PM4-LNT

DC Current/DC Voltage
Process Lineariser/Total/RateMonitor

Operation and Instruction Manual

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1 Introduction

This manual contains information for the installation and operation of the PM4-LNT lineariser/totaliser monitor. The PM4 may be configured to accept inputs of 0 to 20mA, 4 to 20mA, 0-100mV, 0-1V, 0-10V or 0-100VDC.

The PM4-LNT offers the choice of linear rate, square root, linear total or linearised total display. Two separate sets of calibration scaling values can be stored with the display choice being made via the remote input or **P** button.

In lineariser operation up to 40 points may be entered. These points and any function settings and scaling values are stored in EEPROM memory. The lineariser points are stored in a "lineariser table". A written copy of the table should be maintained for reference, a table is provided in Chapter 7 for this purpose. The lineariser table stores the display values for each point and the input values (scaled or otherwise) associated with these display values.

If total is selected as the default display then the display may be toggled between rate, "live input" and linearised values via the front ▲ and ▼ pushbuttons (5, 6 & 8 digit LED models) or rear pushbuttons on other models. The display will indicate rAtE prior to a rate reading, InPt prior to a live input reading and totl prior to a linearised reading. This feature may be used at any time to check the readings against the lineariser table. If rate is selected as the default display then the same pushbuttons will allow toggling between the rate (rAtE) and total (totl) displays.

The instrument may be calibrated to display the input in engineering units. A standard inbuilt relay provides an alarm/control function, a regulated transmitter supply of 18VDC is also provided. Optional extra relays, retransmission and ±12VDC (24V) transmitter supply/excitation voltage may also be provided. The standard 18VDC transmitter supply must not be used if the optional transmitter supply is used.

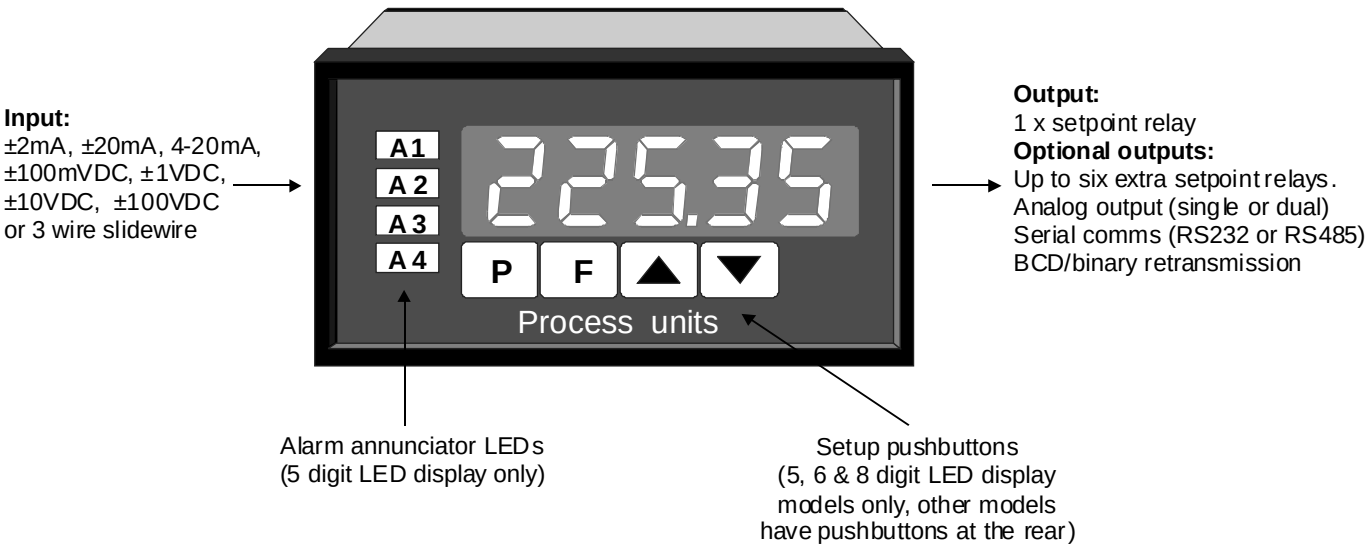
Unless otherwise specified at the time of order, your PM4 has been factory set to a standard configuration. Like all other PM4 series instruments the configuration and calibration is easily changed by the user. Initial changes may require dismantling the instrument to alter PCB links, other changes are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

Full electrical isolation between power supply, input voltage or current 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, PLC's and other data acquisition devices.

The versatile PM4 has various front panel layout options, in some cases the pushbuttons may be located on the front panel as well as the standard rear panel configuration. The meter is available in 4, 5, 6 or 4 digit plus bargraph LED display form or with 4 or 6 digit LCD.

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.

Inputs & outputs



1 .1 Basic operation modes

For all modes it is essential that the input is scaled via CAL 1/SCL 1 & CAL2/SCL2 or USER En4 & USER En20 prior to use. If operation is changed between modes this scaling should be checked prior to operation in the new mode and adjusted if needed. See “Explanation of functions” chapter for details of square root mode operation and for further details of functions used in each mode.

1. Ratemeter only mode (linear display).

With dI SP SCLE set to 0 and tAbL set to OFF the totaliser and lineariser functions are disabled. The instrument will then function purely as a linear display scaled in engineering units via CAL 1/SCL 1 & CAL2/SCL2 or USER En4 and USER En20 functions. The ▲ or ▼ pushbutton will allow the display to toggle between rate (rAtE) and total (tOtL) but the totaliser will be disabled.

2. Lineariser only mode.

With dI SP SCLE set to 0 the totaliser functions are disabled. If the tAbL function is set to on the lineariser will be enabled allowing entry of points into the lineariser table. The ▲ or ▼ pushbutton will allow the display to toggle between rate (rAtE), input (InPt) and total (tOtL) but the totaliser will be disabled. The rAtE figure will display the input using the scale values set at the CAL 1/SCL 1 and CAL2/SCL2 or USER En4 and USER En20 functions. The InPt figure will display the linearised value of the rate input i.e. it will display the value for the rAtE input adjusted by the lineariser table.

3. Totaliser only mode.

With tAbL set to OFF the lineariser will be disabled. If the dI SP SCLE function is given a value other than 0 the totaliser will be enabled. The instrument will then work as a totaliser using to formula shown in the “Explanation of functions” chapter. The “Rate display” used in the formula will be derived from the linear scaling set via the CAL 1/SCL 1 and CAL2/SCL2 or USER En4 and USER En20 functions. The ▲ or ▼ pushbutton will allow the display to toggle between rate (rAtE), and total (tOtL). The rAtE figure will display the input using the scale values set at the CAL 1/SCL 1 and CAL2/SCL2 or USER En4 and USER En20 functions.

4. Totaliser with linearisation mode.

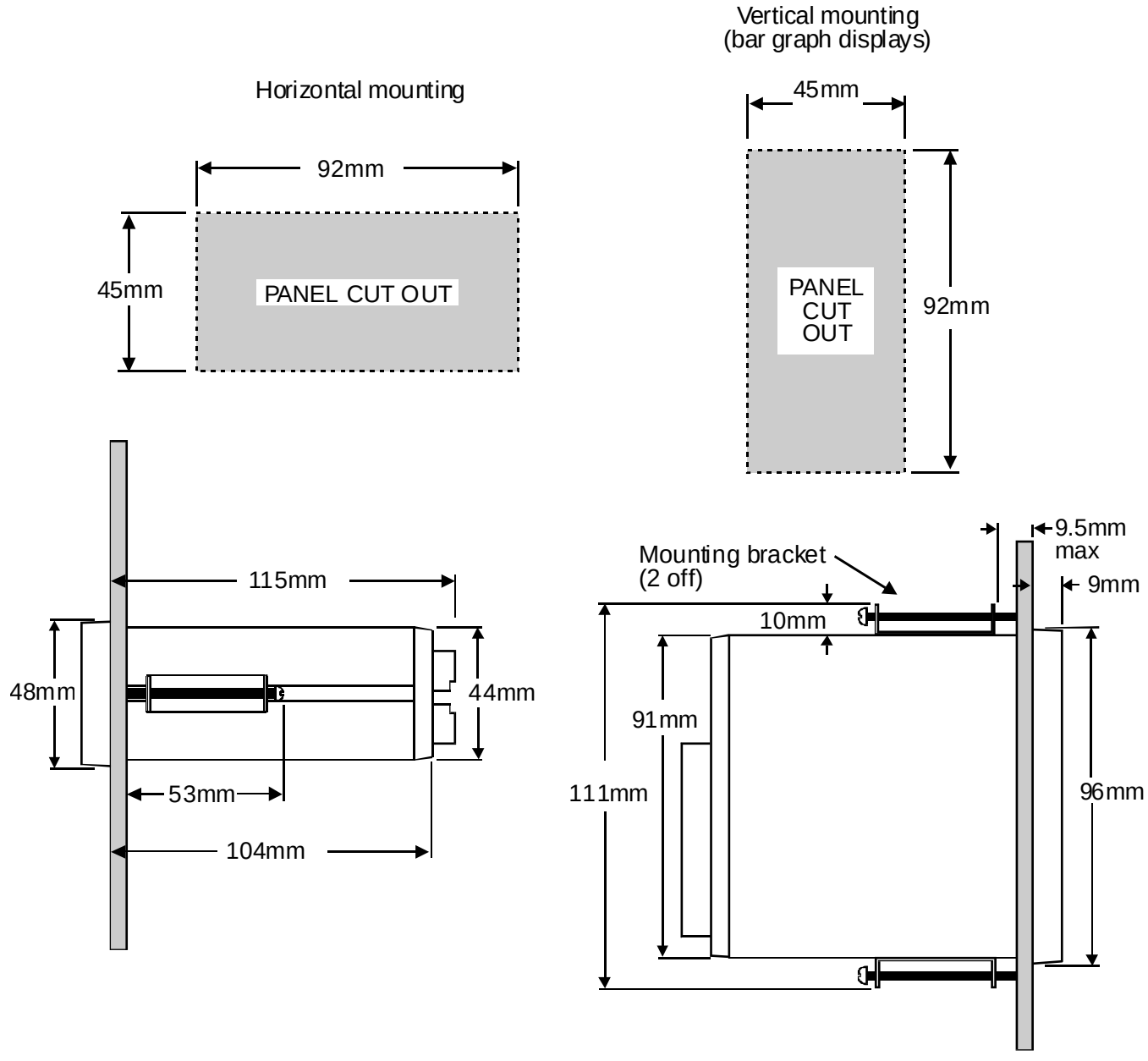
With tAbL set to on and dI SP SCLE set to a value other than 0 the instrument will function as a totaliser. The “Rate display” figure used in the totaliser formula will be referenced from the lineariser table rather than the CAL2/SCL2 or USER En4 and USER En20 scaling values. The ▲ or ▼ pushbutton will allow the display to toggle between rate (rAtE), input (InPt) and total (tOtL). The rAtE figure will display the linearised value of the rate input i.e. it will display the value for the input adjusted by the lineariser table. The InPt figure will display the input using the scale values set at the CAL 1/SCL 1 and CAL2/SCL2 or USER En4 and USER En20 functions. The tOtL figure will display the result of the totaliser formula calculation.

