PM6-FC

Totaliser or Rate

Process Monitor

Operation and Instruction Manual

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1 Introduction

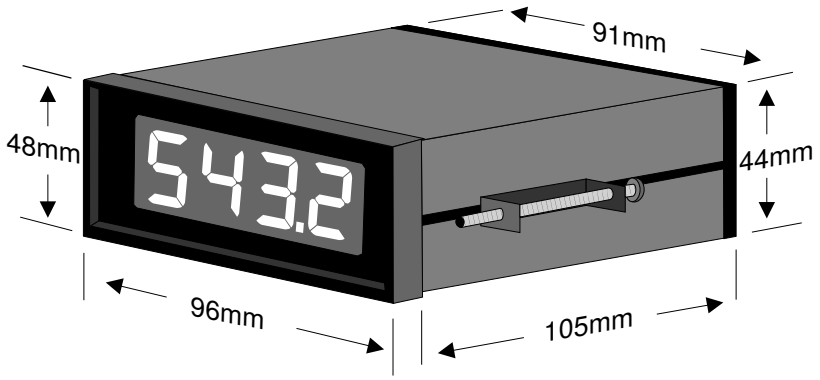
This manual contains information for the installation and operation of the PM6-FC monitor. The PM6 is selectable as a totaliser or rate monitor which may be configured to accept inputs within the range of 0 to 10KHz. The instrument may be push button calibrated/scaled to display the input, directly in frequency or in engineering units.

Unless otherwise specified at the time of order, your PM6 has been factory set to a standard configuration. Like all other PM6 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.

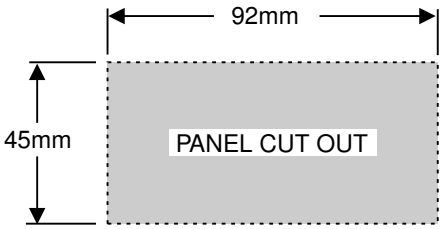
The PM6 series of Panel Mount Monitors are designed for high reliability in industrial applications. The high brightness 4 digit LED display provides good visibility, even in areas with high ambient light levels.

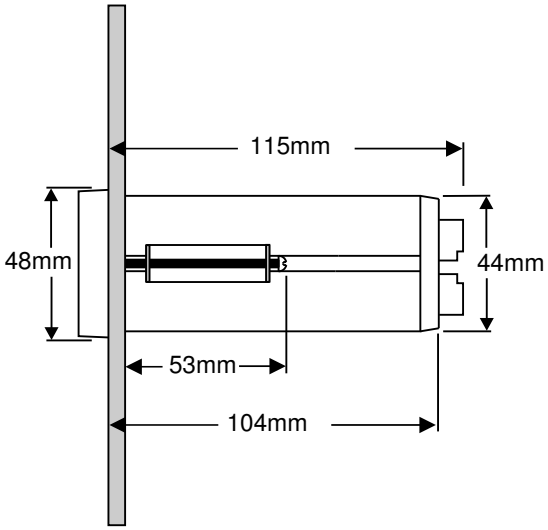
2 Mechanical Installation

The dimensions of the PM6 are shown in the diagrams below. The panel cut out required to mount the PM6 is 45mm x 92mm as shown below. The tolerances on this cut out are +1mm/-0mm. Insert the panel meter from the front of the panel. From the rear of the instrument place the two mounting brackets into the side recesses. Whilst holding the brackets (the elastic bands provided may prove useful for this) tighten the securing screws. Be careful not to over tighten the screws as this could cause damage to the instrument casing.



Horizontal mounting

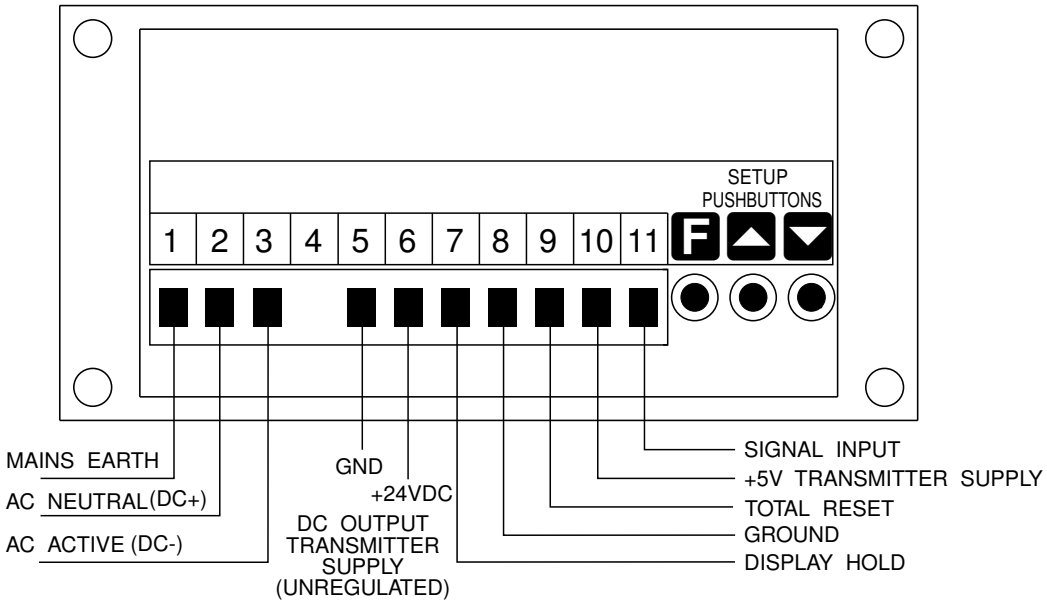




3 Electrical Installation

The PM6-FC 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 terminal blocks, which are the plug in type for ease of installation, allow for wires of up to 2.5mm^2 to be fitted. Connect the wires to the appropriate terminals (examples shown below). Since various output options are available refer to the data label on the actual instrument being installed for exact connection details. Refer to other details provided in this chapter to confirm proper selection of voltage, polarity and input type before applying power to the instrument. It is recommended that shielded cable is used for the signal input. 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.

