vetec

Large digit sclable loadcell / weighing display

FUSION-L 6 digit version

Connection details, scaling and general information

Caution: There is a risk of electrical shock if this instrument is not properly installed

Caution: Risk of danger: Read the whole manual before you install this meter

Software version F00.14

Document Ref:pm65\manuals\Fusion_L

Revision:9 Dated: 21 November 2008

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Contents

Warnings

Please carefully read this manual and all warnings. Install the display 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 display.

Connect the display according to current IEE regulations, IEC61010 & NFPA:70 National Electric Code in USA.

We designed this meter for Pollution-Degree 2 environments.
It is sealed to IP65 NEMA4 all round for wall and suspension mounting versions with glands on the bottom surface.

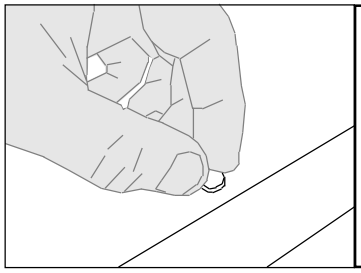
Power supplies to this equipment must have anti-surge (T) fuses at 2A for 230V supply, 5A for 110V supply or 5A for DC supplies in the range 11-30VDC. A switch or circuit breaker, clearly marked as a disconnecting device, must be included close to the installation.

Don't touch any circuitry after you have connected the display, 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 display's case with a soft damp cloth. Only lightly dampen with water. Do not use any other solvents.



Rear case screws - please note

The rear panel is held in place with finger-screws, which only need to be gently tightened.
Do not use tools to tighten or loosen the screws, as this could cause damage to the internal threads.

Safety First .....Don't assume anything..... Always double check.
If in doubt, ask someone who is QUALIFIED to assist you in the subject.

Introduction

Please contact us if you need help, if you have a complaint, or if you have suggestions to help us improve our products or services.

If you contact us about a product you already have, please tell us the full model number and serial number, so that we can give you accurate and fast help.

This product has a 2 year warranty. We will put right or replace any meter which is faulty because of bad workmanship or materials. This warranty does not cover damage caused by misuse or accident.

IMPORTANT

If this equipment is important to your process, you may want to buy a spare to cover possible failure or accidental damage in the future.

This is because during factory shutdown periods, you may have to to wait several weeks for an equivalent replacement, or we may have no stock at the time you urgently need it.

You may also need to pay extra carriage charges if you want a fast, guaranteed courier service. Warranty repairs or replacements are usually returned with a standard courier service.

We do not offer compensation for losses caused by failure of this instrument.

If you do not agree with these conditions, please return this item in unused, condition, in its original packaging and we will refund the purchase price, excluding any carriage paid.

We thought you'd prefer to know about possible delays and extra charges now, rather than during a panic. A spare unit could help to avoid these issues.

We always try to improve our products and services, so these may change over time. You should keep this manual safely, because future manuals, for new designs, may not describe this product accurately.

We believe these instructions are accurate, and that we have competently designed and manufactured the product, but please let us know if you find any errors.

General Description

The FUSION Series of displays accept industrial sensors to allow various physical measurements to be made, such a weight, temperature, pressure, humidity etc. Different models are available for different sensor types.

The main function of the FUSION series is to give a large numeric readout of the variable being monitored. You can choose from various digit sizes and formats. Most models include an excitation power output, to power the sensor directly.

Optional output modules are also available, to give alarm relay outputs, analogue output or digital communications, or any combination of these options.

Displays are programmed using front panel pushbuttons. The buttons may be locked with a switch. The buttons may also be wired remotely, so that you can make your settings from ground level.

These displays have two power supply options : 100-240 VAC or 11-30VDC

These units must be installed fully assembled, and must be installed according to local electrical installation rules. When properly installed, with glands on the lower surface, they provide ingress protection to IP65 / NMA4X

Safety

Caution: There is a risk of electrical shock if this instrument is not properly installed

Caution: Risk of danger: Read the whole manual before you install this meter

Obey all safety warnings in this manual, and install the display according to local wiring and installation regulations. Failure to follow these guidelines may cause damage to the display, connected equipment, or may be harmful to personnel.

Any moving mechanical device controlled by this equipment must have suitable access guards to prevent injury to personnel if the meter should fail.

Mounting and Installation

Install your Fusion display according to local electrical regulations.

Mount it away from moving machinery, to minimise the chance of damage, and keep away from sources of heat, plastics solvents and electrical and magnetic noise, such as welding equipment, arc lighting, inductive machines etc.

The screws on the back of the display are necessary for sealing - do not omit any screws.

Do not overtighten screws - it is sufficient to finger-tighten them. In no circumstance use an electric screwdriver to remove or fit screws, or you will damage the case threads and sealing will be impaired.

Power cables and alarm relay cables should be routed seaparately to input signal, logic signal, serial data and analogue output cabling, to minimise the chances of electrical interference.

Wiring Advice

Only open the case when power has been removed.

This display uses internal detachable screw terminal connectors. Refer to the wiring diagram on the following page for the correct positioning of each wire. Each cable is fed through a compression gland for sealing. All glands must be sealed, unused glands must be plugged.

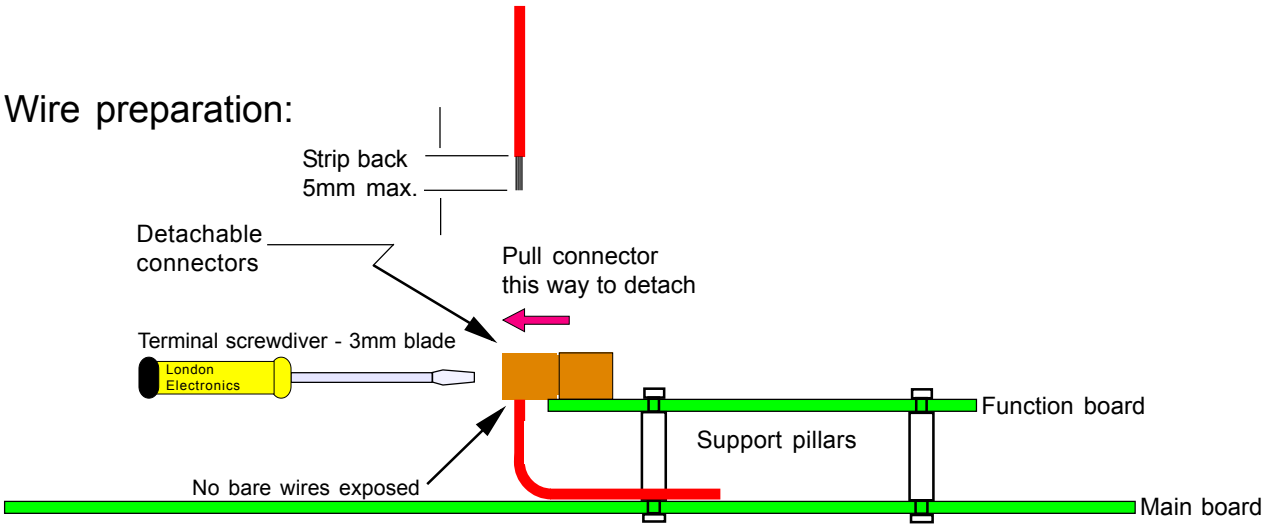
The conductors you use must be suitable for the meter's temperature, current and voltage rating, which is broadly described as follows:-

Cable Temperature Rating
All cables must be rated for operation up to 90C continuous.

Cable gauge
The connectors on this instrument can accept conductors up to 1.5mm^2 c.s.a. The minimum cross sectional area shall be 0.5mm^2

Cable insulation voltage rating
Cables shall have an insulation voltage rating of at least 380V continuous.

Wire preparation:

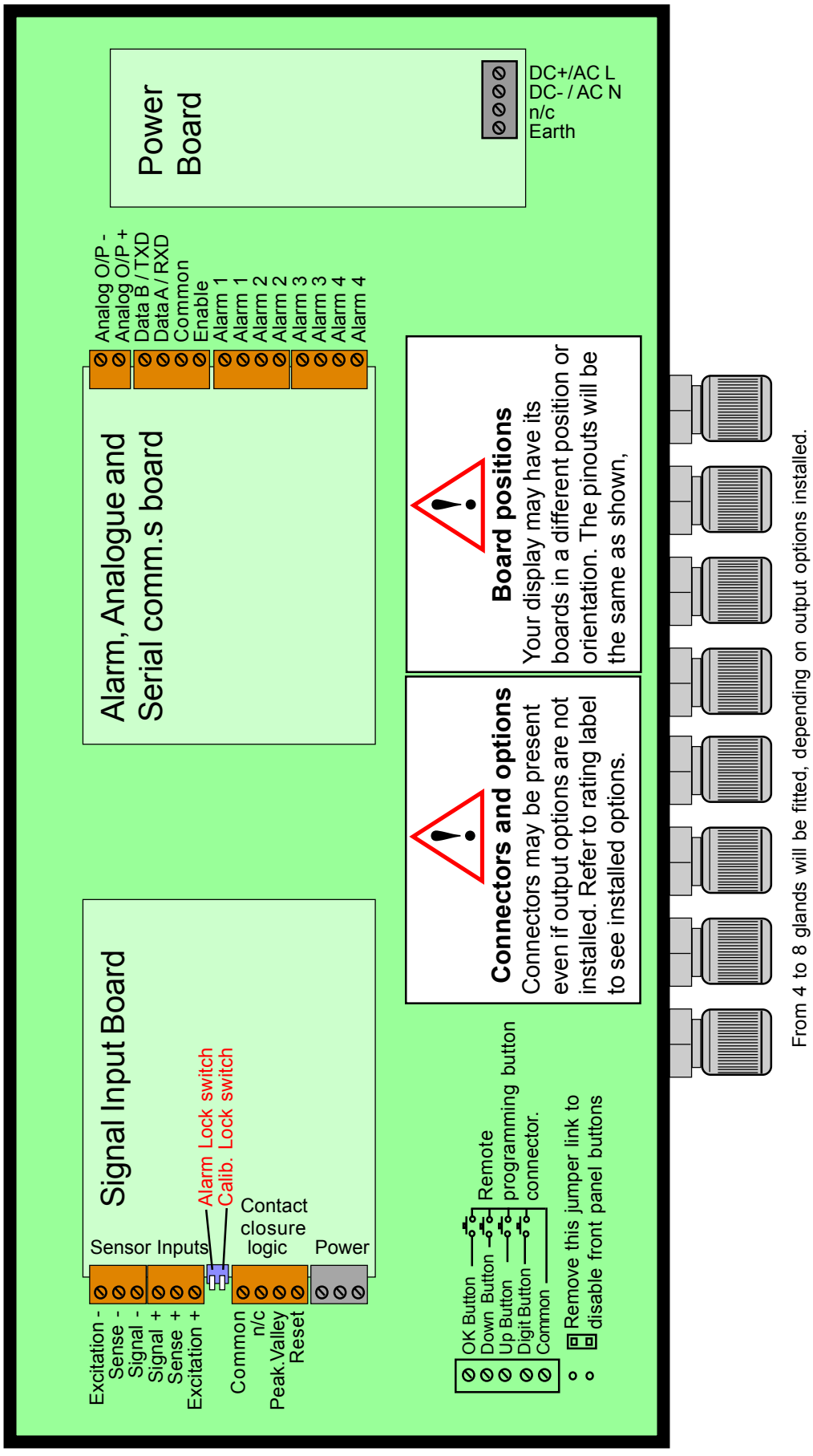


We recommend multi-strand wire, because it withstands vibration better than single strand cable. Pull the wire firmly after you make the connection to confirm it is tight.

Use screened cable for all signal and control wiring and connect the screen to earth at the destination end only. Route signal cabling away from power cabling and relay switching cabling, to avoid electrical noise interference.

Use a single, circular cable through each gland, diameter 4.5 to 6.5mm

Connections



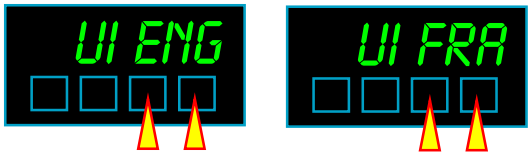
From 4 to 8 glands will be fitted, depending on output options installed.

Startup meter Settings

Lockout notes: Cal Lock switch = OFF when changing. Switch Cal Lock to ON after changing

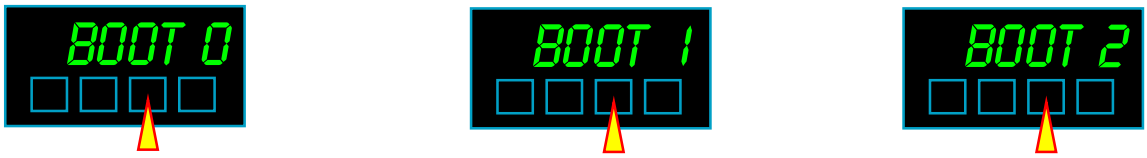
Menu Language Choice

Press the two right hand buttons briefly. You will see the **U**ser **I**nterface language, which you can change with the UP or DOWN buttons. Accept with OK



Next you will see ...

Meter Bootup routine



1. Activates all digit segments
2. Runs up and down brightness settings
3. Displays model number and installed options
4. Displays firmware version
5. Displays calibration audit number.
6. Goes to meter mode

1. Activates all digit segments
2. Runs up and down brightness settings
3. Displays model number and installed options
4. Goes to meter mode

1. Goes immediately to meter mode

When you switch the meter on, it can run through a summary list of software version number, installed options, calibration number etc.

You can choose from the 3 lists of bootup information to be displayed, the less information you display, the sooner the meter will be available to operate.

Next you will see ...

