

PM4-AI & PM4-AV
True RMS
AC Current or AC Voltage
Process Monitor/Controllers
Operation and Instruction Manual

AMALGAMATED INSTRUMENT CO

Unit 5/28 Leighton Place Telephone: (02) 9476 2244 www.aicpi.com.au
Hornsby NSW 2077 Australia Facsimile: (02) 9476 2902 E-mail: sales@aicpi.com.au

ABN 20 619 963 692

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1 Introduction

This manual contains information for the installation and operation of the PM4-AI and PM4-AV Monitors. Model PM4-AI will accept inputs of 0-5A AC (RMS) (lower ranges available to order) and will display AC in true RMS. Model PM4-AV will accept AC (RMS) voltages in user selectable ranges of 1.5V, 15V, 150V or 300V and will display AC inputs in true RMS.

Two separate sets of calibration scaling values can be stored with the display choice being made via the remote input.

The instrument may be calibrated to display the input in engineering units. A standard inbuilt relay provides an alarm/control function. Optional extra relays, retransmission or serial communications may also be provided. If optional outputs are fitted this manual covers the function settings for the optional output but also supplied will be a "PM4 Panel Meter Optional Output Addendum" brochure which gives details of electrical connections, link settings etc.

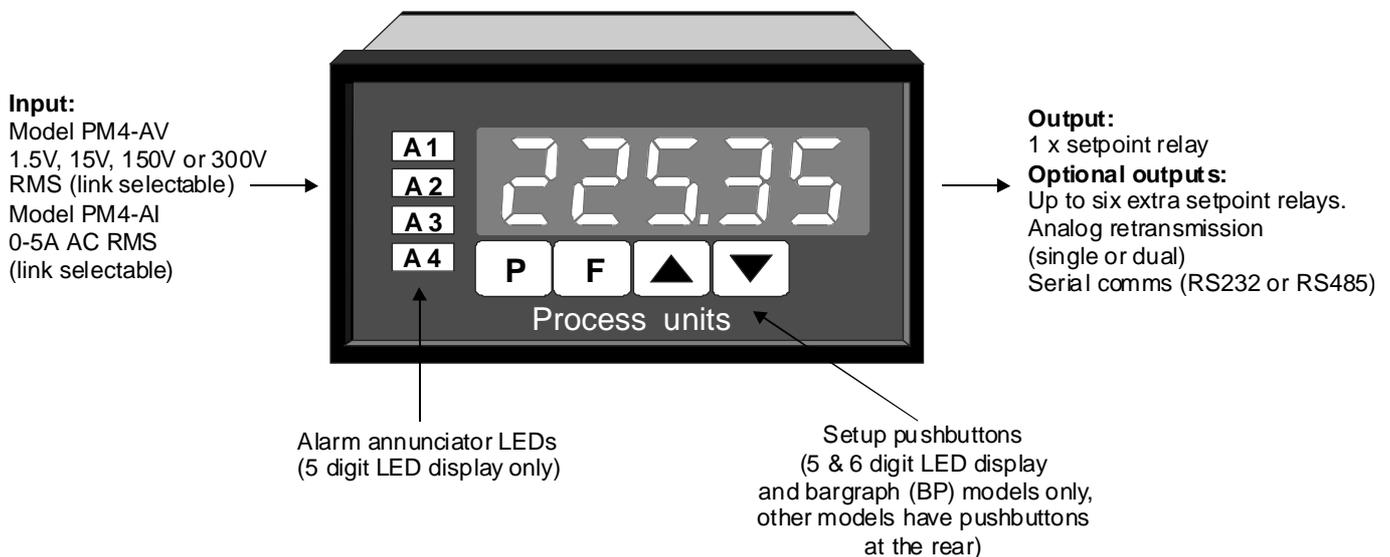
Unless otherwise specified at the time of order, your PM4 has been factory set to a standard configuration. Like all other PM4 series instruments the configuration and calibration is easily changed by the user. Initial changes may require dismantling the instrument to alter PCB links, other changes are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

