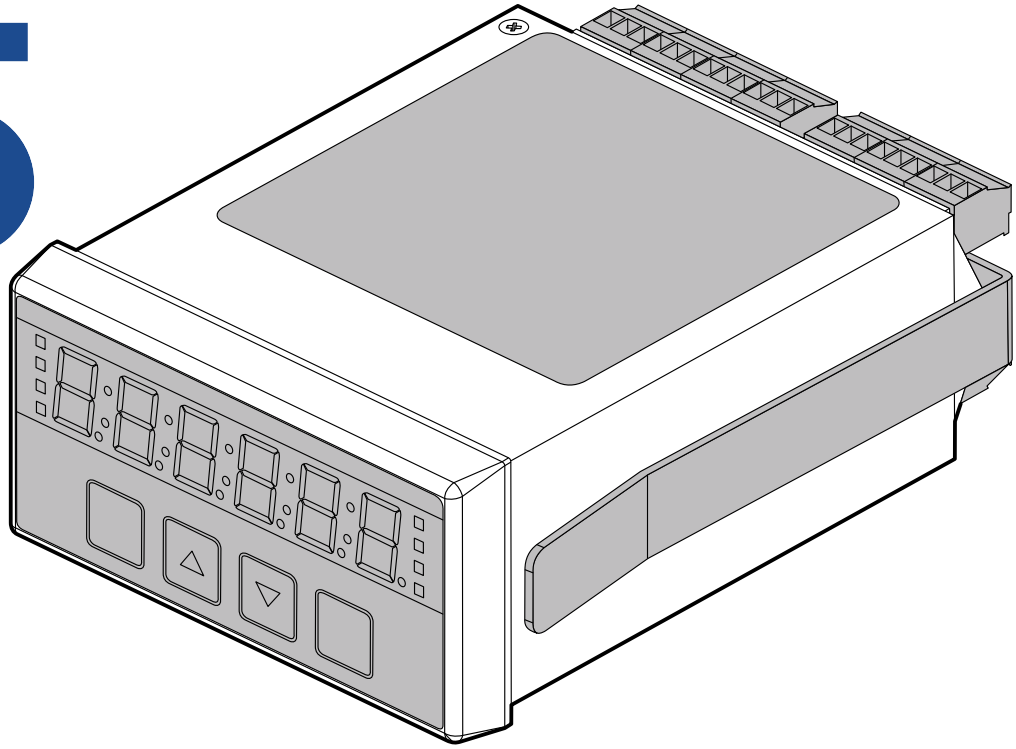
INT5



UNIVERSAL INPUT DIGITAL PANEL METER

USER MANUAL

F0.03 b.070
Publication date 26-01-2024
Revision 2

CE UKCA

London Electronics Limited
SINCE 1992
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1 Introduction

The INT5 is the fifth generation of our popular 1/8 DIN INTUITIVE panel meter range. Its' unique universal sensor input, puts this meter in a class of its own. The 32-bit A/D converter makes the INT5 the fastest, highest performing, panel meter we have produced to date and our patented multi-sensor design makes it the most universal meter ever.

Several developments have been made to this new INTUITIVE panel meter to ensure the INT5 is the only panel meter you need for all your processes.

- The new multi-colour LED display improves functionality allowing digit colour to be used as part of the alarm system, for an additional visual response to conditions detected. Digit colour can also be selected from green, red or yellow for panel meter differentiation.
- The addition of 2 data ports, which work independently of each other upgrades the potential system integration achieved by the INT5. These ports have RS232 or RS485 outputs which allow greater control of your processes.
- The INT5 has 6 logic inputs which are configurable as: tare, show tare, reset, hold, peak gross, peak nett, valley gross, valley nett, gross, nett, mirror image and ambient temperature.
- The INT5 is capable of measuring input resistance whist being calibrated. If there is a change to this value, the meter will indicate this by value indicator X lighting up. This indicates a fault with the input and prevents the unnecessary need to replace the meter.
- The rear lock out switches have been removed, ceasing the need to access the rear of the panel meter whilst programming the meter.
- An internal sensor allows you to monitor the temperature of the panel meter to ensure that optimal conditions are maintained.

1.1. Features

- Two power supply options: 95-265V AC / 100-300V DC or 11-30V DC
- Programmed using front panel push buttons
- Ingress protection to IP65 from the front, IP67 optional
- Multi-sensor / multi-function capability
- 6 digits, LED, 3 colours
- 10 brightness levels
- Self-locking if unattended
- Panel cutout 45mm high x 92mm wide
- Depth behind panel = 125mm

1.2. Standard Input Signals

- 0-10V : Fully scalable
- 1-5V : Fully scalable
- 4-20mA : Fully scalable, active or passive
- Load Cells : Up to 4 x 350 Ohm cells or 8 x 700 Ohm load cells with automatic cable resistance compensation
- Thermocouples : Types B, E, J, K, N, R, S, T
- PT100 : 2 wire, 3 wire and 4 wire
- PT1000 : 2 wire, 3 wire and 4 wire
- Potentiometers: 3 wire and 4 wire
- DC Shunts : For measuring high DC current
- Resistances : 2 or 4 wire connection
- On-board ambient temperature
- Elapsed timer
- NPN/Contact Closure: Production Counter
- NPN/Contact Closure: Production Rate Meter

1.3. Optional Input Signals

- Power Frequency measurement 47.000 to 63.000 Hz
- Real Time clock, calendar, day counter

1.4. Optional Output Signals

- 4-20mA isolated, scalable, active source passive sink
- 0-10V isolated, scalable
- x4 SPDT mechanical relays
- RS232
- RS485 + Modbus ASCII + Modbus RTU

1.5. Ordering Codes

INT5	-X	-X	-X	-X	-X	-X	-X	-X
Function / Input Type:								
Digital input (counter, rate meter, elapsed timer)	D							
Power frequency monitor (AC powered only)	PFM							
Real time clock	RTC							
Universal input (analogue and digital signals)	U							
Analogue Outputs:								
None		0						
4-20mA		ANI						
0-10V		ANV						
Alarm Outputs:								
None			0					
1 x SPDT mechanical relay			AL1					
2 x SPDT mechanical relays			AL2					
3 x SPDT mechanical relays			AL3					
4 x SPDT mechanical relays			AL4					
Data Port 1:								
None				0				
RS232				232				
RS485 + Modbus ASCII + Modbus RTU				485				
Data Port 2:								
None					0			
RS232					232			
RS485 + Modbus ASCII + Modbus RTU					485			
Power:								
95-265V AC or 100-300V DC						AC		
11-30V DC						DC		
Options:								
Power frequency monitor (AC powered only)							PFM	
Real time clock							RTC	
Accessories:								
DIN rail mounting								DIN
IP67 front cover								SPC4
IP65 wall mounting enclosure for 1 x meter								WALLBOX
IP65 wall mounting enclosure for 2 x meters								WALLBOX2

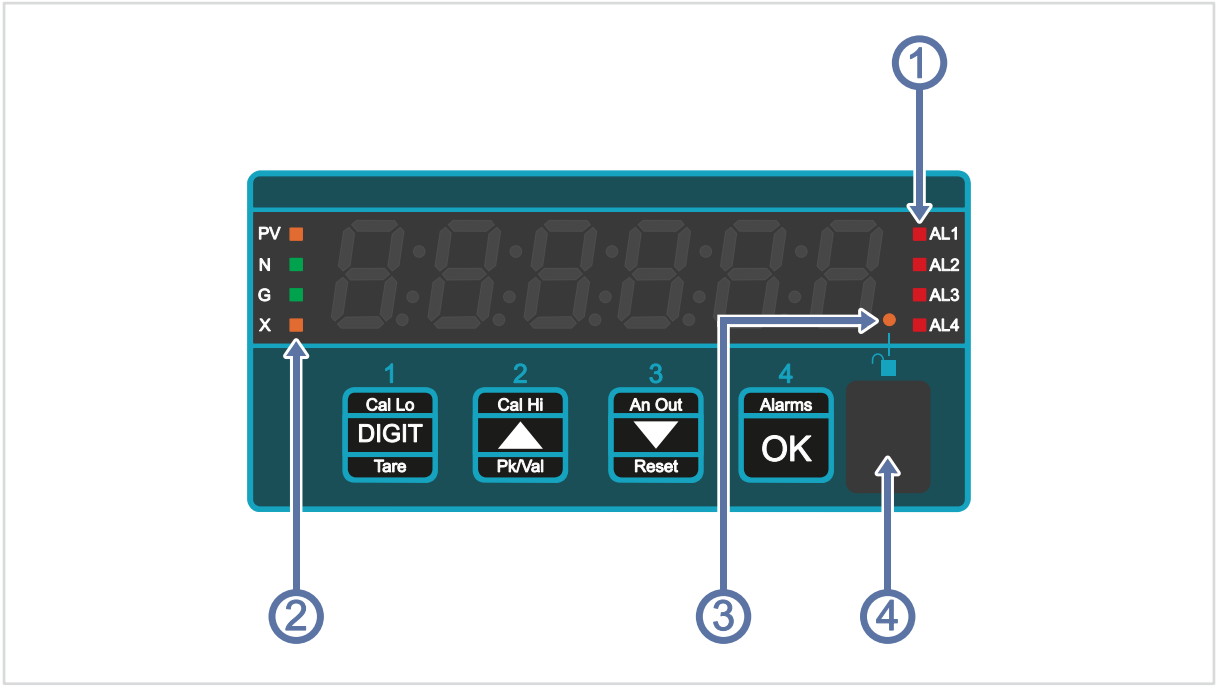
Ordering Example:

INT5-U-ANI-0-232-485-DC-PFM-SPC4

INT5 - U - Universal input
ANI - 4-20mA
0 - No alarms fitted
232 - Data port 1 RS232
485 - Data port 2 RS485
DC - 11-30V DC
PFM - Power Frequency Monitor option
SPC4 - IP67 front cover

1.6. Indicator LED's

Your display has indicator LED's which give status information during set-up and operation.



1

Alarm Indicators

In normal operation, these LED's will be unlit.

If an alarm channel goes into an alarm state, its LED will light.

When you configure an alarm channel, its light will blink yellow, to show which channel you are adjusting.

2

Status Indicators

PV Lit, means the value on the display is either the Peak (PV LED is Yellow) or Valley (PV LED is Green)

N Green, means the value on the display is a Nett value

G Green, means the value on the display is a Gross value

X Flashing Yellow, means there may be a problem with the sensor or its wiring. See the Input type pages for details

3

Lock Indicator

When your meter is fully locked, this LED will not be lit.

This indicator will blink differently to identify if the alarm settings are unlocked or the configuration settings are unlocked.

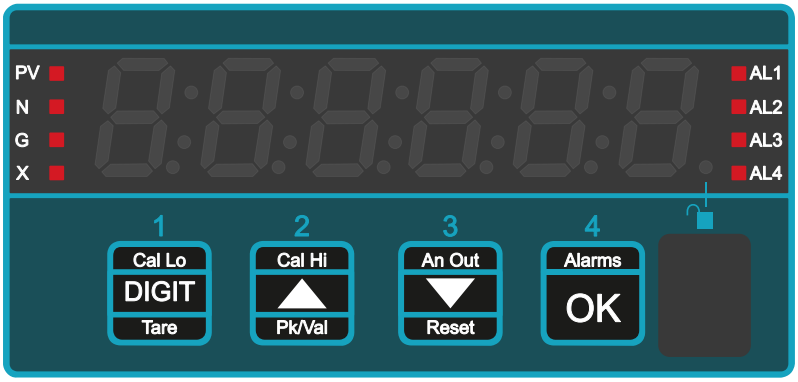
4

Units of Measure Window

You can place a label behind this protective window to show what units your meter is measuring, for example kg, Bar, Deg.C etc.

1.7. Front Panel Buttons

Each button has several functions. They are normally locked when the meter is being used, to prevent unwanted changes to the configuration.



1.8. Inventory Report

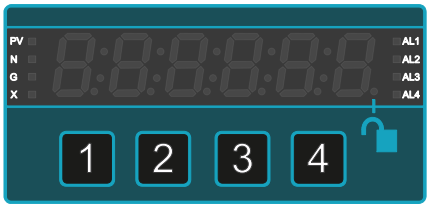
You do not need to unlock the meter to view the inventory report.

The Inventory report shows the meter's hardware and software status.

It includes input mode, board temperature, firmware version, firmware build number and installed option boards.

It does not report alarm relay type or whether the power frequency option is installed.

1



Press buttons **1** and **4** together for 3 seconds.

The display will briefly show a sequence of values and will then return to normal display mode.

All signal processing, analogue output, communications and alarm outputs continue normally in the background while you view the inventory.

Data will appear in the following sequence:

	Example:
1. Input mode	
2. Ambient temperature of meter	
3. Firmware version	
4. Firmware build number	
5. Analogue output option	
6. Data port 1 option	
7. Data port 2 option	
8. Real time clock option	

Empty options are not reported.

For example, if the meter has no analogue output, data ports or real time clock option fitted, only the first 4 lines of the report will appear.

2 Safety

Please carefully read this manual and all warnings. Install the meter ONLY when you are sure that you've covered all aspects.

Check that the model number and supply voltage suit your application before you install the meter.

Connect the meter according to current IEE regulations, IEC61010 and NFPA:70 National Electrical Code in USA.

This meter is for Installation Class II service only. This means it has exposed electrical and power terminals. You must install it in a suitable fire enclosure which will also protect users from electric shock.

We designed this meter for Pollution-Degree 2 environments only.

Power supplies to this equipment must have anti-surge (T) fuses rated at 2A for 95-265V AC supply, or 5A for DC supplies in the range 11-30VDC. A switch or circuit breaker, clearly marked as a disconnecting device, must be included close to the installation.

Don't touch any circuitry after you have connected the meter, because there may be lethal voltages on the circuit board.

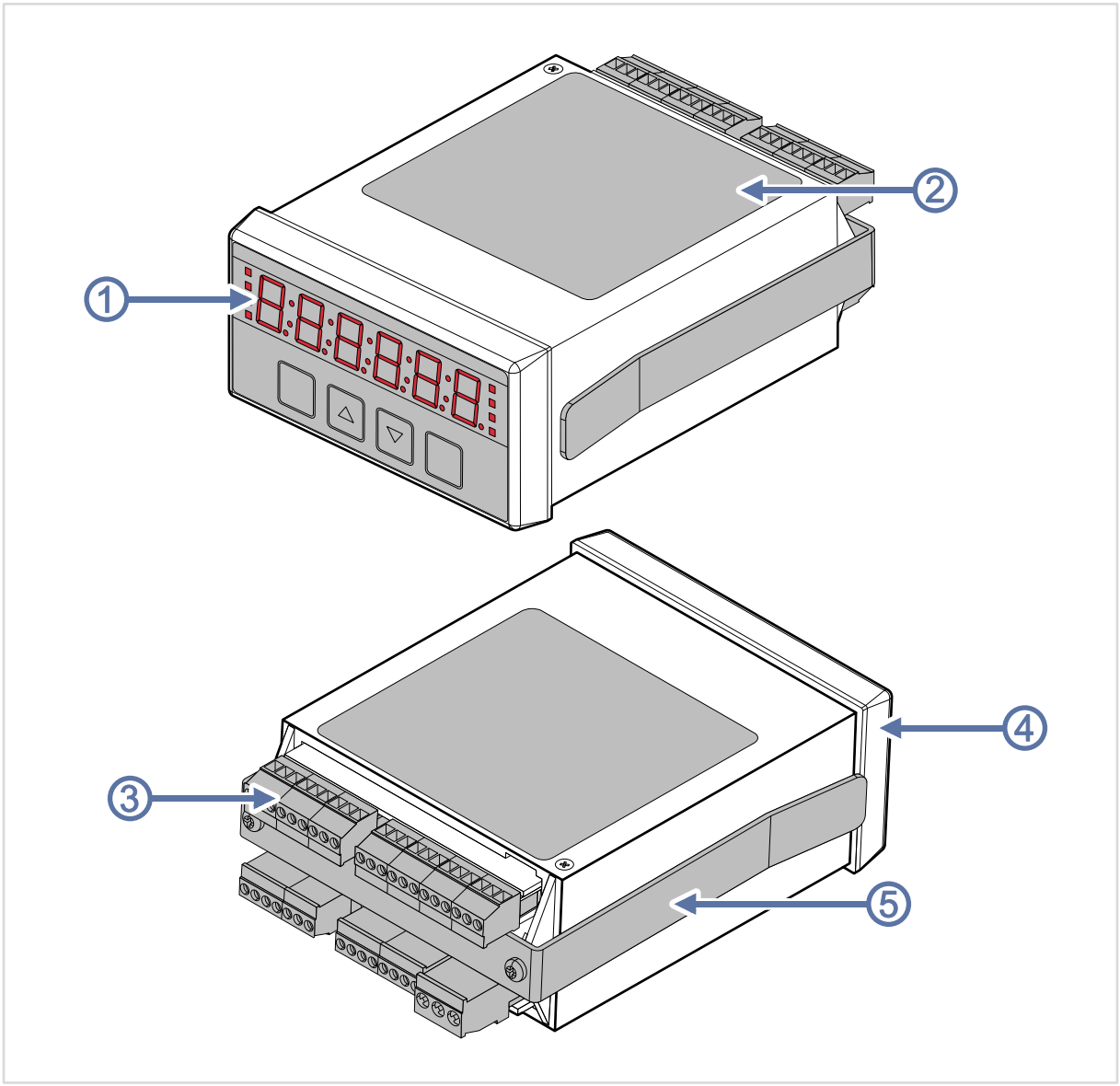
Only adjust on-board switches or connections with the power turned off.

Make sure all screw terminals are tight before you switch the meter on.

Only clean the meter's front with a soft damp cloth. Only lightly dampen with water. Do not use any other solvents. The behind-panel case may be cleaned with a dry cloth only, use no liquid or solvent on it.


3
Installation

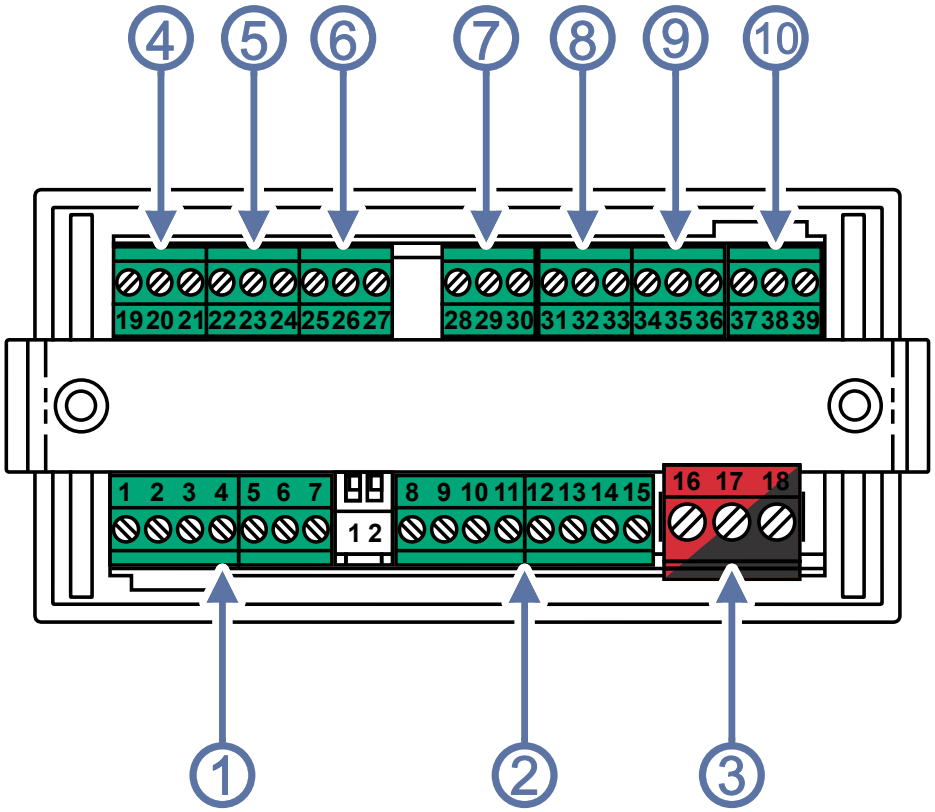
3.1. External Parts



1. Overlay
2. Information Label
3. Connectors
4. Front Panel
5. Panel Mounting Bracket

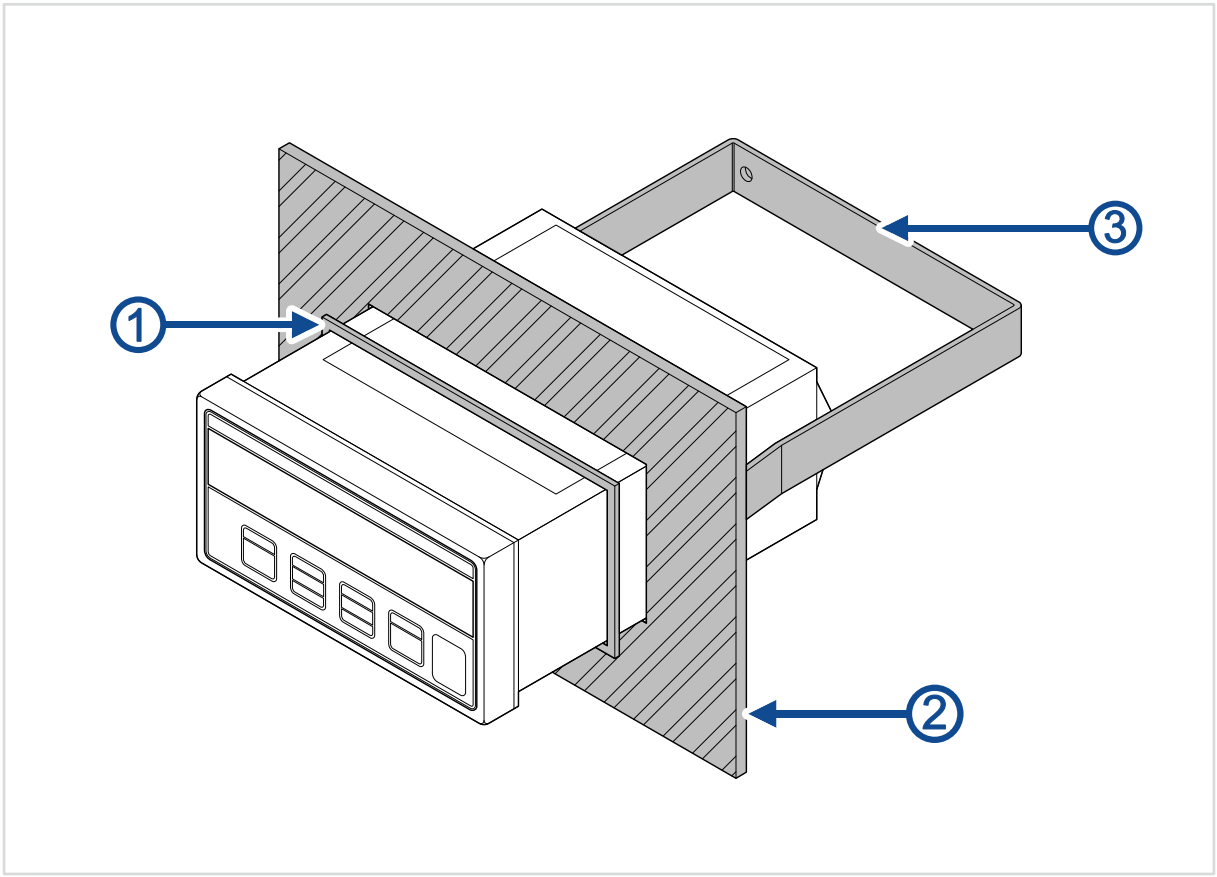
3.2. Connectors

The pin out for the connectors will vary depending on the settings you have configured



1. Analogue signal Input
2. Logic and pulse signal inputs
3. Power supply input
4. Analogue output
5. Data Port 1
6. Data Port 2
7. Alarm Relay 1
8. Alarm Relay 2
9. Alarm Relay 3
10. Alarm Relay 4

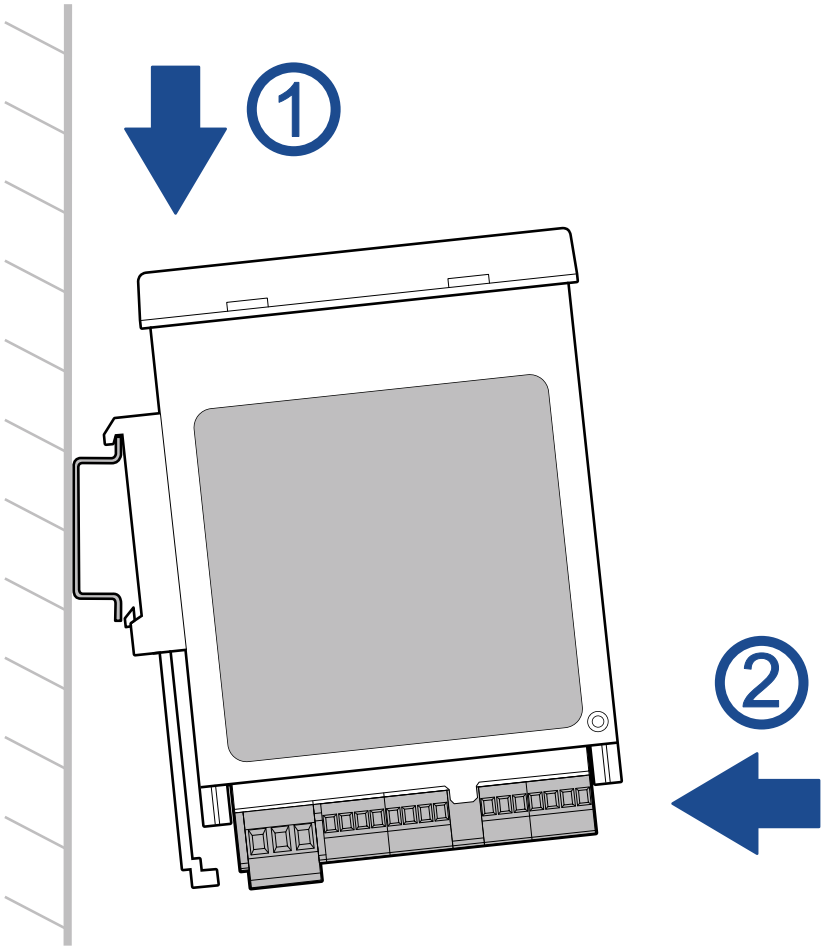
3.3. Panel Mounting



1. Gasket
2. Panel
3. Bracket

3.4. Optional DIN Rail Mounting

> **!** The equipment must be electrically grounded through the DIN rail for EMC compliance. Make sure that the equipment is correctly mounted on the rail and that the rail is properly grounded.

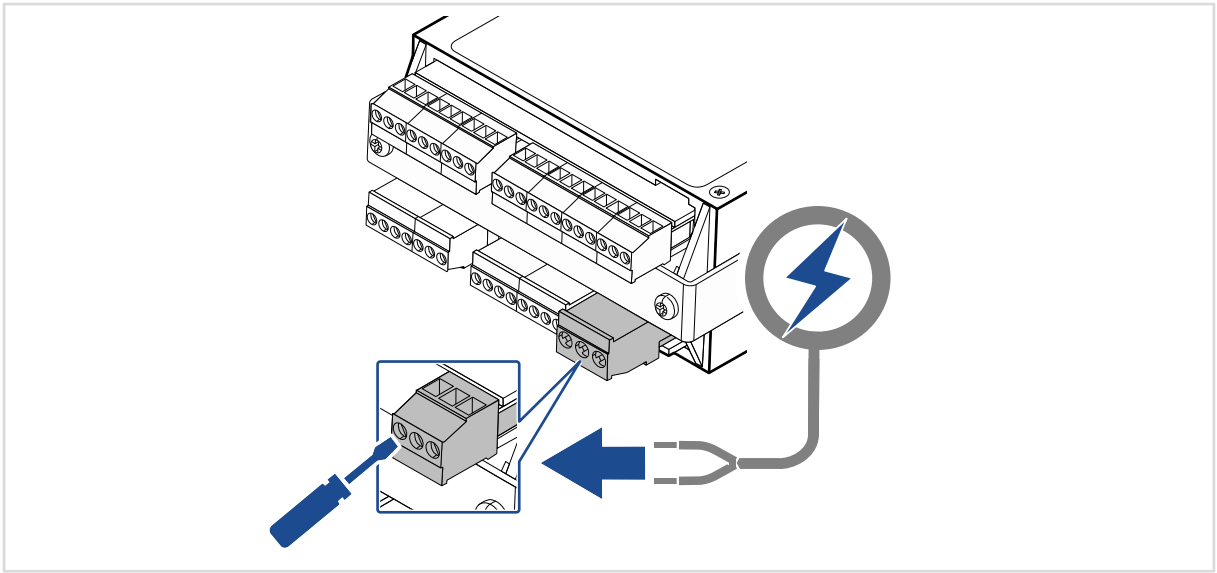


3.5. Connecting to Power

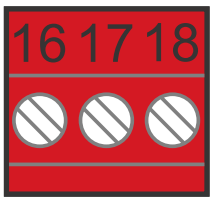
Caution
Ensure that the power supply is turned off before connecting it to the equipment.