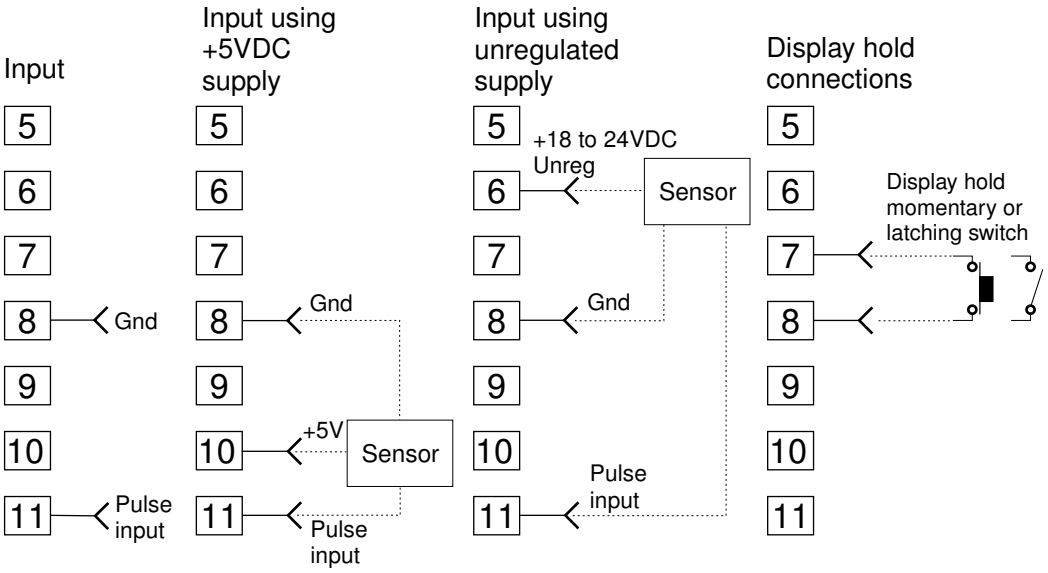


Instrument Rear Panel

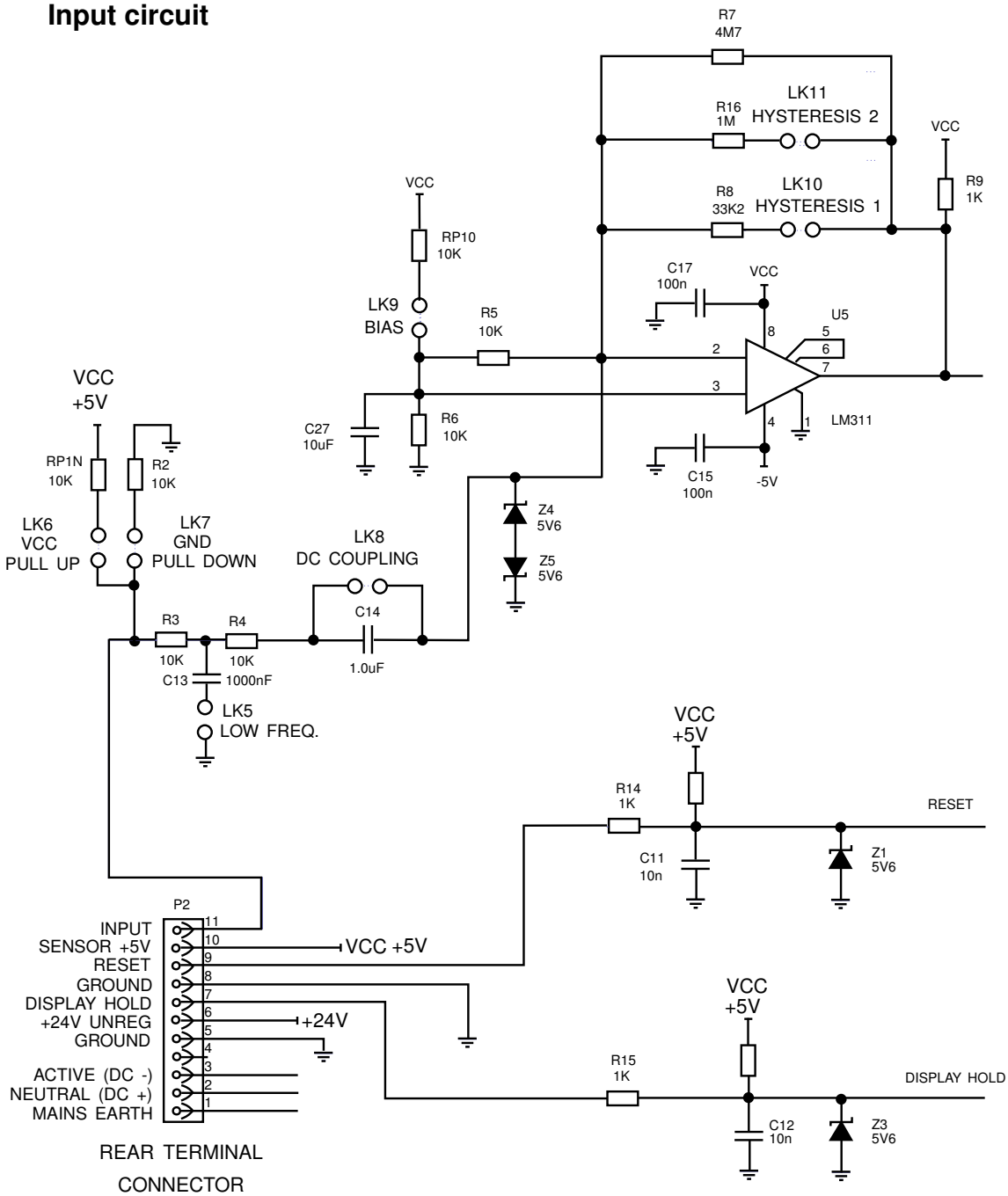
1	**MAINS EARTH**	
2	**240VAC NEUTRAL**	
3	**240VAC ACTIVE**	
5	**DC OUTPUT GND**	
6	**DC OUTPUT +24V**	
7	**DISPLAY HOLD**	
8	**GROUND**	
9	**TOTAL RESET**	
10	**DC OUTPUT +5V**	
11	**SIGNAL INPUT**	
PM6-FC-240-4E		**SERIAL No:**

