Model PM4-BC
Binary/BCD/Gray Code
Panel Mount Display/Controller
Operation and Instruction Manual

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1 Introduction

1.1 General description

This manual contains information for the installation and operation of the PM4-BC Monitor. The PM4 is a general purpose instrument which may be configured to accept inputs of:

Binary (SEt I nPt function 5.27 set to bI n)

BCD (SEt I nPt function 5.27 set to bcd)

Gray code (SEt I nPt function 5.27 set to grAy)

Weighted binary (SEt I nPt function 5.27 set to d.I nP)

Scaled binary, BCD or Gray code (see USEr SCLE function 5.36)

The inputs may be presented in parallel, strobed or addressed form. Twenty input lines plus two GND lines are available. For BCD inputs, addressed, strobed or up to 4 digit parallel four of these input lines can be allocated for use as remote decimal point or display hold.

Optional relays, serial communications, analog or digital retransmission may also be provided.

The PM4 series of Panel Mount Monitors are designed for high reliability in industrial applications. The high brightness LED display provides good visibility even in areas with high ambient light levels. The high contrast LCD displays provide good visibility and are ideal for battery powered applications.

Full electrical isolation between power supply, input signals and retransmission output is provided by the PM4, thereby eliminating grounding and common voltage problems. This isolation feature makes the PM4 ideal for interfacing to computers, PLCs and other data acquisition devices. Note that the input signals themselves share a common ground.

Unless otherwise specified at the time of order, your PM4 has been factory set to a standard configuration. The PM4 series instruments can be configuration and calibrated easily by the user. Initial changes may require dismantling the instrument to alter PCB links, other changes are made by push button functions.

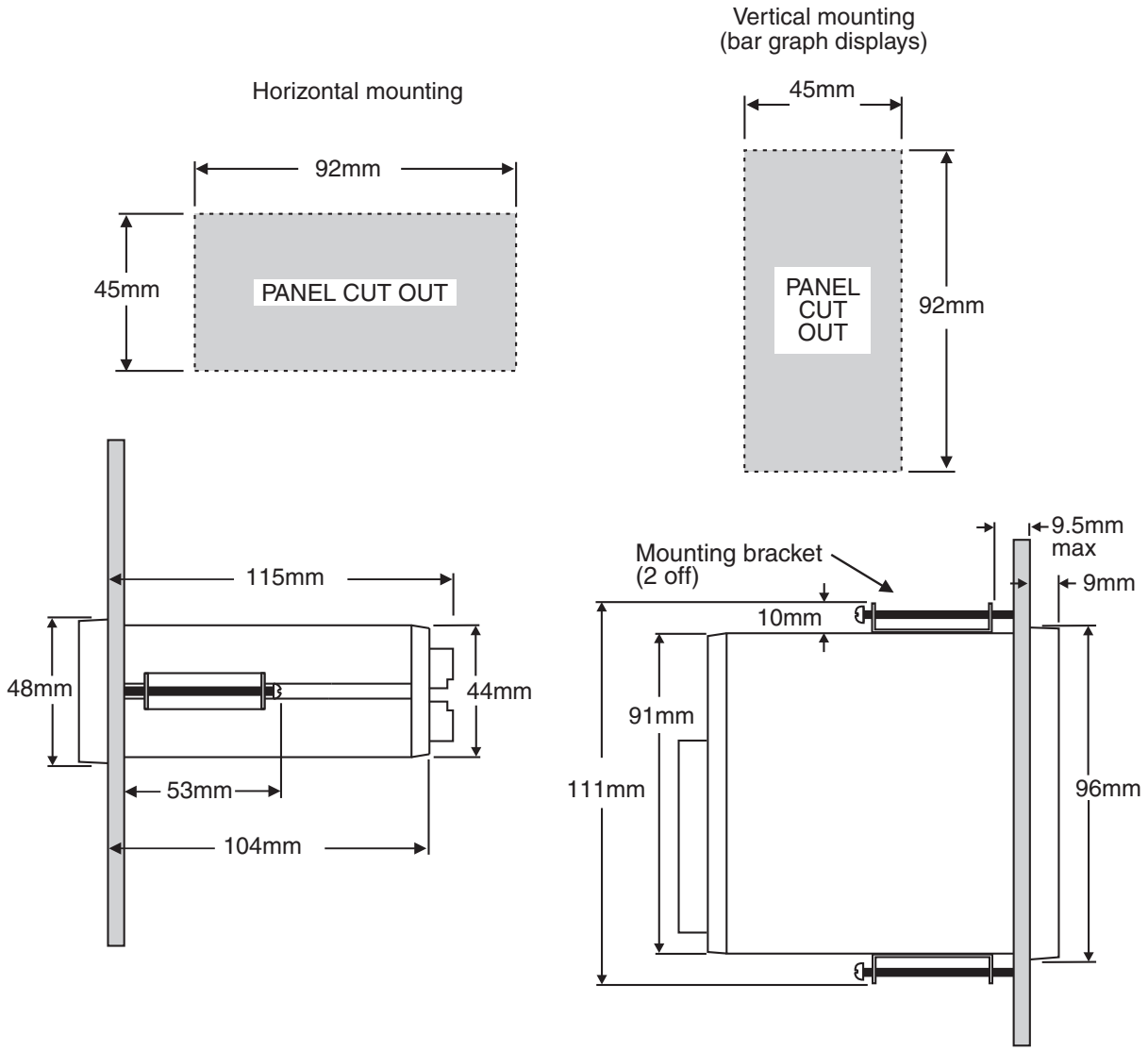
1.2 Output options

- 1, 3 or 6 optional relays rated 240VAC 5A (resistive load)
- Isolated analog retransmission configurable for 4–20mA, 0–1V or 0–10V
- Isolated RS485 or RS232 serial communications (ASCII or Modbus RTU)
- Isolated Digital output - binary or BCD up to 16 bit, NPN or PNP output types available
- Optional outputs are available in certain combinations only e.g. Extra relay plus RS232

2 Mechanical Installation

Choose a mounting position as far away as possible from sources of electrical noise such as motors, generators, fluorescent lights, high voltage cables/bus bars etc. An IP65 or IP67 access cover which may be installed on the panel and surrounds is available as an option to be used when mounting the instrument in damp/dusty positions. A wall mount case is available, as an option, for situations in which panel mounting is either not available or not appropriate. A portable carry case is also available, as an option, for panel mount instruments.

Prepare a panel cut out of 45mm x 92mm +1 mm / – 0 mm (see diagram below). Insert the instrument into the cut out from the front of the panel. From the rear of the instrument fit the two mounting brackets into the recess provided (see diagram below). Whilst holding the bracket in place, tighten the securing screws being careful not to over-tighten, as this may damage the instrument. Hint: use the elastic band provided to hold the mounting bracket in place whilst tightening securing screws.



3 Electrical installation

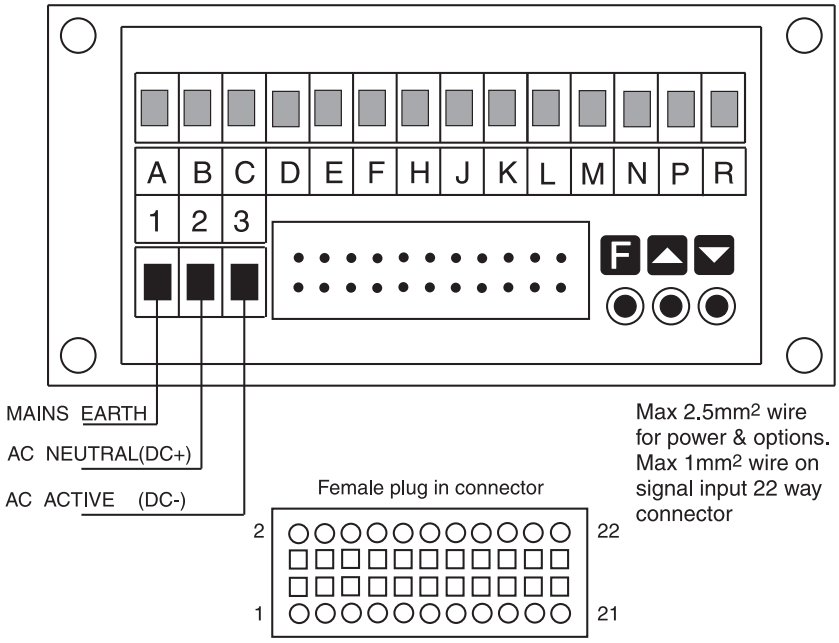
3.1 Electrical installation

The PM4 Panel Meter 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.

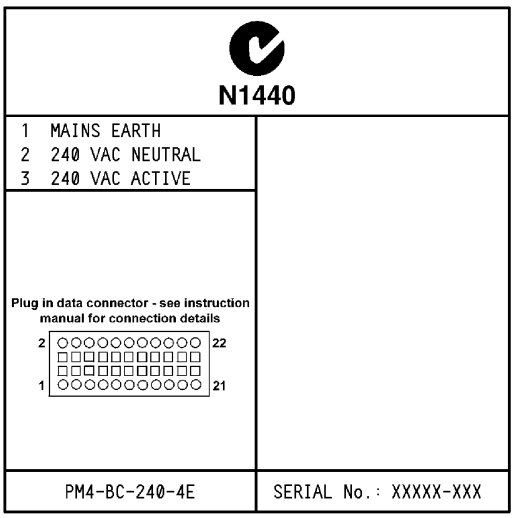
The plug in, screw type, terminal blocks allow for power supply wires of up to 2.5mm^2 to be fitted. Connect the wires to the appropriate terminals as indicated below. A 22 terminal plug in data connector is provided which will accept up to 1mm^2 wires. To insert wires to this data connector insert a screwdriver blade (max 2.5mm wide) into the square socket adjacent to the terminal required, push the wire into the terminal and remove the screwdriver blade. The wire will lock in place. See the "Weighted digital input operation and electrical connections" chapter page 37 for weighted digital input connections.

For connection details of optional outputs refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when options are fitted.

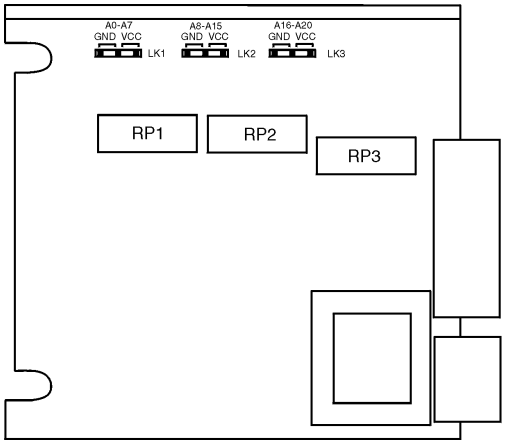
3.2 Instrument rear panel



Instrument label (example)



3.3 Resistor pack and link locations

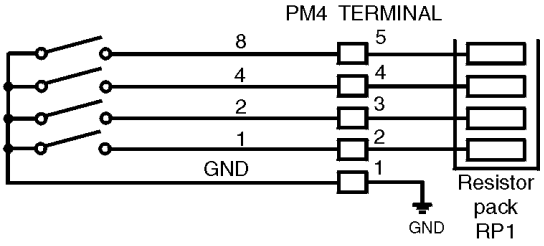


Resistor packs & link settings

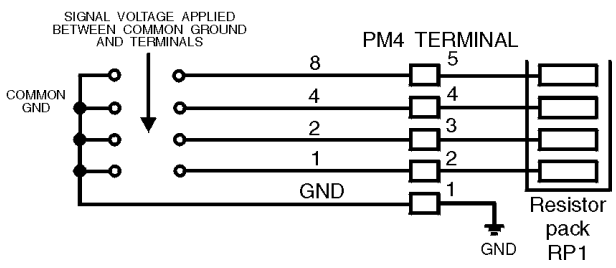
Input	RP1, 2 & 3	LK1, 2 & 3
Voltage free	100 Ohms	VCC
5V	100 Ohms	GND
12V to 24V	10k Ohms	GND
48V	22k Ohms	GND

