LD-232, LD-485 and LD-CL
Serial Data Input
Large Digit Displays
Operation and Instruction Manual

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1 Introduction

General description

This manual contains information for the installation and operation of the LD-232, LD-485 or LD-CL serial communications monitor. The instrument will accept inputs from serial communications RS232, RS485 or serial current loop (input type is factory configured). The digital display will indicate numeric and some alpha characters (when alpha function is selected). Two standard inbuilt relays are provided for alarm/control functions which will operate in some communication modes.

Unless otherwise specified at the time of order, your instrument 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. Drawings below show typical displays, see "Mechanical installation" chapter for a details of displays available.

Full electrical isolation between power supply and input signal (not applicable to non isolated DC supply versions) is provided by the instrument, thereby eliminating grounding and common voltage problems.

There are six main modes in which the serial input monitor will operate:

1. **Direct display of input**. The LD display is sent an ASCII or Modbus RTU (function 6 or 16) string and displays the characters. To operate in this mode the **POLL ı ∩PŁ** function must be set to **OFF**. To operate in this mode the **CodE** function must be set to **dı SP**, **RSCı** , **URL** or **∩.buS**.
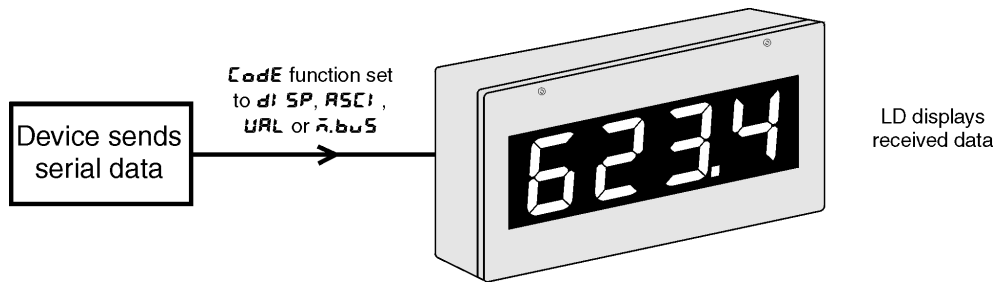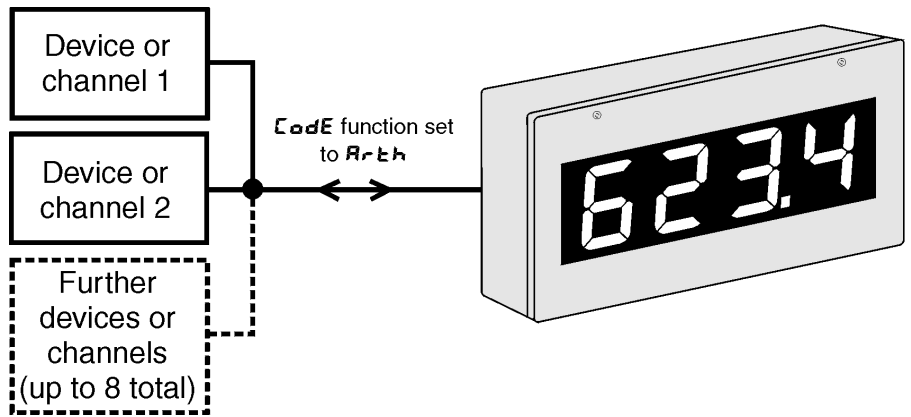

2. **POLL mode**. LD display sends a poll command of up to 8 characters to request data. To operate in this mode the **POLL ı ∩PŁ** function must be set to **on** and the **CodE** function must be set to **RSCı** or **URL**.
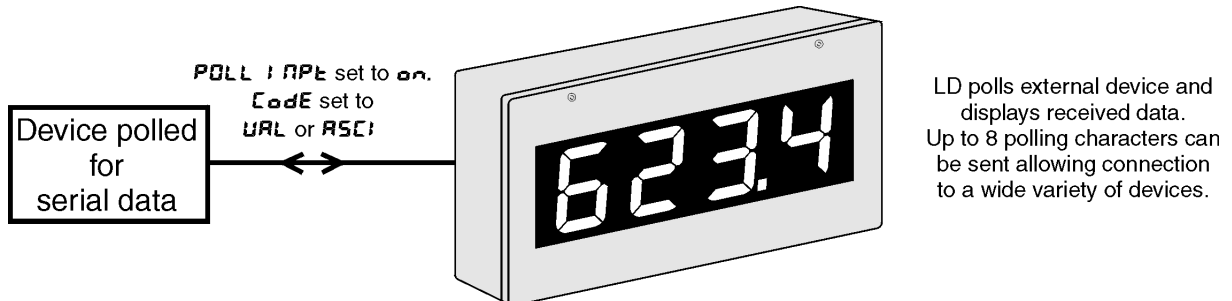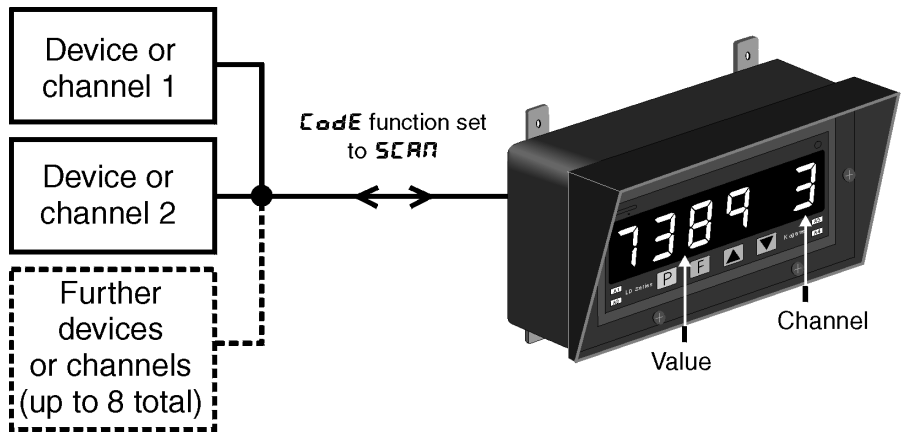
3. **Arithmetic mode**. The instrument can be programmed to accept input from up to eight RS485 sources and combine these arithmetically. The time between polling requests is programmable from 0.0 to 20.0 seconds. The instruments polled for arithmetic operation must be of the same manufacture as the LD display. To operate in this mode the **COdE** function must be set to **Arth**.

Refer to the separate "Arithmetic and Wind Speed/Direction Addendum" booklet for further details of this mode.


Device or channel 1

Device or channel 2

Further devices or channels (up to 8 total)

CodE function set to **Arth**

LD polls external devices and displays arithmetic result or ▲ & ▼ can be used to display value of each device or channel. Polled devices must be of the same manufacture as the LD. Communications must be RS485 if more than one device is polled.

4. **Scanning mode**. Allows the LD display to scan up to 8 inputs from other devices and display the value together with an indication of which input is being viewed. The input devices must be of the same manufacture as the LD display and the serial communications must be via RS485. A special mode allows the LD display to act as a slave display when connected to a model TP488 eight channel scanning monitor equipped with a serial output. Note the display will not scan when in **CAL** mode, see section 6. To operate in this mode the **COdE** function must be set to **SCAN**.

Device or channel 1

Device or channel 2

Further devices or channels (up to 8 total)
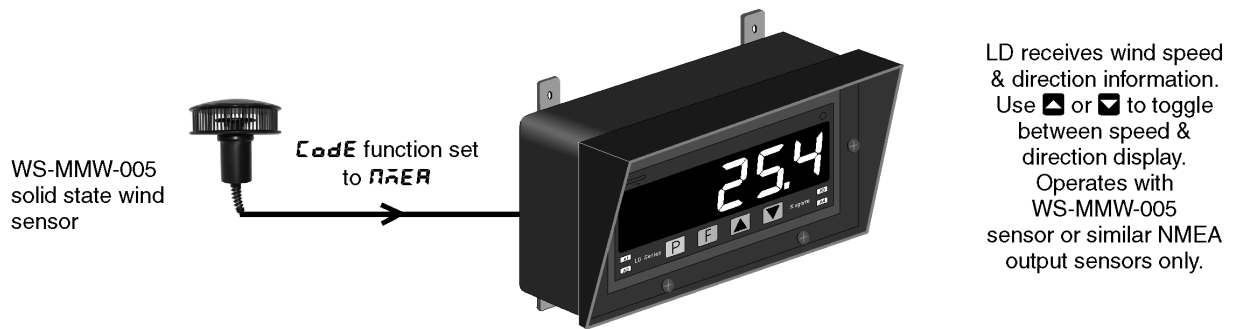
CodE function set to **SCAN**

Channel

Value

LD polls external devices ▲ & ▼ can be used to display each input or the display can scroll automatically. Polled devices must of the same manufacture as the LD. Communications must be RS485 if more than one device is polled.

5. **Comma separated mode**. This mode allows the LD display to accept up to eight display values sent sequentially, separated by a comma or to pick out a single comma separated value from a string. Note the display will not scan when in `CAL` mode, see section 6. To operate in this mode the `COdE` function must be set to `CS`.

Device sends comma separated serial data

`CodE` function set to `CS`

LD displays received data. ▲ & ▼ can be used to display each input or the display can scroll automatically
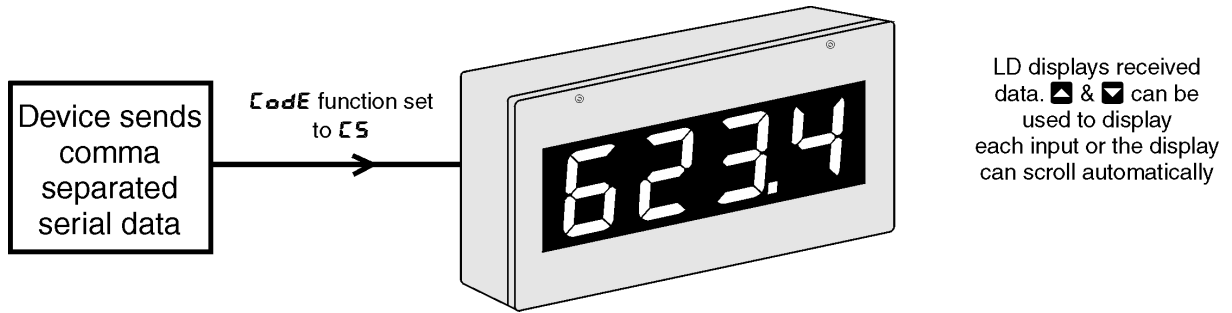
6. **Wind speed and direction (NMEA)**. This mode is used only with instruments using NMEA (National Marine Electronics Association) serial code such as model WS-MMW-005 wind speed and direction sensor. To operate in this mode the `COdE` function must be set to `NMEA`.

Refer to the separate "Arithmetic and Wind Speed/Direction Addendum" booklet for further details of this mode.

WS-MMW-005 solid state wind sensor

`CodE` function set to `NMEA`

LD receives wind speed & direction information. Use ▲ or ▼ to toggle between speed & direction display. Operates with WS-MMW-005 sensor or similar NMEA output sensors only.

2 Mechanical installation

2.1 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.
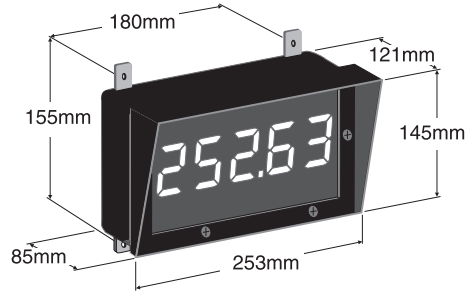
2.2 100mm 4 digit LED or electromagnetic

Weight 10kg (LED), 10.5kg (electromagnetic)

2.3 100mm 5 digit electromagnetic

Weight 12kg.
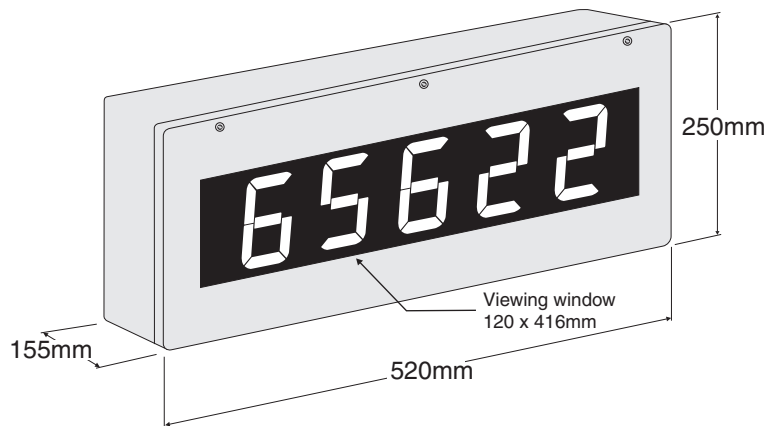
2.4 100mm 6 digit LED or electromagnetic

Weight 13kg (LED), 13.5k (electromagnetic)
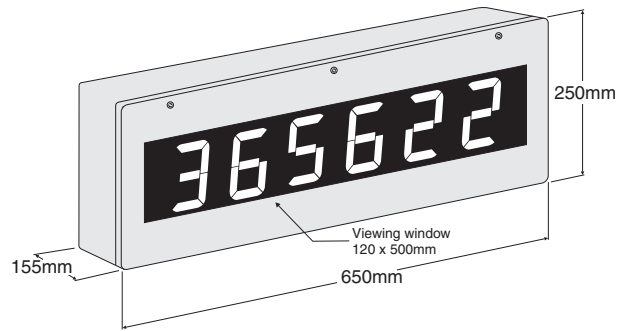
2.5 200mm 4 digit LED