2 Mechanical Installation

If a choice of mounting sites is available then choose a site as far away as possible from sources of electrical noise such as motors, generators, fluorescent lights, high voltage cables/bus bars etc. An IP65 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. Then, 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.

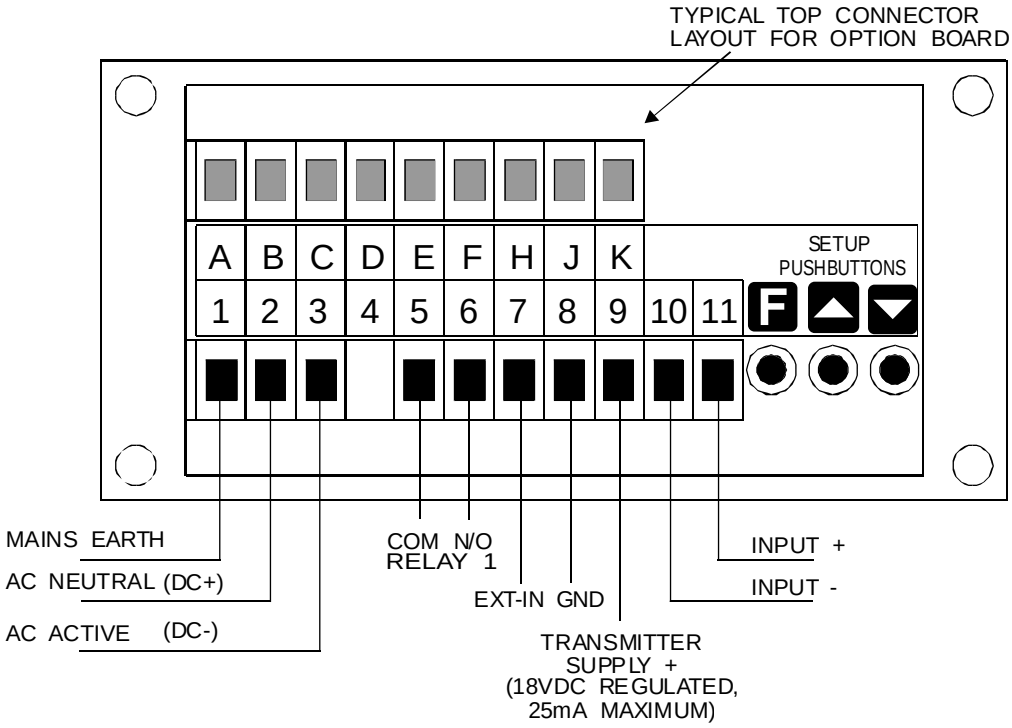


3 Electrical Installation

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 wires of up to 2.5mm^2 to be fitted. Connect the wires to the appropriate terminals as indicated below. Refer to connection details provided in this chapter to confirm proper selection of voltage, polarity and input type before applying power to the instrument. When power is applied to the instrument will cycle through a display sequence indicating the software version and other status information, this indicates that the instrument is functioning. Acknowledgment of correct operation may be obtained by applying an appropriate input to the instrument and observing the reading. The use of screened cable is recommended for signal inputs.

See the appropriate appendix at the end of this manual for wiring details of optional outputs.



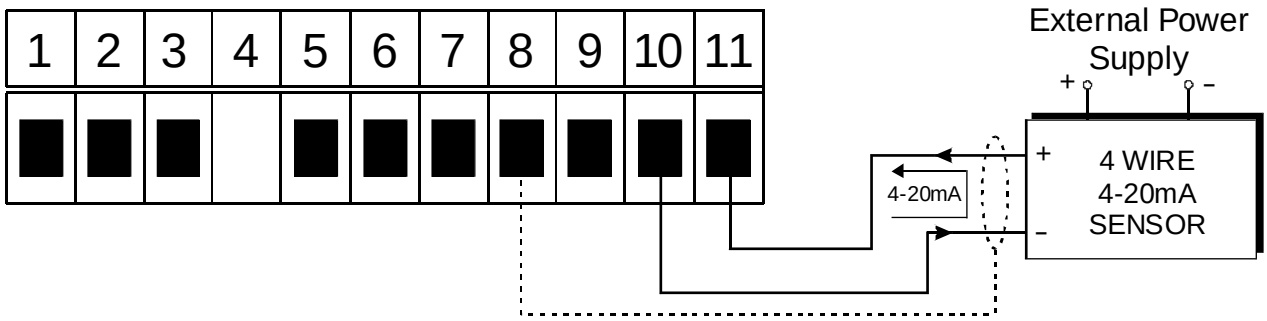
Instrument Rear Panel

1	MAINS EARTH		
2	240VAC NEUTRAL		
3	240VAC ACTIVE		
5	RELAY 1	COM	
6	RELAY 1	N/O	
7	EXT IN		
8	GROUND		
9	18VDC SUPPLY		
10	INPUT	-	
11	INPUT	+	
PM4-LNT-240-4E			SERIAL No:

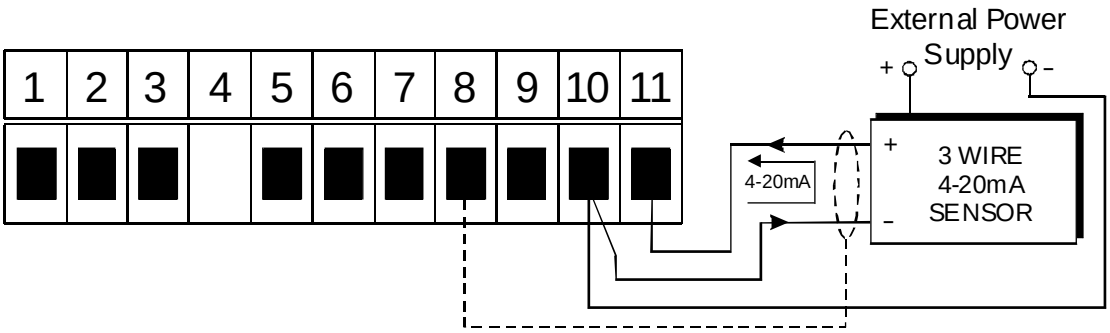
Instrument Data Label (example)

3 .1 Connection examples

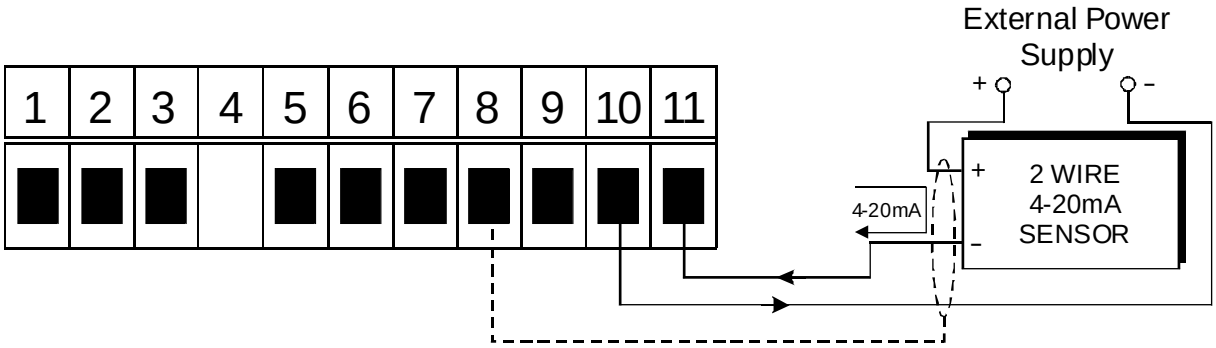
1. 4 wire 4-20mA input - externally powered sensor



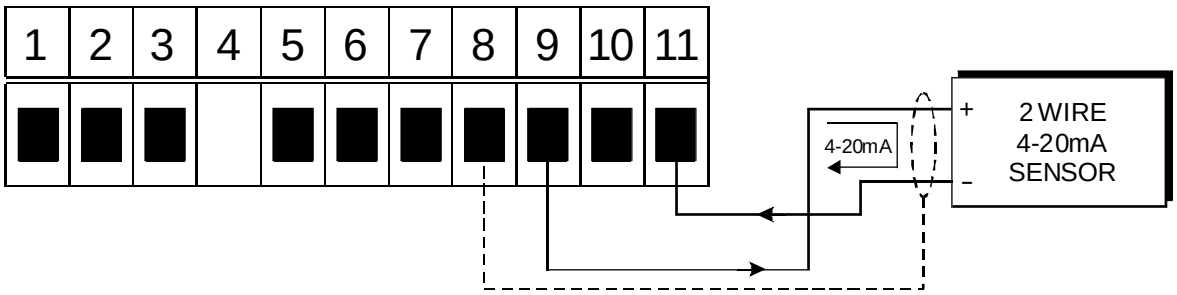
2. 3 wire 4-20mA input - externally powered sensor



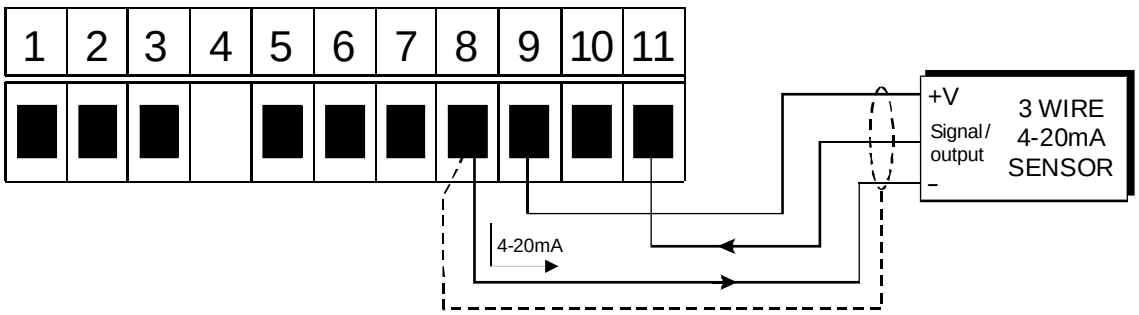
3. 2 wire 4-20mA input - externally powered sensor



