# Model PM4-TMR
# Panel Mount Timer Display/Controller
# Operation and Instruction Manual

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# 1 Introduction

This manual contains information for the installation and operation of the PM4-TMR timer monitor. The instrument may be set to operate in one of two basic modes namely period (PErd) or scaled period (S.Prd) modes. The mode of operation is selected at the SEt OPEr function.

The two modes of operation are:

- PErd - period of the input pulse display. The period of the input pulse is measured and may be displayed in various different time display modes e.g. hours.minutes.seconds. Count up from zero or count down from a preset value modes of operation are provided.
- S.Prd - scaled period display mode. This mode allows the measurement and scaling of the duration of an input pulse. Since time is being measured the display would typically be programmed and scaled to read in time (minutes, seconds etc.) or rate (metres/second, litres/hour etc.). It is equally valid to scale the display to read in any units which may be a function of time e.g. distance traveled in mm.

Selection of operating mode, calibration and scaling are all accomplished by push button operation. "On screen" prompts are given for each function to assist in setting up the instrument. Some changes may require dismantling the instrument to alter PCB links.

Selection of operating mode and scaling are all accomplished by push button operation (see page 19 for details). Display prompts are given for each function to assist in setting up the instrument. Changes to input sensor type or optional outputs may require dismantling the instrument to alter PCB links.

When the display is actively timing a decimal point will flash approximately once per second. If no decimal point is used in the selected display the decimal point of the least significant digit (the digit on the right of the display) will flash approximately once per second.

An inbuilt relay provides an alarm/control function, optional extra relays (allowing up to 7 in total), optically isolated analog (single or dual channel), serial or digital (BCD or binary) re-transmission and isolated excitation voltage may also be optionally provided. The single analog output option can be set for retransmission or PI rate control. The dual analog output option allows output 1 to be set for PI or retransmission, the second output can be set for retransmission only.

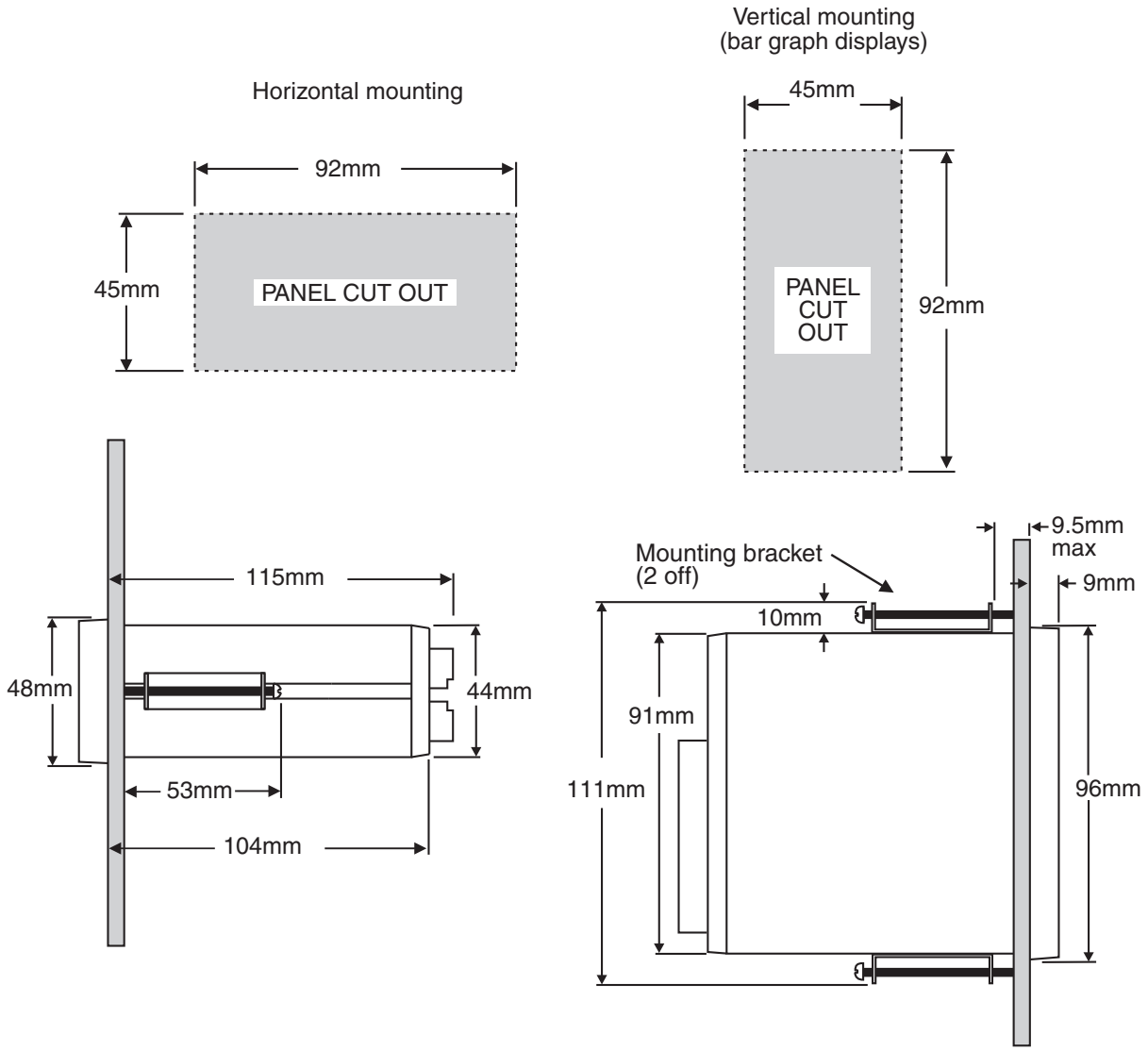
Unless otherwise specified at the time of order, your PM4 has been factory set to a standard configuration, see the function table for your selected mode for default settings. Full electrical isolation between power supply, input voltage and re-transmission output is provided by the PM4, thereby eliminating grounding and common voltage problems. This isolation feature makes the PM4 ideal for interfacing to computers, PLCs and other data acquisition devices.

The 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.

# 2 Mechanical Installation

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

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



# 3 Electrical installation

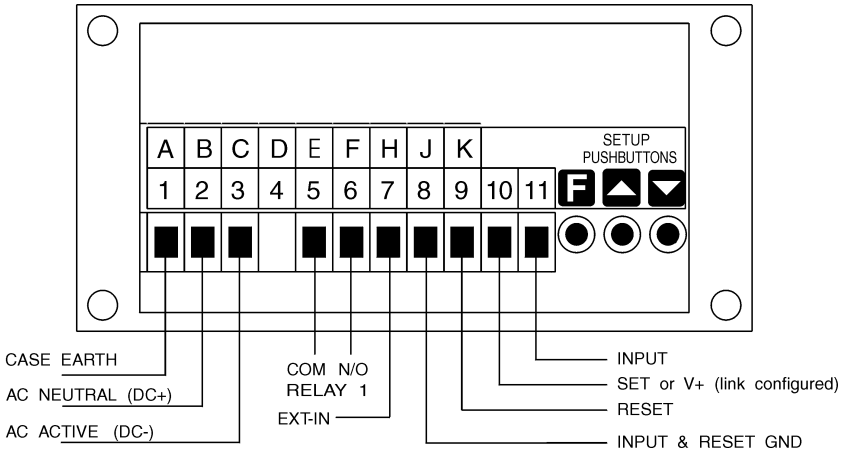
## 3.1 Electrical installation

The PM4 Panel Meter is designed for continuous operation. 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.

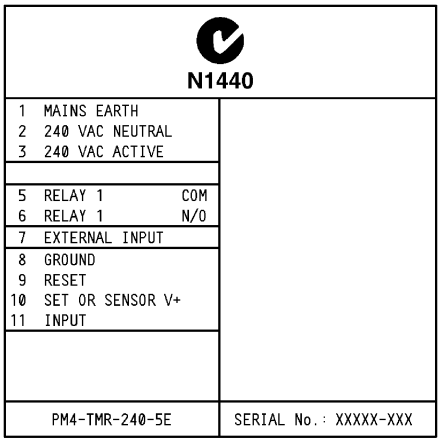
The plug in, screw type, terminal blocks allow for wires of up to 2.5mm$^2$ to be fitted. Connect the wires to the appropriate terminals as indicated below. Refer to connection details provided in this chapter to confirm proper selection of voltage, polarity and input type before applying power to the instrument.

When power is applied 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.

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

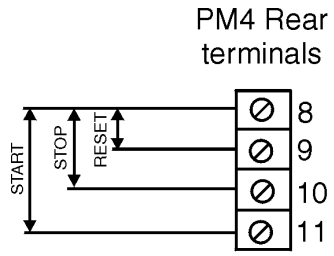



**Instrument data label example**

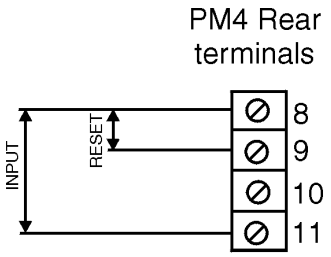


## 3.2 Input connections for various operation modes

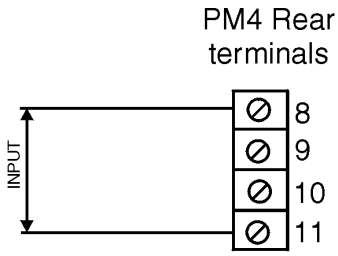
The operation mode is set via the **OPEr** function. Note: Stop and Reset inputs must be voltage free or 0V/5V open collector. The Start/Input input (terminal 11) can be set via the input links.




Input connections for **UP** and **dn** operation modes



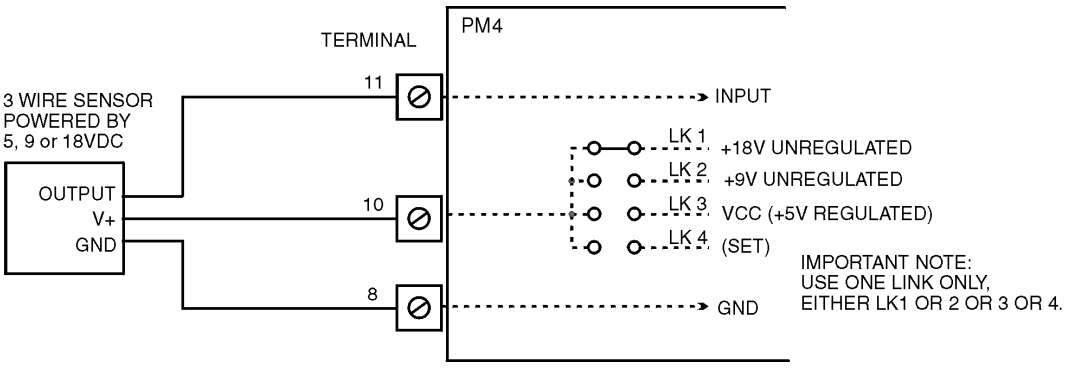

Input connections for **run**, **Sn9L**, **Sn9.H**, **A.dur** and **Sn9.r** operation modes




Input connections for **dur**, **PLSE**, **PLS.H** and **PLS.r** operation modes

## 3.3 Transducer power supply

The standard internal power supply may be link selected to provide a regulated 5V or unregulated 9V or 18V to power the sensor. The maximum current available is 20mA. The 18V supply is not available on DC powered instruments. Note to avoid damage to the circuit no more than one link should be fitted in LK1 to LK4 i.e. either LK1 or LK2 or LK3 or LK4 can be fitted. An optional internally fitted isolated and regulated power supply is available which can be configured for 5, 10, 12 or 24V supply (25mA max.).