Using the wrong type of power voltage will damage the equipment. Ensure that the power voltage is connected properly and of the recommended type. See the rating label on the meter for its power voltage.

3.5.1. Connections

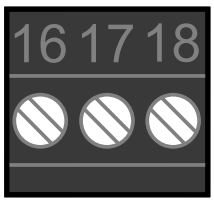


95-265V AC / 100-300V DC Power - Red Connector



Pin	Description
16	
17	Neutral
18	Live

11-30V DC Power - Black Connector



Pin	Description
16	
17	Ground (GND)
18	11-30V DC

4 Functionality

4.1. Locking and Editing Settings

Caution
When you switch your meter on, it will be locked automatically.

Before you can change your configuration settings you must first unlock the configuration menu. There are 2 Unlocked 'edit' modes.

4.1.1. Ed.AL: Edit Alarm Settings

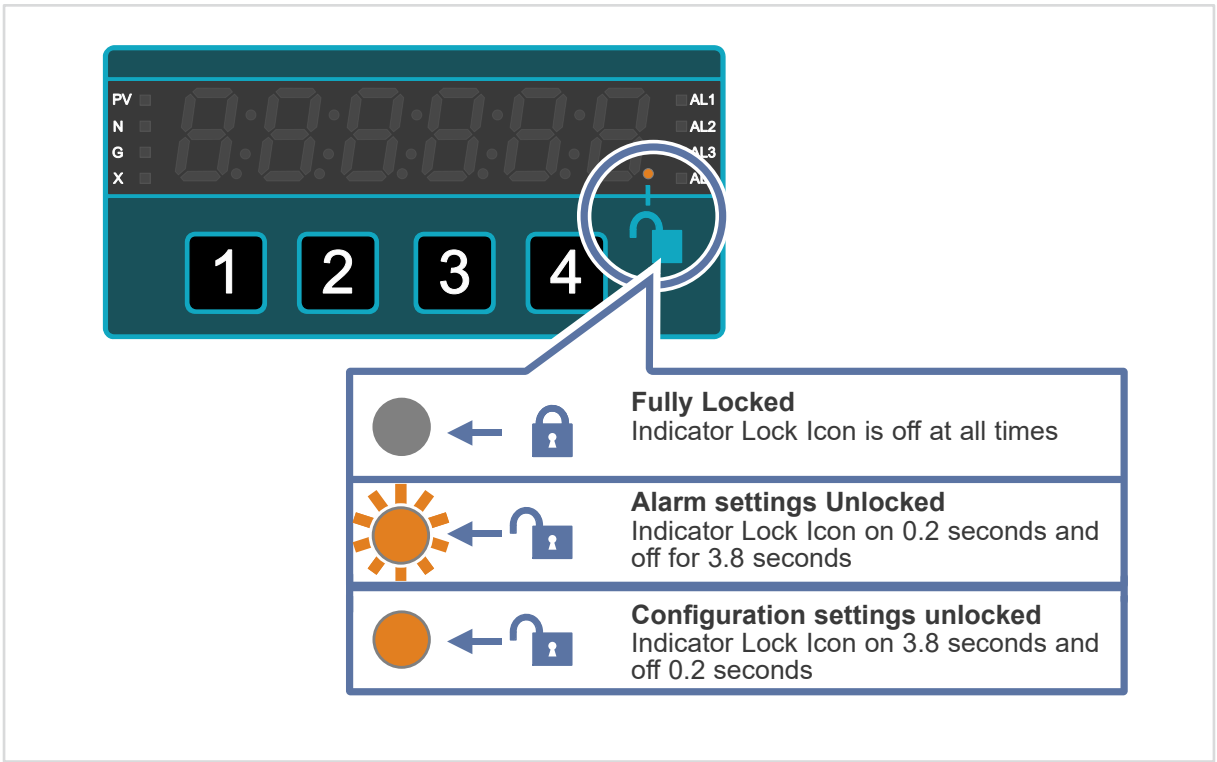
In normal running mode, press button **4** (OK) button for 5 seconds until display shows '**Ed.AL**'.

You can now edit alarm modes and set points.

4.1.2. Ed.CF: Edit Configuration Settings (Full Access)

In normal running mode, press button **4** (OK) button for 10 seconds until display shows '**Ed.CF**'. Do not release the button when you see '**Ed.AL**'

You can now edit all parameters and modes in the meter.



4.2. Brightness Adjustment

The display has 10 levels of brightness. You can change the brightness at any time during normal operation, when the meter is locked.

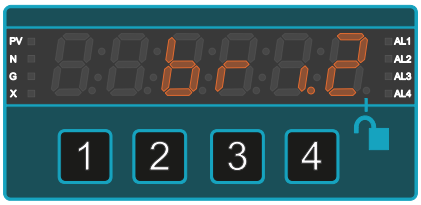
1

Press button **2** for at least 3 seconds.

The display will say **'bri.X'**

X is the brightness value from 0 (dimmest) to 9 (brightest)

2



Press button **2** (△) or **3** (▽) to change the brightness level.

3

Press button **4** (OK) to save your choice.

4.3. Display Colour

You can set the normal display colour to be Red, Yellow or Green.

1 ***Unlock the configuration menu***

2

Press and hold buttons **3** and **4** together for at least 3 seconds.

The display will say either:

3

Press button **2** (△) or **3** (▽) to set the colour you want.

4

Press button **4** (OK) to save your choice.

Keep pressing button **4** repeatedly until you exit the menu.

4.4. Main Display Value

You can set the display to permanently show one of several different sources of data.

For example, you can configure the display to permanently show the peak, or valley, or the nett value, or the gross value, or the tare value, etc.

In most measurements, the nett value is the most appropriate, so this is the default.

The Nett Value

This is the value after you tare the display.

For example, if the meter reading shows 12.5 and you tare it, the display will show 0.0

This is the most common display choice in most weighing applications.

The Gross Value

This is the amount the measurement has risen by since it was calibrated at 0.

The displayed value will not change if you tare the meter.

This is common in applications where you want to see the total amount of some measurement, such as silo content.

The Peak Gross Value

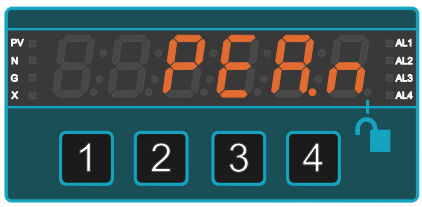
This value will track the rising gross value and will remain at the highest level, since it was last reset.

This is useful in such applications as over-temperature monitoring, flood level monitoring, mechanical overload / destructive test monitoring.

The Valley Gross Value

This value will track the falling gross value and will remain at the lowest level, since it was last reset.

This is useful in such applications as under-temperature monitoring, storage container depletion monitoring, minimum ground-water level detection etc.



The Peak Nett Value

This shows the highest Nett value since the peak was last reset.

The Valley Nett Value

This shows the lowest Nett value since the valley was last reset.

The Tare Value

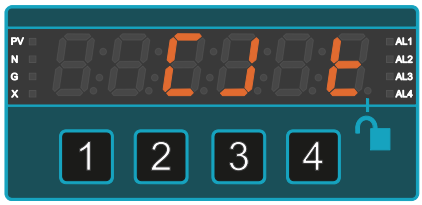
This shows the tare amount.

For example, in a weighing application, your platform has nothing on it and reads 0

You place an empty container weighing 78kg on the platform and the display reads 78.

You tare the display to 0, ready to weigh how much material you put in the container.

The Tare value will remain at 78kg, even while you fill or empty the container.



The Cold Junction Temperature

There is a temperature sensor on the rear of the meter which compensates for thermocouple cable ambient temperature errors.

You can display this temperature permanently, if you want to show the temperature inside the enclosure.

The meter can continue its main measurement / control function in the background.

The Power Frequency

If your meter is AC powered and includes the Power Frequency monitoring option, you can set the display to show power frequency, while the rest of the meter monitors and reacts to the main measurement input signal, which could be temperature, speed, total etc.

4.4.1. Setting the Main Display Value

1

Unlock the configuration menu

2

Press Buttons 3 and 4 together for 3 seconds. The '**dISP**' prompt will appear.

3

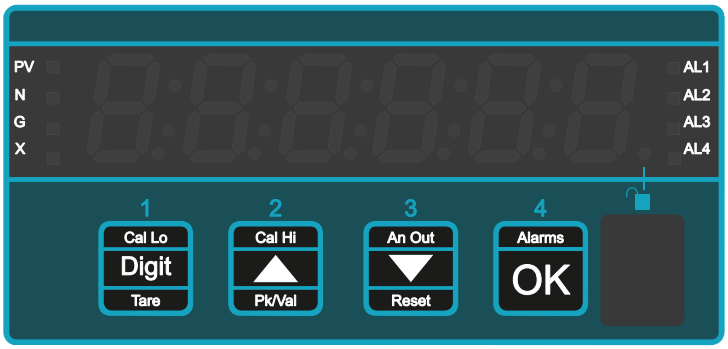
You can use button **2** (△) or **3** (▽) to set one of the listed permanent display values.

Press button **4** (OK) to save, and keep pressing button **4** until you exit the menu.

4.5. Logic Inputs

Caution
Ensure that the power supply is turned off before connecting it to the equipment.

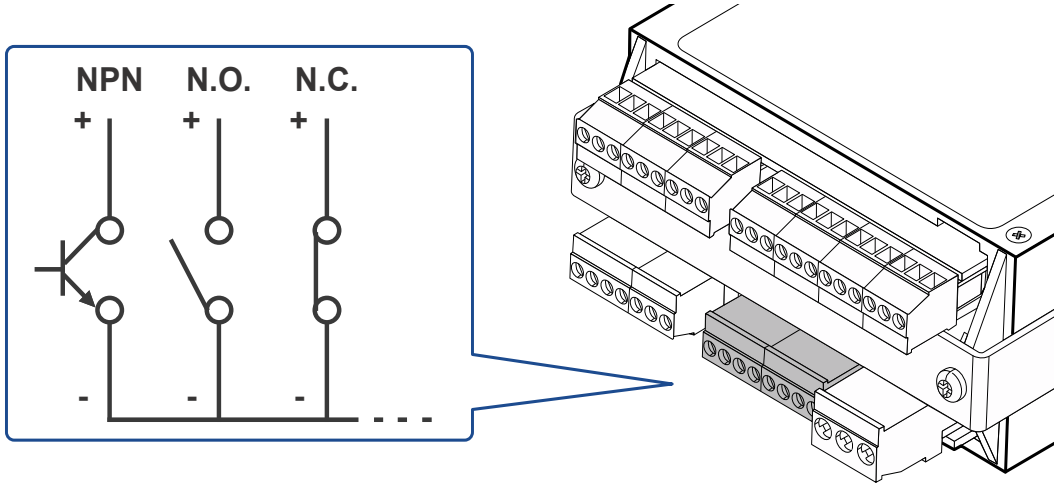
Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.



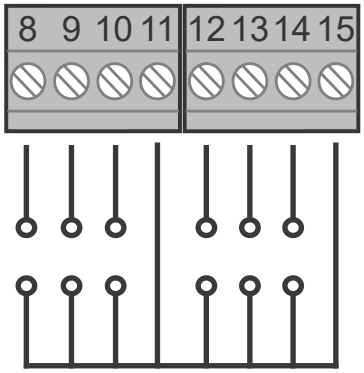
4.5.1. Signal Types

NPN Transistors	Switching 5V DC at 1mA Must saturate to lower than 1V Vce
Normally Open Contacts	Switching 5V DC at 1mA We recommend you use wiping contacts, to mechanically clear any oxidation or tarnishing of the contact surfaces.
Normally Closed Contacts	Switching 5V DC at 1mA We recommend you use wiping contacts, to mechanically clear any oxidation or tarnishing of the contact surfaces.
De-bounce	Each input port has its own configurable de-bounce time which you can adjust to suit your application. Range 0 to 9999 milli-seconds.

4.5.2. Connections



Signal Input



Pin	Description
8	Contact closure #1
9	Contact closure #2
10	Contact closure #3
11	0V
12	Contact closure #4
13	Contact closure #5
14	Contact closure #6
15	0V

* If your meter has the P.FrE power frequency function fitted, logic port #6 will not be available.

4.5.3. Contact Closure Input Port Function

Legend	Function	Description	Default
rSt	Reset	Clear counts, Tare, Timer, latched alarms, Peak/valley memory etc.	#3
tArE	Tare	Clear the display value to 0, regardless of weight acting upon load cell	#1
Hold	Hold	Freeze the meter state at a moment in time	
nEtt	Nett	Show nett value	
Gross	Gross	Show gross value	
PEAG	Peak Gross	Show tracking peak (maximum) gross value. PV LED is yellow	
VALG	Valley Gross	Show tracking valley (minimum) gross value. PV LED is green	
PEAn	Peak Nett	Show tracking peak (maximum) nett value. PV LED is yellow	
VALn	Valley Nett	Show tracking valley (minimum) nett value. PV LED is green	
dtAr	Display Tare	Show the tare amount	
rEV.I	Reverse display	Show mirror image of the display for heads-up	
CJt	Cold Junction Temperature	Show the CJ temperature at back of meter.	
none	None	No function for this logic input	#2

Peak and valley values update up to 10 times per second, with a maximum bandwidth of 7Hz. This will reduce if you add display averaging / filtering.

4.5.4. How to configure your external contact closure input functions

1

Unlock the configuration menu

2

Press buttons **3** and **4** together for 3 seconds.

The meter will show '**diSP**' Then it will show the existing display parameter.

3

Press button **4** repeatedly until you see '**E.CC.n**'

Press the **2**(△) or **3**(▽) button until you see '**E.CC.Y**'

4

Press button **4** (OK) to save.

5

The meter will then show '**CC 1**'

6

To choose which contact closure channel to view or edit press button **2**(△) or **3**(▽) button to select a channel.

7

Press button **4** (OK) to save.

8

To choose the function of that channel press button **2**(△) or **3**(▽) until you see your desired function.

To save that function, press button **4** (OK)

9

Choose a debounce time for that channel. The default is 50 mS.

10

Press button **1** (Digit) to select each digit and edit with button **2**(△) or **3**(▽) to increase or decrease the value of the selected digit.

Press button **4** (OK) when all digits are correct.

11

Do this for as many contact closure inputs as you want to configure by repeating stages 6 through 10.

12

When you are finished return to '**CC1**' and press button **3**, the meter will then show '**SAVE**'

To save your choices, press button 4 '**OK**' Repeat until you return to the normal display.

4.6. Boot-up Modes

You can choose what happens on the display when you first switch on the meter.

There are 5 power-on or boot-up modes available:

bt. 0	Meter immediately displays measurement data.
bt. 1	Meter does a display test, then displays measurement data.
bt. 2	Meter does a display test, reports measurement mode, then displays measurement data.
bt. 3	Meter does a display test, reports full inventory of measurement mode and all installed options, then displays measurement data.
bt. 4	Meter does a display test, and remains fixed with all segments lit (display burn-in test), until you press a button, then displays measurement data.

We recommend you to use **bt. 0** as standard.

4.6.1. How to change the Boot-up Mode

1 ***Unlock the configuration menu***

2 

Press and hold buttons **3** and **4** together for at least 3 seconds until the display shows **'dISP'.**

3 

Press button **4** (OK) until you see **'bt. X'** where X is a number from 0 to 4

4 

Press button **2** (△) or **3** (▽) to set the boot-up mode you want

Press button **4** (OK) repeatedly to save your choice and to exit the menu.

The meter will lock itself automatically within 5 minutes, or immediately, if you switch the meter off then on again.

4.7. Active Digits

You can choose to have 4 or 6 digits active on this display.

1 ***Unlock the configuration menu***

2 

Press Buttons **3** and **4** together for 3 seconds. The '**dISP**' prompt will appear.

3 

Press button **4** (OK) until you see '**diG.6**' or '**diG.4**'.

4 

Press button **2** (△) or **3** (▽) to set the option you want.

Press button **4** (OK) repeatedly to save your choice and to exit the menu.

We recommend choosing '**dig.6**' for the 1/8 DIN panel meter version.

4.8. Front Button Functions

Each button has several functions. They are normally locked when the meter is being used, to prevent unwanted changes to the configuration.

4.8.1. Front Button Tare

Button **1** can be enabled as a **tare** or **zero** button.

1 ***Unlock the configuration menu***

2 

Press buttons **3** and **4** together for 3 seconds.

The meter will show '**diSP**' Then it will show the existing display parameter. (may vary depending on function mode)

3 

Press button **4** (OK) until you see '**fbt.0**' or '**fbt.1**'.

4 

Press button **2** (△) or **3** (▽) to set the option you want.

'**fbt.1**' = Front Button Tare is enabled

'**fbt.0**' = Front Button Tare is Disabled

5 

Press button **4** (OK) to save your choice.

Keep pressing button **4** (OK) repeatedly until you exit the menu.

4.8.2. Front Button Peak and Valley

Button **2** can be used to see the **peak** or **valley** when in an operating mode that would require a peak or valley reading, for example, Load Cell.

Press briefly and repeatedly on button **2** (△) to see Peak (maximum memory, PV LED is Yellow) and Valley (minimum memory, PV LED is Green) stored values and the live value.

If you want the display to give a live update of the peak value (peak tracking) you should use a contact closure input, configured for peak display, the display will track the input and automatically update with new peak values as they happen.

Can similarly be enabled for valley values.

4.8.3. Front Button Reset

Button **3** can be enabled as a **reset** button.

1

Unlock the configuration menu

2

Press buttons **3** and **4** together for 3 seconds.

The meter will show '**diSP**' Then it will show the existing display parameter. (may vary depending on function mode)

3

Press button **4** (OK) until you see '**fbr.0**' or '**fbr.1**'.

4

Press button **2** (△) or **3** (▽) to set the option you want.

'**fbr.1**' = Front Button Tare is enabled

'**fbr.0**' = Front Button Tare is Disabled

5

Press button **4** (OK) to save your choice.

Keep pressing button **4** (OK) repeatedly until you exit the menu.

4.9. Power Frequency

If your model number includes '**PFM**' and the meter is AC powered, you can display precise power frequency.

Frequency is displayed to 3 decimal places.

Range 47.000 to 63.000 Hz. 95-265V AC. The meter measures the frequency of its own power voltage, no auxiliary connection is needed.

1 ***Unlock the configuration menu***

2

Press buttons **1** and **2** together for at least 6 seconds.

The display will say: '**tYPE**'

3

Press button **2** (△) or **3** (▽) repeatedly until you see '**P.FrE**'

4

Press Button **4** (OK) to save.

4.10. Ambient Temperature Sensor

There is a temperature sensor on the rear of the meter, between the analogue input terminals and the contact closure input terminals.

It gives cold junction compensation for thermocouple measurements, but can also show the meter's ambient temperature when in another measurement mode.

This reading cannot be scaled or offset, it is a fixed internal calibration.

1 ***Unlock the configuration menu***

2 

Press buttons **3** and **4** together for 3 seconds.

The meter will show '**diSP**' Then it will show the existing display parameter.

3 

Press button **2** (△) or **3** (▽) repeatedly until you see '**CJ t**'

Press Button **4** (OK) to save.

4 

Press Button **4** (OK) repeatedly until you see the local temperature to 2 decimal places, in degrees C.

It will display the meter's rear ambient temperature in degrees C, in the format XX.XX

Available for alarm and re-transmission:

It can be compared to an alarm set point, to warn if the ambient temperature is too low or too high.

Other set points can be used for general measurement control or alarm of the meter's main measurement.

It can be re-transmitted from one of the meter's data ports or from the analogue output.

4.11. Factory Defaults

You can return the display to its factory default conditions whenever you wish. If you do so, you will permanently loose all your settings and will need to start from the beginning again.

1 ***Unlock the configuration menu***

2 

Press and hold buttons **1**, **2, 3** and **4** together for at least 3 seconds until the display shows '**dEF.n**' (Defaults no).

3 

Press button **2** (△) or **3** (▽) to change the display to '**dEF.y**' (Defaults yes) if you want to return to default conditions.

Press Button **4** (OK) to accept.

5 Adjustments

5.1. Stabilisation

This function helps you to stabilise a reading which is moving because of input signal fluctuations.

The more stabilisation you add, the slower will be the display's response, so some compromise is required between stability and speed.

1 ***Unlock the configuration menu***

2 

Press and hold buttons **2** and **3** together for at least 3 seconds until the display shows **'Lin.0' or 'Lin.1'**

3 

Press button **4** (OK) until you see **'F00.0'**

You can edit the stability function value from **'F00.0'** to **'F99.9'** seconds.

4 

Press button **1** (Digit) to select each digit and edit with button **2** (△) or **3** (▽) to change the function value.

Press button **4** (OK) when all digits are correct, keep pressing button **4** until you exit the menu.

A value of **'F05.0'**, for example, will average the reading over a 5 second period, updating every 0.1 second.

If you make a step change to the input with **'F05.0'**, the display will ramp linearly to the new value, taking 5 seconds to reach it.

Use the smallest value which provides sufficient stability.

5.2. Automatic Drift Cancelling

Drift cancelling is useful if your display reads 0 most of the time.

This is common in weighing applications, destructive test force applications etc.

Temperature changes can cause drift in the sensor and display.

While the display is near 0, we regularly check the reading. If it drifts by a small amount which you can define, in a certain time which you can define, we will reset the display to 0.

1 ***Unlock the configuration menu***

2 

Press and hold buttons **3** and **4** together for at least 3 seconds until the display shows '**dISP**'

3 

Press button **4** (OK) repeatedly until you see '**drF.0**'

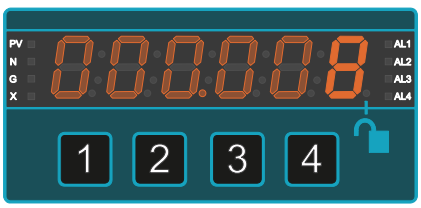
4 

Press button **2** (△) or **3** (▽) to change the display to '**drF.1**'

Press button **4** (OK) when you see '**drF.1**'

5 

To define the maximum amount of drift you will accept, edit '**drF.A**'

6 

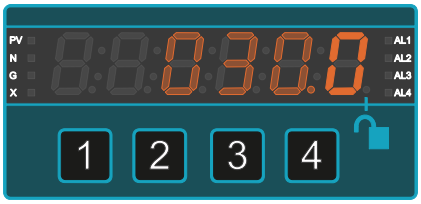
Press button **1** (Digit) to select each digit and edit with button **2** (△) or **3** (▽) to show the maximum amount of drift you will accept.

Press button **4** (OK) when all digits are correct.

7

To define how often you will check for drift, in seconds, edit '**drF.t**'

8



Press button **1** (Digit) to select each digit and edit with button **2** (△) or **3** (▽) to define how often you will check for drift, in seconds.

Press button **4** (OK) when all digits are correct, keep pressing button **4** until you exit the menu.

5.3. Linearisation

After basic direct or theoretical calibration, you can easily linearise your system if its errors are repeatable.

The lineariser is easy to use. You can switch it on or off at any time, so you can compare linearised and non-linearised responses.

It is located at the end of the display process, so you can enter readings which the un-linearised display shows, and the ideal readings you would like the display to show.

It can linearise all physical displayed values, including rate, total, temperature, load, resistance etc., but excluding time.

It makes a curve having from 3 up to 31 points.

Examples: You can use the lineariser function to:

- Improve the precision of a weighing system which has repeatable non-linearity.
- Use a liquid pressure sensor at the bottom of a curved tank to show actual liquid volume
- Convert differential pressure across an orifice plate or weir to show flow rate

You can view and edit any part of the lineariser table.

Any errors which are not repeatable are normally caused by mechanical problems such as worn or poorly lubricated pulley bearings, loose load cell mountings, moisture in connection boxes or accumulated material which is interfering with the free movement of the load cells.

Non-repeatable errors cannot be corrected with the lineariser - they must be corrected physically.

5.3.1. Preparing your Data

Before you enter any values, record what the display shows, without linearising, at several points and what you want it to show.

For example, in a weighing system, the engineer checked various readings with test weights and wrote down these results...

Step	Test Weight (kg)	Displayed Value (kg)
①	0.0	0.0
②	100.0	100.2
③	200.0	200.5
④	300.0	300.3
⑤	400.0	400.1
⑥	500.0	500.1

Adding load: Results with Lineariser off

He tested in the reverse direction also, to ensure the errors were repeatable.

Step	Test Weight (kg)	Displayed Value (kg)
⑦	500.0	500.1
⑧	400.0	400.1
⑨	300.0	300.3
⑩	200.0	200.5
⑪	100.0	100.2
⑫	0.0	0.0

Removing load: Results with Lineariser off

We can see that the errors are repeatable, they are the same when we add or remove weight, so can be improved with the lineariser.

Our Linearisation Table

	Un-linearised Value	Desired Value	
①	In.01	rd.01	0.0
②	In.02	rd.02	100.0
③	In.03	rd.03	200.0
④	In.04	rd.04	300.0
⑤	In.05	rd.05	400.0
⑥	In.06	rd.06	500.0

This table has 6 rows, so there are 6 calibration points

Important
In.02 > In.01
In.03 > In.02
In.04 > In.03 ...

5.3.2. Activate the Lineariser

1 ***Unlock the configuration menu***

2 

Press and hold buttons **2** and **3** together for at least 3 seconds until the display shows '**Lin.0**' or '**Lin.1**'

'**Lin.0**' = The lineariser is turned off
'**Lin.1**' = The lineariser is turned on

3 

Press button **2** (△) or **3** (▽) to select '**Lin.1**'

Press button **4** (OK) to proceed.

4 

The display will say '**nr.XX**'. XX is the number of linearisation points you want to use, from 2 to 31 points.

5 

Press button **2** (△) or **3** (▽) to increase or decrease the value of **XX**, until it shows your desired amount of linearisation points.

Press button **4** (OK) to proceed.

6 

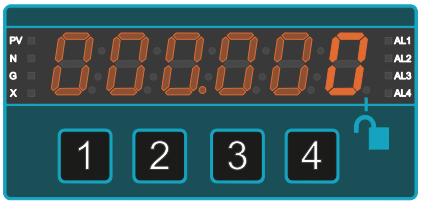
The display will now say '**In.01**',

7 

If you want to edit a point, select which point by using buttons **2** (△) or **3** (▽) to select which one point to edit.

Press button **4** (OK) to proceed.

8



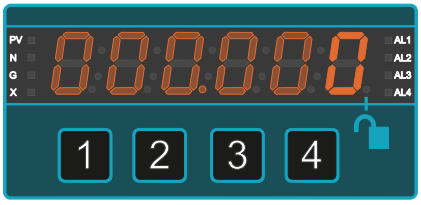
Press button **1** (Digit) to select each digit and edit with button **2** (△) or **3** (▽) to change the value.

Press button **4** (OK) to proceed.

9

The display will now briefly say '**rd.XX**' to confirm you are editing in the Reading setting.

10



Press button **1** (Digit) to select each digit and edit with button **2** (△) or **3** (▽) to change the value.

Press button **4** (OK) to proceed.

11

The display will now bring you back to the calibration point list and will show what point you just edited, by using buttons **2** (△) or **3** (▽) you can select the other points to edit

12

When you reach the beginning or end of the list, you will see **'SAVE'** To save your lineariser table, press button **4** (OK) to proceed.

5.4. Last Digit Tolerance

In some applications, you may prefer your digital display to resolve to the nearest 2, 5, 10, 20 or 50 counts.

For example, on a weigh bridge, showing 0-10000 kg, you may wish to display to the nearest 10 kg.

1 ***Unlock the configuration menu***

2 

Press and hold buttons **2** and **3** together for at least 3 seconds until the display shows '**Lin.0**' **or** '**Lin.1**'

3 

Press button **4** (OK) repeatedly until you see '**L.d. x**'

4 

Press button **2** (△) or **3** (▽) to increase or decrease the value of **x**, until it shows your preferred rounding value.

5 

To save your choice, press button **4** (OK), keep pressing button **4** until you exit the menu.

5.5. Offset Adjustment

After you have calibrated your meter, you can use the **'OF.St'** feature to make fine additions or subtractions to the reading, without affecting the calibration itself.

For example if your weighing structure is altered after calibration and you want to subtract the effect of 37kg of extra metalwork which was welded to the hopper, you can easily do this by entering a value of -37 in the offset value.

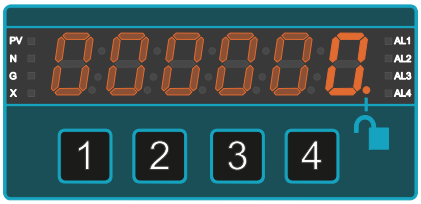
1 ***Unlock the configuration menu***

2 

Press and hold buttons **2** and **3** together for at least 3 seconds until the display shows **'Lin.0' or 'Lin.1'**

3 

Press button **4** (OK) repeatedly until you see **'OF.St'**

4 

Press button **1** (Digit) to select each digit and edit with button **2** (△) or **3** (▽) to change the offset value.

5 

To save your choice, press button **4** (OK).