Tare Memory

You can configure the meter to store any tared values on power down (Tar.1), typical in weighing applications, or you can clear the tare memory on power down (Tar.0).

Next you will see ...

Drift cancellation (Not on INT2-C, INT2-S)

If your meter will normally be showing 0, for example a platform scale, you can set the meter to continually cancel any long term drift. To do this, set Drf. 1. to remove this feature, select Drf.0

This only operates at and around zero reading.

The meter will compares readings to previous ones every 30 seconds, and if the value has changed by a small amount, the meter will aoutomatically re-zero. The maximum movement in a 30 second period is 8 counts of the least-significant digit. Any more than that, we assume the change has been a valid process movement, so leave the change unaltered.

Brightness Adjustment

Lockout notes: Cal Lock switch = ON when changing.

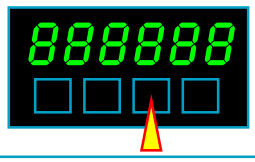
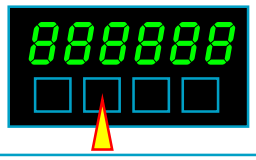
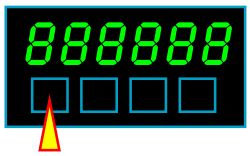
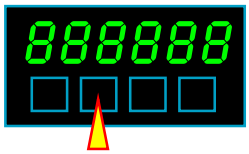
In normal operation, you can select from one of 8 brightness levels, to suit your local lighting conditions, or to match the brightness of several meters which may be from different batches or ages.

Press for 3 seconds, then press the down or up button to decrease or increase the brightness.

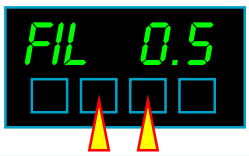
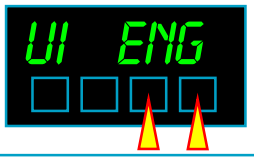
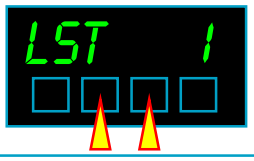
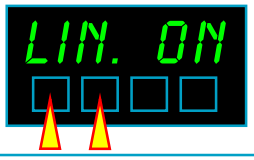
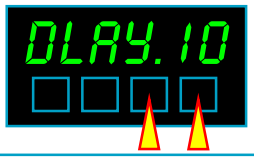
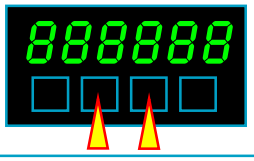
Press OK when set.

Your chosen brightness level will be saved in memory, so that the meter will return to the chosen brightness after power-off.

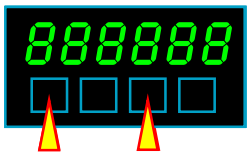
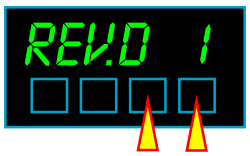
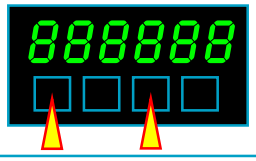
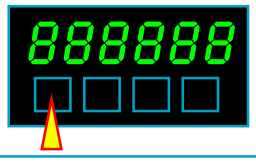
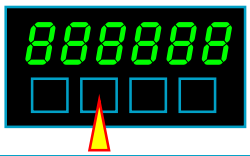
Button Functions- 'Quick-Step' - Page 1

Functions	Buttons	Conditions
Alarm Settings Press button briefly to view >3 seconds to change setpoint >5 seconds to change function		Can be viewed at any time. Alarm lockout OFF to change
Analogue Output Settings Press > 3 seconds to enter		Calibration lockout OFF
Brightness Press button for 3 seconds Change with UP/DOWN button. OK=Accept		Calibration lockout ON
Calibration Factor Press both buttons >3 secs, press OK 2x Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Calibration Offset Press both buttons >3 secs, press OK 3x Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Calibration Span Setting Press > 3 seconds to enter		Calibration lockout OFF
Calibration Type Press both buttons >3 secs Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Calibration Zero Setting Press > 3 seconds to enter		Calibration lockout OFF
Decimal Point position Press button 3 seconds, set during Cal Span Change with UP/DOWN button. OK=Accept		Calibration lockout OFF

Button Functions- 'Quick-Step' - Page 2

Functions	Buttons	Conditions
Drift Compensation Press both buttons briefly, press OK 2x Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Filter Jump percentage Press both buttons >3 secs, press OK 1x Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Filter time constant Press both buttons >3 secs Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Hardware & Software summary Press both buttons >3 secs		Can be viewed at any time
Language& Boot-up mode Press both buttons briefly Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Last digit round-up Press both buttons >3 secs, press OK once Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Linearisation Press both buttons briefly, press Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Menu timeout delay Press both buttons briefly, press OK 3x Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Reset Peak & Valley memories Press buttons briefly		Calibration lockout ON Link terminals 7,10 and 8

Button Functions- 'Quick-Step' - Page 3

Functions	Buttons	Conditions
Reset Tare Press buttons briefly		Calibration lockout ON Link terminals 7, 10 and 8
Reverse / Mirror display Press both buttons briefly, press OK 5x Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Serial Comms setup Press both buttons briefly		Calibration lockout OFF
Tare display to 0 Press button briefly. Display shows 0 and the button LED will illuminate to show you are tared.		Calibration lockout ON and Link terminals 7 and 8
Tare Storage Press both buttons briefly, press OK once Change with UP/DOWN button. OK=Accept		Calibration lockout OFF
Valley & Peak (Max. & Min.) Press button briefly, once for peak, next for valley.		Calibration lockout ON Link terminals 7 and 9

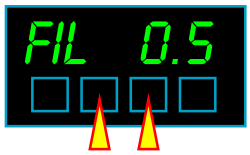
Filter settings

You can use the filter to improve display stability. This is useful if your signal is unstable. Bigger time constants give more stability but slower response.

Filter time constant

Press both buttons >3 secs

Change with UP/DOWN button. OK=Accept



Calibration lockout OFF

The Time constant of this digital filter is very similar to the time constant of an RC filter where T=RC . The time constant is the time it takes for the display to reach 63 % of its final reading value, after a step change on the input.

You will see that if you select a 1 second filter time, it will take several seconds for the meter to reach its final value.

To give improved response to large step changes, we can momentarily cancel the filter action with the 'Filter Jump' feature

Filter Jump percentage

Press both buttons >3 secs, press OK 1x

Change with UP/DOWN button. OK=Accept

Calibration lockout OFF

How does the Filter Jump feature work?

First, make a note of the range you **calibrated** your meter over (not the full dynamic range of the meter, just the the difference between the maximum and minimum display values you set, in either direct or theoretical calibration) Let's assume you calibrated the meter for a 250 range.

If you set the filter jump percentage to 25%, any sudden change in input of less than 25% of 250 will be included in the averaging calculation.

However, a jump of greater than 25% will cause the filter to be ignored and the meter will immediately jump to that new value.

If you set a jump of 0%, filtering will always be overridden (never any filtering)

If you set a jump of 99%, filtering will always be present, so long as the input signal doesn't jump more than 99% of the calibrated range.

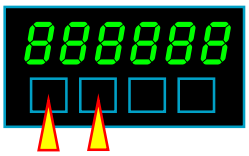
Calibration Methods - introduction

There are two ways you can calibrate your display, and each way can be done with 2 points only, or up to 10 linearisation points.

A. Direct connection of real-time low and high input signal levels, which you scale the display against. (Zero and Span)

B. Theoretical scaling, where you use the keyboard to enter expected zero and full scale sensor signals, and the measurement amounts these relate to .

Calibration lockout switch must be OFF to view and/or change calibration.
Press Set1 and Set2 buttons at the same time...



After a couple of seconds, display shows...

Shortly after CAL.SrC appears, the display will change to show either dIrECt or tHEor as below.

Examples of Direct Calibration...

1. If you want to calibrate a weighing system by loading it with known calibration weights.

2. If you want to calibrate a straight-sided tank gauging system by filling the tank with a known amount of liquid.

3. If you are performing a calibration check against a calibration reference, such as humidity cells, pH buffers etc.

Press UP or DOWN arrow to change

Press OK to choose.

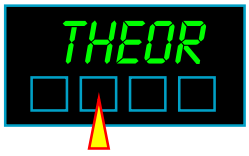
Press △ button to toggle

Examples of Theoretical Calibration...

1. If you do not yet have your sensor, but know what its published calibration settings are.
For example, you plan to use a pressure sensor, which will give 0-20mV for 0-250 kg. You can enter the input range of 0-20mV and the measurement range of 0-250.

2. If you are a distributor, supplying adisplay to an end user who will be buying his sensor from another source. He has told you on his order what he would like the scaling to be.

Press UP or DOWN arrow to change



Press OK to choose.

When you have chosen the Calibration type, it will be saved in your display's memory, so you will not need to repeat the procedure.

You may now calibrate your display using your preferred method, on the following pages...

Direct Calibration, no linearisation

Lockout notes: Cal Lock switch = OFF when changing. Switch Cal Lock to ON after changing

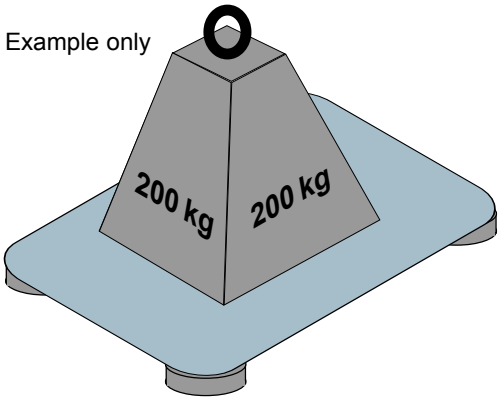
Set your calibration method to DIRECT - see previous page.

Assume we want to calibrate a weighing platform, rated at 250kg. We have a 200kg calibration weight. (Use at least 60% rated load for calibration. 100% ideally)

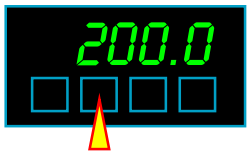
First, calibrate the full scale (SPAN) reading. We do SPAN first, because in the SPAN procedure we can set the **decimal point** position of our measurement, to set resolution.

SPAN Calibration . Apply your calibration load and press the **Set2** button for 3 seconds.
Display will show 'direct' , 'set HI' . Press OK. You will see that one digit is brighter than the others.

Example only



Enter your calibration weight value.



Press OK when done.

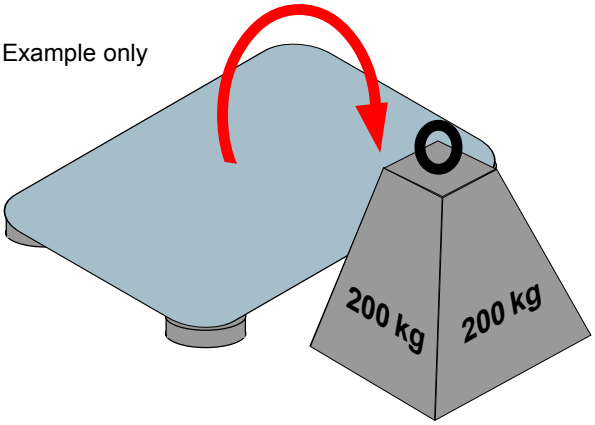
You can edit the value of a brightened digit with the UP/DOWN buttons.
You can brighten other digits with the DIGIT button.

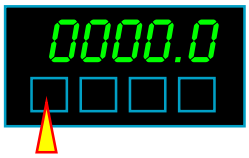
Go through each digit in turn, to set the desired value of your calibration load.
Press OK when done.

To set the **decimal point position**, press the **Set2** button for 3 seconds whilst in the numeric setting stage . You'll see all decimal points light, with one brighter than the rest. Use UP or DOWN buttons to move the brightest decimal point and press OK when in the desired position.

ZERO Calibration. Remove your load and press the **Set1** button for 3 seconds.
Display will show 'direct' , 'set LO' . Press OK. You will see that one digit is brighter than the others.

Example only





You can edit the value of a brightened digit with the UP/DOWN buttons.
You can brighten other digits with the DIGIT button.
Go through each digit in turn, to set all digits to 0. Press OK when done.

Theoretical Cal., no linearisation - page 1

Lockout notes: Cal Lock switch = OFF when changing. Switch Cal Lock to ON after changing

Set your calibration method to THEORETICAL - see previous pages

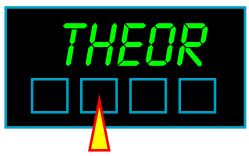
As an example, let us assume we want to calibrate the display for a pressure sensor input.

Let us also assume that we know from the calibration sheet which came with the pressure sensor, that it has an output of 0-20mV and a rated capacity of 0 to 50 kg

.

We need to enter these figures into the display...

Start with the full scale SPAN setting...



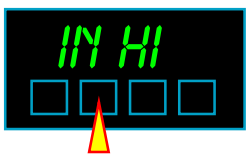
Press the Set2 button for around 3 seconds.

The display will briefly show **theor**, to confirm that we are in the theoretical setup mode.

Choose with the up or down arrows and press OK.

In HI will appear briefly, followed by a numeric value, which you can set...

The numeric value will need to be the High input signal level ...



Set to highest input signal level which was 20mV, according to the sensor calibration sheet in our example.

You can change the value of the brightest digit with the UP or DOWN buttons. Brighten other digits with the DIGIT button.

Press OK when done...

Theoretical cal., no linearisation - page 2

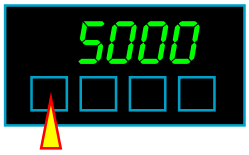
....Continued from previous page

rd HI will appear briefly, followed by a numeric value, which you can set...

