manner as remote input 1. See r.i nP function above. Remote input 2 uses the RST input and remote input 3 uses the SET input.	
ACCS	OFF, EASY. nonE or ALL	Access mode - The access mode function ACCS has four possible settings. If set to OFF the mode function has no effect or alarm relay operation. If set to EASY the "easy alarm access" mode will be in operation, see page 8. If set to nonE there will be no access to any functions via FUnC mode, entry via CAL mode must be made to gain access to alarm functions. If set to ALL then all functions will be accessible via FUnC mode i.e. there is no need to enter CAL mode. This function provides an alternative to using the r1 nP function for easy access or no access mode thereby allowing the remote input to be programmed for an alternative use.
SPAC	A 1 or A 1-2	Setpoint access - Sets the access to the alarm relay set points. The following choices are available: A 1 - Allows setpoint access to alarm 1 only. A 1-2 - Allows access to alarms 1 and 2. For the setpoint access function to operate the remote input function (r.i nP) must be set to SP.AC.
i nPt	Display value	Input factor - The i nPt factor and the SCLE factor are used to scale the display to read in engineering units e.g. metres. The i nPt value must always be a whole number. The equation used is as follows: Display value = Value from encoder/sensor x SCLE / i nPt Note that the U.SCL and USEr SCLE functions must be set to OFF when the i nPt and SCLE method of display scaling is used.
SCLE	Display value	Scale factor - The SCLE factor is used together with the i nPt factor to calculate the value to be displayed from the binary input information. See above.
SSI bits	1 to 31	Number of input bits - Displays and selects the number of input bits which the LD-SS will interpret as incoming data. This can be set from 1 to 31 bits. For example with an i nPt of 1 and a SCLE of 1 and 12 bits selected the display will show from 0 to 4095, i.e. the 12 bit binary number range, before returning to 0. Note: If the SI gn function is set to on then the number maximum range displayed in this example would be between -2048 and 2047. The table which follows gives some examples of the effect of i nPt, SCLE, SSI bits and SI gn settings.
SI gn	on or OFF	Minus sign - Displays and sets the minus sign setting. When set to OFF all numbers displayed will be positive. When set to on the display can show positive and negative numbers. With the minus sign switched on the data is interpreted as a two's compliment signed number, masked to the number of bits set by the SSI bits function. See the SSI bits function above for the effect of the SI gn setting on the values displayed for a given number of input bits.
SSI CodE	bin or GrAY	Input code type - The input type can be set to bin for binary or to GrAY for gray code SSI input.

i nPt	SCLE	SSI bits	SI gn	Maximum display range
1	1	12	OFF	0 to 4095
1	1	12	on	-2048 to 2047
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
1000	1.00	20	OFF	0 to 1048.58
8192	1000	12	OFF	0 to 500