3.4 Electrical connection examples

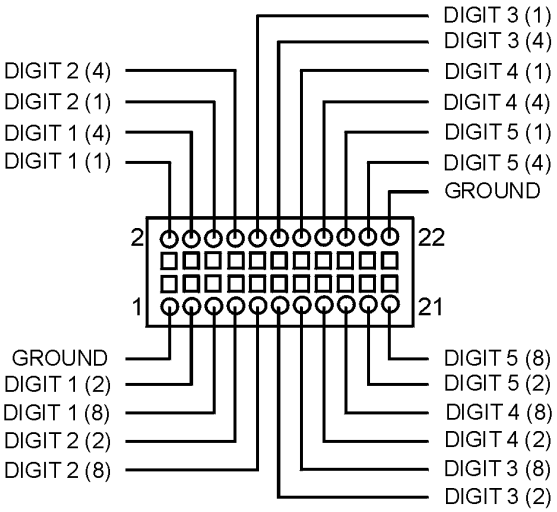
WIRING EXAMPLE - VOLTAGE FREE CONTACT

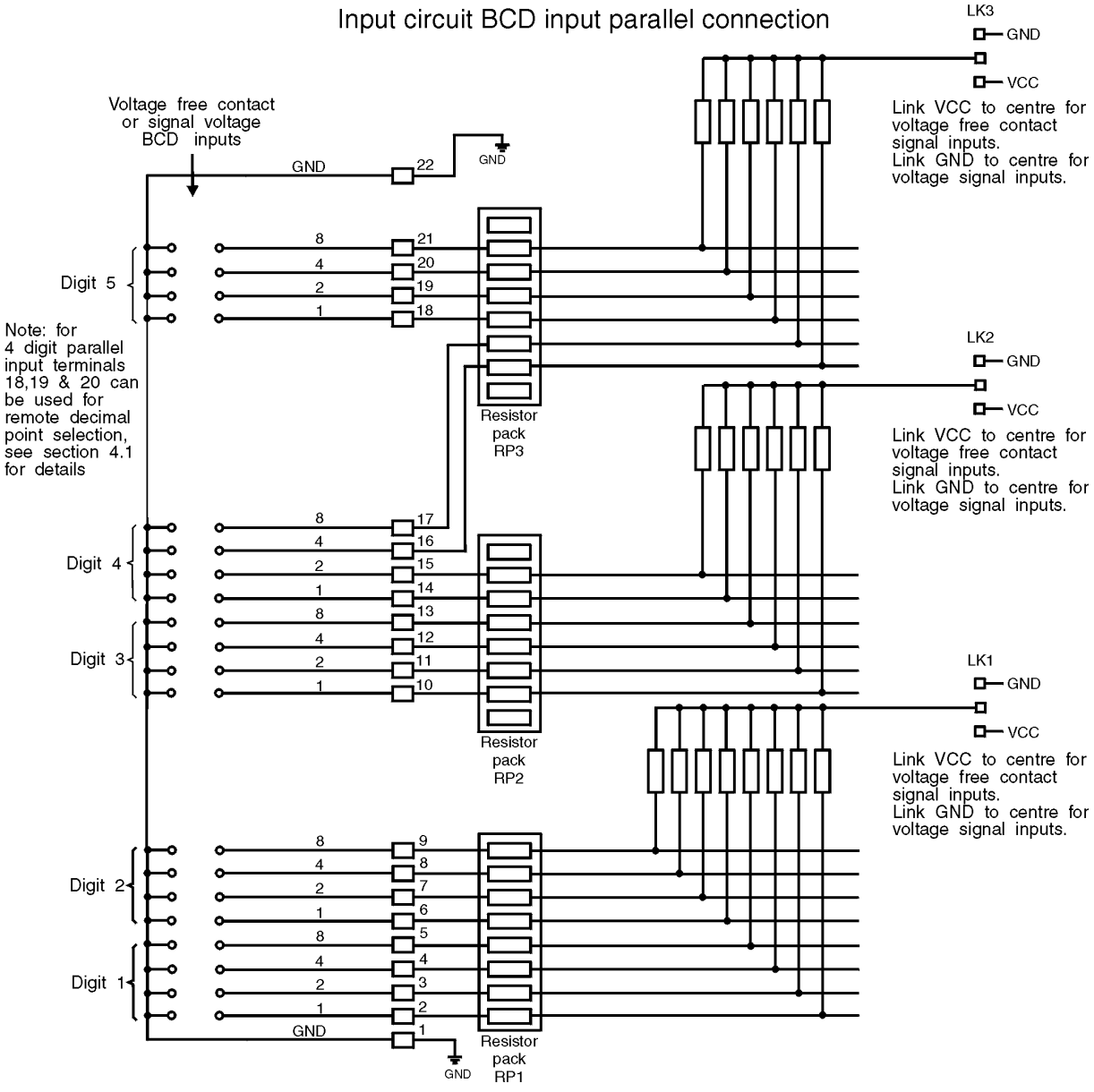


WIRING EXAMPLE - SIGNAL VOLTAGE

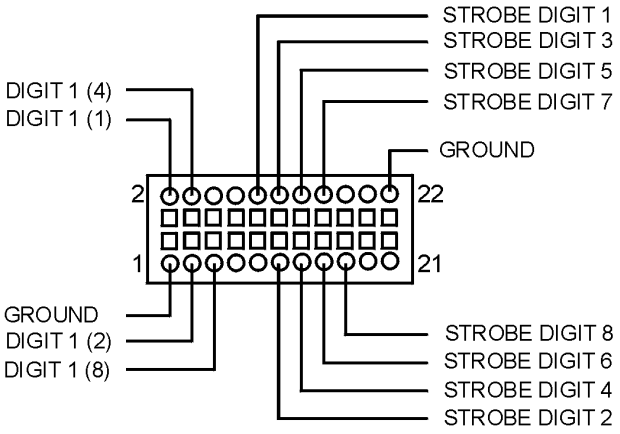


3.5 Parallel BCD input

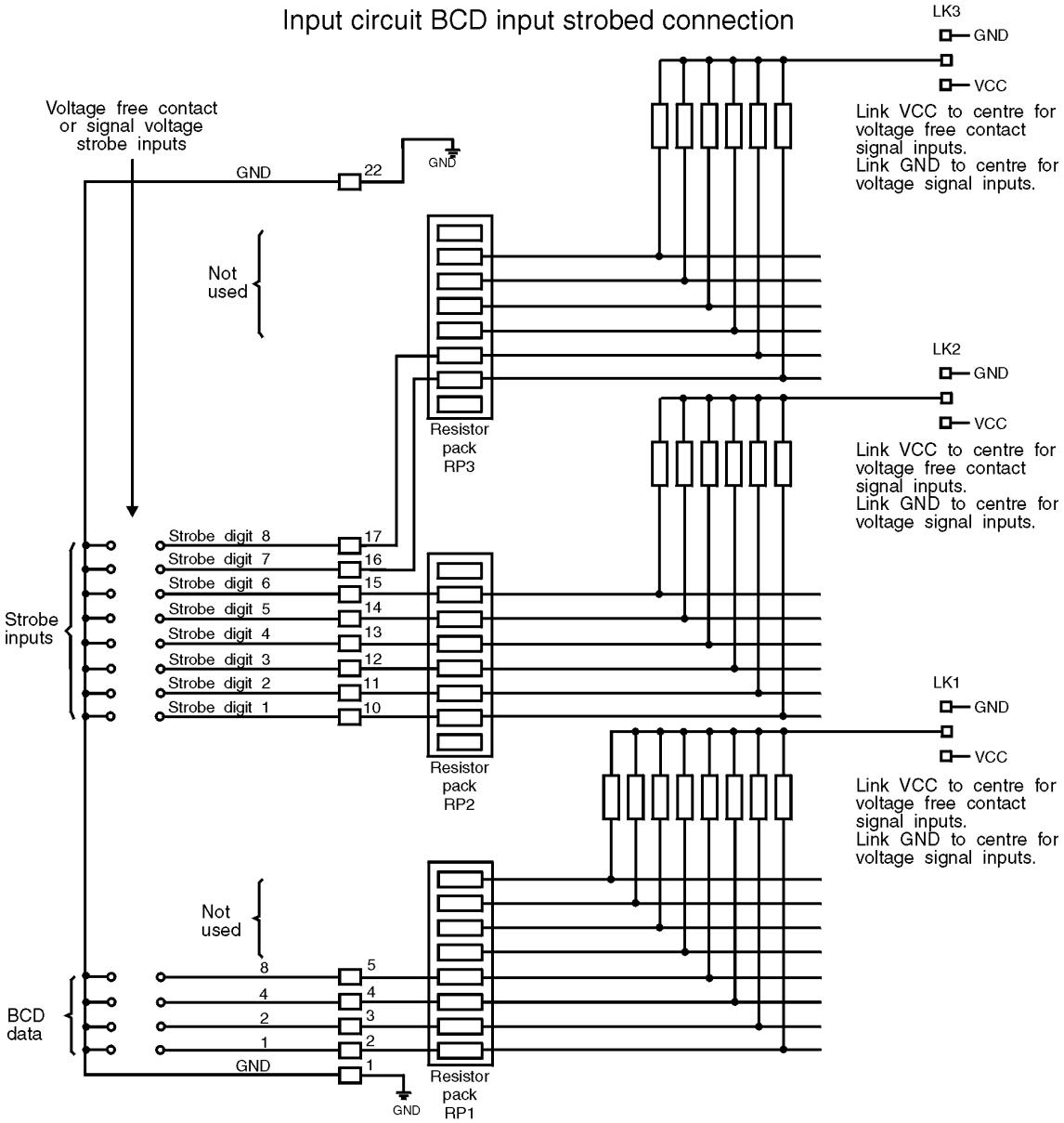




3.6 Strobed BCD input



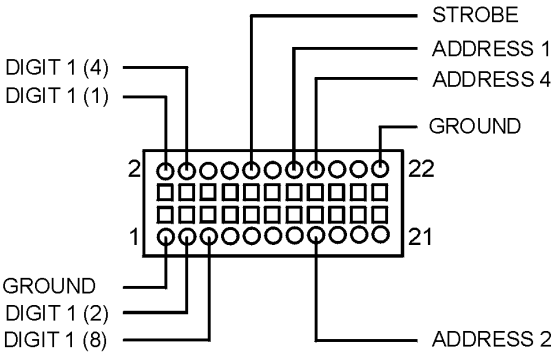
Input circuit BCD input strobed connection