Weight 13kg.
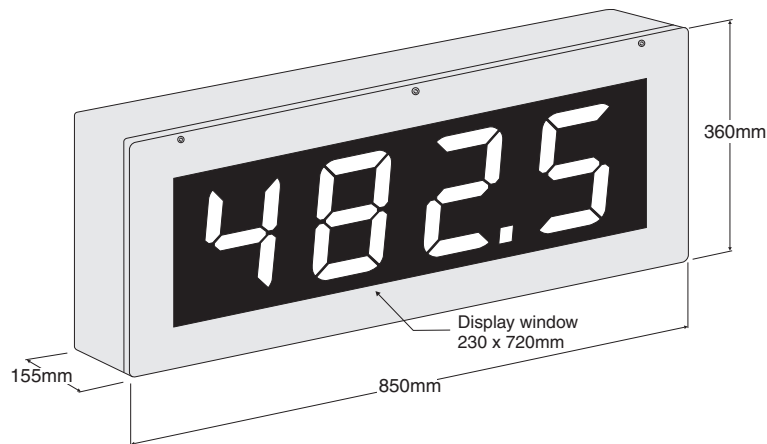
2.6 Cable entry and Mounting brackets

For 38 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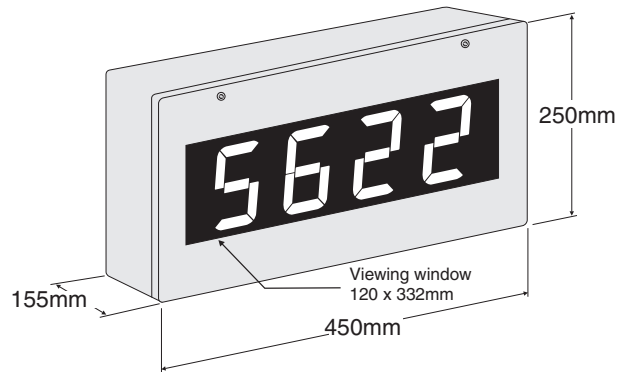 blind grommets are supplied for use with all metal case large digit displays. Diagrams below illustrate vertical and horizontal installation for mounting brackets. If mounting without the brackets is preferred then the 9mm dia. case holes provided for the brackets can be used as alternative mounting holes. Any rear holes not used for mounting should be sealed.
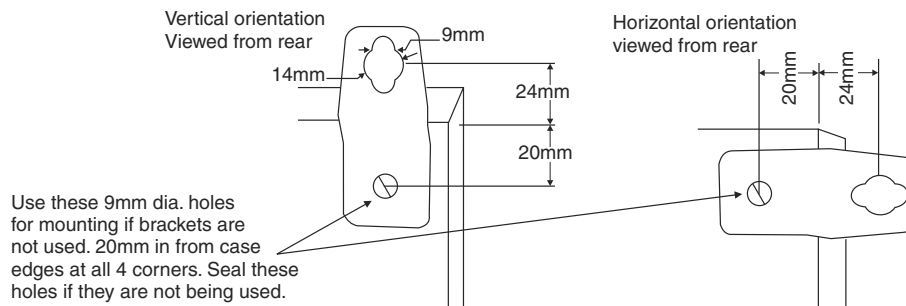
3 Electrical installation

3.1 Electrical installation

The display 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.

3.2 Main circuit board layout
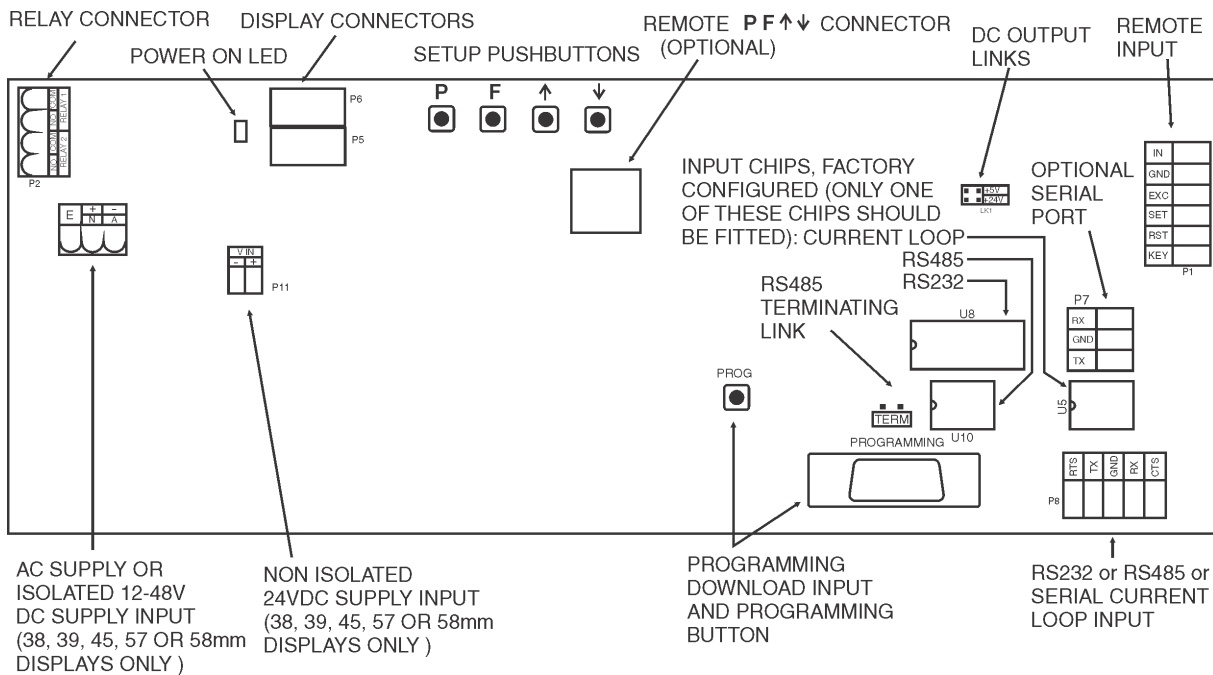
3.3 38, 45, 57, 58mm LED or 39mm electromagnetic display power supplies

AC power connections use a plug in connector with screw terminals at P12 (2.5mm^2 max. wire). 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). Note supply type is factory configured.
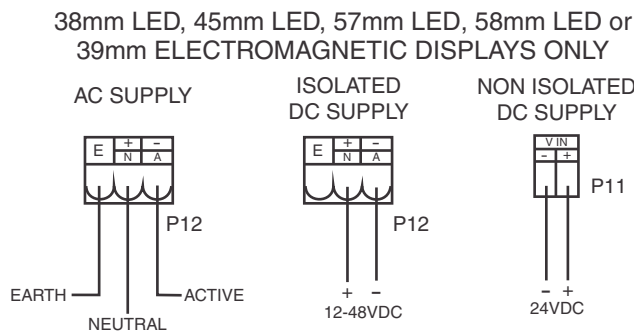
3.4 100mm and 200mm display isolated DC power supplies

Isolated DC supplies (12 to 24VDC) for 100mm and 200mm LED and 100mm electromagnetic displays connect to the isolated supply pcb on the base board.

Optional isolated DC supply
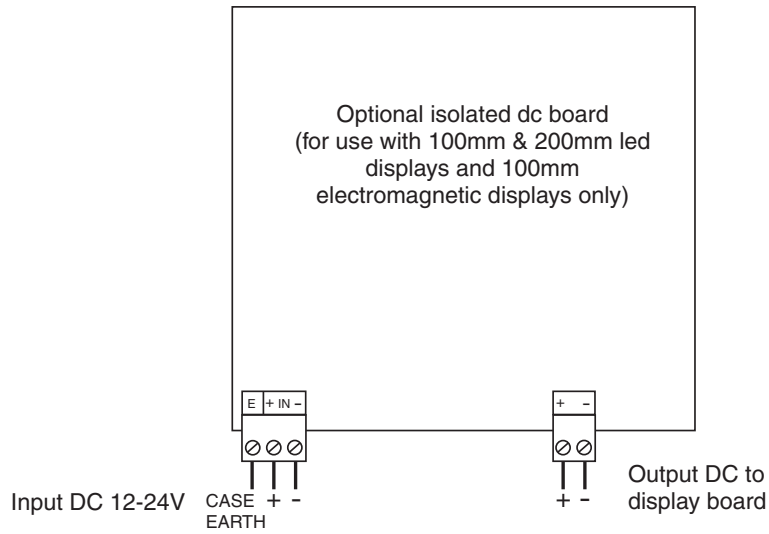
3.5 100mm and 200mm display non isolated DC power supplies

Non isolated DC supplies (24VDC) for 100mm and 200mm LED and 100mm electromagnetic displays are wired to a connector on the baseboard as shown below.
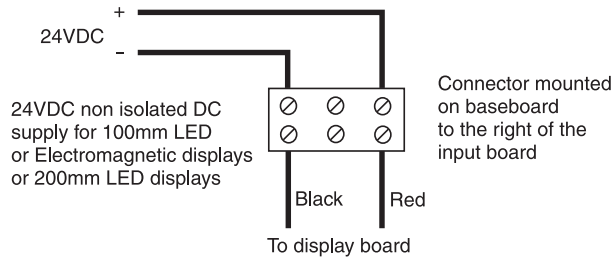
High and low voltage AC supplies

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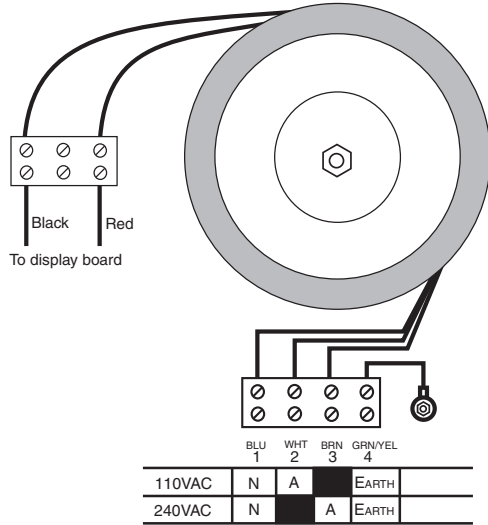
Black Red

To display board

	BLU 1	WHT 2	BRN 3	GRN/YEL 4	
110VAC	N	A		EARTH	
240VAC	N		A	EARTH	

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

Black Red

To display board

	BRN 1	RED 2	ORG 3	BLK 4	GRY 5	WHT 6	GRN/YEL 7
48VAC	A		LINK			IN	
42VAC	A		LINK			IN	
32/36VAC	A		LINK			IN	
24VAC	A	LINK			LINK	IN	EARTH
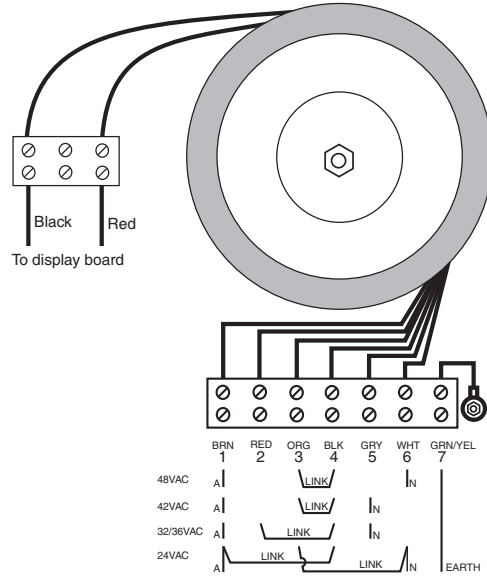
Wiring examples 240VAC & 110VAC

	BLU 1	WHT 2	BRN 3	GRN/YEL 4
110VAC	N	A		EARTH
240VAC	N		A	EARTH

240VAC
NEUTRAL
ACTIVE
EARTH

	BLU 1	WHT 2	BRN 3	GRN/YEL 4
110VAC	N	A		EARTH
240VAC	N		A	EARTH

110VAC
NEUTRAL
ACTIVE
EARTH

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

48VAC

BRN 1 RED 2 ORG 3 BLK 4 GRY 5 WHT 6 GRN/YEL 7

LINK

ACTIVE
NEUTRAL
EARTH

42VAC

BRN 1 RED 2 ORG 3 BLK 4 GRY 5 WHT 6 GRN/YEL 7

LINK

ACTIVE
NEUTRAL
EARTH

32 TO 36VAC

BRN 1 RED 2 ORG 3 BLK 4 GRY 5 WHT 6 GRN/YEL 7

LINK

ACTIVE
NEUTRAL
EARTH

24VAC

BRN 1 RED 2 ORG 3 BLK 4 GRY 5 WHT 6 GRN/YEL 7

LINK   LINK

ACTIVE
NEUTRAL
EARTH

3.6   Serial input connections

If wiring RS232 to a 9 or 25 pin D type connector the standard connections are as follows:
9 pin: Tx pin 3, Rx pin 2, GND pin 5
25 pin: Tx pin 2, Rx pin 3, GND pin 7
See note below regarding Tx and Rx crossing when wiring RS232