Instrument Data Label (example)

3 .1 Connection details

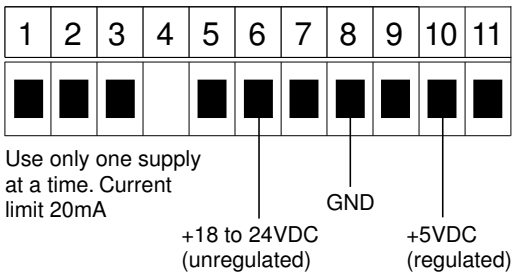


3 .2 Input circuit



3 .3 Transducer power supply

A standard transmitter supply of 5VDC (regulated) is provided on all models. A 24VDC (unregulated) transmitter supply is provided on AC powered models. Only one transmitter supply should be used at any one time. The transmitter supplies are rated at 20mA.



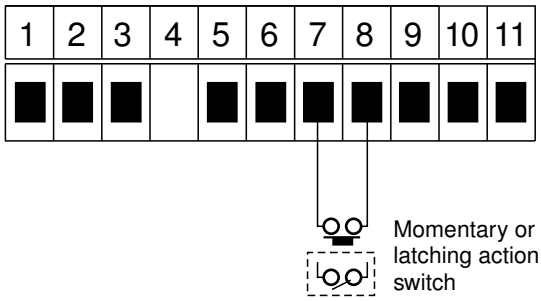
3 .4 Hysteresis link settings

Two hysteresis links are used to optimise the input circuit gain .

Signal voltage	Link 10 (HYST 1)	Link 11 (HYST 2)
Input signal above 2.5V	IN	OUT
Input signal between 100mV and 2.5V	OUT	IN

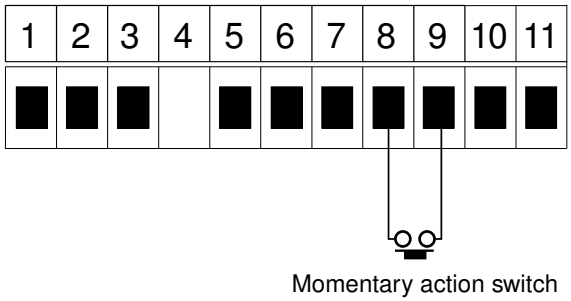
3 .5 Display hold switch

The display hold switch contacts are placed across terminals 7 and 8 at the rear of the PM6. The display will be held whilst the contact is closed and will return to normal measurement when the contact is opened.

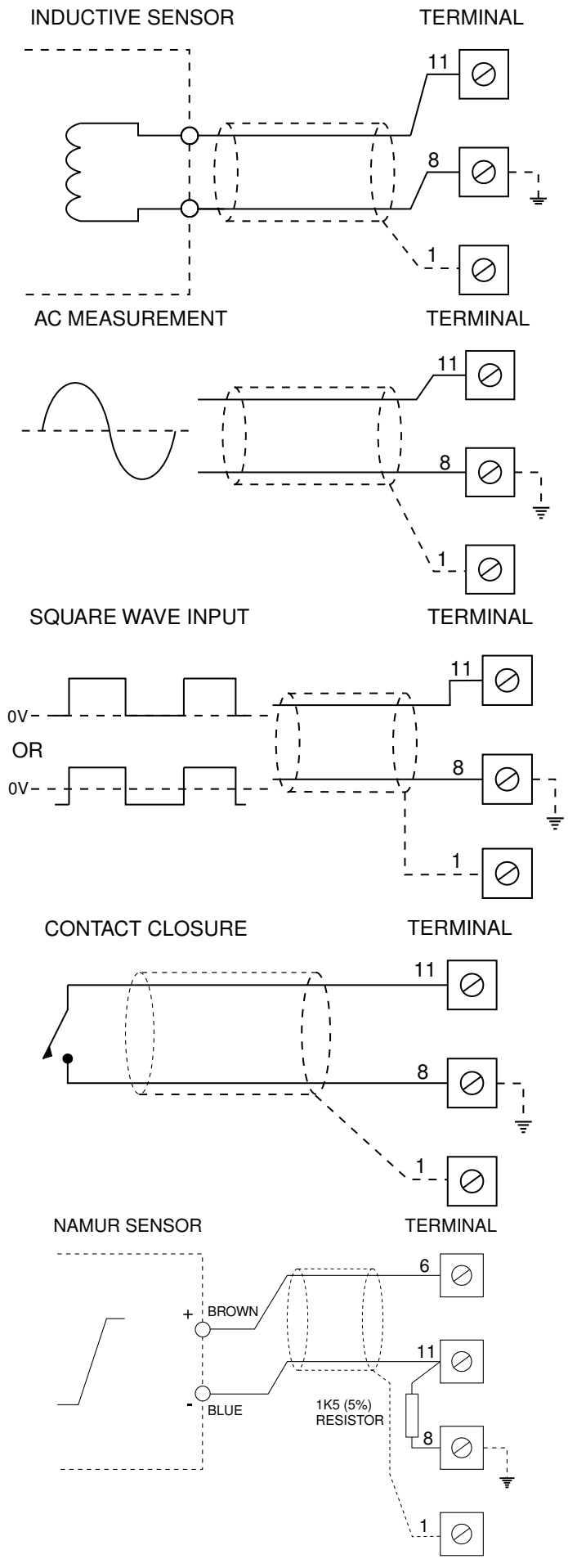


3 .6 Total reset switch

The reset switch is used to reset the total memory to zero when the PM6 is used as a totaliser. The switch contacts are placed across terminals 8 and 9 at the rear of the PM6. The display will be held whilst the contact is closed and will return to normal measurement when the contact is opened.