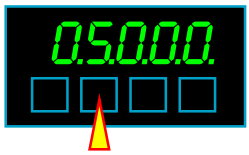
The numeric value will need to be the High display reading value ...

Set to highest reading value, which was 50 according to the sensor calibration sheet in our example.

You can change the value of the brightest digit with the UP or DOWN buttons.
Brighten other digits with the DIGIT button.
Press OK when done...

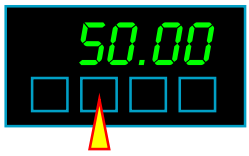


To change decimal point position, press the **Set2** button for around 3 seconds while you're in the rdHI setup...



Use the UP arrow button to move the decimal point to your desired position.

Press OK when done.



You can change the position of the decimal point, relating to rd HI (and rd LO)

This may be useful if you want to increase the resolution of the display.

The resolution affects several of the display's important functions, such as ....

...the resolution of the analogue output signal
...the resolution of your alarm relay action.
...the resolution of the serial data output value.

As an example, assume you have a sensor with 10 tonne capacity.

If you scale the display for 0 to 10, the resolution will only be 1 part in 10

Your analogue output will change in 10% steps.Your precision of alarm setting would be to within 1 tonne. The resolution of serial data would be within 1 tonne.

However, if you include a decimal point you could control the resolution, as in these examples :-

0-10.0 which gives 1% resolution
0-10.00 which gives 0.1% resolution
0-10.000 which gives 0.01% resolution

You cannot get more resolution than 1 part in 60000. This is the limit of resolution in the A/D converter.

Note: If you change the decimal point position, you must reset the rdLO and rdHI values also.

Next .... how to set the theoretical ZERO calibration...

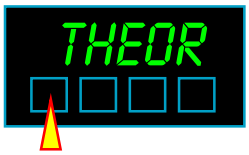
Theoretical cal., no linearisation - page 3

Continued from previous pages. ZERO setting ...

Press the **Set1** button for around 3 seconds.

theor will appear briefly, to confirm that you are in the theoretical calibration mode.

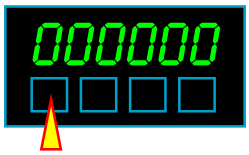
The numeric value will need to be the low input signal value ...



Next, **In Lo** will appear briefly. Set to the low input value, which was 0mV according to the sensor calibration sheet in our example.

You can change the value of the brightest digit with the UP or DOWN buttons. Brighten other digits with the DIGIT button.

Press OK when done...



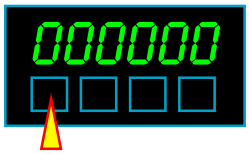
rd LO will now appear briefly, followed by a numeric value, which you can set...

The numeric value will need to be the low reading value ...

Set to the low reading value, which was 0kg according to the sensor calibration sheet in our example.

You can change the value of the brightest digit with the UP or DOWN buttons. Brighten other digits with the DIGIT button.

Press OK when done...

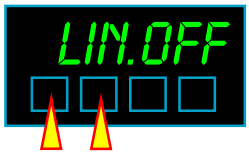


This completes the Theoretical calibration routine. Please remember to switch the Calibration Lockout switch ON

Linearisation - theoretical scaling

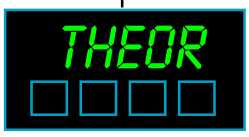
Lockout notes: Cal Lock switch = OFF when changing. Switch Cal Lock to ON after changing

Choose THEORETICAL Calibration method - See the Calibration methods page.



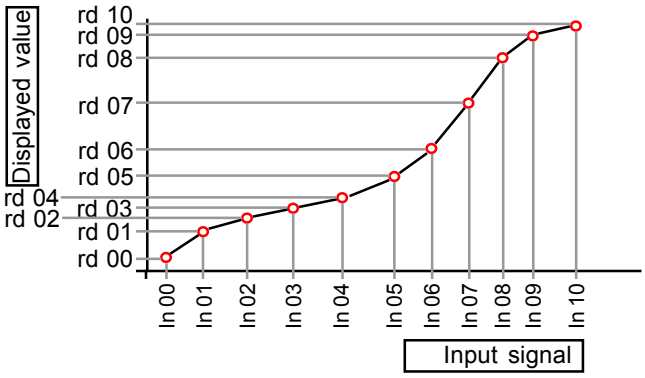
Press both left buttons briefly
You can now choose to have the linearisers on or off

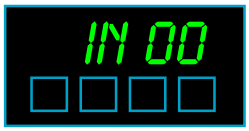
Press OK to select



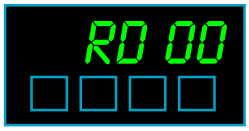
Confirms you are in Theoretical Cal mode

Confirms DC voltage range. If DC current, this display will show DC A
If loadcell, this will be absent





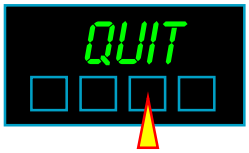
Set Value for input signal at point 0. Press OK when done



Set Value for display at point 0. Press OK when done

Press OK if you want to add another point

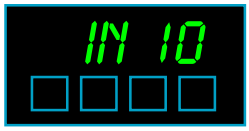
Press OK if you want to quit / abort.



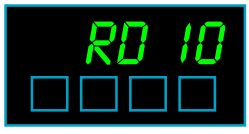
Press OK if you want to finish and save.

Press OK to select

You can set as many or few points as you wish. 11 points available.

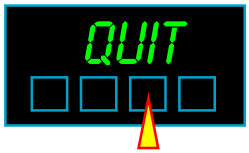


Set Value for input signal at point 10. Press OK when done



Set Value for display at point 10. Press OK when done

Press OK if you want to quit / abort.



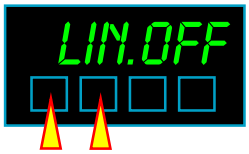
Press OK if you want to finish and save.

Press OK to select

Linearisation - Direct scaling

Lockout notes: Cal Lock switch = OFF when changing. Switch Cal Lock to ON after changing

Choose a DIRECT Calibration method - See the Calibration methods page.



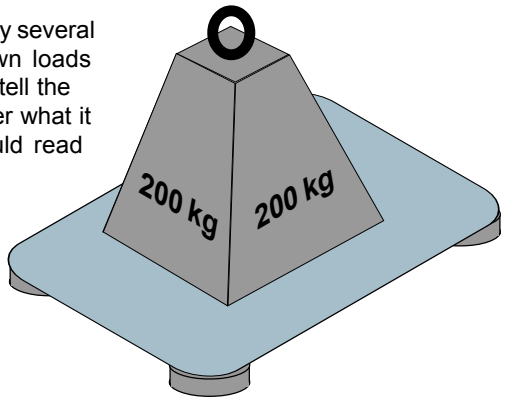
Press both left buttons briefly
You can now choose to have the linearisers on or off

Press OK to select

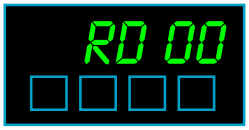
Confirms you are in Theoretical Cal mode

Confirms DC voltage range. If DC current, this display will show DC A
If loadcell, this will be absent

Apply several known loads and tell the meter what it should read



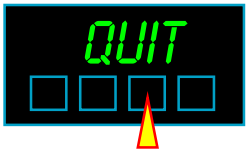
Apply input for known value 00. Press OK when done



Set Value for display at point 0. Press OK when done

Press OK if you want to add another point

Press OK if you want to quit / abort.

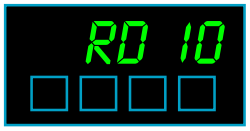


Press OK if you want to finish and save.

Press OK to select

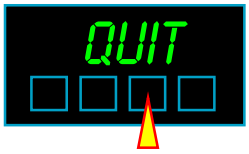
You can set as many or few points as you wish. 11 points available.
You can quit and Save with less than 11 points if you wish.

Apply input for known value 10. Press OK when done



Set Value for display at point 10. Press OK when done

Press OK if you want to quit / abort.



Press OK if you want to finish and save.

Press OK to select

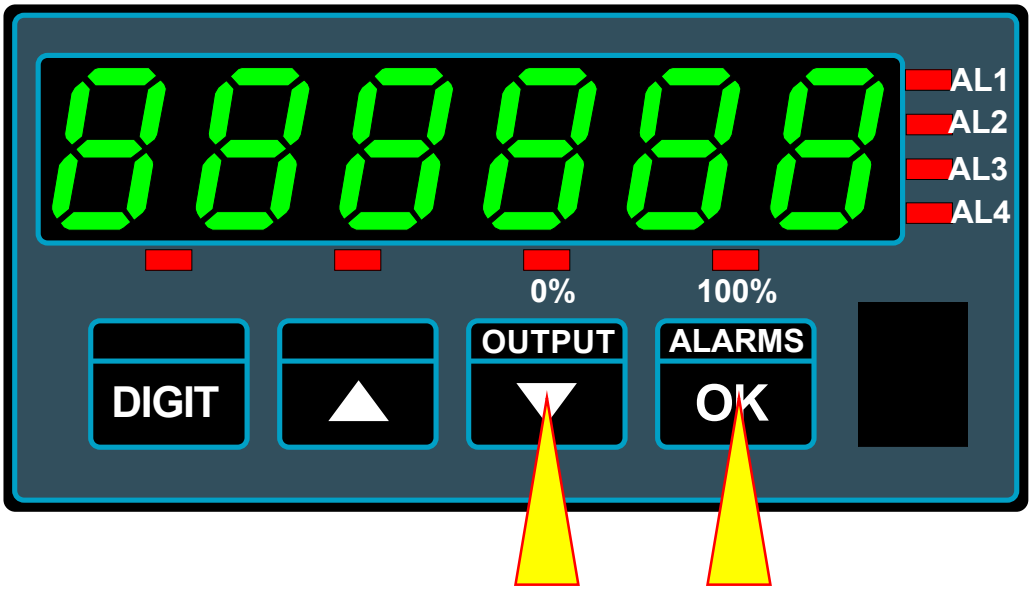
Zero Drift Compensation

Lockout notes: Cal Lock switch = OFF when changing. Switch Cal Lock to ON after changing

If your application means the display is normally showing 0, for example a weighing platform which only occasionally carries a load, you can set the meter to constantly check the zero calibration.

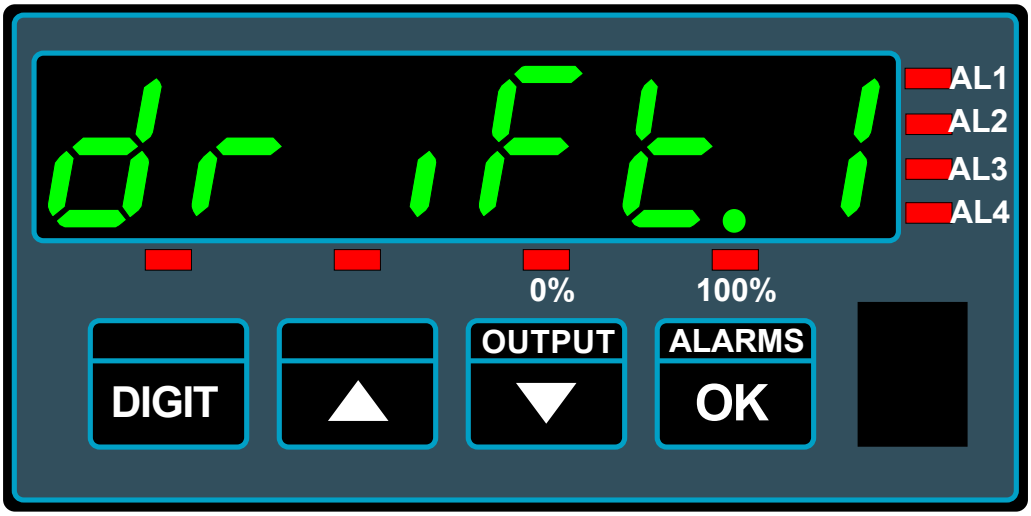
It does this by comparing readings every 30 seconds, and if the reading should wander off 0 by a small amount, the meter will re-zero the display.

It will not re-zero if the reading goes above 8 counts, or below -8 counts, as we consider that this may be a true measurement value.



Press together briefly (will show “UI ENG”)

Now press 2 times until you see something like ...



Use the UP/DOWN buttons to choose **drift.0** to disable the drift correction or **drift.1** to enable it. Press OK when done.

How to install option boards

Warning:
Disconnect all power before exposing the rear of the meter

If you want to open your display to install or modify option boards, follow these steps...