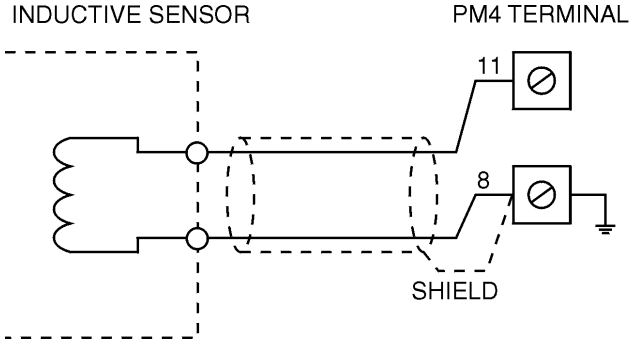

## 3.4 Relay connections

The PM4 is supplied with one alarm relay as standard with connections on terminals 5 and 6, extra relays are optionally available. The relay is a single pole, single throw type and is rated at 5A, 240VAC into a resistive load. The relay contact is voltage free and may be programmed for normally open or normally closed operation. The relay will close when power is removed.

## 3.5 Ext In (Remote input) connections

The remote input connections are across terminals 7 and 8. A momentary or latching switch can be fitted across these terminals to suit the operation selected at the **r.I nP** function.

## 3.6 Input connection and internal link settings




**Inductive sensor AC output (48V RMS max)**
Typical internal link settings

| | | |
|---|---|---|
| LK5 | LOW FREQ | Out |
| LK6 | VCC | Out |
| LK7 | GND | See Notes |
| LK8 | DC | In |
| LK9 | BIAS | Out |
| LK10 | HYST | See Notes |
| LK11 | HYST2 | See Notes |
| LK12 | FREQ | See Notes |

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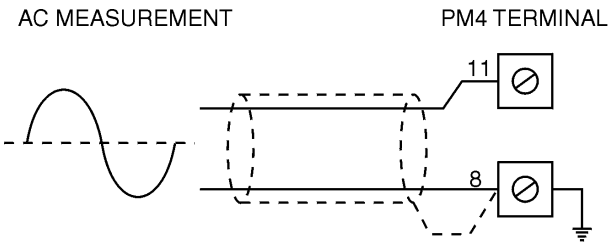


**AC input (48V RMS max}**
Typical internal link settings

| | | |
|---|---|---|
| LK5 | LOW FREQ | Out |
| LK6 | VCC | Out |
| LK7 | GND | See Notes |
| LK8 | DC | See Notes |
| LK9 | BIAS | Out |
| LK10 | HYST | See Notes |
| LK11 | HYST2 | See Notes |
| LK12 | FREQ | See Notes |

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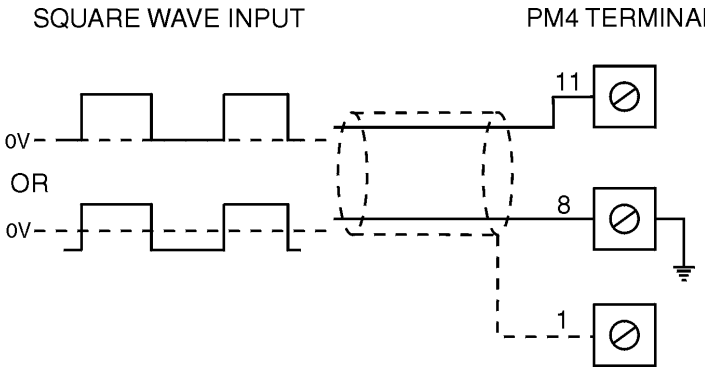


**Square wave**
Typical internal link settings

| | | |
|---|---|---|
| LK5 | LOW FREQ | Out |
| LK6 | VCC | Out |
| LK7 | GND | See Notes |
| LK8 | DC | In |
| LK9 | BIAS | See Notes |
| LK10 | HYST | See Notes |
| LK11 | HYST2 | See Notes |
| LK12 | FREQ | Out |

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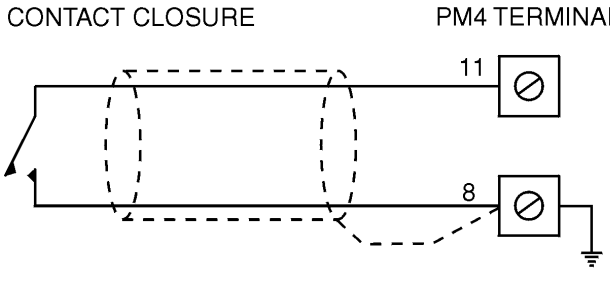


**Voltage free contact closure**
Typical internal link settings

| | | |
|---|---|---|
| LK5 | LOW FREQ | In |
| LK6 | VCC | In |
| LK7 | GND | Out |
| LK8 | DC | In |
| LK9 | BIAS | In |
| LK10 | HYST | In |
| LK11 | HYST2 | Out |
| LK12 | FREQ | Out |

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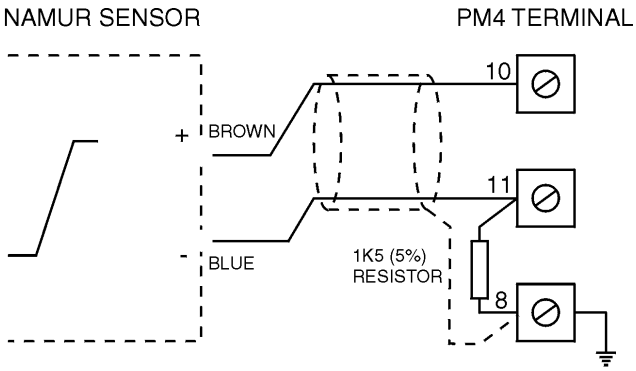


**NAMUR Sensor**
An external resistor is required for this input type as shown.
Typical internal link settings

| | | |
|---|---|---|
| LK5 | LOW FREQ | Out |
| LK6 | VCC | Out |
| LK7 | GND | In |
| LK8 | DC | In |
| LK9 | BIAS | In |
| LK10 | HYST | In |
| LK11 | HYST2 | Out |
| LK12 | FREQ | Out |

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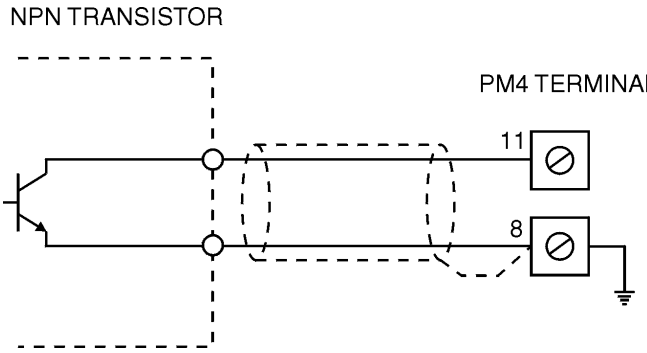


**NPN Transistor 2 wire**
Typical internal link settings

| | | |
|---|---|---|
| LK5 | LOW FREQ | Out |
| LK6 | VCC | In |
| LK7 | GND | Out |
| LK8 | DC | In |
| LK9 | BIAS | In |
| LK10 | HYST | See Notes |
| LK11 | HYST2 | See Notes |
| LK12 | FREQ | Out |

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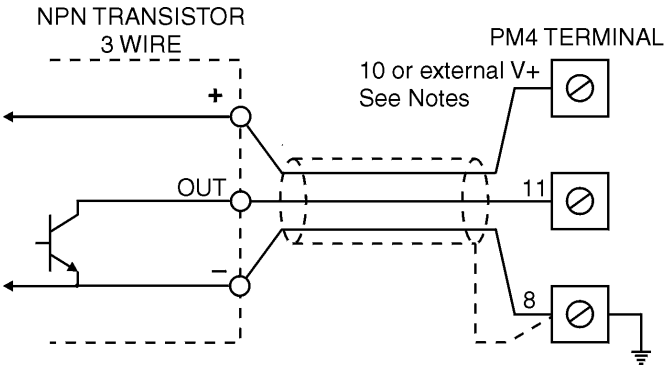


**NPN Transistor 3 wire**
Typical internal link settings

| | | |
|---|---|---|
| LK5 | LOW FREQ | Out |
| LK6 | VCC | In |
| LK7 | GND | Out |
| LK8 | DC | In |
| LK9 | BIAS | In |
| LK10 | HYST | See Notes |
| LK11 | HYST2 | See Notes |
| LK12 | FREQ | Out |

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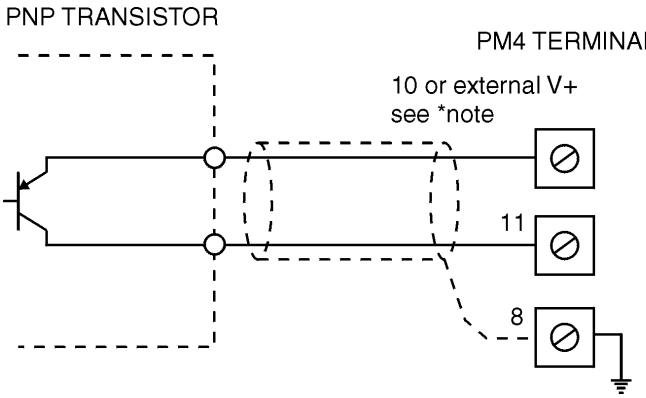


**PNP Transistor 2 wire**
Typical internal link settings

| | | |
|---|---|---|
| LK5 | LOW FREQ | Out |
| LK6 | VCC | Out |
| LK7 | GND | In |
| LK8 | DC | In |
| LK9 | BIAS | In |
| LK10 | HYST | See Notes |
| LK11 | HYST2 | See Notes |
| LK12 | FREQ | Out |

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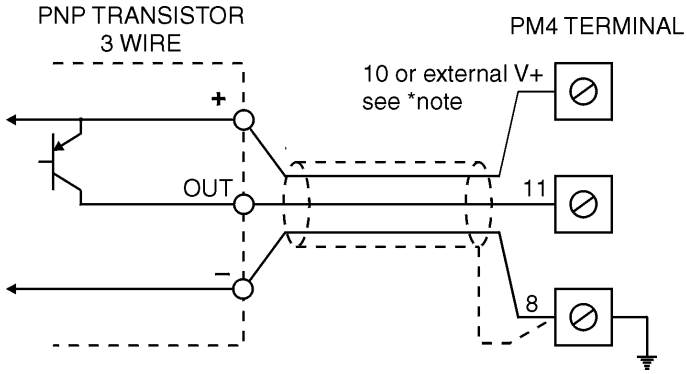



**PNP Transistor 3 wire**
Typical internal link settings

| | | |
|---|---|---|
| LK5 | LOW FREQ | Out |
| LK6 | VCC | Out |
| LK7 | GND | In |
| LK8 | DC | In |
| LK9 | BIAS | In |
| LK10 | HYST | See Notes |
| LK11 | HYST2 | See Notes |
| LK12 | FREQ | Out |

## 3.7 Notes

If the STOP and RESET inputs are used then these are not link configurable. Inputs to the STOP and RESET inputs must be either voltage free contact or 0V/5V switching via open collector.