RS232 communications

P8

| | RTS |
Tx (out) | TX |
GND | GND |
Rx (in) | RX |
| CTS |
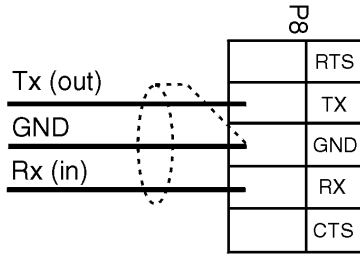
Use 3 core shielded cable

Note: when connecting using RS232
the Tx line at the instrument connects to
the Rx line at the device it is
communicating with. Likewise the
Rx line at the instrument connects to Tx.
When using RS485 connections are
A to A and B to B

RS485 communications

P8

| | RTS |
B or - ... B | TX |
| GND |
A or + ... A | RX |
| CTS |

TERM

Rs485 terminating link.
The link should be in for long
cable runs if communications
difficulties are encountered. If
multiple instruments are connected
insert the link if the instrument
is the first and last unit on the line,
see drawing below.
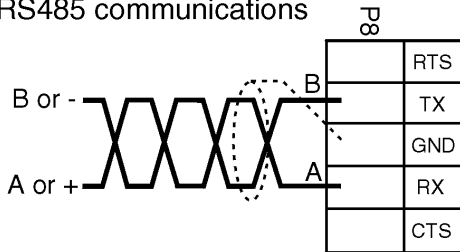
Use twisted pair shielded cable.
Note: shield can be connected
at each end, see below for example.

| Unit 1 | Unit 2 | Unit 3 |

Terminating resistor

Terminating resistor

GND   GND   GND

RS485 A   RS485 B   Shield   RS485 A   RS485 B   Shield   RS485 A   RS485 B   Shield

Twisted pair shielded cable
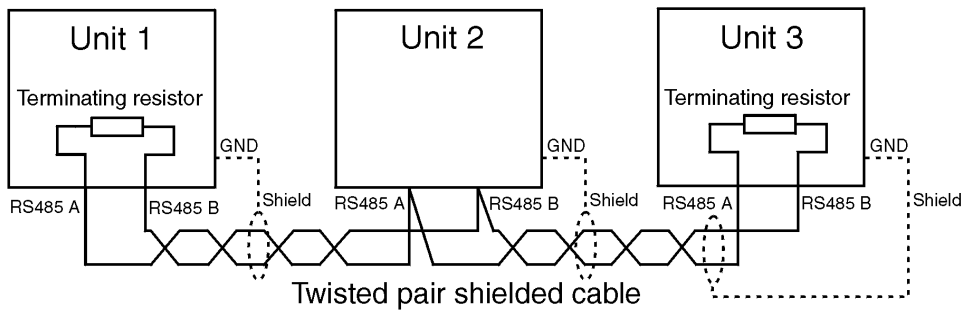
20mA serial current loop communications.

P8

| | RTS |
-VE | TX |
| GND |
+VE | RX |
| CTS |
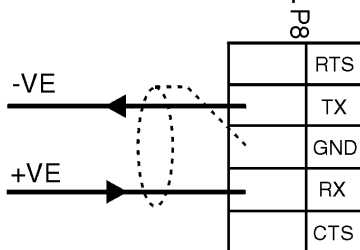
Use 2 core shielded cable

3.7 Remote input and DC out connections

Remote input and DC output connections

IN	
GND	
EXC	
SET	
RST	
KEY	

P1

GROUND

REMOTE INPUT

DC out (5V or 24V @ 50mA max
link selectable via LK1 or LK2)

Use momentary or latching
switch to suit function chosen
0V/5V control voltage can
alternatively be used
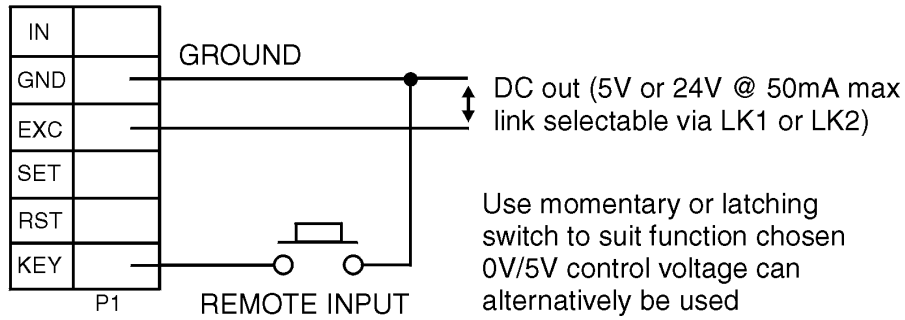
3.8 Relay connections

The display is supplied with two alarm relays as standard with connections on terminal P2. The relays are single pole single throw types and are rated at 5A, 240VAC into a resistive load. The relay contacts are voltage free and may be programmed for normally open or normally closed operation. With power removed the relay contacts will be in closed position.

Relay 1

Relay 2

NO	COM		NO	COM	
		RELAY 2			RELAY 1

P2
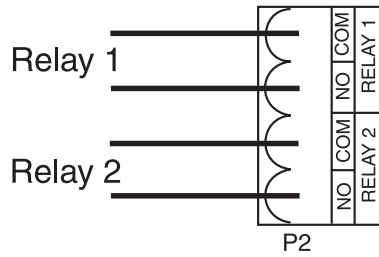
4 Functions available for each mode

The table below shows which functions are applicable to modes **di SP**, **ASCi** , **UAL**, **SCAN**, **CS** and **n.buS**. Refer to a separate Addendum booklet for details or **ArtH** and **MMEA** modes.

Function	di SP	ASCi	UAL	SCAN	CS	n.buS
A ILo	No	No	Yes	Yes	Yes	Yes
A IHi	No	No	Yes	Yes	Yes	Yes
A2Lo	No	No	Yes	Yes	Yes	Yes
A2Hi	No	No	Yes	Yes	Yes	Yes
A IHY	No	No	Yes	Yes	Yes	Yes
A2HY	No	No	Yes	Yes	Yes	Yes
A Itt	No	No	Yes	Yes	Yes	Yes
A2tt	No	No	Yes	Yes	Yes	Yes
A Irt	No	No	Yes	Yes	Yes	Yes
A2rt	No	No	Yes	Yes	Yes	Yes
A In.o or **A In.c**	No	No	Yes	Yes	Yes	Yes
A2n.o or **A2n.c**	No	No	Yes	Yes	Yes	Yes
AxSP or **Axt I** etc.	No	No	Yes	Yes	Yes	Yes
br9t AUto	Yes	Yes	Yes	Yes	Yes	Yes
br9t HI9H	Yes	Yes	Yes	Yes	Yes	Yes
br9t Lo	Yes	Yes	Yes	Yes	Yes	Yes
br9t	Yes	Yes	Yes	Yes	Yes	Yes
duLL	Yes	Yes	Yes	Yes	Yes	Yes
SPEd Unit	No	No	No	No	No	No
dFLt di SP	No	No	No	No	No	No
SCAN CH	No	No	No	Yes	Yes	No
Strt CH	No	No	No	No	Yes	No
SCAN SECS	No	No	No	Yes	Yes	No
Ch I Addr	No	No	No	Yes	No	No
Ch2 Addr	No	No	No	Yes	No	No
Ch3 Addr	No	No	No	Yes	No	No
Ch4 Addr	No	No	No	Yes	No	No
Ch5 Addr	No	No	No	Yes	No	No
Ch6 Addr	No	No	No	Yes	No	No
Ch7 Addr	No	No	No	Yes	No	No
Ch8 Addr	No	No	No	Yes	No	No
Ch I dCPt	No	No	No	Yes	Yes	No
Ch2 dCPt	No	No	No	Yes	Yes	No
Ch3 dCPt	No	No	No	Yes	Yes	No
Ch4 dCPt	No	No	No	Yes	Yes	No

Function	di5P	A5Ci	URL	SCAN	CS	ñ.buS
Ch5 dCPt	No	No	No	Yes	Yes	No
Ch6 dCPt	No	No	No	Yes	Yes	No
Ch7 dCPt	No	No	No	Yes	Yes	No
Ch8 dCPt	No	No	No	Yes	Yes	No
Ch1	No	No	No	No	Yes	No
Ch2	No	No	No	No	Yes	No
Ch3	No	No	No	No	Yes	No
Ch4	No	No	No	No	Yes	No
Ch5	No	No	No	No	Yes	No
Ch6	No	No	No	No	Yes	No
Ch7	No	No	No	No	Yes	No
Ch8	No	No	No	No	Yes	No
drnd	No	No	Yes	No	No	No
dCPt	No	No	Yes	No	No	No
FLtr	No	No	Yes	No	No	No
CodE	Yes	Yes	Yes	Yes	Yes	Yes
A1 OPEr	No	No	Yes	Yes	Yes	Yes
A2 OPEr	No	No	Yes	Yes	Yes	Yes
ñ.buS Addr	No	No	No	No	No	Yes
SCH1	No	Yes	Yes	No	No	No
SCH2	No	Yes	Yes	No	No	No
SCH3	No	Yes	Yes	No	No	No
tchr	No	Yes	Yes	No	No	No
dLAY	No	Yes	Yes	No	No	No
bАct	No	Yes	Yes	No	No	No
ñ.Chr	No	Yes	Yes	No	No	No
1.dPt	No	Yes	Yes	No	No	No
ALPH	No	Yes	Yes	No	No	No
POLL 1 ñPt	No	Yes	Yes	No	No	No
POLL dLAY	No	Yes	Yes	No	No	No
P.ch.1	No	Yes	Yes	No	No	No
P.ch.2	No	Yes	Yes	No	No	No
P.ch.3	No	Yes	Yes	No	No	No
P.ch.4	No	Yes	Yes	No	No	No
P.ch.5	No	Yes	Yes	No	No	No
P.ch.6	No	Yes	Yes	No	No	No
P.ch.7	No	Yes	Yes	No	No	No
P.ch.8	No	Yes	Yes	No	No	No
d5.to	Yes	Yes	Yes	Yes	Yes	Yes

Function	dISP	RSCI	URL	SCRN	CS	π.buS
t.out	Yes	Yes	Yes	Yes	Yes	Yes
P.but	Yes	Yes	Yes	Yes	Yes	Yes
r.ínP	Yes	Yes	Yes	Yes	Yes	Yes
RCCS	Yes	Yes	Yes	Yes	Yes	Yes
SPRC	No	No	Yes	No	No	No
R1	No	No	Yes	Yes	Yes	No
R2	No	No	Yes	Yes	Yes	No
CLr ZErO	No	No	Yes	No	No	No
bRud rRtE	Yes	Yes	Yes	Yes	Yes	Yes
Prty	Yes	Yes	Yes	Yes	Yes	Yes
dRtR	Yes	Yes	Yes	Yes	Yes	Yes
SEr.1 tYPE	Yes	Yes	Yes	Yes	Yes	Yes
SEr.2 tYPE	Yes	Yes	Yes	Yes	Yes	Yes

5 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.

This table lists functions available in **cont**, **ASCI**, **UAL** and **m̄.buS** modes. Refer to chapter 4 for details of which functions are available in each of these modes. Refer to the separate "Arithmetic and Wind Speed/Direction Addendum" for details of Arithmetic (**Arth**) and Wind Speed/Direction (**m̄mEA**) modes.

Functions in this first table are available in **FUNC** or **CAL** mode

Display	Function	Range	Default	Your record	Ref/Page
A 1Lo	Low setpoint value for alarm relay 1	Any display value or **OFF**	**OFF**		6.1 / 21
A 1Hi	High setpoint value for alarm relay 1	Any display value or **OFF**	**OFF**		6.2 / 22
A2Lo	Low setpoint value for alarm relay 2	Any display value or **OFF**	**OFF**		6.3 / 22
A2Hi	High setpoint value for alarm relay 2	Any display value or **OFF**	**OFF**		6.4 / 22
A 1HY	Hysteresis value for alarm relay 1	**0** to **9999**	**10**		6.5 / 23
A2HY	Hysteresis value for alarm relay 2	**0** to **9999**	**10**		6.6 / 23
A 1tt	Trip time delay for alarm relay 1	**0** to **999.9**	**0.0**		6.7 / 23
A2tt	Trip time delay for alarm relay 2	**0** to **999.9**	**0.0**		6.8 / 24
A 1rt	Reset time delay for alarm relay 1	**0.0** to **999.9**	**0.0**		6.9 / 24
A2rt	Reset time delay for alarm relay 2	**0.0** to **999.9**	**0.0**		6.10 / 24
A 1n.o or **A 1n.c**	Alarm relay 1 action to normally open or normally closed	**A 1n.o** or **A 1n.c**	**A 1n.o**		6.11 / 24
A2n.o or **A2n.c**	Alarm relay 2 action to normally open or normally closed	**A2n.o** or **A2n.c**	**A2n.o**		6.12 / 25
A2SP or **A2t 1**	Relay operation independent setpoint or trailing setpoint	**A2SP** or **A2t 1**	**A2SP**		6.13 / 25
br9t	Display brightness level (manually set)	**1** to **63**	**63**		6.14 / 25
duLL	Display remote brightness switching	**0** to **63**	**15**		6.15 / 25

Functions in this second table are available only in **CAL** mode or if **ACCS** is set to **ALL**