1.1 Inputs & outputs

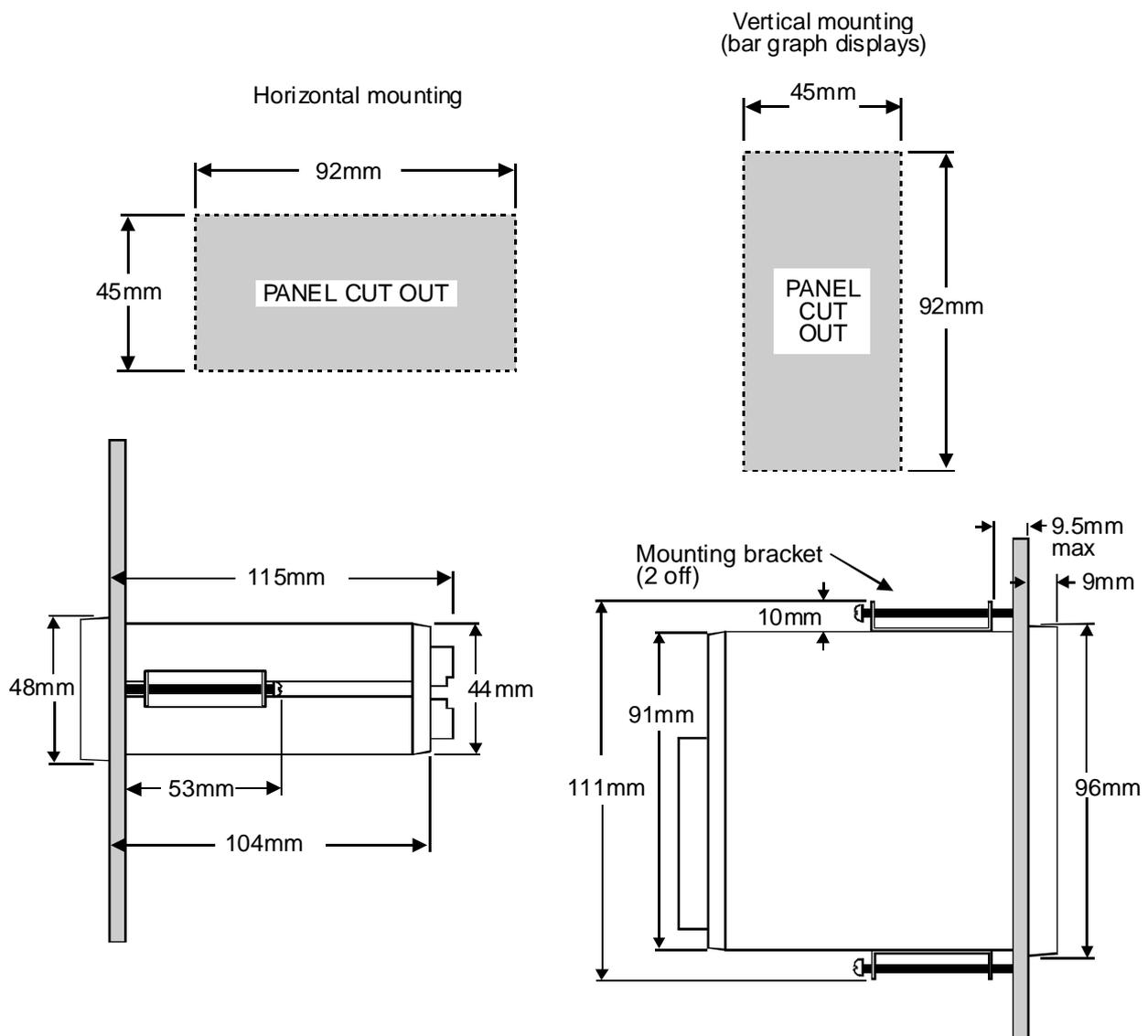


2 Mechanical Installation

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.

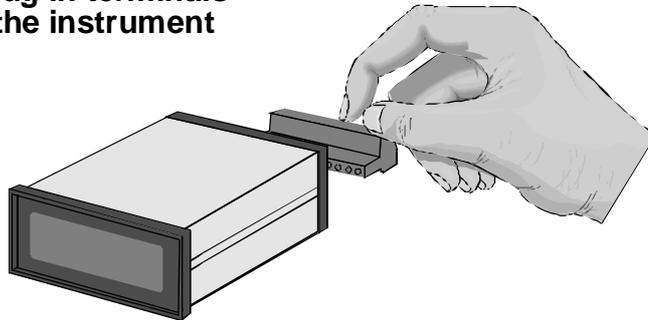
Hint: use the elastic band provided to hold the mounting bracket in place whilst tightening securing screws.



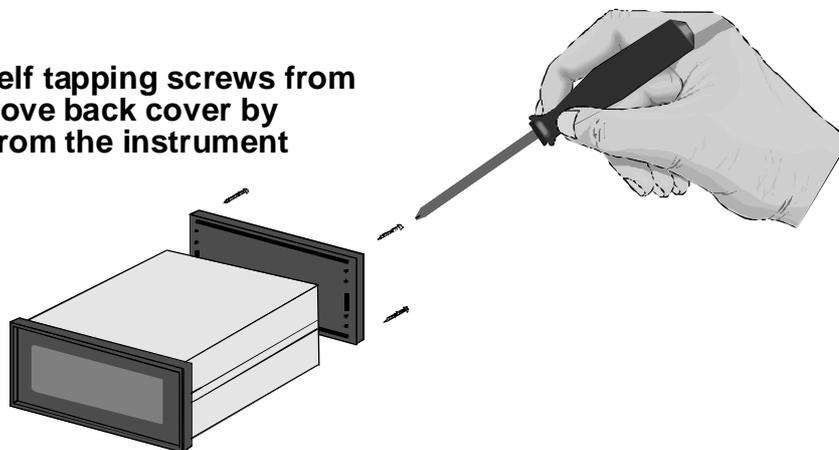
3 Input/Output Configuration

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

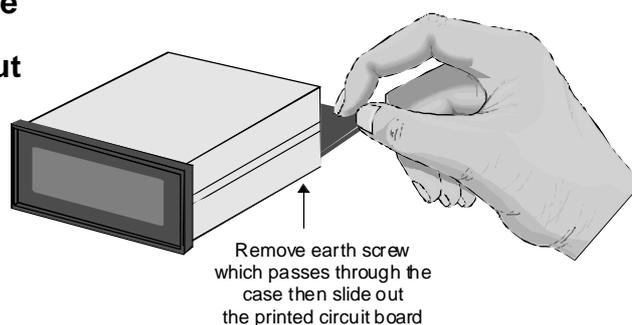
1. Remove the plug in terminals from the rear of the instrument



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



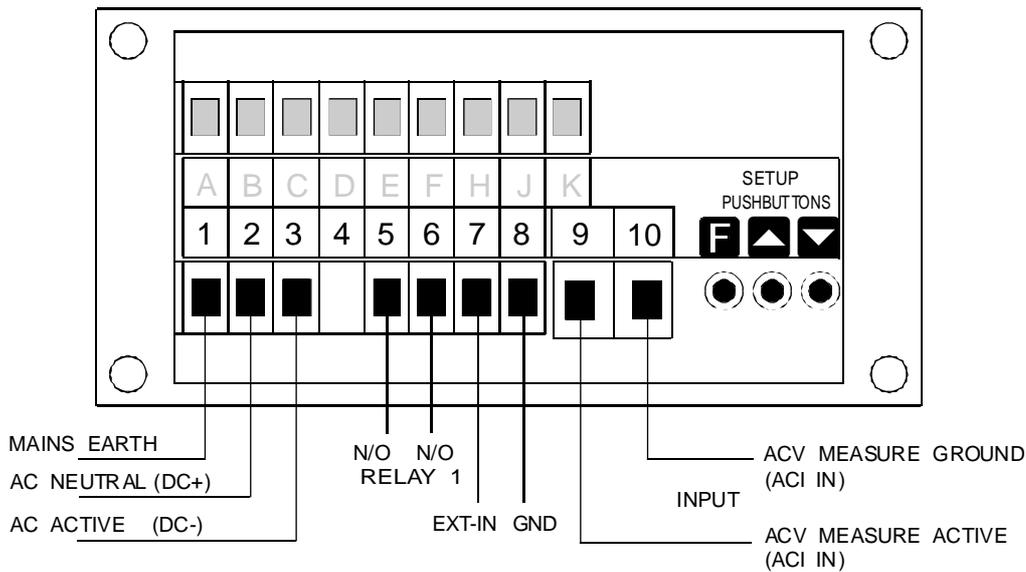
4. Configure the PCB links as required, see appropriate chapter
5. Slide PCB back into the case
6. Replace the earth screw which passes through the case
7. Refit back cover and fix with the self tapping screws
8. Plug the terminal strips back into the rear of the instrument

4 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 2.5mm² 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. Acknowledgement 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 “PM4 Panel Meter Optional Output Addendum” booklet supplied when of optional outputs are fitted.