5.6. Scale Factor Adjustment

After you have calibrated your meter, you can use the '**SCAL**' feature to make fine adjustments to calibration, without affecting the calibration itself, or you can convert to different units of measure.

Examples:

A. Changing weight units of measure from kg to pounds
You can use the '**SCAL**' feature to convert your readout from kg to pounds, without affecting the calibration. Simply set '**SCAL**' = 2.205 and your meter which was calibrated in kg will now read in pounds. (To convert from Pounds to kg, set scale = 0.454)

B. Changing from Degrees C to Degrees F
0 Degrees C is +32 degrees F (A 32 degree F offset)
A change of 1 degrees C is equivalent to a change of 1.8 Degrees F (A scale factor of 1.8)
So, we set '**SCAL**' = 1.8 and offset = 32 See next page for offset setting.

C. Changing from Degrees F to Degrees C
0 Degrees F is -17.8 degrees C (A -17.8 degree C offset)
A change of 1 degrees F is equivalent to a change of 0.555 Degrees C (A scale factor of 0.555) So, we set '**SCAL**' = 0.555 and offset = -17.8 See next page for offset setting.

1 ***Unlock the configuration menu***

2

Press and hold buttons **2** and **3** together for at least 3 seconds until the display shows '**Lin.0**' **or** '**Lin.1**'

3

Press button **4** (OK) repeatedly until you see '**SCAL**'

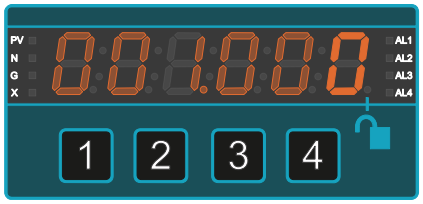
4

Press button **2** (△) or **3** (▽) to choose Multiply or Divide.

5

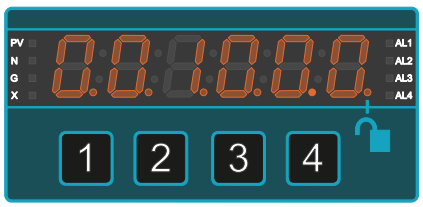
To save your choice, press button **4** (OK)

6



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to increase or decrease the scale value.

7



To set decimal point position, press button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press Button **4** (OK) to save.

8

You can continue to edit the numeric value.

To save your choice, press button **4** (OK), keep pressing button **4** until you exit the menu.

6 Signals

6.1. How to Choose Your Input Type

1

Unlock the configuration menu

2

Press buttons **1** (Digit) and **2** (△) together for at least 6 seconds. (ignore '**c.src**')

The display will say: '**tYPE**'

Press button **2** (△) or **3** (▽) repeatedly until you see input function you require:

Load Cell

4-20mA

0-10V

Shunt

Elapsed Timer

Power Frequency

Rate

Total

Thermocouples

Resistance

Potentionmeter

rtd.A/b

Clock

3

Press Button **4** (OK) to save your choice.

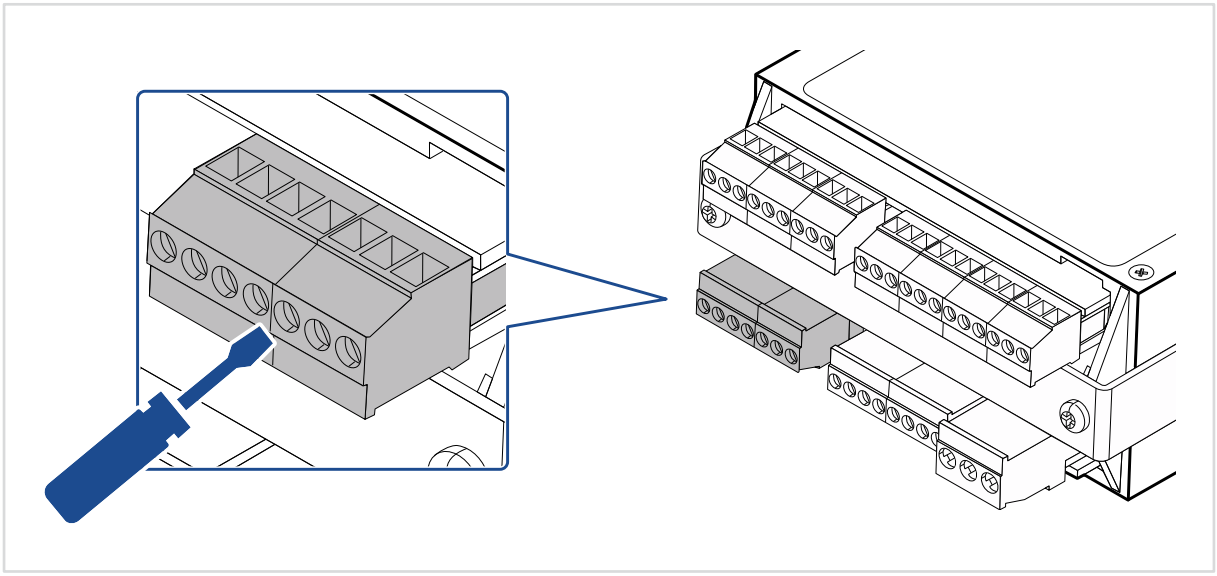
6.2. 0-10V Input Mode

Caution
Ensure that the power supply is turned off before connecting it to the equipment.

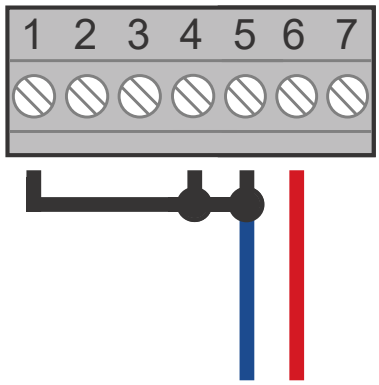
Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.

Suitable for connecting an active DC Voltage signal from a PLC or other processor or sensor.

6.2.1. Connections



Signal Input



Pin	Description
1	- V DC (must be linked to terminals 4 and 5)
2	
3	
4	- V DC (must be linked to terminals 1 and 5)
5	- V DC (must be linked to terminals 1 and 4)
6	+ V DC
7	

6.2.2. How to calibrate your meter

There are 2 calibration methods available:

Direct Calibration Method

Direct calibration is more accurate, because it calibrates the whole system, including the sensor.

1

Unlock the configuration menu

2

Connect your sensor to the meter and to your process.

You must be able to adjust the process to two precisely known values, ideally at 0% and 100% of your measurement range, but you can use any 2 well separated points.

You will adjust the meter to read those two calibration values.

3

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

4

Press button **2** or **3** until you see: '**dir**' then press button **4** (OK).

Example Calibration:

Calibrate the meter with an input signal range of 1.000 V to 9.000 V, to display 0.0 to 60.0

High Calibration Point:
In.Hi = 9.000 V
rd.Hi = 60.0

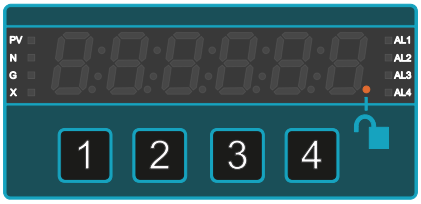
Low Calibration Point:
InLo = 1.000 V
rd.Lo = 0.0

We will also check the middle of the range at 5V input, to verify that the display shows 30.0

Method…

High Calibration Point

1



Press button **2** (Cal Hi) for 3 seconds.

2

The display will say '**dir**' to confirm you are in Direct calibration mode, and will then say '**InHi**'.

3

Apply the high level calibration signal 9.000V in the example, and press button **4** (OK).

4

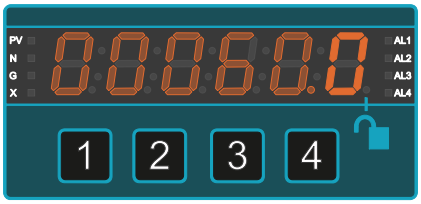
The display will now briefly say '**rdHi**' to confirm you are in the high reading setting.

5

To set decimal point position, press and hold button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press button **4** (OK) to save.

6

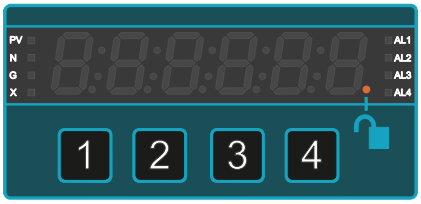


Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show 60.0 or your desired high reading.

Press button **4** (OK) when all digits are correct.

Low Calibration Point

7



Press button **1** (Cal Lo) for 3 seconds.

8

The display will say '**dir**' to confirm you are in direct calibration mode, and will then say '**InLo**'.

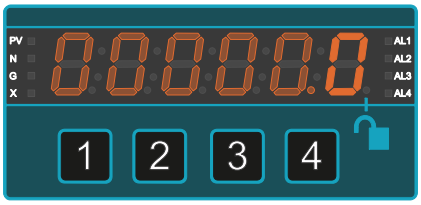
9

Apply the low level calibration signal 1.000V in the example, and press button **4** (OK).

10

The display will now briefly say '**rdLo**' to confirm you are in the low reading setting.

11



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show 0.0 or your desired low reading.

Press button **4** (OK) when all digits are correct.

12

Apply 50% of input range, so 5.000V in the example and ensure the display reads 50% of display range, being 30.0 in the example.

The meter will lock itself automatically within 5 minutes, or immediately, if you switch the meter off then on again.

Theoretical Calibration Method

Theoretical calibration allows you to define two input and corresponding display values, without needing to connect a sensor to the display.

It is not as accurate as direct calibration, because we do not include the sensor in the calibration, but it is useful as an approximate calibration method.

1

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

2

Press button **2** or **3** until you see: '**thEo**' then press button **4** (OK).

Example Calibration:

Calibrate the meter with a theoretical input signal range of 2.000 V to 8.750 V, to display 0.0 to 75.0

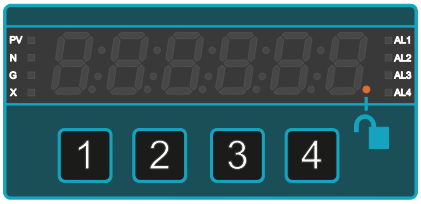
High Calibration Point:
InHi = 8.750 V
rdHi = 75.0

Low Calibration Point:
InLo = 2.000 V
rdLo = 0.0

Method…

High Calibration Point

1



Press button **2** (Cal Hi) for 3 seconds.

2

The display will say '**thEo**' to confirm you are in theoretical calibration mode, and will then say '**InHi**'.

3

It will then show the existing '**InHi**' value, which you can edit, as follows.

4

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show 8.750 or your desired high reading.

Press button **4** (OK) when all digits are correct.

5

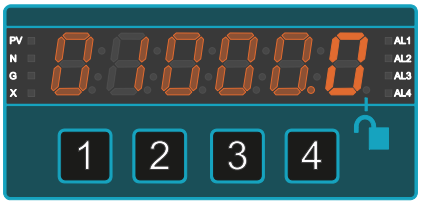
'**rdHi**' will appear, then the existing '**rdHi**' value, which you can edit, as follows.

6

To set decimal point position, press button **2** (Cal Hi) for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press button **4** (OK) to save.

7



Press button **1** (Digit) repeatedly, to highlight individual digits.

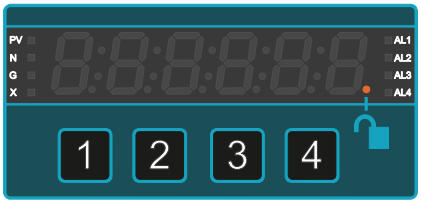
8

Press buttons **2** (△) or **3** (▽) to set 75.0 or your desired '**rdHi**' reading.

Press button **4** (OK) when all digits are correct.

Low Calibration Point

9

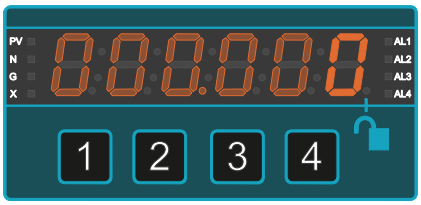


Press button **1** (Cal Lo) for 3 seconds.

10

The display will say '**thEo**' to confirm you are in theoretical calibration mode, and will then say '**InLo**'.

11



It will then show the existing '**InLo**' value, which you can edit, as follows.

4

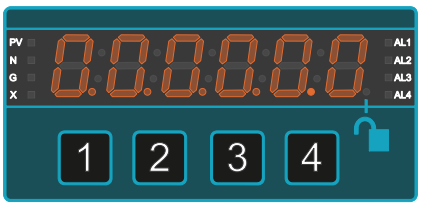
Press button **1** (Digit) to select each digit and edit with button **2** (△) or **3** (▽) to show 2.000 or your desired low value.

Press button **4** (OK) when all digits are correct.

5

'**rdLo**' will appear, then the existing '**rdLo**' value, which you can edit, as follows.

6



To set decimal point position, press button **2** (Cal Hi) for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press Button **4** (OK) to save.

7

Press button **1** (Digit) repeatedly, to highlight individual digits.

8

Press buttons **2** (△) or **3** (▽) buttons to set 0.0 or your desired '**rdLo**' reading.

Press button **4** (OK) when all digits are correct.

The meter will lock itself automatically within 5 minutes, or immediately, if you switch the meter off then on again.

6.3. 4-20mA Input Mode

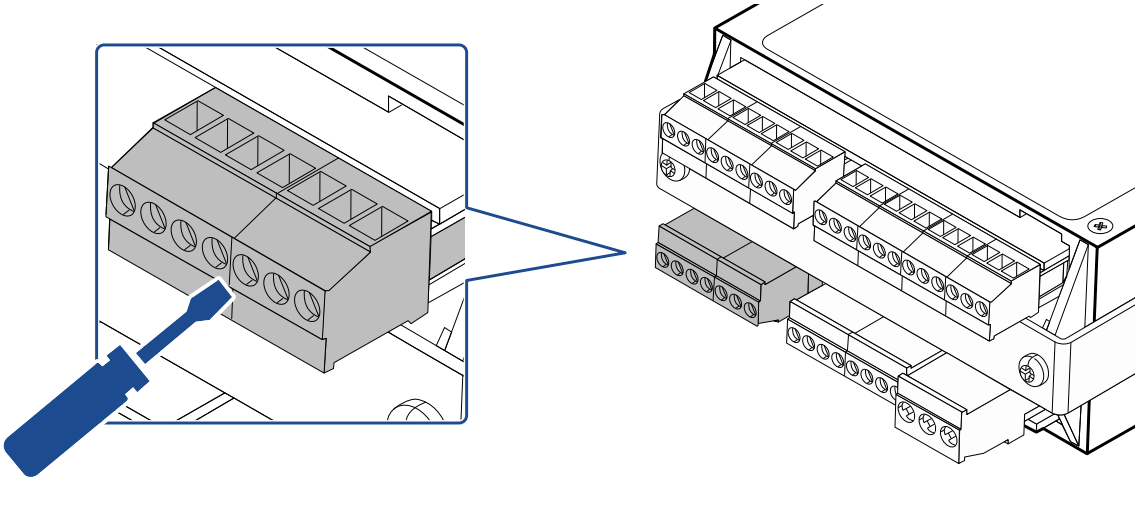
Caution
Ensure that the power supply is turned off before connecting it to the equipment.

Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.

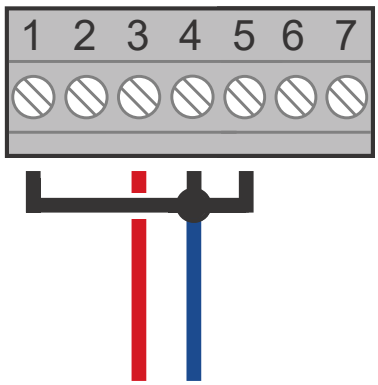
Loop excitation is available, if you need it. The excitation is current limited to 30mA.

It is easy to calibrate and has many useful features.

6.3.1. Connections



Active 4-20mA Signal Input



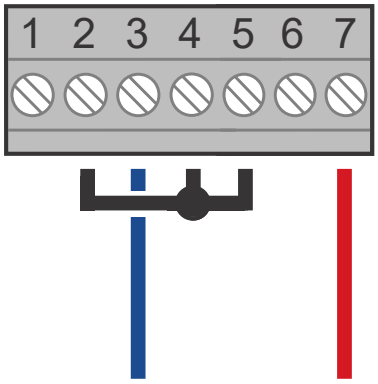
Pin	Description
1	- mA (must be linked to terminals 4 and 5)
2	
3	+ mA
4	- mA (must be linked to terminals 1 and 5)
5	- mA (must be linked to terminals 1 and 4)
6	
7	

Suitable if the signal is coming from an active device sending 4-20mA out.
The meter can accept an input range of -40 to +40 mA DC in this mode.

It will tolerate up to 30V DC across the current input terminals without damage.

The input is electrically isolated from power and output ports.

Passive 4-20mA Signal Input



Pin	Description
1	
2	(must be linked to terminals 4 and 5)
3	- mA
4	(must be linked to terminals 2 and 5)
5	(must be linked to terminals 2 and 4)
6	
7	+ mA

Connecting and powering a 2 wire pressure, temperature or humidity transmitters, for example.
The meter gives 24V DC excitation for the transmitter.

6.3.2. How to calibrate your meter

There are 2 calibration methods available:

Direct Calibration Method

Direct calibration is more accurate, because it calibrates the whole system, including the sensor.

1 ***Unlock the configuration menu***

2 Connect your sensor to the meter and to your process.

You must be able to adjust the process to two precisely known values, ideally at 0% and 100% of your measurement range, but you can use any 2 well separated points.

You will adjust the meter to read those two calibration values.

3 

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

4 

Press button **2** or **3** until you see '**dir**' then press button **4** (OK).

Example Calibration:

Calibrate the meter with an input signal range of 4.000mA to 20.000mA, to display 0.0 to 60.0

High Calibration Point:
In.Hi = 20.000mA
rd.Hi = 60.0

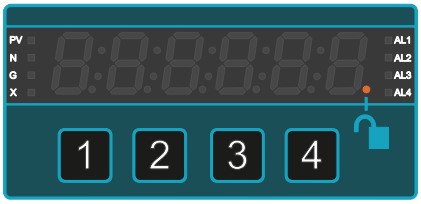
Low Calibration Point:
InLo = 4.000mA
rd.Lo = 0.0

We will also check the middle of the range at 12mA input, to verify that the display shows 30.0

Method…

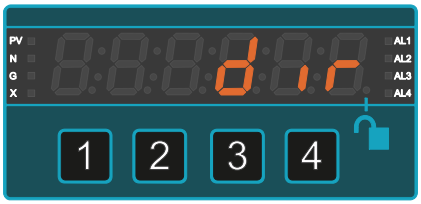
High Calibration Point

1



Press button **2** (Cal Hi) for 3 seconds.

2



The display will say '**dir**' to confirm you are in direct calibration mode, and will then say '**InHi**'.

3

Apply the high level calibration signal 20.000mA in the example, and press button **4** (OK).

4

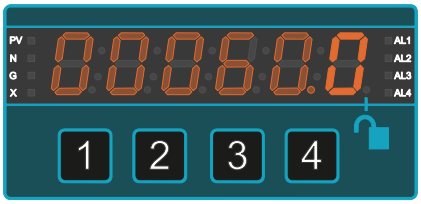
The display will now briefly say '**rdHi**' to confirm you are in the high reading setting.

5

To set decimal point position, press button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press Button **4** (OK) to save.

6

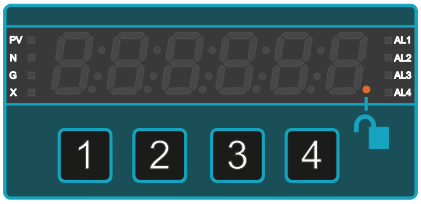


Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show 60.0 or your desired high reading.

Press button **4** (OK) when all digits are correct.

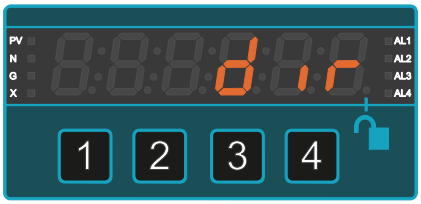
Low Calibration Point

7



Press button **1** (Cal Lo) for 3 seconds.

8



The display will say '**dir**' to confirm you are in direct calibration made, and will then say '**InLo**'.

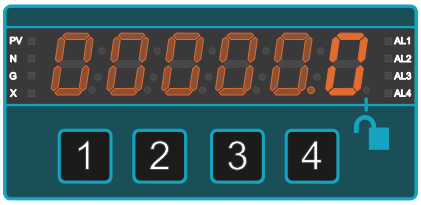
9

Apply the low level calibration signal 4.000mA in the example, and press button **4** (OK).

10

The display will now briefly say '**rdLo**' to confirm you are in the low reading setting.

11



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show 0.0 or your desired low reading.

Press button **4** (OK) when all digits are correct.

12

Apply 50% of input range, so 12.000mA in the example and ensure the display reads 50% of display range, being 30.0 in the example.

The meter will lock itself automatically within 5 minutes, or immediately, if you switch the meter off then on again.

Theoretical Calibration Method

Theoretical calibration allows you to define two input and corresponding display values, without needing to connect a sensor to the display.

It is not as accurate as direct calibration, because we do not include the sensor in the calibration, but it is useful as an approximate calibration method.

1

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

2

Press button **2** or **3** until you see: '**thEo**' then press button **4** (OK).

Example Calibration:

Calibrate the meter with a theoretical input signal range of 4.000mA to 20.000mA, to display 0.0 to 75.0

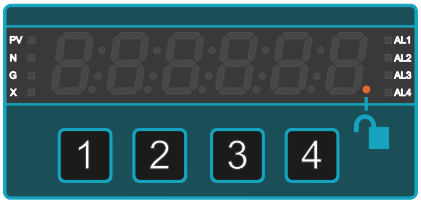
High Calibration Point:
InHi = 20.000mA
rdHi = 75.0

Low Calibration Point:
InLo = 4.000mA
rdLo = 0.0

Method…

High Calibration Point

1



Press button **2** (Cal Hi) for 3 seconds.

2

The display will say '**thEo**' to confirm you are in theoretical calibration mode, and will then say '**InHi**'.

3

It will then show the existing '**InHi**' value, which you can edit, as follows.

4

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show 20.000 or your desired high reading.

Press button **4** (OK) when all digits are correct.

5

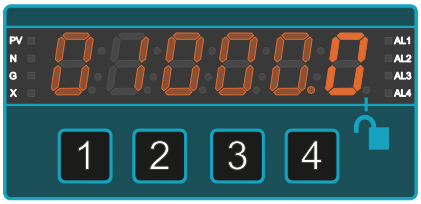
'rdHi' will appear, then the existing '**rdHi'** value, which you can edit, as follows.

6

To set decimal point position, press button **2** (Cal Hi) for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press button **4** (OK) to save.

7



Press button **1** (Digit) repeatedly, to highlight individual digits.

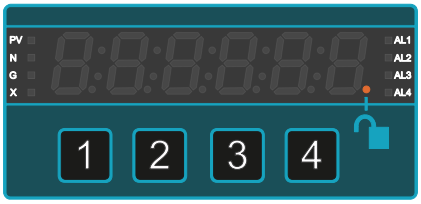
8

Press buttons **2** (△) or **3** (▽) buttons to set 75.0 or your desired '**rdHi**' reading.

Press button **4** (OK) when all digits are correct.

Low Calibration Point

1

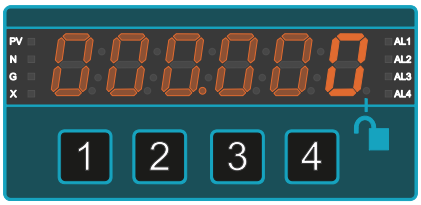


Press button **1** (Cal Lo) for 3 seconds.

2

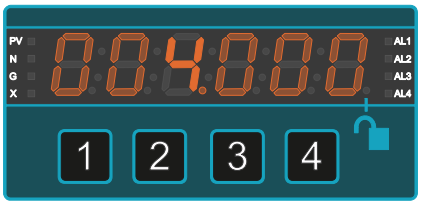
The display will say '**thEo**' to confirm you are in theoretical calibration mode, and will then say '**InLo**'.

3



It will then show the existing '**InLo**' value, which you can edit, as follows.

4



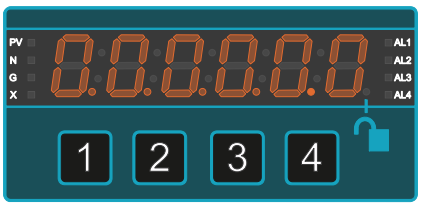
Press button **1** (Digit) to select each digit and edit with button **2** (△) or **3** (▽) to show 4.000 or your desired low value.

Press button **4** (OK) when all digits are correct.

5

'**rdLo**' will appear, then the existing '**rdLo**' value, which you can edit, as follows.

6



To set decimal point position, press button **2** (Cal Hi) for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press button **4** (OK) to save.

7

Press button **1** (Digit) repeatedly, to highlight individual digits.

8

Press buttons **2** (△) or **3** (▽) to set 0.0 or your desired '**rdLo**' reading.

Press button **4** (OK) when all digits are correct.

The meter will lock itself automatically within 5 minutes, or immediately, if you switch the meter off then on again.

6.4. DC Shunt Input Mode

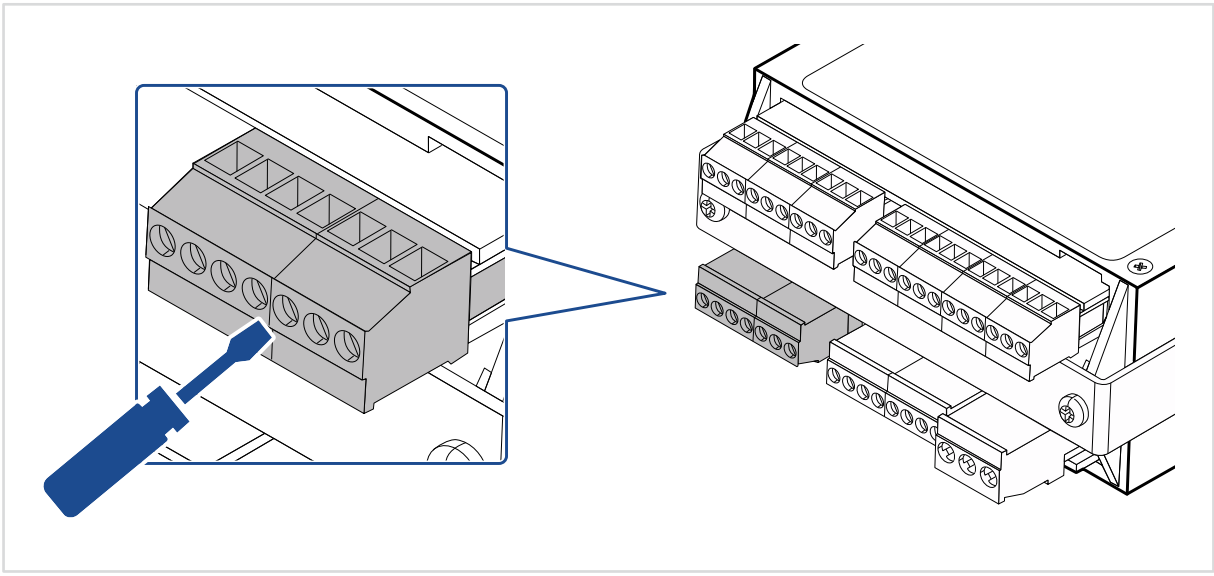
Caution
Ensure that the power supply is turned off before connecting it to the equipment.

Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.

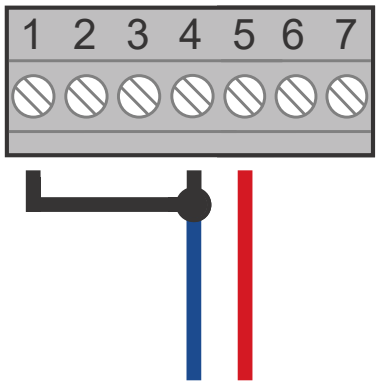
DC Shunt input mode is ideal for all DC current measurements.

It accepts shunts of all current ratings, with mV outputs from 5mV full scale to 100mV full scale.

6.4.1. Connections



Signal Input



Pin	Description
1	- V (must be linked to terminals 4)
2	
3	
4	- V (must be linked to terminals 1)
5	+ 50, 60, 75, 100mV
6	
7	

6.4.2. How to Calibrate Your Meter

There are 2 calibration methods available:

Direct Calibration Method

Direct calibration is more accurate, because it calibrates the whole system, including the shunt.

1 ***Unlock the configuration menu***

2 Connect your shunt to the meter and to your process.

You must be able to adjust the process to two precisely known current values, ideally at 0% and 100% of your measurement range, but you can use any 2 well separated points.

You will adjust the meter to read those two calibration values.

3 

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

4 

Press button **2** or **3** until you see: '**dir**' then press button **4** (OK).