U.SCL	on or OFF	User scale - note: 5 or more display digits are required to view fully some of the messages seen in this function. The user scale function allows the front panel F button to be used to enter a scale value. To operate by this method the U.SCL function must be set to on. When set to on the operator simply moves the encoder to a know position and then holds the F button pressed for approximately 2 seconds. The message SCALE will then appear followed by the previous scale value. The value can now be adjusted via the ▲ or ▼ button. The F button is pressed to accept the change or the P button can be pressed to abort the scaling. If an error occurs such as trying to give a scaling value to a display reading which is zero then the message SCALE Error will be seen. Usually the remote input or P button can be used to zero the display or set the display to a preset value prior to the U.SCL operation. For example the measuring device is moved to its zero position and a ZERO operation carried out via the remote input or P button. The measuring device is then moved a know distance and the U.SCL operation is carried out via the F button. Note: the USER SCLE function must be set to OFF if the U.SCL method of display scaling is used.
dI SP rAtE	1, 2, 4, 8, 16 or 32	Display update rate - Displays and sets the display update rate in updates per second .e. if 4 is selected then the LD-SS display will update four times per second. The lowest satisfactory update rate should be chosen. If too high a rate is selected then the rapid update may cause an apparent flickering of the display. The update rate affects the display only and does not affect the sampling rate, alarm update etc. Choices are: 1, 2, 4, 8, 16 or 32.
CLr ZERO	n/a	Clear zero - Allows any zero operations performed via the P button to be cleared. Pressing the ▲ and ▼ buttons simultaneously will clear the zero offset caused by previous zero operations. The message CLrd will be displayed to indicate that the clearing operation has been completed.
CLr U.SCL	n/a	Clear user scale - The display scaling via the U.SCL function operation can be cleared at this function. Pressing the ▲ and ▼ buttons simultaneously will clear the user scaling and will cause the scaling to revert to a 1:1 equivalent i.e. equivalent to I nPt function set to 1 and SCLE function set to 1. Note that clearing the user scale will not clear any zero operations, the CLr ZERO function must be used to clear any offsets.
USEr SCLE	on or OFF	Two point live input scaling - Allows selection of two point live input calibration to be used when this function is set to on. The CAL 1, CAL2 and CAL OFSt functions below can then be used to scale the display. These functions will only be seen when the USEr SCLE function is set to on. Note: the U.SCL function must be set to OFF when the USEr SCLE function is used.
CAL 1	n/a	First live input scaling point - CAL 1 and CAL2 are used together to scale the instruments display, values for both must be set when using this scaling method. The CAL 1 function sets the first calibration point for live input calibration . When using this method a "live" signal input must be present at the input terminals. Note: CAL 1 and CAL2 can be set independently i.e. it is not necessary to perform a CAL2 operation directly after a CAL 1. The procedure for entering the first scaling point is: **a.** Ensure that an input signal of a know value from an encoder etc. is present at the input terminals, this will normally be at the low end of the range. **b.** At the CAL 1 function press ▲ and ▼ simultaneously, then release them. The display will indicate the live input value. Do not be concerned at this stage if the live input display value is not what is required. **c.** Press, then release the F button. The display will indicate SCL 1 followed by a value. Use the ▲ or ▼ button to change this value to the required display scale value at this input. Press the F button to accept changes, the display will show CAL End and will then move on to the next function.

CAL2	n/a	The second point scaling is performed in exactly the same manner as CAL2 except that SCL2 will be seen instead of SCL 1. It is essential that the live input is different in value to the CAL 1 input. The procedure for entering the second scaling point is: **a.** Ensure that an input signal of a know value (different to the input used at CAL 1) from an encoder etc. is present at the input terminals, this will normally be at the high end of the range. **b.** At the CAL2 function press ▲ and ▼ simultaneously, then release them. The display will indicate the live input value. Do not be concerned at this stage if the live input display value is not what is required. **c.** Press, then release the F button. The display will indicate SCL2 followed by a value. Use the ▲ or ▼ button to change this value to the required display scale value at this input. Press the F button to accept changes, the display will show CAL End and will then move on to the next function.
CAL OFSt	n/a	The calibration offset is a single point adjustment which can be used to alter the calibration scaling values across the entire measuring range without affecting the calibration slope. This method can be used instead of performing a two point calibration when a constant measurement error is found to exist across the entire range. To perform a calibration offset press the ▲ and ▼ buttons simultaneously at the CAL OFSt function. A "live" reading from the input will be seen, make a note of this reading. Press the F button, the message SCLE will now be seen followed by the last scale value in memory. Use the ▲ or ▼ button to adjust the scale value to the required display value for that input. For example if the "live" input reading was 50 and the required display value for this input was 70 then adjust the SCLE value to 70. 
SEt OPEr	SSI , bc8 or bc24	Set operation mode - Allows selection of one of the three main operation mode. Select SSI if the input is an SSI signal (binary or GRAY code) from encoder etc. The remaining two modes are for use only when the LD-SS is connected to a RM-BC or RM4-BC converter. The two remaining modes are bc 8 for 8 bit BCD and bc24 for up to 24 bit BCD inputs. The BCD input can be either parallel, strobed or addressed.
SSI rAtE	Lo or Hi	SSI clock frequency - Allows settings of Lo (90kHz) or Hi (600kHz) clock frequencies. The normal setting is Hi . Use Lo only if communications difficulties are experienced due to long cable runs.
SEr. 1 tYPE	Not applicable to this software version	
SEr.2 tYPE	Not applicable to this software version	

Returning to normal measure mode

When the calibration has been completed it is advisable to return the instrument to the normal mode (where calibration functions cannot be tampered with).To return to normal mode, turn off power to the instrument, wait a few seconds and then restore power.