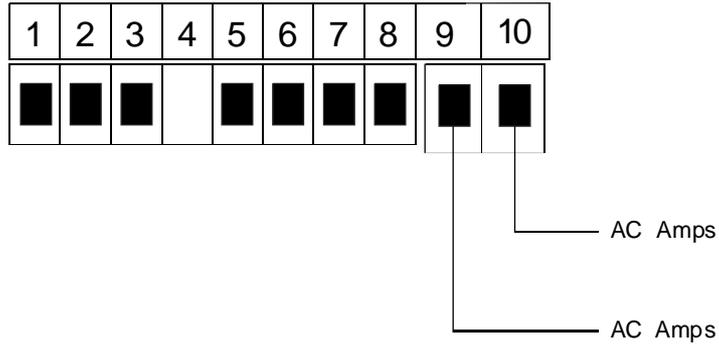
Instrument Rear Panel

1	MAINS EARTH	
2	240VAC NEUTRAL	
3	240VAC ACTIVE	
5	RELAY 1	COM
6	RELAY 1	N/O
7	EXT IN	
8	GROUND	
9	INPUT	
10	INPUT GND	
PM4-AI-240-4E		SERIAL No:

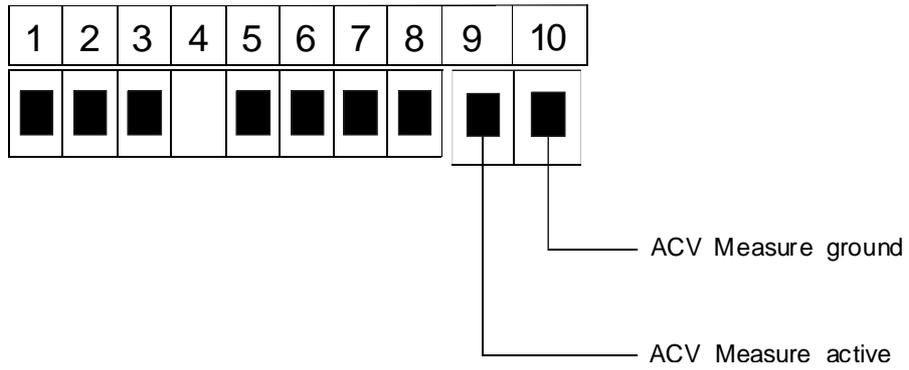
Instrument Data Label (example)

4.1 Connection examples

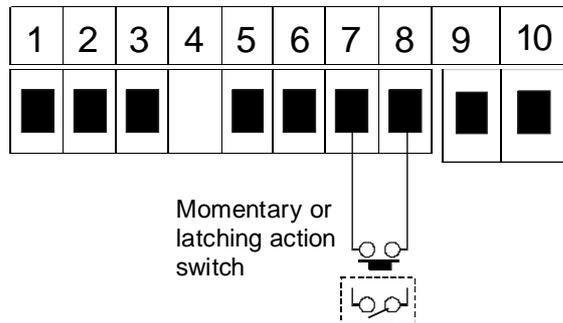
1. PM4-AI AC amps input



2. PM4-AV AC volts input

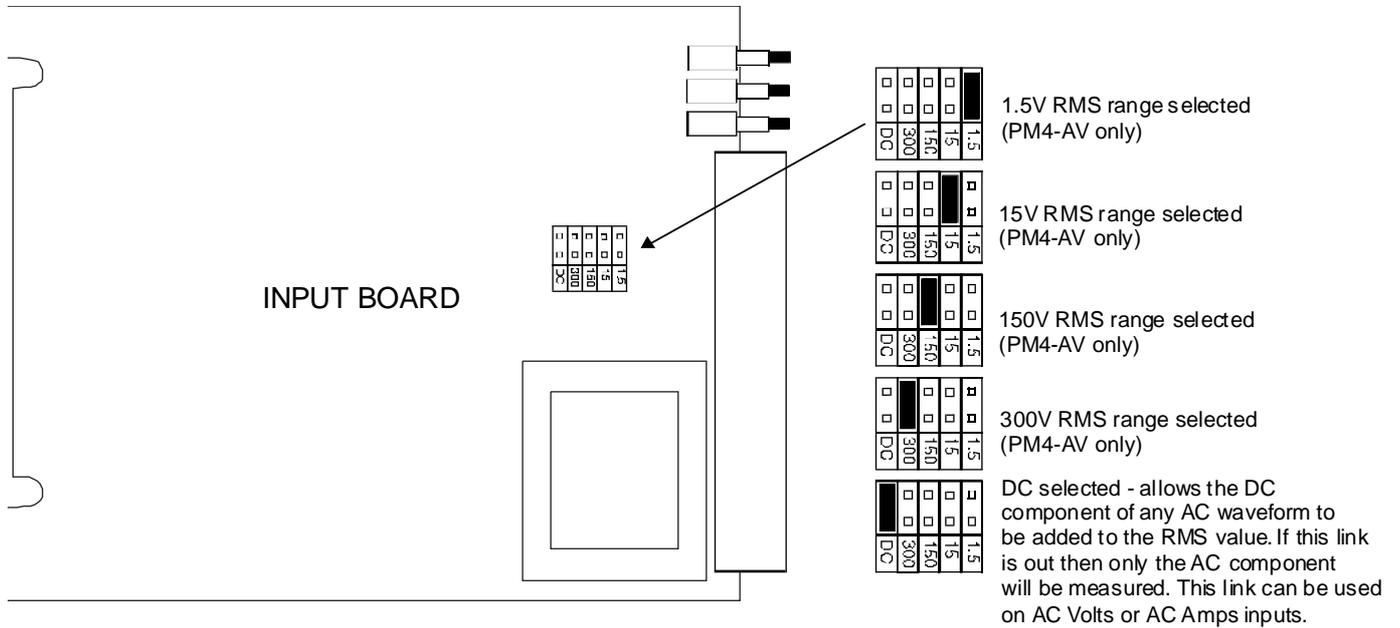


3. Remote input



4.2 Selecting the input range

Dismantle the instrument as described in Chapter 3, "Input/output configuration". Insert the links into the appropriate location on the pin header to suit the range required. The DC link allows DC measurement of an AC signal in which a DC component in the signal it to be taken into account in the measurement. With the DC link in any DC component value in the AC waveform will be added to the RMS value of the waveform and displayed i.e. Display = DC value + RMS value.



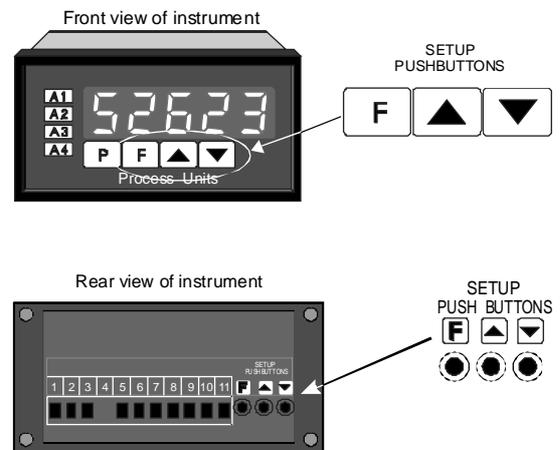
5 Explanation of Functions

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.