Example Calibration:

Calibrate the meter with an input signal range of 0A to 250A, to the shunt, to display 0.0 to 250.0

High Calibration Point:
In.Hi = 250 A
rd.Hi = 250.0

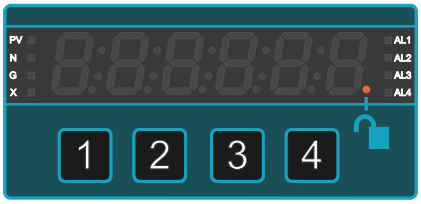
Low Calibration Point:
InLo = 0 A
rd.Lo = 0.0

We will also check the middle of the range at 125 A input, to verify that the display shows 125.0

Method…

High Calibration Point

1



Press button **2** (Cal Hi) for 3 seconds.

2

The display will say '**dir**' to confirm you are in direct calibration mode, and will then say '**InHi**'.

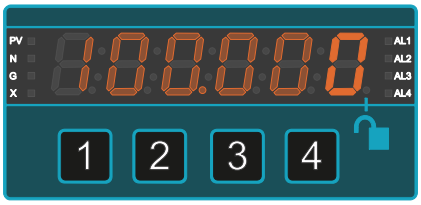
3

Apply the high level calibration signal 250A in the example, and press button **4** (OK).

4

The display will now briefly say '**rd.Hi**' to confirm you are in the high reading setting.

5



To set decimal point position, press button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2** (△) or **3** (▽) .

Press button **4** (OK) to save.

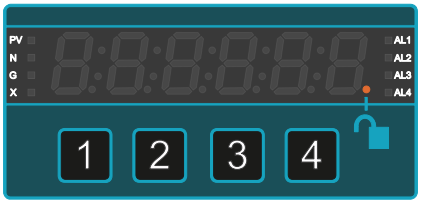
6

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show 250.0 or your desired high reading.

Press button **4** (OK) when all digits are correct.

Low Calibration Point

7



Press button **1** (Cal Lo) for 3 seconds.

8

The display will say '**dir**' to confirm you are in direct calibration made, and will then say '**InLo**'.

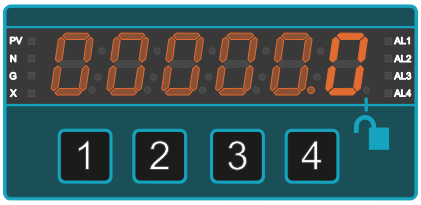
9

Apply the low level calibration signal 0A in the example, and press button **4** (OK).

10

The display will now briefly say '**rdLo**' to confirm you are in the low reading setting.

11



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) buttons to show 0.0 or your desired low reading.

Press button **4** (OK) when all digits are correct.

12

Apply 50% of input range, so 125 A in the example and ensure the display reads 50% of display range, being 125.0 in the example.

The meter will lock itself automatically within 5 minutes, or immediately, if you switch the meter off then on again.

Theoretical Calibration Method

Theoretical calibration allows you to define two input and corresponding display values, without needing to connect a shunt to the display.

It is not as accurate as direct calibration, because we do not include the shunt in the calibration, but it is useful as an approximate calibration method.

1 ***Unlock the configuration menu***

2 

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source).

3 

Press button **2** or **3** until you see: '**thEo**' then press button **4** (OK).

Example Calibration:

Calibrate the meter with a theoretical input signal range of 400 A shunt, giving 0 - 60mV

Calibrate the meter with a theoretical input signal range of 0.000 mV to 60.000 mV, to display 0.0 to 400.0 A

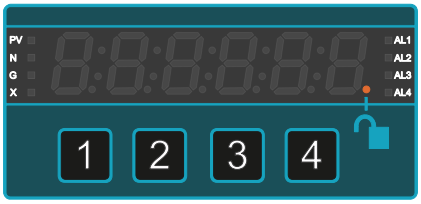
High Calibration Point:
InHi = 60.000 mV
rdHi = 400.0

Low Calibration Point:
InLo = 0.000 mV
rdLo = 0.0

Method…

High Calibration Point

1



Press button **2** (Cal Hi) for 3 seconds.

2

The display will say '**thEo**' to confirm you are in theoretical calibration mode, and will then say '**InHi**'.

3

It will then show the existing '**InHi**' value, which you can edit, as follows.

4

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show 60.000 or your desired high reading.

Press button **4** (OK) when all digits are correct.

5

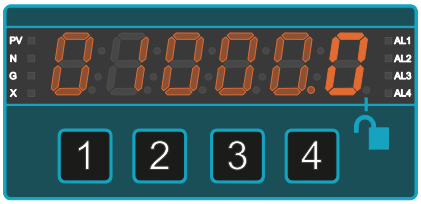
'**rdHi**' will appear, then the existing '**rdHi**' value, which you can edit, as follows.

6

To set decimal point position, press button **2** (Cal Hi) for 3 seconds and move the decimal point to the desired position with buttons **2** (△) or **3** (▽) .

Press button **4** (OK) to save.

7



Press button **1** (Digit) repeatedly, to highlight individual digits.

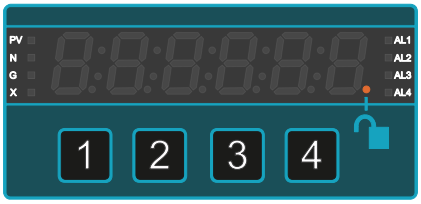
8

Press buttons **2** (△) or **3** (▽) to set 400.0 or your desired '**rdHi**' reading.

Press button **4** (OK) when all digits are correct.

Low Calibration Point

9

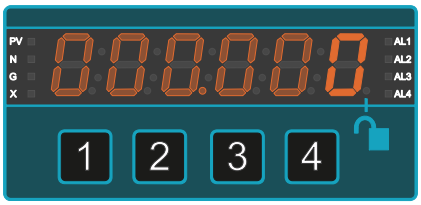


Press button **1** (Cal Lo) for 3 seconds.

10

The display will say '**thEo**' to confirm you are in theoretical calibration mode, and will then say '**InLo**'.

11



It will then show the existing '**InLo**' value, which you can edit, as follows.

4

Press button **1** (Digit) to select each digit and edit with button **2** (△) or **3** (▽) to show 0.000 or your desired low value.

Press button **4** (OK) when all digits are correct.

5

'**rdLo**' will appear, then the existing '**rdLo**' value, which you can edit, as follows.

6

To set decimal point position, press button **2** (Cal Hi) for 3 seconds and move the decimal point to the desired position with buttons **2** (△) or **3** (▽) .

Press button **4** (OK) to save.

7

Press button **1** (Digit) repeatedly, to highlight individual digits.

8

Press buttons **2** (△) or **3** (▽) to set **0.0** or your desired '**rdLo**' reading.

Press button **4** (OK) when all digits are correct.

The meter will lock itself automatically within 5 minutes, or immediately, if you switch the meter off then on again.

6.5. Load / Weight Input Mode

Caution
Ensure that the power supply is turned off before connecting it to the equipment.

Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.

Load Cell mode is ideal for all weighing, torque, strain and force measurements.

You only need a 4-wire connection for high performance cable resistance compensation, thanks to our new patented signal processor.

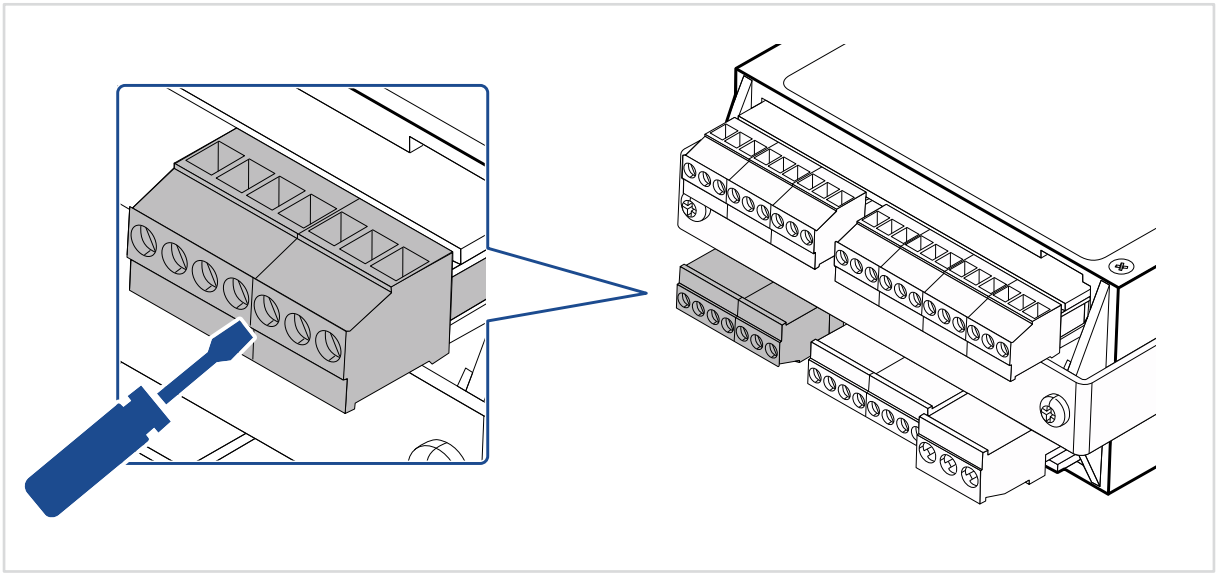
You can connect up to 4 x 350 Ohm or 8 x 700 Ohm load cells in parallel.

The meter constantly checks your system resistance to give you early warning of any unexpected changes caused by moisture in junction boxes, corroded connections etc.

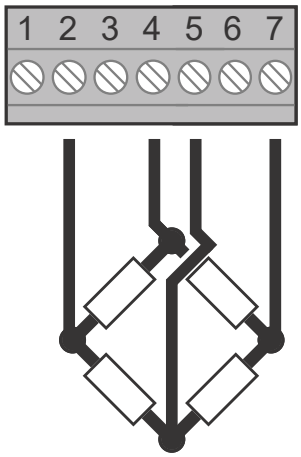
If your cells are in a hazardous area, you only need to use 4 x zener barriers with this meter, where most other meters would need 6 barriers.

This meter will automatically compensate for changes in cable resistance with a 4 wire connection. Most other meters need a 6 wire connection. You can also use it with passive zener barriers, in a 4 wire system.

6.5.1. Connections



Signal Input



Pin	Description
1	
2	- Excitation
3	
4	- Signal
5	+ Signal
6	
7	+ Excitation

You can connect up to 4 x 350 Ohm or 8 x 700 Ohm load cells in parallel.

6.5.2. How to Calibrate Your Meter

How to Choose a Calibration Method

Direct calibration is recommended, because it calibrates the whole system including the display and the load cells and any leverage effects. You will put a known calibration weight on the platform and adjust the meter to read that weight exactly.

Theoretical calibration is only recommended if you cannot apply a test weight to your system. You will enter details from the load cell calibration certificate.

1

Unlock the configuration menu

2

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

3

It will then show either ...

Direct '**dir**' or Theoretical '**thEo**'

4

Press button **2** or **3** until you see the calibration option you want.

Then press button **4** (OK), to save your choice.

Direct Calibration (Recommended)

Choose direct calibration if you will put known calibration weights on the system to calibrate the display. We recommend this calibration mode, because it allows you to calibrate your whole weighing system in one procedure.

Low Calibration Point

1 Press button **1** (Cal Lo) for 3 seconds.

2 

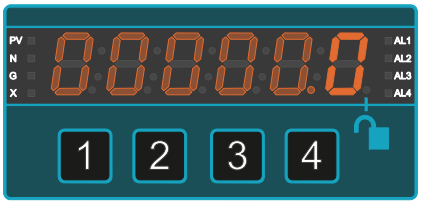
The display will say '**dir**' to confirm you are in direct calibration made, and will then say '**InLo**'.

3 

Apply the lowest load value, usually 0kg, to your load cell, and press button **4** (OK).

4 

The display will now briefly say '**rdLo**' to confirm you are in the low reading setting.

5 

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) buttons to show your desired low reading.

Press button **4** (OK) when all digits are correct.

High Calibration Point

6 Press button **2** (Cal Hi) for 3 seconds.

7 

The display will say '**dir**' to confirm you are in direct calibration mode, and will then say '**InHi**'.

8 

Apply the highest load value, ideally 100% of full load, and press button **4** (OK).

You can calibrate with less load, but with proportionally less accuracy.

9 

The display will now briefly say '**rd.Hi**' to confirm you are in the high reading setting.

10 

To set decimal point position, press button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press button **4** (OK) to save.

11 

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired high reading.

Press button **4** (OK) when all digits are correct.

That completes the direct calibration.

We suggest that you check 0% load and some intermediate loads, to ensure your system is working as you wish.

Theoretical Calibration

To use theoretical calibration you will need to enter details from the load cell calibration certificate into the meter.

The values you will need are:

- Capacity
- Sensitivity
- Resistance
- Number of load cells connected in parallel

You do not need to connect the load cell to the meter for this calibration method.

This method is less accurate than the direct calibration method, because it does not include all the components of the weighing system.

1 ***Unlock the configuration menu***

2 

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

3 

It will then show either ...

Direct '**dir**' or theoretical '**thEo**'

4 

Press button **2** or **3** until you see '**thEo**'

Then press button **4** (OK), to save your choice.

6.6. Potentiometer Input Mode

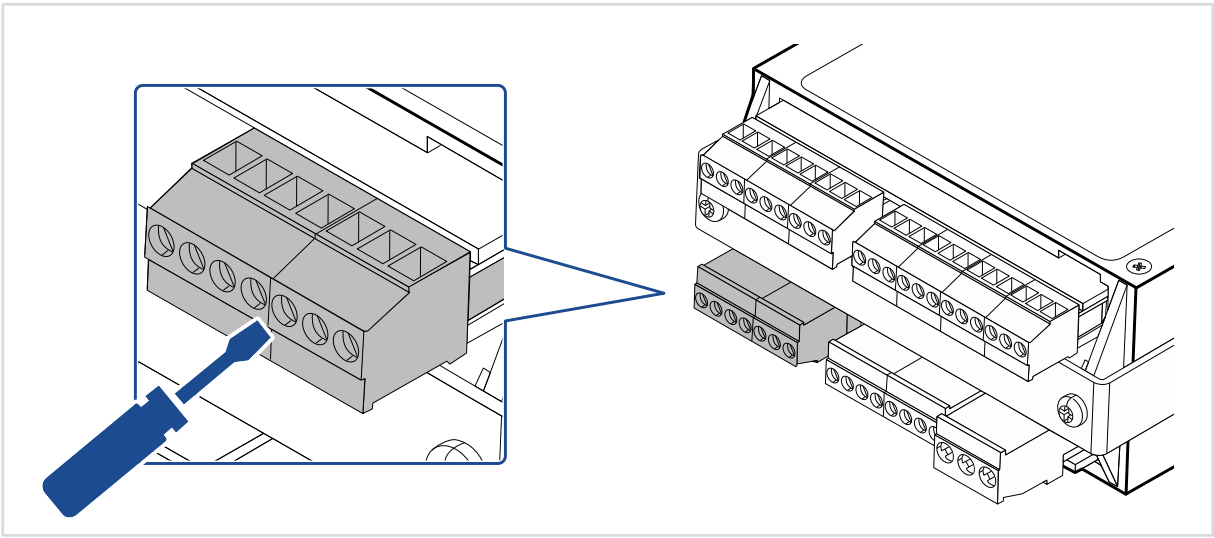
Caution
Ensure that the power supply is turned off before connecting it to the equipment.

Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.

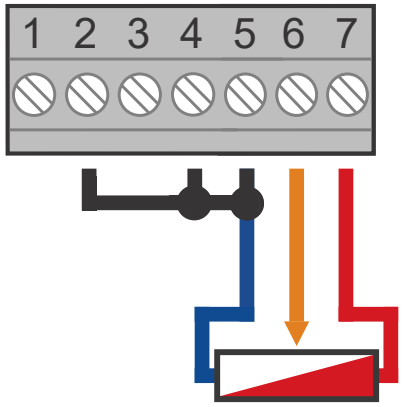
Potentiometer mode is ideal for all position, displacement and angle applications using a resistive 3 wire potentiometer as the sensor.

You can use 4 wire connection to reduce the effect of cable resistance, It checks your system resistance to give you early warning of any unexpected changes caused by moisture in junction boxes, corroded connections etc.

6.6.1. Connections

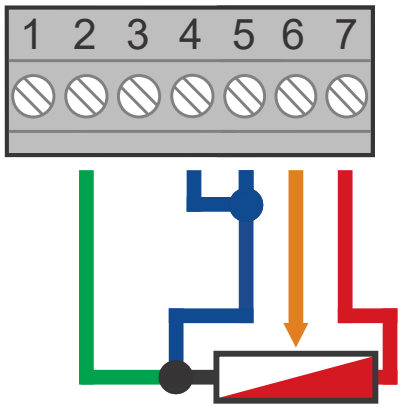


Signal Input: 3 Wire



Pin	Description
1	
2	
3	
4	
5	
6	
7	

Signal Input: 4 Wire



Pin	Description
1	
2	
3	
4	
5	
6	
7	

6.7. RTD / PT100 Input Mode

Caution
Ensure that the power supply is turned off before connecting it to the equipment.

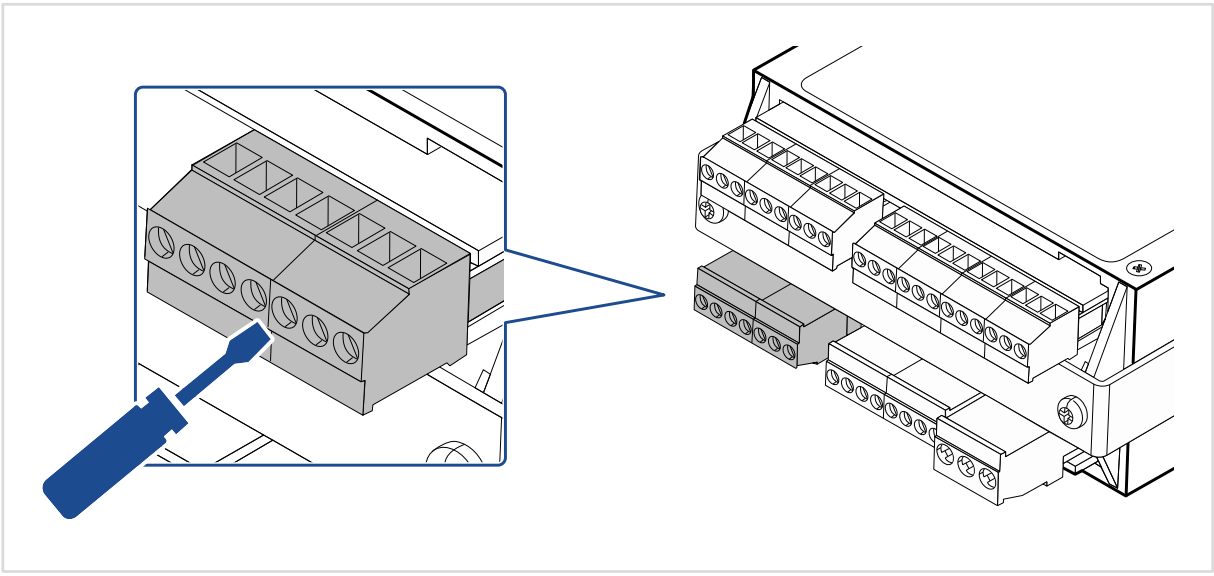
Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.

Accepts 2,3 or 4 wire RTD of PT100 specification.

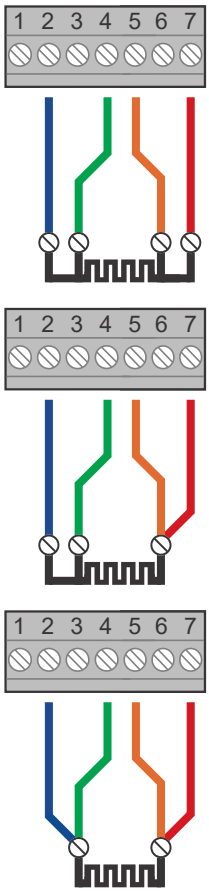
Can display **Centigrade**, **Fahrenheit**, **Kelvin** and **Rankine** and has **0.1** degree or **1** degree selectable resolution.

It constantly checks your system resistance to give you early warning of any unexpected changes caused by moisture in junction boxes, corroded connections etc.

6.7.1. Connections



Signal Input: 2,3 and 4 Wire



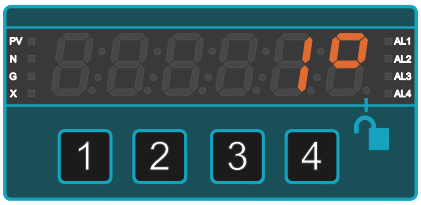
Pin	Description
1	
2	Blue
3	
4	Green
5	Yellow
6	
7	Red

6.7.2. How to calibrate your meter

1 ***Unlock the configuration menu***

2 

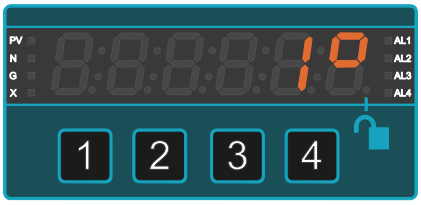
Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

3 

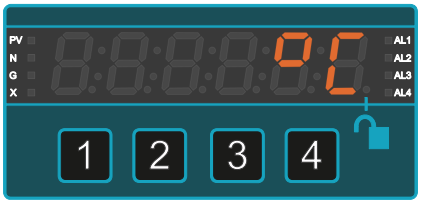
It will then ask you to set the resolution… '**1°**' deg resolution or '**0.1°**' deg resolution

4 

Press button **2** (△) or **3** (▽) until you see the resolution you want...

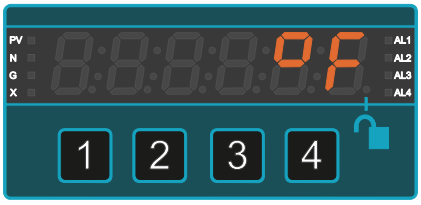
5 

Then press button **4** (OK), to save your choice.

6 

It will then show the existing temperature unit.

Press button **2** (△) or **3** (▽) until you see the temperature unit you want...

7 

Then press button **4** (OK), to save your choice.

6.8. Rate/RPM Input Mode

Caution
Ensure that the power supply is turned off before connecting it to the equipment.

Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.

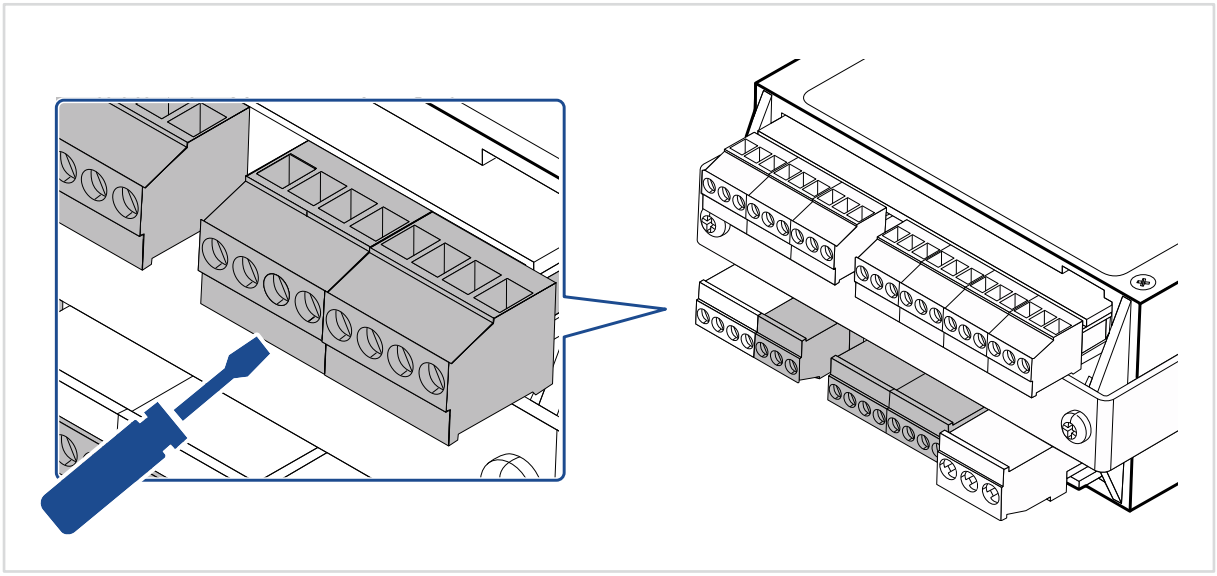
This accurate rate measurement system works well in RPM and production line applications, measuring rate over short or long periods.

You can average the rate over a chosen time period, from as little as 1 second up to 24 hours.

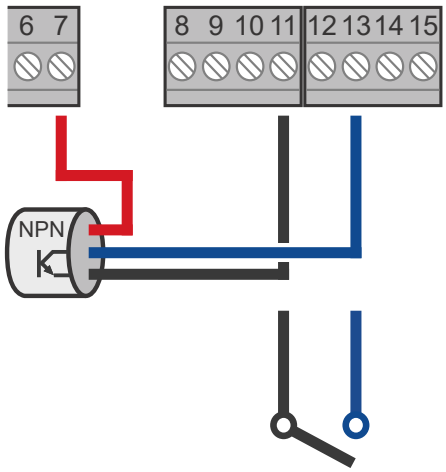
It also works well in flow rate measurement and machine speed applications.

The maximum pulse rate the meter can accept in this mode is 400 per second. It is intended for production line rate measurements.

6.8.1. Connections



Signal Input



Pin	Description
7	+24V
8	
9	
10	
11	0V
12	
13	Pulse
14	
15	

Signal Types

NPN Transistors

Switching 5V DC at 1mA
Must saturate to lower than 1V Vce

Normally Open / Closed Contacts

Switching 5V DC at 1mA
We recommend you use wiping contacts, to mechanically clear any oxidation or tarnishing of the contact surfaces.

6.8.2. Bin Concept

Our rate measuring system uses the concept of 'bins', which is very user-friendly and flexible.

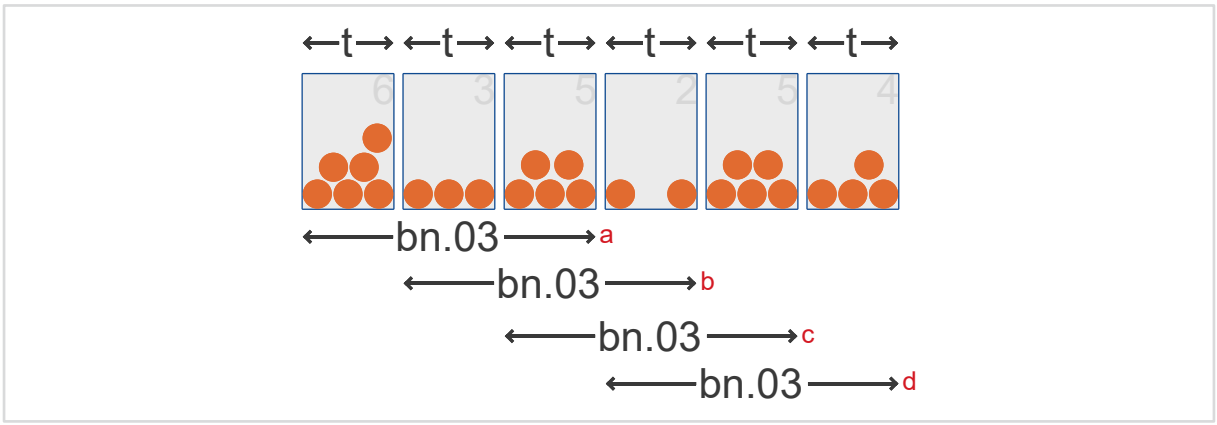
A bin can be filled with the number of counted pulses it receives. You can set the time during which a bin is open. This is shown as '**t**' in the diagram.

You can also specify a number of bins to use in your rate measurement, from 1 to 99. In the diagram we have chosen 3 bins, set by the '**bn.03**' parameter.

In this case, we update the display with the number of counts received in the last 3 bins.

If we set '**t**' to be 20 seconds, we will show the rate in items per minute, updated every 20 seconds...

So at point a, the display will show 14 (6 + 3 + 5)
So at point b, the display will show 10 (3 + 5 + 2)
So at point c, the display will show 12 (5 + 2 + 5)
So at point d, the display will show 11 (2 + 5 + 4)



6.8.3. How to Calibrate Your Meter

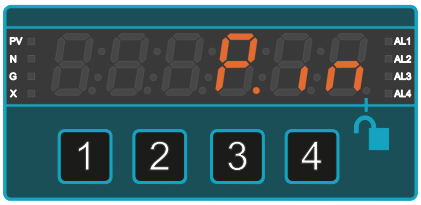
1

Unlock the configuration menu

2

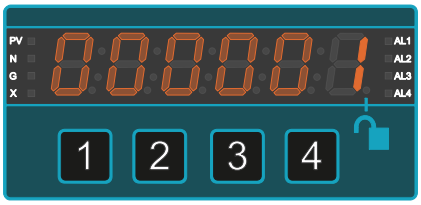
Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

3



The display will now briefly say '**P.in**' prompting you to enter a maximum frequency in hertz, which will correspond to a desired display value.