3 .7 Input Connection Details



Inductive Sensor (48V RMS Max)

Typical Internal Link Settings
Low frequency Link 5 . . . . out
VCC up . . . . Link 6 . . . . . out
Ground . . . . Link 7 . . . . . see notes
DC couple. . . Link 8 . . . . . in
Supply V+ . . . . . n/a
Bias . . . . . Link 9 . . . . . out
Hysteresis. . . Links 10 & 11. see notes
Notes: Ground link should be out if input is greater than 48V. See section 3.4 for hysteresis link settings.

AC Measurement (48V RMS Max)

Typical Internal Link Settings
Low frequency Link 5 . . . . out
VCC up . . . . Link 6 . . . . . out
Ground . . . . Link 7 . . . . . see notes
DC couple. . . Link 8 . . . . . see notes
Bias . . . . . Link 9 . . . . . out
Hysteresis. . . Links 10 & 11. see note
Supply V+ . . . . . n/a
Notes: Ground link should be out if input is greater than 48V. The DC coupling link should be <u>in</u> for frequencies less than 10Hz. See section 3.4 for hysteresis link settings.

Square Wave (48V Max)

Typical Internal Link Settings
Low frequency Link 5 . . . . out
VCC up . . . . Link 6 . . . . . out
Ground . . . . Link 7 . . . . . see notes
DC couple. . . Link 8 . . . . . in
Bias . . . . . Link 9 . . . . . see notes
Hysteresis. . . Links 10 & 11. see notes
Supply V+ . . . . . n/a
Notes: Ground link should be out if input is greater than 48V. The bias link should be <u>in</u> when input signal does not go below 0V. See section 3.4 for hysteresis link settings.

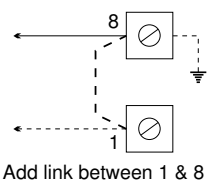
Switch Contact

Typical Internal Link Settings
Low frequency Link 5 . . . . in
VCC up . . . . Link 6 . . . . . in
Ground . . . . Link 7 . . . . . out
DC couple. . . Link 8 . . . . . in
Bias . . . . . Link 9 . . . . . in
Hysteresis. . . Link 10 . . . . in
Hysteresis . . Link 11 . . . . out
Supply V+ . . . . . n/a

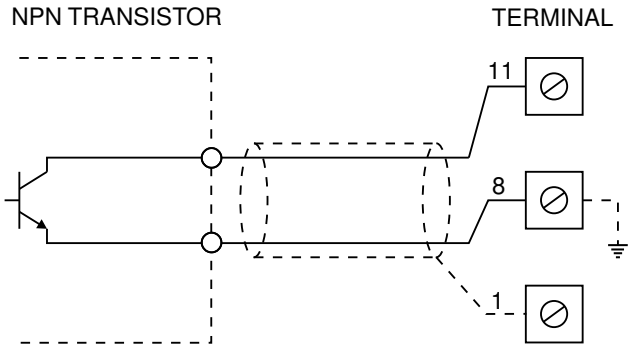
NAMUR Sensor

Typical Internal Link Settings
Low frequency Link 5 . . . . out
VCC up . . . . Link 6 . . . . . out
Ground . . . . Link 7 . . . . . in
DC couple. . . Link 8 . . . . . in
Bias . . . . . Link 9 . . . . . in
Hysteresis. . . Link 10 . . . . in
Hysteresis. . . Link 11 . . . . out

General Note:
This alternative earthing method may be used when noisy signals are present. This method should only be used when the shield is unconnected externally



Add link between 1 & 8 (input ground & earth)

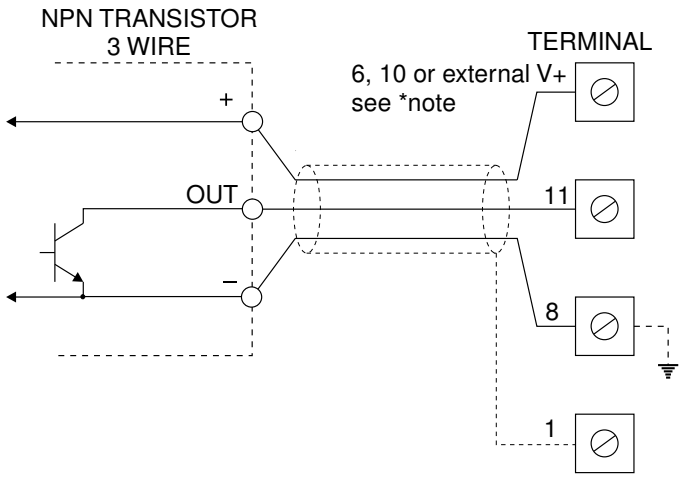


NPN Transistor

Typical Internal Link Settings

Low frequency	Link 5	out
VCC up	Link 6	in
Ground	Link 7	out
DC couple	Link 8	in
Bias	Link 9	in
Hysteresis	Link 10	in
Hysteresis	Link 11	out
Supply V+		see note

Note: The transducer may require an external DC supply. This may be provided from a remote power source or by a +18V unregulated DC output on terminal 6 or the 5VDC regulated output on terminal 10 (see section 3.3 “Transducer Power Supply”).

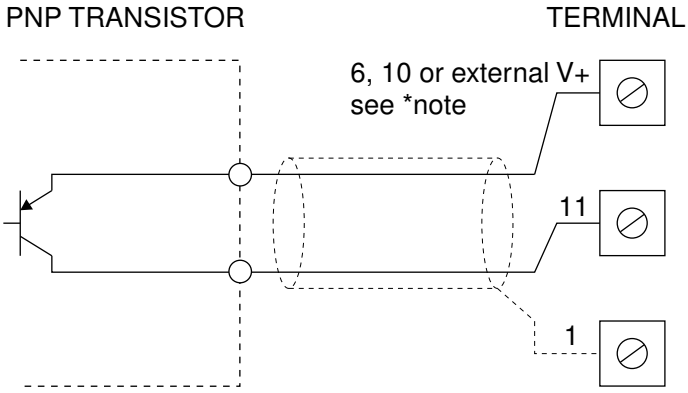


NPN Transistor 3 Wire

Typical Internal Link Settings

Low frequency	Link 5	out
VCC up	Link 6	in
Ground	Link 7	out
DC couple	Link 8	in
Bias	Link 9	in
Hysteresis	Link 10	in
Hysteresis	Link 11	out
Supply V+		see note

Note: The transducer may require an external DC supply. This may be provided from a remote power source or by a +18V unregulated DC output on terminal 6 or the 5VDC regulated output on terminal 10 (see section 3.3 “Transducer Power Supply”).