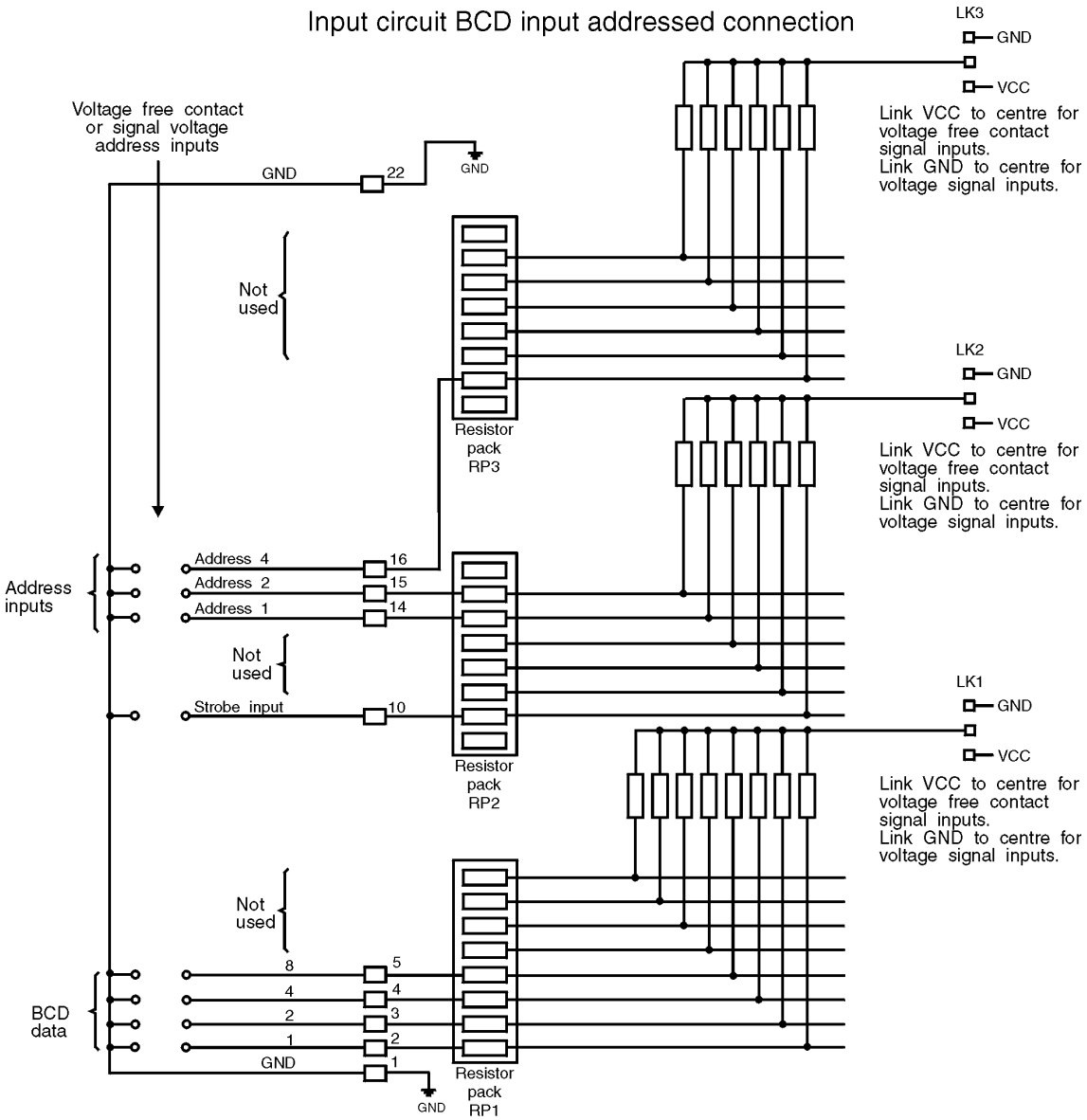
Strobe mode operation
1. Set data value
2. Activate required strobe input when ready

Example
If BCD data 1001 is placed on the input and the strobe input for digit 2 is activated a value of 9 will be sent to digit 2

3.7 Addressed BCD input



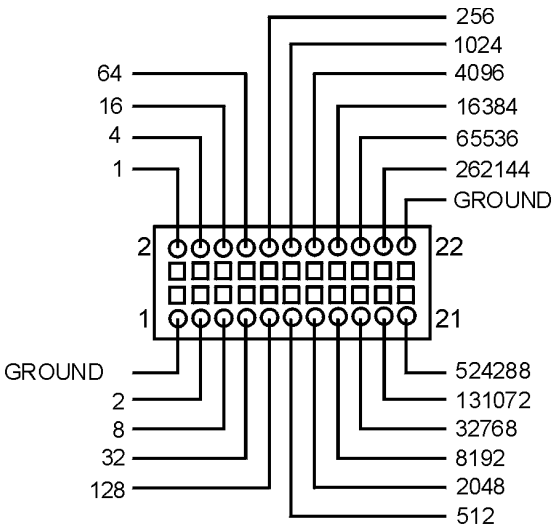
Input circuit BCD input addressed connection

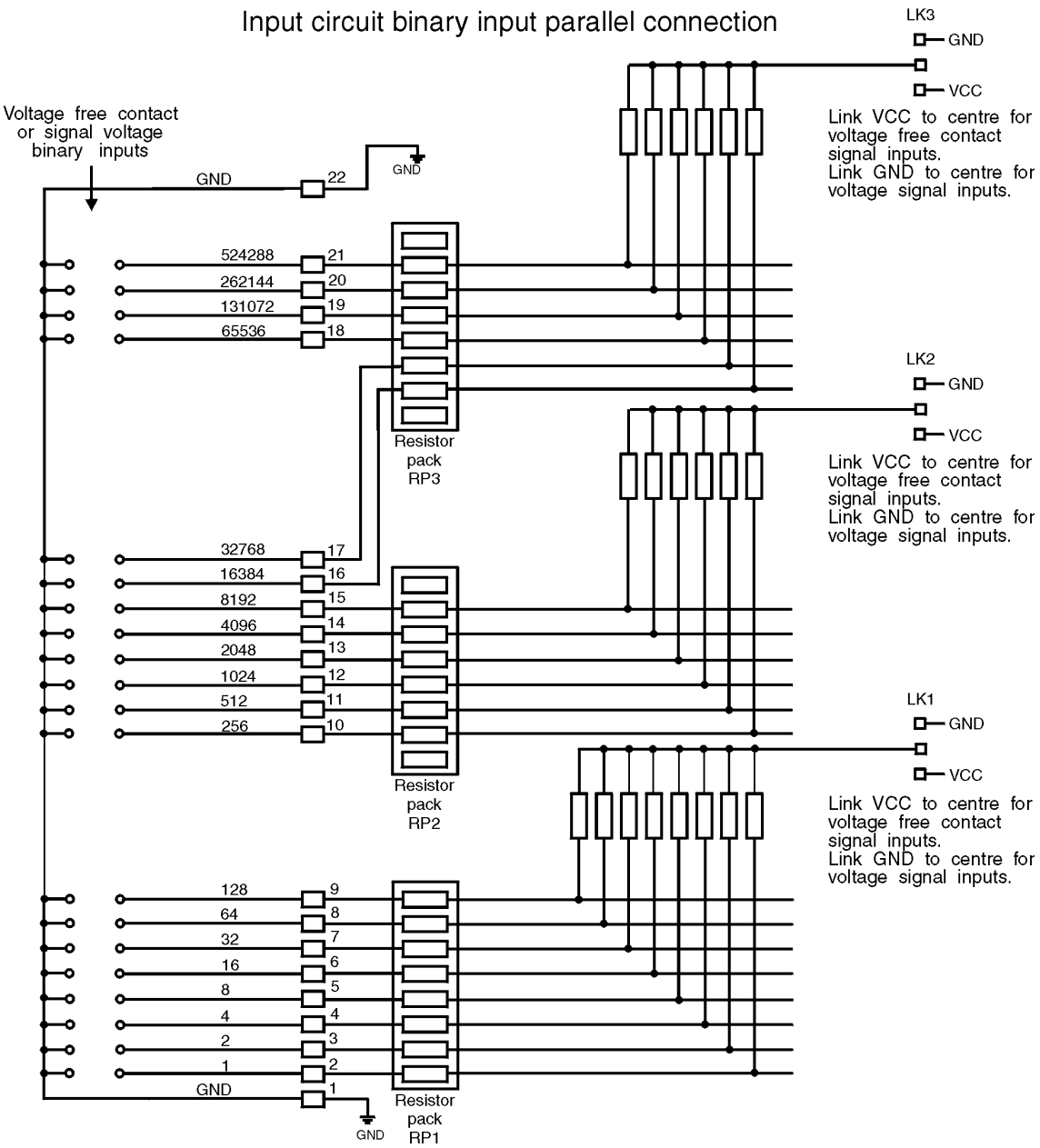


Addressed mode operation
1. Set data value
2. Set address
3. Activate strobe input when ready
See section 4.1 for details of remote decimal point selection

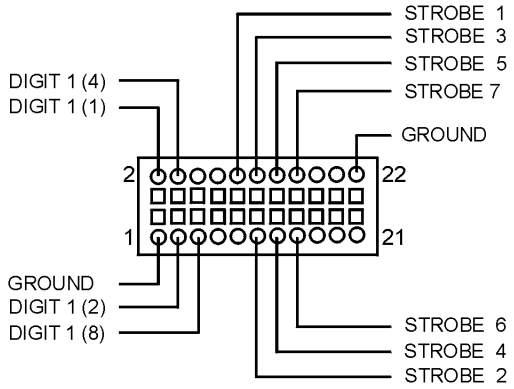
Address input	4	2	1	Digit addressed
Status	Inactive	Inactive	Inactive	1
	Inactive	Inactive	**Active**	2
	Inactive	**Active**	Inactive	3
	Inactive	**Active**	**Active**	4
	Active	Inactive	Inactive	5
	Active	Inactive	**Active**	6
	Active	**Active**	Inactive	7
	Active	**Active**	**Active**	8

3.8 Parallel binary input (also used for Gray code)

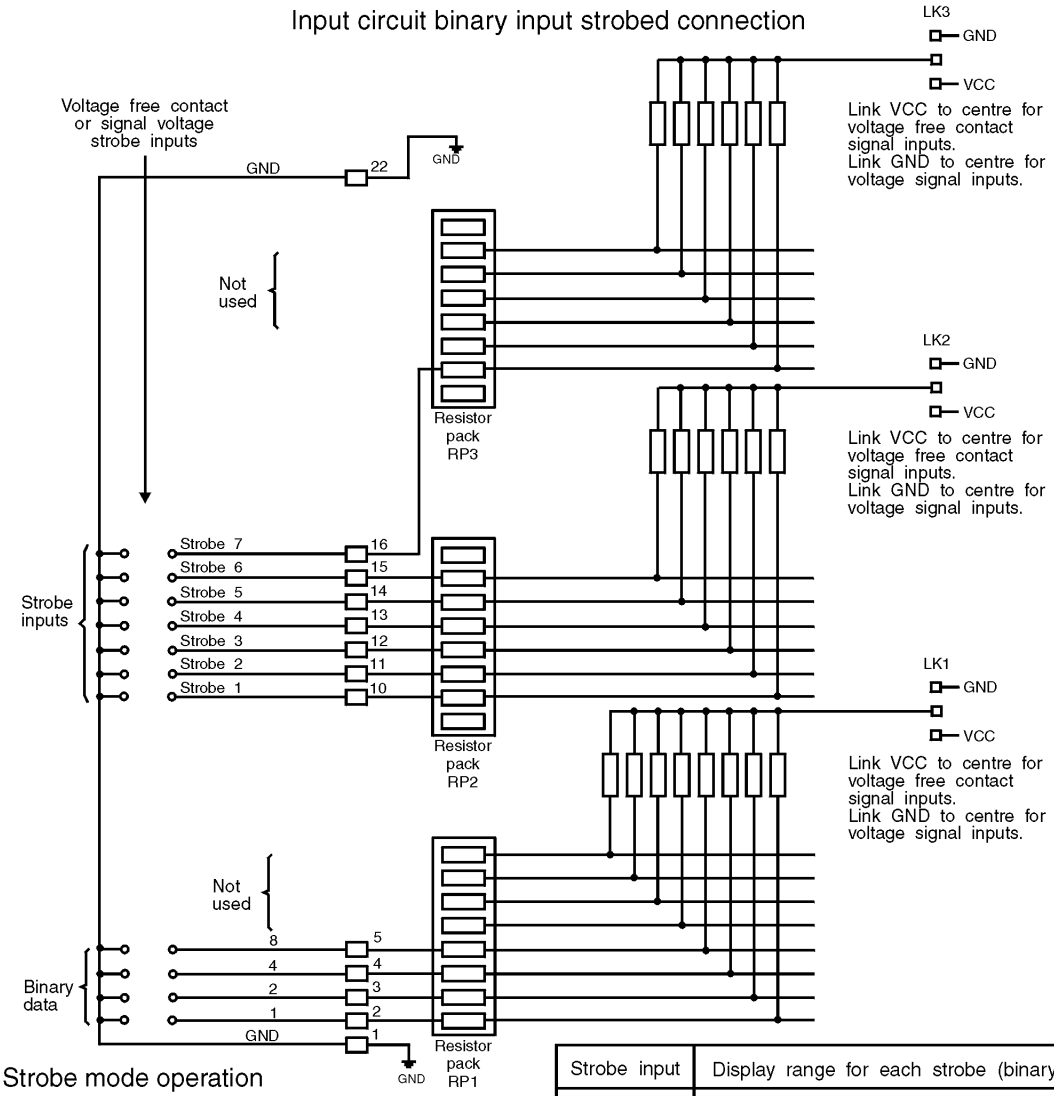




3.9 Strobed binary input (also used for Gray code)



Input circuit binary input strobed connection

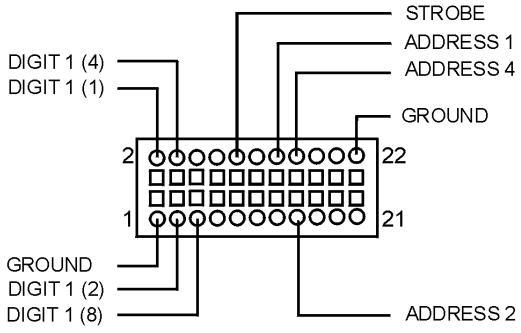


Strobe mode operation
1. Set data value
2. Activate required strobe input when ready