5 Function table - SSI functions

Initial display	Meaning of display	Next display	Default Setting	Record Your Settings
A1Lo	Alarm 1 low setpoint value	Setpoint value or OFF	OFF	
A1Hi	Alarm 1 high setpoint value	Setpoint value or OFF	1000	
A2Lo	Alarm 2 low setpoint value	Setpoint value or OFF	OFF	
A2Hi	Alarm 2 high setpoint value	Setpoint value or OFF	1000	
A1HY	Alarm 1 hysteresis	Hysteresis value in measured units	1	
A2HY	Alarm 2 hysteresis	Hysteresis value in measured units	1	
A1tt	Alarm 1 trip time	No of seconds before relay 1 trips	0	
A1rt	Alarm 1 reset time	No of seconds before relay 1 resets	0	
A2tt	Alarm 2 trip time	No of seconds before relay 2 trips	0	
A2rt	Alarm 2 reset time	No of seconds before relay 2 resets	0	
A1no or A1nc	Alarm 1 action N/O or N/C	A1no or A1nc	A1no	
A2no or A2nc	Alarm 2 action N/O or N/C	A2no or A2nc	A2no	
A1SP or A1t1	Alarm trailing or setpoint mode. Only seen if more than one setpoint relay is fitted	A1SP or A1t1	A2SP	
P.SEt	Preset value	Value in memory	0	
brgt	Display brightness	1 to 15	15	
dull	Remote brightness control	0 to 15	0	
Functions below are accessible only via CAL mode or if the ACCS function is set to ALL				
brgt AUt0	Automatic brightness control on or off	on or OFF	on	
brgt Hi gH	Automatic high brightness level	1 to 63	63	
brgt Lo	Automatic low brightness level	1 to 63	10	
drnd	Display rounding	Value in memory	1	
dCPt	Decimal point	0, 0.1, 0.02 etc.	0	
FLtr	Digital filter	0 to 8	3	
P.but	P Button function	nonE, Hi, LoHi, Lo, 2Er0 or P.SEt	nonE	
r.1 nP	First remote input function	nonE, P.HLd, d.HLd, Hi, Lo, Hi Lo, 2Er0, SP.Ac, no.Ac CAL.S, P.SEt or dull	nonE	
r.1 n2	Second remote input function	nonE, P.HLd, d.HLd, Hi, Lo, Hi Lo, 2Er0, SP.Ac, no.Ac CAL.S, P.SEt or dull	nonE	

Initial display	Meaning of display	Next display	Default Setting	Record Your Settings
r.i n3	Third remote input function	nonE, P.HLd, d.HLd, Hi, Lo, Hi, Lo, 2Er0, SP.Ac, no.Ac CAL.S, P.SEt or dULL	nonE	
ACCS	Access mode	OFF, EASY, nonE or ALL	OFF	
SPAC	Alarm relay setpoint access.	A 1 or A 1-2	A 1	
i nPt	Input setting	Value in memory	n/a	
SCLE	Scale setting	Value in memory	n/a	
SSI bitS	Number of bits for SSI input	1 to 31	24	
SI gn	Negative sign	on or OFF	on	
SSI CodE	SSI code input, binary or Gray	bin or GrAY	bin	
U.SCL	User scaling	on or OFF	OFF	
di SP rAtE	Display update rate	1, 2, 4, 8, 16 or 32	4	
CLr 2Er0	Clear zero	CLrd following clear operation	n/a	
CLr USCL	Clear user scale	CLrd following clear operation	n/a	
USEr SCLE	Live input scaling mode	on or OFF	OFF	
CAL 1	First live input	n/a	n/a	
CAL2	Second live input	n/a	n/a	
CAL OFSt	Live input scaling offset	n/a	n/a	
SEt OPEr	Set operation mode	SSI, bc 8 or bc24	SSI	
SSI rAtE	SSI clock rate	Lo or Hi	Hi	
SEr. 1tYPE	Not applicable			
SEr.2tYPE	Not applicable			