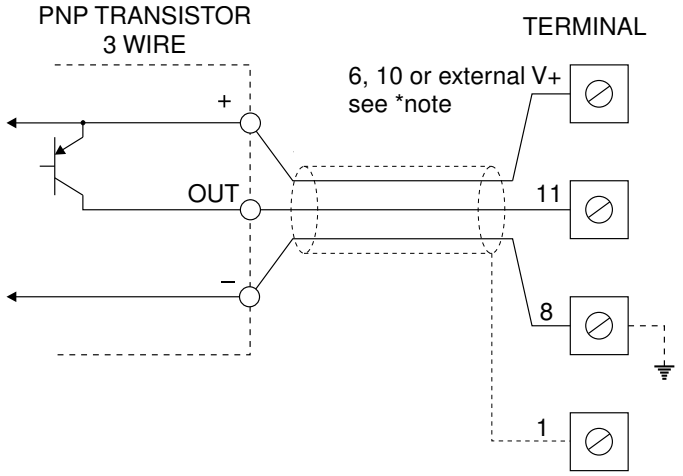


PNP Transistor

Typical Internal Link Settings

Low frequency	Link 5	out
VCC up	Link 6	out
Ground	Link 7	in
DC couple	Link 8	in
Bias	Link 9	in
Hysteresis	Link 10	in
Hysteresis	Link 11	out
Supply V+		see note

Note: The transducer may require an external DC supply. This may be provided from a remote power source or by a +18V unregulated DC output on terminal 6 or the 5VDC regulated output on terminal 10 (see section 3.3 “Transducer Power Supply”).



PNP Transistor 3 Wire

Typical Internal Link Settings

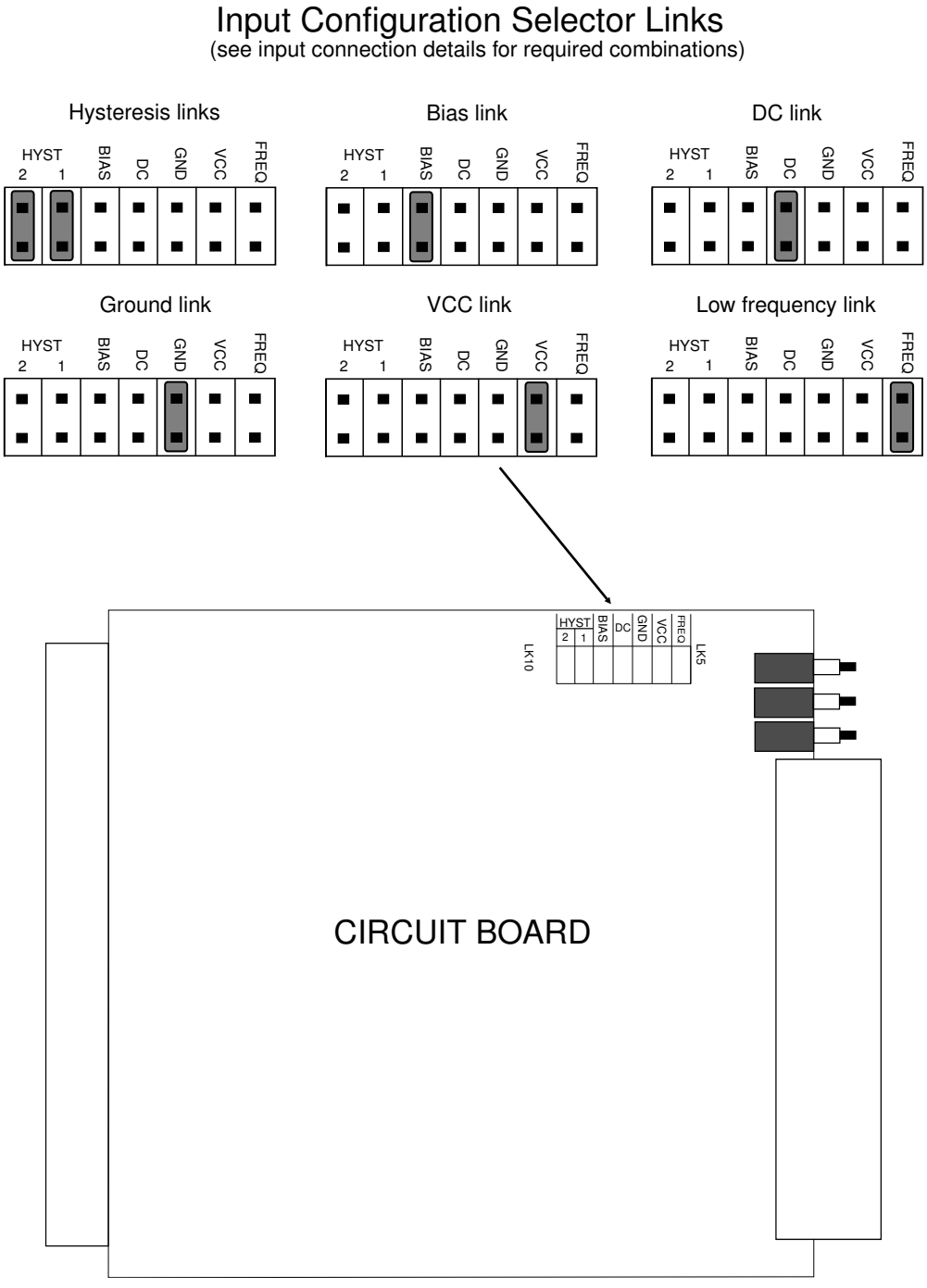
Low frequency	Link 5	out
VCC up	Link 6	out
Ground	Link 7	in
DC couple	Link 8	in
Bias	Link 9	in
Hysteresis	Link 10	in
Hysteresis	Link 11	out
Supply V+		see note

Note: The transducer may require an external DC supply. This may be provided from a remote power source or by a +18V unregulated DC output on terminal 6 or the 5VDC regulated output on terminal 10 (see 3.3 “Transducer Power Supply”).