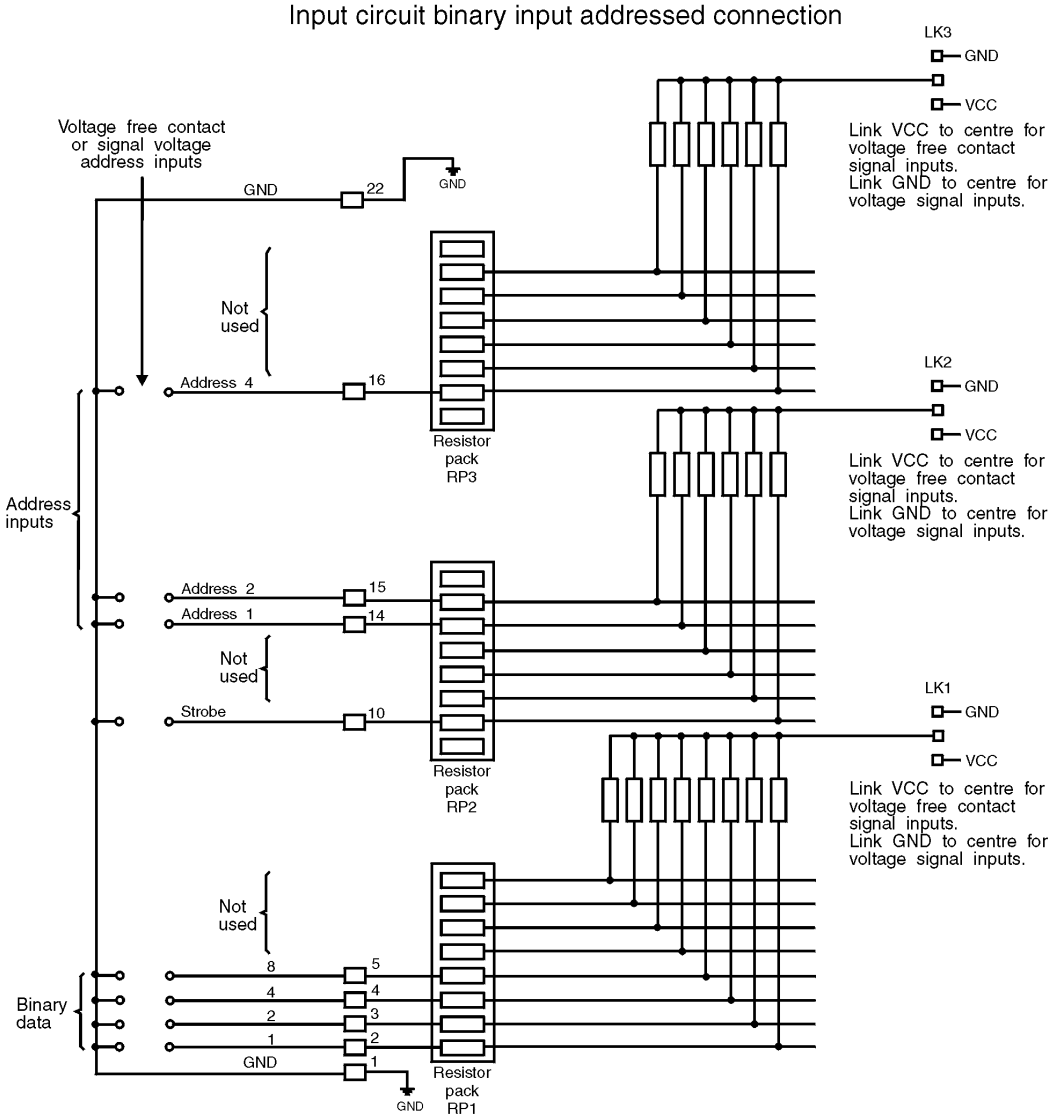
Example
1. Data value set to 0100
2. Strobe 2 activated - a value of 64
(0100 0000 in binary) is added to the display.

Strobe input	Display range for each strobe (binary input)
1	0000 to 1111 adds 0 to 15
2	0001 to 1111 adds 16 to 240
3	0001 to 1111 adds 256 to 3840
4	0001 to 1111 adds 4096 to 61440
5	0001 to 1111 adds 65536 to 983040
6	0001 to 1111 adds 1048576 to 15728640
7	0001 to 1111 adds 16777216 to 251658240
	Note 99999999 is the largest number which can be displayed on a 8 digit display

3.10 Addressed binary input (also used for Gray code)



Input circuit binary input addressed connection



Addressed binary mode operation
1. Set data value
2. Set address
3. Activate strobe

	Address input 4	2	1	Display range for each address (binary input)
Status	Inactive	Inactive	Inactive	0000 to 1111 adds 0 to 15
	Inactive	Inactive	**Active**	0001 to 1111 adds 16 to 240
	Inactive	**Active**	Inactive	0001 to 1111 adds 256 to 3840
	Inactive	**Active**	**Active**	0001 to 1111 adds 4096 to 61440
	Active	Inactive	Inactive	0001 to 1111 adds 65536 to 983040
	Active	Inactive	**Active**	0001 to 1111 adds 1048576 to 15728640
	Active	**Active**	Inactive	0001 to 1111 adds 16777216 to 251658240
				Note 99999999 is the largest number which can be displayed on a 8 digit display

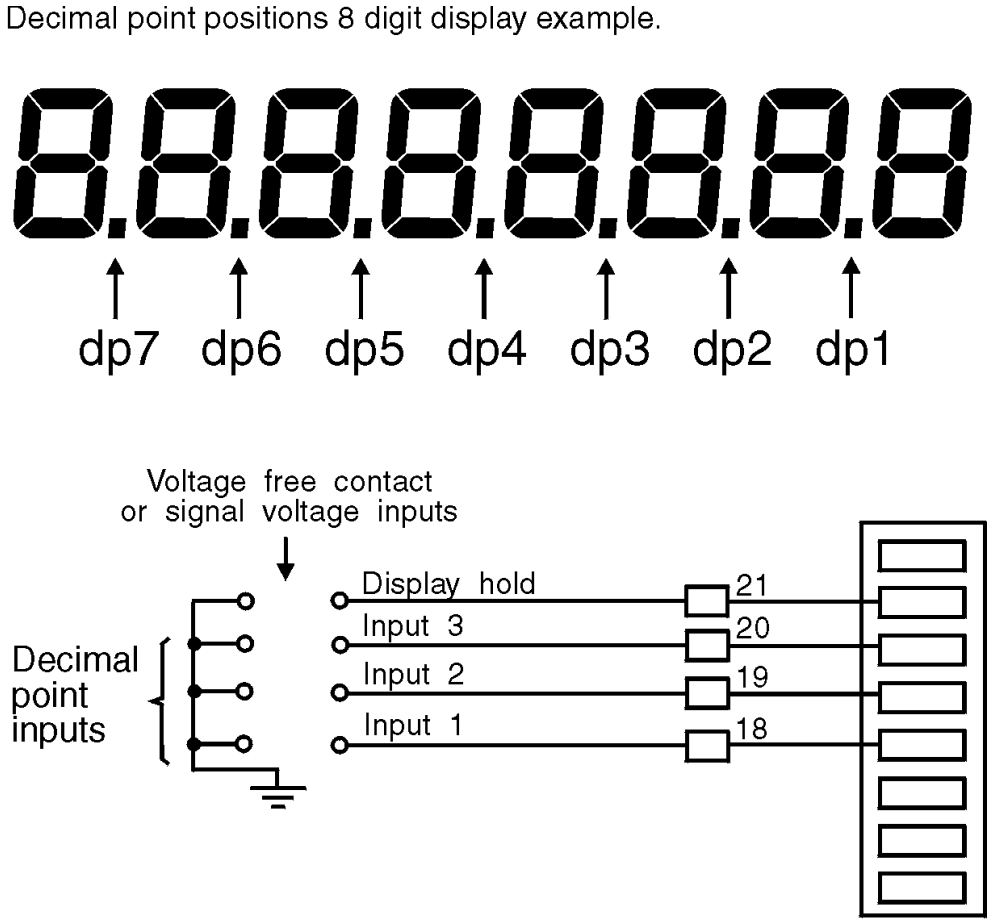
Example
1. Data value set to 0100
2. Address set to 001 (digit 2)
3. Strobe activated - a value of 64 (0100 0000 in binary) is added to the display.

3.11 Remote decimal point selection and display hold

For up to 4 digit parallel BCD or addressed BCD or strobed BCD inputs terminals 18, 19 and 20 may be used to select the decimal point position. To allow these inputs to be used in this manner the **dP I nPt** function must be set to **on**. When the **dP I nPt** function is set to on the software decimal point selection set at the **dCPt** function will be ignored. The table below shows the input requirements for remote decimal point selection.

The display hold input will hold the current display value when activated. The **I nPt HOLd** function must be set to on to enable the display hold input. The **HOLd POL** function may be set to **Hi** or **Lo**, this sets the input logic level at terminal 21 for display hold. The display hold input is available for use with up to 4 digit parallel BCD or addressed BCD or strobed BCD.

Decimal point positions 8 digit display example.