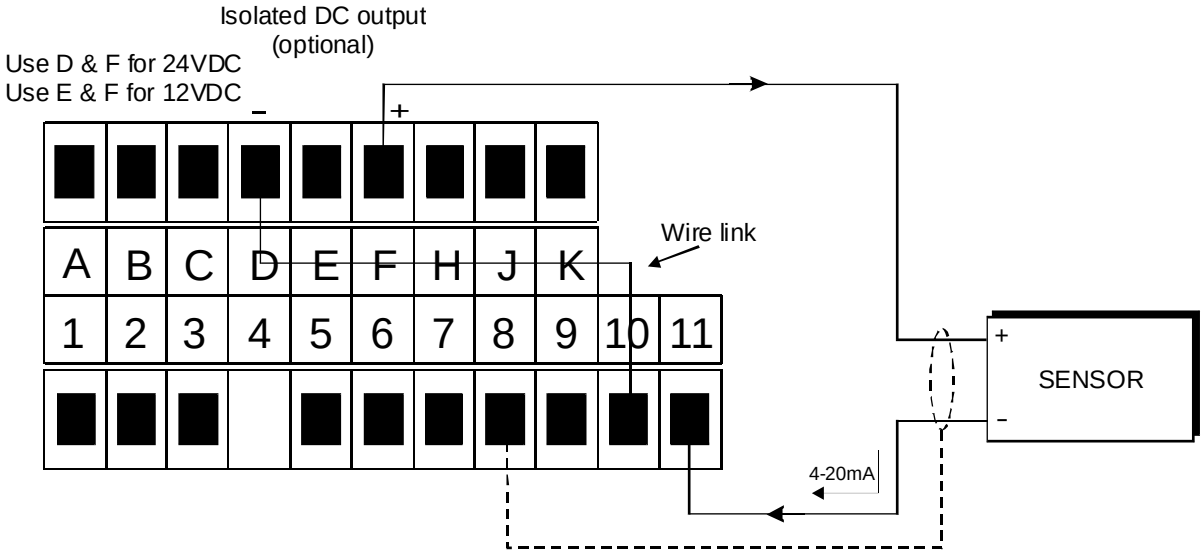
4. 2 wire 4-20mA - powered from PM4 standard 18VDC (25mA) supply



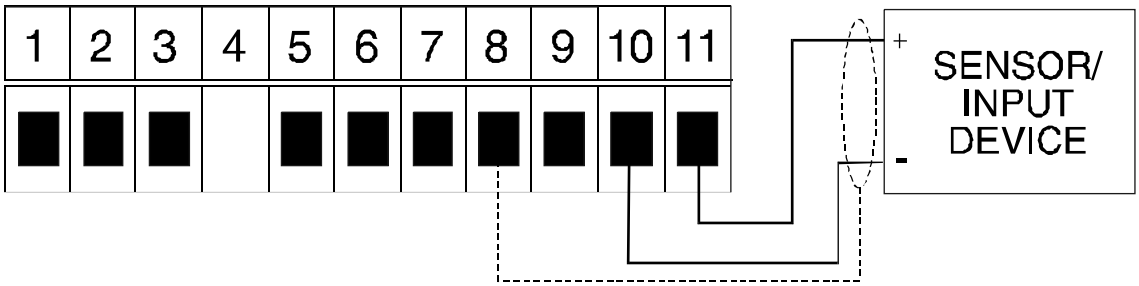
5. 3 wire 4-20mA - powered from PM4 standard 18VDC (25mA) supply



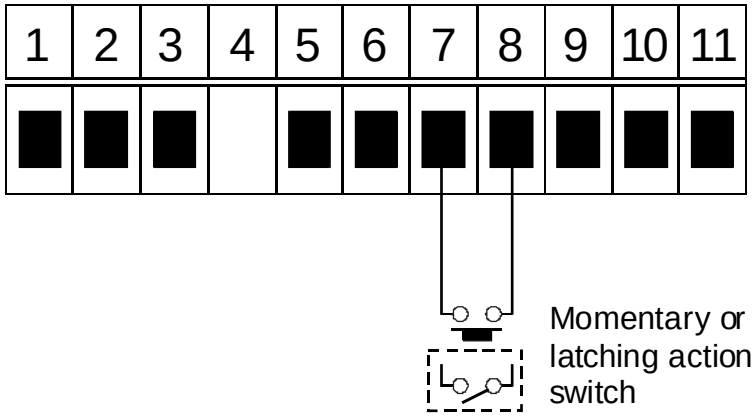
5. 4-20mA input - powered from optional ±12V (25mA) PM4 supply



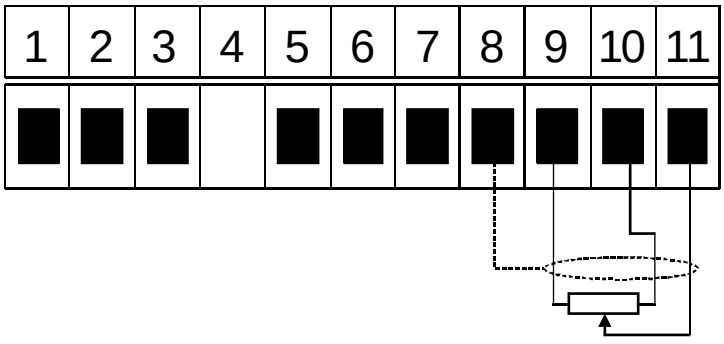
6. DC voltage input



7. Remote input



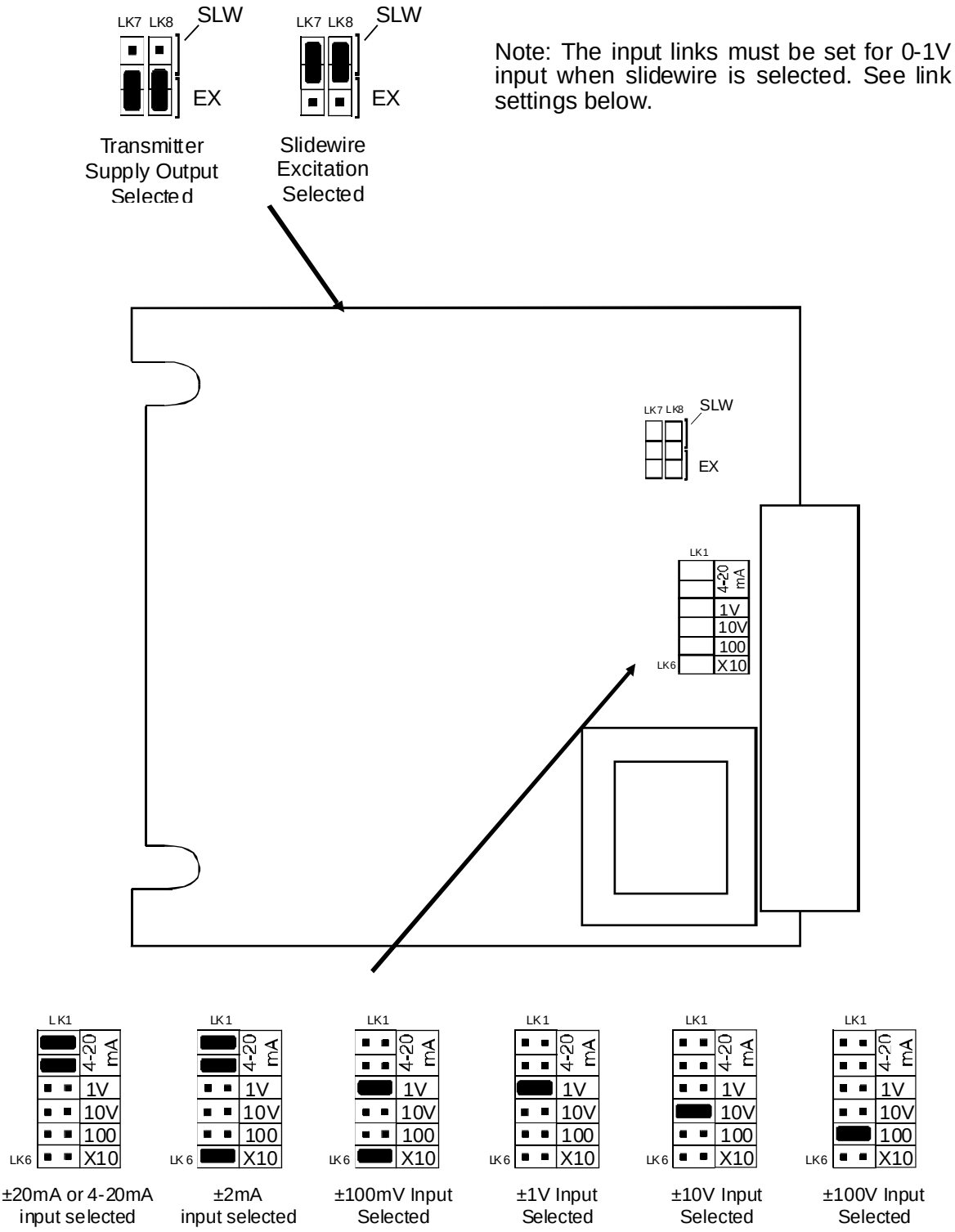
8. Slidewire input



Note: Links LK7 & LK8 Must be set to SLIDE WIRE for Slide Wire input all other links should be out.

3 .2 Selecting the input range

Dismantle the instrument as described in Chapter 7, “Input/output configuration”. Insert the links into the appropriate location on the pin header to suit the range required.



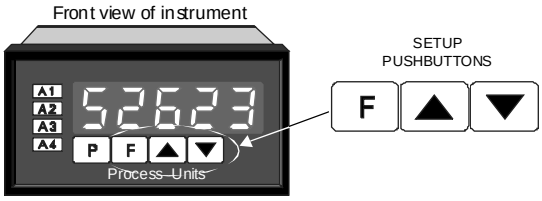
4 Explanation of Functions

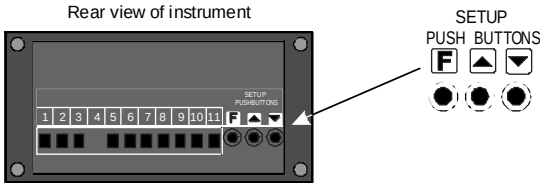
The PM4 setup and calibration functions are configured through a push button sequence. Two levels of access are provided for setting up and calibrating:-

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.

The three push buttons located at the rear of the instrument (also at the front on some display options) are used to alter settings. 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.

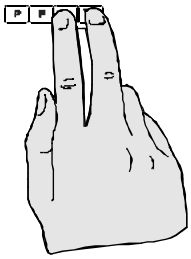




Entering CAL Mode

1. Remove power from the instrument. 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.



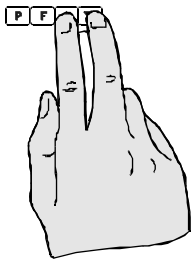
3. Within 2 seconds of releasing the **F** button press, then release the ▲ and ▲ buttons together. The display will now indicate **FUNC** followed by the first function.