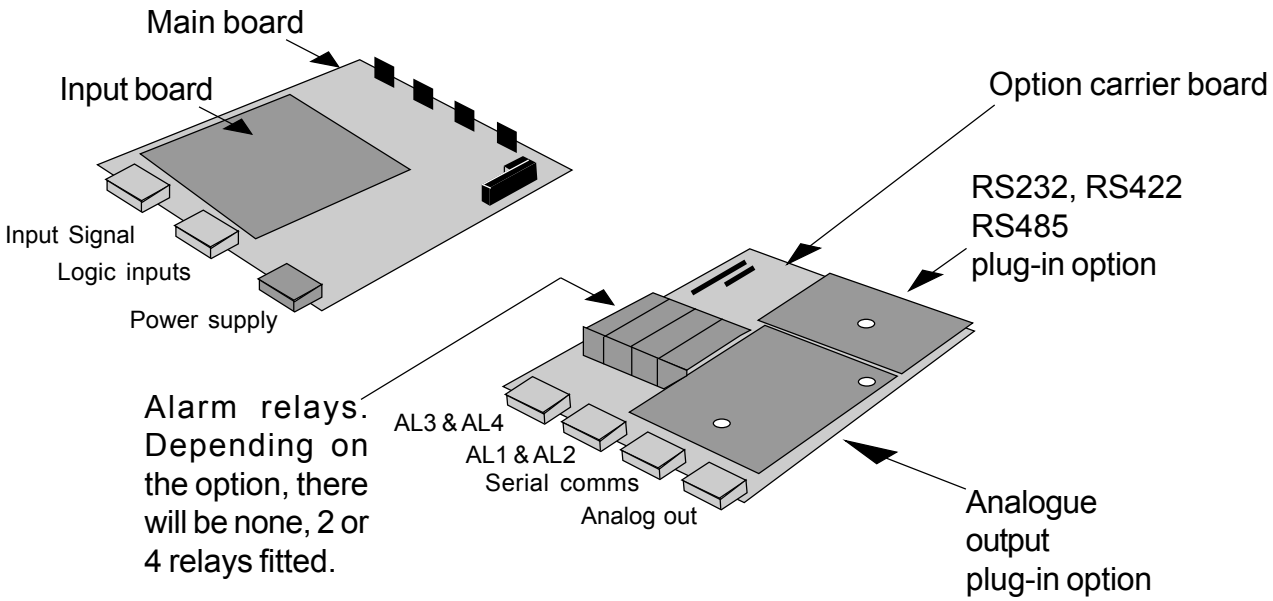
1) Switch off power to the display.

2) Undo all screws on the rear of the case, remove the back panel.

3) The internal display board has positions for mounting the main board and the option board

4) The option board will either have 0, 2 or 4 relays, and can be fitted onto the connectors. It is secured by white plastic press-pillars. You can add an analogue output option and a serial output option to this option carrier board, or one of each, or neither.

The board assemblies will look something like this...



You must apply a firm force when fitting or removing these options.

Always be careful to connect the pins to sockets accurately. When reassembling, make sure option boards are firmly fixed to the upper option board. When the boards are installed, you can make connections via the cable glands - see manual for terminal identification. when wiring is complete, replace the back panel and re-fit all the screws - do not over-tighten.

Analogue Output - page 1

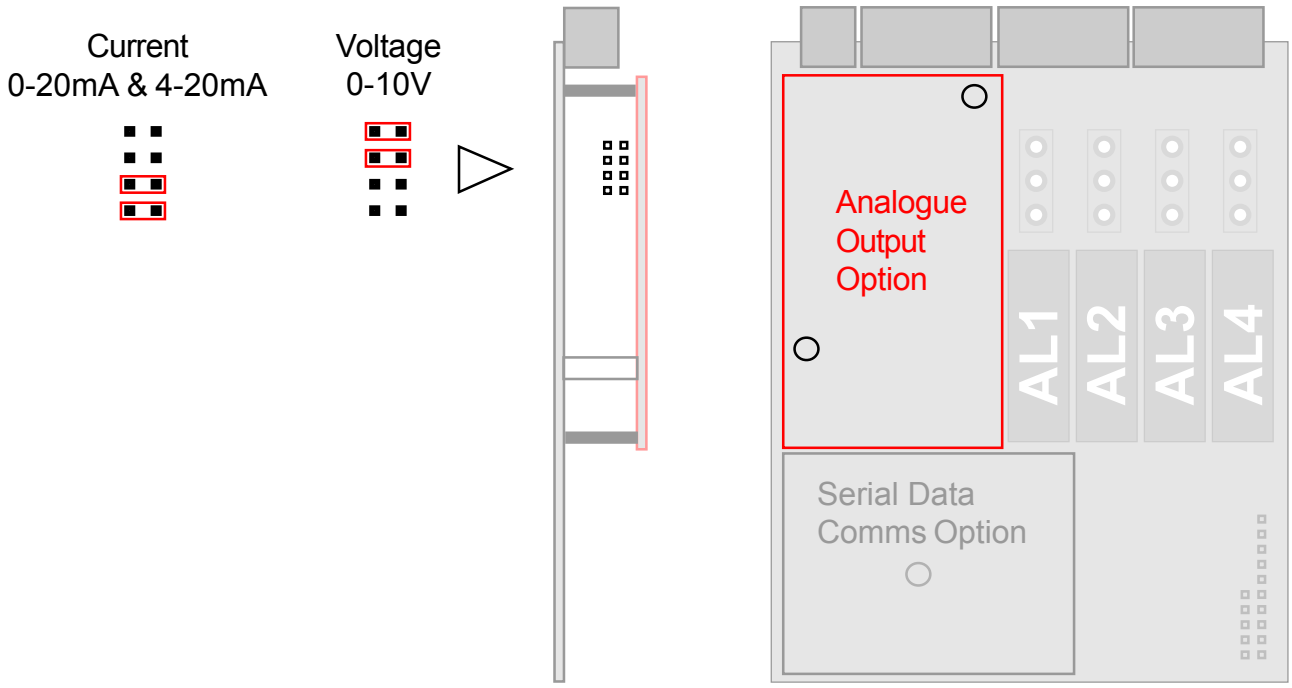
Warning:
Disconnect all power before exposing the rear of the meter

Warning:
Disconnect all cables from option board before adjusting

The analogue output board plugs onto the 0, 2 or 4 alarm upper option board.

It plugs onto a pair of connectors and is secured by two snap-pillars.

Check that the unit is set for voltage or current output, to suit your application.



Re-assemble the meter, apply power and follow the Analogue Output Settings procedure on the next page.

You can set the analogue output to operate over a display range of your choice, to create 0-20mA, 4-20mA or 0-10V, fully isolated.

Please see the following page for a guide how to do this.

Handy Feature
You can tell if an analogue output is fitted to your meter, and if it has been set for voltage or current, by viewing the 'Summary' display.

To see this, press the two outer buttons of the display for 3 seconds. You will also see the summary when you first switch on your meter.

Analogue Output - page 2

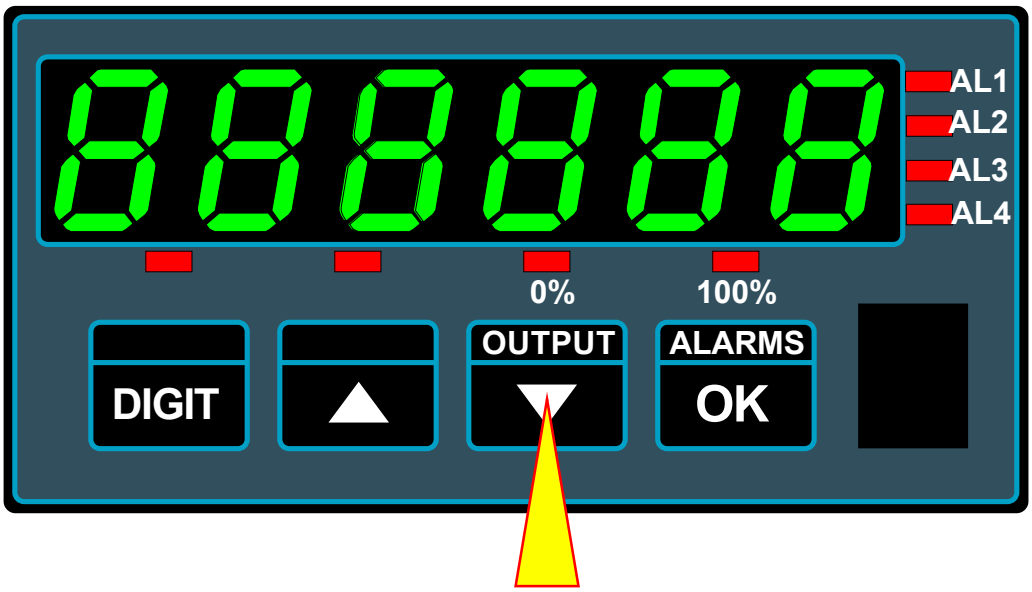
Lockout notes: Cal Lock switch = OFF when changing. Switch Cal Lock to ON after changing

Your analogue output can cover 0-100% of its range over a display range which you can set.

For example, you might want 4-20mA output, for a display range of 500 to 1000.

You would press the Analogue O/P button for 3 seconds, and select 4-20mA

Then set 0% = 500
Then set 100% = 1000



Press the OUTPUT button for 3 seconds. If an output board is fitted, the display will confirm this and confirm the range chosen by the jumpers on the previous page.

The 0% LED will flash. Select the Output range you want.

Use the **DIGIT**, ▲ and ▼ buttons to set the display value at which you want 0% analogue output.

Press **OK** when done.

The 100% LED will flash.

Use the **DIGIT**, ▲ and ▼ buttons to set the display value at which you want 100% analogue output.

Press **OK** when done.

When you have finished setting the meter, put the lockout switch in its ON position now, to prevent your settings from being changed.

Alarm Board Configuration

Warning:
Disconnect all power before exposing the rear of the meter

Warning:
Disconnect all cables from option board before adjusting

Warning:
All switched power must come from the same phase.

You can have 3 types of alarm board:-

a) An alarm board with no relays, which will simply allow you to fit analogue and/or serial output options.

b) An alarm board with 2 relays, to which you can also fit analogue and/or serial output options.

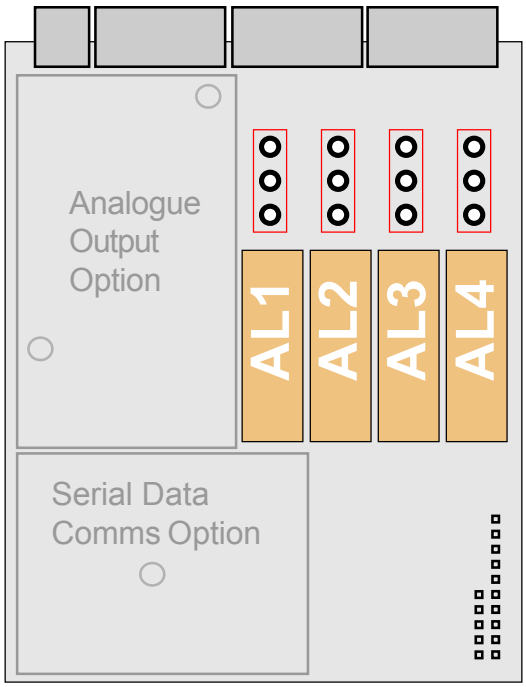
c) An alarm board with 4 relays, to which you can also fit analogue and/or serial output options.

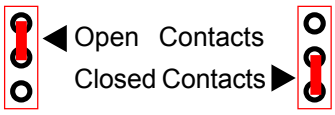
For failsafe operation (where contacts open on alarm or when power is lost to the meter) set the jumpers for OPEN CONTACTS as shown below, and DE-ENERGISE on alarm, in the alarm setup menu.

To access the alarm board, remove power from meter, including any power which might be on the alarm output board.

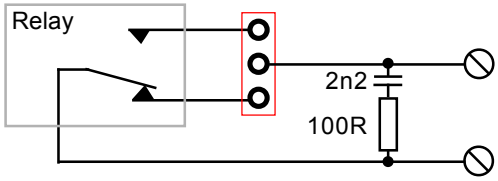
Look on the top and bottom surfaces of the case, near the rear. You will see two small screws, one on each surface. Remove both screws. Now, clip off the front bezel and slide the meter assembly carefully out via the front of the case.

The relay board plugs into the main board. Gently separate the two boards.





Select relay output contact status, when relays are de-energised (power removed from meter) by placing these jumpers. Each relay has a snubbing network to minimise contact sparking.



When you have set the jumpers, refit the board to the meter and carefully slide the assembly back into the case.

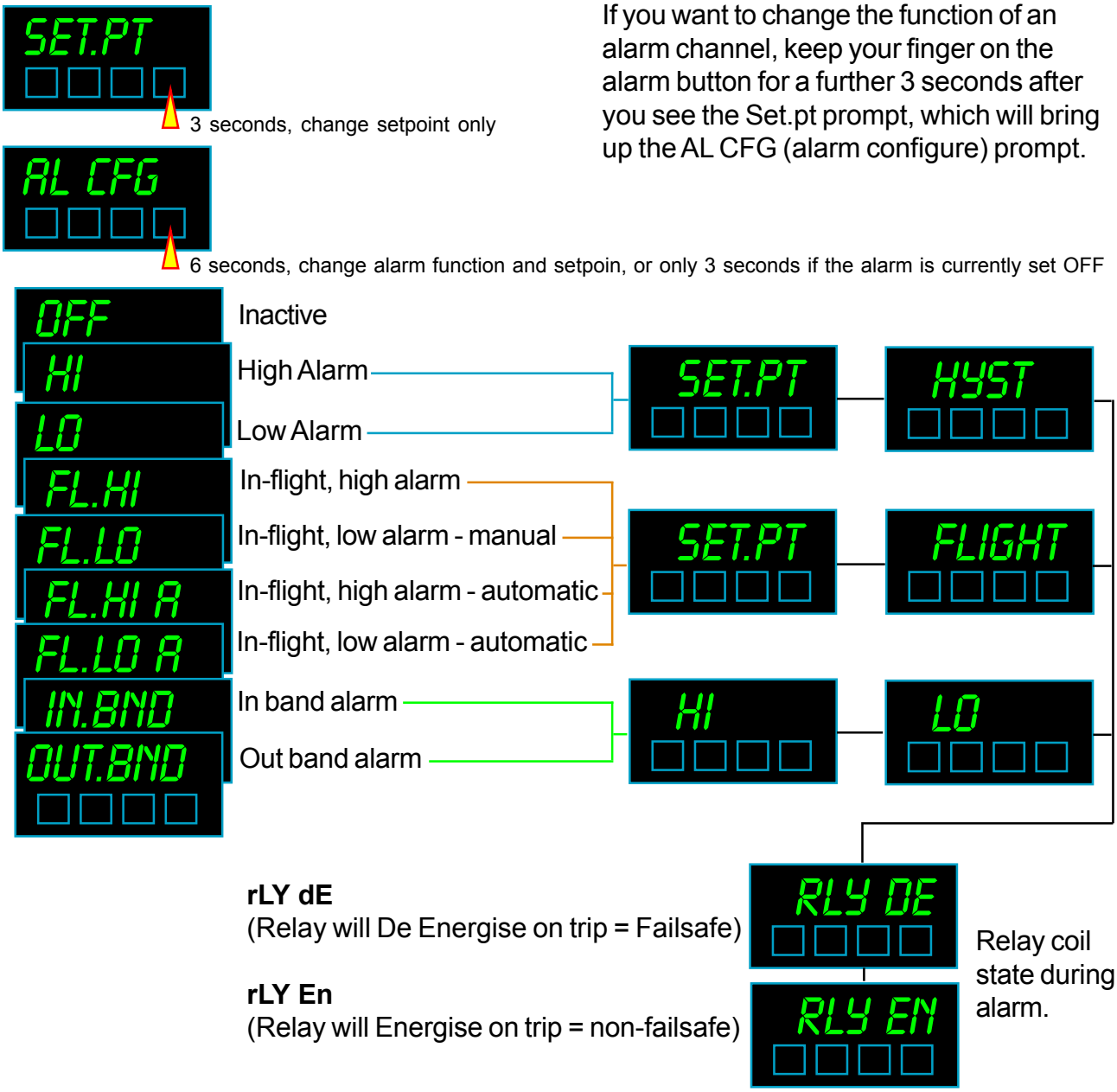
Fit the two small screws to the top and bottom surfaces of the case.