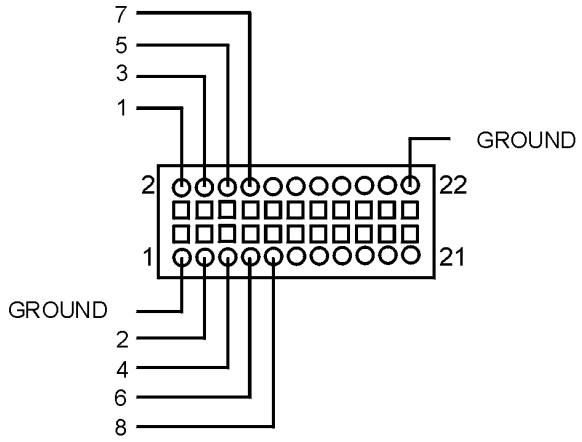


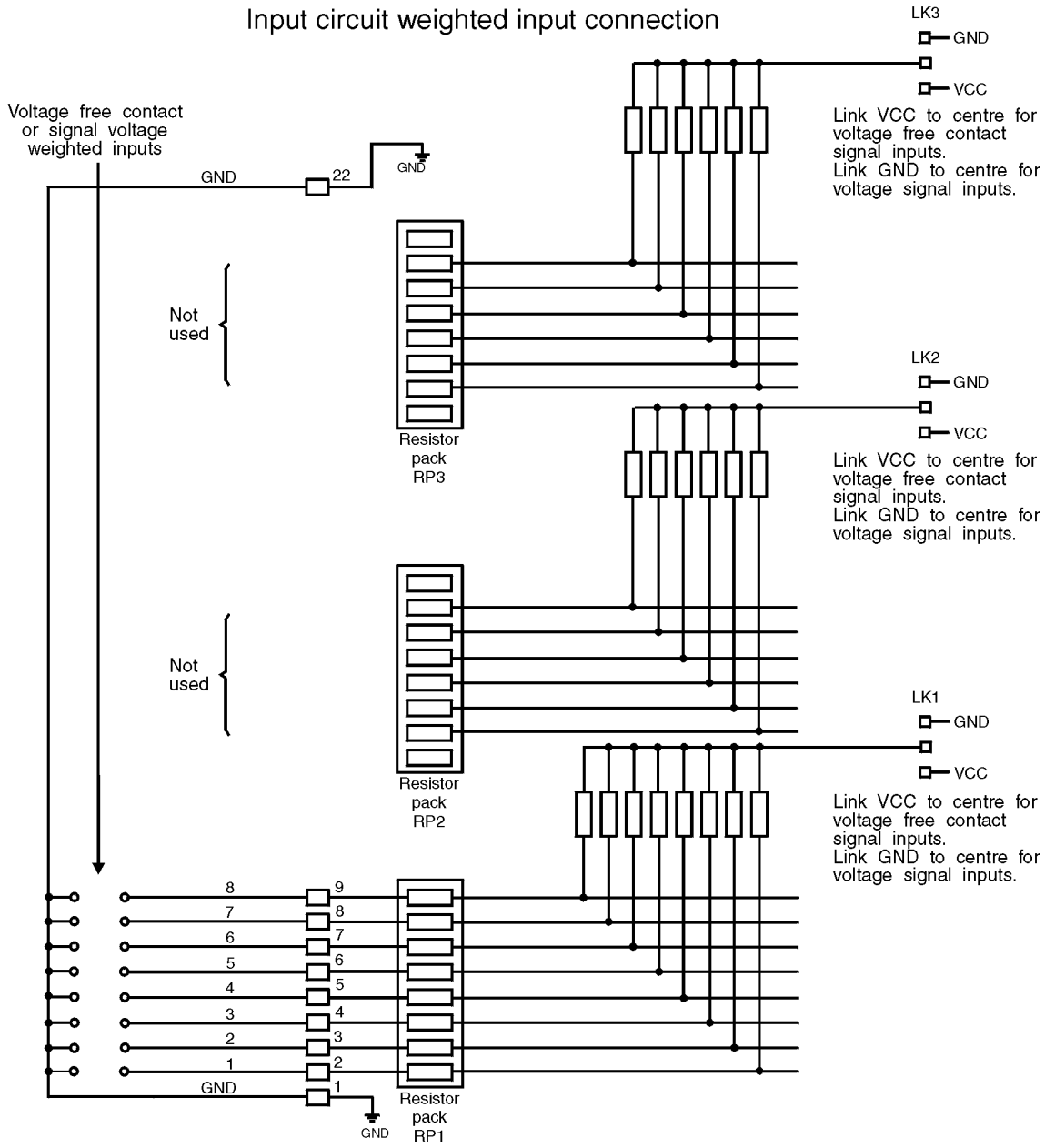
Decimal point selection table

	No decimal points	dp1 on	dp2 on	dp3 on	dp4 on	dp5 on	dp6 on	dp7 on
Input 1	Inactive	Active	Inactive	Active	Inactive	Active	Inactive	Active
Input 2	Inactive	Inactive	Active	Active	Inactive	Inactive	Active	Active
Input 3	Inactive	Inactive	Inactive	Inactive	Active	Active	Active	Active

3.12 Weighted digital input

See chapter 7 for description of this input type.

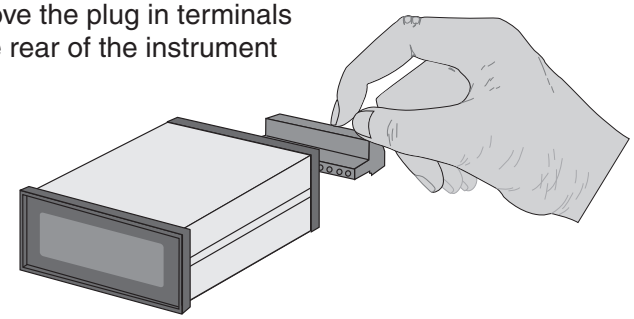




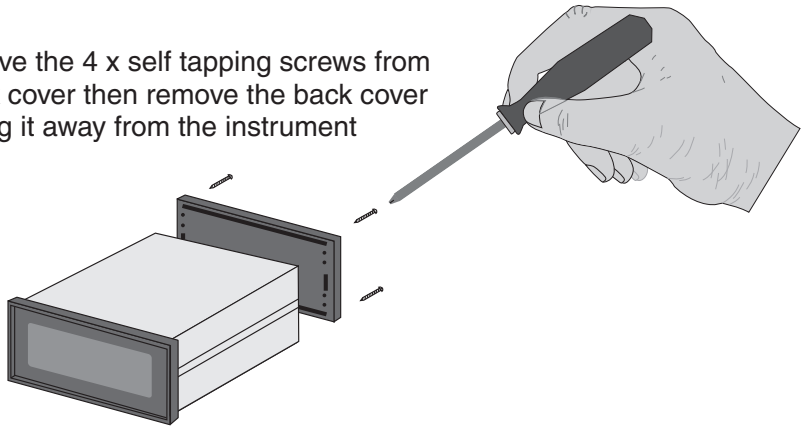
3.13 Input Output Configuration

If you need to alter the input or output configuration link settings proceed as follows:

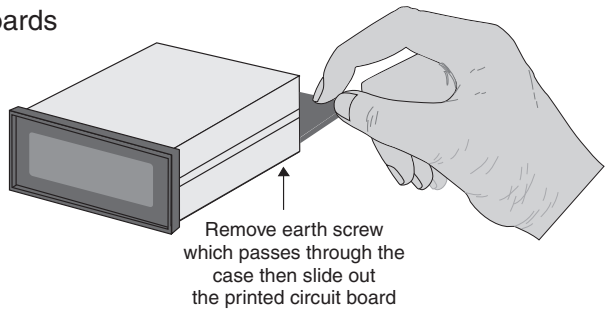
1. Remove the plug in terminals from the rear of the instrument



2. Remove the 4 x self tapping screws from the back cover then remove the back cover by pulling it away from the instrument



3. Remove the earth screw which passes through the underside of the case then slide out the board or boards



4. Configure the PCB links as requred, see appropriate chapter

5. Slide PCB back into case

6. Replace the earth screw which passes through the case

7. Refit the back cover and fix with the self tapping screws

8. Plug the terminal strips back into the rear of the instrument

4 Function tables - summary of setup functions

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

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

Display	Function	Range	Default	Your record	Ref/Page
A*x*Lo	Low setpoint value for the designated alarm relay *x* (*__Optional__)	Any display value or OFF	OFF	See 4.1	5.1 / 21
A*x*H,	High setpoint value for designated alarm relay *x* (*__Optional__)	Any display value or OFF	OFF	See 4.1	5.2 / 21
A*x*HY	Hysteresis value for the designated alarm relay *x*. (*__Optional__)	0 to 9999	10	See 4.1	5.3 / 22
A*x*tt	Trip time delay for the designated alarm relay *x*. (*__Optional__)	0 to 9999	0	See 4.1	5.4 / 23
A*x*rt	Reset time delay for the designated alarm relay *x*. (*__Optional__)	0 to 9999	0	See 4.1	5.5 / 23
A*x*n.o or A*x*n.c	Alarm relay *x* action to normally open (de-energised) or normally closed (energised) (*__Optional__)	A*x*n.o or A*x*n.c	A*x*n.o	See 4.1	5.6 / 23
A3.SP or A3.t2 etc.	Relay operation independent setpoint or trailing setpoint (*__Optional__)	A3.SP, A3.t2, A4.SP, A4.t2 or A4.t3	A3.SP	See 4.1	5.7 / 24
brgt	Display brightness level	1 to 15	15		5.8 / 24
bAr_	Bargraph low value (seen only on bargraph display instruments)	Any display value	0		5.9 / 24
bAr¯	Bargraph high value (seen only on bargraph display instruments)	Any display value	1000		5.10 / 25
rEC_	Analog output option low display value (*__Optional__)	Any display value	0		5.11 / 25
rEC¯	Analog output option high display value (*__Optional__)	Any display value	1000		5.12 / 25

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

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
bAr TYPE	Bargraph type for instruments with bargraph display (seen only on bargraph display instruments)	bAr, S.dot, d.dot, C.bAr or r.dot	bAr		5.13 / 26
d9OP	Digital output option mode (*Optional)	bcd, b.SCL, bin or bin2	bin2		5.14 / 27
d9.OP	Digital output option polarity (*Optional)	AIo or AHi	AIo		5.15 / 27
bcd Strt	Digital output option BCD start position (*Optional)	0, 1 or 2	0		5.16 / 27
di 9_	Digital output option low value (*Optional)	Any display value	0		5.17 / 27
di 9¯	Digital output option high value (*Optional)	Any display value	1000		5.18 / 28
dCPt	Decimal point	0, 0.1 etc.	0		5.19 / 28
Pbut	P button function (for instruments with front P button)	NONE, Hi, Lo or Hi Lo	NONE		5.20 / 28
ACCS	Access mode	OFF, EASY, NONE or ALL	OFF		5.21 / 29
INPt biES	Number of input bits	1 to 20 or 1 to 31	14		5.22 / 29
SIGN	Sign bit on or off	on or OFF	OFF		5.23 / 29
diSP rAtE	Display rate	1, 2, 4, 8, 16 or 32	4		5.24 / 30
di.nP	Number of weighted digital input	1 to 8	4		5.25 / 30
di 1, di 2 etc.	Weighted digital input	Any display value	0		5.26 / 30
SEt INPt	Set input type	bin, bcd, GrAY or di.nP	bin		5.27 / 30
INPt	Set input mode	PArL, Strb or Addr	PArL		5.28 / 30
dAtA POL	Data polarity	Hi or Lo	Hi		5.29 / 31
Strb POL	Strobe polarity	Hi or Lo	Hi		5.30 / 31
bcd CodE	BCD code	0 to 5	0		5.31 / 31

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

bcd dI 9t	Number of BCD digits to be displayed	1 to number of display digits on the instrument	4		5.32 / 31
dP I nPt	Remote decimal point on or off	on or OFF	OFF		5.33 / 32
I nPt HOLd	Remote display hold on or off	on or OFF	OFF		5.34 / 32
HOLd POL	Remote display hold polarity	Hi or Lo	Lo		5.35 / 32
USEr SCLE	User scale	n/a	n/a		5.36 / 32
CAL 1	First scaling point	n/a	n/a		5.37 / 33
CAL2	Second scaling point	n/a	n/a		5.38 / 33
CAL OFSt	Scaling offset	n/a	n/a		5.39 / 33
bAUd rAtE	Baud rate for serial communications (*Optional)	300.600. 1200.2400. 4800.9600. 19.2 or 38.4	9600		5.40 / 33
PrtY	Parity for serial communications (*Optional)	nONE.EUEn or odd	nONE		5.41 / 33
O.Put	Output for serial communications (*Optional)	dI SP.Cont. POLL, A.buS or ñ.buS	Cont		5.42 / 34
Addr	Instrument address for serial communications (*Optional)	0 to 31	0		5.43 / 34

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

4.1 Relay table

Record your relay settings in the table below. Note there is no relay 1 in this instrument.

Display	Relay 2	Relay 3	Relay 4	Relay 5	Relay 6	Relay 7
A*x*Lo						
A*x*Hi						
A*x*HY						
A*x*tt						
A*x*rt						
A*x*n.o or A*x*n.c						
A*x*SP or A*x*t 1 etc.	n/a					

5 Explanation of functions

The PM4 setup and calibration functions are configured through a push button sequence. The three push buttons located at the rear of the instrument (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.

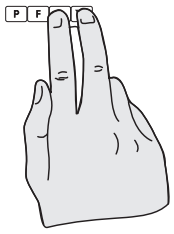
CAL mode (power up sequence plus push button sequence) allows access to all functions including calibration parameters.

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. See the flow chart example on the following page.

Entering CAL Mode

1. Remove power from the instrument. Hold in the **F** button and reapply power. The display will briefly 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.



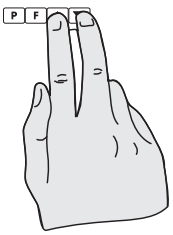
3. Within 2 seconds of releasing the **F** button press, then release the ▲ and ▼ buttons together. The display will now indicate **FUNC** followed by the first function.

Note: 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.

Entering FUNC Mode

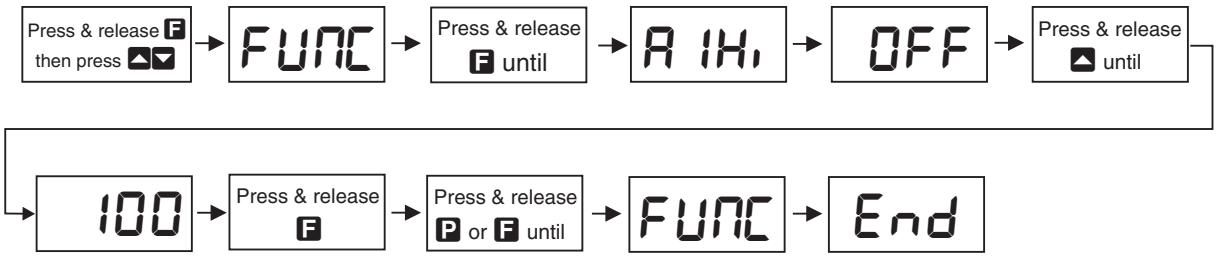
No special power up procedure is required to enter **FUNC** mode.