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.

The alarm and brightness functions below are accessible via FUNC mode.

Note that "x" in the alarm functions is used to indicate any alarm number e.g. if 3 setpoint alarm relays are fitted then A1.Lo, A2.Lo and A3.Lo will all seen as functions on the display.

The PM4-LN 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.

The instrument must be set in the manner described below to allow the easy access facility to work:

1. The r.1 nP function must be set to SP.AC.

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

3. The SP.AC function must be set to allow access to the relays required e.g. if set to A1-2 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 then 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 unless the instrument is powered up in CAL mode.

AxPS (alarm pass value)

Displays and sets the pass value (seen only when the alarm operation mode is set to AxPA) . Use ▲ or ▼ to adjust the pass value if required. The alarm will activate when the displayed total increments by the value set at this function. The relay will remain activated for the duration set by the alarm pass time function (AxPt). For example if A1PS is set to 1000 and A1Pt is set to 0.3 then relay 1 will activate for 0.3 seconds each time the total value increases by a value of 1000.

AxPt (alarm pass time)

Displays and sets the pass time (seen only when the alarm operation mode is set to AxPA) . See AxPS function above. Use ▲ or ▼ to adjust the pass time if required. The relay will remain activated for the duration set by the alarm pass time function (AxPt).

AxLo (alarm low setpoint)

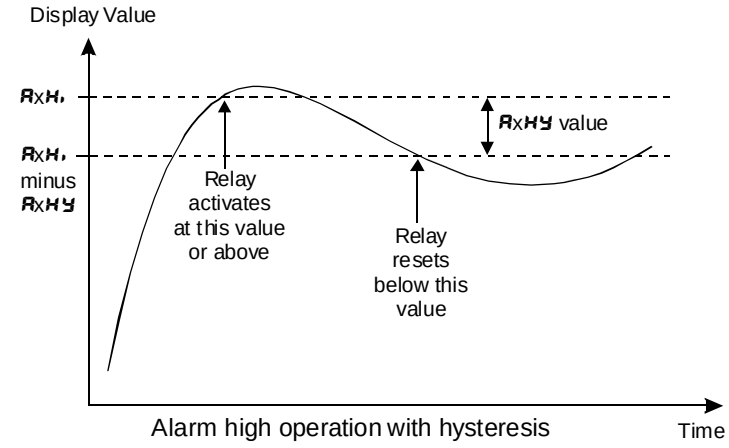
Displays and sets the low setpoint value for the designated alarm relay (seen only when the alarm operation mode is set to AxrE or AxtL) . The low alarm setpoint may be disabled by pressing the ▲ and ▼ pushbuttons simultaneously. When the alarm is disabled the display will indicate OFF . Use ▲ or ▼ to adjust the setpoint value if required. The alarm will activate when the displayed value is lower than the AxLo setpoint value. Each relay may be configured with both a low and high setpoint if required, if so the relay will be activated when the display reading moves outside the band set between low and high setpoints.

AxHi (alarm high setpoint)

Displays and sets the high setpoint value for the designated alarm relay (seen only when the alarm operation mode is set to AxrE or AxtL) . 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 higher than the AxHi setpoint value. Each relay may be configured with both a low and high setpoint if required, if so the relay will be activated when the display reading moves outside the band set between low and high setpoints.

AxHY (alarm hysteresis [deadband])

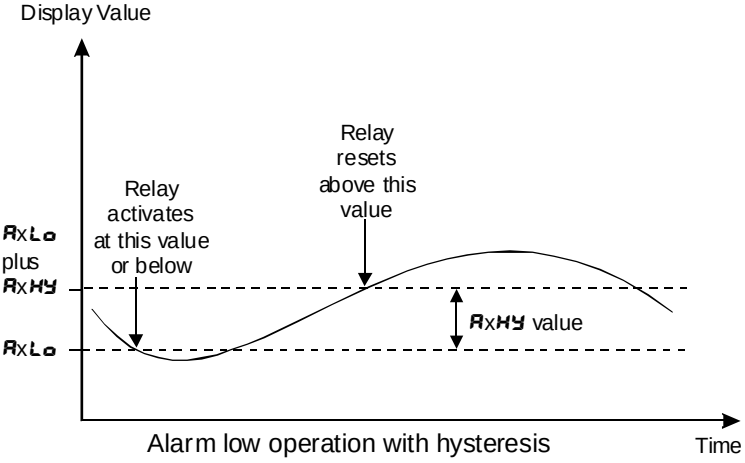
Displays and sets the alarm hysteresis limit and is common for both high and low setpoint values (seen only when the alarm operation mode is set to AxrE or AxtL) . The hysteresis value may be used to prevent too frequent operation of the setpoint relay when the measured value stays close to the setpoint. Without a hysteresis setting (AxHY set to zero) the alarm will activate when the display value goes above the alarm setpoint (for high alarm) and will reset when the display value falls below the setpoint, this can result in repeated on/off switching of the relay at around the setpoint value. The hysteresis setting operates as follows:



In the high alarm mode, once the alarm is activated the input must fall below the setpoint value minus the hysteresis value to reset the alarm.

e.g. if A1H1 is set to 50.0 and A1HY is set to 3.0 then the setpoint output relay will activate once the display value goes above 50.0 and will reset when the display value goes below 47.0 (50.0 minus 3.0).

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 set to 20.0 and A1HY is set to 10.0 then the alarm output relay will activate when the display value falls below 20.0 and will reset when the display value goes above 30.0 (20.0 plus 10.0).

The hysteresis units are expressed in displayed engineering units.

AxtE (alarm trip time)

Displays and sets the alarm trip time and is common for both alarm high and low setpoint values (seen only when the alarm operation mode is set to AxrE or AxtL) . The trip time is the delay time before the alarm relay will activate, or trip, when an alarm condition is present. The alarm condition must be present continuously for the trip time period before the alarm will trip. This function is useful for preventing an alarm trip due to short non critical deviations from setpoint. The trip time is selectable over 0 to 60 seconds.

AxrE (alarm reset time)

Displays and sets the alarm relay reset time (seen only when the alarm operation mode is set to AxrE or AxtL) . With the alarm condition is removed the alarm relay will stay in its alarm condition for the time selected as the reset time. The reset time is selectable over 0 to 60 seconds.

Axno or Axnc (alarm x normally open or normally closed)

Displays and sets the setpoint alarm relay action to normally open (de-energised) or normally closed (energised), when no alarm condition is present. A normally closed alarm is often used to provide a power failure alarm indication.

Ax.SP, Ax.t1, Ax.t2 etc. (relay operation independent setpoint or trailing) - seen only if more than one relay is fitted (also seen only when the alarm operation mode is set to AxrE or AxtL) . Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted.

Each alarm may be programmed to operate with an independent setpoint setting or may be linked (or trailing) to operate at a fixed difference to another relay setpoint. The operation is as follows: Alarm 1 (A1) is always independent. Alarm 2 (A2) may be independent or may be linked to Alarm 1. Alarm 3 (A3) may be independent or may be linked to Alarm 1 or Alarm 2. Alarm 4 (A4) may be independent or may be linked to Alarm 1, Alarm 2 or Alarm 3. The operation of each alarm is selectable within the Function Setup Mode by selecting, for example, (Alarm 4) A4.SP = Alarm 4 normal setpoint or A4.t1 = Alarm 4 trailing Alarm 1 or A4.t2 = Alarm 4 trailing Alarm 2 or A4.t3 = Alarm 4 trailing Alarm 3. For trailing set points the setpoint value is entered as the difference from the setpoint being trailed. If the trailing setpoint is to operate ahead of the prime setpoint then the value is entered as a positive number and if operating behind the prime setpoint then the value is entered as a negative number. For example, with Alarm 2 set to trail alarm 1, if A1H1 is set to

1000 and **A2H,** 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). See the trailing alarm table which follows.

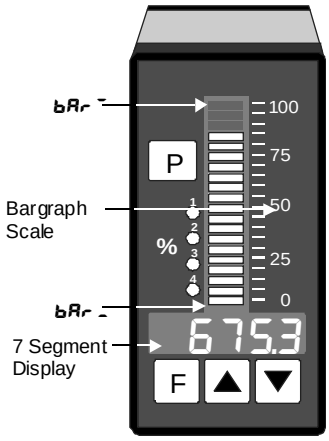
Trailing Alarm Table Showing Possible Alarm Assignments			
	A2	**A3**	**A4**
A 1	**A2.t 1**	**A3.t 1**	**A4.t 1**
A2		**A3.t2**	**A4.t2**
A3			**A4.t 3**

bright (display brightness)

Displays and sets the digital display brightness. The display brightness is selectable from **0** to **15**. where **0** = 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.

dULL (remote display brightness)

Displays and sets the level for remote input brightness switching, see **r.i nP** function. When the remote input is set to **dULL** the remote input can be used to switch between the display brightness level set by the **bright** function and the display brightness set by the **dULL** function. The display brightness is selectable from **0** to **15**, where **0** = lowest intensity and **15** = highest intensity. This function is useful in reducing glare when the display needs to be viewed in both light and dark ambient light levels.



The functions which follow are accessible via **CAL** mode only.

rEC_ (recorder/retransmission output low value) - seen only when analog retransmission option fitted. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted.

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. e.g. if it is required to retransmit 4mA when the display indicates **0** then select **0** in this function via the ▲ or ▼ button.

rEC^ (recorder/retransmission output high value) - seen only when analog retransmission option fitted. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted.

Displays and sets the analog retransmission (4-20mA, 0-1V or 0-10V, link selectable) output high value (20mA, 1V or 10V) in displayed engineering units. e.g. if it is required to retransmit 20mA when the display indicates **500** then select **500** in this function via the ▲ or ▼ button.

bAr_ (bar graph display low value) - 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 a bargraph scale could be 0 to 100 yet the 4 digit display could be showing **675.3**. In this example the bargraph scale may be indicating percentage fill of a tank whilst the 7 segment display is indicating litres.

bAr^ (bargraph display high value) - 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 (all LED's illuminated). May be independently set anywhere within the display range of the instrument.

bAr tYPE (bar graph display operation mode) - seen only in bargraph display instruments.

Allows selection of bargraph operation mode choices are:

bAr - conventional solid bargraph display i.e. all LED's 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 single 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**.

d9.OP (output polarity) - seen only with digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted.