4



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired frequency.

5

To set decimal point position, press button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press button **4** (OK) to save.

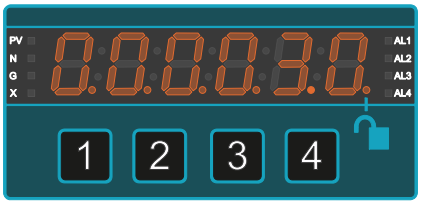
6

The display will now briefly say '**diSP**' prompting you to enter what 1 pulse represents as a quantity.

7

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired frequency.

8



To set decimal point position, press button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽).

Press button **4** (OK) to save.

9

'bn.00' will appear, prompting you to enter how many bins do you want to average.

10

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired bins.

Press button **4** (OK) to save.

11

'T.001' will appear, prompting you to enter how long is each bin open for in seconds.

12

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your time.

Press button **4** (OK) to save.

13

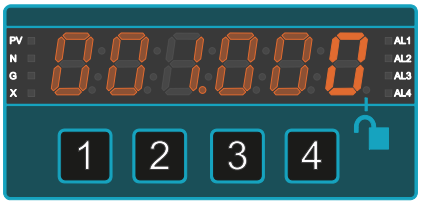
'ScAL' will appear briefly, prompting you to choose between multiplying or dividing.

14

Use buttons **2** (△) or **3** (▽) to choose either **'nuLT'** or **'dIV'.**

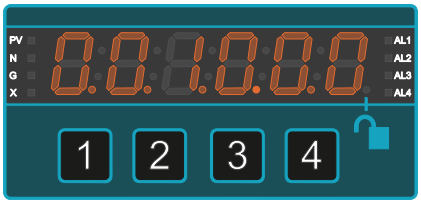
Press button **4** (OK) to save.

15



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽).

16



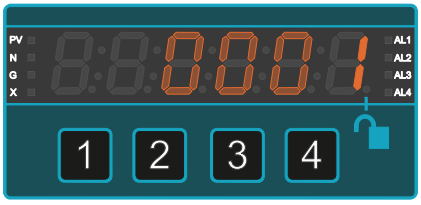
To set decimal point position, press button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press button **4** (OK) to save.

17

'dbnc' will appear, prompting you to enter the debounce setting you require.

18



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your time.

Press button **4** (OK) to save.

6.9. Total Input Mode

Caution
Ensure that the power supply is turned off before connecting it to the equipment.

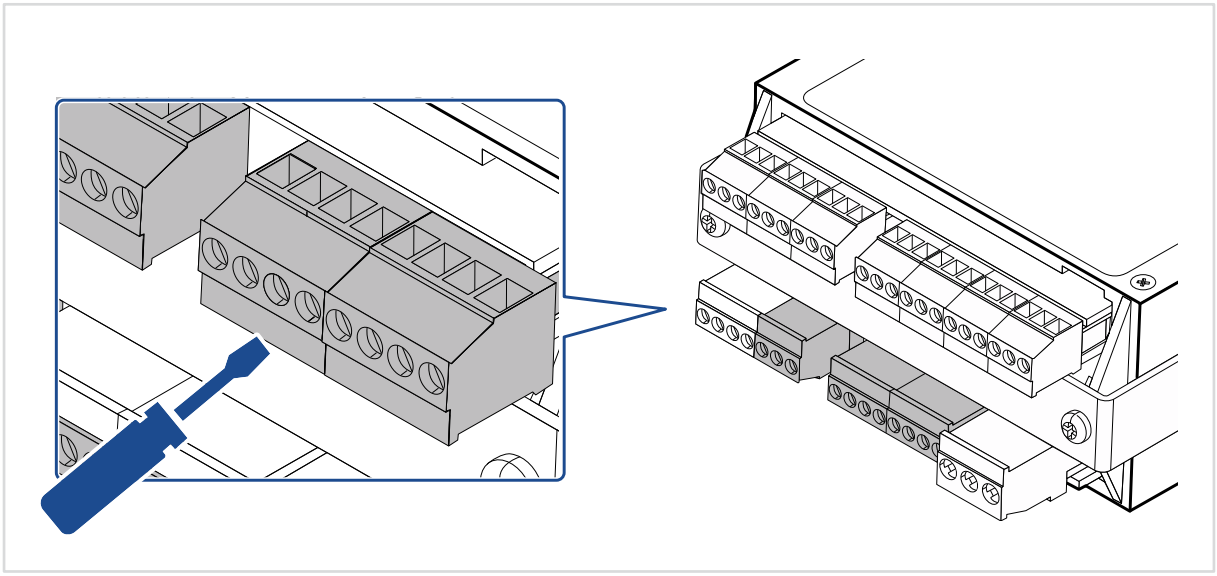
Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.

Totaliser mode is ideal for most production counting applications.

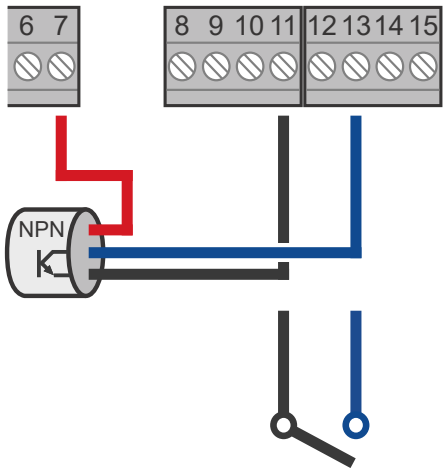
It is easy to scale and has non-volatile memory to store your count if power is lost.

The maximum pulse rate the meter can accept in this mode is 400 per second. It is intended for production line rate measurements.

6.9.1. Connections



Signal Input



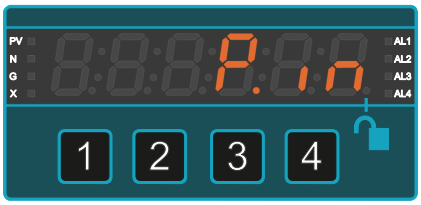
Pin	Description
7	+24V
8	
9	
10	
11	0V
12	
13	Pulse
14	
15	

6.9.2. How to Calibrate Your Meter

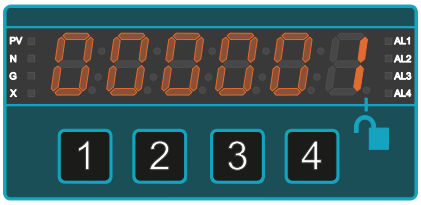
1 ***Unlock the configuration menu***

2 

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

3 

The display will now briefly say '**P.in**' prompting you to enter the number of input pulses.

4 

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired pulse input.

5 

The display will now briefly say '**diSP**' prompting you to specify how much the display should change when those pulses arrive.

6 

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired frequency.

7 

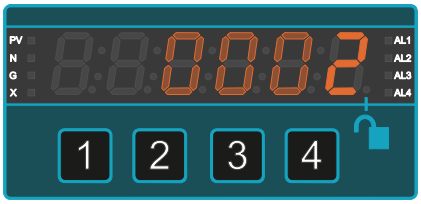
To set decimal point position, press button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press button **4** (OK) to save.

8

The display will now briefly say '**dbnc**' prompting you to set a contact debounce filter time in milliseconds.

9



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired frequency.

Press button **4** (OK) to save.

Contact Debounce Filter Time

The contact debounce filter time gives you more reliable counting if you use a switch, relay, push button or other mechanical contact closure device as your input signal.

Set the debounce period according to your maximum input pulse rate:

Max. pulse input frequency	dbnc
1 pulse per second max.	500
10 pulses per second max.	50
100 pulses per second max.	5
More than 100 pulses per second	0

6.10. Resistance Input Mode

Caution
Ensure that the power supply is turned off before connecting it to the equipment.

Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.

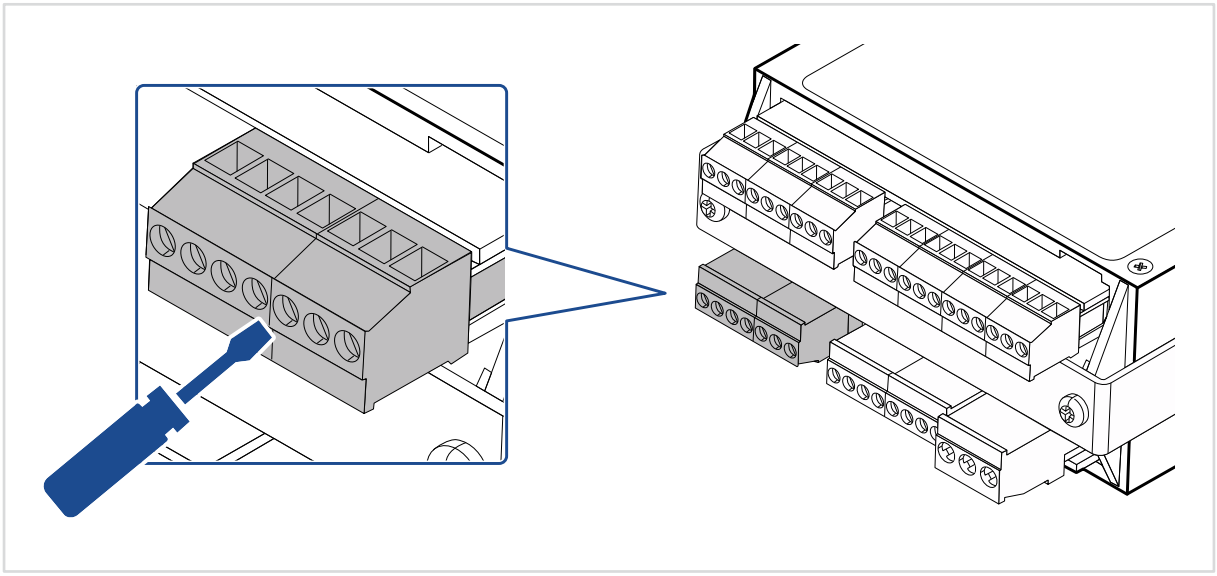
Resistance mode is ideal for measuring and checking the resistance of components such as inductors, heaters, transformers and earth bonds.

The meter's pass/fail alarm modes let you easily enter an acceptable range of resistance, as well as individual high or low alarms to form an effective quality Assurance system on your production line.

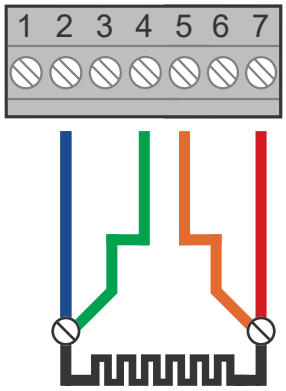
The 4-wire connection gives high performance cable resistance compensation, thanks to our new patented signal processor.

It constantly checks your system resistance to give you early warning of any unexpected changes caused by moisture in junction boxes, corroded connections etc.

6.10.1. Connections



Signal Input



Pin	Description
1	
2	- Excitation
3	
4	- Signal
5	+ Signal
6	
7	+ Excitation

6.10.2. How to Calibrate Your Meter

1 ***Unlock the configuration menu***

2 

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

3 

The display will now briefly say '**r.top**' prompting you to set the maximum resistance value you want to measure.

4 

Press buttons **2** (△) or **3** (▽) to navigate the menu to show your desired resistance range*.

Press button **4** (OK) to save.

*See next page for resistance ranges.

6.10.3. How to Choose the Correct Resistance Range

Low Ranges		
Range	**Screen Prompt**	**Excitation Current**
1 Ohm maximum		50mA
10 Ohm maximum		5mA
100 Ohm maximum		0.5mA
High Ranges		
Range	**Screen Prompt**	**Excitation Current**
1 kilOhm maximum		50uA
10 kilOhm maximum		5uA
20 kilOhm maximum		2.5uA

There is no user scaling in the setup. If you want to scale the readings, you can use scale and offset.

Range	Display Resolution
1 Ohm max.	0 - 999.9 mOhms
10 Ohm max.	0.000 - 9.999 Ohms
100 Ohm max.	0.00 to 99.99 Ohms
1 kilOhm max.	0.0 to 999.9 Ohms
10 kilOhm max.	0 to 9999 Ohms
20 kilOhm max.	0 to 20.00 kilOhms

6.11. Thermocouple Input Mode

Caution
Ensure that the power supply is turned off before connecting it to the equipment.

Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.

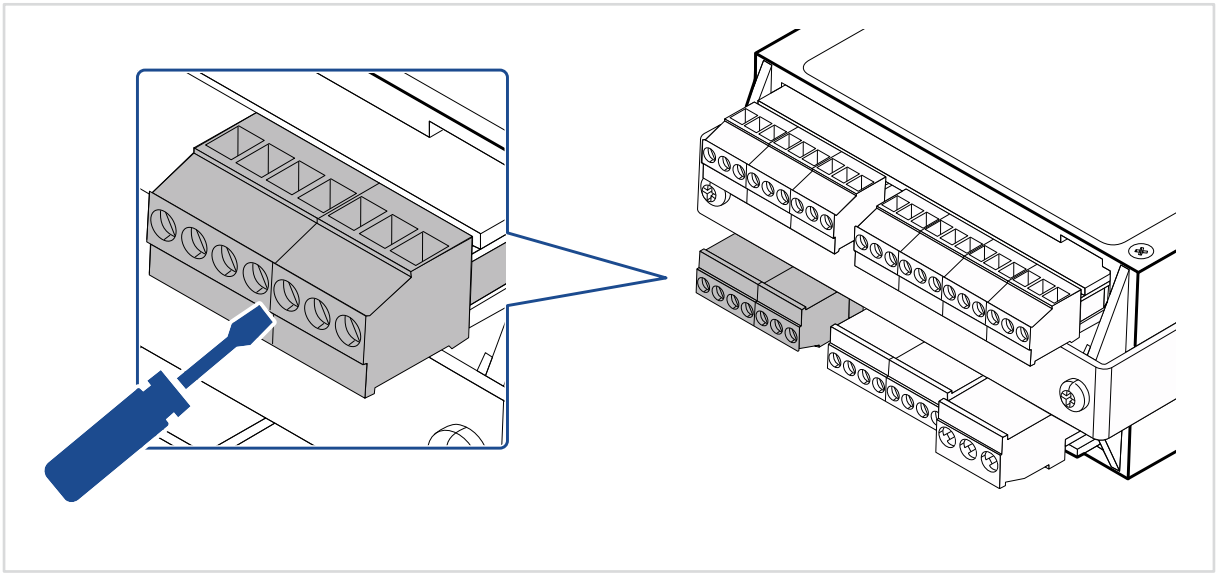
Thermocouple mode is ideal for all temperature measurements using type B, E, J, K, N, R, S or T thermocouples

Can display **Centigrade**, **Fahrenheit**, **Kelvin** and **Rankine**. It has 0.1 degree or 1 degree selectable resolution.

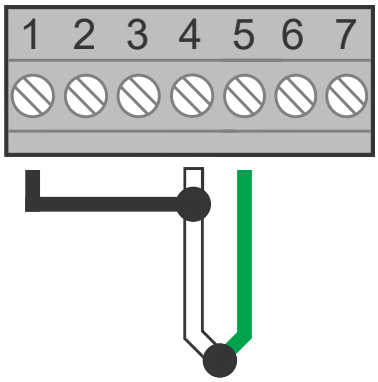
Thermocouple connection to digital panel meter with auto CJ compensation

You can use its internal cold junction compensation or you can use your own external fixed temperature cold junction.

6.11.1. Connections



Signal Input



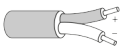
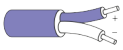
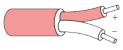
Pin	Description
1	
2	
3	
4	-
5	+
6	
7	

Example showing Thermocouple type T selection.

6.11.2. Thermocouple Types

You can choose from these thermocouple types:

International Colour Code to IEC 60584-3

Screen Prompt	Name	Thermocouple Cable Colour	Intrinsically Safe Colour	Thermocouple Connector Colour
	Type B			
	Type E			
	Type J			
	Type K			
	Type N			
	Type R			
	Type S			
	Type T			

> **Caution**
> You must wire intrinsically safe thermocouple cable through suitable barriers before it connects to the meter, if the thermocouple is in a hazardous area.

Temperature Units

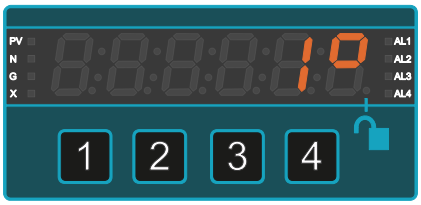
	Screen Prompt
Celsius/Centigrade	
Fahrenheit	
Kelvin	
Rankine	

6.11.3. How to Calibrate Your Meter

1 ***Unlock the configuration menu***

2 

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

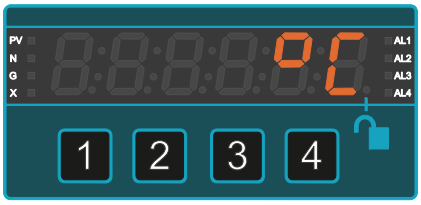
3 

The display will ask you to set the resolution.

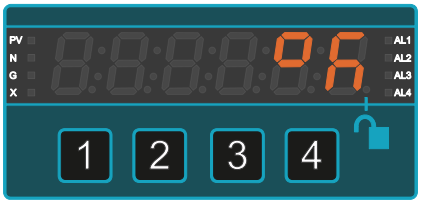
4 

Press buttons **2** (△) or **3** (▽) to change the menu to show your desired resolution, '**1°**' or '**0.1°**'.

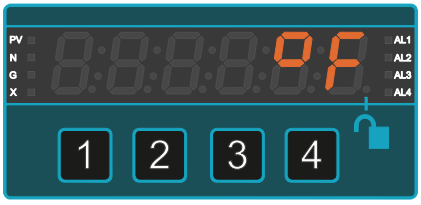
Press button **4** (OK) to save.

5 

The display will now ask you to select the temperature unit.

6 

Press buttons **2** (△) or **3** (▽) to navigate the menu to show your desired temperature units…

7 

Press button **4** (OK) to save.

Cold Junction Compensation

8

The display will now ask you to choose the cold junction compensation you want.

In most applications you would choose '**Auto**'

9

To set a fixed cold junction temperature press buttons **2** (△) or **3** (▽) to change the display to show '**CJ - -**'

Press button **4** (OK) to save.

4

The display will now briefly say '**CJ00**' prompting you to edit the degree value from 00 to 99 degrees.

5

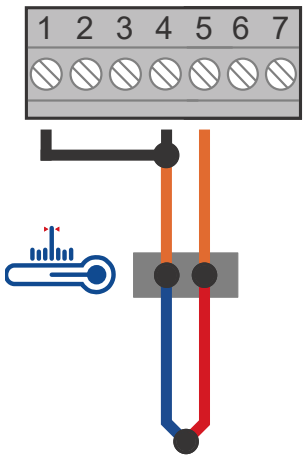
Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired degrees.

Press button **4** (OK) to save.

6.11.4. External Fixed Cold Junction

Higher precision connection method using an external fixed cold junction. Triple-point cells or oven-controlled 45 deg C references are commonly used.

Signal Input



Pin	Description
1	
2	
3	
4	- Cu
5	+ Cu
6	
7	

This method is useful when the cable length from thermocouple to meter is long, because you can use lower cost copper for much of the cabling distance, instead of more costly extension cable.

More importantly though, the environment of the cold junction can be more precisely defined than the typical ambient conditions at the back of a meter in a general purpose control panel. This has the benefit of higher precision and stability under changing ambient temperature conditions.

6.12. Elapsed Timer Mode (Up and Down Timing)

Caution
Ensure that the power supply is turned off before connecting it to the equipment.

Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.

Elapsed timer mode is ideal for a wide range of applications, such as process timing, takt timing, countdown to completion etc.

Simple **start**, **stop** and **reset** contact inputs from your process allow you to set up many common timing tasks.

You can choose from several timing modes.

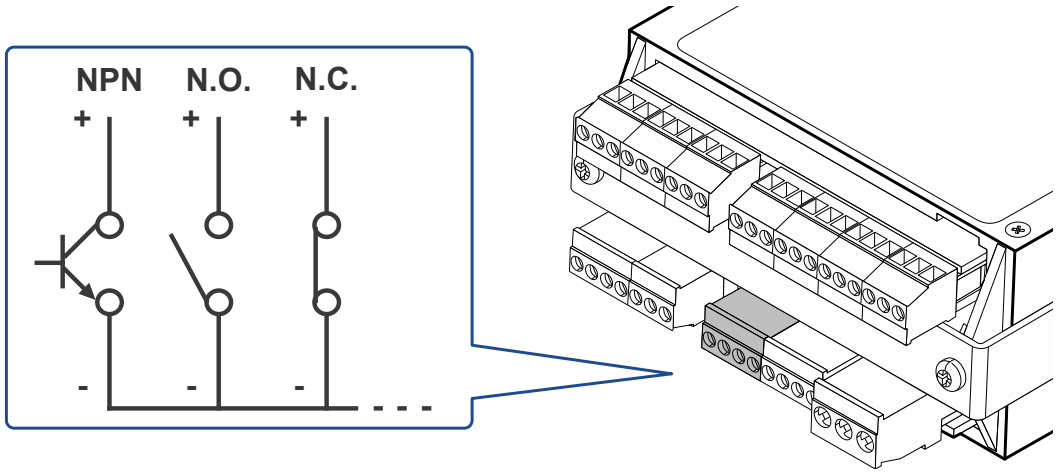
Timing formats:

SSSS seconds
SSS.T seconds, to 1/10 second
MM:SS minutes and seconds
HH:MM hours and minutes

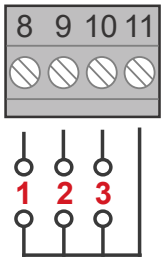
Timing direction:

UP counts up from 0
dn counts down from preset

6.12.1. Connections



Signal Input



Pin	Description
8	Contact 1
9	Contact 2
10	Contact 3
11	Common

6.12.2. How to Select Your Timing Mode

1 ***Unlock the configuration menu***

2 

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

3 

The display will ask you to set the timing format.

4 

Press buttons **2** (△) or **3** (▽) to change the menu to show your desired format.

Press button **4** (OK) to save.

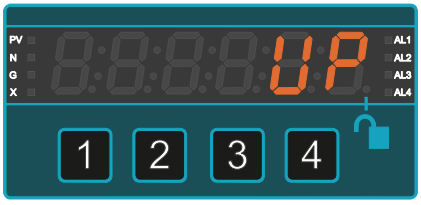
5 

The display will now ask you if you want to reset previous parameter to defaults.

6 

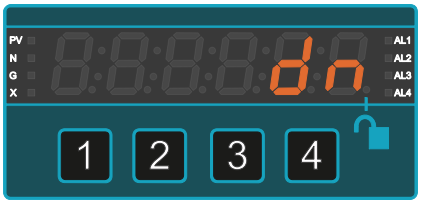
Press buttons **2** (△) or **3** (▽) to change the menu to show your yes or no.

Press button **4** (OK) to save.

7 

The display will now ask you if you which direction you want it to count.

8



Press buttons **2** (△) or **3** (▽) to change the menu to select either ‘UP’ or down ‘dn’.

Press button **4** (OK) to save.

9

The display will now briefly say '**P.rst**' prompting you to enter the reset value.

This is the value the timer will reset to.

10

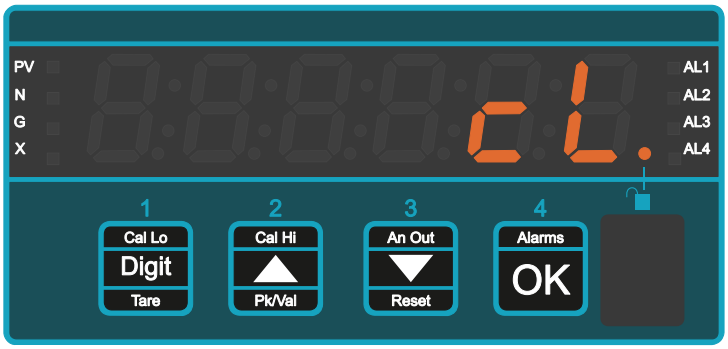
Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired reset value.

Press button **4** (OK) to save.

6.13. Clock Mode (Option)

Caution
Ensure that the power supply is turned off before connecting it to the equipment.

Using the wrong type of input signal can damage the equipment. Ensure that the input signal is connected properly and of the recommended type.



The model number will include "RTC" if the clock option module is installed.

The Clock mode will display accurate time of day or date in several international standard formats.

It automatically adjusts for summer / winter time, or it can display GMT / UTC / Zulu time.

You can also use it as a day counter for **'Days Since Last Accident'** or to count down days to an event.

It is easy to set up and includes automatic daylight saving time.

Functional limitations

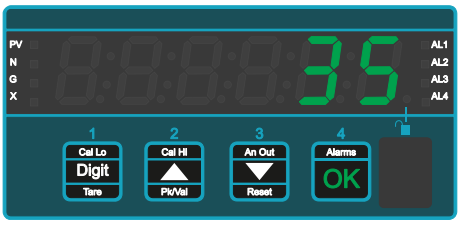
In this mode, the following functional limitations apply

Serial data output - only available in mode C1 on clocks.

Analogue output - Unavailable on clocks.

6.13.1. Timer Formats

Mode	Display	Description
H.n		Hours : Minutes
H.n.S		Hours : Minutes : Seconds
d.n		Day . Month
n.d		Month . Day
d.n.y		Date, EU format:
n.d.y		Date, USA format

Mode	Display	Description
		Date, China, Korea format
		Days elapsed

6.13.2. How to Configure Your Clock

1 ***Unlock the configuration menu***

2 

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

3 

The display will ask you to set the clock format.

4 

Press buttons **2** (△) or **3** (▽) to change the menu to show your desired clock format.

Press button **4** (OK) to save.

5 

The display will now ask you to select the time format, either **'24Hr'** or **'12Hr'**

6 

Press buttons **2** (△) or **3** (▽) to navigate the menu to show your desired time format

Press button **4** (OK) to save.

7 

The display will now say **'dSt'**, prompting you to set the daylight saving time zone you are in.

8

Press buttons **2** (△) or **3** (▽) to change the menu to show your desired DST.

Press button **4** (OK) to save.

9

The display will now ask you to enter the year.

Press buttons **2** (△) or **3** (▽) to change the number.

Press button **4** (OK) to save.

10

The display will now ask you to enter the month.

Press buttons **2** (△) or **3** (▽) to change the number.

Press button **4** (OK) to save.

11

The display will now ask you to enter the day.

Press buttons **2** (△) or **3** (▽) to change the number.

Press button **4** (OK) to save.

12

The display will now ask you to enter the hour.

Press buttons **2** (△) or **3** (▽) to change the number.

Press button **4** (OK) to save.

13

The display will now ask you to enter the minutes.

We recommend setting it one minute ahead of actual time.

14

Press buttons **2** (△) or **3** (▽) to change the number.

Press button **4** (OK) to save.

15

The display will now show the time you have set and the green alarm LED's will flash.

16

Once the time has caught up with you programmed time (1 minute ahead) press button **4** (OK) to save.

6.13.3. How to Configure Your Day Counter

1 ***Unlock the configuration menu***

2 

Press button **1** and **2** together for 3 seconds until you see '**C.Src**' (calibration source)

3 

The display will ask you to set the clock format.

4 

Press buttons **2** (△) or **3** (▽) to change the menu to show **'dAY.C'** format.

Press button **4** (OK) to save.

5 

The display will now ask you to select the time format, either **'24Hr'** or **'12Hr'**

6 

Press buttons **2** (△) or **3** (▽) to navigate the menu to show your desired time format

Press button **4** (OK) to save.

7 

The display will now say **'dSt'**, prompting you to set the daylight saving time zone you are in.

8

Press buttons **2** (△) or **3** (▽) to change the menu to show your desired DST.

Press button **4** (OK) to save.

9

The display will now ask you to enter the year.

Press buttons **2** (△) or **3** (▽) to change the number.

Press button **4** (OK) to save.

10

The display will now ask you to enter the month.

Press buttons **2** (△) or **3** (▽) to change the number.

Press button **4** (OK) to save.

11

The display will now ask you to enter the day.

Press buttons **2** (△) or **3** (▽) to change the number.

Press button **4** (OK) to save.

12

The display will now ask you to enter the hour.

Press buttons **2** (△) or **3** (▽) to change the number.

Press button **4** (OK) to save.

13

The display will now ask you to enter the minutes.

We recommend setting it one minute ahead of actual time.

14

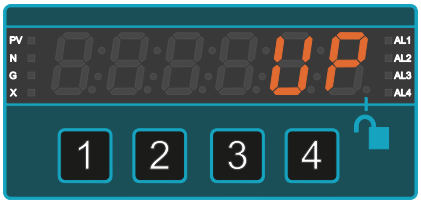
Press buttons **2** (△) or **3** (▽) to change the number.

Press button **4** (OK) to save.

15

The display will now show the time you have set and the green alarm LED's will flash.