Alarm Programming

Lockout notes: Alarm Lock switch = OFF when changing. Switch Alarm Lock to ON after changing

Alarm lockout switch must be OFF. Press alarm button briefly to choose an alarm channel - look at the AL!, AL2, AL3 or AL4 leds to see which channel is selected.

Then press the alarm button for 3 seconds to show the Setpoint window - you can now edit the setpoint value with the DIGIT, UP and DOWN buttons. Press OK when done.



If you want to change the function of an alarm channel, keep your finger on the alarm button for a further 3 seconds after you see the Set.pt prompt, which will bring up the AL CFG (alarm configure) prompt.

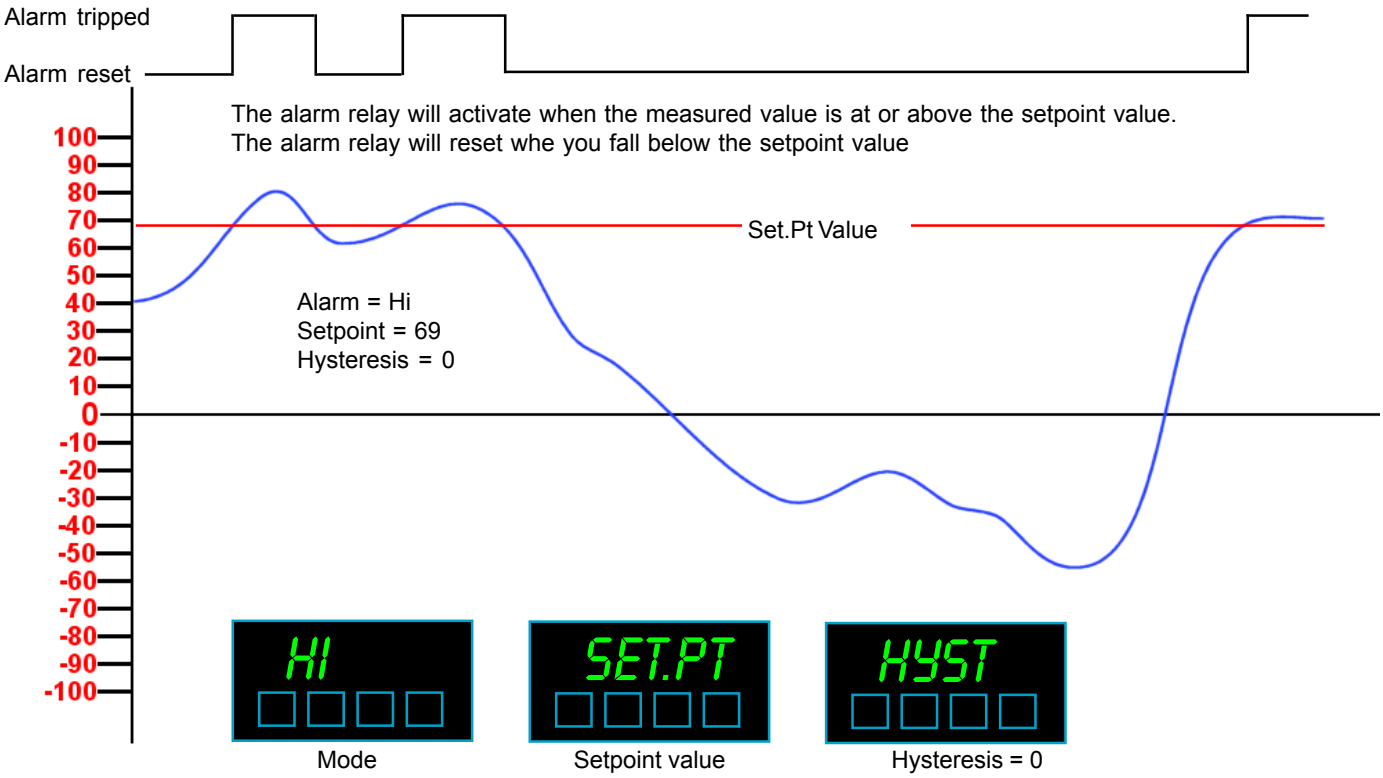
rLY dE
(Relay will De Energise on trip = Failsafe)

rLY En
(Relay will Energise on trip = non-failsafe)

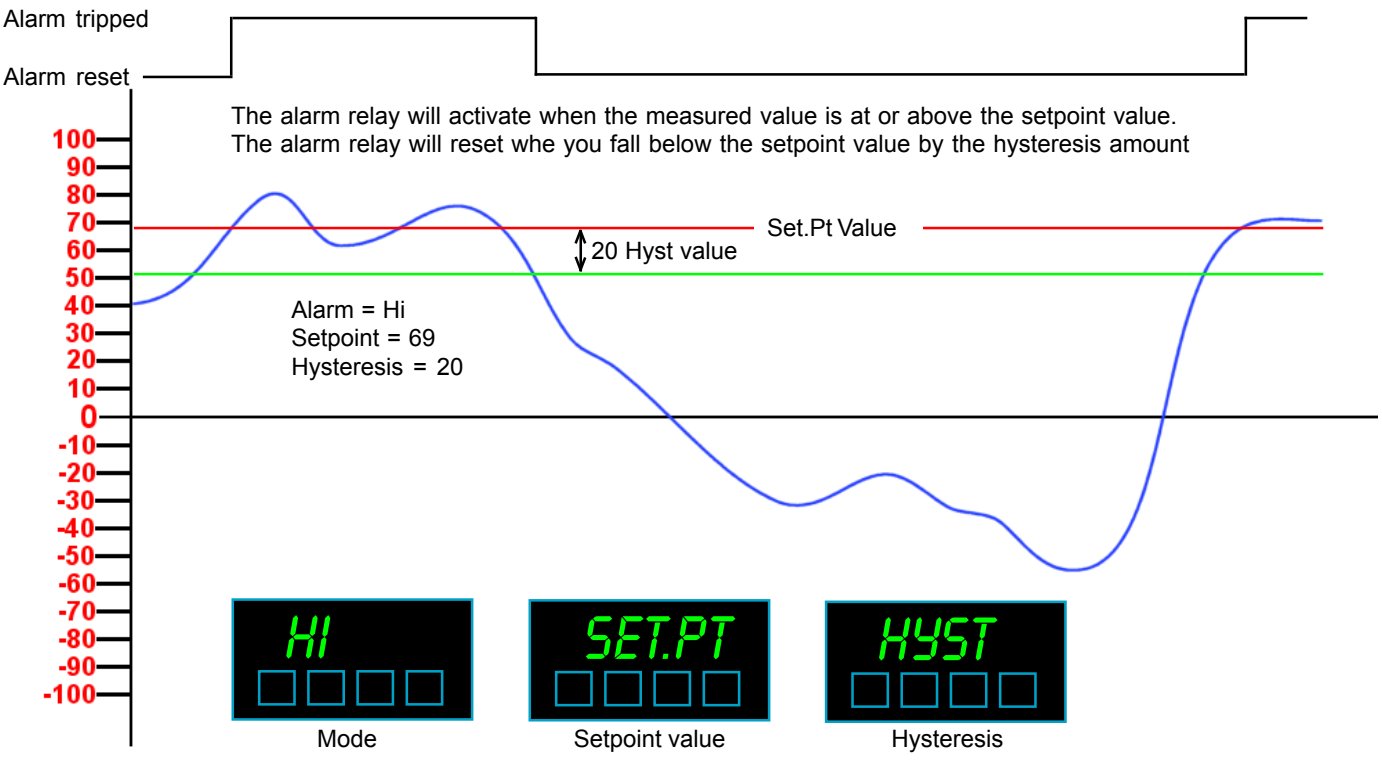
See the alarm board configuration page also, for details on selecting normally open or normally closed contact outputs.

See the following pages for more detailed descriptions of how each alarm mode operates. Remember to put the alarm lock switch ON when finished, to keep your settings safe.