Select either **AlO** - active low output or **AHi** - active high output.

bcdStrt (BCD - start display position) - seen only with 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. 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.

di 9_ (scaled digital output low reading) - seen only with 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.

di 9^ (scaled digital output high reading) - seen only with 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 high scaling point for the **b.SCL** mode and has no effect on other modes. For example if **di 9_** is set to **0** and **di 9^** is set to **65535** (2^{16}) then the retransmission will not be scaled i.e. a display of **2** will cause a retransmission of 2. If **di 9^** is now changed to **32767** (2^{15}) then a display of **2** will cause a retransmission of 4.

drnd (display rounding)

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. (e.g. if set to **10** the display indication will change in multiples of 10 only).

dCPt (decimal point selection)

Displays and sets the decimal point. 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), **0.003** (3 decimal places) and **0.0004** for display with more than 4 digits. **Note**: It is important that the decimal point is chosen before a scaling is completed. Changing the decimal point after a scaling will cause a error in the display value (a factor of 10).

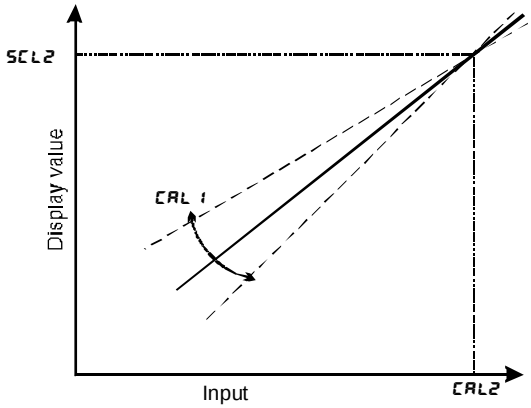
FiLtr (digital filter)

Displays and sets the digital filter value. Digital filtering is used for reducing susceptibility to short term interference. The digital filter range is selectable from 0 to 8, where 0 = none and 8 = most filtering. A typical value for the digital filter would be 3. Use ▲ or ▼ to alter if required. Note that at higher filter values the display update time will be increased.

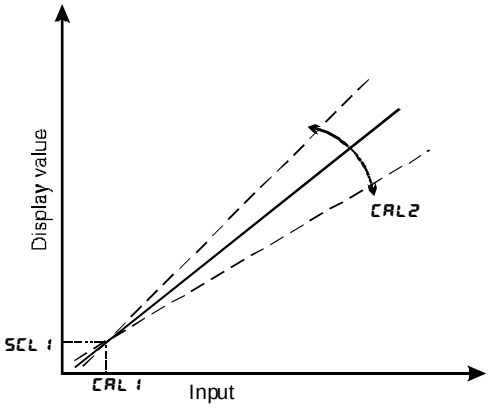
CAL 1 (first scaling point for 2 point scaling method)

Note: Two decimal point places (one place for 4 digit displays) will automatically be set for both **CAL 1** and **CAL2** entries when the **tAbL** function is set to **on**.

CAL 1 and CAL2 are used together to scale the instruments display, values for both must be set when using this scaling method (see also USEr En4 and USEr En20 functions for an alternative scaling method



Setting CAL 1



Setting CAL 2

when using a 4-20mA input). The CAL 1 function sets the first calibration point for live input calibration . When using this method a signal input must be present at the input terminals. Note: CAL 1 and CAL2 can be set independently i.e. it is not necessary to perform a CAL2 operation directly after a CAL 1.

The procedure for entering the first scaling point is:

a. Ensure that the tAbL function is set to on if the lineariser table is to be used. Ensure that an input signal is present at the input terminals, this will normally be at the low end of the signal range e.g. 4mA for a 4-20mA input type.

b. At the CAL 1 function press ▲ and ▼ simultaneously, then release them. The display will indicate the live input value. Do not be concerned at this stage if the live input display value is not what is required. It is important that the live input value seen is a steady value, if not then the input needs to be investigated before proceeding with the scaling.

c. Press, then release the F button. The display will indicate SCL 1 followed by a value. Use the ▲ or ▼ button to change this value to the required display value at this input. e.g. if 4mA was input and the required display at 4mA was 0.00 then ensure 0.00 is selected at SCL 1. Press the F button to accept changes or the P button to abort the scaling.

CAL2 (second scaling point for 2 point scaling method)

The second point scaling is performed in exactly the same manner as CAL 1 except that SCL2 will be seen instead of SCL 1. It is essential that the live input is different in value to the CAL 1 input e.g. for a 4-20mA input use 20mA as the CAL2 live input. Note; it is not essential that 4 and 20mA are used as the live inputs for a 4-20mA scaling but the input values must be significantly different.

USEr En4 (4mA input scaling without a live input)

Note: Two decimal point places (one place for 4 digit displays) will automatically be set for both USEr En4 and USEr En20 entries when the tAbL function is set to on.

The instrument can be scaled for a 4-20mA input without a live input. This is an alternative method to the CAL 1 and CAL2 method of scaling. To perform the first point (En4) scaling simply press the ▲ and ▼ buttons simultaneously when the USEr En4 function has been reached. The display will now indicate a value. Use the ▲ or ▼ button to change this value to the display value required for a 4mA input.

USEr En20 (20mA input scaling without a live input)

Used in conjunction with USEr En4 described above. The USEr En20 function can be used to set the second 4-20mA scaling point i.e. the scale required for a 20mA input.

UCAL (uncalibrate)

The uncalibration function sets the instrument back to the factory calibration value. This function is useful as a temporary measure when the input source device/transmitter is replaced and on the spot recalibration is difficult or when a calibrating error exists due to a problem during calibration. To uncalibrate press the ▲ and ▼ buttons simultaneously (note this function will delete the existing calibration and should only be used when necessary). The display will show CAL CLr indicating that the calibration is cleared.

P.but (P button function)

Seen only in 5 , 6 or 8 digit LED models.

The P button may be set to operate one of a number of special functions, see F.1 nP below for a description of these functions. The P button is located at the front of 5, 6, or 8 digit LED models. With some functions, to prevent accidental operation, the P button must be held pressed for 2-3 seconds before the

function will operate. If both the remote input and P button function are operated simultaneously the P button will override the remote input. The functions below are as described in the **r.I nP** function above with the exception of the **P.SEt** function.

Functions available are: **nonE**, **Hi**, **Lo**, **Hi Lo**, **2Er0**, **di SP** or **CLr.t**

r.I nP (remote input function)

Pins 7 and 8 at the rear of the instrument are the remote input pins. When these pins are short circuited, via a pushbutton or keyswitch the instrument will perform the selected remote input function. A message will flash to indicate which function has been selected when the remote input pins are short circuited. The remote input functions are as follows:

nonE - no remote function required.

P.HLd - peak hold. The display will show the peak value only whilst the remote input pins are short circuited.

d.HLd - display hold. The display value will be held whilst the remote input pins are short circuited.

Hi - peak memory. The peak value stored in memory will be displayed if the remote input pins are short circuited, if the short circuit is momentary then the display will return to normal measurement after 20 seconds. If the short circuit is held for 1 to 2 seconds or the power is removed from the instrument then the memory will be reset.

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

Hi Lo - toggle between **Hi** and **Lo** displays. This function allows the remote input to be used to toggle between peak and valley memory displays. The first operation of the remote input will cause the peak memory value to be displayed, the next operation will give a valley memory display. **PHi** or **PLo** will flash before each display to give an indication of display type.

2Er0 - 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 short circuited.

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.

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.

di SP - Switch to alternate display. When the linearising table is being used it is possible to toggle between the linearised display (the display which uses the table to calculate the display value) and the live input which will be calculated purely from the 2 point values input at **CAL 1** and **CAL2** or **USEr En4** and **USEr En20**. This feature is useful in that it can provide an easy check of live input against linearised display value i.e. **P** values against **y** values. The display will indicate **inPt** prior to showing the live input value and **Lin** prior to showing the linearised value. With the remote input terminals open circuit the display will always show the linearised value (if the **tAbL** function is set to **on**). The display will only show the live input value whilst the remote input is short circuited i.e. the contact must remain closed whilst the value is read.

dULL - display brightness control. The remote input can be used to change the display brightness. When this mode is selected the display brightness can be switched, via the remote input, between the brightness level set at the **br9t** function and the brightness level set at the **dULL** function.

CLr.t - clear totaliser memory. When this mode is selected the remote input can be used to clear the totaliser memory i.e. reset it to zero.

SPAC (setpoint access)

Seen only if more than 1 relay fitted.

Sets the access to the alarm relay set points. The following choices are available:

A 1 - Allows setpoint access to alarm 1 only.

A 1-2 - Allows access to alarms 1 and 2 only.

A 1-3 allows access to alarms 1,2 and 3 etc. up to the maximum number of relays fitted.

The remote input function (**r.I nP**) 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 **A 1Hi** is set to **OFF** then there will be no access to the **A 1Hi** function when **SPAC** is used.

Sqrt (square root) - For use only when **tAbL** function set to **OFF** i.e. not for use with linearised display.

Selects the square root scaling to on or **OFF**. When set to **on** a square root function is applied to the input. When set to **OFF** the calibration is a linear function. **Note**: It is essential that the display is rescaled,

using CAL 1 and CAL2 or USER En4 and USER En20, whenever the square root function is turned on or off.

When the square root facility is used the scaled displayed value follows the square root of the percentage of the full scale input value. The upper and lower input limits are set as normal as are the values to be displayed at these limits. For example if, for a 4 - 20mA input, you wish to display 0 at 4mA and 1000 at 20mA the square root function will calculate as follows:

At 20mA (100%) the display will be 1000 i.e. $\sqrt{1}x1000$.

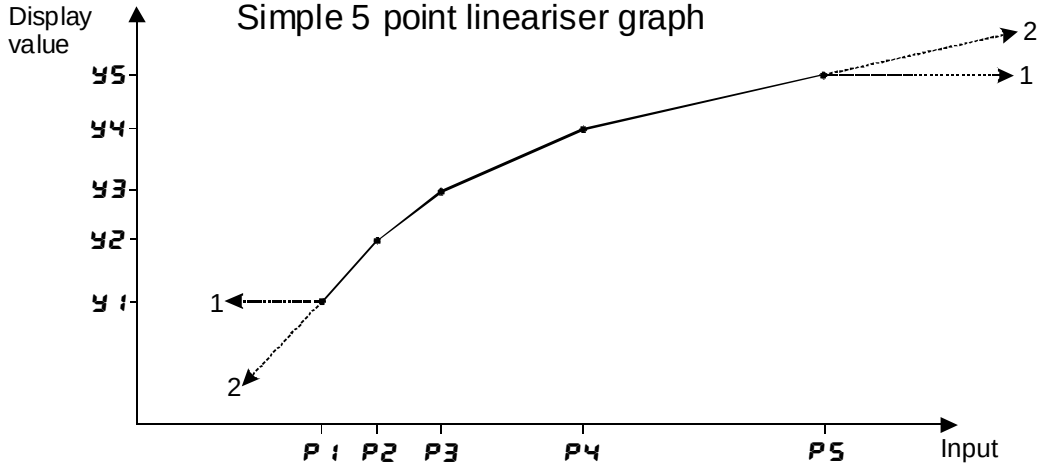
At 16mA (75%) the display will be 866 i.e. $\sqrt{0.75}x1000$.