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

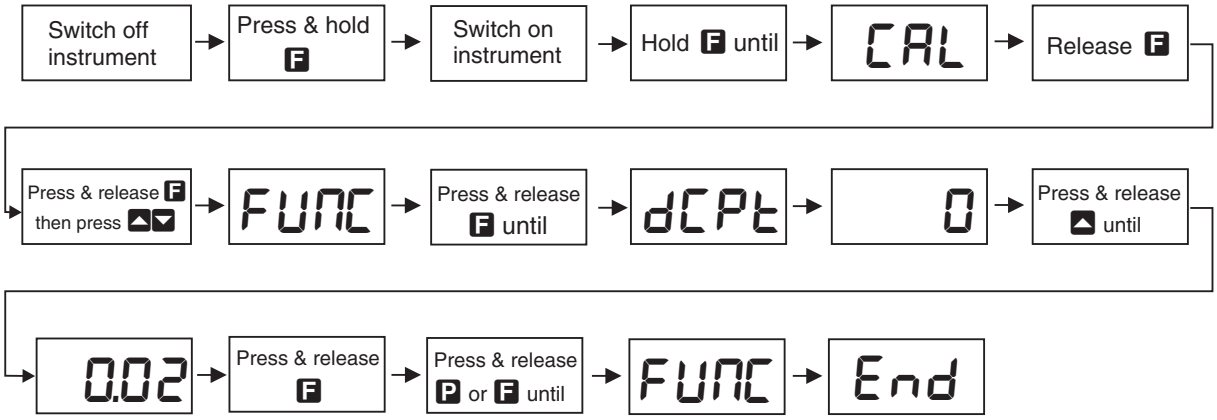


2. Within 2 seconds of releasing the **F** button press, then release the ▲ and ▼ buttons together. The display will now indicate **FUNC** followed by the first function.

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



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



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 nP 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.

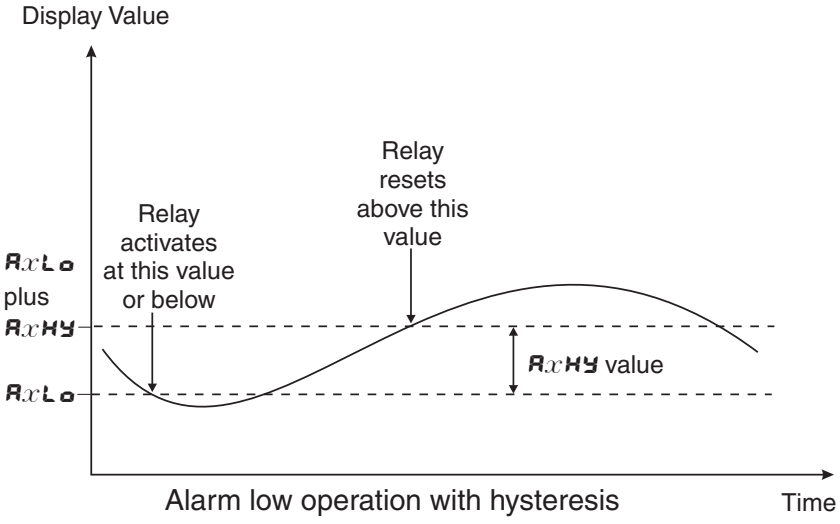
Explanation of Functions

5.1 Alarm relay low setpoint

Display: **AxLo**
Range: Any display value or **OFF**
Default Value: **OFF**

Optional relay low setpoint (binary, Gray code, whole number BCD (**bcd CodE** = **0**) and weighted digital inputs only) - note there is no relay 1 therefore relay numbering starts from 2. Note x will be replaced by the relay number when displayed e.g. **A2Lo** for relay 2. The **A**xLo function displays and sets the low setpoint value for the alarm relay. The low alarm setpoint may be disabled by pressing the ▲ and ▼ pushbuttons simultaneously. When the alarm is disabled the display will indicate **OFF**. Use ▲ or ▼ to adjust the setpoint value if required. The alarm will activate when the displayed value is lower than the setpoint value. Each relay may be configured with both a low and high setpoint if required. When both a low and high setpoint is used the relay will be activated when the display reading moves outside the band set between low and high setpoints

Example:
If **A2Lo** is set to **10** then relay 2 will activate when the display value is 10 or less.



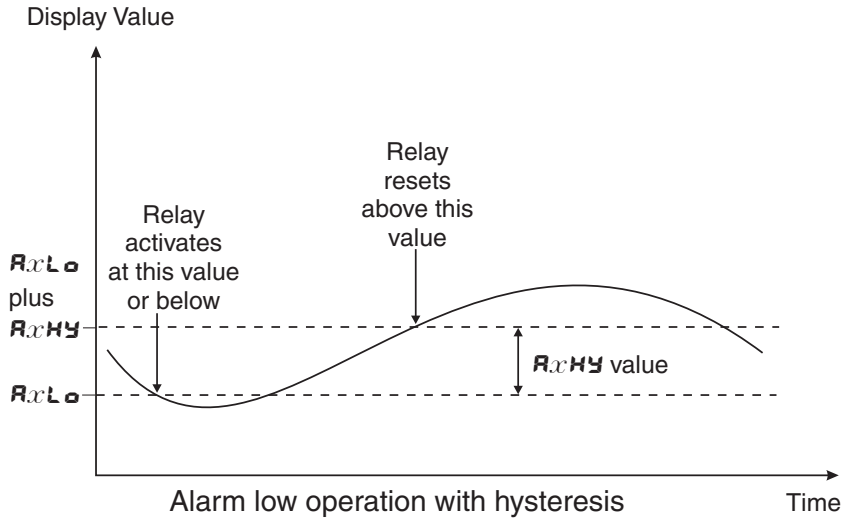
5.2 Alarm relay x high setpoint

Display: **AxHi**
Range: Any display value or **OFF**
Default Value: **OFF**

Optional relay high setpoint (binary, Gray code, whole number BCD (**bcd CodE** = **0**) and weighted digital inputs only) - note there is no relay 1 therefore relay numbering starts from 2. Note x will be replaced by the relay number when displayed e.g. **A2Hi** for relay 2. The **A**x**Hi** function displays and sets the high setpoint value for the alarm relay. The high alarm setpoint may be disabled by pressing the ▲ and ▼ pushbuttons simultaneously. When the alarm is disabled the display will indicate **OFF**. Use ▲ or ▼ to adjust the setpoint value if required. The alarm will activate when the displayed value is equal to or higher than the setpoint value. Each relay may be configured with both a low and high setpoint if required. When both a low and high setpoint is

used the relay will be activated when the display reading moves outside the band set between low and high setpoints.

Example:
If A2Hi is set to 100 then relay 2 will activate when the display value is 100 or higher.



5.3 Alarm relay hysteresis (deadband)

Display: AxHY
Range: 0 to 9999
Default Value: 10

Displays and sets the alarm relay hysteresis limit for the designated relay x (binary, Gray code, whole number BCD (bcd CodE = 0) and weighted digital inputs only) - note there is no relay 1 therefore relay numbering starts from 2. Note x will be replaced by the relay number when displayed e.g. A2HY for relay 2. To set a relay hysteresis value go to the AxHY function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value. The hysteresis value is common to 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 A2HY is set to zero the alarm relay 2 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 A2Hi is to 50.0 and A2HY 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 A2Lo is to 20.0 and A2HY 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 A2Hi is set to 100 and A2HY 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.

5.4 Alarm relay trip time

Display: Rxtt
Range: 0 to 9999
Default Value: 0

Displays and sets the alarm trip time in seconds. The trip time is common for both alarm high and low setpoint values (binary, Gray code, whole number BCD (bcd CodE = 0) and weighted digital inputs only) - note there is no relay 1 therefore relay numbering starts from 2. 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 to 9999 seconds. To set a trip time value go to the Rxtt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

Example: If R2tt is set to 5 seconds then the display must indicate an alarm value for a full 5 seconds before relay 2 will activate.

5.5 Alarm relay reset time

Display: Rxrt
Range: 0 to 9999
Default Value: 0

Displays and sets the alarm reset delay time in seconds (binary, Gray code, whole number BCD (bcd CodE = 0) and weighted digital inputs only) - note there is no relay 1 therefore relay numbering starts from 2. 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 to 9999 seconds. To set a reset time value go to the Rxrt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

Example: If R2rt is set to 10 seconds then the resetting of alarm relay 2 will be delayed by 10 seconds.

5.6 Alarm relay normally open/closed

Display: Rxn.o or Rxn.c
Range: Rxn.o or Rxn.c
Default Value: Rxn.o

Displays and sets the setpoint alarm relay x action to normally open (de-energised) or normally closed (energised), when no alarm condition is present (binary, Gray code, whole number BCD (bcd CodE = 0) and weighted digital inputs only) - note there is no relay 1 therefore relay numbering starts from 2. Since the relay will always open when power is removed a normally closed alarm is often used to provide a power failure alarm indication. To set the alarm relay for normally open or closed go to the Rxn.o or Rxn.c function and use the ▲ or ▼ push buttons to

set the required operation then press F to accept this selection. **Example:**
If set to A2n.o alarm relay 2 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.

5.7 Alarm relay setpoint or trailing operation

Display:	A3.SP or A3.t2 etc.
Range:	A3.SP, A3.t2, A4.SP, A4.t2 or A4.t3
Default Value:	A3.SP

Relay operation independent setpoint or trailing setpoint, this function will not be seen unless optional relays are fitted (binary, Gray code, whole number BCD (bcd CodE = 0) and weighted digital inputs only) - note there is no relay 1. Relay 3 may be programmed to operate with an independent setpoint value or may be linked to operate at a fixed difference to relay 2 setpoint, known as trailing operation.

Relay 4 may be programmed to operate with an independent setpoint value or may be linked to operate at a fixed difference to relay 2 setpoint or relay 3 setopoint.

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 relay 3 set to trail alarm 2, if A2H, is set to 10.0 and A3H, is set to 5.0 then Alarm 2 will activate at 10.0 and alarm 3 will activate at 15.0 (i.e. 10.0 + 5.0). If Alarm 3 had been set at -5.0 then alarm 3 would activate at 5.0 (i.e. 10.0 – 50).

5.8 Display brightness

Display:	brgt
Range:	1 to 15
Default Value:	15

Displays and sets the digital display brightness. The display brightness is selectable from 1 to 15, where 1 = lowest intensity and 15 = 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. To set brightness level go to the brgt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

5.9 Bargraph low value

Display:	bAr_
Range:	Any display value
Default Value:	0

Seen only in bargraph display instruments. Displays and sets the bar graph low value i.e. the value on the 7 segment display at which the bargraph will start to rise. This may be independently set anywhere within the display range of the instrument. Note: The bAr_ and bAr¯ settings are referenced from the 7 segment display readings, not the bargraph scale values. The bargraph scale

may scaled differently to the 7 segment display. For example the bargraph scale may be indicating percentage fill of a tank whilst the 7 segment display is indicating actual process units. To set bargraph low level go to the bAr_ function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

5.10 Bargraph high value

Display: bAr⁻
Range: Any display value
Default Value: 1000

Seen only in bargraph display instruments. Displays and sets the bar graph high value i.e. the value on the 7 segment display at which the bargraph will reach its maximum indication (e.g. all LEDs illuminated). May be independently set anywhere within the display range of the instrument. To set bargraph high level go to the bAr⁻ function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

5.11 Analog output option low value

Display: rEC_
Range: Any display value
Default Value: 0

Seen only when analog retransmission option fitted. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted for wiring details and link settings. Displays and sets the analog retransmission (4–20mA, 0–1V or 0–10V, link selectable) output low value (4mA or 0V) in displayed engineering units. To set the analog output low value go to the rEC_ function and use the ▲ or ▼ push buttons to set the required value then press F to accept this selection.