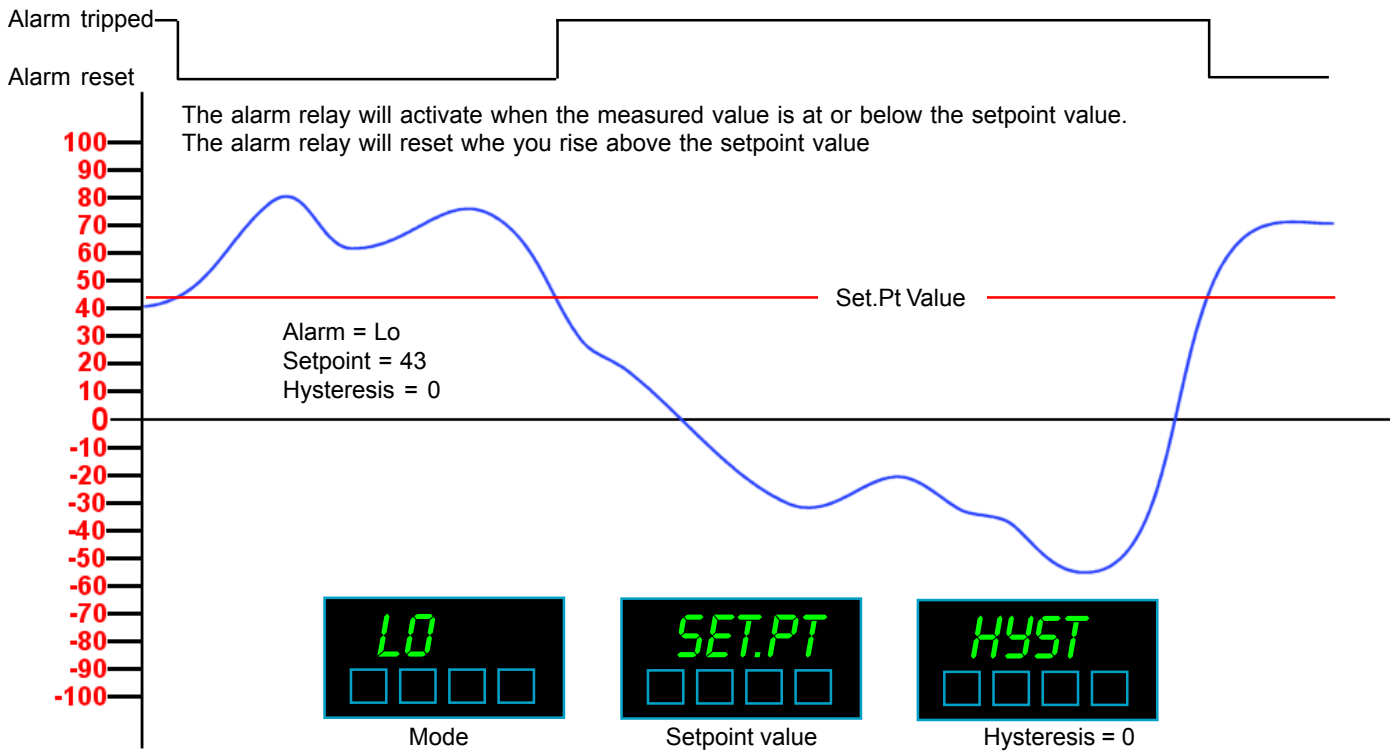
Hi Alarm relay action, no Hysteresis



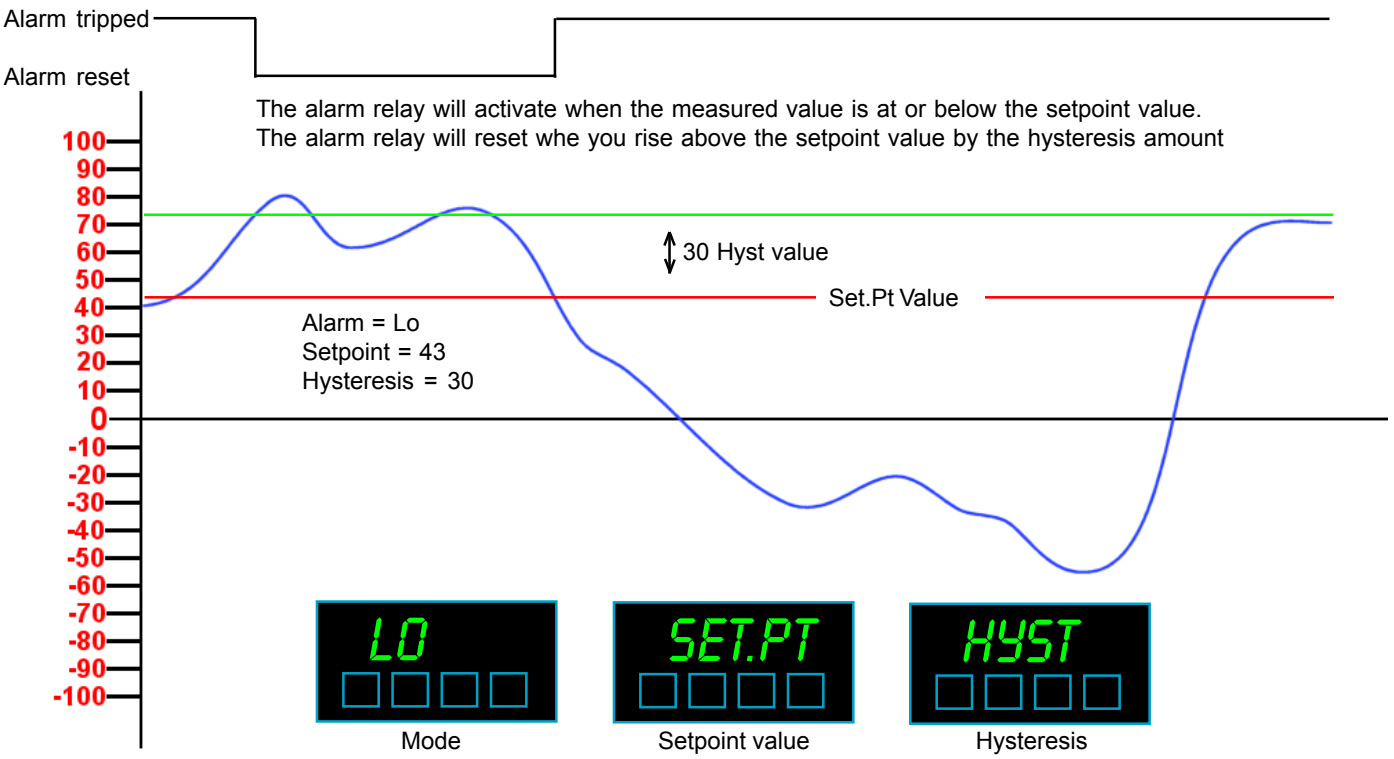
Hi Alarm relay action with Hysteresis



Lo Alarm relay action, no hysteresis



Lo Alarm relay action with Hysteresis



InFlight Hi Alarm relay

The In-Flight alarm modes are used in applications where you want to accurately fill one container from another.

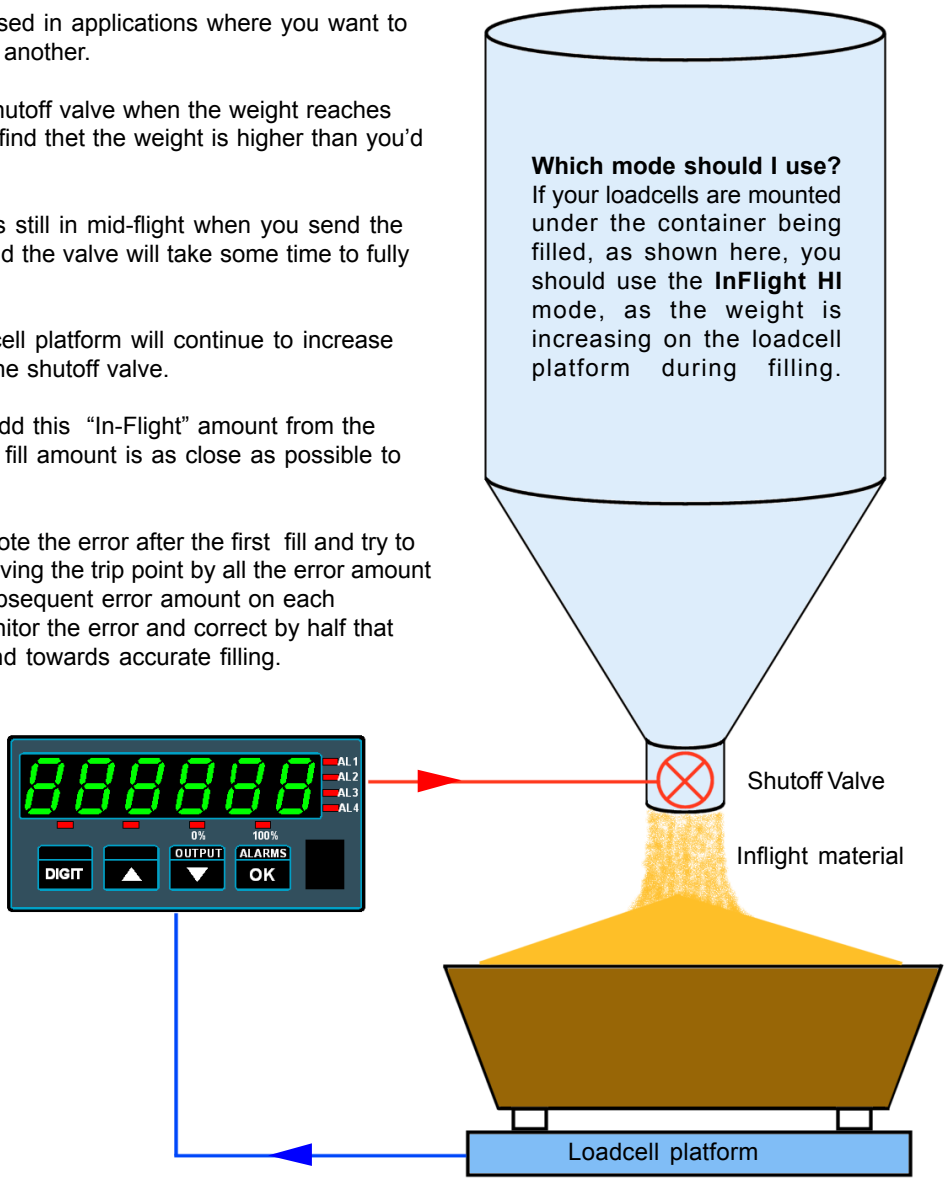
If you were to simply close the shutoff valve when the weight reaches your desired amount, you would find thet the weight is higher than you'd hoped for.

This is because some material is still in mid-flight when you send the alarm signal to shut the valve, and the valve will take some time to fully close.

The load measured on the loadcell platform will continue to increase after the alarm signal is sent to the shutoff valve.

The InFlight modes subtract or add this "In-Flight" amount from the setpoint to ensure that your final fill amount is as close as possible to your desired value.

In automatic mode, the unit will note the error after the first fill and try to correct for it on the next fill by moving the trip point by all the error amount on the 2nd fill and by half the subsequent error amount on each following fill. It will constantly monitor the error and correct by half that amount, to ensure a smooth trend towards accurate filling.



Manual or Automatic ?
You can set a manual value for the Inflight amount, if you know how much in-flight material will continue to fall into the container after the shutoff valve has been triggered, and if this value is likely to remain consistent from fill to fill.

If you don't know the inflight amount or if the material flow properties may change from batch to batch, you can use the automatic mode.

To set, press the alarm button until you illuminate the alarm LED channel you want to change. Press the alarm button again for around 6 seconds, you will see "Set.Pt" followed by "AL CFG". Use the Digit, UP/Down buttons and OK to set.

Manual Mode

Automatic mode

Desired Setpoint
This is the amount you want to fill.

Inflight amount
You can set a best guess for automatic mode, to speed the correction.

InFlight Lo Alarm relay

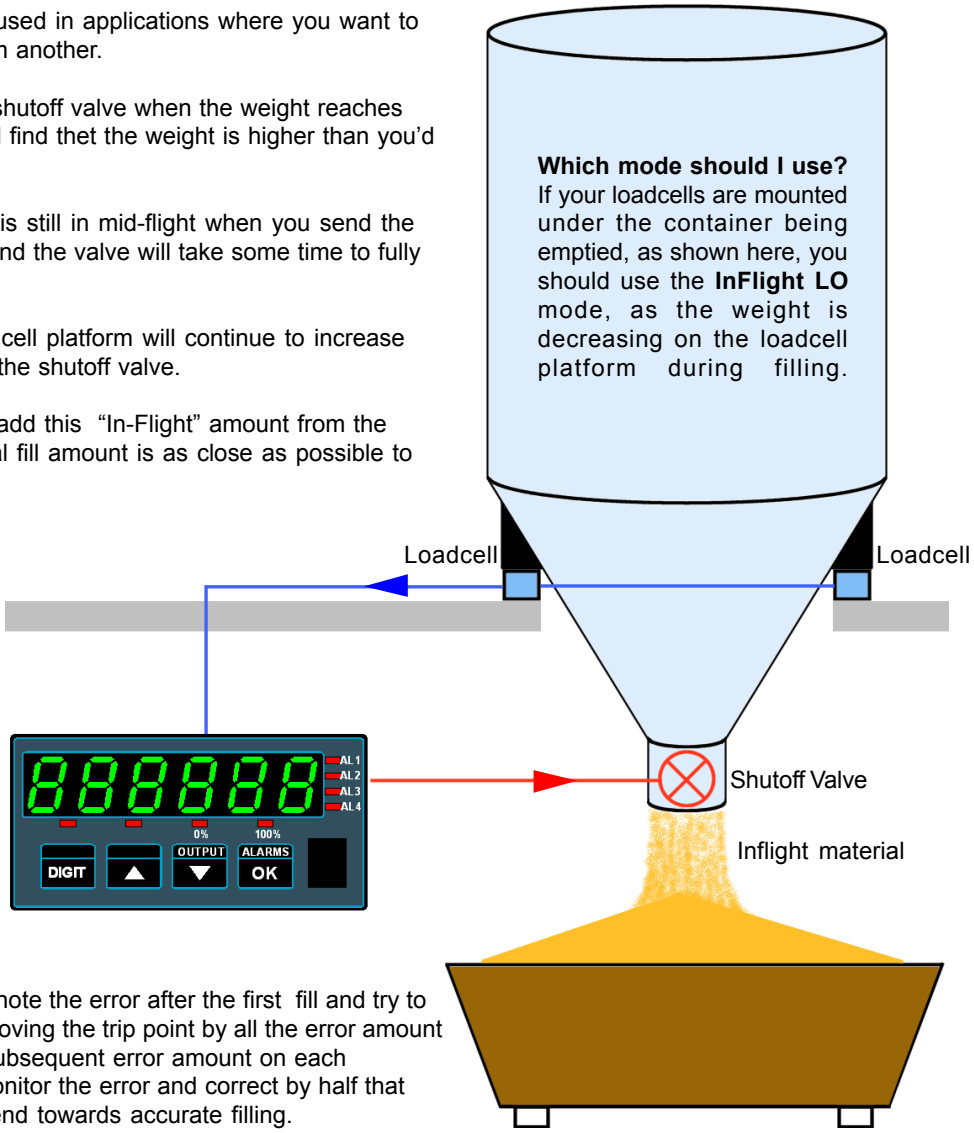
The In-Flight alarm modes are used in applications where you want to accurately fill one container from another.

If you were to simply close the shutoff valve when the weight reaches your desired amount, you would find thet the weight is higher than you'd hoped for.

This is because some material is still in mid-flight when you send the alarm signal to shut the valve, and the valve will take some time to fully close.

The load measured on the loadcell platform will continue to increase after the alarm signal is sent to the shutoff valve.

The InFlight modes subtract or add this "In-Flight" amount from the setpoint to ensure that your final fill amount is as close as possible to your desired value.



In automatic mode, the unit will note the error after the first fill and try to correct for it on the next fill by moving the trip point by all the error amount on the 2nd fill and by half the subsequent error amount on each following fill. It will constantly monitor the error and correct by half that amount, to ensure a smooth trend towards accurate filling.

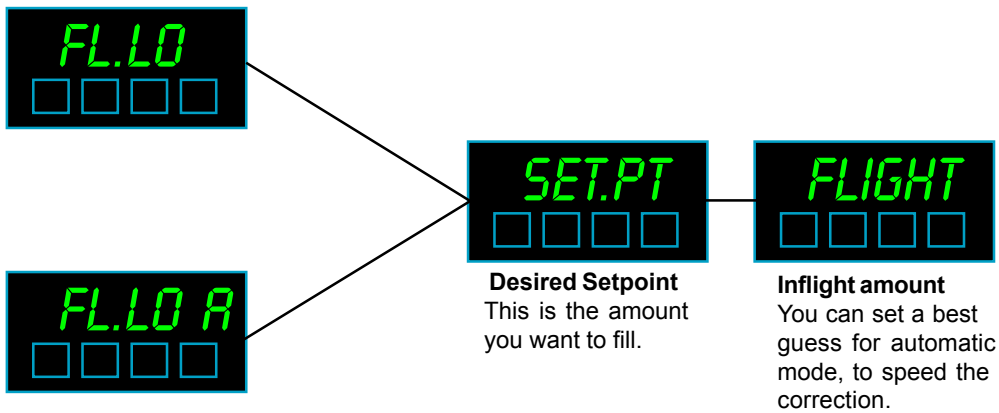
Manual or Automatic ?
You can set a manual value for the Inflight amount, if you know how much in-flight material will continue to fall into the container after the shutoff valve has been triggered, and if this value is likely to remain consistent from fill to fill.