At 12mA (50%) the display will be 707 i.e. $\sqrt{0.50}x1000$ and so on.

4 .1 Lineariser functions

The following five functions are used to set up the lineariser table. The lineariser is of the X,Y type with space for up to 40 points to be programmed and stored. All points are stored in battery backed memory and will be retained when power is removed. Chapter 7 contains a table in which you can make a permanent written record of the points entered.

The X values for each point will actually be indicated as P (e.g. P 1 .P2 etc.) since the seven segment display cannot show an X. The P values are normally entered either as a percentage of full scale input or as a direct representation of the input signal e.g. for a 4-20mA input you could either enter 4mA = 0.00 and 20mA = 100.00 or 4mA = 4.00 and 20mA = 20.00. The value entered into the table must correspond with the initial calibration values (CAL 1 & CAL2 or USER En4 & USER En20). For example if a 4-20mA input is initially scaled to read from 0.00 to 100.00 then you cannot enter these values as 4.00 to 20.00 in the table (without causing errors in the reading). The number of decimal points available for entering P values is



Arrows labelled "1" show the effect of tABL StOP function = on
Arrows labelled "2" show the effect of tABL StOP function = OFF

1 decimal place for 4 digit displays or 2 decimal places for 5, 6 or 8 digit displays.

The Y values are indicated as Y (e.g. Y 1 .Y2 etc.) . These Y values represent the display required for the given P value entered. For example if P3 = 25.00 and Y3 = 1500 then 1500 will be displayed whenever that input is present.

Y values to be entered into the lineariser table must be either calculated or measured via a live input. Refer to the "Example" later in this chapter for an example of creating a lineariser table using live inputs.

tABL (lineariser on or off)

Allows the lineariser to be switched on (on) or off (OFF). If it is switched off then none of the other lineariser functions will be seen on the display and the instrument will either operate as a linear display using the CAL 1 & CAL2 or USER En4 & USER En20 scaling values or as a square root law display if the SQrt function is set to on.

tABL StOP (mode of operation at points outside the table range)

This function sets the mode in which the instrument will behave when a value is input which is higher than the largest value entered in the table or lower than the smallest value entered in the table. Refer to the graph above.

If set to on then the display value will remain equal to the nearest table entry value. For example if the

lowest table entry is made at 8mA and the display indicates **500** at this value then any input lower than 8mA will also cause the display to indicate **500**.

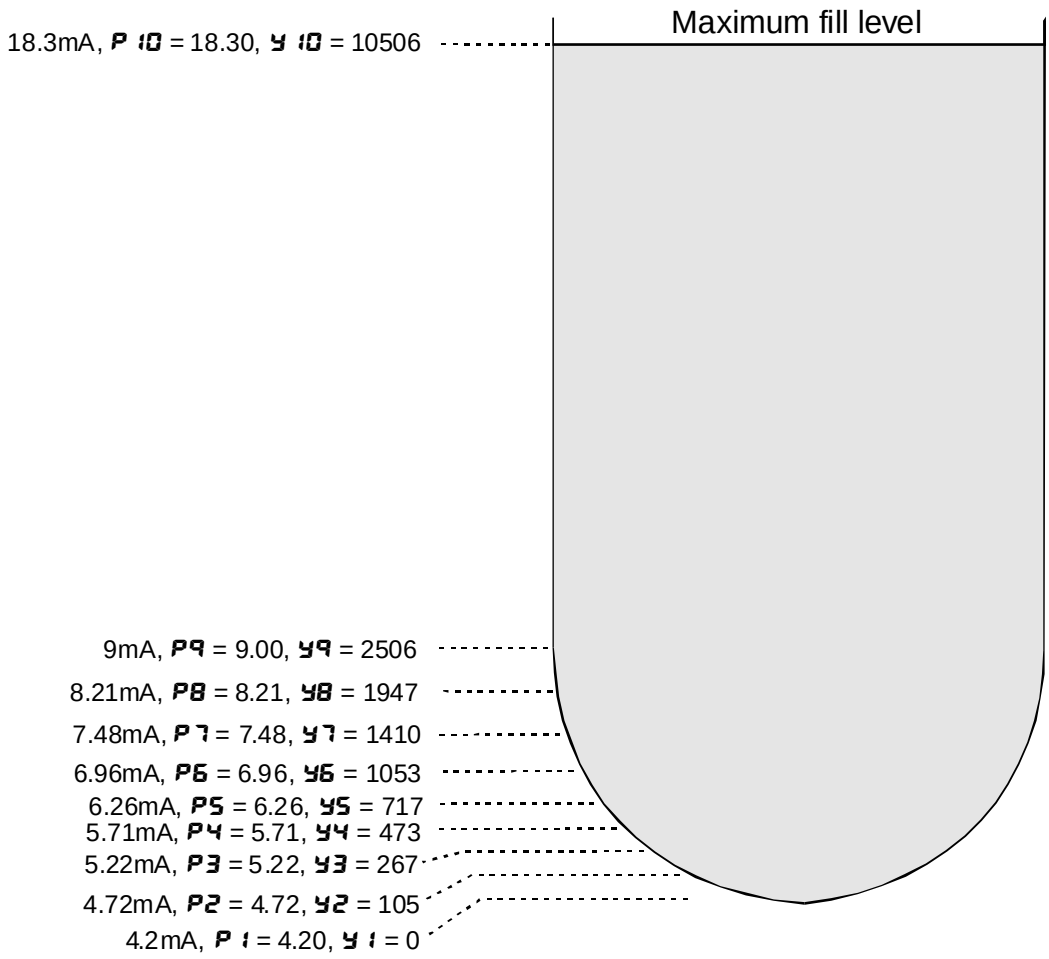
If set to **OFF** then the display value will continue to change when an input outside the table limits in encountered. The instrument will extrapolate the reading using the slope of the previous pair of points.

SCLE tbl E (table rounding value)

This function allows a rounding value to be set for **y** entries. Options provided are 1, 2, 5, 10, 20, 25, 50, 100, 250, 500 or 1000 . For example if the rounding value is set to 25 then the **y** entries will jump in steps of 25 i.e. 0, 25, 50, 75 etc. (or 0.00, 0.25 etc. depending on decimal place setting). This rounding factor is useful in that it allows the speeding up of entries into the table, it does not cause the final display value to jump in steps. Use the **drnd** function if you wish to cause the final display value to also jump in these steps.

tAbL PntS (number of table points)

Displays and sets the number of points in the linearisers table. Select the number you require and enter that number of points. If you wish to increase or decrease the number of points then the **tAbL PntS** value can be changed at a later stage.



SEt tAbL (enter values into the table)

This function allows values to be entered into the lineariser table. Entries to the table do not need to be in any ascending or descending order since the instrument will automatically arrange the points in order at the end of the entry sequence. The procedure for entering points is:

1. Ensure that the correct number of points required has been set in the **tAbL PntS** function.

2. Complete the lineariser table given in Chapter 7 by calculation or measurement of values.

3. At the **SEt tAbL** function press the ▲ and ▼ buttons simultaneously.

4. The display will show **P 1** indicating the first linearising point followed by the first **P** value in memory, use the ▲ or ▼ button to adjust this to the required first input point value.

5. Press the **F** button, the display will indicate **y 1** followed by the first **y** value in memory, again use the ▲ or ▼ to make any changes to the value required.

6. Press the **F** button, the display will indicate **P2** followed by the second **P** value in memory. Repeat the process described in steps 4 and 5 until all points have been entered.

Example

A pressure transmitter with a 4-20mA output is installed near the base of an irregularly shaped tank, see picture above, which contains a liquid. The transmitter is connected to a PM4-LN and 10 linearising points are required to measure the number of litres in the tank. The output from the transmitter will be linear between P9 and P10 since the sides of the tank are straight. Most of the linearisers points are concentrated on the non linear (curved) parts of the tank i.e. the parts of the tank in which the output from the transducer will not be linear.

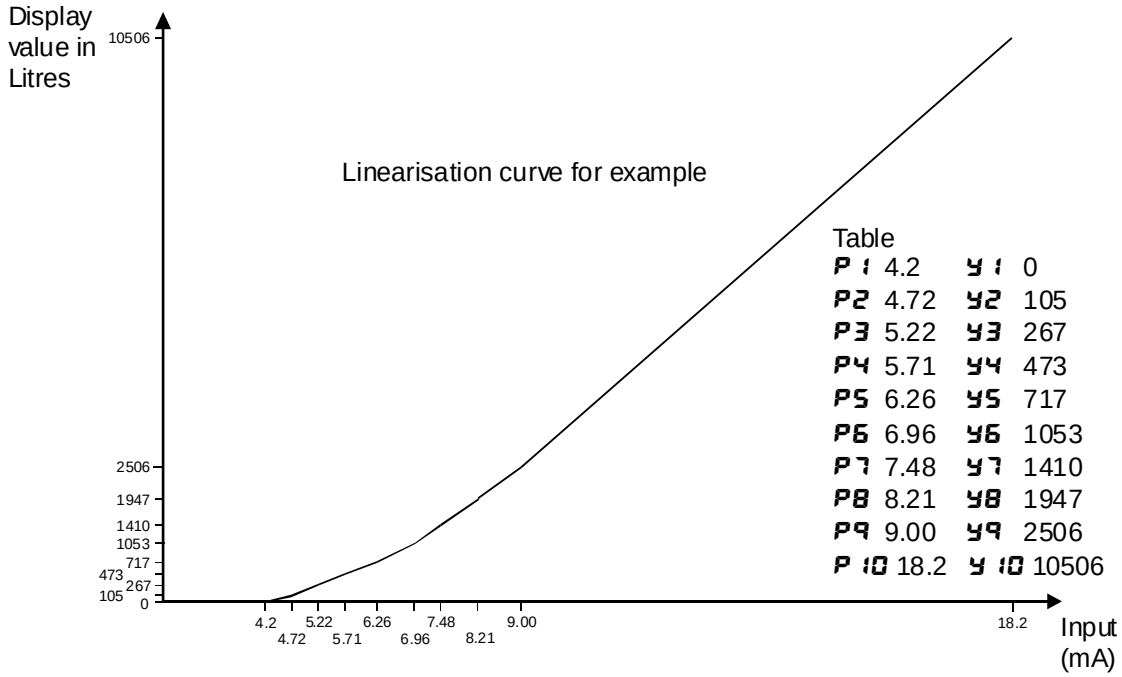
The procedure used is as follows, steps a. to n.:

a. All general functions are set as required i.e. display rounding etc.

b. Set the tAbL function to on. The SPrt function should be set to OFF .

c. Use CAL 1 & CAL 2 or USEr En4 & USEr En20 to scale the PM4 to show 4mA= 4.00, 20mA= 20.00.

d. The tank is emptied and the transmitter is connected to the display, the tank will need to be gradually



filled whilst the lineariser table (Chapter 7) record is completed. Note that the reverse process is equally valid i.e. starting with a full tank and gradually emptying it.

e. The first reading is taken from the display (4.20 in this case) with the tank virtually empty this represents a reading of zero litres. The lineariser table is filled in for the first point, P 1 = 4.20, y 1 = 0.

f. The tank is now gradually filled and a flowmeter is used to measure the number of litres entering the tank. The panel meter reading will change as the tank is filled.

g. The second reading is taken from the display (4.72 in this case), at this point 105 litres had been added to the tank. The lineariser table is filled in for the second point, P2 = 4.72, y2 = 105.

h. Repeat the filling procedure until all 10 points are recorded, the results in this example are shown in the example diagram and table.

j. The figures from the written table record now need to be transferred to the instruments lineariser table memory. Set the tAbL function to on and the tAbL PntS function to 10.

k. At the SEt tAbL function press the ▲ and ▼ button simultaneously. The display will show P 1 followed by a number, use the ▲ or ▼ button to change this number to 4.20.

l. Press, then release, the F button. The display will indicate y 1 followed by a number. Use the ▲ or ▼ button to change this to 0.

m. Press, then release, the F button. The display will indicate P2 followed by a number. Use the ▲ or ▼ button to change this to 4.72.

n. Repeat the process until all the P and y values have been entered.