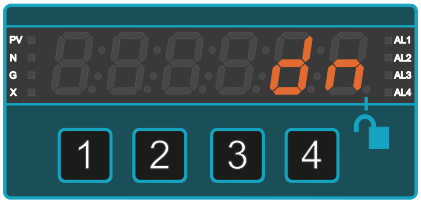
16



The display will now ask you to select which direction it counts, up or down.

Press buttons **2** (△) or **3** (▽) to change the value.

17



Press button **4** (OK) to save.

18

The display will now briefly show **'PrST'**, prompting you to set the preset value.

19

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) buttons to show your desired low value.

Press button **4** (OK) to save.

20

The display will now briefly show **'LoAd'**, prompting you to set the pre-load value.

21

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) buttons to show your desired low value.

Press button **4** (OK) to save.

7 Analogue Output

7.1. Analogue Output: 0-10V or 4-20mA

The analogue output option allows you to create an isolated analogue signal which is proportional to the value shown on the front of your display.

This can be used to feed remote devices such as data loggers, displays, PLCs and other peripheral equipment.

The outputs are active. That means the outputs are available directly, without needing external excitation power.

There are 2 different option boards available:-

1. Unipolar output board **-ANI** which can be configured to give an output range of either **4-20mA**

2. Unipolar output board **-ANV** which can be configured to give an output range of either **0-10V**

Choose which data your Analogue output will be derived from:


Nett Value


Gross Value


Peak Gross Value


Valley Gross value

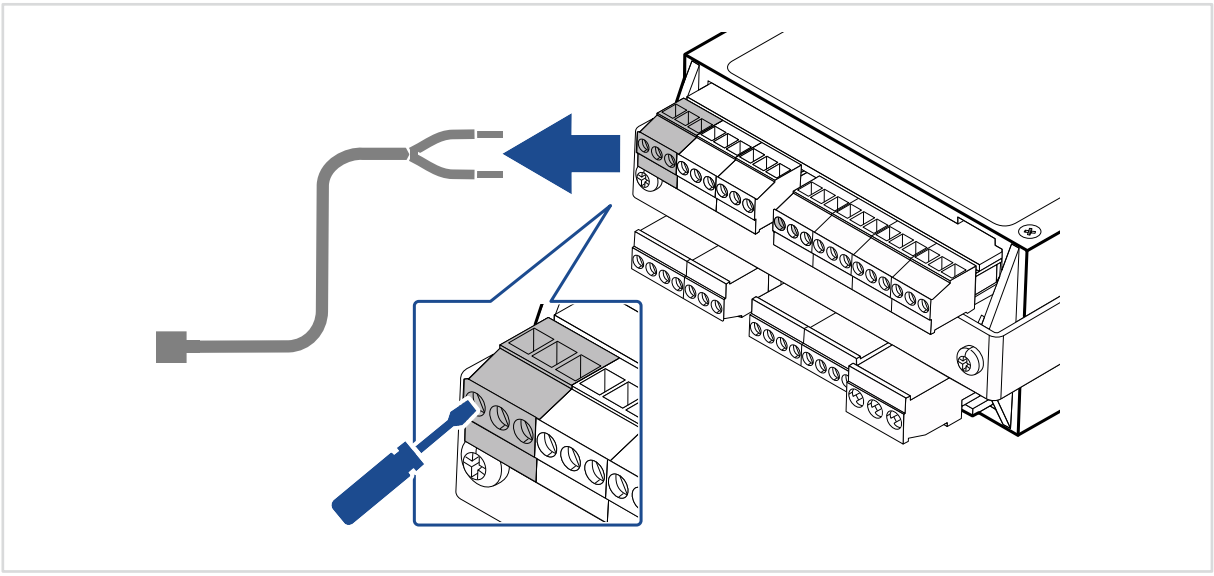

Peak Nett value


Valley Nett value


Tare Value

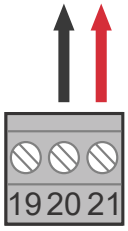

CJ T on-board temperature

7.1.1. Connections



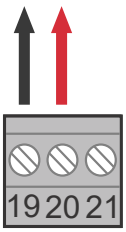
4-20mA Active Source

This will drive a current into a passive device such as a moving coil meter. This is the most common 4-20mA output configuration.

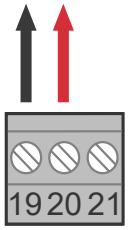
Signal Output		
	**Pin**	**Description**
	19	
	20	-
	21	+

4-20mA Passive Sink

This will modulate a current from a connected external excitation voltage. The output stage acts similar to a 4-20mA 2 wire transmitter.

Signal Output		
	**Pin**	**Description**
	19	-
	20	+
	21	

0-10V Active Output

Signal Output		
	**Pin**	**Description**
	19	**-**
	20	**+**
	21	

7.1.2. How to Calibrate Your Analogue Output

1 ***Unlock the configuration menu***

2 

Press and hold button **3** (▽) for 3 seconds until the display shows what option is installed, either '**0-20'**, **'4-20'** or **'0-10'.**

3 

If you have the 'ANI' option installed you can press button **2** (△) or **3** (▽) to select your preferred output signal range.

0-20 mA = **0-20**

4-20 mA = **4-20**

4 

Press button **4** (OK) to save your choice.

5 

The display will now ask you to choose which variable will generate the analogue output.

Press button **2** (△) or **3** (▽) to select your preferred variable from the list below.

nEtt	The real-time nett value
Gro5	The real-time gross value
PEA9	The memorised maximum gross value
UAL9	The memorised minimum gross value
PEAn	The memorised maximum nett value
UALn	The memorised minimum nett value
tArE	The real-time tare value
Cjt	The real-time on-board temperature

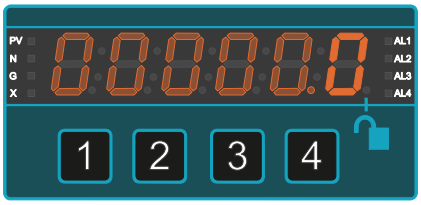
6

Press button **4** (OK) to save your choice.

7

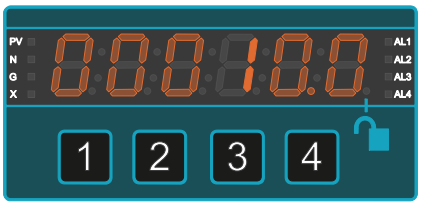
'Out.L' will appear, prompting you to set the measurement which generates the minimum analogue output signal. For example 4mA.

8



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired low value.

9

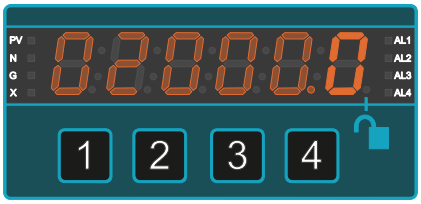


Press button **4** (OK) when all digits are correct.

10

'Out.h' will appear, prompting you to set the measurement which generates the maximum analogue output signal. For example 20mA.

11



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired low value.

12

Press button **4** (OK) when all digits are correct.

8 Alarm Output

8.1. General Description

The alarm output option lets you create up to 4 relay or 2 solid state switch outputs, which will operate when certain conditions occur, and you can program this using the front panel buttons.

The outputs may be used to control a process in a closed loop system, for example, by opening or closing valves, operating heaters, adding ingredients etc., or can simply feed power to, or remove power from external devices such as warning sounders, beacons etc.

The outputs are volt-free. That means you can wire whichever signals you wish to them, AC or DC, provided the voltage and current lies within the relays' rated limits.

There are several alarm actions available as standard, which include....

	High alarm and adjustable hysteresis, and automatic or manual in-flight correction
	Low alarm and adjustable hysteresis, and automatic or manual in-flight correction
	In-band alarm, where you set a high and low limit for each relay
	Out-of-band alarm, where you set a high and low limit for each relay
	Pump or reservoir control function
	OFF - disables all alarm relay action

Independent timers let you set a delay to activate and delay to reset time on each relay. You can also set the relays to operate with variable duty cycles.

The relays can be set to be normally energised, to de-energise on trip (fail safe)
The relays can be set to be normally de-energised, to energise on trip (non-fail safe)

Each relay is independent, so you can have one relay performing a different function to the others, with different setpoints.

Each relay has an LED on the front panel of the display, so that you can see the status of each alarm channel.

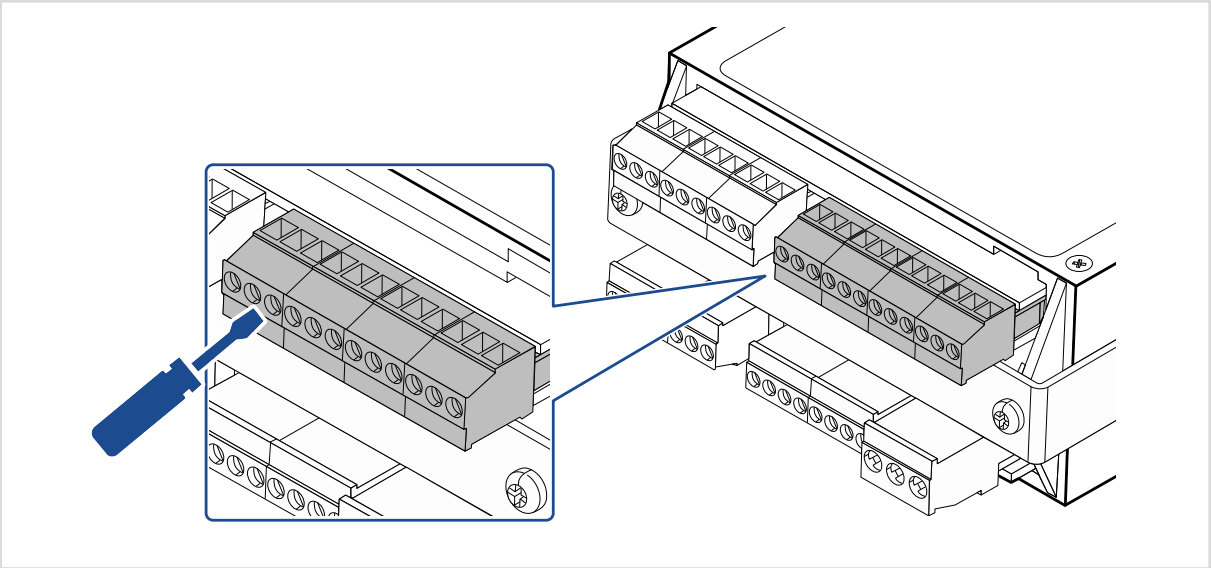
These LED's and all the standard comparison functions are present in the display even if you do not have the alarm options fitted.

This means you can produce a simple alarm annunciator with the basic display - there is no need to buy the alarm option if you only want to visualise alarm conditions and do not need switched alarm outputs.

Each relay is independent and can have a different mode to the other relays.

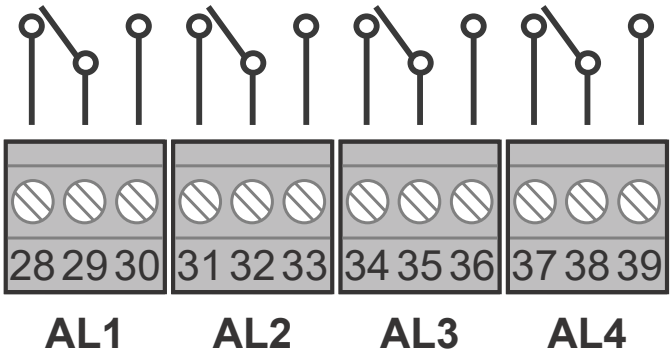
The menu options and settings available will vary depending on the installed options and what operating mode you are in.

8.2. Connections



Mechanical Relay Outputs: SPDT

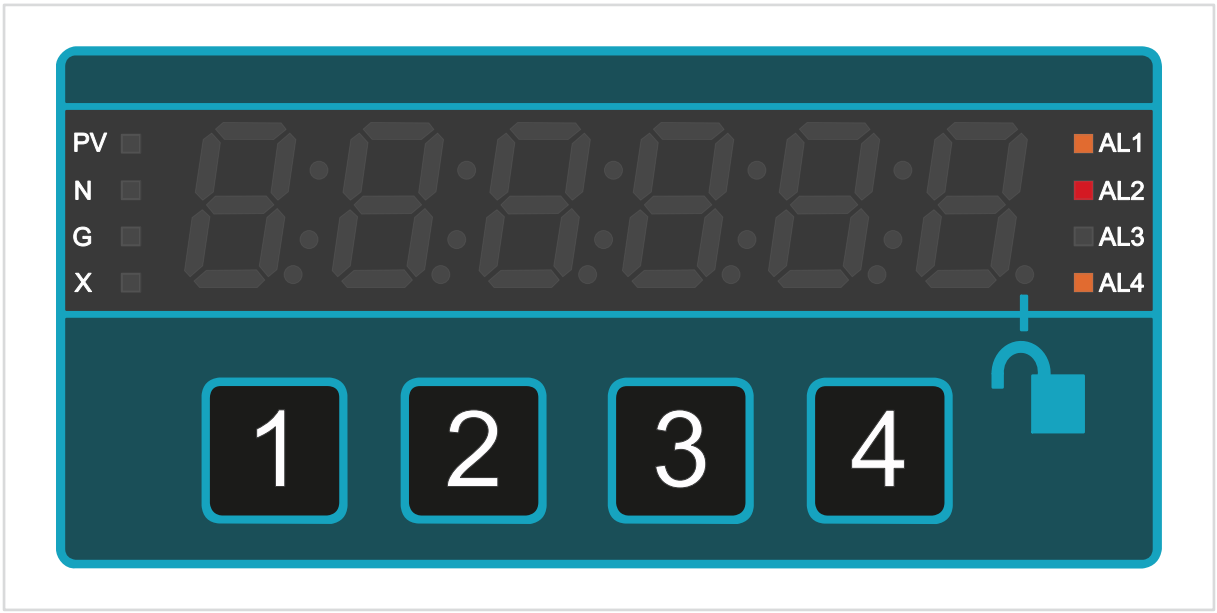
The contacts will be in this position when no power is connected to the device.



Pin	Description
28	NC
29	COM
30	NO
31	NC
32	COM
33	NO
34	NC
35	COM
36	NO
37	NC
38	COM
39	NO

8.3. Alarm Status LED's

The Alarm status LED, AL1, AL2, AL3 or AL4 shows the status of each alarm channel.



The status LED has 3 colour states...

- Yellow means the set point has been triggered but the alarm relay has not yet been activated. (if a timer delay is set, for example)
- Red means the alarm relay is active.
- Not lit means there is no alarm condition and the alarm relay is not active.

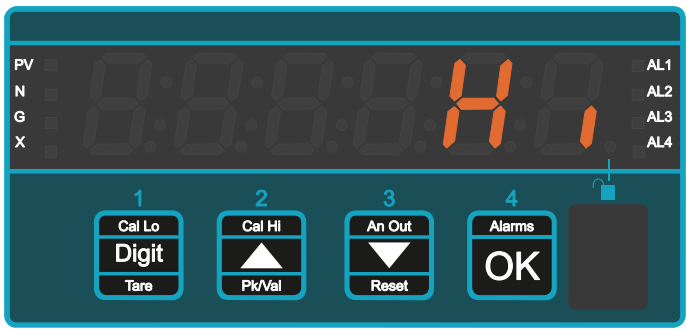
You can also make the numeric display change colour whenever the input signal is in an alarm condition. The most recent active alarm will determine the alarm display colour.

8.4. Alarm Modes

Your meter has many useful alarm modes to help with control and warning applications.

8.4.1. High Alarm Mode

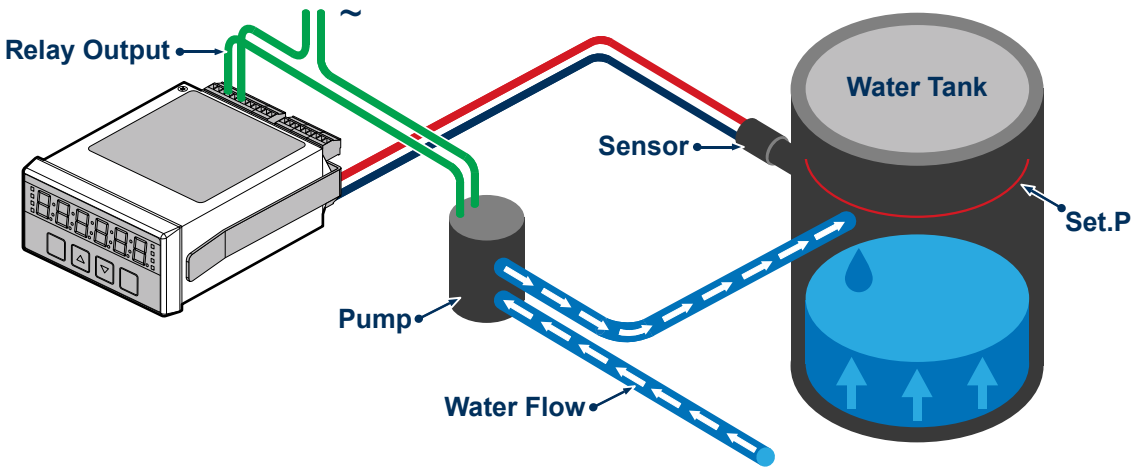
High alarm, the alarm occurs if the input signal or displayed reading reaches or exceeds the set point value.



Example

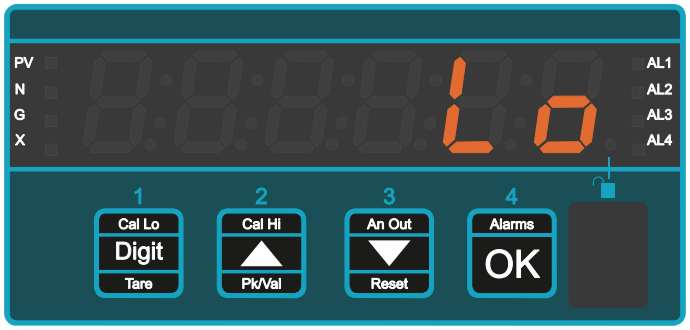
The meter will switch the pump off when the water reaches the alarm **'Set.P'** level.

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



8.4.2. Low Alarm Mode

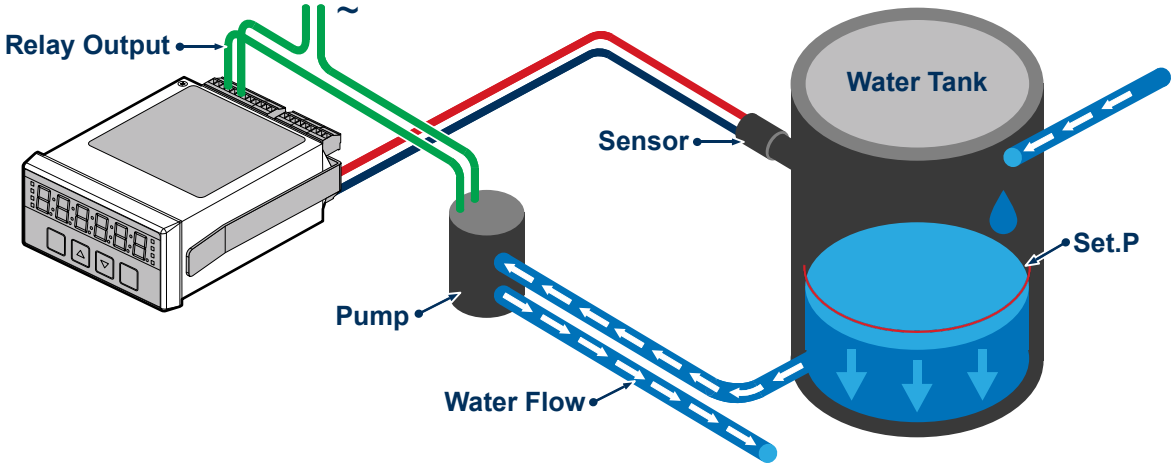
Creates an alarm if the input signal falls below a set point.



Example

The meter will switch the pump off when the water drops to the alarm **'Set.P'** level.

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



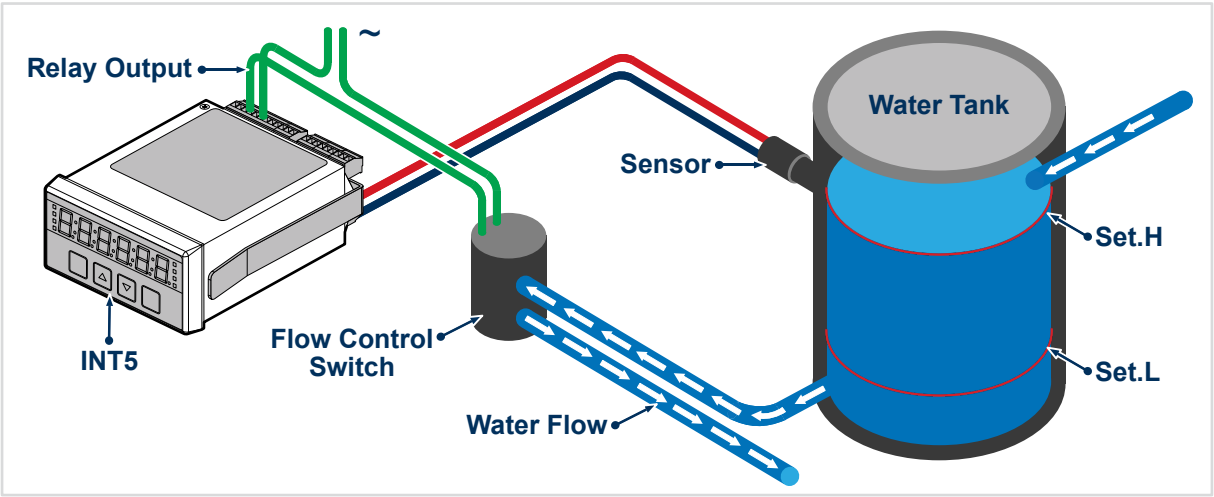
8.4.3. Pump Control High Alarm Mode

Creates an alarm if the input signal reaches or goes above a set point **'SEt.H.'** resets the alarm if the input signal goes below a minimum set point **'SEt.L'**

Example

The meter will switch the pump off when the water reaches the alarm maximum set point level 'SEt.H.' It will only switch the pump on again when the level has dropped to a minimum set point 'SEt.L.'

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



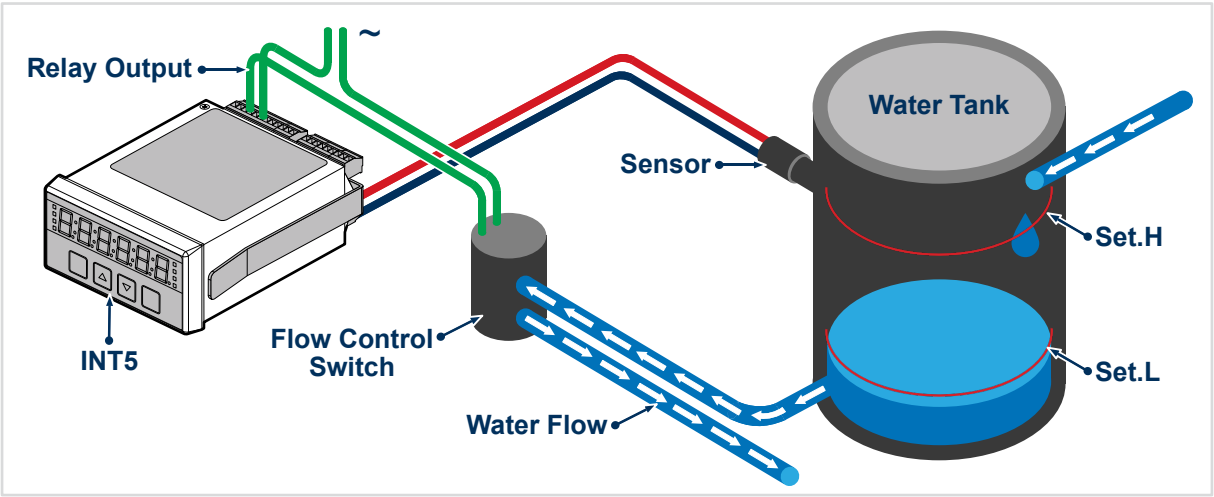
8.4.4. Pump Control Low Alarm Mode

Creates an alarm if the input signal reaches or goes below a set point **'SEt.L.'** Resets the alarm if the input signal reaches or goes above a maximum set point **'SEt.H'**

Example

The meter will switch the pump off when the water reaches the alarm minimum set point level 'SEt.L.' It will only switch the pump on again when the level has risen to a maximum set point 'SEt.H.'

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



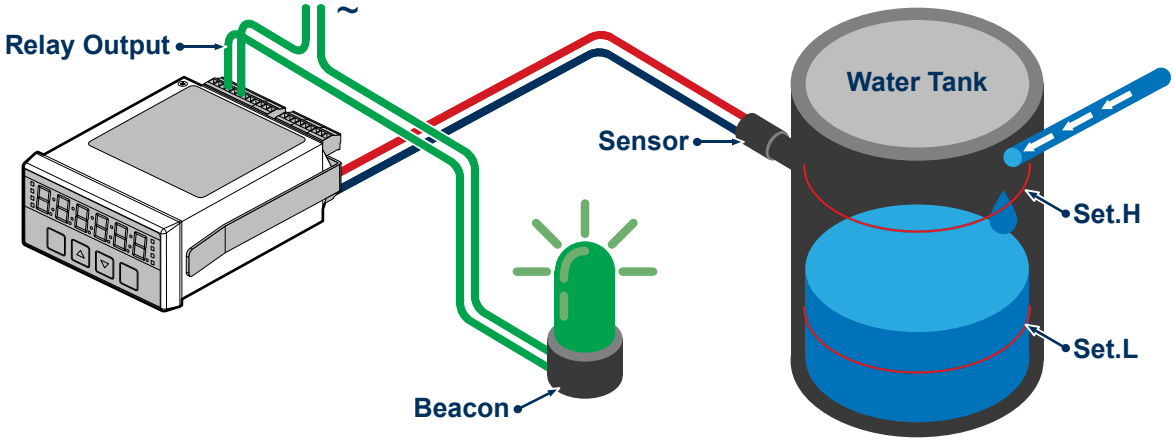
8.4.5. In Band Alarm Mode

An alarm occurs if the input signal goes within two limits. The lower limit is set with **'SEt.L'** and the higher limit is set with **'SEt.H'**

Example

The meter will switch the beacon on when the water level is between the alarm lower limit **'SEt.L.'** and the higher limit **'SEt.H.'**

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



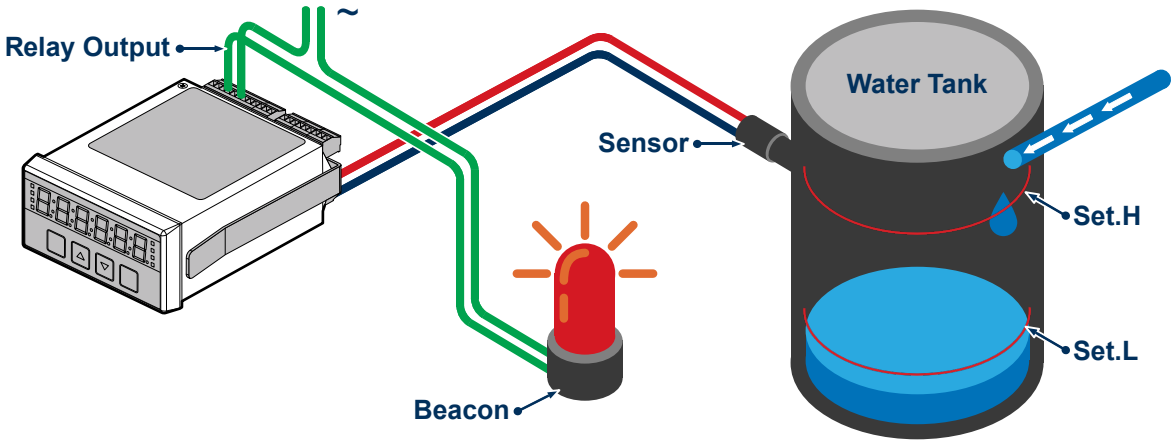
8.4.6. Out Band Alarm Mode

An alarm occurs if the input signal goes outside two limits. The lower limit is set with **'SEt.L'** and the higher limit is set with **'SEt.H'**

Example

The meter will switch the beacon on when the water level is outside the alarm minimum set point **'SEt.L.'** and the maximum set point **'SEt.H.'**

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



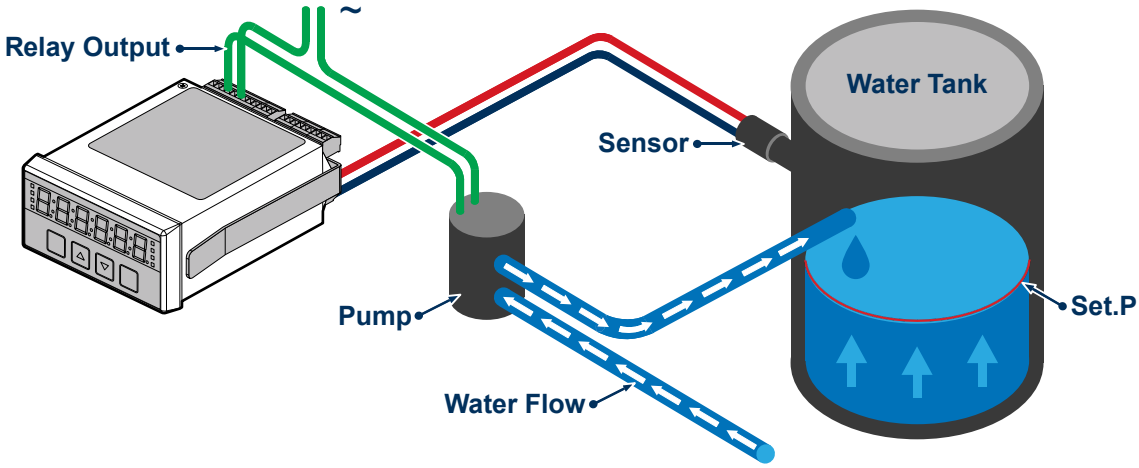
8.4.7. High Alarm with Manual In-flight Compensation Mode

Alarm occurs if the input signal reaches or exceeds the Set point value, less the expected in-flight (dribble) amount, which is manually set to a fixed amount.