If you don't know the inflight amount or if the material flow properties may change from batch to batch, you can use the automatic mode.

To set, press the alarm button until you illuminate the alarm LED channel you want to change. Press the alarm button again for around 6 seconds, you will see "Set.Pt" followed by "AL CFG". Use the Digit, UP/Down buttons and OK to set.

Manual Mode

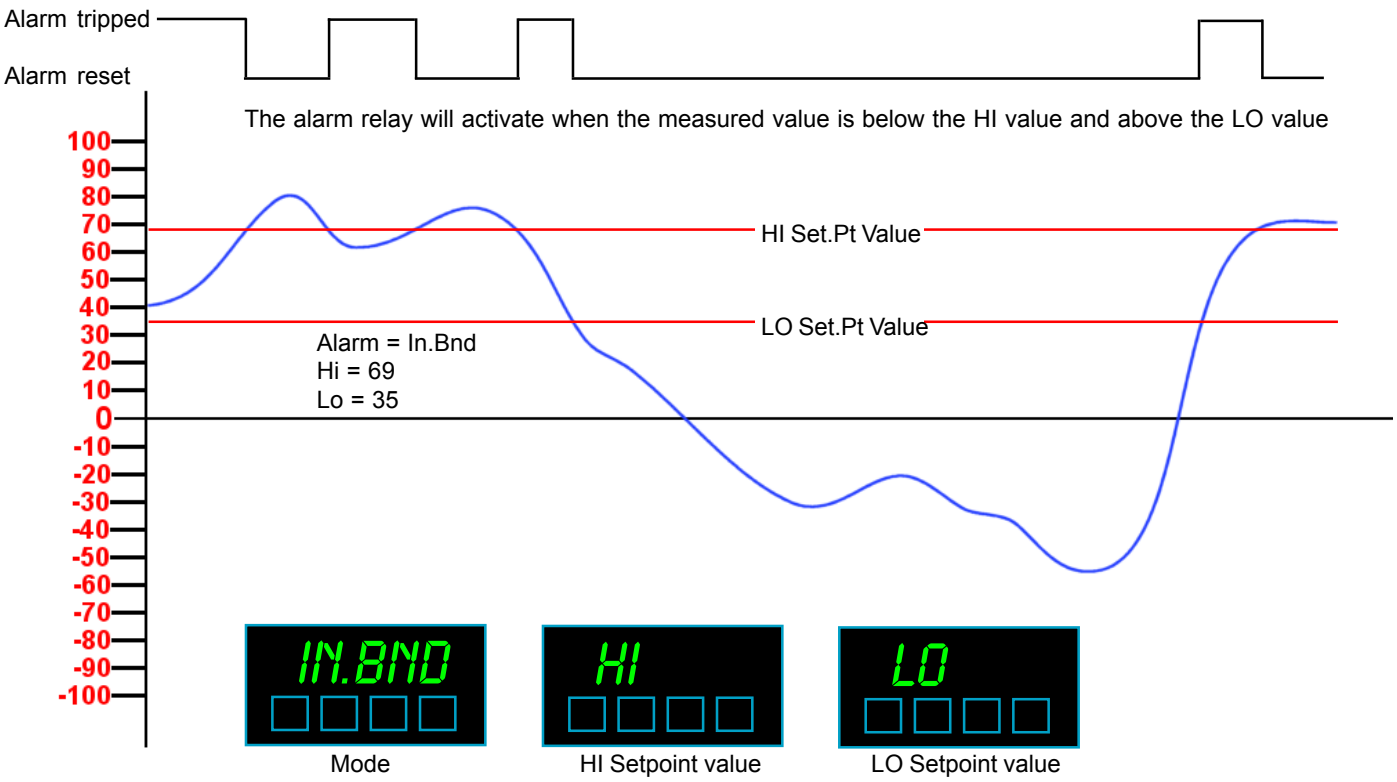
Automatic mode



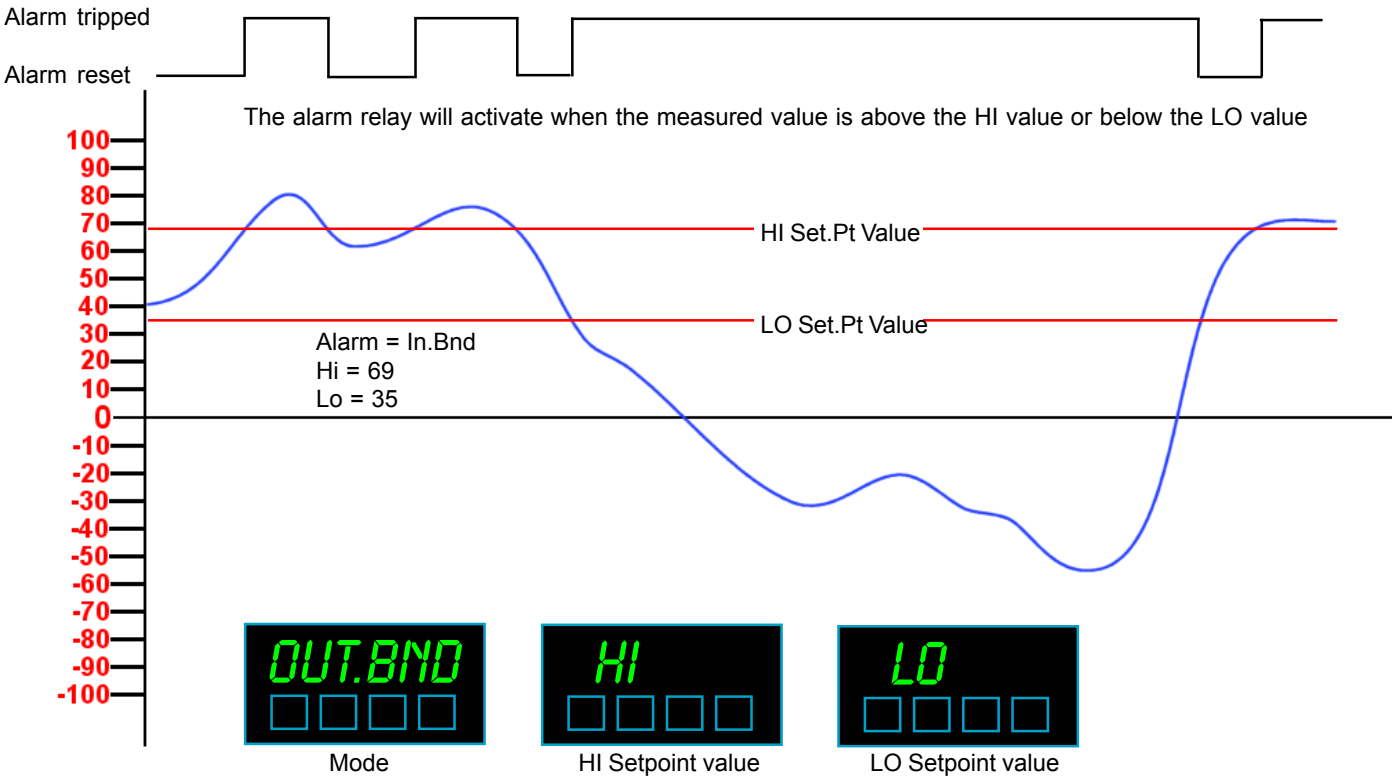
Desired Setpoint
This is the amount you want to fill.

Inflight amount
You can set a best guess for automatic mode, to speed the correction.

In-Band Alarm relay



Out-Band Alarm relay



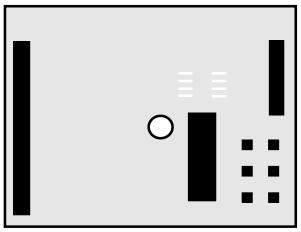
Serial Output - page 1

Warning:
Disconnect all power before exposing the rear of the meter

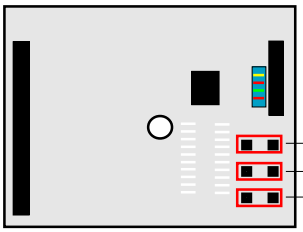
Warning:
Disconnect all cables from option board before adjusting

The serial output board plugs onto the 0, 2 or 4 alarm upper option board.

It plugs onto a pair of connectors and is secured by a snap-pillar.

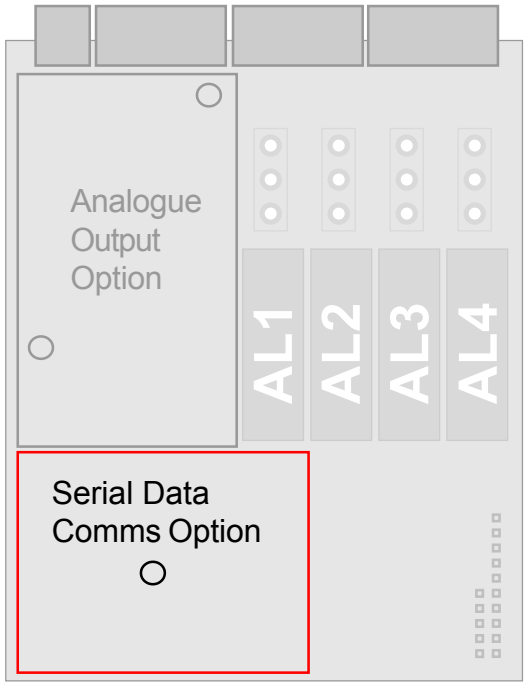


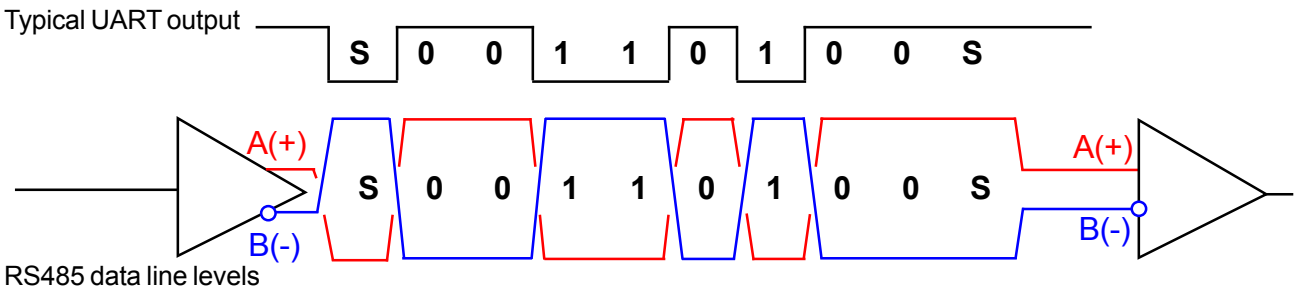
RS232 board
No jumpers needed



RS485 board

If fitted, connects 120 Ohm terminator
If fitted, sets a bias of +0V on Sig A
If fitted, sets a bias of +5V on Sig B





RS485 data line levels

The 120 Ohm termination resistor should be fitted to only the last display on an RS485 data link, to improve noise immunity. A terminator should also be fitted on the sending device.

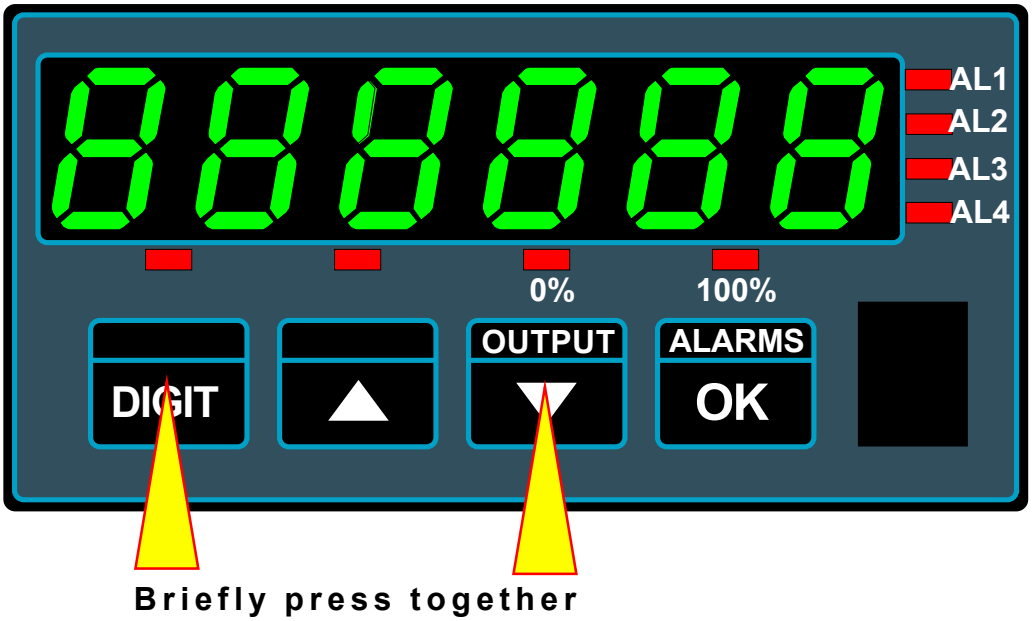
The bias jumpers are not normally fitted, but are available if your system needs biasing, to keep it in a valid idle state when data is not present.

Re-assemble the meter, apply power and follow the Serial Output Settings procedure on the next page.

Handy Feature
You can tell if a serial output is fitted to your meter by viewing the 'Summary' display. Press the two outer buttons of the display for 3 seconds. You will also see the summary when you first switch on your meter.