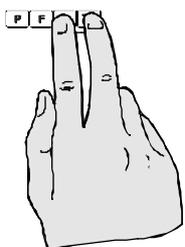
Entering **CAL** Mode



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 **R1Lo**, **R2Lo** and **R3Lo** will all be seen as functions on the display.

The PM4 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 **F: NP** function must be set to **SP.AC** or the **ALCS** 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 **SP.AC** function must be set to allow access to the relays required e.g. if set to **R1-2** 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.

RxLo (alarm low setpoint)

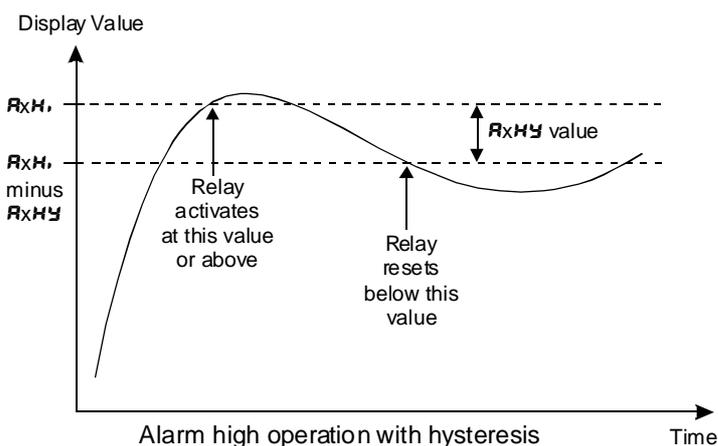
Displays and sets the low setpoint value for the designated alarm relay. The low alarm setpoint may be disabled by pressing the **▲** and **▼** pushbuttons simultaneously. When the alarm is disabled the display will indicate **OFF**. Use **▲** or **▼** to adjust the setpoint value if required. The alarm 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, if so the relay will be activated when the display reading moves outside the band set between low and high setpoints.

RxH. (alarm high setpoint)

Displays and sets the high setpoint value for the designated 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 higher than the 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.

RxHy (alarm hysteresis [deadband])

Displays and sets the alarm hysteresis limit and is common for both high and low setpoint values. The hysteresis value may be used to prevent too frequent operation of the setpoint relay when the measured value stays close to the setpoint. Without a hysteresis setting (**RxHy** 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:



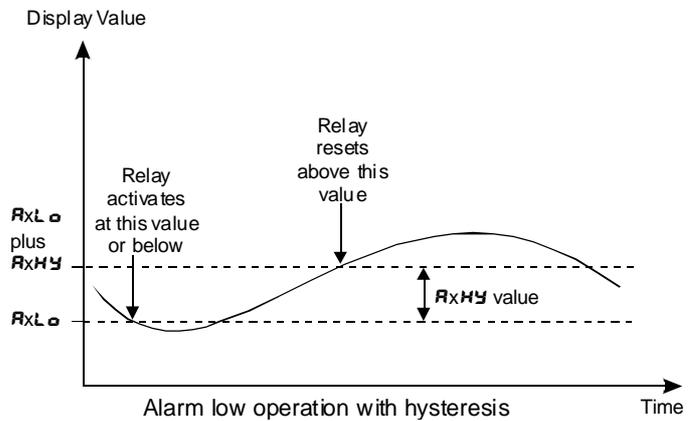
In the high alarm mode, once the alarm is activated the input must fall below the setpoint value minus the hysteresis value to reset the alarm.

e.g. if **R1H.** is set to **50.0** and **R1Hy** 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 **R1Lo** is set to **20.0** and **R1Hy** 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.



RxLt (alarm trip time)

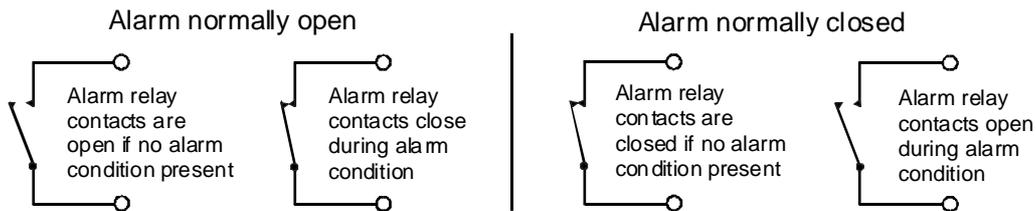
Displays and sets the alarm trip time and is common for both alarm high and low setpoint values. The trip time is the delay time before the alarm relay will activate, or trip, when an alarm condition is present. The alarm condition must be present continuously for the trip time period before the alarm 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.

RxRt (alarm reset time)

Displays and sets the alarm relay reset time. With the alarm condition is removed the alarm relay will stay in its alarm condition for the time selected as the reset time. The reset time is selectable over 0 to 60 seconds.

Rxn.O or Rxn.C (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.



Rx.SP, Rx.t1, Rx.t2 etc. (relay operation independent setpoint or trailing setpoint)

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 **A1.H** is set to 1000 and **A2.H** 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	A5	A6	A7
A1	A2.t1	A3.t1	A4.t1	A5.t1	A6.t1	A7.t1
A2		A3.t2	A4.t2	A5.t2	A6.t2	A7.t2
A3			A4.t3	A5.t3	A6.t3	A7.t3
A4				A5.t4	A6.t4	A7.t4
A5					A6.t5	A7.t5
A6						A7.t6

br 9t (display brightness)

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.

dULL (remote display brightness)

Displays and sets the level for remote input brightness switching, see **F.1 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 **br 9t** 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 **LR mode only.**

br - (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 **br -** and **br ~** settings are referenced from the 7 segment display readings, not the bargraph scale values. The bargraph scale may be scaled differently to the 7 segment display, as shown on the right where bargraph scale is 0 to 100 yet the display is showing **675.3**. In this example the bargraph scale may be indicating percentage of full range whilst the 7 segment display is indicating actual process units.

br ~ (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.

br t YPE (bar graph display operation mode) - seen only in bargraph display instruments.

Allows selection of bargraph operation mode choices are:

br - - conventional solid bargraph display i.e. all LED's illuminated when at full scale.

When scaling the display use the **br -** and **br ~** functions e.g. **br - = 0** and **br ~ = 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 **br -** and **br ~** functions e.g. **br - = 0** and **br ~ = 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. **br - = -100**, **br ~ = 100**.