Display	Function	Range	Default	Your record	Ref/Page
br9t AUto	Automatic display brightness adjustment	**on** or **OFF**	**OFF**		6.16 / 26
br9t HI9H	Automatic display brightness adjustment - high level	**1** to **63**	**63**		6.17 / 26
br9t Lo	Automatic display brightness adjustment - low level	**1** to **63**	**10**		6.18 / 26

SPEd Unit	Units to be used for **ΠΠER** mode	**ΠS**, **ΠPH**, **hPH** or **hnot**	**ΠS**		6.19 / 26
dFLt diSP	Default display for **ΠΠER** mode	**dir**, **SPEd** or **SCRΠ**	**SCRΠ**		6.20 / 27
SCRΠ CH	Number of channels to scan	**0** to **8**	**0**		6.21 / 27
Strt CH	Start channel for scanning mode	**1** to **32**	**1**		6.22 / 27
SCRΠ SECS	Number of seconds between scans	**0** to **255**	**0**		6.23 / 28
Ch1 Rddr	Channel 1 address	**P1** to **P8** or **S1** to **S8** or **t1** to **t8**	**P1**		6.24 / 28
Ch2 Rddr	Channel 2 address	**P1** to **P8** or **S1** to **S8** or **t1** to **t8**	**P1**		6.25 / 28
Ch3 Rddr	Channel 3 address	**P1** to **P8** or **S1** to **S8** or **t1** to **t8**	**P1**		6.26 / 28
Ch4 Rddr	Channel 4 address	**P1** to **P8** or **S1** to **S8** or **t1** to **t8**	**P1**		6.27 / 29
Ch5 Rddr	Channel 5 address	**P1** to **P8** or **S1** to **S8** or **t1** to **t8**	**P1**		6.28 / 29
Ch6 Rddr	Channel 6 address	**P1** to **P8** or **S1** to **S8** or **t1** to **t8**	**P1**		6.29 / 29
Ch7 Rddr	Channel 7 address	**P1** to **P8** or **S1** to **S8** or **t1** to **t8**	**P1**		6.30 / 29
Ch8 Rddr	Channel 8 address	**P1** to **P8** or **S1** to **S8** or **t1** to **t8**	**P1**		6.31 / 29
Ch1 dCPt	Channel 1 decimal point	**0**, **0.1** etc.	**0**		6.32 / 30
Ch2 dCPt	Channel 2 decimal point	**0**, **0.1** etc.	**0**		6.33 / 30
Ch3 dCPt	Channel 3 decimal point	**0**, **0.1** etc.	**0**		6.34 / 30
Ch4 dCPt	Channel 4 decimal point	**0**, **0.1** etc.	**0**		6.35 / 30
Ch5 dCPt	Channel 5 decimal point	**0**, **0.1** etc.	**0**		6.36 / 30
Ch6 dCPt	Channel 6 decimal point	**0**, **0.1** etc.	**0**		6.37 / 31
Ch7 dCPt	Channel 7 decimal point	**0**, **0.1** etc.	**0**		6.38 / 31

Ch8 **dCPt**	Channel 8 decimal point	**0**, **0.1** etc.	**0**		6.39 / 31
Ch0	Channel 0 polarity	**both**, **POS** or **nEg**	**both**		6.40 / 31
Ch1	Channel 1 polarity	**both**, **POS** or **nEg**	**both**		6.41 / 31
Ch2	Channel 2 polarity	**both**, **POS** or **nEg**	**both**		6.42 / 32
Ch3	Channel 3 polarity	**both**, **POS** or **nEg**	**both**		6.43 / 32
Ch4	Channel 4 polarity	**both**, **POS** or **nEg**	**both**		6.44 / 32
Ch5	Channel 5 polarity	**both**, **POS** or **nEg**	**both**		6.45 / 32
Ch6	Channel 6 polarity	**both**, **POS** or **nEg**	**both**		6.46 / 32
Ch7	Channel 7 polarity	**both**, **POS** or **nEg**	**both**		6.47 / 33
Ch8	Channel 8 polarity	**both**, **POS** or **nEg**	**both**		6.48 / 33
drnd	Display rounding	**1** to **5000**	**1**		6.49 / 33
dCPt	Decimal point	**0**, **0.1** etc.	**0**		6.50 / 33
FLtr	Digital filter	**0** to **8**	**2**		6.51 / 33
CodE	Data type for display	**diSP**, **ASCi**, **UAL**, **ArtH**, **n.buS**, **PtA**, **SCAn**, **nnEA** or **CS**	**diSP**		6.52 / 34
A1 **OPEr**	Alarm relay 1 operation mode	**inPt**, **t.out** or **both**	**inPt**		6.53 / 36
A2 **OPEr**	Alarm relay 2 operation mode	**inPt**, **t.out** or **both**	**inPt**		6.54 / 36
n.buS **Addr**	Modbus address	**0** to **255**	**1**		6.55 / 36
SCH1	Address character 1	**-2** to **255**	**-1**		6.56 / 36
SCH2	Address character 2	**-2** to **255**	**-1**		6.57 / 37
SCH3	Address character 3	**-2** to **255**	**-1**		6.58 / 37
tchr	Terminating character	**-1** to **255**	**13**		6.59 / 37
dLAY	Number of characters to skip	**0** to **255**	**0**		6.60 / 37
bAct	Number of characters back	**0** to **24**	**0**		6.61 / 37
n.Chr	Number of characters to skip from **SCH**	**0** to **10**	**0**		6.62 / 38
i.dPt	Input string decimal point	**-1** to **8**	**-1**		6.63 / 38
ALPH	Alphabetic characters on or off	**on** or **OFF**	**OFF**		6.64 / 38
POLL **inPt**	Polling function	**on** or **OFF**	**OFF**		6.65 / 39

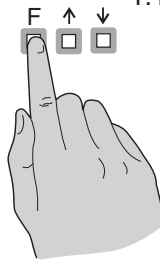|					
POLL dLAY	Polling delay time	**0.0** or **20.0**	**0.0**		6.66 / 39
P.ch.1	First polling character	**-1** to **255**	**-1**		6.67 / 39
P.ch.2	Second polling character	**-1** to **255**	**-1**		6.68 / 39
P.ch.3	Third polling character	**-1** to **255**	**-1**		6.69 / 40
P.ch.4	Fourth polling character	**-1** to **255**	**-1**		6.70 / 40
P.ch.5	Fifth polling character	**-1** to **255**	**-1**		6.71 / 40
P.ch.6	Sixth polling character	**-1** to **255**	**-1**		6.72 / 40
P.ch.7	Seventh polling character	**-1** to **255**	**-1**		6.73 / 40
P.ch.8	Eighth polling character	**-1** to **255**	**-1**		6.74 / 40
dS.to	Display timeout	**0** to **9999**	**10**		6.75 / 41
t.out	Data string timeout	**0.0** to **10.0**	**1.0**		6.76 / 41
P.but	🅿 button function	**NONE.Hi.Lo. Hi.Lo.tArE** or **ZErO**	**NONE**		6.77 / 41
r.1 NP	Remote input (external input) one function	**NONE.P.HLd. d.HLd.Hi.Lo .Hi.Lo.tArE. ZErO.SP.Ac. No.Ac** or **duLL**	**NONE**		6.78 / 41
ACCS	Access mode	**OFF.EASY. NONE** or **ALL**	**OFF**		6.79 / 43
SPAC	Setpoint access mode (*Optional)	**A1.A1-2** etc.	**A1**		6.80 / 43
A1	Alarm relay 1 operation channel	**ch0** to **ch8**	**ch0**		6.81 / 43
A2	Alarm relay 2 operation channel	**ch0** to **ch8**	**ch0**		6.82 / 43
CLr ZErO	Clear zero	n/a	n/a		6.83 / 44
bAUd rAtE	Baud rate for serial communications	**300.600. 1200.2400. 4800.9600. 19.2** or **38.4**	**9600**		6.84 / 44
Prty	Parity for serial input	**NONE.EUEN** or **Odd**	**NONE**		6.85 / 44
dAtA	Data type	**8.bit** or **7.bit**	**8.bit**		6.86 / 44
SEr.1 tYPE	Serial communications type	**NONE.r232** or **r485**	**NONE**		6.87 / 44
SEr.2 tYPE	Not applicable to this model	**NONE.r232** or **r485**	**NONE**		6.88 / 45

6 Explanation of functions

The LD display setup and calibration functions are configured through a push button sequence. The three push buttons located on the input pcb (also at the front on some display options) are used to alter settings. Two basic access modes are available:

FUNC 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.

Once **CAL** or **FUNC** mode has been entered you can step through the functions, by pressing and releasing the **F** push button, until the required function is reached. Changes to functions are made by pressing the **▲** or **▼** push button (in some cases both simultaneously) when the required function is reached.
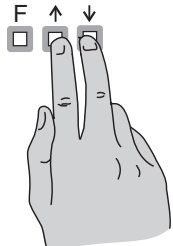
Entering CAL Mode

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.
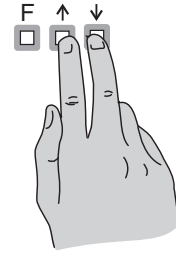
Entering FUNC Mode

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.
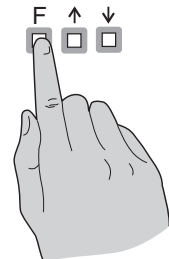Move to step 2 below.

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.

Easy alarm relay adjustment access facility

The display has an easy alarm access facility which allows access to the alarm setpoints simply by pressing the **F** button at the front or rear of the instrument. The first setpoint will then appear and changes to this setpoint may be made to this setpoint via the **▲** or **▼** buttons. Press the **F** button to accept any changes or to move on to the next setpoint. Note: this easy access also functions in the same manner for the PI control setpoint (relay and/or analog PI output) if PI control is available. The instrument must be set in the manner described below to allow the easy access facility to work:

1. The **r.i mp** function must be set to **SPAC** or the **ACCS** function must be set to **EASY**.

2. At least one alarm must have a setpoint, nothing will happen if all the alarm setpoints are set to **OFF**.

3. The **SPAC** function must be set to allow access to the relays required e.g. if set to **A 1-2** then the easy access will work only with alarm relays 1 and 2 even if more relays are fitted.

4. The instrument must be in normal measure mode i.e. if the instrument is powered up so that it is in **CAL** mode then the easy access will not function. If in doubt remove power from the instrument, wait for a few seconds then apply power again.

5. If the easy access facility is used then the only way to view or alter any other function settings is to power up via **CAL** mode i.e. there is no entry to **FUNC** mode functions unless the instrument is powered up in **CAL** mode.

6.1 Alarm relay 1 low setpoint

Display: **A 1Lo**

Range: Any display value or **OFF**

Default Value: **OFF**

Displays and sets the low setpoint value for alarm relay 1. 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 a low alarm value go to the **A 1Lo** function and use the **▲** or **▼** push buttons to set the value required then press **F** to accept this value. 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 **A 1HY** function.

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

Alarm low operation with hysteresis

6.2 Alarm relay 1 high setpoint

Display: **A1H⟩**

Range: Any display value or **OFF**

Default Value: **OFF**

Displays and sets the high setpoint value for alarm relay 1. 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 a high alarm value go to the **A1H⟩** function and use the ▲ or ▼ push buttons to set the value required then press **F** to accept this value. 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 **A1HY** function.

Example:
If **A1H⟩** is set to **100** then relay 1 will activate when the display value is **100** or higher.

Alarm high operation with hysteresis

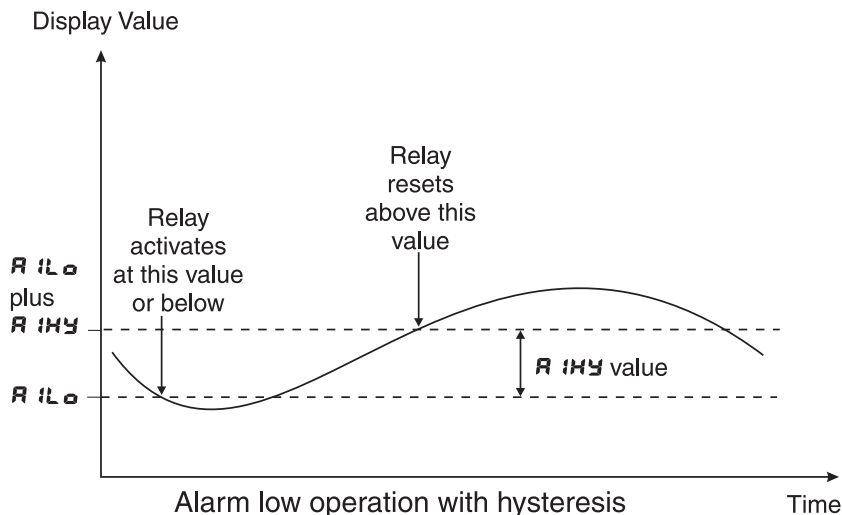## 6.3 Alarm relay 2 low setpoint

Display: **A2Lo**

Range: Any display value or **OFF**

Default Value: **OFF**

Displays and sets the low setpoint value for alarm relay 2 which operates in the same manner as the **A1Lo** function. See **A1Lo** function for further description.
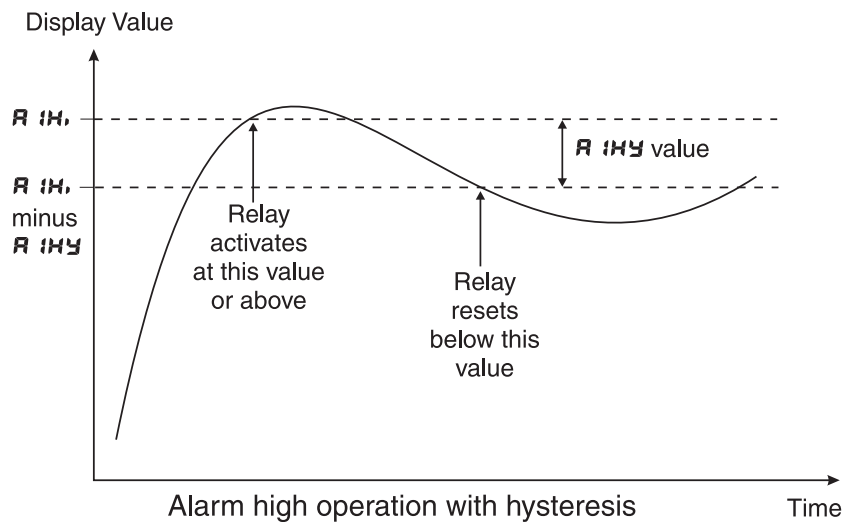
6.4 Alarm relay 2 high setpoint

Display: **A2H⟩**

Range: Any display value or **OFF**

Default Value: **OFF**

Displays and sets the high setpoint value for alarm relay 2 which operates in the same manner as the **A1H⟩** function. See **A1H⟩** function for further description.