6 Specifications

6 .1 Technical Specifications

Display:	4, 5 or 6 digit 100mm yellow electromagnetic type or 6 digit 38mm red LED type or 5 digit 45mm red LED type or 4 digit 57mm red LED type or 4 or 6 digit 100mm red LED type or 4 digit 178mm red LED type
Input types:	SSI (Synchronous Serial Interface, binary or Gray coded.
Clock rate:	90kHZ or 600kHz Programmable
Microprocessor:	MC68HC11 CMOS
Ambient Temperature:	-10 to 60°C,
Humidity:	5 to 95% non condensing
Power Supply:	100mm & 200mm LED & 100mm electromagnetic displays: AC 240/110V selectable 50/60Hz or AC 48/42/32/24V selectable 50/60Hz or DC 12 to 24V isolated or DC 30 to 48V isolated or 24VDC non isolated.
	38mm or 45mm LED or 39mm electro magnetic displays: AC 240V or110V 50/60Hz or DC 12 to 48V isolated DC 24V (±10%) non isolated Note: Supply type is factory configured
Outputs:	2 x Setpoint relays, form A, rated 5A at 240VAC DC sensor supply 24VDC @ 50mA max.
Power Consumption:	AC supply 15 VA max, DC supply, consult supplier (depends on display type & options)

6 .2 Options

Auto brightness control:	Light sensor for automatic display brightness control

6 .3 Physical Characteristics

Models LD-SS-X-100E4 100mm 4 digit electromagnetic	Case size (mm) = 450 x 250 x 155 Weight: = 8.5 kgs Mounting hole locations - see “Mechanical Installation” chapter
Models LD-SS-X-100E5 100mm 5 digit electromagnetic	Case size (mm) = 520 x 250 x 155 Weight: = 9.5 kgs Mounting hole locations - see “Mechanical Installation” chapter
Models LD-SS-X-100E6 100mm 6 digit electromagnetic	Case size (mm) = 650 x 250 x 155 Weight: = 10.5 kgs Mounting hole locations - see “Mechanical Installation” chapter
Model LD-SS-X-38R6 38mm 6 digit LED	Case size (mm) = 255 x 145 x 125 Weight: = 1.3 kgs Mounting hole locations (mm) - see “Mechanical Installation” chapter
Model LD-SS-X-45R5 45mm 5 digit LED	Case size (mm) = 255 x 145 x 125 Weight: = 1.3 kgs Mounting hole locations (mm) - see “Mechanical Installation” chapter
Model LD-SS-X-57R4 57mm 4 digit LED	Case size (mm) = 255 x 145 x 125 Weight: = 1.3 kgs Mounting hole locations (mm) - see “Mechanical Installation” chapter
Model LD-SS-X-100R4 100mm 4 digit LED	Case size (mm) = 450 x 250 x 155 Weight: = 8.5 kg Mounting hole locations (mm) - see “Mechanical Installation” chapter
Model LD-SS-X-100R6 100mm 6 digit LED	Case size (mm) = 650 x 250 x 155 Weight: = 10.5 kg Mounting hole locations - see “Mechanical Installation” chapter
Model LD-SS-X-200R4 200mm 4 digit LED	Case size (mm) = 850 x 360 x 130 Weight: = 12 kg Mounting hole locations - see “Mechanical Installation” chapter

7 Guarantee and Service

The product supplied with this manual is guaranteed against faulty workmanship for a period of 2 years from the date of dispatch.

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