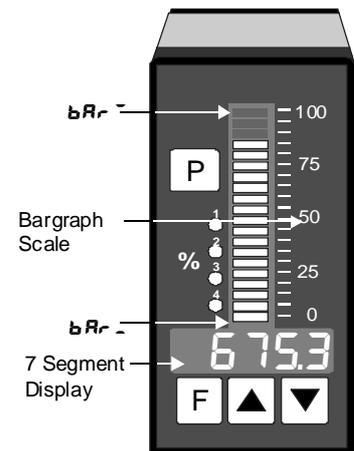
d.dot - double dot display. Two segments will be lit to indicate the input reading position on the scale. The reading should be taken from the middle of the two segments.

When scaling the display use the **br -** and **br ~** functions e.g. **br - = 0** and **br ~ = 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. **br - = -100**, **br ~ = 100**.

C.br - - 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 **br -** and **br ~** functions e.g. **br - = 0** and **br ~ = 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**.



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.

drnd (display rounding)

Displays and sets the display rounding value. This value may be set to 0 - 5000 displayed units. Display rounding is useful for reducing the instrument resolution without loss of accuracy, in applications where it is undesirable to display to a fine tolerance. (example if set to **10** the display 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.

5.1 Calibration functions

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

CAL 1 and **CAL 2** are used together to scale the instruments display, values for both must be set when using this scaling method. Ensure that the required decimal point position is selected prior to calibration.

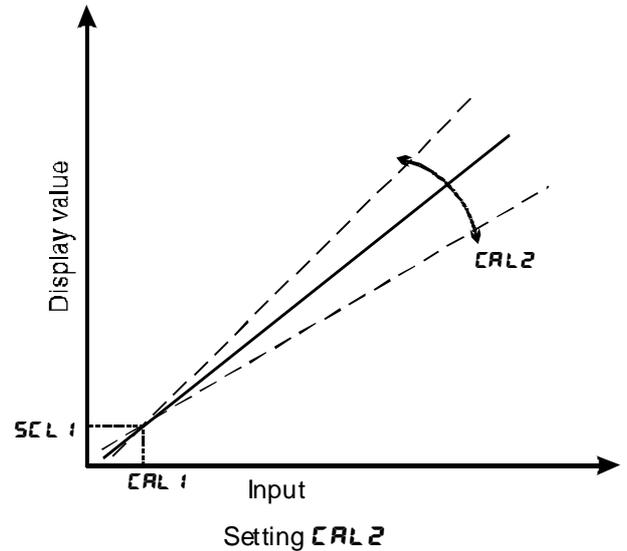
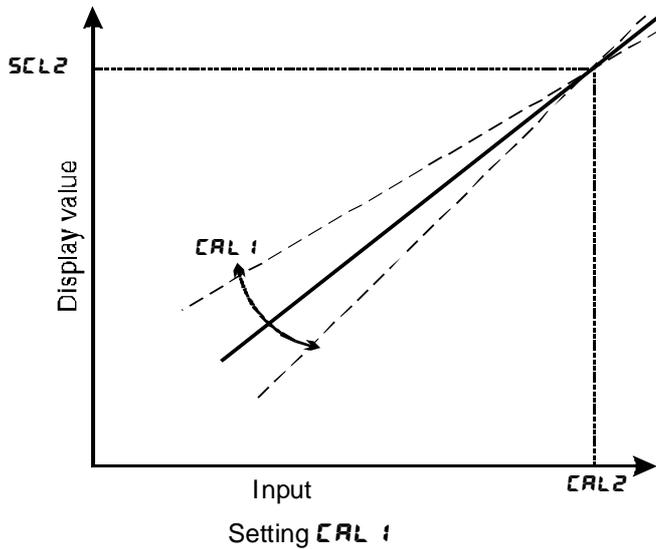
The **CAL 1** function sets the first calibration point for live input calibration. When using this method a signal input must be present at the input terminals. Note: **CAL 1** and **CAL 2** can be set independently.

The procedure for entering the first scaling point is:

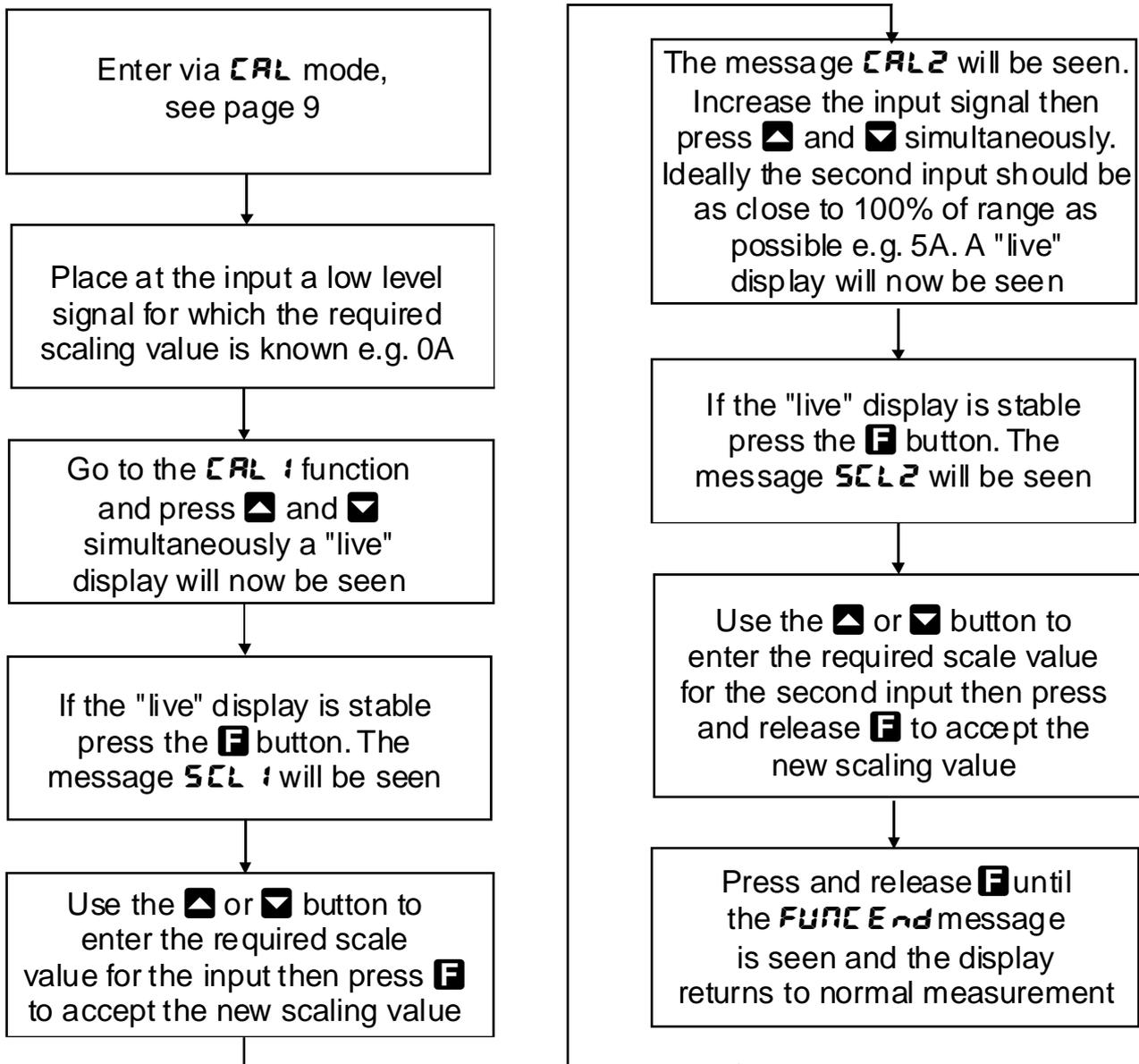
- Ensure that an input signal is present at the input terminals, this will usually be at the low end of the signal range e.g. 0 Amps.
- At the **CAL 1** function press **▲** and **▼** simultaneously then release them. The display will indicate the live input value. Do not be concerned at this stage if 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.
- Press, then release the **F** button. The display will indicate **SCAL 1** followed by a value. Use the **▲** or **▼** button to change this value to the required display value at this input. e.g. if 0A was input and the required display at 0A was **0.0** then ensure **0.0** is selected at **SCAL 1**. Press the **F** button to accept changes or the **P** button to abort the scaling.