Input link notes for terminal 11 inputs are as follows.

**HYST2** link should be in for inputs between 1V and 5V amplitude (low level of the input pulse must be below 0.5V). HYST link should be in for inputs greater than 5V amplitude (low level of the input pulse must be below 2V). If the input pulse amplitude is between 100mV to 1V both HYST and HYST2 links can be taken out but the input will be at its highest sensitivity and will be more prone to interference due to electrical noise and it therefore not normally recommended. A maximum of one hysteresis link should be fitted.

The **DC** coupling link should be in for frequencies less than 10Hz.

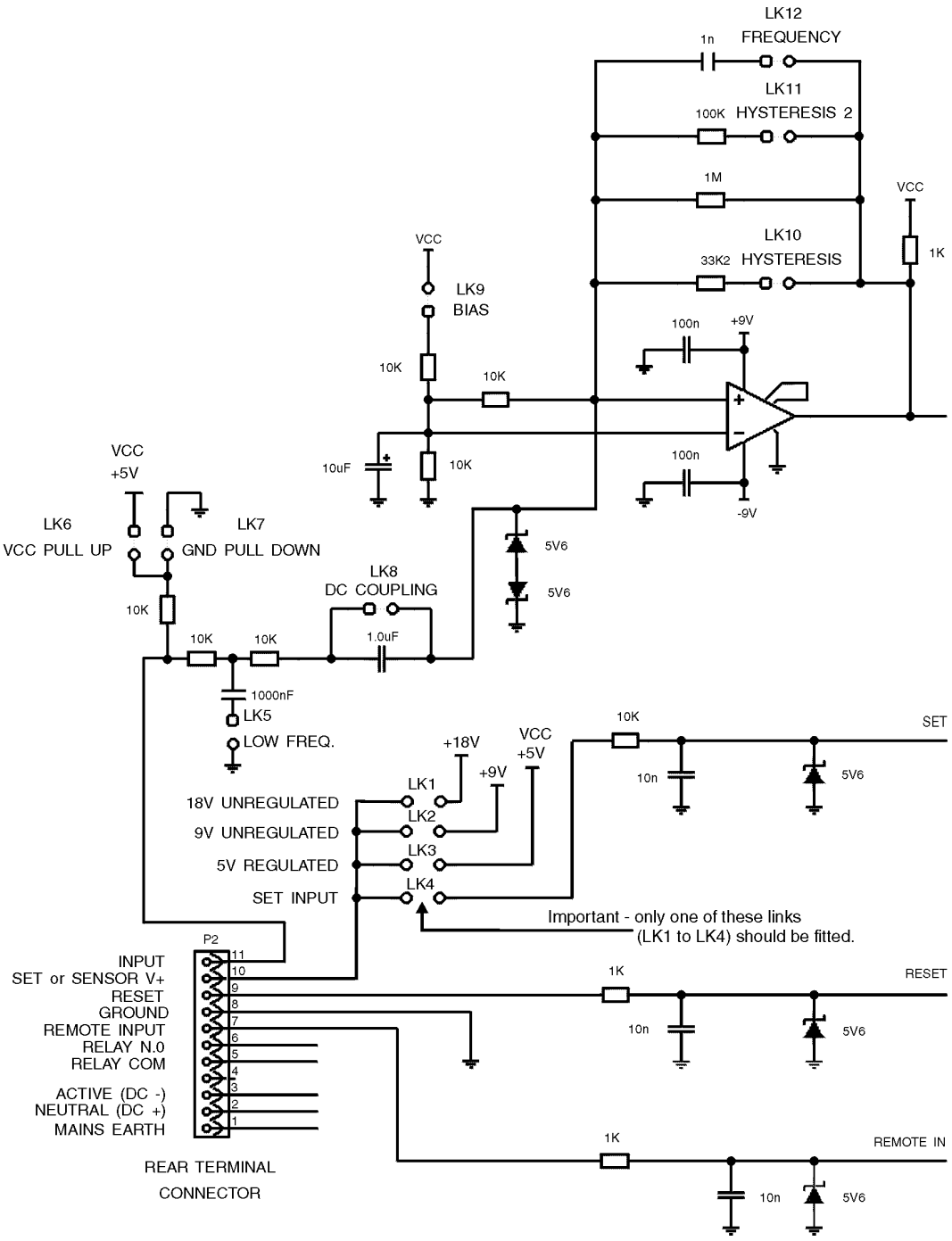
The **BIAS** link should be in when input signal does not go below 0V.

For inputs above 24V (48VDC or RMS max.) both the **VCC** and **GND** link should be out.

The **FREQ** link is used to create a sharply rising edge to give a more definite pulse signal and will be used mainly for input signals with slowly rising edges, typically sinewave AC inputs and inductive inputs.

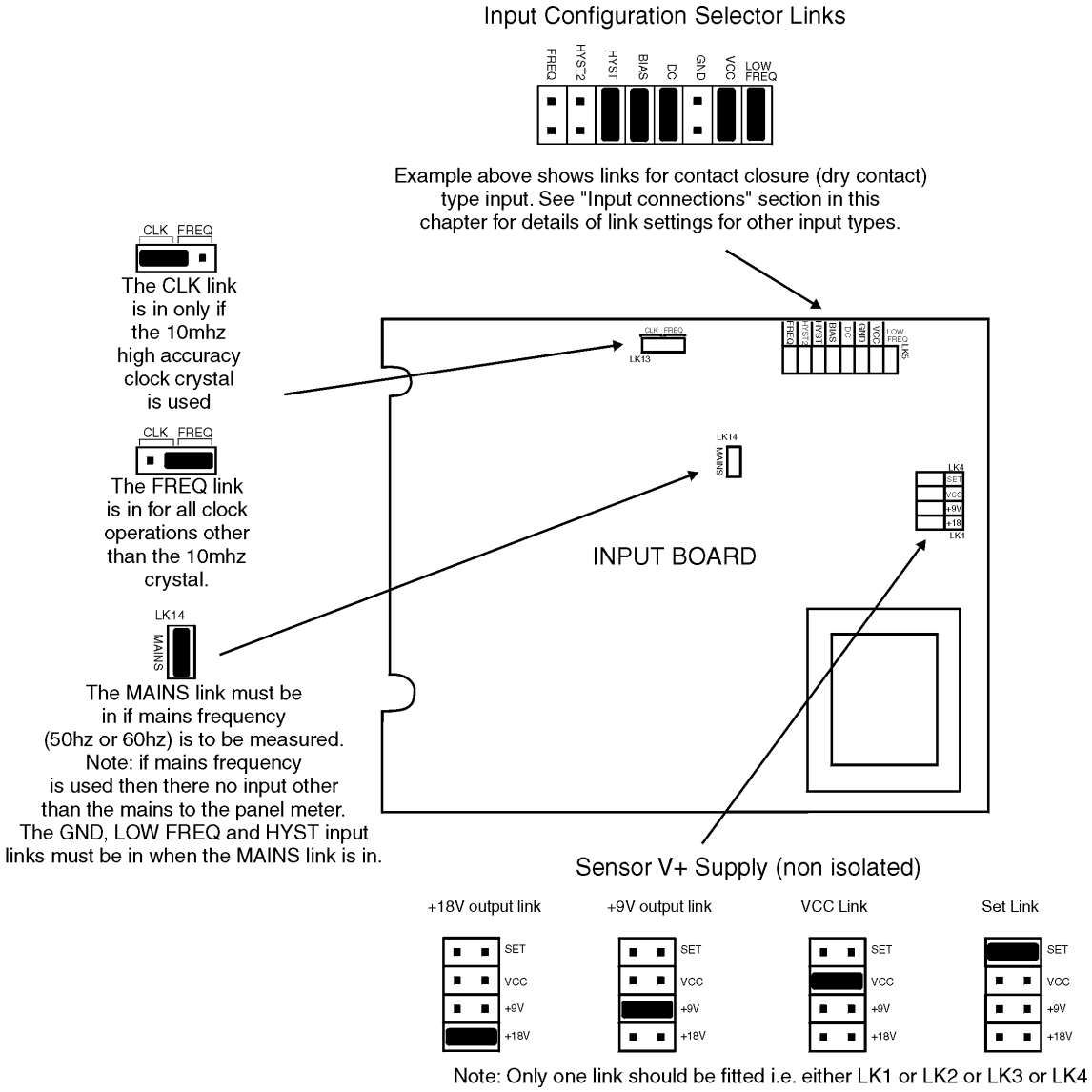
The **LOW FREQ** link is generally used for filtering out contact bounce when relay or switch contacts are used. It can however be used with other input types to filter out high frequency noise provided that the maximum input frequency of the pulse signal is less than 80Hz.

## 3.8 Input circuit diagram



## 3.9 Configuring the input board

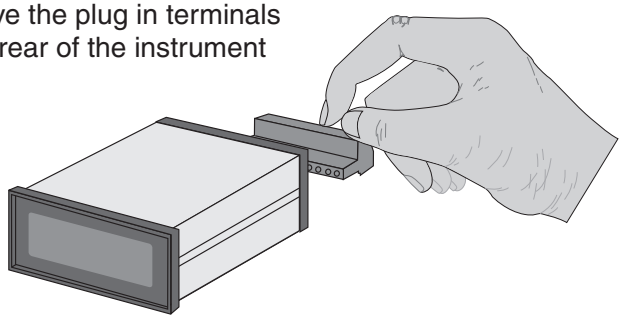
Link settings are only required for mains synchronisation. Dismantle the instrument as described in “Input/output configuration”. Insert the links into the appropriate location on the pin header.