Example: If it is required to retransmit 4mA when the display indicates 0 then select 0 in this function using the ▲ or ▼ button.

5.12 Analog output option high value

Display: rEC⁻
Range: Any display value
Default Value: 1000

Seen only when analog retransmission option fitted. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted for wiring details and link settings. Displays and sets the analog retransmission (4–20mA, 0–1V or 0–10V, link selectable) output high display value (20mA, 1V or 10V) in displayed engineering units. To set the analog output high value go to the rEC⁻ function and use the ▲ or ▼ push buttons to set the required value then press F to accept this selection.

Example: If it is required to retransmit 20mA when the display indicates 50 then select 50 in this function using the ▲ or ▼ button.

5.13 Bargraph type for instruments with bargraph display

Display: bAr tYPE

Range: bAr, S.dot, d.dot, C.bAr or r.dot

Default Value: bAr

Bar graph display operation mode - seen only in vertical or circular bargraph display instruments. Allows selection of bargraph operation mode. Choices available are:

- bAr - conventional solid bargraph display i.e. all LEDs illuminated when at full scale. When scaling the display use the bAr_ and bAr¯ functions e.g. bAr_ = 0 and bAr¯ = 100 will give a bargraph with no segments lit at a 7 segment display reading of 0 and all segments lit with a 7 segment display reading of 100.

- S.dot - single dot display. A single segment will be lit to indicate the input readings position on the scale. When scaling the display use the bAr_ and bAr¯ functions e.g. bAr_ = 0 and bAr¯ = 100 will give a bargraph with the bottom segment lit at a 7 segment display reading of 0 and the top segment lit with a 7 segment display reading of 100. Note: this could also be set up as a centre zero single dot display by entering a negative value and positive value. e.g. bAr_ = -100, bAr¯ = 100.

- d.dot - double dot display. Two segments will be lit to indicate the input reading position on the scale. The reading should be taken from the middle of the two segments. When scaling the display use the bAr_ and bAr¯ functions e.g. bAr_ = 0 and bAr¯ = 100 will give a bargraph with the bottom two segments lit at a 7 segment display reading of 0 and the top two segments lit with a 7 segment display reading of 100. Note: this could also be set up as a centre zero double dot display by entering a negative value and positive value. e.g. bAr_ = -100, bAr¯ = 100.

- C.bAr - centre bar display. The display will be a solid bargraph but will have its zero point in the middle of the display. If the seven segment display value is positive the bargraph will rise. If the seven segment display value is negative then the bargraph will fall. When scaling the display use the bAr_ and bAr¯ functions e.g. bAr_ = 0 and bAr¯ = 100 will give a bargraph with all the bottom half segments lit at a 7 segment display reading of -100 and all the top segments lit with a 7 segment display reading of 100.

- r.dot - modulus or wrap around single dot bargraph. This mode of operation allows the bargraph to wrap around the limits set by the bAr_ and bAr¯ functions by dividing the 7 segment display by the modulus (the modulus is the difference between 0 and bAr¯) and displaying the remainder. For example if bAr_ is set to 0 and bAr¯ is set to 10 then in other bargaph modes when the 7 segment display reads a value such as 25 the bargraph would be stuck at the high limit of its travel since it cannot go beyond 10. In r.dot mode the display will wrap around at 10 then continue up the bar again and will be at the midpoint of the bargraph when the 7 segment display shows 25 (as it would for a 7 segment display of 15, 35, etc.). In this example for a 7 segment display of 25 the value of 25 is divided by the modulus value of 10 in this example and the remainder displayed i.e. 10 goes into 25 twice with the remainder of 5 and so a bargaph position of 5 is displayed. This mode will operate on both vertical and circular bargraph type displays.

5.14 Digital output option mode

Display: d9OP
Range: bcd, b.SCL, bin or bin2
Default Value: bin2

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. Selections available are: bin2 (signed binary) i.e. -32767 to 32767, bin (unsigned binary) i.e. 0 to 65535, b.SCL (scaled binary, see d9-L and d9-H below), bcd (binary coded decimal) i.e. up to four BCD numbers. .

5.15 Digital output option polarity

Display: d9.OP
Range: AIo or AHi
Default Value: AIo

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. Selections available are: AIo (active low i.e. logic 1 = 0V output, logic 0 = +V output) or AHi (active high i.e. logic 1 = +V output, logic 0 = 0V output).

5.16 Digital output option BCD start position

Display: bcd Strt
Range: 0, 1 or 2
Default Value: 0

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. This function affects BCD mode only and determines the number of digits to skip when outputting from the display. As the output is 16 bit it can output up to 4 BCD numbers. Select from 0 to number of display digits minus 4. e.g. for a 6 digit display you may select 0 to 2, if 2 is selected then the four left most digits will be output, if set to 0 then the four right most digits will be output.

5.17 Digital output option low value

Display: d9-L
Range: Any display value
Default Value: 0

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. Accepts any valid display value. Determines the low scaling point for the b.SCL mode and has no effect on other modes. See example which follows in 5.18.

5.18 Digital output option high value

Display: d1 9H

Range: Any display value

Default Value: 1000

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. Determines the high scaling point for the b.SCL mode and has no effect on other modes.

Example: If d1 9L is set to 0 and d1 9H is set to 65535 ($2^{16} - 1$) then the retransmission will not be scaled i.e. a display of 2 will cause a retransmission of 2. If d1 9H is now changed to 32767 ($2^{15} - 1$) then a display of 2 will cause a retransmission of 4 (note: rounding may occur on retransmission).

5.19 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. For addressed, strobed and 4 digit parallel BCD inputs the decimal points can be selected remotely via the signal levels on the rear input terminals 18, 19 and 20. See section 3.11 and dP1 nPt function for details. When remote decimal point selection is used the dCPt function settings are ignored.

5.20 P button function

Display: Pbut

Range: NONE, HI, LO or HI LO

Default Value: NONE

P button function - a only applicable models with front panel P buttons. The P button is located at the front of 5, 6 or 8 digit LED models and bargraph models.

Functions available are:

- NONE - no function required.
- HI - peak memory. The peak value stored in memory will be displayed when the P button is pressed, if the button is pressed momentary then the display will return to normal measurement after 20 seconds. If the button is held for 1 to 2 seconds or the power is removed from the instrument then the memory will be reset. PHI will flash before the reading to indicate that the peak memory value is being displayed.
- LO - valley memory. The minimum value stored in memory will be displayed. Otherwise operates in the same manner as the HI function. PLO will flash before the reading to indicate

that the valley memory value is being displayed.

- **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 P button will cause the peak memory value to be displayed, the next operation will give a valley memory display. **PHi** or **PLo** will flash before each display to give an indication of display type.

5.21 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" section. 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.

5.22 Number of input bits

Display: **InPt bits**
Range: **1** to **20** or **1** to **31**
Default Value: **14**

Input bits - allows selection of the number of input bits from 1 to 20 for parallel inputs or 1 to 31 for strobed or addressed inputs.

5.23 Sign bit on or off

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

Sign bit **on** or **OFF** (parallel binary input only) - Example: if set to on then, with 16 bit binary selected, the most significant digit will be used as the sign bit with 0 on the most significant digit being positive and 1 on the most significant digit being negative. e.g. 0111 1111 1111 1001 will show as **32761** on the display and 1111 1111 1111 1001 will show as **-7** (-7 being the twos compliment of 111 1111 1111 1001). Thus the display with 15 bits plus a sign bit can display any number from **-32768** to **32767**. If set to **OFF** none of the data bits will be treated as a sign bit and all values will be positive.

5.24 Display rate

Display: dI SP rAtE
Range: 1, 2, 4, 8, 16 or 32
Default Value: 4

Display rate - allows selection of display update rate from 1, 2, 4, 8, 16 or 32 updates per second.

5.25 Number of weighted digital input

Display: d.I nP
Range: 1 to 8
Default Value: 4

Weighted digital input bits - seen only when SEt I nPt is set to d.I nP. Allows the number of weighted digital inputs used to be set from 1 to 8. See "Weighted digital input operation and electrical connections" chapter 7 for a description of the d.I nP mode.

5.26 Weighted digital input

Display: dI 1, dI 2 etc.
Range: Any display value
Default Value: 0

Weighting for digital input 1, 2 etc. - seen only when SEt I nPt is set to d.I nP. Allows weighted values to be set for each of the digital inputs used. May be set to any value in the display range. See "Weighted digital input operation and electrical connections" chapter 7 for a description of the d.I nP mode.

5.27 Set input type

Display: SEt I nPt
Range: bI n, bcd, 9rAY or d.I nP
Default Value: bI n

Set input - allows selection of binary (bI n), BCD (bcd), Gray (9rAY) code input or a special weighted digital input (d.I nP). See "Weighted digital input operation" chapter 7 for a description of the d.I nP mode.

5.28 Set input mode

Display: I nPt
Range: PArL, Strb or Addr
Default Value: PArL

Input type - Allows selection of parallel (PArL), strobed (Strb) or addressed (Addr) input.

5.29 Data polarity

Display: dAtA POL
Range: Hi or Lo
Default Value: Hi

Data polarity - Allows selection of active low (Lo) or active high (Hi) data inputs.

5.30 Strobe polarity

Display: Strb POL
Range: Hi or Lo
Default Value: Hi

Strobe polarity - Allows selection of active low (Lo) or active high (Hi) strobe inputs.

5.31 BCD code

Display: bcd CodE
Range: 0 to 5
Default Value: 0

BCD code - BCD inputs only i.e. bcd selected at SEt inPt function - allows selection of special code characters as shown below.

Select the format for non BCD digits, A to F (hexadecimal):

0 - A to F (1010 to 1111) displays blanks

1 - A to F (1010 to 1111) displays A, b, C, d, E, F

2 - A to F (1010 to 1111) displays -, C, i, o, o, blank

3 - A to F (1010 to 1111) displays A, L, H, i , o, blank

4 - A to F (1010 to 1111) displays o, C, F, ¯, -, _

5 - A to F (1010 to 1111) displays -, E, H, L, P, blank

5.32 Number of BCD digits to be displayed

Display: bcd di 9t
Range: 1 to number of display digits on the instrument
Default Value: 4

Number of BCD digits (1 to number of display digits on the instrument) - BCD inputs only i.e. bcd selected at SEt inPt function - allows selection of the number of BCD digits to be displayed. The setting allows unused digits to be ignored and thereby prevent unwanted display characters appearing when the bcd CodE function is set to a value other than 0.

5.33 Remote decimal point on or off

Display: dP I nPt
Range: on or OFF
Default Value: OFF

Remote decimal point selection - for addressed, strobed or 4 digit parallel BCD inputs only there is a choice of setting the decimal point place either in software via the dCPt function or remotely via rear terminals 18, 19 and 20, see section 3.11. If selection is to be made via software the dP I nPt function must be set to OFF. If remote selection is required the dP I nPt function must be set to on. When the dP I nPt function is set to on the dCPt function setting is ignored.

5.34 Remote display hold on or off

Display: I nPt HOLd
Range: on or OFF
Default Value: OFF

Remote display hold - for addressed, strobed or 4 digit parallel BCD inputs only there is a choice of assigning terminal 21 as a display hold input. If the I nPt HOLd function is set to on terminal 21 can be used to hold the display value (a latching switch or input level is normally required). If set to OFF terminal 21 cannot be used to hold the display. See HOLd POL function below.

5.35 Remote display hold polarity

Display: HOLd POL
Range: Hi or Lo
Default Value: Lo

Polarity for display hold input - for addressed, strobed or 4 digit parallel BCD inputs only. This function can be set to Hi or Lo to select the logic level required for the display hold input on input terminal 21. The table below shows the effect of the HOLd POL function setting. The voltage levels at the hold input must be the same as the data voltage levels.

HOLd POL setting	LK1, 2 and 3 set to GND	LK1, 2 and 3 set to VCC (voltage free or 0V/5Vmax inputs only)
Lo	Low voltage or open circuit holds display. High voltage frees display	Low voltage holds display. High voltage or open circuit frees display
Hi	Low voltage or open circuit frees display. High voltage holds display	Low voltage frees display. High voltage or open circuit holds display

5.36 User scale

Display: USEr SCLE
Range: n/a
Default Value: n/a

User scale - allows binary, Gray or BCD (bcd CodE function = 0 only) code inputs to be scaled to non standard display values - see "Scaled inputs" chapter 6 for description.