CAL 2 (second scaling point for 2 point scaling method)

The second point scaling is performed in exactly the same manner as **CAL 1** except that **SCAL 2** will be seen instead of **SCAL 1**. It is essential that the live input is different in value to the **CAL 1** input e.g. for a 0 to 5A input use 5A as the **CAL 2** live input. Note; it is not essential that 0 and 5A are used as the live inputs for a 0 to 5A scaling but there must be at least a 10% of full scale difference between the **CAL 1** and **CAL 2** inputs, if this is not the case then a **SPAN Err** message will be seen and the calibration point will not be accepted.



Example - Scaling AC Amps using two live inputs



Note: If the "live" display at any scaling point is not stable then check the input signal for stability.

CAL OFFSET (calibration offset)

The calibration offset is a single point adjustment which can be used to alter the calibration scaling values across the entire measuring range without affecting the calibration slope. This method can be used instead of performing a two point calibration when a constant measurement error is found to exist across the entire range. To perform a calibration offset press the **▲** and **▼** buttons simultaneously at the **CAL OFFSET** function. A "live" reading from the input will be seen, make a note of this reading. Press the **▢** button, the message **SCALE** will now be seen followed by the last scale value in memory. Use the **▲** or **▼** button to adjust the scale value to the required display value for that input. For example if the "live" input reading was 50 and the required display value for this input was 70 then adjust the **SCALE** value to 70.

UNCAL (uncalibration)

Used to set the instrument back to the factory calibration values. This function should only be used when calibration problems exist, and it is necessary to clear the calibration memory. To clear the memory press the **▲** and **▼** buttons simultaneously at the functions. The message **CAL CLR** will be seen to indicate that the memory has cleared.

FREQ (frequency display enable)

If this function is set to **ON** the display can be toggled to the frequency display via the **▲** or **▼** button, the message **FREQ** will be shown prior to the frequency reading. If this function is set to **OFF** no frequency reading will be available.

FREQ dCPt (decimal point position for frequency display)

Displays and sets the decimal point position for the frequency display, settings available are **0** (no decimal point), **0.1** (one decimal point place), **0.02** (two decimal point places etc. The maximum number of decimal places available depends on the number of display digits.

FREQ I NPt (frequency input factor)

The frequency input factor is used with the frequency scale factor described below to allow the frequency display to be scaled as required. This factor must be a whole number.

FREQ SCALE (frequency scale factor)

The frequency scale factor is used with the frequency input factor to allow the frequency display to be scaled. The frequency scale factor has the same number of decimal points as the **FREQ dCPt** function. The two factors work together as follows:

$$\text{Frequency displayed} = \frac{\text{FREQ SCALE}}{\text{FREQ I NPt}} \times \text{actual frequency of the input voltage or current (Hz)}$$

For example to display the actual input frequency set both the **FREQ I NPt** and **FREQ SCALE** to **1**. If at an input of 200HZ the display is required to show a frequency of 300Hz then set the **FREQ I NPt** to **2** and the **FREQ SCALE** to **3**.

FREQ FLtR (digital filter for the frequency display)

Displays and sets the digital filter value for the frequency display. 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 increase.

dFLt d: SP (default display)

The default display function allows the display to default to either the voltage or current reading (**I NPt**) or the frequency display (**FREQ**). The **▲** or **▼** button can be used to toggle between the default and alternate display, the **▢** button and remote input can also be programmed to allow toggling between the default and alternate display. The instrument will always show the default display when switched on and when toggled to the alternate display a message (**FREQ or I NPt**) will flash once every 8 seconds to indicate that the display being viewed is the alternate display.

P.bUt (P button function)

Applicable only in models with front panel **P** buttons.

The **P** button may be set to operate some of the remote input functions, see **F: NP** below for a description of these functions. The **P** button is located at the front of 5 or 6 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 **F: NP** function below.

Functions available are: **NONE**, **H**, **Lo**, **H**, **Lo**, **ZERO**, **P.SET** or **d: SP**

F.1: RP (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.

H - 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 **H** function.

H, Lo - toggle between **H** 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. **PH** or **PLo** will flash before each display to give an indication of display type.

ZERO - display zero. Zeroes the display. The input at the time of the zero will be the new zero level. The zero will be retained at this level even if power is removed to the instrument.

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.

CAL.S - calibration select. The remote input can be used to select between calibration scaling values. Two sets of calibration values can be entered in the PM4, one set with the remote input open circuit and another set with the remote input short circuit to ground. The remote input can then be used to switch between one set and the other. For example: With the remote input open circuit a 0-50V input can be scaled (using **CAL 1** & **CAL 2**) to read **0** to **100** over the 0-50V range. With the remote input short circuit to ground the scaling can be repeated using figures of **0** to **500** for the 0-50V range. The remote input can be used to switch between ranges. In this example the first scaling could represent a % figure and the second scaling could represent the actual process units. Note: Alarm settings will not change when changing between calibration scales. i.e. Only one set of alarm functions can be made and the alarm relay will operate from those set values no matter which calibration scale is being viewed at the time.