6.5 Alarm relay 1 hysteresis (deadband)

Display: $A1HY$

Range: 0 to 9999

Default Value: 10

Displays and sets the alarm relay hysteresis limit for relay 1. To set a relay hysteresis value go to the $A1HY$ function and use the ▲ or ▼ push buttons to set the value required then press 🅵 to accept this value. The hysteresis value is common to both high and low 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. e.g. if $A1HY$ is set to zero the alarm will activate when the display value reaches 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 $A1Hi$ is to 50.0 and $A1HY$ is set to 3.0 then the setpoint output relay 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. 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 $A1Lo$ is to 20.0 and $A1HY$ is set to 10.0 then the alarm output relay will activate when the display value falls to 20.0 or below and will reset when the display value goes above 30.0 i.e at 30.1 or above. The hysteresis units are expressed in displayed engineering units.

Example:
If $A1Hi$ is set to 100 and $A1HY$ is set to 10 then relay 1 will activate when the display value is 100 or higher and will reset at a display value of 89 or lower.

6.6 Alarm relay 2 hysteresis (deadband)

Display: $A2HY$

Range: 0 to 9999

Default Value: 10

Displays and sets the alarm relay hysteresis limit for relay 2 which operates in the same manner as the $A1HY$ function. See $A1HY$ function for further description.

6.7 Alarm relay 1 trip time

Display: $A1tt$

Range: 0 to 999.9

Default Value: 0.0

Displays and sets the alarm trip time in seconds and tenths of 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 999.9 seconds. To set a trip time value go to the $A1tt$ function and use the ▲ or ▼ push buttons to set the value required then press 🅵 to accept this value.

Example:
If $A1tt$ is set to 5.0 seconds then the display must indicate an alarm value for a full 5 seconds before relay 1 will activate.

6.8   Alarm relay 2 trip time

Display: A2tt

Range: 0 to 999.9

Default Value: 0.0

Displays and sets the alarm trip time in seconds and tenths of seconds for relay 2 and operates in the same manner as the A1tt function. See A1tt for further description.

6.9   Alarm relay 1 reset time

Display: A1rt

Range: 0.0 to 999.9

Default Value: 0.0

Displays and sets the alarm reset delay time in seconds and tenths of 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 999.9 seconds. To set a reset time value go to the Axrt function and use the ▲ or ▼ push buttons to set the value required then press **F** to accept this value.

Example:
If A1rt is set to 10.0 seconds then the resetting of alarm relay 1 will be delayed by 10 seconds.

6.10   Alarm relay 2 reset time

Display: A2rt

Range: 0.0 to 999.9

Default Value: 0.0

Displays and sets the alarm reset time in seconds and tenths of seconds for relay 2 and operates in the same manner as A1rt function. See A1rt for further description.

6.11   Alarm relay 1 normally open/closed

Display: A1n.o or A1n.c

Range: A1n.o or A1n.c

Default Value: A1n.o

Displays and sets the setpoint alarm relay 1 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 alarm for normally open or closed go to the A1n.o or A1n.c function and use the ▲ or ▼ push buttons to set the required operation then press **F** to accept this selection.

Example:
If set to A1n.o alarm relay 1 will be open circuit when the display is outside alarm condition and will be closed (short circuit across terminals) when the display is in alarm condition.

6.12 Alarm relay 2 normally open/closed

Display: **A2n.o** or **A2n.c**

Range: **A2n.o** or **A2n.c**

Default Value: **A2n.o**

Displays and sets the setpoint alarm relay 2 action to normally open (de-energised) or normally closed (energised) and operates in the same manner as the **A1n.o** or **A1n.c** function. See **A1n.o** or **A1n.c** for further description.

6.13 Alarm relay setpoint or trailing operation

Display: **A2SP** or **A2t1**

Range: **A2SP** or **A2t1**

Default Value: **A2SP**

Relay operation independent setpoint or trailing setpoint, this function will not be seen unless extra optional relays are fitted. Each alarm, except relay 1, may be programmed to operate with an independent setpoint value or may be linked to operate at a fixed difference to another relay setpoint, known as trailing operation. The operation is as follows:

Alarm 1 (**A1**) is always independent. Alarm 2 (**A2**) may be independent or may be linked to Alarm 1. 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.

Example:
With Alarm 2 set to trail alarm 1, if **A1Hi** is set to **1000** and **A2Hi** 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).

6.14 Display brightness (manually set)

Display: **br9t**

Range: **1** to **63**

Default Value: **63**

Seen only when **br9t Auto** is set to **OFF**. Displays and sets the digital display brightness. The display brightness is selectable from **1** to **63**, where **1** = lowest intensity and **63** = highest intensity. This function is useful for improving the display readability in dark areas or to reduce the power consumption of the instrument. See also the **dull** function 6.15. To set brightness level go to the **br9t** function and use the ▲ or ▼ push buttons to set the value required then press **F** to accept this value.

6.15 Display remote brightness switching

Display: **dull**

Range: **0** to **63**

Default Value: **15**

Displays and sets the level for remote input brightness switching, see **r.1 nP** function. When a remote input is set to **dull** the remote input can be used to switch between the display brightness level set by the **br9t** function 6.14 and the display brightness set by the **dull** function. The display dull level is selectable from **0** to **63**, where **0** = lowest intensity and **63** = highest intensity. This function is useful

in reducing glare when the display needs to be viewed in both light and dark ambient light levels. To set dull level go to the **duLL** function and use the ⬆ or ⬇ push buttons to set the value required then press **F** to accept this value.

Example:

With **duLL** set to **15** and **br9t** set to **63** and the **r.1 NP** function set to **duLL** the display brightness will change from the **63** level to **15** when a switch connected to the remote input terminals is activated.

6.16   Automatic display brightness adjustment

Display:	**br9t RUto**
Range:	**on** or **OFF**
Default Value:	**OFF**

Automatic display brightness adjustment. Not applicable unless the optional light sensor is 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 **br9t HI9H** and **br9t Lo** functions described below. If the light sensor is not fitted this function should be set to **OFF**.

6.17   Automatic display brightness adjustment - high level

Display:	**br9t HI9H**
Range:	**1** to **63**
Default Value:	**63**

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

6.18   Automatic display brightness adjustment - low level

Display:	**br9t Lo**
Range:	**1** to **63**
Default Value:	**10**

Automatic brightness low level - seen only when **br9t RUto** is set to **on**. The high brightness level sets the minimum brightness which the automatic brightness control can achieve with 63 being the highest intensity.

6.19   Units to be used for **NNER** mode

Display:	**SPEd Un1t**
Range:	**NS**, **NPH**, **hPH** or **hnot**
Default Value:	**NS**

Applicable to **NNER** mode only. Select from the following choices: **NS** (metres/sec), **NPH** (miles/hour), **hPH** (kilometers/hour) or **hnot** (knots).

6.20   Default display for **ΠΣΕΑ** mode

Display: **dFLt diSP**

Range: **di r**, **SPEd** or **SCAΠ**

Default Value: **SCAΠ**

Applicable to **ΠΣΕΑ** mode only. Select from the following choices: **di r** (wind direction), **SPEd** (wind speed) or **SCAΠ** (automatically toggles display between direction and speed at the rate set by the **SCAΠ SECS** function). For example if this function is set to **di r** then the operator will need to push the ▲ or ▼ button to display speed, the display will then automatically revert back to direction after approximately 4 minutes.

6.21   Number of channels to scan

Display: **SCAΠ CH**

Range: **0** to **8**

Default Value: **0**

Seen only when **CodE** function = **SCAΠ** or **CS**. Select the number of channels from 0 to 8. The **SCAΠ** mode allows up to 8 instruments or channels from the same manufacturer as this instrument to be connected and polled individually. A different polled address must be set for each input channel and a scan period set. The display in scan mode will show the value to 3 digits followed by a space followed by the channel number being shown.

The **CS** mode allows up to eight values to be displayed the ▲ or ▼ button can be used to toggle between values or the display set to scan automatically (see function 6.23). An indicator e.g. **CH2** will be seen prior to the value to indicate which value is being viewed.

6.22   Start channel for scanning mode

Display: **Strt CH**

Range: **1** to **32**

Default Value: **1**

Seen only when **CodE** function = **CS**.
This function can be used in the comma separated **CS** mode to choose which of the comma separated values to start the scanning process from. For example in the string below if the **SCAΠ CH** function is set to **3** and the **Strt CH** function is set to **2** then the display will scan and display the second, third and fourth values only i.e. the display will show **CH 1** followed by **2222** then **CH2** followed by **3333** then **CH3** followed by **4444**. The time interval between scans is set by the **SCAΠ SECS** function.
If only one value is to be displayed from the string (no scanning) then select that value as the start channel and set the **SCAΠ CH** to **1**. e.g. for the string below if the **Strt CH** function is set to is set to **3** and the **SCAΠ CH** function is set to **1** then the display will just show the value **3333**. The channel number would not be displayed as the display is no longer scanning.

   Sample string <1111>,<2222>,<3333>,<4444>,<5555>,<CR>

6.23 Number of seconds between scans

Display: **SCAN SECS**

Range: **0** to **255**

Default Value: **0**

Seen only when **CodE** function is set to **SCAN**, **CS** or **NNEA**. Selects the number of seconds between channel scans or between wind speed and direction if **CodE** function is set to **NNEA**. The scan period can be set from 0 to 255 seconds. If set to 0 the display will not automatically scroll between channels and the ▲ or ▼ button must be used to change the channel displayed. Note the display will not automatically scan if it is in **CAL** mode.

6.24 Channel 1 address

Display: **Ch1 Addr**

Range: **P1** to **P8** or **S1** to **S8** or **t1** to **t8**

Default Value: **P1**

Seen only when **CodE** function is set to **SCAN** or **Arth**. The instruments connected to the display for scanning purposes must be of the same manufacture this instrument. These units allow a primary and in some cases secondary values to be sent. Refer to the separate manuals supplied when this option is fitted to see if secondary values are available for that instrument. The primary value is the main display value for that instrument e.g. For a conductivity instrument the conductivity would be the primary value and the temperature the secondary. Addresses available are **P1** to **P8** (to poll for primary values), **S1** to **S8** (to poll for secondary values) and **t1** to **t8** (to poll a channel of model TP488 scanning monitor). The numerical value refers to the channel number of a TP488 scanning monitor, for other instruments the numerical value is the address which is set at the **Addr** function of the instrument being polled. For example if **Ch2 Addr** is set to **P2** then the value will be returned will be the primary display value from the instrument whose **Addr** function is set to **2**.

6.25 Channel 2 address

Display: **Ch2 Addr**

Range: **P1** to **P8** or **S1** to **S8** or **t1** to **t8**

Default Value: **P1**

Seen only when **CodE** function is set to **SCAN** or **Arth**. Scan address for channel 2, see function 6.24 for further information.

6.26 Channel 3 address

Display: **Ch3 Addr**

Range: **P1** to **P8** or **S1** to **S8** or **t1** to **t8**

Default Value: **P1**

Seen only when **CodE** function is set to **SCAN** or **Arth**. Scan address for channel 3, see function 6.24 for further information.

6.27 Channel 4 address

Display: `Ch4 Addr`

Range: `P1` to `P8` or `S1` to `S8` or `t1` to `t8`

Default Value: `P1`

Seen only when `CodE` function is set to `SCAN` or `Arth`. Scan address for channel 4, see function 6.24 for further information.

6.28 Channel 5 address

Display: `Ch5 Addr`

Range: `P1` to `P8` or `S1` to `S8` or `t1` to `t8`

Default Value: `P1`

Seen only when `CodE` function is set to `SCAN` or `Arth`. Scan address for channel 5, see function 6.24 for further information.

6.29 Channel 6 address

Display: `Ch6 Addr`

Range: `P1` to `P8` or `S1` to `S8` or `t1` to `t8`

Default Value: `P1`

Seen only when `CodE` function is set to `SCAN` or `Arth`. Scan address for channel 6, see function 6.24 for further information.