5.37 First scaling point

Display: CAL 1
Range: n/a
Default Value: n/a

First scaling point - see "Scaled inputs" chapter 6 for description.

5.38 Second scaling point

Display: CAL2
Range: n/a
Default Value: n/a

Second scaling point - see "Scaled inputs" chapter 6 for description.

5.39 Scaling offset

Display: CAL OFSt
Range: n/a
Default Value: n/a

Scaling offset - see "Scaled inputs" chapter 6 for description.

5.40 Baud rate for optional serial communications

Display: bAUd rAtE
Range: 300.600. 1200.2400.4800.9600. 19.2 or 38.4
Default Value: 9600

Set baud rate - seen only with serial output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when optional outputs are fitted. Select from 300.600. 1200.2400.4800.9600. 19.2 or 38.4 baud. The baud rate should be set to match the device being communicated with.

5.41 Parity for optional serial communications

Display: PrtY
Range: nONE.EUEn or odd
Default Value: nONE

Set parity - seen only with serial output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when optional outputs are fitted. Select parity check to either nONE, EUEn or odd. The parity should be set to match the device being communicated with.

5.42 Output mode for optional serial communications

Display: O.Put
Range: di SP, Cont, POLL, A.bus or M.bus
Default Value: Cont

Set serial interface mode - seen only with serial output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when optional outputs are fitted. Allows user to select the serial interface operation as follows:

di SP - sends image data from the display without conversion to ASCII.

Cont - sends 8 bit ASCII form of display data at a rate typically 90% of the sample rate.

POLL - controlled by computer or PLC as host. Host sends command via RS232/485 and instrument responds as requested.

A.bus - is a special communications mode used with Windows compatible optional PC download software. Refer to the user manual supplied with this optional software.

M.bus - Modbus RTU protocol.

5.43 Instrument address for optional serial communications

Display: Addr
Range: 0 to 31
Default Value: 0

Set unit address for polled (**POLL**) or **M.bus** mode (**0** to **31**)) - seen only with serial output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when optional outputs are fitted. Allows several units to operate on the same RS485 interface reporting on different areas etc. if RS485 is available. The host computer or PLC may poll each unit in turn supplying the appropriate address. The unit address ranges from 0 to 31 (DEC) but is offset by 32 (DEC) to avoid clashing with ASCII special function characters (such as <STX> and <CR>). Therefore 32 (DEC) or 20 (HEX) is address 0, 42 (DEC) or 2A (HEX) is address 10. Do not use address 0 in **M.bus** mode.

5.44 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 Scaled inputs

This chapter covers the scaled binary/Gray/BCD code facility of the PM4-BC display (note for BCD inputs the **bcd CodE** function must be set to **0** if scaling is required). This facility allows the display value for an input to be scaled by a two point scaling i.e. the display does not need to follow normal binary or Gray code values. For example, using the scaling functions it is possible to display half the normal binary value for the inputs present. The functions which allow the scaling facility are:

USEr SCLE - this function allows the selection of **on** or **OFF**. If scaled inputs are required then this function must be set to **on**. The display can be reset to normal display values for each input type by setting the function back to **OFF**.

CAL 1/**SCL 1** - first scaling point, see examples which follow.

CAL2/**SCL2** - second scaling point, see examples which follow.

CAL OFSt - calibration scaling offset value. This function allows an offset value to be added or subtracted from the scaled value. For example if a value of 10 is to be added to all values on the display at the **CAL OFSt** function press the ▲ and ▼ buttons together, the scaled display value for the input will be seen e.g. **150**, press the **F** button then use the ▲ button to make the scale value the display value plus 10 e.g. **160**. Press the **F** button to accept the change.

The display scaling will operate in parallel, strobed or addressed modes, scaling cannot be used with BCD inputs. The electrical inputs for scaled binary are identical to non scaled binary. To access any of the scaling function and to follow the examples below it is necessary to enter **CAL** mode, see page 20 for method. The basic scaling procedure for any input is as follows:

1. Select the input type required e.g. parallel binary.
2. Set the **USEr SCLE** function to **on**.
3. Place a known input value into the instrument and with this input present use **CAL 1**/**SCL 1** functions to change the scaling for this input as required.
4. Change the input to a second known value then use **CAL2**/**SCL2** functions to change the scaling for this input as required.

Example 1 - halving the reading of a Gray code input. Using inputs of 0 and 6000 decimal arrange the display to show half the normal value. The Gray code for 6000 decimal is 1110011001000. The Gray code for 0 is 0.

1. With the Gray code input set at **0** go to the **CAL 1** function and press ▲ and ▼ simultaneously. A display value will be seen.
2. Press the **F** button, the message **SCL 1** will be seen followed by a value. Use the ▲ or ▼ button if required to make this value read **0**.
3. Press the **F** button the message **CAL End** followed by **CAL2** should be seen. Change the input to 1110011001000 (6000 decimal.)
4. Press the ▲ and ▼ buttons together. A display value will be seen.

5. Press the F button, the message SCL2 will be seen followed by a value. Use the ▲ or ▼ button if required to make this value read 3000.

6. Press the F button the message CAL End followed by the next function will be seen. Press and release the F button until the message FUNC End is seen and the display moves back to normal display mode. The readings viewed should now be half the normal Gray code values.

Example 2 - altering both the zero and span of a Gray code input. Set the display to read 0 for an input of 3000 and to read 3000 for an input of 6000. Note alternatively the CAL OFSt function could be used to achieve the same result. The Gray code for 6000 decimal is 1110011001000. The Gray code for 4000 decimal is 100001110000. The Gray code for 3000 decimal is 111001100100.

1. Set the input to 111001100100 (3000 decimal) then go to the CAL 1 function and press ▲ and ▼ simultaneously. A display value will be seen.

2. Press the F button, the message SCL 1 will be seen followed by a value. Use the ▲ or ▼ button if required to make this value read 0.

3. Press the F button the message CAL End followed by CAL2 should be seen. Change the input to 1110011001000 (6000 decimal.)

4. Press the ▲ and ▼ buttons together. A display value will be seen.

5. Press the F button, the message SCL2 will be seen followed by a value. Use the ▲ or ▼ button if required to make this value read 3000.

6. Press the F button the message CAL End followed by the next function will be seen. Press and release the F button until the message FUNC End is seen and the display moves back to normal display mode. The readings viewed should now show 0 for an input of 3000 and 3000 for an input of 6000 with the display being linear in between e.g. an input of 4000 should now be displayed as 1000.

7 Weighted input operation

Refer to section 3.12 for electrical connection details.

This chapter describes the special weighted digital input mode available on the PM4-BC. To operate in this mode the **SEt InPt** function must be set to **d.In nP**.

The weighted digital input mode allows up to 8 inputs to be given weighted values, these weighted values are added together for each active input. The added values will be displayed and can be retransmitted if an analog or serial retransmission option is fitted.

The functions which control this mode are **d.In nP** which allows the number of digital inputs required to be set from 1 to 8 and **d. 1**, **d. 2**, **d. 3** etc. which allows the weighting for each input to be set. The weighting value can be set to any display value.

Example - Four weighted inputs are to be used with the weighted values to be added, displayed and retransmitted as a 4-20mA signal using optional analog retransmission. The display is to have two decimal points and each weighted input in turn is to be given a value of 1.00, 3.00, 5.00 and 10.00 mA. The input signals are to be from a switch inputs with a short circuit to ground being the active signal i.e. active low operation. The retransmission output is set to give a 4mA output when the display shows 0.00 and a 20mA output when the display shows 16.00. Note that whilst the display can show a value greater than 16.00 the analog retransmission is limited to 20mA. The main settings required for this example are:

Function	Setting	Description
rEC_	**0.00**	Sets display value of **0.00** for 4mA output
rEC^	**16.00**	Sets display value of **16.00** for 20mA output
dCPt	**0.02**	Sets decimal point to 2 places
d. nP	**4**	Sets number of weighted inputs to 4
d. 1	**1.00**	Sets first input weighting to 1.00
d. 2	**3.00**	Sets second input weighting to 3.00
d. 3	**5.00**	Sets third input weighting to 5.00
d. 4	**10.00**	Sets fourth input weighting to 10.00
SEt InPt	**d.In nP**	Sets input type to weighted digital input
dAtA POL	**Lo**	Sets input type to active low operation

The result of these inputs are shown in the table below.

Input 1 state	Input 2 state	Input 3 state	Input 4 state	Display	Retransmission
Inactive	Inactive	Inactive	Inactive	0.00	4mA
Active	Inactive	Inactive	Inactive	1.00	5mA
Inactive	**Active**	Inactive	Inactive	3.00	7mA
Active	**Active**	Inactive	Inactive	4.00	8mA
Inactive	Inactive	**Active**	Inactive	5.00	9mA
Active	Inactive	**Active**	Inactive	6.00	10mA
Inactive	**Active**	**Active**	Inactive	8.00	12mA
Active	**Active**	**Active**	Inactive	9.00	13mA
Inactive	Inactive	Inactive	**Active**	10.00	14mA
Active	Inactive	Inactive	**Active**	11.00	15mA
Inactive	**Active**	Inactive	**Active**	13.00	17mA
Active	**Active**	Inactive	**Active**	14.00	18mA
Inactive	Inactive	**Active**	**Active**	15.00	19mA
Active	Inactive	**Active**	**Active**	16.00	20mA
Inactive	**Active**	**Active**	**Active**	18.00	20mA
Active	**Active**	**Active**	**Active**	19.00	20mA

8 Specifications

8.1 Technical specifications

Input data:	20 input lines for BCD, binary or Gray code addressed and strobed inputs can be used to give up to 8 digit display or special weighted digital input (up to 8 inputs). For BCD inputs four of the 20 input bits can be assigned for use as remote decimal point and display hold if required.
Input types:	5V, 12V to 24V or 48V DC contact closure or open collector (factory configured)
Input logic:	Selectable active high or low
Decimal point:	User selectable
Sample Rate:	4 samples per second
Microprocessor:	HC68HC11F CMOS
Ambient temperature:	LED -10 to 60^o C, LCD -10 to 50^o C
Humidity:	5 to 95% non condensing
Display:	LED Models: 4 digit 20mm, 5 digit 14.2mm + status LEDs + 4 way keypad 6 digit 14.2mm + 4 way keypad 8 digit 10mm + 4 way keypad LED Bar Graph 20 segment bar + 5 digit 7.6mm + relay status LEDs LCD Models: 4 digit 12.7mm, 6 digit 12.7mm
Power Supply:	AC 240V, 110V or 24V 50/60Hz or DC isolated wide range 12 to 48V. Special supply types 32VAC, 48VAC 50/60Hz or DC isolated 50 to 110V also available. Note: supply type is factory configured
Power Consumption:	AC supply 4 VA max, DC supply typically 80mA at 12VDC and 40mA at 24VDC for PM4 with no optional outputs, actual current drawn depends on display type and options fitted

8.2 Optional outputs

Alarm relays:	1, 3 or 6 alarm relays (binary, Gray code, whole number BCD (**bcd CodE** = **0**) and weighted digital input only).
Analog Retransmission:	12 bit isolated 4 to 20mA, 0 to 1V or 0 to 10V link selectable (4-20mA output will drive into resistive loads of up to 800Ω) (binary, Gray code, whole number BCD (**bcd CodE** = **0**) and weighted digital input only)
Digital Retransmission:	Isolated BCD/Binary (binary, Gray code, whole number BCD (**bcd CodE** = **0**) and weighted digital input only)
Serial Communications:	Isolated RS232 or RS485 (ASCII or Modbus RTU) (binary, Gray code, whole number BCD (**bcd CodE** = **0**) and weighted digital input only)

8.3 Physical Characteristics

Bezel Size:	DIN 48mm x 96mm x 10mm
Case Size:	44mm x 91mm x 120mm behind face of panel
Panel Cut Out:	45mm x 92mm +1mm/-0mm
Connections:	Plug in screw terminals (max. 2.5mm^2 wire)
Weight:	400 gms basic model, 450 gms with option card

9 Guarantee and service

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

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

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

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

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

This product is designed and manufactured in Australia.