Example

The meter will switch the pump off when the water level reaches the **'Set.P'** value, and will use the given 'flight' value to compensate for the water still on its way from the pump to the water tank.

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



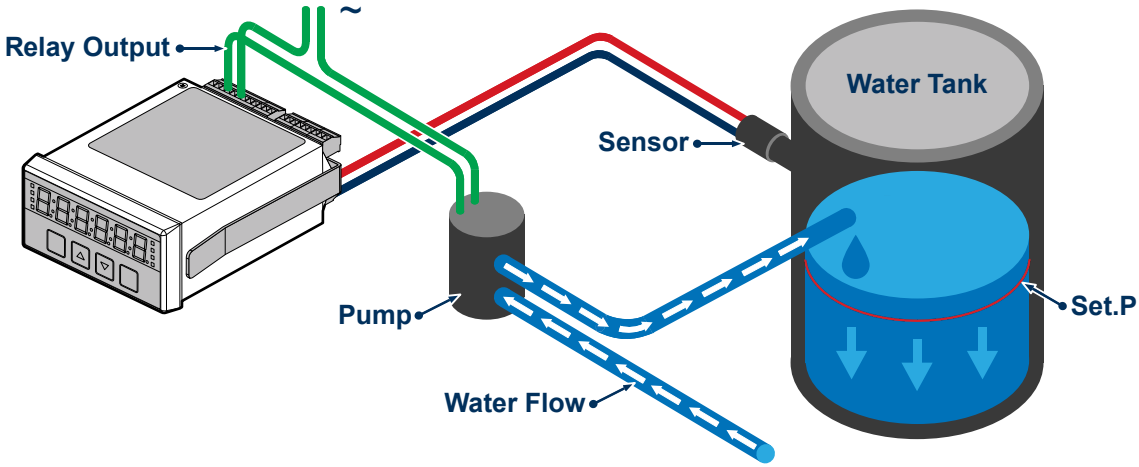
8.4.8. Low Alarm with Manual In-flight Compensation Mode

Alarm occurs if the input signal reaches or falls below the Set point value, plus the expected in-flight (dribble) amount, which is manually set to a fixed amount.

Example

The meter will switch the pump on when the water level reaches or falls below the **'Set.P'** value, and will use the given **'flight'** value to compensate for the water level loss before the pump can be switched on.

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



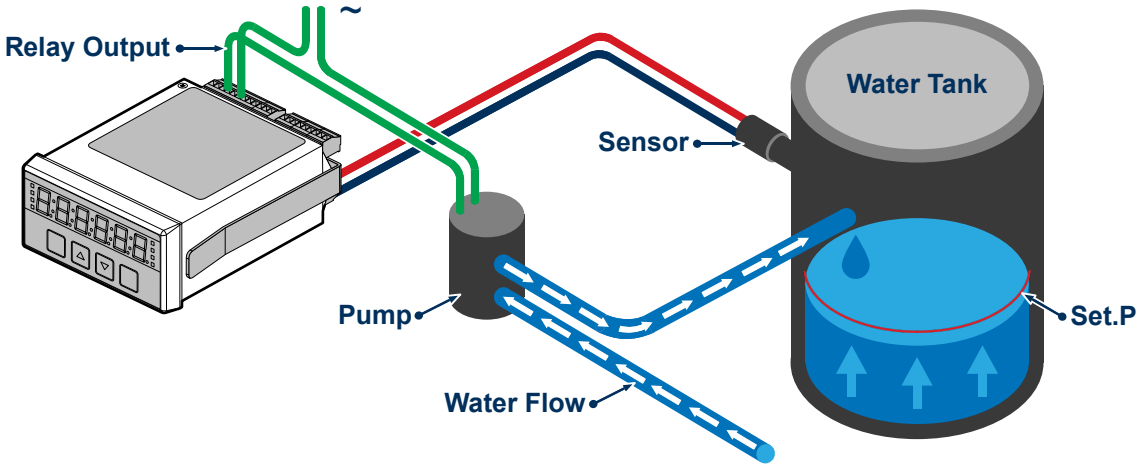
8.4.9. High Alarm with Automatic In-flight Compensation Mode

Alarm occurs if the input signal reaches or exceeds the Set point value, less the expected in-flight (dribble) amount, which is automatically set, according to previous alarm overshoot.

Example

The meter will switch the pump off when the water level reaches the **'Set.P'** value, and will use the previous alarm overshoot value to compensate for the water still on its way from the pump to the water tank.

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



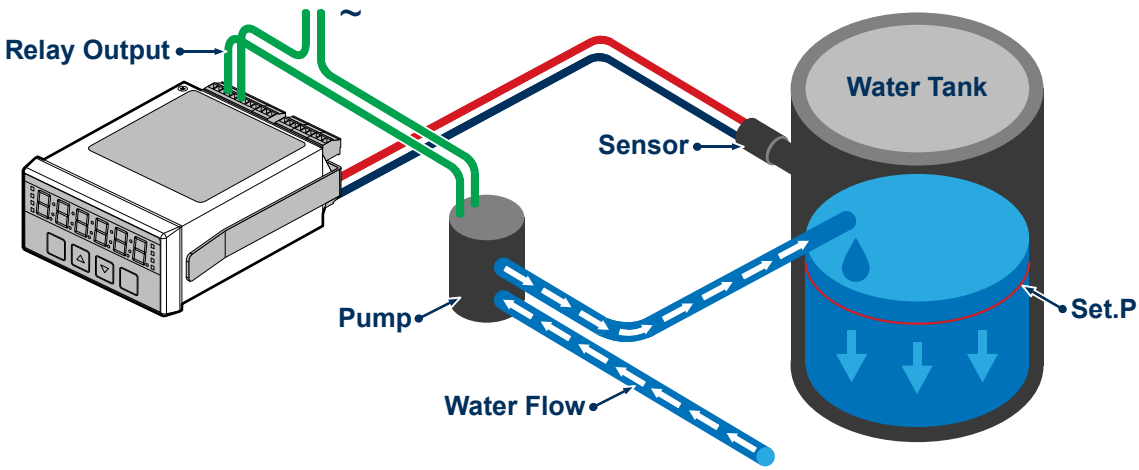
8.4.10. Low Alarm with Automatic In-flight Compensation Mode

Alarm occurs if the input signal reaches or falls below the Set point value, plus the expected in-flight (dribble) amount, which is automatically set, according to previous alarm overshoot.

Example

The meter will switch the pump on when the water level reaches or falls below the **'Set.P'** value, and will use the previous alarm overshoot value to compensate for the water still on its way from the pump to the water tank.

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



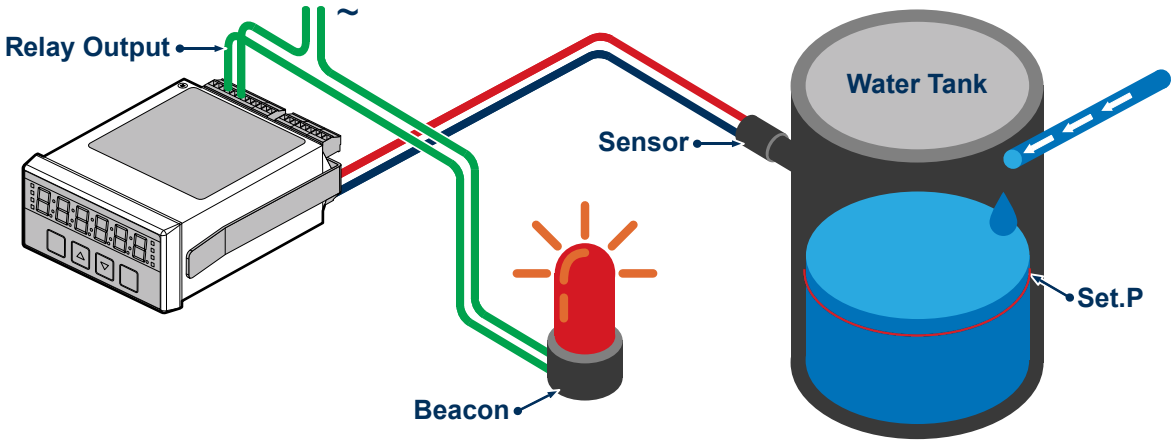
8.4.11. Latching High Alarm Mode

Alarm occurs if the input signal reaches or exceeds the Set point value. Remains in alarm state even if signal returns to a non-alarm level. Can be reset using the reset logic input port.

Example

The meter will switch the beacon on when the water level reaches and goes above the **'Set.P'** value, and will remain lit even if the water level goes back below the **'Set.P'** value. The alarm can only be reset using one of the logic input ports.

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



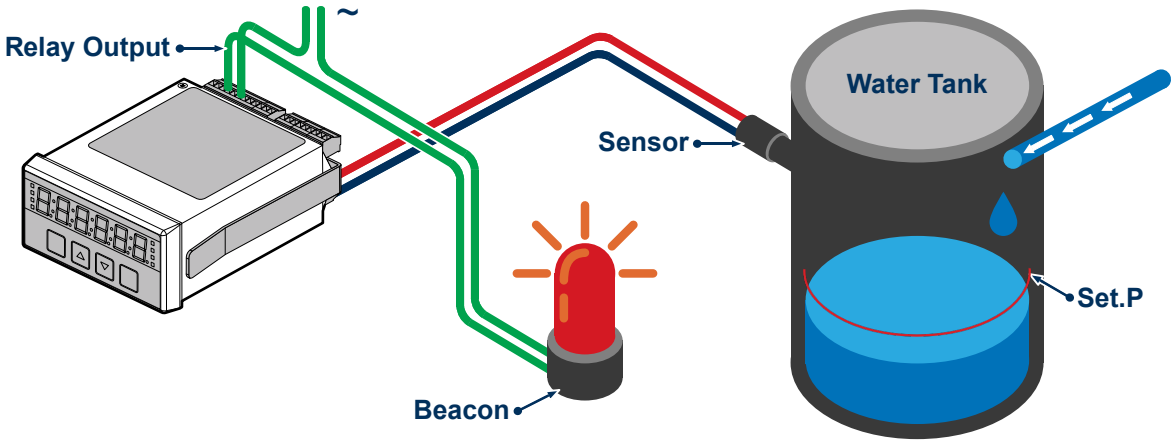
8.4.12. Latching Low Alarm Mode

Alarm occurs if the input signal reaches or falls below the Set point value. Remains in alarm even if signal returns to a non-alarm level. Can be reset using the reset logic input port.

Example

The meter will switch the beacon on when the water level reaches and goes below the **'Set.P'** value, and will remain lit even if the water level goes back above the **'Set.P'** value. The alarm can only be reset using one of the logic input ports.

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



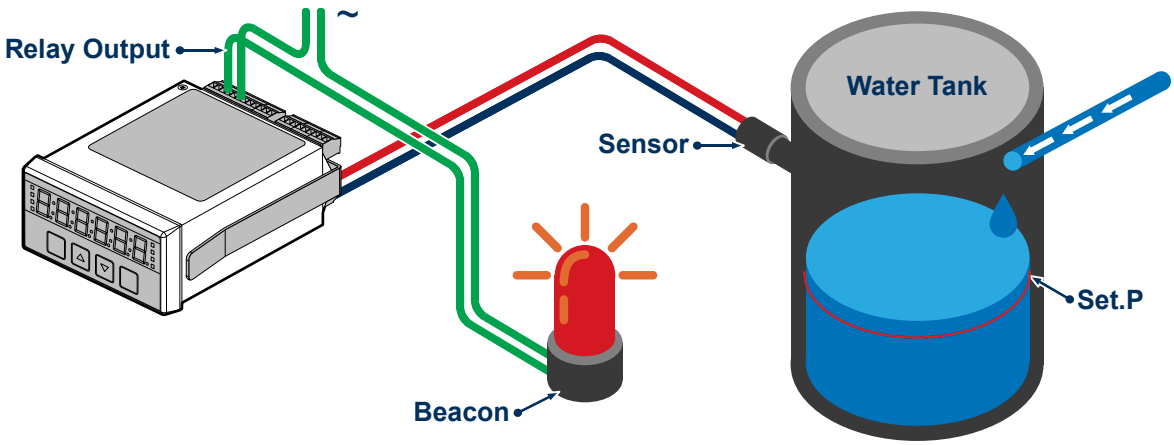
8.4.13. Pulsed High Alarm Mode

Alarm occurs if the input signal reaches or exceeds the **'Set.P'** value. The output will pulse once only, for a duration set with **'t.Out'**, in a range from 0.1 to 99.9 seconds. The alarm annunciator LED will be red for the duration of the pulse and will be switched off at all other times.

Example

The meter will switch the beacon on when the water reaches the alarm **'Set.P'** level and stay active for the duration of the set **'t.Out'**, for example 9.0 seconds.

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



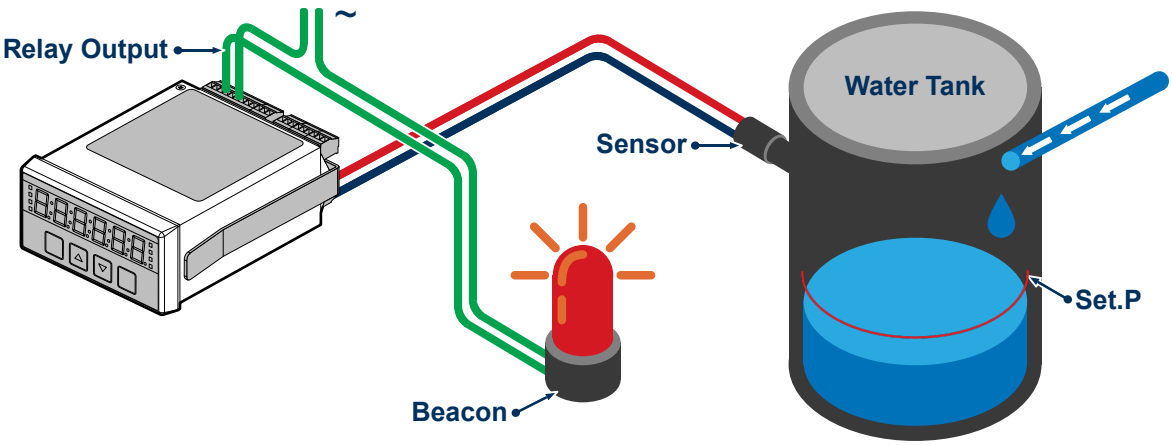
8.4.14. Pulsed Low Alarm Mode

Alarm occurs if the input signal reaches or falls below the **'Set.P'** value. The output will pulse once only, for a duration set with **'t.Out'**, in a range from 0.1 to 99.9 seconds. The alarm annunciator LED will be red for the duration of the pulse and will be switched off at all other times.

Example

The meter will switch the beacon off when the water drops to the alarm **'Set.P'** level.and stay active for the duration of the set **'t.Out'**, for example 9.0 seconds.

If the tank does not have straight sides, you can use the meter's lineariser to convert pressure to volume.



8.5. How to Configure the Alarm Type

1

Unlock the configuration menu

2

Press the button **1** (OK) repeatedly until your chosen alarm channel LED flashes.

3

Press and hold the button **1** (OK) for at least 6 seconds until you see '**A.CFG**'

4

Press button **2** (△) or **3** (▽) to select your preferred alarm mode.

Press button **4** (OK) once the alarm mode is correct.

The next few pages will continue the configuration order

8.6. Display Colour When in Alarm State

After you have chosen your alarm type the meter will show the existing display colour setting. To change how your display reacts please follow the instruction below.

5

Press button **2**(△) or **3**(▽) to select your preferred colour.

Press button **4** (OK) to confirm your choice.

The highest numbered alarm channel will have the highest colour priority.

If tripped, AL2 will dominate AL1 for colour
If tripped, AL3 will dominate AL2 and AL1 for colour
If tripped, AL4 will dominate AL3, AL2 and AL1 for colour

So, if Alarm 1 has tripped and its alarm colour is Yellow, and Alarm 2 has tripped and its alarm colour is red, the display will be red.

If no alarms are active, the display colour will be the colour chosen in the Colour Setting section.

If you want visual colour cues to critical alarms, place the most critical alarms on the higher alarm channels.

8.7. Relay Energised or De-energised When in Alarm

Next the meter will prompt you to choose how your relays act once triggered.

6

Press button **2**(△) or **3**(▽) to select your choice.

7

Press button **4** (OK) to confirm your choice.

Means the relay will **de-energise** when an alarm condition occurs. This is the recommended option, because it gives fail safe relay action. You will get the same condition if you lose power to meter, which is generally the safest response. On the diagram below, we show relays which de-energise on trip with a green tick.

Means the relay will **energise** when an alarm condition occurs. This is normally not the best option, because it is not fail safe. You will never get an alarm response if you lose power to the meter, which could be dangerous, so we mark this response with a red cross.

8.8. Source of Comparison Data for Alarm

Next you can choose which available data within the meter is compared to each alarm set point.

8

Press button **2**(△) or **3**(▽) to select your choice.

9

Press button **4** (OK) to confirm your choice.


Only the Nett value will be compared with this alarm set point.


Only the Gross value will be compared with this alarm set point.


Only the Peak (maximum) Gross value will be compared with this alarm set point.


Only the Valley (minimum) Gross value will be compared with this alarm set point.


Only the Peak (maximum) Nett value will be compared with this alarm set point.


Only the Valley (minimum) Nett value will be compared with this alarm set point.


Only the Tare value will be compared with this alarm set point.


Only the ambient temperature sensor value will be compared with this alarm set point.

8.9. Set.H and Set.L or Set.P

Depending on which Alarm mode you are using you will either have the option to set the high **'Set.H'** and low **'Set.L'** points or the single set point **'Set.P'**.

8.9.1. Set.H and Set.L

These are the values which the measurement will be compared to.

8

The display will first ask you to set the Low point **'Set.L'**

9

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired frequency.

10

To set decimal point position, press button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

Press button **4** (OK) to save.

11

The display will now ask you to set the high point **'Set.H'**

12

Follow stages **9** and **10** to set your high point.

Press button **4** (OK) to save.

8.9.2. Set.P

This is the value which the measurement will be compared to.

8

The display will now ask you to set the set point **'Set.P'**

9

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired frequency.

10

To set decimal point position, press button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽) .

11

Press button **4** (OK) to save.

8.10. Hysteresis

Hysteresis is often used in filling or simple control applications to prevent the alarm relay from repeatedly energising and de-energising when the signal is near to the set point.

If hysteresis is set to 0, the alarm will reset as soon as the signal changes to a level outside the alarm limit.

Example

If the signal represents water level and there is turbulence in the liquid, you may find the alarm relay repeatedly switches on and off, even though the average level is not changing. You can prevent this with hysteresis.

If you have a high set point of 100.00 and no hysteresis, the alarm will occur at 100.00 and will reset at 99.99.

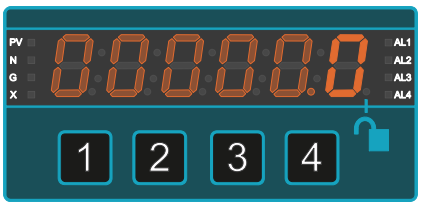
If you set hysteresis to 0.30, the alarm will occur at 100.0 and will only reset when the measurement drops below 99.70.

Choose the amount of hysteresis you need, according to the amount of variability or instability in your signal.

13

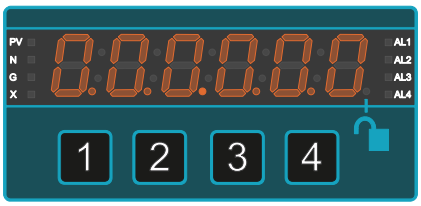
The display will now ask you to set the set point **'Hyst'**

14



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired frequency.

15



To set decimal point position, press button **2** (Cal Hi) again for 3 seconds and move the decimal point to the desired position with buttons **2**(△) or **3**(▽).

Press button **4** (OK) to save.

8.11. On Time Delay

This sets a delay, before which the alarm relay will trip, when an alarm condition occurs. You can set it from 00.0 to 99.9 seconds.

It is useful if your measurement has noise or transient alarm conditions and you do not want brief false alarms.

It requires that the alarm condition remains present for the whole **'On.tr'** period, before the alarm output will change.

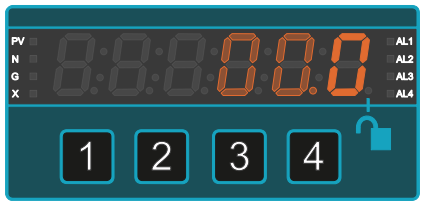
If your trip has this delay set, and an alarm condition occurs, you will see that the alarm annunciator LED will first turn yellow, to indicate that the trip condition has been triggered.

Then after the delay period has passed, the alarm relay will trip and the annunciator LED will turn red.

16

The display will now ask you to set the **'On.tr'**

17



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired time.

18

Press button **4** (OK) to save.

8.12. Timed Pulse Output Duration

This sets a timed pulse output duration on your alarm relay. You can set it from 00.0 to 99.9 seconds.

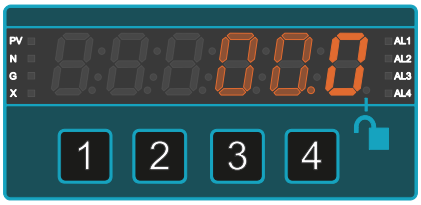
You would normally use this setting and **'On.tr'**. If you set **'On.tr'** to 01.0 and set **'t.Out'** to 05.0, the alarm will activate after 1 second, will remain active for 5 seconds, then be inactive for 1 second, active for 5 and so on, for the duration that the alarm is present. The annunciator LED will be yellow during inactive alarm relay periods and red when the alarm relay is active.

If you alarm mode is **'PuL.H'** or **'PuL.L'**, then you will only get one pulse, whose duration is set by **'t.Out'** and it may be delayed by a period set in **'On.tr'**. The alarm condition must exist for longer than **'On.tr'** for the relay to change state.

19

The display will now ask you to set the **'t.out'** duration.

20



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired time.

21

Press button **4** (OK) to save.

8.13. Off Time Delay

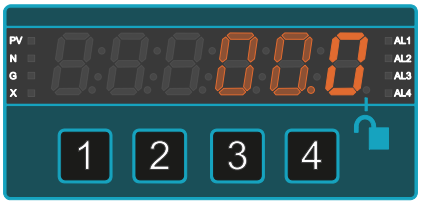
This sets a delay, before which the alarm relay will reset, when coming out of an alarm condition. You can set it from 00.0 to 99.9 seconds.

If your trip has this delay set, and an alarm condition ends, then after the delay period has passed, the alarm relay will reset and the red annunciator LED will turn off.

22

The display will now ask you to set the **'t.out'** duration.

23

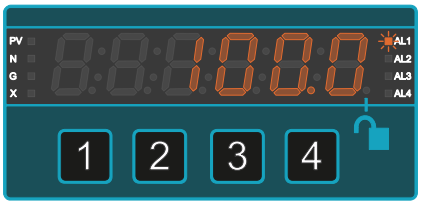


Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired time.

24

Press button **4** (OK) to save.

25



You have now configured your alarm, the display will now show you which alarm you have configured and the set point.

8.14. Installation Hints for Best Performance

This section offers several suggestions which will help you get the best performance from your alarm relay output board.

① Route your relay cabling away from any signal cabling. This is because when the relay operates and switches your load, large electrical noise spikes can be created, and these can interfere with low-level signals. Ideally the relay cabling will be in a separate cable tray or conduit, along with other power cabling.

② You can leave the alarm section of the display unlocked, but lock the main setup system of the display, if you wish. Or you can lock everything out, to prevent any adjustments. Simple switch the Alarm lockout switch on or off, and the Calibration lockout switch on or off, in a combination which best suits your requirements.

③ If you are switching an inductive load, such as a contactor or solenoid, you should use a varistor or flywheel diode to limit the electrical noise spike which will occur when your relay contacts open. This noise spike is caused by the rapidly collapsing magnetic field in the contactor or solenoid, and can create thousands of volts of noise.

Contact the manufacturer of the inductive load, who should be able to guide you regarding suitable varistor of flywheel diode. Most contactor manufactures have standard varistor and diode accessories.

The varistor or flywheel diode should be mounted at the inductive-load end of the cable, not at the display end.

9 Serial Output

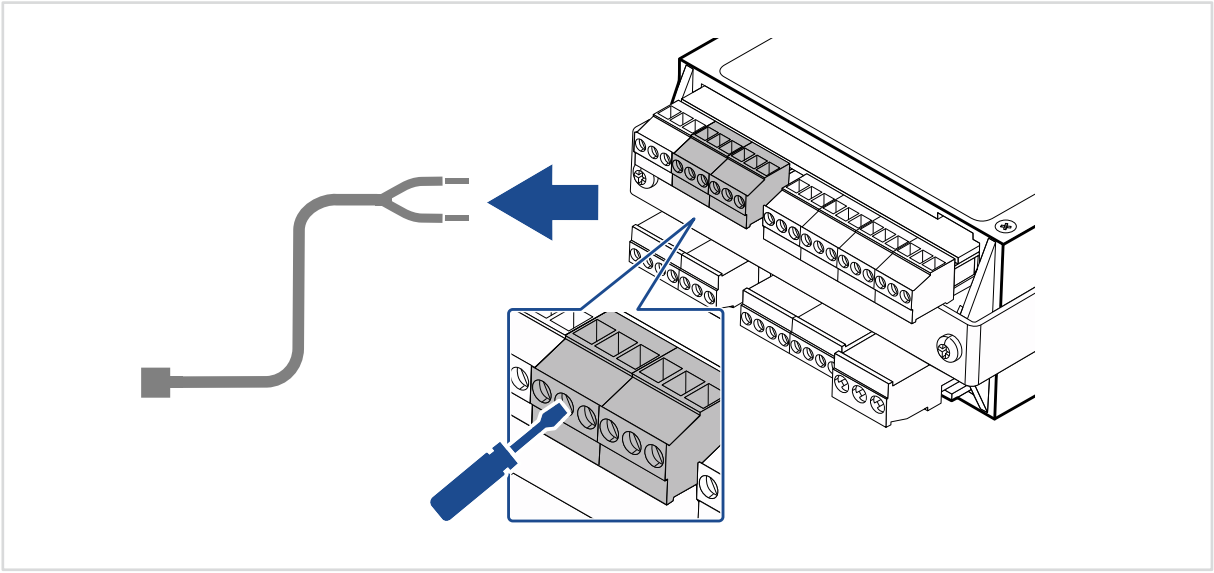
9.1. RS232 or RS485 Serial Data Ports

You can have 0, 1 or 2 data ports. You can configure each of them differently.

For example data port 1 could be RS232 at 9600 baud, sending the meter's reading in ASCII format.

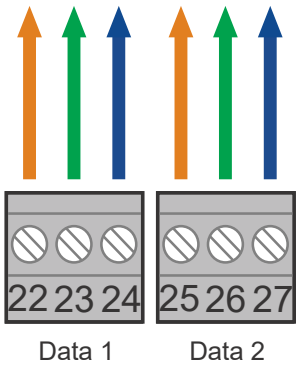
Data port 2 could be RS485 at 115200 baud, giving the meter's ambient temperature in modbus RTU format.

9.1.1. Connections



RS232 Output

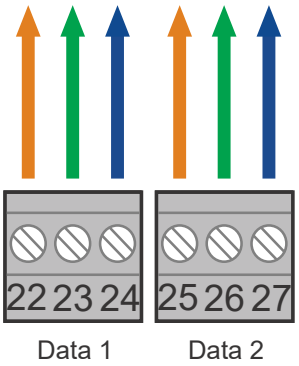
Signal Output (Example x2 RS232 outputs)



Pin	Description
22	Common
23	Rxd
24	Txd
25	Common
26	Rxd
27	Txd

RS485 Output

Signal Output (Example x2 RS485 outputs)



Pin	Description
22	Common
23	A+
24	B-
25	Common
26	A+
27	B-

9.2. How to Configure the Serial Data Ports.

1

Unlock the configuration menu

2

Press and hold buttons **2** (△) and **4** (OK) together for at least 6 seconds.