3 .8 Configuring the input board

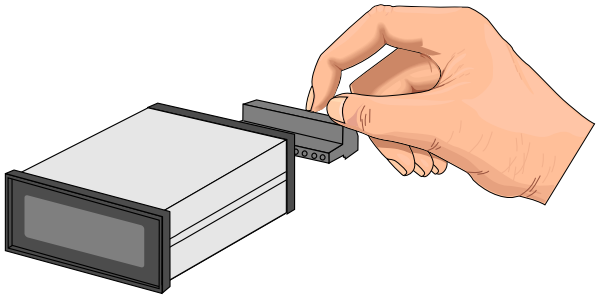
Selecting the input

Dismantle the instrument as described in section 3.9 “Input board removal””. Insert the links into the appropriate location on the pin header, to suit the application or input sensor.

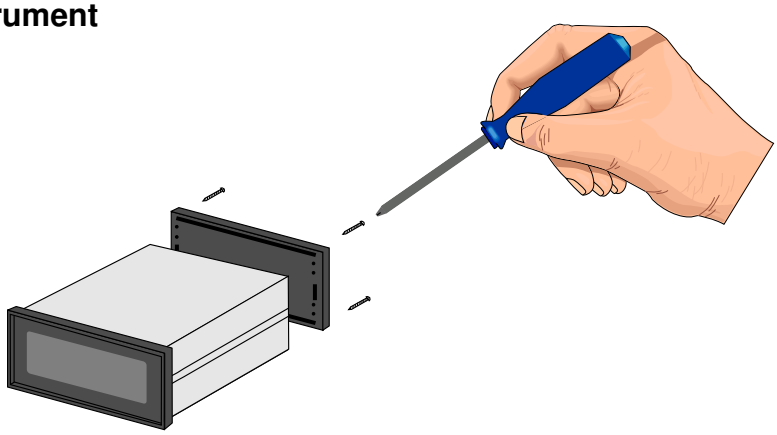


3 .9 Input board removal

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

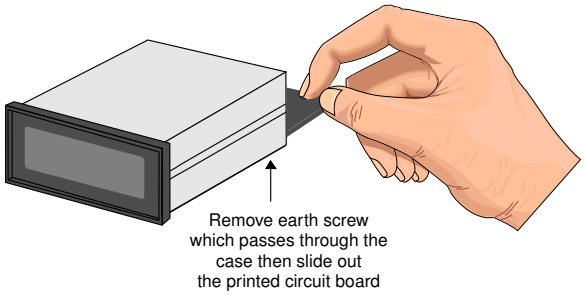


1. Remove the plug in terminals from the rear of the instrument



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

3. Using a screwdriver, loosen the earth screw which passes through the PCB 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. Re tighten the earth screw which passes through the PCB

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

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

4 Explanation of Functions

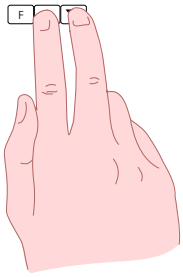
4 .1 Examining and changing functions.

The PM6 setup and scaling functions are configured through a pushbutton sequence. To enter the function set up mode, a simple pushbutton sequence is necessary (this prevents accidental alteration of settings). The process is as shown below:

Functions may be accessed by pressing and releasing the F pushbutton to step through the functions. Once the required function is reached changes can be made via the ▲ or ▼ buttons.

4 .2 CAL mode entry.

1. With the display switched on and showing 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.

All functions other than the tYPE function are accessible via the method detailed in 4.1 above. To access the tYPE function follow the procedure below:

1. Remove power from the panel meter.
2. Hold in the F button and re-apply the power whilst still holding in the F button.
3. Watch the display, the message CAL should appear amongst the other “wake up” messages. You can now release the F button.
4. Follow the method detailed in 4.1 to access the functions. You will find that the last function will now be tYPE.

Exiting CAL mode.

Once the tYPE function has been altered it is advisable to exit CAL mode by removing power from the instrument and then powering up again without touching any of the setup pushbuttons. This procedure will reduce the chance of the tYPE function being accidentally changed.

4 .3 Explanation of functions.

Functions available in this instrument are:

brgt (display brightness)

Displays and sets the digital display brightness. The display brightness is selectable from 0 to 15, where 0 = lowest intensity and 15 = highest intensity. This function is useful for reducing glare in low light environments.

drnd (display rounding) - operates in the function setup mode only.

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 in the set up mode, allowing the display to change larger steps for faster setting of setpoints etc.

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).

Note: Changes to the decimal point will affect the existing display scaling. If the decimal point place is changed then the display may need to be rescaled (see InPt (or FrEq) and SCLE functions).

InPt (total input factor) - seen only when tYPE function set to totL.

Scaling the PM6-FC totaliser display involves entering the ratio between the input factor and the scaling factor.

The equation used is as follows:

$$\text{Display value} = \frac{\text{Number of input pulses x } \mathtt{SCLE}}{\mathtt{INPt}}$$

This allows the PM6-FC to be scaled i.e. the display value does not have to equal the number of input pulses.

For example: if a count of 15 is required for every 5 pulses then the **INPt** value could be **5** and the **SCLE** value would be **15**.

Note: since these factors are entered as a ratio, they may be entered as the lowest common denominator. i.e.: in the above example **INPt** may be entered as **1** and **SCLE** entered as **3.**

See “Setup examples” later in this chapter for further scaling examples.