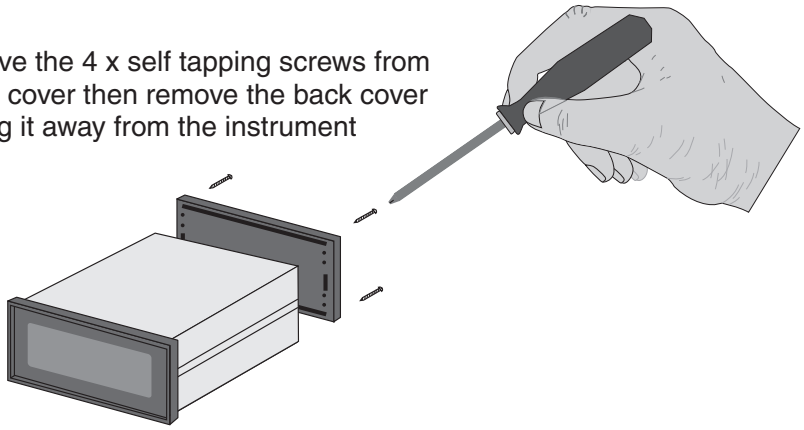
## 3.10 Input Output Configuration

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

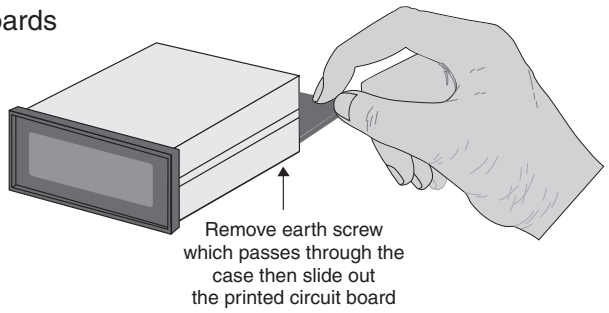
1. Remove the plug in terminals from the rear of the instrument



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



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




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

5. Slide PCB back into case

6. Replace the earth screw which passes through the case

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

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

# 4 Function table for Period measurement (PErd) mode

The function table below shows the functions which will be seen when the SEt OPEr function is set to PErd.

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

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

| Display | Function | Range | Default | Your record | Ref/Page |
|---|---|---|---|---|---|
| A*x*Lo | Low setpoint value for designated alarm relay *x* | Any display value or OFF | OFF | See 5.1 | 6.3 / 21 |
| A*x*Hi | High setpoint value for designated alarm relay *x* | Any display value or OFF | OFF | See 5.1 | 6.4 / 22 |
| A*x*HY | Hysteresis value for the designated alarm relay *x*. | 0 to 9999 | 10 | See 5.1 | 6.5 / 23 |
| A*x*tt | Trip time delay for the designated alarm relay *x*. | 0 to 9999 | 0 | See 5.1 | 6.6 / 23 |
| A*x*rt | Reset time delay for the designated alarm relay *x*. | 0 to 9999 | 0 | See 5.1 | 6.7 / 24 |
| A*x*n.o or A*x*n.c | Alarm relay *x* action to normally open (de-energised) or normally closed (energised) | A*x*n.o or A*x*n.c | A*x*n.o | See 5.1 | 6.8 / 24 |
| A*x*SP or A*x*t 1 etc. | Relay operation independent setpoint or trailing setpoint (*__Optional__) | A*x*SP or A*x*t 1 etc. | A*x*SP | See 5.1 | 6.9 / 24 |
| brgt | Display brightness level | 1 to 15 | 15 | | 6.10 / 25 |
| dULL | Display remote brightness switching | 0 to 15 | 1 | | 6.11 / 25 |
| rEC_ | Analog output option low display value (*__Optional__) | Any display value | 0 | | 6.20 / 28 |
| rEC¯ | Analog output option high display value (*__Optional__) | Any display value | 1000 | | 6.21 / 28 |
| bAr_ | Bargraph low value (seen only on bargraph display instruments) | Any display value | 0 | | 6.12 / 25 |
| bAr¯ | Bargraph high value (seen only on bargraph display instruments) | Any display value | 1000 | | 6.13 / 26 |
| P.SEt | Preset value | Any display value | 0 | | 6.31 / 32 |

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

Functions in this second table are available in CAL mode

| Display | Function | Range | Default | Your record | Ref/Page |
|---|---|---|---|---|---|
| bAr tYPE | Bargraph type for instruments with bargraph display (seen only on bargraph display instruments) | bAr, S.dot, d.dot, C.bAr or r.dot | bAr | | 6.14 / 26 |
| d9OP | Digital output option mode (*Optional) | bcd, b.SCL, bi n or bi n2 | bi n2 | | 6.15 / 27 |
| d9.OP | Digital output option polarity (*Optional) | AI o or AHi | AI o | | 6.16 / 27 |
| bcd Strt | Digital output option BCD start position (*Optional) | 0, 1 or 2 | 0 | | 6.17 / 27 |
| di 9_ | Digital output option low value (*Optional) | Any display value | 0 | | 6.18 / 28 |
| di 9¯ | Digital output option high value (*Optional) | Any display value | 1000 | | 6.19 / 28 |
| rEC ctrl | Analog output PI control - not applicable to this instrument (*Optional) | on or OFF | OFF | | 6.22 / 29 |
| drnd | Display rounding | 1 to 5000 | 1 | | 6.23 / 29 |
| r.i nP | Remote input function | nonE, P.HLd, d.HLd, Hi , Lo, Hi Lo, 2Er0, SP.Ac, no.Ac, di SP, duLL or 9.rSt | nonE | | 6.24 / 29 |
| P.but | P button function | nonE, Hi , Lo, Hi Lo, 2Er0, di SP, FUnC or 9.rSt | nonE | | 6.25 / 30 |
| ACCS | Access mode | OFF, EASY, nonE or ALL | OFF | | 6.26 / 31 |
| SPAC | Setpoint access mode (*Optional) | A 1, A 1-2 etc. | A 1 | | 6.27 / 31 |
| Lo di SP | Low overrange warning - not applicable to this instrument | Any display value or OFF | OFF | | 6.28 / 31 |
| Hi 9H di SP | High overrange warning - not applicable to this instrument | Any display value or OFF | OFF | | 6.29 / 32 |
| di SP | Display visual warning - not applicable to this instrument | FLSH or -or- | FLSH | | 6.30 / 32 |
| dCPt | Decimal point | 0 to 0.02 | 0 | | 6.32 / 32 |

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

| | | | | | |
|---|---|---|---|---|---|
| OPEr | Operation mode for PErd mode | run, dur, PLSE, SnGL, PLS.H SnGH, UP, dn or A.dur | dur | | 6.33 / 33 |
| di SP rnGE | Display range | SECS, nn.SS, h.n.S, nnn, hh.nn, hrS, dd.hh or dAYS | SECS | | 6.35 / 35 |
| i nPt | Input edge type | hi, Gh or Lo | hi, Gh | | 6.38 / 36 |
| S.i nP | SET terminal input function | hi, Gh or Lo | hi, Gh | | 6.39 / 37 |
| c.rSt | Totaliser counter reset value | 2Er0 or PSEt | 2Er0 | | 6.40 / 37 |
| c.rSt | Totaliser counter reset signal | Lo, LoE, Hi or Hi E | Lo | | 6.41 / 37 |
| dbnc | Debounce time m/s | 0 to 9999 | 0 | | 6.42 / 37 |
| SEt OPEr | Set display operation | S.Prd, PErd, FrEq, totL or both | rAtE | | 6.43 / 38 |
| bAUd rAtE | Baud rate for serial communications (*Optional) | 300.600. 1200.2400. 4800.9600. 19.2 or 38.4 | 9600 | | 6.44 / 38 |
| PrtY | Parity for serial communications (*Optional) | nonE.EUEn or odd | nonE | | 6.45 / 38 |
| O.Put | Output for serial communications (*Optional) | di SP.Cont. POLL, A.buS or n.buS | Cont | | 6.46 / 38 |
| Addr | Instrument address for serial communications (*Optional) | 0 to 31 | 0 | | 6.47 / 39 |

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

## 4.1 Relay table

Record your relay settings in the table below

| Display | Relay 1 | Relay 2 | Relay 3 | Relay 4 | Relay 5 | Relay 6 | Relay 7 |
|---|---|---|---|---|---|---|---|
| A*x*Lo | | | | | | | |
| A*x*Hi | | | | | | | |
| A*x*HY | | | | | | | |
| A*x*tt | | | | | | | |
| A*x*rt | | | | | | | |
| A*x*n.o or A*x*n.c | | | | | | | |

# 5 Function table for Scaled Period (S.Prd) mode

The function table below shows the functions which will be seen when the SEt OPEr function is set to S.Prd. Note: the order in which the functions appear on the display may not be exactly as shown below. The availability and order of functions is determined by choice of function settings and options fitted.

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

| Display | Function | Range | Default | Your record | Ref/Page |
|---|---|---|---|---|---|
| A*x*Lo | Low setpoint value for designated alarm relay *x* | Any display value or OFF | OFF | See 5.1 | 6.3 / 21 |
| A*x*Hi | High setpoint value for designated alarm relay *x* | Any display value or OFF | OFF | See 5.1 | 6.4 / 22 |
| A*x*HY | Hysteresis value for the designated alarm relay *x*. | 0 to 9999 | 10 | See 5.1 | 6.5 / 23 |
| A*x*tt | Trip time delay for the designated alarm relay *x*. | 0 to 9999 | 0 | See 5.1 | 6.6 / 23 |
| A*x*rt | Reset time delay for the designated alarm relay *x*. | 0 to 9999 | 0 | See 5.1 | 6.7 / 24 |
| A*x*n.o or A*x*n.c | Alarm relay *x* action to normally open (de-energised) or normally closed (energised) | A*x*n.o or A*x*n.c | A*x*n.o | See 5.1 | 6.8 / 24 |
| A*x*SP or A*x*t 1 etc. | Relay operation independent setpoint or trailing setpoint (*__Optional__) | A*x*SP or A*x*t 1 etc. | A*x*SP | See 5.1 | 6.9 / 24 |
| brgt | Display brightness level | 1 to 15 | 15 | | 6.10 / 25 |
| dULL | Display remote brightness switching | 0 to 15 | 1 | | 6.11 / 25 |
| rEC_ | Analog output option low display value (*__Optional__) | Any display value | 0 | | 6.20 / 28 |
| rEC¯ | Analog output option high display value (*__Optional__) | Any display value | 1000 | | 6.21 / 28 |
| bAr_ | Bargraph low value (seen only on bargraph display instruments) | Any display value | 0 | | 6.12 / 25 |
| bAr¯ | Bargraph high value (seen only on bargraph display instruments) | Any display value | 1000 | | 6.13 / 26 |