6.30 Channel 7 address

Display: `Ch7 Addr`

Range: `P1` to `P8` or `S1` to `S8` or `t1` to `t8`

Default Value: `P1`

Seen only when `CodE` function is set to `SCAN` or `Arth`. Scan address for channel 7, see function 6.24 for further information.

6.31 Channel 8 address

Display: `Ch8 Addr`

Range: `P1` to `P8` or `S1` to `S8` or `t1` to `t8`

Default Value: `P1`

Seen only when `CodE` function is set to `SCAN` or `Arth`. Scan address for channel 8, see function 6.24 for further information.

6.32   Channel 1 decimal point

Display: **Ch 1 dCPt**

Range: **0**, **0. 1** etc.

Default Value: **0**

Seen only in **CodE = Arth** mode. Displays and sets the decimal point for input channel 1. By pressing the ▲ or ▼ pushbuttons the decimal point position may be set. The display will indicate as follows: **0** (no decimal point), **0. 1** (1 decimal place), **0.02** (2 decimal places) etc.

6.33   Channel 2 decimal point

Display: **Ch2 dCPt**

Range: **0**, **0. 1** etc.

Default Value: **0**

Seen only in **CodE = Arth** mode. Displays and sets the decimal point for input channel 2. See function 6.32 for further details.

6.34   Channel 3 decimal point

Display: **Ch3 dCPt**

Range: **0**, **0. 1** etc.

Default Value: **0**

Seen only in **CodE = Arth** mode. Displays and sets the decimal point for input channel 3. See function 6.32 for further details.

6.35   Channel 4 decimal point

Display: **Ch4 dCPt**

Range: **0**, **0. 1** etc.

Default Value: **0**

Seen only in **CodE = Arth** mode. Displays and sets the decimal point for input channel 2. See function 6.32 for further details.

6.36   Channel 5 decimal point

Display: **Ch5 dCPt**

Range: **0**, **0. 1** etc.

Default Value: **0**

Seen only in **CodE = Arth** mode. Displays and sets the decimal point for input channel 5. See function 6.32 for further details.

6.37 Channel 6 decimal point

Display: `Ch6 dCPt`

Range: `0`, `0.1` etc.

Default Value: `0`

Seen only in `CodE` = `Arth` mode. Displays and sets the decimal point for input channel 6. See function 6.32 for further details.

6.38 Channel 7 decimal point

Display: `Ch7 dCPt`

Range: `0`, `0.1` etc.

Default Value: `0`

Seen only in `CodE` = `Arth` mode. Displays and sets the decimal point for input channel 7. See function 6.32 for further details.

6.39 Channel 8 decimal point

Display: `Ch8 dCPt`

Range: `0`, `0.1` etc.

Default Value: `0`

Seen only in `CodE` = `Arth` mode. Displays and sets the decimal point for input channel 8. See function 6.32 for further details.

6.40 Channel 0 polarity

Display: `Ch0`

Range: `both`, `POS` or `NEG`

Default Value: `both`

Displays and sets the polarity selection for the display of the engineering value for channel 0. Channel 0 is the channel which displays the result of the arithmetic operations. If set to `bOtH` then the display will be able to indicate both positive and negative values. If set to `POS` the display will allow only positive values with any values below zero being rounded to zero. If set to `NEG` then the display will allow only negative values with any value above zero being rounded to zero. Channel 0 polarity applies to Arithmetic mode `ArtH` only.

6.41 Channel 1 polarity

Display: `Ch1`

Range: `both`, `POS` or `NEG`

Default Value: `both`

Displays and sets the polarity selection for the display of the engineering value for channel 1. If set to `bOtH` then the display will be able to indicate both positive and negative values. If set to `POS` the display will allow only positive values with any values below zero being rounded to zero. If set to `NEG` then the display will allow only negative values with any value above zero being rounded to zero.

6.42   Channel 2 polarity

Display: `Ch2`

Range: `both`, `POS` or `NEG`

Default Value: `both`

Displays and sets the polarity selection for the display of the engineering value for channel 2. See function 6.41 for further information.

6.43   Channel 3 polarity

Display: `Ch3`

Range: `both`, `POS` or `NEG`

Default Value: `both`

Displays and sets the polarity selection for the display of the engineering value for channel 3. See function 6.41 for further information.

6.44   Channel 4 polarity

Display: `Ch4`

Range: `both`, `POS` or `NEG`

Default Value: `both`

Displays and sets the polarity selection for the display of the engineering value for channel 4. See function 6.41 for further information.

6.45   Channel 5 polarity

Display: `Ch5`

Range: `both`, `POS` or `NEG`

Default Value: `both`

Displays and sets the polarity selection for the display of the engineering value for channel 5. See function 6.41 for further information.

6.46   Channel 6 polarity

Display: `Ch6`

Range: `both`, `POS` or `NEG`

Default Value: `both`

Displays and sets the polarity selection for the display of the engineering value for channel 6. See function 6.41 for further information.

6.47 Channel 7 polarity

Display: *Ch7*

Range: *both*, *POS* or *NEG*

Default Value: *both*

Displays and sets the polarity selection for the display of the engineering value for channel 7. See function 6.41 for further information.

6.48 Channel 8 polarity

Display: *Ch8*

Range: *both*, *POS* or *NEG*

Default Value: *both*

Displays and sets the polarity selection for the display of the engineering value for channel 8. See function 6.41 for further information.

6.49 Display rounding

Display: *drnd*

Range: *1* to *5000*

Default Value: *1*

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. To set the display rounding value go to the *drnd* function and use the ▲ or ▼ push buttons to set the required value then press **F** to accept this selection.

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.

6.50 Decimal point

Display: *dCPt*

Range: *0*, *0.1* etc.

Default Value: *0*

Displays and sets the decimal point. By pressing the ▲ or ▼ pushbutton at the *dCPt* function the decimal point position may be set. The display will indicate as follows: *0* (no decimal point), *0.1* (1 decimal place), *0.02* (2 decimal places), *0.003* (3 decimal places) and *0.0004* for display with more than 4 digits. Note if the decimal point is altered the display will need to be recalibrated and alarm etc. settings checked. In arithmetic mode this function sets the decimal point position for channel 0 i.e. the arithmetic result.

6.51 Digital filter

Display: *FLtr*

Range: *0* to *8*

Default Value: *2*

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.

6.52 Data type for display

Display:	**CodE**
Range:	**diSP**, **ASCi**, **UAL**, **ArtH**, **m.buS**, **PtA**, **SCAn**, **mAEA** or **CS**
Default Value:	**diSP**

One of eight different display modes can be selected in this function, namely **diSP**, **ASCi**, **UAL**, **ArtH**, **m.buS**, **PtA**, **SCAn**, **mAEA** or **CS**. Note: see the separate Addendum booklet for details of arithmetic mode **ArtH** and Wind speed/direction **mAEA** operation. The **PtA** option is a special purpose function and is not described to this manual. See also the "Examples" section at the end of this chapter. Note that if the mode is altered it is necessary to switch the instrument off then on again to reset to the new mode.

- **diSP** mode
  With **diSP** selected (image mode) the display expects to see an input in raw data format from another instrument. This mode is generally only used when the display is connected to an instrument from the same manufacturer. This mode is not used with any other source. The data format expected is: <ESC>Incccc

Where:	<ESC>	is 27 Dec or 1B Hex
	I	is the ASCII character "I"
	n	is the number of image characters to follow
	cccc	are the image characters in Hex. format

- **ASCi** mode
  ASCi selects ASCII type input data, the input data will then be displayed without modification (see also **ALPH** function as this can also affect what is displayed). Displays of characters in **ALPH** mode are left justified. Any leading zeroes received will be visible in this mode e.g. data received such as 00873 will be displayed as **00873**.

- **UAL** mode
  With **UAL** selected (numeric or value mode) the incoming characters will not be displayed unless they are numeric characters or a negative sign "-", the characters will be read until a terminating character (see **tchr**) is found. In circumstances, e.g. when terminating characters are not sent by the transmitting device, the instrument can be programmed to look for a constant transmitted character which occurs before to the required display values rather than at the end of the string. In this instance the **SCH1** character can be used and the display told to display a number of characters after this character (see **n.Chr** function). Once the **tchr** or **SCH1** character is found the numeric value will be updated and displayed. If a non numeric character is found then the conversion will cease at that point. Note that ASCII control characters 00 Decimal (Null) to 31 Decimal (Unit Separator) will be ignored if they are seen as part of the string and will not cause the conversion to cease when encountered, they will however not be ignored if used as a start character (**SCH1**, **2** or **3**) or the terminating character set at the **tchr** function. The numeric value is filtered after conversion the **FLtr** setting determines the level of filtering. Note: In **UAL** mode any leading zeroes transmitted will be ignored e.g. data received such as -00345 will be displayed as **-345**.

- **ArtH** mode
  Refer to separate Addendum.

- **PtA** mode

  Not applicable to this instruction manual. Do not use this mode.

- **SCAn** mode

  With **SCAn** selected the instrument can be made to scan and display in turn values from up to 8 other devices or channels from the same manufacturer. To operate in scan mode select the number of channels to scan at the **SCAn CH** function then select the automatic scanning period at the **SCAn SECS** function (the scanning period sets the time for the display automatic scrolling, note that the ▲ or ▼ button can also be used to manually scroll between channels) then set the address for each channel at the **Ch1Addr**, **Ch2Addr** etc. functions. The address choices are **P1,P2,P3,P4, P5,P6,P7,P8,S1,S2,S3,S4,S5,S6,S7** or **S8. A1** to **A8** and **t1** to **t8** are also choices but are only for use in polling channels 1 to 8 of a model TP488 scanning monitor. The letters **P** and **S** refer to the primary (**P**) or secondary (**S**) display values from the transmitting instrument e.g. the primary display value of a conductivity instrument will be the conductivity value on the display whilst the secondary display value would be the solution temperature. The number refers to the address of the instrument. For example if **Ch1Addr** function has **P3** selected then the primary display value from the instrument with address 3 will be requested as the channel 1 input.

- **m.buS** mode

  With **m.buS** selected the display will accept a modbus RTU input. An address (1 to 255) must be selected at the **m.buS Add** function to correspond to the address selected at the host device. The instrument accepts modbus command 6 "preset single register" and command 16 "preset multiple registers". The command 6 or 16 information sent can be used to preset four registers, these are:

  Register 0   Decimal point position

  Register 1   Input taken as an unsigned 16 bit number (0 to 65535)

  Register 2   Input taken as a signed 16 bit number (-32767 to 32767)

  Register 3   Signed 32 bit number high order 16 bits

  Register 4   Signed 32 bit number low order 16 bits

  Registers 3 and 4 are used together to form a 32 bit number. The display will be updated when the low order register is set.

- **MmEA** mode

  Refer to separate Addendum.

- **CS** mode

  In **CS** mode up to 8 values can be sent in comma separated form. The number of comma separated values to be displayed is set at the **SCAn CH** function. The ▲ or ▼ buttons can be used to view these values or the display can be set to scan between values automatically via the **SCAn SECS** function. An indicator will be displayed just prior to the values e.g. **CH2** to indicate which value will appear next.

  The **Strt CH** function can be used to select the start channel e.g. if **Strt CH** is set to **3** and the **SCAn CH** is set to **6** then the first 2 comma separated values will be ignored and the scan will start from the third value and will scan and display the next 6 values i.e. values 3, 4, 5, 6, 7 and 8 in the comma separated string. For the same example if the **SCAn CH** function was set to **1** then scanning would be disabled and only the third coma separated value in the string would be displayed.

  The format required for this mode is:

  <value1>,<value2>,.............<value8><CR>

  Where: <CR> is the carriage return character.

  The **CS** mode can be used with the TP488 scanning monitor and other multi output monitors when the other units **OPut** function is set to **Cont**.

6.53   Alarm relay 1 operation mode

Display: **A1 OPEr**

Range: **i NPt**, **t.out** or **both**

Default Value: **i NPt**

Relay 1 operation mode - relay 1 can be made to operate from the input value (e.g. at the **A1Lo** or **A1Hi** value, applicable when **CodE** is set to **URL** or **n.buS** only) or when the display blanks due to the timeout value being exceeded (timeout value set at the **dS.to** function). If set to **both** the relay will operate from the display value or if communications fails.

6.54   Alarm relay 2 operation mode

Display: **A2 OPEr**

Range: **i NPt**, **t.out** or **both**

Default Value: **i NPt**

Relay 2 operation mode - relay 2 can be made to operate from the input value (e.g. at the **A1Lo** or **A1Hi** value, applicable when **CodE** is set to **URL** or **n.buS** only) or when the display blanks due to the timeout value being exceeded (timeout value set at the **dS.to** function). If set to **both** the relay will operate from the display value or if communications fails. Note that this function is only available for the first 2 relays fitted.

6.55   Modbus address

Display: **n.buS Addr**

Range: **0** to **255**

Default Value: **1**

Seen only when **CodE** function is set to **n.buS**. An address (0 to 255) must be selected to correspond to the address selected at the host device when Modbus communications is being used. Note: address 0 is available but should not be used with Modbus communications.