Continue pressing, then releasing, the F button until the FUnC End message is seen and the display returns to measurement mode.

4 .2 Totaliser functions

tOt dCPt (totaliser decimal point selection)

Displays and sets the decimal point position for the totaliser display. Choices are **0** (no decimal point) . **0.1** , **0.02** etc.

di SP SCLE (display scaling factor)

Displays and sets the display scaling factor. The scaling factor can be set anywhere in the range from 0 to the maximum display value. This factor is used in the formula to calculate the total display (see **E.SCL**). See below for examples. A **di SP SCLE** setting of **0** will disable the totaliser i.e. the instrument will function either as a linear display (e.g. rate) if **tAbL** is set to **OFF** or a linearised display if the lineariser table is used (**tAbL** set to **on**).

tOt SECS (totaliser scaling factor)

Displays and sets the totaliser scaling factor. The scaling factor can be set anywhere in the range from 0 to the maximum display value. This factor is used in the formula to calculate the total display (see **E.SCL**). See below for examples.

E.SCL (exponent scaling factor)

Displays and sets the exponent factor for the display. The scaling factor can be set anywhere in the range from 0 to 9. This factor allows a larger accumulated total by dividing the rate display value down to a smaller number. For example a rate display in grams can be converted to kilograms by setting **E.SCL** to 3.

The formula used to calculate the accumulated total display from the rate display is as follows:

$$\text{Total} = \text{Previous Total} + \frac{\text{Rate display} \times \text{dISPSCLE}}{\text{totSECS} \times 10^{\text{ESCL}}} \times \text{Ts}$$

Where: Ts is the time since the last sample in seconds.

Examples:

Example 1 - The instrument is connected to a flow meter and the rate is scaled to show litres per minute (L/m). The total display is required in mega litres (ML). For a flow indication of 500 L/m the total should increase by 500 litres or 0.0005ML in 1 minute.

In the formula the rate display will be 500, there is no display scaling factor (**dISPSCLE**) so enter this as 1, the totaliser scaling factor (**tOtI SECS**) will be 60 (seconds) since we are measuring in litres per minute and Ts will be 60 (seconds) if we wish to see the total after 1 minute. Since we are measuring in mega litres (Litres x 10^6), the **E.SCL** value will be 6.

$$\text{Total} = \text{Previous Total} + \frac{500 \times 1}{60 \times 10^6} \times 60 \text{ (ML)}$$

$$\text{Total} = \text{Previous Total} + 0.0005 \text{ (ML)}$$

Example 2 - Rate of fill measured is to be in m^3/hr (cubic metres per hour). It is found that the total fill in one hour equals 1.22 times the rate indication, this will be the **d.SCL** factor. **t.SCL** will be 3600 (seconds i.e. 1hour in seconds), **E.SCL** will be 0 since both rate and total are in cubic metres. For this example we will examine the increase in total after 2 hours (7200 seconds). A rate of 35.8 m^3/hr we would expect an increase in the total of 87.352 m^3 in 2 hours (35.8 x 1.22 x 2).

$$\text{Total} = \text{Previous Total} + \frac{35.8 \times 1.22}{3600 \times 10^0} \times 7200 \text{ } (m^3)$$

$$\text{Total} = \text{Previous Total} + 87.352 \text{ } (m^3)$$

totI NEG (negative total select)

Displays and sets whether negative totals are allowed or not . When set to **OFF** negative totals are not allowed and the total will not increase when the rate input is negative. Set to **on** to allow negative totals.

totI rAP.F (wrap around operation)

Displays and sets the totaliser wrap around operation for displays at full scale. If **StOP** is selected the display will halt at its maximum or minimum display value. If **2Er0** is selected then the display will wrap around to zero i.e. will reset itself and start again at zero.

CLr totI (clear totaliser)

Allows the totaliser value to be cleared via the setup pushbuttons located at the rear of the instrument. To clear the totaliser press ▲ and ▼ simultaneously at this function. The message **CLrd** will be seen to confirm that the totaliser memory has been cleared.

dFI t dISP (default display)

The default display may be set to total (**tOtI**) or rate (**rAtE**). The instrument will automatically revert to its default display. The ▲ or ▼ button can be used to change from the default to the alternate display and the instrument will then return to the default display after a period of around 20 seconds.

4 .3 Output mode functions

Ax.rt or Ax.tL or Ax.PA (alarm rate, total or pass operation)

Select **Ax.rt** if the alarm is to operate from the rate value or **Ax.tL** if the alarm is to operate from the total value. For pass operation select **Ax.PA**, in this mode the relay will activate for the time set at the AxPt function every time the total increments by the value set at the **AxPS** function.

rEC (analog retransmission operation mode) - seen only when the analog retransmission option is fitted.

Displays and sets the mode of operation for the analog retransmission. Choices are rAtE (follows the rate value) or totl (follows the total value value).

d9.OP (digital output mode) - seen only when digital retransmission is fitted.

As with the rEC function above the digital output can be set to follow the rAtE (follows the rate value) or totl (follows the total value value).

bAr (bargraph mode) - seen only in bargraph display instruments.

The bargraph can be set to follow the rAtE (follows the rate value) or totl (follows the total value value).

4 .4 Serial output functions

The following functions will only be seen if the RS232 or RS485 communications option is fitted. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted.

bAud (set baud rate, seen only with serial output option).

Select from 9600, 4800, 2400, 1200, 600, 300, 19.2 or 38.4.

PrtY (set parity, seen only with serial output option).

Select parity check to either nonE, EUEn or odd.

O.Put (set RS232/485 interface mode, seen only with serial output option).

Select d, SP, Cont or POLL

Allows user to select the RS232/485 interface operation as follows:-

d, SP Sends image data from the display without conversion to ASCII.

Cont Sends ASCII form of display data every time display is updated.

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

Addr (set unit address for polled (POLL) mode (0 to 31, seen only with serial output option).

Allows several units to operate on the same RS485 interface reporting on different areas etc. 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) addresses unit 10.

SErL - **(serial retransmission mode)**

Applies only when O.Put function set to Cont. Allows selection of serial retransmission of:

L, uE - live input mode. The retransmission will follow the electrical input and will not necessarily follow the 7 segment or bargraph display. For example if the remote input is set for peak hold operation then when the remote input is closed the 7 segment display will only show the peak value but the retransmission will be free to change to follow the electrical input.

P.HLd - peak hold mode. The 7 segment display and retransmission value will indicate the peak value only whilst the peak value function is operated via a contact closure on the remote input i.e. the 7 segment display and retransmission can rise but not fall whilst the remote input switch is closed. When the remote input switch is opened the retransmission value will remain fixed i.e. it will not rise or fall, although the 7 segment display value will be free to alter. This peak retransmission output can be cleared by closing the remote input switch for another operation or by removing power from the instrument. Note: In this mode the retransmission will show a zero reading until the remote input is operated for the first time after switch on.

d.HLd - display hold mode. The 7 segment display and retransmission value will be held whilst the remote input display hold switch is closed. When the switch is opened the retransmission value will remain fixed at the held value although the 7 segment display value will be free to alter. The held retransmission output can be cleared by closing the remote input switch for another operation or by removing power from the instrument. Note: In this mode the bargraph will show a zero reading until the remote input is operated for the first time after switch on.

Hi - peak (max.) memory mode. With the peak remote input switch open the retransmission will indicate the peak value in memory i.e. the retransmission output can rise but not fall. The retransmission output can be reset by clearing the memory. The memory may be cleared either by closing the remote input switch for approximately 2 seconds or by removing power to the instrument.

Lo - valley (min.) memory mode. With the valley remote input switch open the retransmission will

indicate the valley (min.) value in memory .e. the retransmission output can fall but not rise. The retransmission output can be reset by clearing the memory. The memory may be cleared either by closing the remote input switch for approximately 2 seconds or by removing power to the instrument.

dI SP - display mode. The retransmission output will follow whatever value is on the 7 segment display.

Returning to normal measure mode

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

4 .5 Error messages

The following contains some of the error messages which may be encountered when setting up the instrument.

Lin trbl E Err - lineariser table entry error. This message indicates that there is an error in the figures in the table e.g. all **P** and **Y** values are identical. Return to the **SEt tAbL** function and check the entries.

---- - the bars across the screen indicate that the instrument is seeing an input which is out of its range. e.g. if the input links are set to 0-1V and the signal input is much greater than 1V then this error message will be seen. Check the input signal and input links.

-or- this message indicates that the display is "overrange" i.e. it is being asked to display a number larger than its display range. e.g. larger than **9999** for a 4 digit instrument. Check that the input signal is within the input range chosen by the link settings. Check also that the scaling values given are correct e.g. if, for a 0-1V input on a 4 digit instrument, the instrument was scaled using 0V = **0** and 0.4V = **8000**, then an input of 0.5V or above will cause the error message to be seen.

SPAN Err - scaling span error. This message indicates that the live inputs used in **CAL 1** and **CAL2** were either identical or too close together. Recalibrate ensuring that the live input used at **CAL 1** is significantly different to that used at **CAL2**.