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

Functions in this second table are available in CAL mode

| Display | Function | Range | Default | Your record | Ref/Page |
|---|---|---|---|---|---|
| bAr tYPE | Bargraph type for instruments with bargraph display (seen only on bargraph display instruments) | bAr, S.dot, d.dot, C.bAr or r.dot | bAr | | 6.14 / 26 |
| d9OP | Digital output option mode (*Optional) | bcd, b.SCL, bin or bin2 | bin2 | | 6.15 / 27 |
| d9.OP | Digital output option polarity (*Optional) | AIo or AHi | AIo | | 6.16 / 27 |
| bcd Strt | Digital output option BCD start position (*Optional) | 0, 1 or 2 | 0 | | 6.17 / 27 |
| di 9_ | Digital output option low value (*Optional) | Any display value | 0 | | 6.18 / 28 |
| di 9¯ | Digital output option high value (*Optional) | Any display value | 1000 | | 6.19 / 28 |
| rEC ctrl | Analog output PI control - not applicable to this instrument (*Optional) | on or OFF | OFF | | 6.22 / 29 |
| drnd | Display rounding | 1 to 5000 | 1 | | 6.23 / 29 |
| r.inP | Remote input function | NONE, P.HLd, d.HLd, Hi , Lo, Hi Lo, 2ErO, SP.Ac, No.Ac, di SP, duLL or 9.rSt | NONE | | 6.24 / 29 |
| P.but | P button function | NONE, Hi , Lo, Hi Lo, 2ErO, di SP, FUNC or 9.rSt | NONE | | 6.25 / 30 |
| ACCS | Access mode | OFF, EASY, NONE or ALL | OFF | | 6.26 / 31 |
| SPAC | Setpoint access mode (*Optional) | A1, A1-2 etc. | A1 | | 6.27 / 31 |
| Lo di SP | Low overrange warning - not applicable to this instrument | Any display value or OFF | OFF | | 6.28 / 31 |
| Hi 9H di SP | High overrange warning - not applicable to this instrument | Any display value or OFF | OFF | | 6.29 / 32 |
| di SP | Display visual warning - not applicable to this instrument | FLSH or -or- | FLSH | | 6.30 / 32 |

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

| | | | | | |
|---|---|---|---|---|---|
| dCPt | Decimal point | 0 to 0.02 | 0 | | 6.32 / 32 |
| OPEr | Operation mode for S.Prd mode | PLSE, SnGL, PLS.r or Sn9.r | dur | | 6.34 / 35 |
| PErd InPt | Period input scaling value | Any whole number | 1 | | 6.36 / 36 |
| PErd SCLE | Period scale factor | Any whole number | 1 | | 6.37 / 36 |
| InPt | Input edge type | hi 9h or Lo | hi 9h | | 6.38 / 36 |
| c.rSt | Totaliser counter reset value | ZEr0 or PSEt | ZEr0 | | 6.40 / 37 |
| c.rSt | Totaliser counter reset signal | Lo, LoE, Hi or Hi E | Lo | | 6.41 / 37 |
| dbnc | Debounce time m/s | 0 to 9999 | 0 | | 6.42 / 37 |
| SEt OPEr | Set display operation | S.Prd, PErd, FrEq, totL or both | rAtE | | 6.43 / 38 |
| bAUd rAtE | Baud rate for serial communications (*Optional) | 300.600. 1200.2400. 4800.9600. 19.2 or 38.4 | 9600 | | 6.44 / 38 |
| PrtY | Parity for serial communications (*Optional) | nonE.EUEn or odd | nonE | | 6.45 / 38 |
| O.Put | Output for serial communications (*Optional) | di SP.Cont. POLL, A.buS or n.buS | Cont | | 6.46 / 38 |
| Addr | Instrument address for serial communications (*Optional) | 0 to 31 | 0 | | 6.47 / 39 |

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

## 5.1 Relay table

Record your relay settings in the table below

| Display | Relay 1 | Relay 2 | Relay 3 | Relay 4 | Relay 5 | Relay 6 | Relay 7 |
|---|---|---|---|---|---|---|---|
| A*x*Lo | | | | | | | |
| A*x*Hi | | | | | | | |
| A*x*HY | | | | | | | |
| A*x*tt | | | | | | | |
| A*x*rt | | | | | | | |
| A*x*n.o or A*x*n.c | | | | | | | |

# 6 Explanation of functions

The PM4 setup and calibration functions are configured through a push button sequence. The three push buttons located at the rear of the instrument (also at the front on some display options) are used to alter settings. Two basic access modes are available:

**FUNC** mode (simple push button sequence) allows access to commonly set up functions such as alarm setpoints.

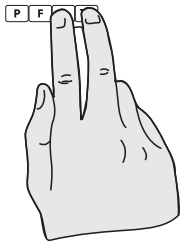
**CAL** mode (power up sequence plus push button sequence) allows access to all functions including calibration parameters.

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

## Entering CAL Mode

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

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



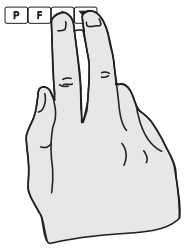
3. Within 2 seconds of releasing the **F** button press, then release the ▲ and ▼ buttons together. The display will now indicate **FUNC** followed by the first function.

Note: If step 1 above has been completed then the instrument will remain in this **CAL** mode state until power is removed. i.e. there is no need to repeat step 1 when accessing function unless power has been removed.

## Entering FUNC Mode

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

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

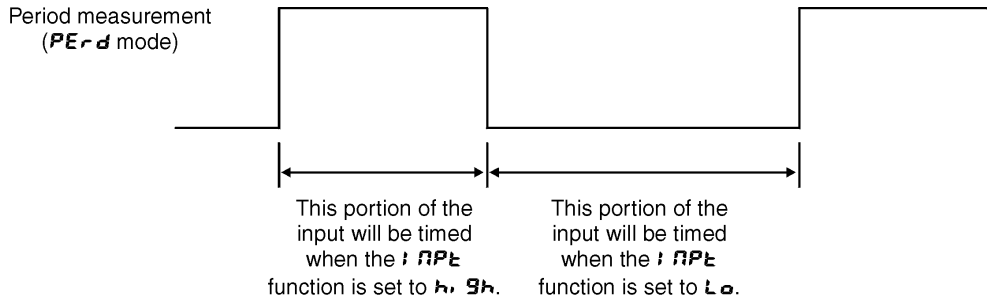


2. Within 2 seconds of releasing the **F** button press, then release the ▲ and ▼ buttons together. The display will now indicate **FUNC** followed by the first function.

Two basic modes of operation are available namely **PErd** or **S.Prd**. This chapter covers the explanation of available functions for both of these modes. Refer to the individual function tables for each mode for an overview of which functions are available for each mode.

## 6.1 Period measurement (PErd mode)

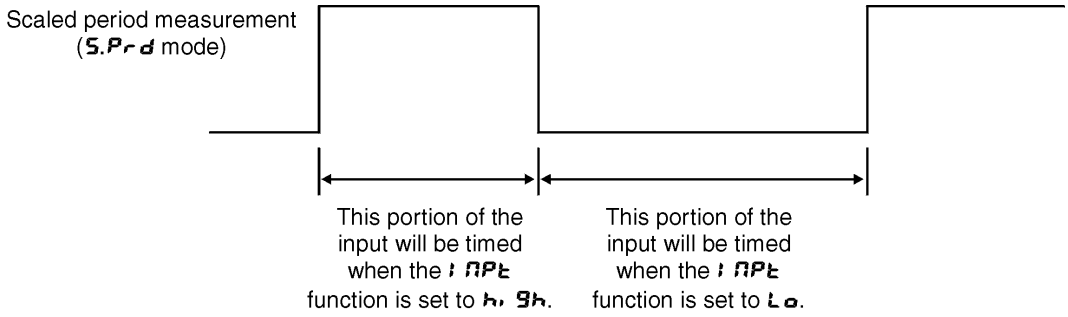
To choose the period measurement mode select PErd at the SEt OPEr function. The period mode operation is used when a display of the actual time period of the input pulse is required (with no scaling). Eight different period display options are given, from a display in seconds to a display in hours. These display options may be selected at the di SPrnGE function. You will also need to choose the required operation mode from the OPEr function There are various operation modes to choose from, allowing a wide choice of timing methods. The instrument will measure the period of the pulse width from either the low or high going edge of the pulse, selection of which edge to start measurement from is via the I nPt function.




Note: this model will time the low **or** the high period of the waveform, not the overall period.
Alternative stopwatch type operations (OPEr function set to UP or dn)allow separate start, stop and reset inputs.

## 6.2 Scaled period measurement (S.Prd) mode

To choose the scaled period measurement mode select S.Prd at the SEt OPEr function. The scaled period mode allows an event to be timed and scaled to match the display units required rather than showing the true time. This mode may be selected via the SEt OPEr function. The scaled period mode has four different operating modes, namely PLSE (pulse), SnGL (single pulse), PLS.r (pulse reciprocal) and Sn9.r (single pulse reciprocal). The pulse reciprocal and single pulse reciprocal allow the display to be scaled with the result being inversely proportional to time, this allows scaling in units such as velocity e.g. cm/sec, km/hr etc.




Note: this model will time the low **or** the high period of the waveform, not the overall period.
The measured period can be scaled and/or the reciprocal taken before being displayed.

**Easy alarm relay adjustment access facility**

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

1. The **F.I nP** function must be set to **SPAC** or the **ACCS** function must be set to **EASY**.
2. At least one alarm must have a setpoint, nothing will happen if all the alarm setpoints are set to **OFF**.
3. The **SPAC** function must be set to allow access to the relays required e.g. if set to **A 1-2** then the easy access will work only with alarm relays 1 and 2 even if more relays are fitted.
4. The instrument must be in normal measure mode i.e. if the instrument is powered up so that it is in **CAL** mode then the easy access will not function. If in doubt remove power from the instrument, wait for a few seconds then apply power again.
5. If the easy access facility is used then the only way to view or alter any other function settings is to power up via **CAL** mode i.e. there is no entry to **FUNC** mode functions unless the instrument is powered up in **CAL** mode.