6.56   Address character 1

Display: **SCH1**

Range: **-2** to **255**

Default Value: **-1**

Seen only when **CodE** function = **URL** or **ASCi** . When a string is sent the instrument will look for three address characters, **SCH1**, **SCH2** and **SCH3**. If these character do not appear, one after the other, then the string of data will not be accepted and will not be displayed. Selecting **-1** disables the **SCH** and no matching will be required for that character. Selecting **-2** means "dont care" and any character will be taken as a match (note that a missing character will not constitute a match). Valid characters are -2 to 255 Decimal. **SCH1** is the first start of text character. The use of one or more start of text characters allows addressing of the display in multidrop applications using RS485. If data is required to be displayed by only selected displays on a multidrop line then the data can be preceded by an address which matches the **SCH** settings in the instruments required. The **SCH1** character can also be used in conjunction with the **n.Chr** function to force the display to show only a certain number of characters following the SCH1 character. This method cannot be used with either **SCH2** or **SCH3**. For example if the data string is always preceded by the letter M e.g. M345678 then setting **SCH1** to **77** (decimal form of the ASCII character M) and **n.Chr** to **3** will mean that the display will show **345** i.e. the three characters following the M character.

6.57 Address character 2

Display: **SCH2**

Range: **-2** to **255**

Default Value: **-1**

Seen only when **CodE** function = **URL** or **ASCi** . See function 6.56 for details.

6.58 Address character 3

Display: **SCH3**

Range: **-2** to **255**

Default Value: **-1**

Seen only when **CodE** function = **URL** or **ASCi** . See function 6.56 for details.

6.59 Terminating character

Display: **tchr**

Range: **-1** to **255**

Default Value: **13**

Seen only when **CodE** function = **URL** or **ASCi** . Terminating character, default is **13** (the decimal equivalent of the ASCII carriage return <CR>). This character is recognised as the end of transmission for a certain input stream. The next character received will be interpreted as the start of the next input stream. A setting of **-1** means that no terminating character is used.

6.60 Number of characters to skip

Display: **dLAY**

Range: **0** to **255**

Default Value: **0**

Seen only when **CodE** function = **URL** or **ASCi** . Select the numbers of characters in front of the input string to skip before displaying (may be set from **0** to **200**, default is **0** [off]). This allows the display to skip a certain number of characters in the input string before starting the display. This is useful for skipping unwanted data such as control characters etc., which may be sent by the instruments along with the display information. For example if **dLAY** is set to **5** then **678** will be displayed from the following example string: <STX>12345678<CR> i.e. the first **5** characters of the string will be ignored. Note that in **URL** mode the values displayed will be right justified and in ASCI mode the display is left justified e.g. for this example using a 4 digit display <BLANK>**678** will be seen in **URL** mode whereas in **ASCi** mode the value will displayed as **678**<BLANK> for a 4 digit display.

6.61 Number of characters to skip backwards

Display: **bAct**

Range: **0** to **24**

Default Value: **0**

Seen only when **CodE** function = **URL** or **ASCi** . Number of characters back from the terminating character to skip, default is **0** [off]. The display will wait for the terminating character and will then skip back over the last X characters in front to the terminating character with the X value being the value set

in this function. For example if the terminating character **tchr** is set to **13** (i.e. carriage return <CR>) and **bAct** is set to **4** then **1234** will be displayed from the example string <STX>12345678<CR>. For the same input string the display would show **12345678** if the **bAct** function was set to **0** and the display had enough digits to show this value. If the number of display digits is too few the overrange message **-or-** will be seen in **URL** mode or the most significant values which will fit on the display will be displayed in **ASCI** mode. Both **ASCI** an **URL** mode values will be right justified when the **bAct** function is used and the display value is less than the number of digits on the display.

6.62   Number of characters to skip from **SCH** character

Display:	**n.Chr**
Range:	**0** to **10**
Default Value:	**0**

Seen only when **CodE** function = **URL** or **ASCI** . Normally used only when no consistent end of text character is being transmitted and operates in a similar manner to the **dLAY** function. In most circumstances the **dLAY** or **bACt** function would be used in preference to this function. If the length of the input data string is likely vary, or the position of the required display data can vary in the string, but the required data to be displayed is always a set number of bytes away from a constant character which can be used as the **SCH** character then the **n.Chr** function can be used instead of the **dLAY** function. This function sets the number of characters to be extracted from the data string immediately following the **SCH 1** (or **SCH2** if used or **SCH3** if used) character. If this function is not required it should be left at the default setting of **0** which will disable the function. For example if **SCH 1** is used and **SCH2** and **3** are disabled and the **n.Chr** function is set to **3** then the **3** characters after the **SCH 1** character will be displayed. See also the **SCH 1**, **SCH2** and **SCH3** functions.

6.63   Input string decimal point place

Display:	**1.dPt**
Range:	**-1** to **8**
Default Value:	**-1**

In some systems the transmitting unit may display a decimal point position but not transmit the decimal point as part of the serial data. The **1.dPt** can be used to inform the instrument of the required position of the decimal point on the display. The decimal point position of the result shown on the display is set via the **dCPt** function. If the **1.dPt** function is not needed then it should be left at the default setting of **-1** which will disable the function.

6.64   Alphabetic character display on or off

Display:	**ALPH**
Range:	**on** or **OFF**
Default Value:	**OFF**

Seen only when **CodE** function = **URL** or **ASCI** . Set this function to **OFF** to filter alpha characters from the input stream i.e. only numeric characters will be displayed and alpha characters ignored. When set to on the instrument will display both alpha and numeric characters. Note: only a limited number of alpha characters may be displayed due to the nature of 7 segment displays, non displayable characters (e.g. W and X) will be ignored.

6.65   Polling function

Display: **POLL I NPL**

Range: **on** or **OFF**

Default Value: **OFF**

Seen only when **CodE** function = **URL** or **RSCI** . The instrument has the ability to transmit up to eight characters for polling purposes. This ability to poll is used when the instrument is to display data from a source which requires a polling command before it will communicate. The characters are set by functions **P.ch. I** to **P.ch.8** and the repeat rate for this polling is set by the **POLL dLRY** function. If **POLL I NPL** is set to **OFF** then no characters will be transmitted and the other polling functions will not be seen. If set to on then the characters selected will be transmitted at the rate selected by the **POLL dLRY** function. This ability to poll is used when the instrument is to display data from a source which requires a polling command before it will communicate.

6.66   Polling delay time

Display: **POLL dLRY**

Range: **0.0** or **20.0**

Default Value: **0.0**

Seen only when **CodE** function = **URL** or **RSCI** and **POLL I NPL** function is set to **on**. When the polling facility is being used the **POLL dLRY** function sets the repeat rate, in seconds, of the poll command. The time may be set from **0.0** seconds (as fast as the baud rate will allow) to **20.0** seconds.

6.67   First polling character

Display: **P.ch. I**

Range: **- I** to **255**

Default Value: **- I**

Seen only when **CodE** function = **URL** or **RSCI** and **POLL I NPL** function is set to **on**. Each of the eight poll command characters can be set from **- I** to **255** decimal. If set to **- I** then the character is ignored, if set to any other number then the equivalent ASCII character for that number will be sent. Characters **0** to **3 I** are special control characters such as "carriage return" and "start of text". Use as many "**P.ch**" characters as required by your system and set the remaining characters to **- I** so that they are ignored.

6.68   Second polling character

Display: **P.ch.2**

Range: **- I** to **255**

Default Value: **- I**

Refer to function 6.67.

6.69   Third polling character

Display: P.ch.3

Range: - 1 to 255

Default Value: - 1

Refer to function 6.67.

6.70   Fourth polling character

Display: P.ch.4

Range: - 1 to 255

Default Value: - 1

Refer to function 6.67.

6.71   Fifth polling character

Display: P.ch.5

Range: - 1 to 255

Default Value: - 1

Refer to function 6.67.

6.72   Sixth polling character

Display: P.ch.6

Range: - 1 to 255

Default Value: - 1

Refer to function 6.67.

6.73   Seventh polling character

Display: P.ch.7

Range: - 1 to 255

Default Value: - 1

Refer to function 6.67.

6.74   Eighth polling character

Display: P.ch.8

Range: - 1 to 255

Default Value: - 1

Refer to function 6.67.

6.75 Display timeout

Display: d5.to

Range: 0 to 9999

Default Value: 10

This function allows the user to set a timeout value for a valid display. Valid times are 0 to 9999 seconds, a setting of 0 disables the timeout. If a new data stream is not received before the timeout value is reached then the display will be blanked.

6.76 Data string timeout

Display: t.out

Range: 0.0 to 10.0

Default Value: 1.0

This function allows the user to set a timeout value for the data stream. Valid times are 0.0 to 10.0 seconds, a setting of 0.0 disables the timeout. The timeout will cause the current data stream to be ignored if the time gap between characters in the stream exceeds the t.out value. This function helps to prevent false displays when the data stream is interrupted.

6.77 🅿 button function

Display: P.but

Range: NONE,Hi ,Lo ,Hi Lo ,tArE or ZErO

Default Value: NONE

🅿 button function - The 🅿 button function can only be used when the CodE function is set to UAL. The 🅿 button may be set to operate some of the remote input functions. With the tare and zero functions, to prevent accidental operation, the 🅿 button must be held pressed for 2-3 seconds before the display will tare or zero, momentary operation of the tare function will cause the gross value to be displayed, preceded by the message grOS. If both the remote input and 🅿 button function are operated simultaneously the 🅿 button will override the remote input. The functions below are as described in the r.i nP function below. Functions available are: NONE,Hi ,Lo ,Hi Lo ,tArE or ZErO

6.78 Remote input function

Display: r.i nP

Range: NONE,P.HLd,d.HLd,Hi ,Lo ,Hi Lo ,tArE,ZErO,SP.Ac ,No.Ac   or duLL

Default Value: NONE

Remote input functions can only be used when the CodE function is set to UAL.

Remote input function - When these remote input terminals are short circuited, via a switch, relay, keyswitch etc. 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 i.e. activating the remote input has no effect.

P.HLd - 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.HLd** will appear briefly every 8 seconds whilst the input terminals are short circuited to indicate that the peak hold function is active.

d.HLd - 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.

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.

Lo - valley memory. The minimum value stored in memory will be displayed. Otherwise operates in the same manner as the **Hi** function described above.

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.

tArE - display tare. Short circuiting the remote input pins momentarily will allow toggling between nett and gross values (shown as **nEtt** and **9rOS**). If the remote input is short circuited for approx. 2 seconds the display will be tared and will show zero. The tare will be lost if power is removed.

2ErO - display zero. Zeroes the display in same manner as the tare function except that the zero is not lost when power is removed and the display will zero as soon as the remote input is shorted. When the **2ErO** operation is used the gross value cannot be recalled and the input at the time of the **2ErO** operation will become the new zero point.

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 or if the **ACCS** function is set to **ALL**.

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 or if the **ACCS** function is set to **ALL**.

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 terminals, between the brightness level set at the **br9t** function and the brightness level set at the **duLL** function.

d.SCL - applicable only if the dummy load option board is fitted. When the dummy load option board is fitted this option allows the input to be switched from the load to the dummy load. When the dummy load is activated the display will show the scaling value for the dummy load. The scaling value should be noted once installation is complete. Note that if the display is re calibrated or zeroed then the scaling value for the dummy load will change and a note of the new value should be taken. The tare operation will not alter the dummy load scaling value. An adjustment screw allows some adjustment of the value displayed. Whilst the dummy load is connected the display will flash the message **d.SCL** approximately once every 8 seconds. If the dummy load is activated via a momentary action switch (or via the front **P** button) the display will revert back to a normal live input display value after 20 seconds. If a latching switch is used to activate the dummy load then the display will show the dummy load value and flash the **d.SCL** message until 20 seconds after the remote input is released. For 5 digit displays the activation of the dummy load will also cause the "A2" annunciator LED to light during the duration of the dummy load display. The value shown for the dummy load does not affect normal relay or retransmission operations.

6.79 Access mode

Display: `ACCS`

Range: `OFF`,`EASY`,`NONE` or `ALL`

Default Value: `OFF`

Access mode - the access mode function `ACCS` has four possible settings namely `OFF`,`EASY`,`NONE` and `ALL`. If set to `OFF` the mode function has no effect on alarm relay operation. If set to `EASY` the "easy alarm access" mode will be activated. Refer to "Easy alarm relay adjustment access facility" page 21. 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 and calibration functions. If set to `ALL` then access to all functions, including calibration functions, can be gained via `FUNC` mode.

6.80 Setpoint access mode

Display: `SPAC`

Range: `A1`,`A1-2` etc.

Default Value: `A1`

Setpoint access - seen only if more than 1 relay fitted. Sets the access via `FUNC` mode and "easy alarm access" mode to the alarm relay setpoints. The following choices are available:
`A1` - Allows setpoint access to alarm 1 only.
`A1-2` - Allows setpoint access to alarms 1 and 2 only.
`A1-3` - Allows setpoint access to alarms 1, 2 and 3 etc. up to the maximum number of relays fitted.
The remote input function (`r.INP`) must be set to `SP.AC` for this function to operate. Note: Only the setpoints which have been given a value will be accessible e.g. if `A1Hi` is set to `OFF` then there will be no access to the `A1Hi` function when `SPAC` is used.

6.81 Alarm relay 1 operation channel

Display: `A1`

Range: `ch0` to `ch8`

Default Value: `ch0`

Alarm relay 1 allocation - applicable only to `Arth`, `NMEA`, `SCAN` and `CS` modes. Allows relay 1 to be allocated to one channel. Settings available are `ch0`, `ch1`, `ch2`, `ch3`, `ch4`, `ch5`, `ch6`, `ch7` or `ch8`. In `NMEA` mode `ch1` represents wind direction and `ch2` represents wind speed. In `Arth` mode `ch0` represents the arithmetic result. `ch0` should not be selected for any other mode.