P.SET - preset value. Not applicable to this model.

d: SP - display toggle. The remote input can be used to toggle between the default and alternate display as set by the **d: SP** function described earlier. When the remote input contact is open the default display will be seen. When the remote input contact is open the default display will be viewed. When the remote input contact is closed the alternate display will be seen and a message (**: NPt** or **FEEQ**) will flash once every 8 seconds to warn that the alternate display is being viewed.

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 **br St** function and the brightness level set at the **dULL** function.

ACCESS (access mode)

The access mode function **ACCESS** 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, see details at the beginning of this chapter preceding the **AILo** function. 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.

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:

R 1 - Allows setpoint access to alarm 1 only.

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

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

The remote input function (**R 1 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 **R 1H** is set to **OFF** then there will be no access to the **R 1H** function when **SPAC** is used.

5.2 Alarm, bargraph and retransmission operation modes

The following describes the output modes for alarm, bargraph, analog, serial and digital retransmission. The serial output (RS232 or RS485) can alternatively be controlled via polling commands. Retransmission and extra alarm relays are optional outputs. The following commands only apply if the option is fitted to the instrument. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when optional outputs are fitted.

R 1, R2 etc. (Alarm relay operation mode for relays 1, 2 etc.)

The following choices are available for alarm operation mode:

L, UE - live input mode. The alarm relay operation will always follow the electrical input at that time irrespective of the 7 segment display value. e.g. assume the remote input is set to **ZERO** and **R 1H** is set to **100**. If the instrument is zeroed at a display reading of **30** then the alarm will now activate at a display reading of **70**.

FREQ - frequency mode. The alarm relay operation will follow the frequency rather than the voltage or current.

PHLD - peak hold mode. If the peak hold mode is used and the remote input is set to peak hold then once the peak display goes above any alarm high setpoint the alarm relay will activate and will not de-activate until the peak hold is released and the display value falls below the setpoint value.

DHLD - display hold mode. If the display hold mode is used and the remote input is set to display hold then the alarm relay will be held in its present state (activated or de-activated) until the display hold is released and the display is free to change.

H - peak (max.) memory mode. If the peak memory mode is used and the remote input is set to peak memory then the alarm will be activated if the peak memory value is above the high setpoint value. The alarm will not de-activate until the memory is reset.

Lo - valley (min.) memory mode. If the valley memory mode is used and the remote input is set to valley memory then the alarm relay will be activated if the valley memory value is below the low setpoint value. The alarm will not de-activate until the memory is reset.

d SP - display mode. If the live display mode is used then the alarms will operate purely on the display value at the time i.e. if the display is showing above high setpoint or below the low setpoint value then the alarm relay will activate. For example if the remote input were set to peak memory and **R 1** were set to live display mode then, unless the display is actually showing the peak memory value (i.e. the remote input has just been activated), the alarm relay is free to operate from the changing display value i.e. the memory does not have to be reset to clear an alarm condition.

BAG (bargraph operation mode) - applicable only to bargraph displays.

The following choices are available for bargraph operation mode:

L, UE - live input mode. The bargraph will respond to the electrical input only and will not necessarily follow the 7 segment display value. 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 bargraph will be free to move up and down to follow the electrical input.

FREQ - frequency mode. The bargraph will follow the frequency rather than the voltage or current.

PHLD - peak hold mode. The bargraph (and 7 segment display) will indicate the peak value only whilst the peak value function is operated via a contact closure on the remote input i.e. the bargraph & 7 segment display can rise but not fall whilst the remote input switch is closed. When the remote input switch is opened the bargraph 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 bargraph reading 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.

d.HLd - display hold mode. The bargraph (and 7 segment display) value will be held whilst the remote input display hold switch is closed. When the switch is opened the bargraph value will remain fixed at the held value although the 7 segment display value will be free to alter. The held bargraph reading 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.

H - peak (max.) memory mode. With the peak remote input switch open the bargraph will indicate the peak value in memory i.e. the bargraph can rise but not fall. The bargraph 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 bargraph will indicate the valley (min.) value in memory i.e. the bargraph can fall but not rise. The bargraph 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.

d: SP - display mode. The bargraph display will follow whatever value is on the 7 segment display. For example if the remote input is set to **P.HLd** then the 7 segment and bargraph will indicate the peak value.

FEC (analog retransmission operation mode) and SEFL (serial retransmission). Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when optional outputs are fitted.

The following choices are available for analog, digital or serial retransmission operation mode:

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.

FFEQ - frequency mode. The retransmission will follow the frequency rather than the voltage or current.

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.

H - 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 i.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.

d: SP - display mode. The retransmission output will follow whatever value is on the 7 segment display. For example if the remote input is set to **P.HLd** then the 7 segment and retransmission output will indicate the peak value.

Lo d: SP (low overrange limit value)

The display can be set to show an overrange message if the display value falls below the **Lo d: SP** setting. For example if **Lo d: SP** is set to **50** then once the display reading falls below **50** the message **-or-** or the display value (see **d: SP** function) will flash instead of the normal display units. This message can be used to alert operators to the presence of an input which is below the low limit. If this function is not required it should be set to **OFF** by pressing the  and  buttons simultaneously at this function.

Hi GH d: SP (high overrange limit value)

The display can be set to show an overrange message if the display value rises above the **Hi GH d: SP** setting. For example if **Hi GH d: SP** is set to **1000** then once the display reading rises above **1000** the message **-or-** or the display value (see **d: SP** function) will flash instead of the normal display units. This message can be used to alert operators to the presence of an input which is above the high limit. If this function is not required it should be set to **OFF**.

d: SP (overrange warning mode)

The display overrange warning set by the **Lo d: SP** and **Hi GH d: SP** functions can be set to cause the display value to flash or cause the message **-or-** to flash as an overrange warning. If set to **FLSH** the display value will flash when in an overrange condition, if set to **-or-** this message will flash when in an overrange condition.

5.3 Serial output functions

The functions which follow are only seen if the serial output option is fitted. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when optional outputs are fitted.

BRUD (set baud rate) - seen only with serial output option.

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

PRTY (set parity) - seen only with serial output option.

Select parity check to either **NONE**, **EVEN** or **odd**.

Q.PUL (set serial interface mode) - seen only with serial output option.

Select **d: SP**, **Cont**, **POLL** or **̄.buS**

Allows user to select the serial 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 required.

̄.buS Modbus RTU protocol.

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.

SEFL - (serial retransmission mode)

Applies only when **Q.PUL** function set to **Cont**. Refer to **FEC** function on previous page for function description. The **H: Lo** selection in this functions allows both the peak and valley memories to be transmitted. The peak value will be transmitted followed by a space then the valley value.