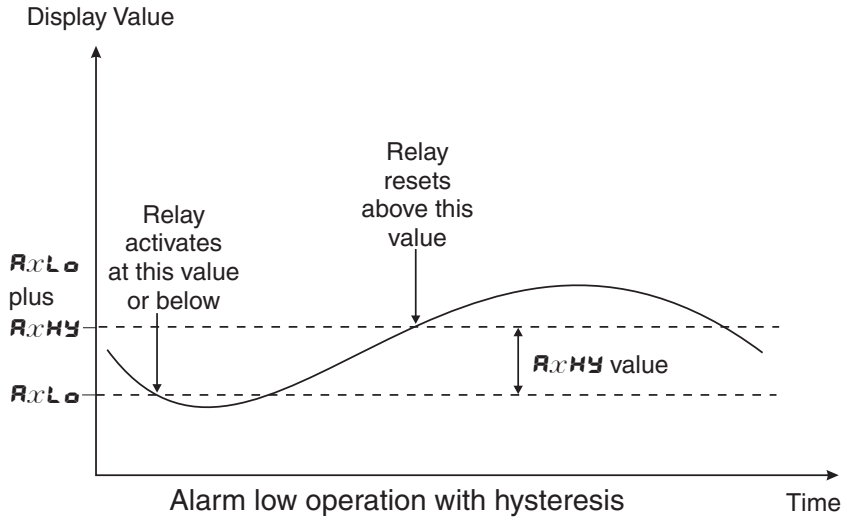
# Explanation of Functions

## 6.3 Alarm relay low setpoint

| | |
|---|---|
| **Display:** | **A*x*Lo** |
| **Range:** | Any display value or **OFF** |
| **Default Value:** | **OFF** |

Displays and sets the low setpoint value for the designated alarm relay $x$. Note $x$ will be replaced by the relay number when displayed e.g. **A 1Lo** for relay 1. Use this low setpoint function if a relay operation is required when the display value becomes equal to or less than the low setpoint value. To set a low alarm value go to the **A*x*Lo** function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value. The low alarm setpoint may be disabled by pressing the ▲ and ▼ push buttons simultaneously. When the alarm is disabled the display will indicate **OFF**. If the relay is allocated both a low and high setpoint then the relay will activate when the value displayed moves outside the band set by the low and high setpoints. The value at which the relay will reset is controlled by the **A*x*HY** function.

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




## 6.4 Alarm relay high setpoint

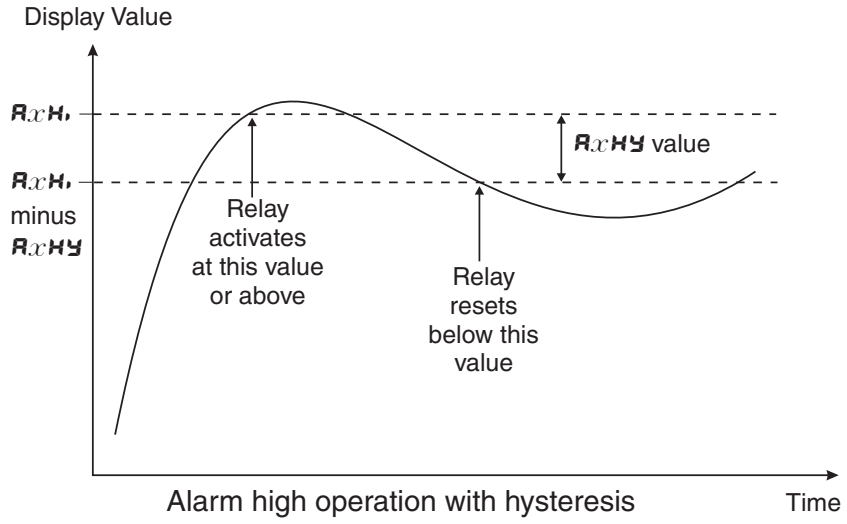
**Display:** RxH,

**Range:** Any display value or OFF

**Default Value:** OFF

Displays and sets the high setpoint value for the designated alarm relay $x$. Note $x$ will be replaced by the relay number when displayed e.g. R 1H, for relay 1. Use this high setpoint function if a relay operation is required when the display value becomes equal to or more than the low setpoint value. To set a high alarm value go to the RxH, function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value. The high alarm setpoint may be disabled by pressing the ▲ and ▼ push buttons simultaneously. When the alarm is disabled the display will indicate OFF. If the relay is allocated both a low and high setpoint then the relay will activate when the value displayed moves outside the band set by the low and high setpoints. The value at which the relay will reset is controlled by the RxHY function.

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



## 6.5 Alarm relay hysteresis (deadband)

**Display:** A*x*HY
**Range:** 0 to 9999
**Default Value:** 10

Displays and sets the alarm relay hysteresis limit for the designated relay $x$. Note $x$ will be replaced by the relay number when displayed e.g. A 1HY for relay 1. To set a relay hysteresis value go to the A*x*HY function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value. The hysteresis value is common to both high and low setpoint values. The hysteresis value may be used to prevent too frequent operation of the relay when the measured value is rising and falling around setpoint value. e.g. if A 1HY is set to zero the alarm will activate when the display value reaches the alarm setpoint (for high alarm) and will reset when the display value falls below the setpoint, this can result in repeated on/off switching of the relay at around the setpoint value.

The hysteresis setting operates as follows: In the high alarm mode, once the alarm is activated the input must fall below the setpoint value minus the hysteresis value to reset the alarm. e.g. if A 1H, is set to 50.0 and A 1HY is set to 3.0 then the setpoint output relay will activate once the display value goes to 50.0 or above and will reset when the display value goes below 47.0 i.e. at 46.9 or below. In the low alarm mode, once the alarm is activated the input must rise above the setpoint value plus the hysteresis value to reset the alarm. e.g. if A 1Lo is to 20.0 and A 1HY is set to 10.0 then the alarm output relay will activate when the display value falls to 20.0 or below and will reset when the display value goes above 30.0 i.e at 30.1 or above. The hysteresis units are expressed in displayed engineering units.

**Example:** If A 1H, is set to 100 and A 1HY is set to 10 then relay 1 will activate when the display value is 100 or higher and will reset at a display value of 89 or lower.

## 6.6 Alarm relay trip time

**Display:** A*x*tt
**Range:** 0 to 9999
**Default Value:** 0

Displays and sets the alarm trip time in seconds. The trip time is common for both alarm high and low setpoint values. The trip time provides a time delay before the alarm relay will activate when an alarm condition is present. The alarm condition must be present continuously for the whole trip time period before the alarm will activate. If the input moves out of alarm condition during this period the timer will reset and the full time delay will be restored. This trip time delay is useful for preventing an alarm trip due to short non critical deviations from setpoint. The trip time is selectable over 0 to 9999 seconds. To set a trip time value go to the A*x*tt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

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

## 6.7 Alarm relay reset time

**Display:** Axrt
**Range:** 0 to 9999
**Default Value:** 0

Displays and sets the alarm reset delay time in seconds. The reset time is common for both alarm high and low setpoint values. With the alarm condition is removed the alarm relay will stay in its alarm condition for the time selected as the reset time. If the input moves back into alarm condition during this period the timer will reset and the full time delay will be restored. The reset time is selectable over 0 to 9999 seconds. To set a reset time value go to the Axrt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

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

## 6.8 Alarm relay normally open/closed

**Display:** Axn.o or Axn.c
**Range:** Axn.o or Axn.c
**Default Value:** Axn.o

Displays and sets the setpoint alarm relay $x$ action to normally open (de-energised) or normally closed (energised), when no alarm condition is present. Since the relay will always open when power is removed a normally closed alarm is often used to provide a power failure alarm indication. To set the alarm relay for normally open or closed go to the Axn.o or Axn.c function and use the ▲ or ▼ push buttons to set the required operation then press F to accept this selection. **Example:** If set to A 1n.o alarm relay 1 will be open circuit when the display is outside alarm condition and will be closed (short circuit across terminals) when the display is in alarm condition.

## 6.9 Alarm relay setpoint or trailing operation

**Display:** Ax5P or Axt 1 etc.
**Range:** Ax5P or Axt 1 etc.
**Default Value:** Ax5P

Relay operation independent setpoint or trailing setpoint, this function only be seen where more than one relay is fitted. Each alarm relay, except relay 1, may be programmed to operate with an independent setpoint value or may be linked to operate at a fixed difference to another relay setpoint, known as trailing operation. The operation is as follows:

Alarm 1 (A1 ) is always independent. Alarm 2 (A2) may be independent or may be linked to Alarm 1. 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 by selecting, for example, (Alarm 4) A4.5P = Alarm 4 normal setpoint or A4.t 1 = 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.

**Example:** With Alarm 2 set to trail alarm 1, if A1H 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).

## 6.10 Display brightness

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

Displays and sets the digital display brightness. The display brightness is selectable from 1 to 15, where 1 = lowest intensity and 15 = highest intensity. This function is useful for improving the display readability in dark areas or to reduce the power consumption of the instrument. See also the dull function. To set brightness level go to the brgt function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

## 6.11 Display remote brightness switching

**Display:** dull
**Range:** 0 to 15
**Default Value:** 1

Displays and sets the level for remote input brightness switching, see r.1 nP function. When a remote input is set to dull the remote input can be used to switch between the display brightness level set by the brgt function 6.10 and the display brightness set by the dull function. The display dull level 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. To set dull level go to the dull function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

**Example:** With dull set to 4 and brgt set to 15 and the r.1 nP function set to dull the display brightness will change from the 15 level to 4 when a switch connected to the remote input terminals is activated.

## 6.12 Bargraph low value

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

Seen only in bargraph display instruments. Displays and sets the bar graph low value i.e. the value on the 7 segment display at which the bargraph will start to rise. This may be independently set anywhere within the display range of the instrument. Note: The bAr_ and bAr⁻ settings are referenced from the 7 segment display readings, not the bargraph scale values. The bargraph scale may scaled differently to the 7 segment display. For example the bargraph scale may be indicating percentage fill of a tank whilst the 7 segment display is indicating actual process units. To set bargraph low level go to the bAr_ function and use the ▲ or ▼ push buttons to set the value required then press F to accept this value.

## 6.13 Bargraph high value

**Display:** bAr ‾

**Range:** Any display value

**Default Value:** 1000

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

## 6.14 Bargraph type for instruments with bargraph display

**Display:** bAr tYPE

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

**Default Value:** bAr

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

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

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

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

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

- r.dot - modulus or wrap around single dot bargraph. This mode of operation allows the bargraph to wrap around the limits set by the bAr _ and bAr ‾ functions by dividing the 7 segment display by the modulus (the modulus is the difference between 0 and bAr ‾ ) and displaying the remainder. For example if bAr _ is set to 0 and bAr ‾ is set to

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

## 6.15 Digital output option mode

**Display:** d90P

**Range:** bcd, b.SCL, bin or bin2

**Default Value:** bin2

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. Selections available are: bin2 (signed binary) i.e. -32767 to 32767, bin (unsigned binary) i.e. 0 to 65535, b.SCL (scaled binary, see d.9_ and d.9¯ below), bcd (binary coded decimal) i.e. up to four BCD numbers. .

## 6.16 Digital output option polarity

**Display:** d9.0P

**Range:** AIo or AHi

**Default Value:** AIo

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

## 6.17 Digital output option BCD start position

**Display:** bcd Strt

**Range:** 0, 1 or 2

**Default Value:** 0

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

## 6.18 Digital output option low value

**Display:** d.9_
**Range:** Any display value
**Default Value:** 0

Seen only with the 16 bit digital output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when this option is fitted. Accepts any valid display value. Determines the low scaling point for the b.SCL mode and has no effect on other modes. See example which follows in 6.19.