SCLE (total scale factor) - seen only when **tYPE** function set to **totL.**

The total scaling factor is used with the **INPt** factor to produce a scaled display. See “Setup examples” later in this chapter for scaling examples.

UrAP (wrap around display mode) - seen only when **tYPE** function set to **totL.**

Allows selection of **NONE** or **rSt.0**. If set to **NONE** then when the total display goes beyond a value of **9999** (or **999.9** etc.) the display will go to **0** and count up from zero but the four decimal points on the display will flash to indicate that the display has “wrapped around” from **9999**. If set to **rSt.0** then after a display of **9999** the display will go to **0** and count up from zero, there will be no indication that the display has passed **9999**.

FLtr (digital filter) - seen only when **tYPE** function set to **FrEq.**

Displays and sets the digital filter value. Digital filtering is used for reducing susceptibility to short term interference. The digital filter range is selectable from **0** to **8**, where **0** = none and **8** = most filtering. A typical value for the digital filter would be **3**.

LrNG (measuring range lower limit) - seen only when **tYPE** function set to **FrEq.**

Displays and sets the lowest accepted input frequency. This function is normally set to **0** where the lowest displayable frequency is 2Hz. For low rate applications a lower frequency limit may be selected:

1 = 1 Hz, **2** = 0.5Hz and **3** = 0.25Hz.

Note: settings **1** to **3** will decrease the display update rate.

FrEq (input frequency, used with scaling factor) - seen only when **tYPE** function set to **FrEq.**

Scaling the PM6-FC rate display involves entering the ratio between the input frequency and the scaling factor. The displayed value will indicate the **SCLE** number when the input is at this frequency.

The equation used is as follows:

$$\text{Display value} = \frac{\text{Number of input pulses x } \mathtt{SCLE}}{\mathtt{FrEq}}$$

This allows the PM6-FC to be scaled in Bottles/min., R.P.M. etc.

For example: if the input is 50Hz and this corresponds to 3000 R.P.M., **FrEq** would be entered as **50** and **SCL 1** as **3000**.

Note: since these factors are entered as a ratio, they may be entered as the lowest common denominator. i.e.: in the above example **FrEq** may be entered as **1** and **SCL 1** entered as **60**.

See “Setup examples” later in this chapter for further scaling examples.

SCLE (rate scaling factor) - seen only when **tYPE** function set to **FrEq.**

The rate scaling factor is used with the **FrEq** factor to produce a scaled display. See “Setup examples” later in this chapter for scaling examples.

dbLo (display blanking low) - seen only when **tYPE** function set to **FrEq.**

Displays and sets the display blanking low frequency. If the scaled display reading falls below the **dbLo** figure then the display will blank. This function may be disabled by pressing the ▲ and ▼

buttons simultaneously, the display will then show OFF.

dbHi (display blanking high) - seen only when tYPE function set to FrEq.

Displays and sets the display blanking high frequency. If the scaled display reading goes above the dbHi figure then the display will blank. This function may be disabled by pressing the ▲ and ▼ buttons simultaneously, the display will then show OFF.

tYPE (operation mode) - accessible only via CAL mode, see 4.2.

Allows the selection of either totL, to allow the PM6-FC to operate as a totaliser meter or FrEq, to allow the PM6-FC to operate as a ratemeter.

4 .4 Setup examples

Example 1 - Changing the decimal setting.

1. Press, then release, the F button. Within 2 seconds of releasing the F button press the ▲ and ▼ buttons simultaneously. The display will indicate FUnC followed by the first function br9t.

2. Press, and release, the F button to step through the functions until the function dCPt appears followed by the last setting in memory.

3. Use the ▲ or ▼ button to alter the decimal point setting as required. Press the F button to accept the change.

4. Press, and release, the F button repeatedly until the message FUnC End appears and the display returns to its normal measurement mode.

Example 2 - Total display scaling i.e. tYPE set to totL

The PM6-FC is connected to a shaft encoder which gives out 1500 pulses for every 1m travel of a belt connected to the shaft. The display is required to show the number of metres and centimetres travelled i.e. metres with 2 decimal point places. The InPt factor will therefore be 1500 and the SCLE factor will be 1.00.

1. Press, then release, the F button. Within 2 seconds of releasing the F button press the ▲ and ▼ buttons simultaneously. The display will indicate FUnC followed by the first function br9t.

2. Press, and release, the F button to step through the functions until the function dCPt appears followed by the last setting in memory.

3. Use the ▲ or ▼ button to alter the decimal point setting to 0.02. Press the F button to accept the change.

4. Press, and release, the F button until the InPt function is seen followed by the previous input value.

5. Use the ▲ or ▼ button to alter the input setting to 1500. Press the F button to accept the change.

6. The display will now show SCLE followed by the previous scale value. Use the ▲ or ▼ button to alter the scale setting to 1.00. Press the F button to accept the change.

7. Press, and release, the F button repeatedly until the message FUnC End appears and the display returns to its normal measurement mode.

Example 3 - Rate display scaling i.e. tYPE set to FrEq

The PM6-FC is connected to a flowmeter which gives out 40 pulses for every 1.5 litres of water passing through a pipe. The display is to be scaled to read in litres per hour.

1. Press, then release, the F button. Within 2 seconds of releasing the F button press the ▲ and ▼ buttons simultaneously. The display will indicate FUnC followed by the first function br9t.

2. Press, and release, the F button to step through the functions until the function FrEq appears. The display will show the last frequency factor in memory and FrEq will flash approximately once every 8 seconds.

3. Use the ▲ or ▼ button to adjust the frequency factor to 40 then press the F button to accept this change.

4. The display will now show SCLE followed by the scale factor in memory. Use the ▲ or ▼ button to change the scale factor to 5400. The scale factor is 1.5 x 3600 where 1.5 is the number of litres per 40 pulses and the 3600 (60 seconds x 60 minutes) converts this to litres/hour.