CAL FAIL - scaling failure. This message indicates that the instrument has not accepted the live inputs used during a **CAL 1** and **CAL2** scaling operation. Try recalibrating again ensuring that the inputs used are correct for the input range and input link settings chosen, you may find that the input links have been set to a different range. If you have checked the inputs and find that the **CAL FAIL** message is still appearing then perform a **UCAL** operation prior to the **CAL 1** and **CAL2** operation.

COP FAIL - this message indicates that the instrument power has been interrupted, usually due a spike on the power supply or signal input lines. The instrument will show this error message and then reset itself i.e. the "wake up" display messages will be seen after the **COP FAIL** message. Check the power supply and input lines for spikes, usually caused by something with a large inductance (e.g. solenoid, motor etc.) on the same supply circuit switching on or off. It may be necessary to suppress the interference at the source and/or place the PM4 on a different supply line. Screened cables are recommended for the signal input lines, the screen should be grounded at the PM4 end only.

5 Function Table

Initial display	Meaning of display	Next display	Default Setting	Record Your Settings
AxPS	Relay pass value	Any display value	0	
AxPt	Relay pass time	0.0 to 999.9	0.0	
AxLo	Alarm low setpoint value	Setpoint value or OFF	OFF	
AxHi	Alarm high setpoint value	Setpoint value or OFF	OFF	
AxHY	Alarm hysteresis	Hysteresis value in measured units	1	
Axtt	Alarm trip time	No of seconds before relay trips	0	
Axrt	Alarm reset time	Reset time in seconds	0	
Axn.o or Axn.c	Alarm Action N/O or N/C	Axn.o or Axn.c	Axn.o	
Ax.SP or Ax.ti	Setpoint or trailing alarm	Ax.SP or Axn.ti	Ax.SP	
brgt	Display brightness	1 to 15	15	
dULL	Remote display brightness switching	0 to 15	1	
Functions below are accessible only via CAL mode				
bAr_	Bar Graph Low Reading	Value in memory	0	
bAr¯	Bar Graph High Reading	Value in memory	1000	
bAr tYPE	Bargraph operation mode	bAr, S.dot, d.dot or C.bAr	bAr	
d9.OP	Digital retransmission output polarity	ALo or AHi	ALo	
bcdStrt	BCD retransmission start value	Value in memory	0	
di9_	Scaled digital output low reading	Value in memory	0	
di9¯	Scaled digital output high reading	Value in memory	1000	
rEC_	Recorder output low limit	Value in memory	0	
rEC¯	Recorder output high limit	Value in memory	1000	
drnd	Display rounding selects resolution	1 to 5000	1	
dCPt	Display decimal point	Decimal point position (e.g. 0, 0.1 0.02 etc.)	0	
FLtr	Digital filter range 0 to 8	0 to 8 (8=most filtering)	3	
CAL 1	First scaling point	Live reading	n/a	
CAL2	Second scaling point	Live reading	n/a	
USEr En4	4mA input scaling	Value in memory	0	
USEr En20	20mA input scaling	Value in memory	1000	
UCAL	Uncalibrate	CAL CLr	n/a	
P.but	P button Function (5, 6 or digit LED displays only)	NONE, Hi, Lo, Hi Lo, 2ErO, di SP or CLr.t	NONE	
r.inP	Remote input function	NONE, PHLd, dHLd, Hi, Lo, Hi Lo, 2ErO, SP.Ac, no.Ac, CAL.S, di SP, dULL or CLr.t	NONE	
SPAC	Setpoint access	A1, A1-2 etc.	A1	
Sqrt	Square root operation	OFF or on	OFF	
tAbL	Lineariser on/off	on or OFF	OFF	
tAbL StOP	Operation mode at table limits	on or OFF	OFF	
SCLE tbl E	Scaling (rounding) factor for linearisser Y values	1, 2, 5, 10, 20, 25, 50, 100, 250, 500 or 1000	1	

tAbL PntS	Number of points for linearisers	2 to 40	2	
SEt tAbL	Enter points into linearisers table	P 1	n/a	
tOt! dCPt	Total display decimal point	0 . 0. 1 . 0.02 etc.	0	
di SP SCLE	Display scale	value in memory	1	
tot! SECS	Total scale	value in memory	60	
E.SCL	Exponent scale	0 to 9	1	
tot! nEG	Total display negative	on or OFF	OFF	
tot! rAP.F	Total display wrap around	StOP or 2Er0	StOP	
CLr tot!	Clear total	CLrd		
dFl t di SP	Default display	rAtE or tot!	rAtE	
Ax.rt or Ax.tL or Ax.PA	Alarm operation from rate or total	Ax.rt or Ax.tL or Ax.PA	Ax.rt	
bAr	Bargraph mode	rAtE or tot!	rAtE	
rEC	Analog retransmission mode	rAtE or tot!	rAtE	
d9.OP	Digital output mode	rAtE or tot!	rAtE	
bAUd rAtE	Baud rate	300 . 600 . 1200 . 2400 . 4800 . 9600 . 19.2 or 38.4	9600	
PrtY	Parity	nONE . EUEn or Odd	nONE	
O.Put	Output mode	POLL . Cont or di SP	Cont	
Addr	Address	Value in memory	0	
SErL	Serial retransmission mode	L, uE . P.HLd . d.HLd . H, . Lo or di SP	L, uE	

Note: Functions shown shaded on this table will be displayed, only when those particular options are fitted. Refer to the separate “PM4 Panel Meter Optional Output Addendum” booklet supplied when these options are fitted.

Settings for relays - record settings here				
	A1	A2	A3	A4
AxLo				
AxH,				
AxHY				
Axtt				
Axrt				
Axn.o or Axn.c				
Ax.SP or Ax.t 1	n/a			
Ax				

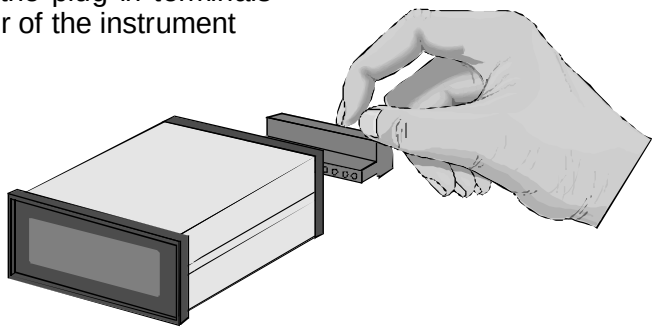
6 Lineariser table

Lineariser Table Complete and retain for reference							
P Value		Y Value (Value to be displayed)		P Value		Y Value (Value to be displayed)	
P1		Y1		P21		Y21	
P2		Y2		P22		Y22	
P3		Y3		P23		Y23	
P4		Y4		P24		Y24	
P5		Y5		P25		Y25	
P6		Y6		P26		Y26	
P7		Y7		P27		Y27	
P8		Y8		P28		Y28	
P9		Y9		P29		Y29	
P10		Y10		P30		Y30	
P11		Y11		P31		Y31	
P12		Y12		P32		Y32	
P13		Y13		P33		Y33	
P14		Y14		P34		Y34	
P15		Y15		P35		Y35	
P16		Y16		P36		Y36	
P17		Y17		P37		Y37	
P18		Y18		P38		Y38	
P19		Y19		P39		Y39	
P20		Y20		P40		Y40	

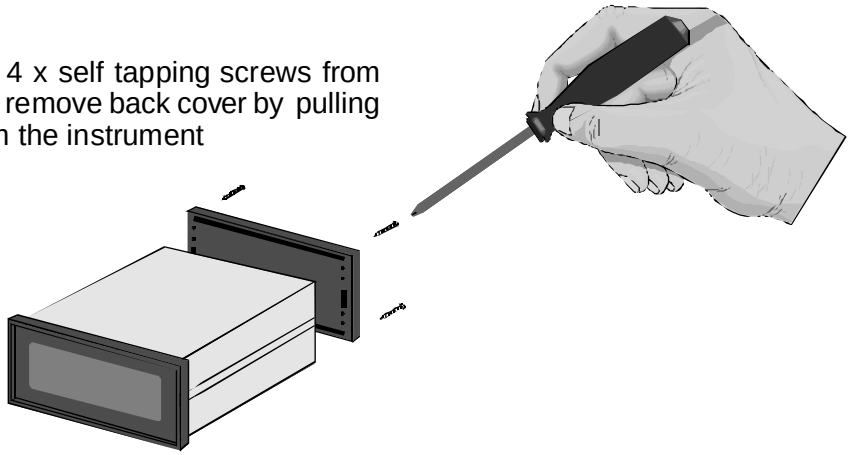
7 Input/Output Configuration

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

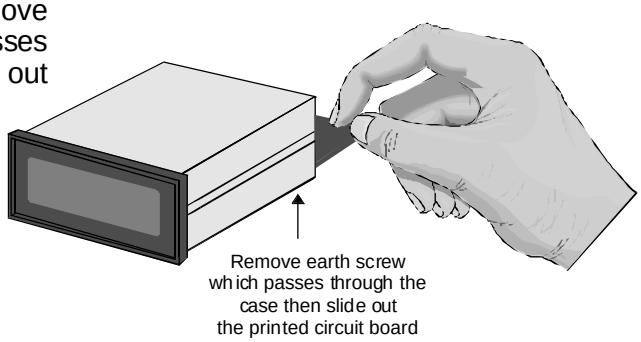
1. Remove the plug in terminals from the rear of the instrument



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



3. Using a screwdriver, remove the earth screw which passes through the case then slide out the board or boards



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

5. Slide PCB back into the case

6. Replace the earth screw which passes through the case

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

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

8 Specifications

8 .1 Technical Specifications

Input Types:	Link selectable 0-20mA, 4 to 20mA or DC Volts 0-100mV, 0-1V, 0-10V, 0-100V
Impedance:	80Ω (4 to 20mA) & 1MΩ on DC Voltage
ADC Resolution:	1 in 20,000
Lineariser table:	Selectable from 2 to 40 points (X,Y type)
Accuracy:	0.1% when calibrated
Sample Rate:	4 per sec
Conversion Method:	Dual Slope ADC
Microprocessor:	MC68HC11F CMOS
Ambient Temperature:	LED -10 to 60°C, LCD -10 to 50°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 + 4 digit 7.6mm + 4 way keypad + alarm 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, (depends on display type & options)
Output (standard):	1 x relay, Form A, rated 5A resistive 18VDC regulated transmitter supply, 25mA max
Relay Action:	Programmable N.O. or N.C.

8 .2 Output Options

Extra Relay:	Same specs as Relay 1 (1 or 3 extra relays)
Analog Retransmission:	4 to 20mA, 0 to 1V or 0 to 10V link selectable 4 to 20mA output can drive into 1kΩ load maximum.
Serial Communications:	RS232 or RS485
DC Voltage Output:	Isolated, regulated ±12V(24V) standard, ± 5V(10V) link selectable (25mA max.).

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 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 2 years from the date of dispatch.

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