## 6.19 Digital output option high value

**Display:** d.9¯
**Range:** Any display value
**Default Value:** 1000

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

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

## 6.20 Analog output option low value

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

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

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

## 6.21 Analog output option high value

**Display:** rEC¯
**Range:** Any display value
**Default Value:** 1000

Seen only when analog retransmission option fitted. Refer to the separate "PM4 Panel Meter

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

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

## 6.22 Analog output PI control

**Display:** rEC ctrl
**Range:** on or OFF
**Default Value:** OFF

This function is not applicable to this instrument and must be set to OFF to allow normal analog retransmission operation.

## 6.23 Display rounding

**Display:** drnd
**Range:** 1 to 5000
**Default Value:** 1

Displays and sets the display rounding value for the rate/frequency display only. This value may be set to 1 - 5000 displayed units. Display rounding is useful for reducing the instrument resolution without loss of accuracy in applications where it is undesirable to display to a fine tolerance. To set the display rounding value go to the drnd function and use the ▲ or ▼ push buttons to set the required value then press F to accept this selection.

**Example:**
If set to 10 the rate/frequency display values will change in multiples of 10 only i.e. display moves from 10 to 20 to 30 etc.

## 6.24 Remote input function

**Display:** r.i nP
**Range:** nONE, P.HLd, d.HLd, Hi , Lo, Hi Lo, 2ErO, SP.Ac, no.Ac, di SP, duLL or 9.rSt
**Default Value:** nONE

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

nONE - no remote function required.

P.HLd - peak hold. The display will show the peak hold value whilst the remote input pins are short circuited i.e. the highest time from the point at which the remote input was short

circuited.

**d.HLd** - display hold. The display will hold its value 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 then the memory will be cleared.

**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. If the short circuit is held for 1 to 2 seconds then the memory will be cleared.

**ZERO** - zero the display. The time display will be reset when the remote input is short circuited. When using **PErd** mode if the **c.rSt** function is set to **ZERO** then the display will zero when reset. If the **c.rSt** function is set to **P.SEt** then the display will go to the preset value when reset. When using **S.Prd** mode the reset will always be to zero.

**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** - display toggle. Not applicable to timer operation.

**dULL** - display brightness control. The remote input can be used to change the display brightness. When this mode is selected the display brightness can be switched via the remote input between the brightness level set at the **brGt** function and the brightness level set at the **dULL** function. Not applicable to electromagnetic displays.

**G.rSt** - grand total reset. Not applicable to timer operation.

## 6.25 P button function

**Display:** **P.but**

**Range:** **nonE**, **Hi** , **Lo**, **Hi Lo**, **ZERO**, **di SP**, **FUnC** or **G.rSt**

**Default Value:** **nonE**

The P button may be set to operate one chosen special function. This button is located on the main circuit board. 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 available functions, except for **FUnC**, are as described in the **r.inP** function above.

The **FUnC** function allows the preset value used with the down timer (when in **PErd** mode) to be displayed and set without the need to enter **CAL** and **FUnC** modes. Note that this is an alternative method to setting the preset value at the **P.SEt** function. To alter the **FUnC** (preset) value press the P pushbutton, the display will indicate **FUnC** followed by the current preset value. This

value may now be altered via the ▲ or ▼ pushbutton. When the preset value is set as required press, then release, the F pushbutton, the display will indicate End and will return to normal measurement.

## 6.26 Access mode

**Display:** ACCS
**Range:** OFF, EASY, NONE or ALL
**Default Value:** OFF

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

## 6.27 Setpoint access mode

**Display:** SPAC
**Range:** A 1, A 1-2 etc.
**Default Value:** A 1

Setpoint access - seen only if more than 1 relay fitted. Sets the access via FUNC mode and "easy alarm access" mode to the alarm relay setpoints. The following choices are available:
A 1 - Allows setpoint access to alarm 1 only.
A 1-2 - Allows setpoint access to alarms 1 and 2 only.
A 1-3 - Allows setpoint 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 1H, is set to OFF then there will be no access to the A 1H, function when SPAC is used.

## 6.28 Low overrange visual warning limit value

**Display:** Lo di SP
**Range:** Any display value or OFF
**Default Value:** OFF

Not applicable to this instrument, leave the function set to OFF. If it is not set to OFF you can put the function back to OFF by pressing the ▲ and ▼ buttons simultaneously at this function.

## 6.29 High overrange visual warning limit value

**Display:** HI OH dI SP
**Range:** Any display value or OFF
**Default Value:** OFF

Not applicable to this instrument, leave the function set to OFF. If it is not set to OFF you can put the function back to OFF by pressing the ▲ and ▼ buttons simultaneously at this function.

## 6.30 Display visual warning flashing mode

**Display:** dI SP
**Range:** FLSH or -or-
**Default Value:** FLSH

Not applicable to this instrument.

## 6.31 Preset value

**Display:** P.SEt
**Range:** Any display value
**Default Value:** 0

A preset value can be entered at this function for PErd mode operation only. The c.rSt function should be set to P.SEt to ensure that the display resets to the preset value if a preset is used. A preset is normally used when timing down from the preset value towards zero although the display can also be set to time up from a preset value.

## 6.32 Decimal point

**Display:** dCPt
**Range:** 0 to 0.02
**Default Value:** 0

Displays and sets the decimal point for the scaled period or period display. 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) or 0.02 (2 decimal places). Two decimal places is the limit for period measurement mode.

The table below shows some possible dI SPrnGE and dCPt settings and t heir effect on the measured value. The actual available display will depend on the number of display digits e.g. hours.minutes.seconds cannot be viewed on a 4 digit display.

| dISPrNGE | dCPt | Measured values |
|---|---|---|
| SECS | 0 | Seconds |
| SECS | 0.1 | Seconds and tenths of seconds |
| SECS | 0.02 | Seconds and hundredths of seconds |
| MM.SS | 0 | Minutes and seconds |
| MM.SS | 0.1 | Minutes, seconds and tenths of seconds |
| MM.SS | 0.02 | Minutes and hundredths of seconds |
| H.M.S | 0 | Hours, minutes and seconds |
| H.M.S | 0.1 | Hours, minutes, seconds and tenths of seconds |
| H.M.S | 0.02 | Hours, minutes, seconds and hundredths of seconds |
| MMM | 0 | Minutes |
| MMM | 0.1 | Minutes and tenths of minutes |
| MMM | 0.02 | Minutes and hundredths of minutes |
| HH.MM | 0 | Hours and minutes |
| HH.MM | 0.1 | Hours, minutes and tenths of minutes |
| HH.MM | 0.02 | Hours, minutes and hundredths of minutes |
| HrS | 0 | Hours |
| dAYS | 0 | Days |
| dAYS | 0.1 | Days and tenths of days |
| dAYS | 0.02 | Days and hundredths of days |

## 6.33 Operation mode for PErd mode

**Display:** OPEr
**Range:** run, dur, PLSE, SnGL, PLS.H SnGH, UP, dn or R.dur
**Default Value:** dur

Displays and sets the operation mode to be used in measuring the pulse period in PErd mode. The active state is set by the INPt function as either a high or low signal. See separate OPEr function below for operation modes in S.Prd modes. The options are as follows:

| Mode | Operation |
|---|---|
| run (run) | The run option allows accumulated time display. The mode operates in the following manner:<br>**Input inactive:** The timer stops but holds the time display.<br>**Input active:** The timer continues timing from the previous time i.e. the time accumulates. |
| dur (duration) | The duration option allows display of an input time with a reset at the end of the input. The mode operates in the following manner:<br>**Input inactive:** The timer is automatically reset and the display shows zero or the preset value.<br>**Input active:** The timer starts timing from zero or the preset value. |
| PLSE (pulse) | The pulse option allows timing of the duration of an input pulse. The mode operates in the following manner:<br>**Input inactive:** The display will hold the time of the last pulse. |

| | |
|---|---|
| | **Input active:** The display resets to zero (preset does not apply to this mode) then starts timing the new pulse. |
| SnGL (single pulse) | The single pulse option allows timing of the duration of a pulse. The mode operates in the following manner:<br>**Input inactive:** The display will hold the time of the last pulse. The display must be reset before a new pulse can be timed.<br>**Input active:** If the previous time display has been reset then the timing process will start from zero or the preset value. If the previous display has not been reset the value displayed will not change when the input becomes active. |
| PLS.H (pulse held) | The pulse held option operates in the same manner as the PLSE option with the exception that the display indication only changes at the end of the active input i.e. the previous display is held until the new active input ends. Preset does not apply to this mode. |
| SnG.H (single pulse held) | The pulse held option operates in the same manner as the SnGL option with the exception that the display indication only changes at the end of the input pulse. As with the SnGL option the display must be reset before a new pulse can be timed. |
| UP (up timer) | The up timer option allows the instrument to be used as a timer with a start, stop and reset input (see I nPt and S.I nP functions for edge settings for these inputs). Note the c.rSt function must be set to 2Er0 if this mode is used. The mode operates in the following manner:<br>Upon receiving an active input the display will show accumulated time. This timing will continue until a STOP input is received even if the input becomes inactive. This STOP input is operated via an edge between the GND and SET terminals. A RESET input will reset the timer to zero. If the timer is stopped and then restarted without a reset the timing will continue from the previous time. |
| dn (down timer) | The down timer works in the same manner as the UP timer with the exception that the down timing will automatically start from the number set at the P.SEt function. The c.rSt function must be set to PSEt if this mode is used. |
| A.dur (accumulating duration) | The accumulating duration mode allows displays of current timing period and accumulated total.<br>The mode operates in the following manner:<br>**Input active:** Display starts timing from zero (preset does not apply to this mode).<br>**Input inactive:** Display shows accumulated time from previous timing periods.<br>A reset operation must be carried out when the accumulated total needs to be reset. |

## 6.34 Operation mode for S.Prd mode

**Display:** OPEr
**Range:** PLSE, SnGL, PLS.r or Sn9.r
**Default Value:** dur

Displays and sets the operation mode to be used in measuring the pulse period in S.Prd mode. See separate OPEr function above for operation modes in PErd modes. The options are as follows:

| Mode | Operation |
|---|---|
| PLSE (pulse) | When this mode is selected the period of the input pulse is displayed according to the scaling factors (PErd InPt and PErd SCLE). When a new pulse is applied to the input the instrument will measure, scale and display the new period i.e. the old display will be overwritten. |
| SnGL (single pulse) | This mode will display the period (again see PErd InPt and PErd SCLE) of the first pulse and will hold this display value until reset via a contact closure across the reset lines i.e. the display will not be overwritten by any subsequent input pulses. |
| PLS.r (pulse reciprocal) | Functions in the same manner as the PLSE mode except that the display will show the inverse of the period. This is useful for displaying rate, velocity and other measuring units requiring a time reciprocal. |
| Sn9.r (single pulse reciprocal) | Functions in the same manner as the SnGL mode except that the display will show the inverse of the period. This is useful for displaying rate, velocity and other measuring units requiring a time reciprocal. |

## 6.35 Display range

**Display:** dI SP rnGE
**Range:** SECS, nn.SS, h.n.S, nnn, hh.nn, hrS, dd.hh or dAyS
**Default Value:** SECS

This function is only applicable to PErd mode. Eight different modes are available these are:

- SECS for a display in seconds.
- nn.SS for a display in minutes and seconds.
- h.n.S for a display in hours, minutes and seconds.
- nnn for a display in minutes.
- hh.nn for a display in hours and minutes.
- hrS for a display in hours.
- dd.hh for a display in days and hours.
- dAyS for a display in days.