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.

6 Function Table

Initial display	Meaning of display	Next display	Default Setting	Record Your Settings
RxLo	Alarm low setpoint value	Setpoint value or OFF	OFF	See following table
RxHi	Alarm high setpoint value	Setpoint value or OFF	OFF	See following table
RxHY	Alarm hysteresis	Hysteresis value in measured units	1	See following table
RxTt	Alarm trip time	No of seconds before relay trips	0	See following table
Rxrt	Alarm reset time	Reset time in seconds	0	See following table
Rxn.o or Rxn.c	Alarm action N/O or N/C	Rxn.o or Rxn.c	R In.o	See following table
Rx.SP or Rx.t!	Setpoint or trailing alarm	Rx.SP or Rx.t!	Rx.SP	See following table
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_	Bargraph low reading	Value in memory	0	
bAr^	Bargraph high reading	Value in memory	1000	
bAr_tYPE	Bargraph operation mode	bAr.S.dot.d.dot or C.bAr	bAr	
rEE_	Recorder output low limit	Value in memory	0	
rEE^	Recorder output high limit	Value in memory	1000	
drnd	Display rounding selects resolution	Value in memory	1	
dCPt	Display decimal point	Decimal point position	0	
CAL 1	First live input scaling point	Live reading	n/a	
CAL 2	Second live input scaling point	Live reading	n/a	
CAL OFSt	Offset to calibration	Live Reading	n/a	
UCAL	Uncalibrate	CAL CLR	n/a	
FFe9	Frequency display on or off	on or OFF	OFF	
FFe9 dCPt	Frequency display decimal point	0.0.1.0.002 etc.	0.1	
FFe9 iNPE	Frequency display input scale value	Value in memory	1	
FFe9 SCLE	Frequency display scale value	Value in memory	1.0	
FFe9 FLtF	Frequency display digital filter setting	0 to 8	2	
dFLt di SP	Default display, current or frequency	iNPE or FFe9	iNPE	
P.but	P button function	NONE.Hi.Lo.Hi.Lo.2EFO.P.SEt or di SP	NONE	
F.iNP	Remote input function	NONE.PHLd.dHLd.Hi.Lo.Hi.Lo.2EFO.SP.Rc.No.Rc.CAL.S.P.SEt.di SP or dULL	NONE	
ACCS	Access mode	OFF.EASY.NONE or ALL	OFF	
SPAC	Setpoint access	R1.R1-2 etc.	R1	
R1	Alarm 1 operation mode	L,uE.FFe9.P.HLd.d.HLd.Hi.Lo or di SP	L,uE	

Initial display	Meaning of display	Next display	Default Setting	Record Your Settings
<i>Rx</i>	Alarm 2 etc. operation mode	<i>L, uE, FFE9, P.HLd, d.HLd, H, .Lo or di SP</i>	<i>L, uE</i>	
<i>bAR</i>	Bargraph operation mode	<i>L, uE, FFE9, P.HLd, d.HLd, H, .Lo or di SP</i>	<i>L, uE</i>	
<i>FEC</i>	Analog retransmission mode	<i>L, uE, FFE9, P.HLd, d.HLd, H, .Lo or di SP</i>	<i>L, uE</i>	
<i>Lo di SP</i>	Display low overrange	Value or <i>OFF</i>	<i>OFF</i>	
<i>Hi 9H di SP</i>	Display high overrange	Value or <i>OFF</i>	<i>OFF</i>	
<i>di SP</i>	Display overrange mode	<i>FLSH or -or-</i>	<i>FLSH</i>	
<i>bAUD</i>	Baud rate	<i>300, 600, 1200, 2400, 4800, 9600, 192 or 384</i>	<i>9600</i>	
<i>Prty</i>	Parity	<i>NONE, EVEN or odd</i>	<i>NONE</i>	
<i>OpUt</i>	Communication mode	<i>d, SP, Cont, POLL or n.bus</i>	<i>Cont</i>	
<i>Addr</i>	Unit address	<i>0 to 31</i>	<i>0</i>	
<i>SEFL</i>	Serial retransmission mode	<i>L, uE, FFE9, P.HLd, d.HLd, H, .Lo, di SP or H, Lo</i>	<i>L, uE</i>	

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	A5	A6	A7
<i>RxLo</i>							
<i>RxH,</i>							
<i>RxHY</i>							
<i>RxLt</i>							
<i>Rxrt</i>							
<i>Rxn.o</i> or <i>Rxn.c</i>							
<i>Rx OPEF</i>							
<i>Rx.SP</i> or <i>Rx.t i</i>	n/a						
<i>Rx</i>							

7 Specifications

7.1 Technical Specifications

Input:	AC current (model PM4-AI) AC volts (model PM4-AV) Display can also show input frequency (Hz)
Measuring Range:	True RMS 0 to 5A (PM4-AI), lower ranges available to order or True RMS 1.5V, 15V, 150 or 300V link selectable (PM4-AV)
Max. crest factor:	5 for voltage & current, up to 600V max.
Impedance:	20 milliohms (typical, PM4-AI), 1M Ω (all ranges PM4-AV)
Isolation:	2kV peak for 30 seconds, 250VAC RMS @ 50Hz continuous
Accuracy:	Voltage & current display 0.3% of full scale typical (over 5 to 100% of full scale, 30Hz to 10kHz, when frequency used when measuring is the same as frequency used when calibrating) Frequency display 0.01% typical (over 5 to 100% of full scale voltage & current input, 10 to 500Hz)
Frequency update time:	20mS or 1 cycle, whichever is the longest (filter (FILTER) set at 0)
Sample Rate:	7 per sec (approx.)
Conversion Method:	Dual Slope ADC
Microprocessor:	MC68HC11CMOS
Ambient Temperature:	LED -40 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 LED Bar Graph 20 segment bar + 5 digit 7.6mm LCD Models 4 digit 12.7mm, 6digit 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, contact supplier (depends on display type & options)
Output (standard):	1 x relay, Form A, rated 5A resistive
Relay Action:	Programmable N.O. or N.C.

7.2 Output Options

Extra Relay:	Same specs. as Relay 1 (up to 6 extra relays)
Analog Retransmission:	Single or dual retransmission. 4 to 20mA, 0 to 1V or 0 to 10V link selectable. 4-20mA output will drive into 1k Ω load max.
Serial Communications:	RS232 or RS485

7.3 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

8 Guarantee & Service

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

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

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

When returning the product for service or repair a full description of the fault and the mode of operation used when the product failed must be given.

In any event the manufacturer has no other obligation or liability beyond replacement or repair of this product.

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

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

This product is designed and manufactured in Australia.