6.82 Alarm relay 2 operation channel

Display: `A2`

Range: `ch0` to `ch8`

Default Value: `ch0`

Alarm relay 2 allocation - applicable only to `Arth`, `NMEA`, `SCAN` and `CS` modes. Allows relay 2 to be allocated to one channel. Settings available are `ch0`, `ch1`, `ch2`, `ch3`, `ch4`, `ch5`, `ch6`, `ch7` or `ch8`. In `NMEA` mode `ch1` represents wind direction and `ch2` represents wind speed. In `Arth` mode `ch0` represents the arithmetic result. `ch0` should not be selected for any other mode.

6.83 Clear zero

Display: *ELr ZErO*

Range: n/a

Default Value: n/a

Seen only when *CodE* function = *UAL* or *AFEH*. Allows any zero operations performed via the remote input or **P** button to be cleared. Pressing the ▲ and ▼ buttons simultaneously will clear the zero offset, the message *ELrd* will be seen, confirming the zero clearing operation is completed. The instrument will then return to displaying the value of the string sent.

6.84 Baud rate for optional serial communications

Display: *bAud rAEE*

Range: *300*,*600*, *1200*,*2400*,*4800*,*9600*, *19.2* or *38.4*

Default Value: *9600*

Select from *300*,*600*, *1200*,*2400*,*4800*,*9600*, *19.2* or *38.4* baud. This must be set to match the baud rate selected at the sending device.

6.85 Parity for serial input

Display: *PrEY*

Range: *NONE*,*EUEN* or *Odd*

Default Value: *NONE*

Select parity check to either *NONE*, *EUEN* or *Odd*. This must be set to match the parity selected at the sending device.

6.86 Data type

Display: *dAEA*

Range: *8.b,E* or *7.b,E*

Default Value: *8.b,E*

Displays and selects the input data type. Select either *8.b,E* for 8 data bits plus 1 stop bit or *7.b,E* for 7 data bits plus 1 stop bit. This must be set to match the number of data bits of the sending device.

6.87 Serial communications type

Display: *SEr.1EYPE*

Range: *NONE*,*r232* or *r485*

Default Value: *NONE*

Selects the serial input communications type from: *NONE* for no serial output, *r232* for RS232 output or *r485* for RS485 output. Note that the serial input is factory configured with the hardware for one particular type i.e. if fitted with RS232 hardware then both the *SEr.1EYPE* and the hardware must be changed to convert to RS485.

6.88 Serial communications type for second comms. port

Display: **SEr.2 tYPE**

Range: **NONE**, **r232** or **r485**

Default Value: **NONE**

Not applicable to this model - leave this function set to **NONE**.

6.89 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 are less likely to be tampered with). To return to normal mode, turn off power to the instrument, wait a few seconds and then restore power.

6.90 Error Messages

- Blank display - if the display shows its normal "wake up" messages when powered up but then the display goes blank this means that the instrument does not recognise that data is being sent to it. If no data is being sent the display will blank. If data is being sent and the display is still blank then check that the correct baud rate and parity are set, if these are correct check that the remaining settings are set correctly for the input string being sent. See "Examples" section which follows for examples of function settings.

- **-or-** - this message means that the number being received is too big to display e.g. **12345** cannot be displayed on a 4 digit display. If applicable the **dLAY** or **bACt** functions can be used to force the display to ignore the unwanted display values.

- **O.run Err** - this message means that data is being received at a faster rate than it can be processed. Reduce the baud rate or the rate at which data is transmitted to the display.

- **FrAE Err** - this message means that data is being received but cannot be interpreted correctly, this is normally due to electrical noise or distorted input signals due to reflections on the line (most commonly seen with RS485). See RS485 connections section for notes on RS485 terminating resistors.

6.91 Examples

Example 1 Input string: <STX>Weight: +2000kg gross +1234kg tare<CR>
Required display: **1234** (on a 4 digit display)
One possible group of settings to achieve the required display is:-

> **SCH1** set to **2** Decimal (this corresponds to <STX>)
> **SCH2** set to **87** Decimal (this corresponds to W)
> **SCH3** set to **-1** (disabled)
> **codE** set to **UAL**
> **dLAY** set to **5**
> **tchr** set to **13** (this corresponds to <CR>)

The matching of all three start of text characters is valid since <STX> appears first followed by W (from Weight) and **SCH3** is disabled. The 5 numeric characters following the W (i.e. <SPACE> and **2000**) are ignored since **dLAY** is set to **5**. The kg characters are ignored since **codE** is set to **UAL**. The + is taken as a numeric value but is not displayable. The terminating character is set to <CR>.

Example 2 Input string: <STX>XYZNNM10.05kg<ETX>
Required display: **10.05** on a 4 digit display
One possible group of settings to achieve the required display is:-

      SCH1 set to **-1** (disabled)
      SCH2 set to **-1** (disabled)
      SCH3 set to **-1** (disabled)
      dLAY set to **0**
      ALPH set to **OFF**
      codE set to **URL**
      dCPt set to **0.02**
      tchr set to **3** (this corresponds to <ETX>)

The **SCH1**, **SCH2** and **SCH3** characters are all disabled. The decimal point is set at two places and therefore appears between the two zeroes on the display.

Example 3 Input string: <STX>X1 ABC 12.34<CR><LF> <STX>Y2 ABC 56.78<CR><LF>
Required display: **56.8** with 5 sec. display blanking.
One possible group of settings to achieve the required display is:-

      SCH1 set to **2** Decimal (this corresponds to <STX>)
      SCH2 set to **-2** (dont care)
      SCH3 set to **50** (this corresponds to 2 in ASCII)
      dLAY set to **1**
      ALPH set to **OFF**
      codE set to **URL**
      dCPt set to **0.1**
      bAct set to **0**
      tchr set to **13** (this corresponds to <CR>)
      dS.to set to **5**

The <STX> character corresponds to **SCH1**, **SCH2** is set to dont care and **SCH3** is set to 2 so the first string is ignored (<STX>Y1 does not match <STX> / dont care / 2). The second string does match, all of the alpha characters which follow Y2 (ABC) are ignored since **ALPH** is set to **OFF** but the spaces are numeric values so setting **dLAY** to **1** will cause one space to be ignored. The decimal point is set at one place and therefore the displayed number is rounded and shown as one decimal place. The display will blank if there is a 5 second gap between strings due to the **dS.to** setting.

Example 4 Input string: ABCDXYZGGNNMM10A0033<CR>
Required display: **10A00** on a 5 digit display.
If the status characters and desired values are sent as one string then the easiest way to recover the desired values is by using the **bAct** function.

      SCH1 set to **-1** (disabled)
      SCH2 set to **-1** (disabled)
      SCH3 set to **-1** (disabled)
      dLAY set to **0**
      codE set to **ASC**
      dCPt set to **0**
      bAct set to **2**
      tchr set to **13** (this corresponds to <CR>)
      ALPH set to **on**

In this mode the last 2 characters will be discarded (because **bAct** is set to 2) and the instrument will display up to 5 characters preceding these two.

Example 5 - Polling facility setup example. The instrument is connected to a different instrument which has serial communications and is set to a polling address of 5. The instrument is required to request a primary display value. The request is to be updated every 10 seconds. The polling command required for transmission of the primary display value from this instrument is:

<STX>P5<CR>

Where: <STX> is the start of text control character, P is the primary display request character, 5 is the unit address and <CR> is the carriage return control character. The main function settings required for this example are:

CodE set to **UAL**
POLL inPt set to **on**
POLL dLAY set to **10.0**
P.ch. 1 set to **2** (this correspond to <STX>)
P.ch.2 set to **80** (this corresponds to P)
P.ch.3 set to **37** (this corresponds to address 5 (32 is address 0))
P.ch.4 set to **13** this corresponds to <CR>
P.ch.5, **P.ch.6**, **P.ch.7** and **P.ch.8** are all set to **- 1**.

Example 6 - Polling facility setup example. The instrument is connected to a PLC via a serial link. The PLC requires a polling command of "T?" before it will transmit data to the instrument. The application requires that the PLC be polled every 2.5 seconds. The main function settings required for this example are:

CodE set to **UAL** (or ASCI depending on requirements)
POLL inPt set to **on**
POLL dLAY set to **2.5**
P.ch. 1 set to **84** (this correspond to T)
P.ch.2 set to **63** (this corresponds to ?)
P.ch.3, **P.ch.4**, **P.ch.5**, **P.ch.6**, **P.ch.7** and **P.ch.8** are all set to **- 1**

6.92   ASCII Code Conversion Listing

ASCII for control characters is shown in brackets. e.g. STX may in some cases be entered as ∧B.

ASCII char.	Decimal	Hex	ASCII char.	Decimal	Hex	ASCII char.	Decimal	Hex
NUL (∧@)	00	00	+	43	2B	V	86	56
SOH (∧A)	01	01	,	44	2C	W	87	57
STX (∧B)	02	02	-	45	2D	X	88	58
ETX (∧C)	03	03	.	46	2E	Y	89	59
EOT (∧D)	04	04	/	47	2F	Z	90	5A
ENQ (∧E)	05	05	0	48	30	[	91	5B
ACK (∧F)	06	06	1	49	31	\	92	5C
BEL (∧G)	07	07	2	50	32	]	93	5D
BS (∧H)	08	08	3	51	33	∧	94	5E
HT (∧I)	09	09	4	52	34	_	95	5F
LF (∧J)	10	0A	5	53	35	'	96	60
VT (∧K)	11	0B	6	54	36	a	97	61
FF (∧L)	12	0C	7	55	37	b	98	62
CR (∧M)	13	0D	8	56	38	c	99	63
SO (∧N)	14	0E	9	57	39	d	100	64
SI (∧O)	15	0F	:	58	3A	e	101	65
DLE (∧P)	16	10	;	59	3B	f	102	66
DC1 (∧Q)	17	11	<	60	3C	g	103	67
DC2 (∧R)	18	12	=	61	3D	h	104	68
DC3 (∧S)	19	13	>	62	3E	i	105	69
DC4 (∧T)	20	14	?	63	3F	j	106	6A
NAK (∧U)	21	15	@	64	40	k	107	6B
SYN (∧V)	22	16	A	65	41	l	108	6C
ETB (∧W)	23	17	B	66	42	m	109	6D
CAN (∧X)	24	18	C	67	43	n	110	6E
EM (∧Y)	25	19	D	68	44	o	111	6F
SUB (∧Z)	26	1A	E	69	45	p	112	70
ESC (∧[)	27	1B	F	70	46	q	113	71
FS (∧\)	28	1C	G	71	47	r	114	72
GS (∧∧)	29	1D	H	72	48	s	115	73
RS (∧)	30	1E	I	73	49	t	116	74
US (∧_)	31	1F	J	74	4A	u	117	75
SP ( )	32	20	K	75	4B	v	118	76
!	33	21	L	76	4C	w	119	77
"	34	22	M	77	4D	x	120	78
#	35	23	N	78	4E	y	121	79
$	36	24	O	79	4F	z	122	7A
%	37	25	P	80	50	{	123	7B
&	38	26	Q	81	51	|	124	7C
'	39	27	R	82	52	}	125	7D
(	40	28	S	83	53	~	126	7E
)	41	29	T	84	54	DEL	127	7F
*	42	2A	U	85	55			

7 Technical specifications

Display: 6 digit 38mm red LED or
                        5 digit 45mm red LED or
                        4 digit 57mm red LED or
                        4 or 6 digit 100mm red LED or
                        4 digit 200mm red LED type

Input: Either RS232, RS485 or Serial current loop
                        (input type is factory configured)

Baud rate::   300, 600, 1200, 2400, 4800, 9600 or 19.2k programmable

Microprocessor: MC68HC11 CMOS

Ambient Temperature: -10 to 60°C

Humidity: 5 to 95% non condensing

Power Supply: 100mm and 200mm LED and 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 ($\pm$10%) non isolated.

                        38mm or 45mm or 57mm LED or 39mm electro magnetic displays:
                        AC 240V or110V 50/60Hz or
                        DC 12 to 48V isolated or DC 24V ($\pm$10%) non isolated
                        Note: Supply type is factory configured

Outputs: 2 x Setpoint relays, form A, rated 5A at 240VAC

Power Consumption: AC supply 15 VA max
                        DC supply:
                        38 standard brightness and 45mm LED displays typically 100mA at 24V, peak 200mA
                        38mm and 58mm high contrast displays typically 150mA at 24V, peak 800mA
                        57mm LED display typically 250mA at 24V, peak 500mA
                        100mm LED displays typically 300mA at 24V, peak 2A
                        39mm electromagnetic typically 150mA at 24V, peak 1A
                        200mm LED displays typically 1A at 24V

DC output supply: Regulated 5VDC or unregulated 18 to 24VDC (link selectable) @ 50mA max.
                        Note: for instruments powered from non isolated DC the 18 to 24V unregulated
                        supply will be slightly less than the power supply voltage.

Physical characteristics - see chapter 2

8 Guarantee and service

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

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

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

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

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

This document is the property of the instrument manufacturer and may not be reproduced in whole or part without the written consent of the manufacturer.

This product is designed and manufactured in Australia.