5. Press, and release, the F button repeatedly until the message FUnC End appears and the display returns to its normal measurement mode.

Note that since the FrEq and SCLE factors are actually used as ratios in calculating the display

values then a FrEq setting of 1 and a SCLE setting of 135 would give the same result.

Example 4 - Rate display scaling i.e. tYPE set to FrEq

The PM6-FC is connected to a proximity detector which gives out 6 pulses for every revolution of a shaft. The display is to be scaled to read in revolutions per minute (R.P.M.).

1. Press, then release, the F button. Within 2 seconds of releasing the F button press the ▲ and ▼ buttons simultaneously. The display will indicate FUnC followed by the first function brGt.

2. Press, and release, the F button to step through the functions until the function FrEq appears. The display will show the last frequency factor in memory and FrEq will flash approximately once every 8 seconds.

3. Use the ▲ or ▼ button to adjust the frequency factor to 6 then press the F button to accept this change.

4. The display will now show SCLE followed by the scaling factor in memory. Use the ▲ or ▼ button to change the scale factor to 60. The factor 60 is used to convert the display from a "per second" display to a "per minute" display i.e. there are 60 seconds in one minute (if the display required was "per hour" then you would need to multiply by 3600).

5. Press, and release, the F button repeatedly until the message FUnC End appears and the display returns to its normal measurement mode.

Note that since the FrEq and SCLE factors are actually used as ratios in calculating the display values then a FrEq setting of 1 and a SCLE setting of 60 would give the same result.

4 .5 Error Messages

In an error condition the following messages may be seen:

totL Err

Indicates a failure of the totaliser. This could be due to hardware, software failure or possibly due to a short supply spike or gross electrical interference on the input. Switch the power off then on again to see if the error message is repeated. Check to see if total is being retained. If the error message does not repeat and the total is being retained then monitor the instrument to see if the error message re-occurs. If the message persists or the total is being lost then return the instrument to the supplier for repair.

U8 Err or **U9 Err**

Indicates a fault with memory chip **U8** or **U9**. If the message does not persist then check that the instrument is retaining its total. If the message persists or the total is being lost then return the instrument to the supplier for repair. If the message does not persist then check that the instrument is retaining its total.

-or-

Indicates an overrange error on the rate display i.e. the rate indication has gone beyond **9999** or **999.9** etc. Check the maximum rate value to be displayed, the PM6 cannot display a value beyond **9999**. If decimal points are being used then reducing the number of decimal point places may cure the problem.

If the maximum rate is not a problem but the display is still displaying **-or-** then it is possible that the panel meter is experiencing interference and is measuring the rate of this interference. Check that the internal links are set to suit the input type being used (see chapter 3 for details) especially check the settings of the hysteresis links. If the interference is above 1kHz and the signal is below 1kHz then inserting the “FREQ” link may help to filter out the interference. Increasing the value of the digital filter function FLtR may also help to reduce the effect of interference on the display. Ensure that screened signal cables are used (see chapter 3 for examples of shield connection). Also ensure that signal cables are not placed next to cables likely to radiate interference e.g. power cables.

All four decimal points flashing.

See **UrAP** function. This is not an error message, the four flashing decimal points are associated with choices made via the **UrAP** function.

Display is blank.

A completely blank display indicates a hardware failure normally a power supply failure. DC powered instruments are fitted with a self healing fuse. If you are using a DC powered instrument then remove power for 3 or 4 minutes and then try re powering. Check to see that power is reaching the instrument. If power is reaching the instrument and the display is still completely blank i.e. not even displaying **0** then the instrument will need to be returned to supplier for repair.

5 Function Table

Initial display	Meaning of display	Next display	Default Setting	Record Your Settings
brgt	Display Brightness	1 to 15	15	
drnd	Display Rounding Selects Resolution	Value in memory	1	
dCPt	Display Decimal Point	Decimal point position (e.g. 0, 0.1 0.02 or 0.003.)	0	
*1 nPt	Totaliser input factor	Value in memory	1	
*SCLE	Totaliser input scale	Value in memory	1	
*UrAP	Wrap around total mode	nonE or rSt0	nonE	
#FLtr	Digital Filter Range 0 to 8	0 to 8 (8=most filtering)	3	
#LrnG	Low measuring range	0, 1, 2 or 3	0	
#FrEq	Frequency input factor	Value in memory	1	
#SCLE	Display scale factor	Value in memory	1	
#dbLo	Display blanking low value	Value in memory	OFF	
#dbHi	Display blanking high value	Value in memory	OFF	
tYPE	Operation mode	FrEq or totL	totL	

Functions marked * are seen only when the tYPE function is set to totl

those marked # are seen only when the tYPE function is set to FrEq.

The tYPE function is only accessible via CAL mode entry, see “Explanation of Functions” chapter.

6 Specifications

Technical Specifications

Input Types:	Selectable types including NPN, PNP, switch contact, magnetic pickup, TTL, CMOS etc.
Frequency range:	10kHz max, 0.25Hz min.
Impedance:	10KΩ
Sample Rate:	4 / sec nominal (≥1 / sec on low frequencies)
Measurement Method:	Reciprocal time period technique
Microprocessor:	MC1468HC05 CMOS
Total memory retention:	Will retain total for a minimum of 40 days with power removed.
Ambient Temperature:	-10 to 60°C
Humidity:	5 to 95% non condensing
Display:	4 digit, 20mm LED
Transducer Power:	+5VDC regulated or 18-24VDC unregulated
Power Supply:	AC 240V, 110V, 24V 50/60Hz DC non isolated 12 to 24V or optional isolated DC 9 to 55V
Power Consumption:	AC supply 2 VA + transmitter current, DC supply 2W + transmitter current

Physical Characteristics

Bezel Size:	DIN 48mm x 96mm x 10mm
Case Size:	44mm x 91mm x 120mm behind face of panel
Panel Cut Out:	45mm x 92mm +1mm & -0mm
Connections:	Plug in screw terminals (max 2.5mm wire)
Weight:	400 gms approx.

7 Guarantee and Service

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

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