The display is also affected by the decimal point setting. Examples below show how a 100 second input is affected by the **di SP rnGE** and **dCPt** functions. Note that actual display available will depend on number of digits e.g. **1.40.00** cannot be seen on a 4 digit display.

| **dCPt** | **di SP rnGE** | Display |
|---|---|---|
| **0** | **SEC** | **100** i.e. 100 seconds with no decimal points |
| **0.1** | **SEC** | **100.0** i.e. 100.0 seconds |
| **0** | **nn.SS** | **1.40** i.e. 1 minute and 40 seconds |
| **0.02** | **nn.SS** | **1.40.00** i.e. 1 minute, 40 seconds and zero hundredths |

## 6.36 Period input scaling value

**Display:** **PErd1 nPt**
**Range:** Any whole number
**Default Value:** **1**

This function is used in **S.Prd** mode only. Displays and sets the period input scale factor to be used with the period scale function **PErd SCLE** to generate the display scaling. The period input is measured in seconds. See the **PErd SCLE** function which follows for more detail.

## 6.37 Period scale factor

**Display:** **PErd SCLE**
**Range:** Any whole number
**Default Value:** **1**

Displays and sets the scale factor to be used with the period input setting. To calculate the display value the input frequency and hence the period of this input needs to be known. Scale and input work together to produce a display as follows:

$$\text{Display Value} = \frac{\text{Input period (seconds)} \times \textbf{PErd SCLE}}{\textbf{PErd1 nPt}}$$

Note: the displayed value is also affected by the decimal point (**dCPt**) and display range (**di SP rnGE**)settings.

## 6.38 Input edge type

**Display:** **1 nPt**
**Range:** **hi 9h** or **Lo**
**Default Value:** **hi 9h**

Displays and sets the input edge type to be used to trigger period measurement. If set to **Lo** the instrument will start to measure the period of an input when it receives a low going edge. If set to **hi 9h** the instrument will start measure the period of an input when it receives a high going edge.

## 6.39 SET terminal input function

**Display:** S.I nP
**Range:** hi 9h or Lo
**Default Value:** hi 9h

Displays and sets the input type to be used to halt the timing process when using the up (UP) or down (dn) count timer. The SET input terminal is used as the stop input when using the up or down timer, ensure that LK4 is in and that LK1, 2 and 3 are out. If set to Lo then the timing will be held when a low going edge is received, if set to hi 9h then the timing will be held when a high going edge is received.

## 6.40 Totaliser counter reset value

**Display:** c.rSt
**Range:** 2Er0 or PSEt
**Default Value:** 2Er0

The reset terminal operation can be programmed to cause the display to reset to either zero or the selected preset value. Choose either 2Er0 or PSEt to select the required operation. PSEt is most commonly selected when the display is required to count down (S.I nP set to Lo) from a preset value.

## 6.41 Totaliser counter reset signal

**Display:** c.rSt
**Range:** Lo, LoE, Hi or Hi E
**Default Value:** Lo

Allows selection of reset level or edge to force a counter reset. If set to Lo a low input level or closed switch on the reset terminal will force a reset, the display will continuously reset whilst the input is low. If set to Hi a high input level or open switch on the reset terminal will force a reset, the display will continuously reset whilst the reset line is high. If set to LoE then a falling edge or switch closure on the reset terminal will force a reset. If set to Hi E then a rising edge or switch opening on the reset terminal will force a reset.

## 6.42 Debounce time

**Display:** dbnc
**Range:** 0 to 9999
**Default Value:** 0

Displays and sets the debounce time. The debounce time can be set from 0 to 9999 milli seconds. If the input pulse width is less than the debounce time setting then the input will be ignored and will not be displayed.

## 6.43 Set display operation

**Display:** SEt OPEr
**Range:** S.Prd, PErd, FrEq, totL or both
**Default Value:** rAtE

Displays and sets the selected operating mode, options are:

**S.Prd** - Scaled period mode, allows scaling of time or time reciprocal display.

**PErd** - Period mode, allows timing of high or low input level.

**both** - Not applicable to timer, select either **S.Prd** or **PErd**.

**totL** - Not applicable to timer, select either **S.Prd** or **PErd**.

**FrEq** - Not applicable to timer, select either **S.Prd** or **PErd**.

## 6.44 Baud rate for optional serial communications

**Display:** bAUd rAtE
**Range:** 300. 600. 1200. 2400. 4800. 9600. 19.2 or 38.4
**Default Value:** 9600

Set baud rate - seen only with serial output option. Refer to the separate "PM4 Panel Meter Optional Output Addendum" booklet supplied when optional outputs are fitted. Select from 300. 600. 1200. 2400. 4800. 9600. 19.2 or 38.4 baud. The baud rate should be set to match the device being communicated with.

## 6.45 Parity for optional serial communications

**Display:** PrtY
**Range:** nonE. EUEn or odd
**Default Value:** nonE

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

## 6.46 Output mode for optional serial communications

**Display:** O.Put
**Range:** di SP. Cont. POLL, A.buS or ñ.buS
**Default Value:** Cont

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

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

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

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

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

**M.bUS** - Modbus RTU protocol.

## 6.47 Instrument address for optional serial communications

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

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

## 6.48 Returning to normal measure mode

When the calibration has been completed it is advisable to return the instrument to the normal mode (where calibration functions are less likely to be tampered with). To return to normal mode, turn off power to the instrument, wait a few seconds and then restore power.

## 6.49 Examples

**Example 1** The timer is to be set up as a stopwatch in minutes, seconds and hundredths of seconds. Contact closure from voltage free contacts are to be used to start, stop and reset the timer.

The main settings required are:

SEt OPEr = PErd

dCPt = 0.02

OPEr = UP

dI SP rnGE = nn.55

I nPt = Lo

S.I nP = Lo

c.rSt = 2Er0

c.rSt = Lo

See section 3.2 for wiring details for UP mode.

**Example 2** The timer is to be set up as a down timer from a preset of one hour thirty minutes. The mode chosen should allow a number of inputs to accumulate in the down count. When the display value reaches zero the alarm relay is required to close and to open again only when the display is reset. Voltage free contact closure inputs are to be used for start and reset inputs.

The main settings required are:

SEt OPEr = PErd

A1Lo = 0.00

P.SEt = 1.30

dCPt = 0

OPEr = dn

dI SP rnGE = hh.nn

I nPt = Lo

S.I nP = Lo

c.rSt = P.SEt

c.rSt = Lo

See section 3.2 for wiring details for dn mode.

**Example 3** It is required to display the velocity in metres/sec. of an object as it moves through a sensor arrangement which provides a pulse for 50 metres of travel. As velocity is the reciprocal of time we need to use one of the reciprocal modes found within the scaled period measuring mode.

SEt OPEr = S.Prd

dCPt = 0

OPEr = Sn9.r

PErd I nPt = I

PErd SCLE = 50

I nPt = Lo

c.rSt = 2Er0

c.rSt = Lo

See section 3.2 for wiring details for Sn9.r mode.

## 6.50 Error messages and fault finding

**Display shows** -or- - this message indicates that the number is too big to display e.g. above 9999 on a 4 digit display

**Display shows** no Acc - this indicates that the ACCS function has been set to nonE or the r.I nP function has been set to no.Ac blocking entry to FUnC mode. Enter functions via CAL mode to gain entry to functions and if required change the ACCS or r.I nP function setting.

**Display shows** no SPAC - this indicates that the r.I nP function has been set to SP.Ac blocking entry to alarm relay functions. Enter functions via CAL mode to gain entry to functions and if required change the r.I nP function setting.

**Fault finding** - Most fault finding occurs during initial setup and consists of selection of the correct operation mode, correct selection of display mode required and setting of the electrical input links to match the inputs used. A brief checklist is given below.

1. Check that the correct operation mode has been chosen at the SEt OPEr function 6.43.
2. Check that the correct display modes has been chosen at the OPEr function 6.34 and the dI SPrnGE function 6.35.
3. Check that the correct input links have been set to suit the input sensor, see page 7.
4. Check that a suitable input or inputs are being received. See "Notes" on page 9. If necessary measure the pulse high and low levels to ensure the input or inputs are suitable.

# 7 Specifications

## 7.1 Technical specifications

| | |
|---|---|
| Input: | Terminal 11 input is ink selectable for various sensor types, see section 3.6<br>Maximum input voltage is 48VDC or RMS with appropriate link settings<br>Terminals 9 and 10 input must be voltage free contact<br>or open collector 0V/5V switching |
| Timer functions: | Period measurement or scaled period measurement |
| Accuracy: | Period measurement 0.01% ±10mS |
| Resolution: | 0.01 second minimum |
| Impedance: | 10kΩ |
| Memory retention: | Battery backed memory |
| Reset: | Contact closure using Reset or Remote Input terminals<br>or via front P button function setting (on instruments with<br>front pusbuttons) |
| Microprocessor: | HC68HC11 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,<br>5 digit 14.2mm + status LEDs + 4 way keypad<br>6 digit 14.2mm + 4 way keypad<br>LCD Models: 4 digit 12.7mm, 6 digit 12.7mm |
| Power Supply: | AC 240V, 110V or 24V 50/60Hz<br>or DC isolated wide range 12 to 48V<br>Note: supply type is factory configured |
| Power Consumption: | AC supply 4 VA max, DC supply typically 160mA at 12VDC and<br>80mA at 24VDC for PM4 with no optional outputs, actual current drawn<br>depends on display type and options fitted |
| Output (standard): | 1 x relay, Form A, rated 5A resistive |
| Relay Action: | Programmable N.O. or N.C |

## 7.2 Optional outputs

| | |
|---|---|
| Extra Relays: | Same specs. as Relay 1 (up to 6 extra relays)<br>Available as one, three or six extra relays. |
| Analog Retransmission: | 12 bit isolated 4 to 20mA, 0 to 1V or 0 to 10V link selectable<br>(single or dual analog output versions available)<br>(4-20mA will drive into resistive loads of up to 800Ω) |
| Serial Communications: | Isolated RS232 or RS485 (ASCII or Modbus RTU) |
| DC Voltage output: | Isolated ±12V(24V) standard or ±5V(10V) @ 25mA maximum |

### 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 and service

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

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

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

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

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



This product is designed and manufactured in Australia.