The display will show Channel 1, **'dAt.1'**.

3

If there are 2 data ports installed, you can now press the button **2** (△) or **3** (▽) to select Channel 2, **'dAt.2'**

4

To select the data port you want to configure press button **4** (OK) to save your choice.

9.3. Baud Rate

The ‘baud rate’ is the rate at which information is transferred in a communication channel.

Example: ‘9600 baud’ means that the serial port is capable of transferring a maximum of 9600 bits per second.

5

The display will now ask you to set the baud rate

6

The baud rate ranges from 300 to 115200

Press button **2**(△) or **3**(▽) to select your choice.

7

Press button **4** (OK) to confirm your choice.

9.4. Data Format

You will now need to select your data format.

8

The display will now ask you to set the data format

Press button **2** (△) or **3** (▽) repeatedly until you see the format you require:

7 data bits, Odd Parity, 1 Stop bit

7 data bits, Even Parity, 1 Stop bit

7 data bits, No Parity, 2 Stop bits

8 data bits, Odd Parity, 1 Stop bit

8 data bits, Even Parity, 1 Stop bit

8 data bits, No Parity, 1 Stop bit

9

Press button **4** (OK) to save your choice.

9.5. Data Protocol

You will now need to select your data protocol. Depending on which protocol you choose, the following configuration options will vary.

10

Press button **2**(△) or **3**(▽) to select your choice.

11

Press button **4** (OK) to confirm your choice.

Continuous ASCII stream

This mode is ideal if you want to send the meter's reading to a remote display. (this mode is also available for time-based displays, such as clock, elapsed time etc.)

Polled 'London ASCII'

This is a general purpose addressable mode, with a simple protocol (not currently available when displaying time, elapsed time, clock etc)

Polled 'Modbus ASCII'

This is a simple modbus ASCII addressable mode (not currently available when displaying time, elapsed time, clock etc)

Polled 'Modbus RTU'

This mode returns data in 32-bit IEEE-754 floating point format. (not currently available when displaying time, elapsed time, clock etc)

9.6. Display Address

You will now need to select the display's output address, from 00 to FF. Choose 00 if you do not need addressing.

12

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired address.

13

Press button **4** (OK) to save.

9.7. Response Delay

Response delay in milliseconds. The default is 10mS. This is the minimum time between receiving the last byte of the request and sending the first byte of the response and it is there is to give slow RS485 transceivers a chance to change direction.

14

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired address.

15

Press button **4** (OK) to save.

9.8. Data Source

You will now need to select the display's output data source, This will only be available in a polled data protocol mode.

12

Press buttons **2** (△) or **3** (▽) to select a data source.

13

Press button **4** (OK) to save.

Only the Nett value will be compared with this alarm set point.

Only the Gross value will be compared with this alarm set point.

Only the Peak (maximum) Gross value will be compared with this alarm set point.

Only the Valley (minimum) Gross value will be compared with this alarm set point.

Only the Peak (maximum) Nett value will be compared with this alarm set point.

Only the Valley (minimum) Gross value will be compared with this alarm set point.

Only the Tare value will be compared with this alarm set point.

Only the ambient temperature sensor value will be compared with this alarm set point.

9.9. Start and End Characters

The Start and End Characters

16

The display will now ask you to set your start character HEX value.

17

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired value.

Press button **4** (OK) to save.

18

The display will now ask you to set your end character HEX value.

19

Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired value.

Press button **4** (OK) to save.

9.10. Repeat Delay

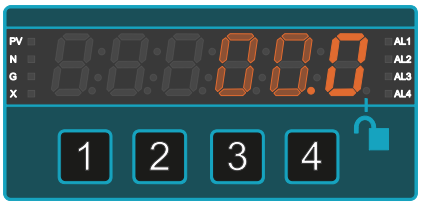
You can now set the repeat delay, if you chose protocol 'C1'

20

The display will now ask you to set your repeat delay value.

The available range is 0.1 to 99.9 seconds.

21



Press button **1** (Digit) to select each digit and edit with buttons **2** (△) or **3** (▽) to show your desired value.

Press button **4** (OK) to save.

9.11. ASCII Character Table

Hex	Value	Hex	Value	Hex	Value	Hex	Value	Hex	Value	Hex	Value
\x00	NUL	\x30	0	\x3F	?	\x4E	N	\x62	b	\x71	q
\x02	STX	\x31	1	\x40	@	\x4F	O	\x63	c	\x72	r
\x03	ETX	\x32	2	\x41	A	\x50	P	\x64	d	\x73	s
\x04	EOT	\x33	3	\x42	B	\x51	Q	\x65	e	\x74	t
\x09	TAB	\x34	4	\x43	C	\x52	R	\x66	f	\x75	u
\x0A	LF	\x35	5	\x44	D	\x53	S	\x67	g	\x76	v
\x0D	CR	\x36	6	\x45	E	\x54	T	\x68	h	\x77	w
\x1B	ESC	\x37	7	\x46	F	\x55	U	\x69	i	\x78	x
\x20	Space	\x38	8	\x47	G	\x56	V	\x6A	j	\x79	y
\x21	!	\x39	9	\x48	H	\x57	W	\x6B	k	\x7A	z
\x2B	+	\x3A	:	\x49	I	\x58	X	\x6C	l	\x7F	DEL
\x2C	,	\x3B	;	\x4A	J	\x59	Y	\x6D	m		
\x2D	-	\x3C	<	\x4B	K	\x5A	Z	\x6E	n		
\x2E	.	\x3D	=	\x4C	L	\x5E	^	\x6F	o		
\x2F	/	\x3E	>	\x4D	M	\x61	a	\x70	p		

The \x prefix shown before each HEX value is needed if you are sending or viewing HEX values through RealTerm.

9.12. ASCII Output Message Formats

Meter sends <STX> 8 characters <ETX>

EXAMPLES	HEX	DISPLAY
Negative value with decimal point:	02 20 20 20 20 2D 31 2E 36 03	
Positive value with decimal point:	02 20 20 20 20 20 31 2E 38 03	
Open circuit:	02 20 20 20 20 2D 4F 43 2D 03	
Short circuit:	02 20 20 20 20 2D 53 43 2D 03	
Display over range:	02 20 20 64 2E 6F 2E 72 2E 03	
Display under range:	02 20 20 64 2E 75 2E 72 2E 03	
Input over range:	02 20 20 69 2E 6F 2E 72 2E 03	
Input under range:	02 20 20 69 2E 75 2E 72 2E 03	

10 Specification

DISPLAY

Type	7 segment LED		
Number of Digits	6		
Digit Colour	Green	Red	Yellow
Digit Height	14.2mm (0.56 inches)		
Viewing Distance	7m (23 feet)		
Brightness	10 levels of adjustment		
Annunciators	4x display status	4x alarm status	1x lock status
Display Update Rate	10 readings per second		

CASE

Bezel	96mm (3.78 inches) wide x 48mm (1.89 inches) high
Panel Cutout	92mm (3.62 inches) wide x 45mm (1.77 inches) high
Front of Panel Projection	13mm (0.51 inches)
Depth Behind Panel	125mm (4.92 inches)
Maximum Weight	360 grams (12.69 ounces) with all options installed
Case Material	Black polycarbonate
Max Width behind panel	100 mm (3.93 inches)

ENVIRONMENTAL

Front Sealing	IP65 standard, IP67 with option SPC4
Rear Sealing	IP20
Storage Temperature	-25 to +60°C
Operating Temperature	-25 to +50°C
Humidity	10 to 95% non condensing
Altitude	-1000m to + 3000m
Vibration/Shock	0-5G, less than 200Hz.
Cleaning	Use only damp cloth moistened with water

POWER

AC Version	95-265V AC or 100-300V DC 47-63 Hz 8W max.	Fuse with 2A 'T' rated (anti-surge) fuse.
DC Version	11-30V DC 8W max.	Fuse with 5A 'T' rated (anti-surge) fuse.
Isolation	Switch-mode transformer galvanic isolation	

POWER FREQUENCY MODE

Input Signal	95-265V AC
Range	47.000 to 63.000 Hz.

0-10V INPUT

Voltage Input Range	-20.000V to +20.000V maximum functional range.
Input Impedance	1 Megohm
Open Circuit Response	0V
Safe Overload Limit	60V DC
CMRR	110dB DC to 60Hz.
Isolation	250V AC
Max. Excitation Voltage*	24V DC
Max. Excitation Current*	30mA DC

4-20mA INPUT

Current Input Range	-40.000 to +40.000mA maximum functional range
Input Impedance	2.5 Ohms
Open Circuit Response	0mA
Safe Overload Limit	High current capacity up to 30V DC permanently applied across current input terminals.
CMRR	110dB DC to 60Hz.
Isolation	250VAC
Max. Excitation Voltage*	24V DC
Max. Excitation Current*	30mA DC

DC SHUNT INPUT

Voltage Input Range	-100.50mV to +100.50mV maximum functional range.
Input Impedance	10 Megohm
Open Circuit Response	-0r- Upscale
Safe Overload Limit	60V DC
CMRR	110dB DC to 60Hz.
Isolation	250VAC
Accuracy	+/- 0.05% of range
Stability	+/- 50ppm/Degree C

LOAD CELL INPUT

Input	Up to 4 x 350 Ohm or 8 x 700 Ohm cells
Excitation Power	Nominal 8V @ 120mA excitation
Accuracy	+/- 0.025% of range
Temperature coefficient	+/- 25ppm/Deg C
Auto zero	Configurable threshold level and duration.
Linearisation	3 to 32 calibration points. Function can be switched in and out.
Filtering / Averaging	4 pole active low pass filter, 7Hz cutoff.
Update Rate	Display updates 10 times per second
Count-by rounding	Can be user adjusted to count in increments of 1, 2, 5, 10, 20, 50
Dead-load add / subtract	Fully adjustable to compensate for added or removed hardware.
Independent scale factor	Fully adjustable multiplying or dividing scale factor, which does not affect the basic calibration.

PULSE - RATE / RPM / TOTAL INPUT

Input Signal	NPN or contact closure input. Switching 5V DC at 1mA
Max. Excitation Voltage*	24V DC
Max. Excitation Current*	30mA DC
Max. Pulse Rate	400Hz
De-bounce	0 to 9999 milli-seconds

RESISTANCE INPUT

Ranges (Max.)	1r Ohm	10 Ohm	100 Ohm	1 kilOhm	1 kilOhm	40 kilOhm
Excitation Current	50mA	50mA	0.5mA	0.5mA	5uA	1.25uA

POTENTIOMETER INPUT

Input	3 or 4-wire resistive

THERMOCOUPLE INPUT

Thermocouple types	Type B	Type E	Type J	Type K	Type N	Type R	Type S	Type T
Temperature Range Low °C	250	-270	-210	-200	-200	-40	-50	-200
Temperature Range High °C	1700	1000	760	1300	1280	1480	1600	370
Temperature Units	Centigrade, Fahrenheit, Kelvin or Rankine							
Resolution	1 or 0.1							
Accuracy	+/- 0.5 degrees C max linearity error							

RTD INPUT

Input	2, 3 or 4-wire - PT100 or PT1000
Temperature Units	Centigrade, Fahrenheit, Kelvin or Rankine
Resolution	1 or 0.1

REAL TIME CLOCK

Time Reference	Internal crystal oscillator
Time Zones	GMT UTC Zulu
Daylight Saving Time	Automatic summer/winter time correction
Formats	HH:MM:SS HH:MM DD.MM.YY MM.DD.YY YY.MM.DD DD.MM MM.DD DDD
Precision	+/- 10 seconds per month

AMBIENT TEMPERATURE SENSOR

Sensor Type	Solid State silicon chip
Resolution	0.01 °C
Range	-20 to +60 °C
Accuracy	+/- 0.25 °C
Update Rate	10 readings per second
Time constant	1 minute

ANALOGUE OUTPUT

Available outputs	0-20mA (active or passive) 4-20mA (active or passive) 0-10V
Drive resistance 20mA Active	Can drive into loads from 0 Ohms to 600 Ohms, using the Active output terminals. 16V DC open circuit output.
Drive resistance 20mA Passive	Can modulate loops from 0 Ohms to 1000 Ohms, using the Passive output terminals. 24V DC external drive voltage.
Drive resistance 0-10V	Can drive into loads greater than 600 Ohms. 30mA short circuit current.
Galvanic Isolation	Optically isolated from all ports up to 250 VAC
Response Speed	10 updates per second
Resolution	18 bit
Precision	+/- 0.05% of range
Temperature Stability	+/- 50ppm of range per ºC

ALARM RELAY OUTPUT

AL1, AL2, AL3 or AL4	1, 2, 3 or 4 mechanical relays
Relay Type	Single Pole Double Throw (SPDT)
Contact Rating	2A @ 250V AC resistive load
Galvanic Isolation	Optically isolated from all ports up to 250V AC
Response Speed	10 updates per second, mechanical response 15mS

SERIAL OUTPUT

Galvanic Isolation	Optically isolated from all ports up to 250 VAC
Response Speed	Updates up to 10 times per second, depending on chosen baud rate.
Repetition Delay	Can be set 0.1 to 99.9 seconds in protocol C1
232 Option	RS232 = Full duplex
485 Option	RS485 = half duplex
Baud Rates	300 600 1200 2400 4800 9600 19200 38400 115200
Address Range	2 byte address, 01 to FE 254 addresses available
Data Formats	701 7 data bits, Odd Parity, 1 Stop bit 7E1 7 data bits, Odd Parity, 1 Stop bit 7N2 7 data bits, No Parity, 2 Stop bits 801 8 data bits, Odd Parity, 1 Stop bit 8E1 8 data bits, Odd Parity, 1 Stop bit 8N1 8 data bits, No Parity, 1 Stop bit

*Both the excitation voltage and current are monitored and controlled by the meter. This allows the meter to provide flexible and precise compensation of cabling resistance, whilst maintaining the sensor's excitation at a level for best signal to noise ratio, depending on which sensor type you use. Changes in the sensor's excitation conditions allow the meter to give instant diagnostic messages. These help you to quickly identify and correct any external wiring or sensor faults which may occur during or after installation.

11 Glossary

If you see something on your display, which you don't recognise, this list of references may help:

Legend	Description
	300 baud
	600 baud
	1200 baud
	2400 baud
	4800 baud
	9600 baud
	19200 baud
	38400 baud
	115200 baud
	Degrees Centigrade / Celsius readout, when thermocouple or PT100 sensor is used.
	Degrees Fahrenheit readout, when thermocouple or PT100 sensor is used.
	Degrees Kelvin readout, when thermocouple or PT100 sensor is used.
	Degrees Rankine readout, when thermocouple or PT100 sensor is used.
	0-20mA input
	0.1 degree Resolution of display, when thermocouple or PT100 sensor is used.
	1 degree Resolution of display, when thermocouple or PT100 sensor is used.
	10V input
	100 Ohm range
	10 Ohm range
	10000 Ohm range
	12 Hour clock format
	1 Ohm range
	1000 Ohm range
	20000 Ohm range

	24 Hour clock format
	4-20mA input
	7 data bits Even parity 1 stop bit
	8 data bits Even parity 1 stop bit
	7 data bits No parity 2 stop bits
	7 data bits Odd parity 1 stop bit
	8 data bits No parity 1 stop bit
	8 data bits Odd parity 1 stop bit
	Alarm Configuration
	Address 0 port, for multi page memory
	Address 1 port, for multi page memory
	Address You can set an address from 00 to FF
	ADC value, show on display
	Automatic cold junction compensation for thermocouple inputs.
	Baud rate
	Bipolar signal
	Bin number Used in averaging of pulsed production rate. Sets a number of bins to be averaged. Each bin has as a defined open-time during which pulses can be entered into it.
	Calibration source
	Contact Closure input 1
	Contact Closure input 2
	Contact Closure input 3
	Contact Closure input 4
	Contact Closure input 5
	Contact Closure input 6
	Cold Junction Temperature.
	Fixed cold junction compensation with definable temperature, for thermocouple inputs.
	Clock function

	Count
	Allows setting of display colour to Green
	Allows setting of display colour to Red
	Allows setting of display colour to Yellow
	Data format. When you see this, you will have the option to select one of several data formats
	Display Over Range. The positive number being sent to the display has more digits than the display.
	Display Tare
	Display Under Range. The negative number being sent to the display has more digits than the display.
	Data Port 1
	Data Port 2
	Debounce filter for contact closure input, set in milliseconds. Prevents multiple input pulses from being processed, when only 1 was intended.
	Defaults - No? Do you NOT want to set the meter to its factory defaults? Press OK if you do NOT want to set factory defaults.
	Defaults - Yes? Do you want to set the meter to its factory defaults? Press OK if you do.
	Used to set the meter with a 4 digit format. Normally only used if you have a 4 digit large display version.
	Used to set the meter with a 6 digit format.
	Direct Calibration You must apply signals to the meter and set the required display value for each signal level you apply.
	Display Lets you choose which parameter to show on the display, by default.
	Division This is the Scale factor choice. For example, if the scale factor is 3 and you chose DIV, all readings will be divided by 3
	Counter mode = Down (total decreases)
	Drift Cancellation turned off
	Drift cancellation turned on
	Drift cancellation Amount threshold.
	Drift cancellation sampling time interval.
	Daylight saving time compensation choices.

	Date (day). Used when setting the calendar.
	External contact closures define - Yes?
	External contact closures define - No?
	End Character You can set a HEX end character for a data stream. For example 03=ETX
	Elapsed timer. Count up or count down
	Error
	European daylight saving calendar.
	Front Button Reset (button3) - disabled
	Front Button Reset (button3) - enabled
	Front Button Tare (button1) - disabled
	Front Button Tare (button1) - enabled
	In-Flight High alarm - Automatic in-flight value.
	In-Flight High alarm - manual in-flight value.
	In-Flight Low alarm - Automatic in-flight value.
	In-Flight Low alarm - manual in-flight value.
	Flight correction. Allows you to set an in-flight amount to compensate for falling material which will add to your container weight, after you shut off feed to the container being filled.
	Frequency In. Used for rate meter scaling.
	Contact closure - Timer Gate
	Gross value, show on display
	Timer mode: counts in hours and minutes HH:MM.
	High Alarm The alarm state will occur if the measured value exceeds the set point value.
	Timer mode: hours minutes and seconds HH:MM:SS
	Contact closure mode is Hold (freeze) display and outputs.
	Hysteresis. Sets a numeric amount by which the signal must return into a non-alarm zone, before the alarm output will reset. Helps to prevent relay chatter.
	Input Over Range. The positive signal being sent to the input terminals is larger than the meter can accept.

	Input Under Range. The negative signal being sent to the input terminals is larger than the meter can accept.
	Lineariser Input signal level identifier. From In.01 to In.32
	In Band alarm. Will cause the alarm relay to trip if the measurement falls within upper and lower band limits.
	In High. Lets you define the highest value of an input signal range.
	In Low. Lets you define the lowest value of an input signal range.
	Load Cell
	Last digit will count/increment by 1 least significant digit. Example 128, 129, 130, 131 etc.
	Last digit will count/increment by 2 least significant digits. Example 128, 130, 132, 134 etc.
	Last digit will count/increment by 5 least significant digits. Example 125, 130, 135, 140 etc.
	Last digit will count/increment by 10 least significant digits. Example 120, 130, 140, 150 etc.
	Last digit will count/increment by 20 least significant digits. Example 120, 140, 160, 180 etc.
	Last digit will count/increment by 50 least significant digits. Example 100, 150, 200, 250 etc.
	Latching High alarm
	Latching Low alarm
	Lineariser is switched OFF. This is a user defined set of between 3 and 31 calibration points, to compensate for sensor or system non-linearity.
	Lineariser is switched ON. This is a user defined set of between 3 and 31 calibration points, to compensate for sensor or system non-linearity.
	Low Alarm The alarm state will occur if the measured value goes below the set point value.
	Load a starting amount to a timer which you are installing, which should already show an accumulated amount. For example, days since last accident.
	No Option fitted
	Negative timing not enabled. A down counter will stop at 0.
	Negative timing is enabled. A down counter will continue past 0 to show negative numbers.
	Nett value, show by default.

	Timer mode: counts in minutes and seconds MM:SS.
	Contact closure mode is None
	Month. Used when setting the calendar.
	Number of lineariser steps you would like to reserve.
	Number of load cells connected in parallel = 1 to 10
	Multiplication This is the Scale factor choice. For example, if the scale factor is 3 and you chose MULt, all readings will be multiplied by 3
	Open circuit It appears that your sensor connection has an open circuit fault.
	Open Circuit sensor will cause the measured value to be at 0.
	Open Circuit sensor will cause the measured value to be at the HIGH end of the scale.
	Open Circuit sensor will cause the measured value to be at the LOW end of the scale.
	Offset A fixed numeric offset, which can be negative or positive, which can be applied to your meter's readings at any time. It is useful in such applications as weighing, if structures have been added to or removed from a weighing platform. You can compensate fr these changes directly with the offset feature.
	Alarm channel disabled.
	Contact closure mode is Off
	No daylight saving compensation. Used for clocks always showing GMT, Zulu, or in regions where daylight saving is not used.
	Off-trip delay. Seconds before an alarm will reset, if the measurement is out of alarm state for the whole period.
	On-trip delay. Seconds before an alarm will activate, if the measurement is in alarm state for the whole period.
	Display Over Range. The positive number being sent to the display has more digits than the display.
	Out Band alarm. Will cause the alarm relay to trip if the measurement falls outside upper and lower band limits.
	Output High. Lets you define the highest value of an output signal range
	Output Low. Lets you define the lowest value of an output signal range.
	Power Frequency - an optional installed feature to show precision frequency of the meter's AC power.
	Pulses In. Used for counter/ totaliser scaling.

	Pump Control - High Used to control a pump which is filling a container or reservoir.
	Pump Control - Low Used to control a pump which is emptying a container or reservoir.
	Peak Gross value, show on display
	Peak Nett value, show on display
	Potentiometer Input. 3 wire or 4 wire.
	Protocol C1 Simple ASCII Continuous stream
	Protocol P1 Simple ASCII addressed protocol
	Protocol P2 Modbus ASCII addressed protocol
	Protocol P3 Modbus RTU addressed protocol
	Contact closure- cause a print stream to be sent from serial port.
	Preset a count amount
	Lineariser confirmation of which point your about to define, with In.01 and rd.01
	Lineariser confirmation of which point your about to define, with In.31 and rd.31
	Pulsed High alarm. Gives one pulse of alarm relay, for a defined duration, when measurement exceeds set point.
	Pulsed Low alarm. Gives one pulse of alarm relay, for a defined duration, when measurement falls below set point.
	Quit your settings without saving
	The maximum resistance you want to measure, in resistance mode.
	Rate
	Lineariser Reading level identifier. From rd.01 to rd.32
	Reading High. Lets you define the highest value of a display range.
	Reading Low. Lets you define the lowest value of a display range.
	Resistance input, 2, 3 or 4 wire.
	Reverse / Mirrored display for heads-up application is Off.
	Reverse / Mirrored display for heads-up application is On.

	Relay will de-energise on alarm (fail safe)
	Relay will energise on alarm (not fail safe)
	Repetition rate You can set how often a stream of data is sent out, when in mode C1
	Contact closure mode is Reset counts and any latched or peak / valley stored values.
	Reset - No?
	Reset - Yes?
	RTD type A Accepts PT100 input, 2, 3 or 4 wire
	RTD type B Accepts PT100 input, 2, 3 or 4 wire
	Save your settings
	Short circuit It appears that your sensor connection has a short circuit fault.
	Start Character You can set a HEX start character for a data stream. For example 02=STX
	Scale A multiplying or dividing scale factor which can be applied to the meter's final reading, after normal scaling has been done. Allows easy conversion of reading from kg to pounds, litres to gallons or pints, etc.
	Sensitivity of your load cell, expressed as mV/V
	Serial data input function
	Upper set point. Used in Band-mode or Pump-Control alarms.
	Lower set point. Used in Band-mode or Pump-Control alarms.
	Set point The point at which an alarm relay output will change state.
	Shunt input Accepts 0-50mV, 0-60mV, 0-75mV or 0-100mV DC current shunt signal.
	Timer mode: counts in seconds to 1/10 second resolution.
	Timer mode: counts in whole seconds.
	Stop
	Start
	Bin time Sets the duration the counting bins are open for.
	Total capacity of your weighing system
	Timeout of alarm relay

	Contact closure - Timer Reset
	Contact closure - Timer Stop
	Contact closure - Timer Start
	Tare value, show on display
	Thermocouple, Type B
	Thermocouple, Type E
	Thermocouple, Type J
	Thermocouple, Type K
	Thermocouple, Type N
	Thermocouple, Type R
	Thermocouple, Type S
	Thermocouple, Type T
	Theoretical calibration. You must enter expected signal levels and desired display values.
	Totaliser function
	Input Signal Type Use up or down button to choose an input signal type.
	Feature is unavailable
	Counter mode = Up (total increases)
	Display Under Range. The negative number being sent to the display has more digits than the display.
	United States daylight saving calendar.
	Valley Gross value, show on display
	Valley Nett value, show on display
	Year. Used when setting the calendar.

12 Legal

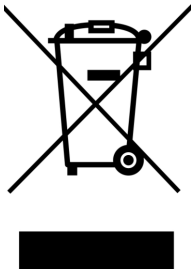
12.1. Waste Electrical Electronic Equipment (WEEE)

In Europe, this equipment must be disposed of in accordance with European parliamentary Directive 2002/96/EC

This directive encourages recycling and the reduction of waste materials in the environment.

This means it must be sent to an approved recycling plant if you want to dispose of it.

It must not be thrown away with general rubbish.



If you are unable to dispose of this item locally, you may send it to us for recycling.

Conditions:

1. We will only accept items of our manufacture.
2. You must pay for the transport of the goods to us.
3. We will only accept items if they include a signed declaration by an authorised person in your organisation, stating that :-
    i. The item is safe to handle and has no contaminants which may be harmful to health.
    ii. You wish us to dispose of or destroy the item(s)

12.2. Declaration of UK & CE Conformity

Declaration Reference	: INTUITIVE Mk5
Issue Date	: 01 January 2024
Products Covered	: INTUITIVE Mk5 series
Title	: DOC-INTUITIVE5

We hereby self-certify that the design and manufacture of this product conforms with the UKCA and CE standards, by complying with the directives and standards below.

Electrical Equipment (Safety) Regulations, 2016 and amendments
Low Voltage Directive 2014/35/EU
BS EN 61010-1 : 2010 + A1 : 2019

Electromagnetic Compatibility Regulations, 2016 and amendments
EMC Directive 2014/30/EU
EN 61326-1 : 2013
Immunity for equipment intended to be used in an industrial electromagnetic environment.

Maximum errors of 1% of dynamic range are permitted.
Instrument must recover automatically from disturbance.

Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations, 2012 and amendments
RoHS2 directive incorporating RoHS3 Amendment 2015/863/EU
EN IEC 63000 : 2018

Conditions

The meters are permitted a worst case error of 1% of A/Drange during electro-magnetic disturbance, and must recover automatically when disturbance ceases without the need for human intervention, such as resetting, power-down etc.

The meters covered by this certificate must be installed in adherence to the following conditions :

Signal cabling shall be routed separately to power carrying cabling (includes relay output wiring)

All signal cabling shall be screened. The screen shall only be terminated to the power earth terminal at the meter end of the cable.

Declared as true and correct, for and on behalf of London Electronics Ltd.

12.3. Warranty

We warrant this product against defects in materials or workmanship for a period of three (3) years from the date of purchase.

In the event of a defect during the warranty period, the unit should be returned, freight (and all duties and taxes) prepaid by the Buyer to the authorised Distributor from where the unit was purchased.

The Distributor, at its option, will repair or replace the defective unit. The unit will be returned to the Buyer with freight charges prepaid by the Distributor.

Before returning complete the RMA (Return of Materials Authorisation) form via the link below:

https://www.london-electronics.com/refund_returns/

LIMITATION OF WARRANTY

The foregoing warranty shall not apply to defects resulting from:

1. Improper or inadequate maintenance by the Buyer.
2. Unauthorised modification or misuse.
3. Operation outside the environmental specification of the product.
4. Mishandling or abuse.

The warranty set forth above is exclusive and no other warranty, whether written or oral is expressed or implied. We specifically disclaim the implied warranties of merchantability and fitness for a particular purpose.

EXCLUSIVE REMEDIES

The remedies provided herein are the buyer's sole and exclusive remedies. In no event shall we be liable for direct, indirect, incidental or consequential damages (including loss of profits) whether based on contract, tort or any other legal theory.

12.4. Disclaimer

London Electronics Limited believes the information stated in this quick start guide to be correct at time of issue. London Electronics Limited does not accept any liability for its accuracy, adequacy or completeness. No express or implied warranty or representation is given relating to the information contained in this document. London Electronics Limited reserves the right to make changes and improvements to the product(s) described herein without notice. The suitability of any products and information should be determined by the buyer and any other user to ensure their own requirements and specifications are met. London Electronics Limited shall not be liable for any loss or damage caused as a result of the user's own determination of how to apply or use London Electronics Limited products.

12.5. Record of Revisions

23 January 2024	Initial release
26 January 2024	Firmware update F003 B070

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