Serial Output - page 2

Lockout notes: Cal Lock switch = OFF when changing. Switch Cal Lock to ON after changing



Baud :- Select from 300,600,1200,2400,4800,9600,19200,38400, 57600,115200
dF = Data Format = 8n1, 7n1, 7E1, 701
Prot = Protocol = P1 (polled ASCII), P2 (Polled Modbus ASCII), C1 (Continuous), H1 (GPS)
Addr = Address = 00 to FF
t.rEP = Reply Delay time in milliseconds 00 to 99
t.Chr = Character space timing in milliseconds 00 to 99

Protocol C1 – Continuous output

Meter sends: 8 characters<CR>
e.g.

20 20 20 20 20 2D 31 37 0D	(-17) decimal position = 0
20 20 20 20 2D 31 2E 36 0D	(-1.6) negative value
20 20 20 20 20 31 2E 38 0D	(+1.8) positive value
20 20 20 20 20 20 4F 52 0D	(OR) over range
20 20 20 20 20 20 55 52 0D	(UR) under range

Protocol H1 - GPS clock data format for use with our ASR-GPS

Protocol P1 – Polled ASCII

Controller sends: <STX> ADDRH:ADDRL r <ETX> e.g. 02 46 37 72 03 (to device F7)
Meter replies <STX> 8 characters <ETX>
e.g.

02 20 20 20 20 20 2D 31 37 03	(-17) decimal position = 0
02 20 20 20 20 2D 31 2E 36 03	(-1.6) negative value
02 20 20 20 20 20 31 2E 38 03	(+1.8) positive value
02 20 20 20 20 20 20 4F 52 03	(OR) over range
02 20 20 20 20 20 20 55 52 03	(UR) under range

Protocol P2 – Polled ASCII Modbus

When you have finished setting the meter, put the lockout switch in its ON position now, to prevent your settings from being changed.

Logic Inputs and extra button functions

Warning:
Disconnect all power before exposing the rear of the meter

Warning:
Logic inputs are NOT isolated from input signal

Lockout notes: Cal Lock switch must be ON to enable logic inputs.

Peak and Valley Detection (Maximum/Minimum Reading View)
The meter can store the lowest and highest reading values in memory. You can see these values if you press the MAX/MIN front panel button, or by using remote contact closure switches. The first press shows peak, with the upper left hand indicator bar lit (marked 'Max.'). The second press shows valley, with the lower left hand indicator lit (marked 'Min.'). The display returns to the running value after 2 or 3 seconds. To reset the memory, press the RESET button for more than 3 seconds while peak or valley is being displayed. Peak and Valley values are not stored if you switch the meter off.

How to use the MAX/MIN button to view Peak or Valley
1) Link terminal 7 to terminal 9
2) Set lockout switch 'ON'
3) Press UP arrow key (MAX/MIN)for peak, valley, normal

Remote contact closure viewing of Peak/Valley
1) Connect a normally-open contact closure switch between terminals 7 and 9
2) Set the calibration lockout switch 'ON

Tare Command
You can force the reading to zero by pressing the front panel tare switch for 2 to 3 seconds, or by applying a remote contact closure. Following readings will be the 'net' value, offset by the reading at the time the tare switch was operated. The tare value can either be stored in non-volatile memory, or can be cleared at power-off. This is set in the Tare menu. The ZERO led will light to show you that the unit has been tared.

Front Panel key Taring
1) Link terminal 7 to terminal 8
2) Set calibration lockout switch 'ON'
3) Press ZERO key for 3 seconds to tare display. The ZERO led will light to show you that the unit has been tared.

To reset the tare from the front panel, press the Tare button and the Reset button together. The ZERO led will go out when tare has been cleared.

Remote contact closure taring
1) Connect a normally-open contact closure switch between terminals 7 and 8
2) Set calibration lockout switch 'ON'

Logic Inputs - contd.

Warning:
Disconnect all power before exposing the rear of the meter

Warning:
Logic inputs are NOT isolated from input signal

Lockout notes: Cal Lock switch must be ON to enable logic inputs.

Reset Command
The reset command clears any stored peak or valley data, any tared offsets and any in-flight compensation data. It may be accessed either from the front panel or by external contact closure command.

Front Panel key reset command
1) Link terminal 7 to terminal 10 (not necessary if MEM-08 option fitted)
2) Set calibration lockout switch 'ON'
3) Press Down Arrow key to reset display.

For Tare reset, you must press the Tare button AND the Reset button together.

For Peak/Valley reset, you must activate the reset key while a peak or valley value is being displayed.

Remote contact closure resetting
1) Connect a normally-open contact closure switch between terminals 7 and 10
2) Set calibration lockout switch 3 'ON'

Calibration Counter / Tamper detector
An internal totaliser counts each calibration. The 'CAL XXX' value appears for a second or two after you switch the meter on. The number starts at 00 and can go up to FFF . It counts all changes made to the meter's calibration . It stores the total in non-volatile memory which can't be reset, so is useful for keeping track of the meter's calibration history.

You can ask the meter to repeat its summary at any time if you press the two outer buttons for 3 seconds.

Software updates (future)

Warning:
Perform update only in dry conditions, meter will be open

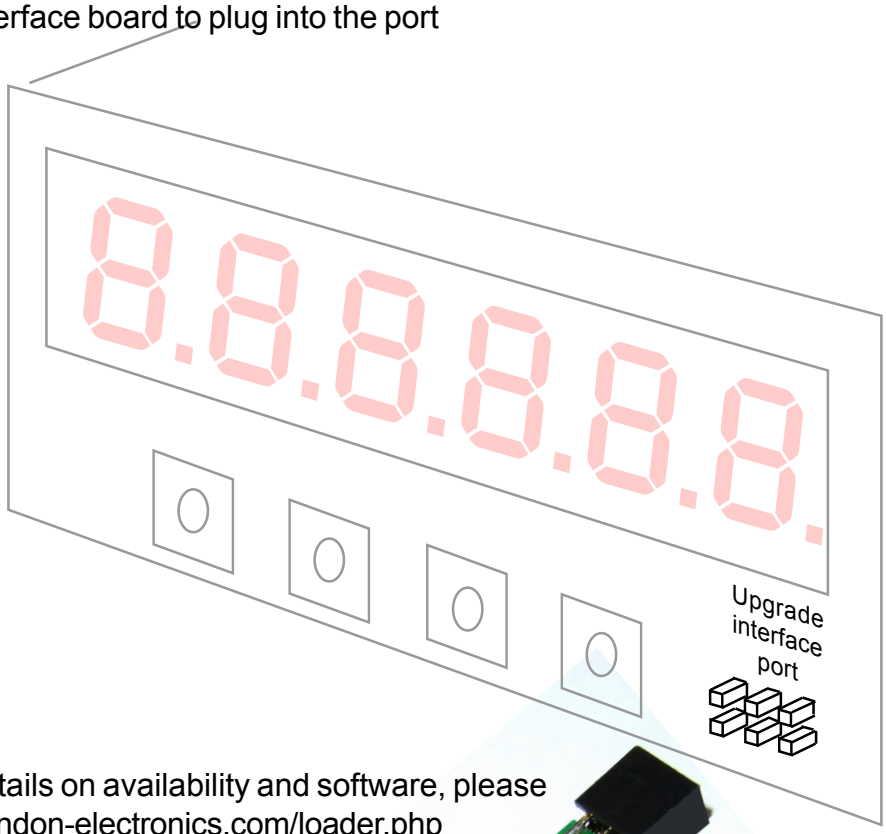
Warning:
Disconnect input signal from meter when doing this step

The FUSION series will soon have a software port accessory which will let you update the meter's internal software. This is useful for upgrades and for customised modifications to the operating system, to allow special features or functions to be added to your meter.

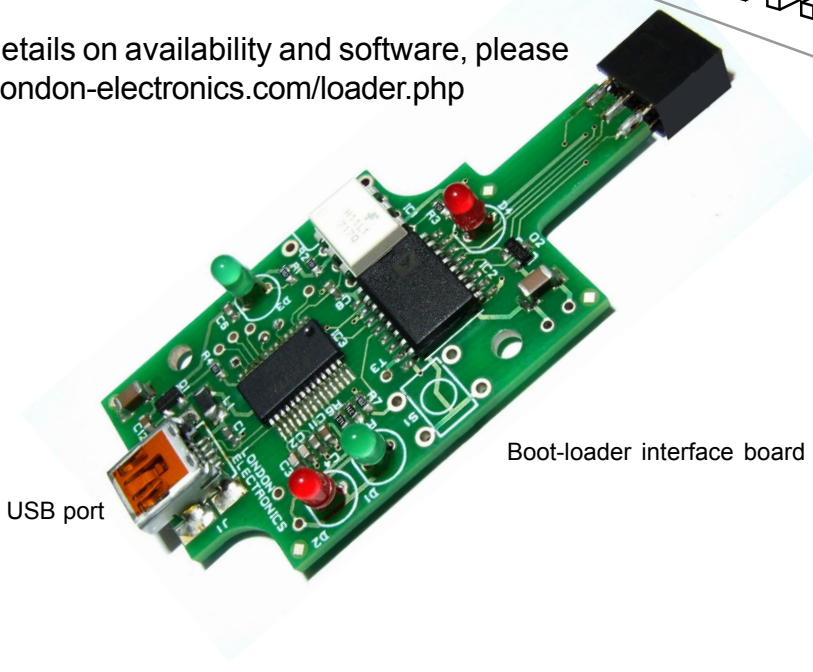
Your existing meter does not have this facility, this is a pre-release note only.

Software files are small, so we will be able to email updates to you whenever you need them.

You will need...
A PC or laptop with USB port and copy of the software-loader program
A USB cable with mini 5 pin plug
A new meter software file, loaded onto the PC or laptop
A boot-loader interface board to plug into the port



For up to date details on availability and software, please see http://www.london-electronics.com/loader.php



Reverse/Mirror/Heads-Up display

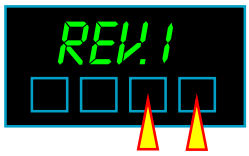
The INT2 display can be ‘mirror-imaged’ to allow it to be viewed as a reflection in a rear-view mirror, windscreen or other reflective surface.

This can be useful for creating ‘heads-up’ displays, for some test installations where the display will be veiwed in a mirror, as a display for drivers reversing large vehicles, etc.

Reverse / Mirror display

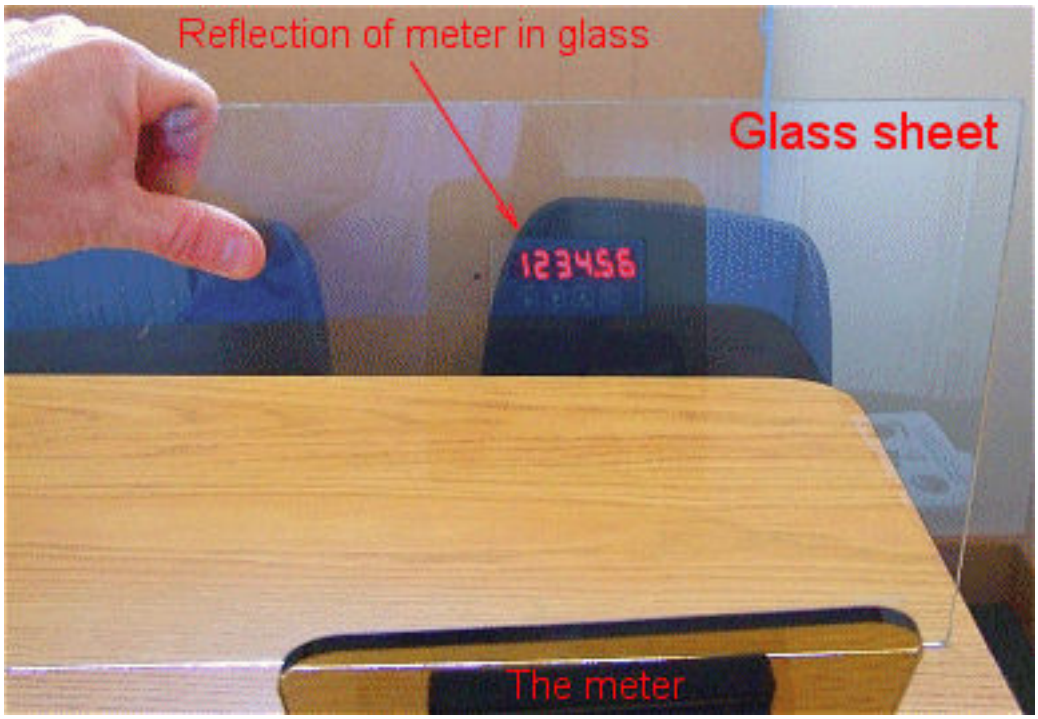
Press both buttons briefly, press OK 5x

Change with UP/DOWN button. OK=Accept



Calibration lockout OFF

Choose Rev.d 0 for normal display
Choose Rev.d 1 for reflected display



Equipment Specifications

Case Depth	75 mm including connectors
Case Material	Black uPVC
Connectors	Detachable Screw Terminal connectors
Environmental	Storage Temperature range -20 to +70C, non condensing Operating temperature range 0 to 50C, non condensing Sealed IP65 all round when glands are mounted on lower surface
Power	100-240 VAC, 45 to 60Hz or 11-30 VDC optional
Burden	50VA maximum
Input Signals (bipolar)	4 or 6 wire loadcell up to +/-40mV
Input Resistance	>10 Megohms
Accuracy	+/-0.05% of range
Span tempco	25 ppm/Degree Celsius
Zero Tempco	30 ppm/Degree Celsius
Excitation voltage	10VDC nominal rated at 120mA. Must connect to Sense.
Excitation Sense	Ratiometric, 4V absolute minimum allowed after line drops
Filtering / smoothing	Selectable time constants of 0 to 5 seconds.
A/D conversion	Sigma-Delta 10 conversions per second, 50/60Hz rejection Resolution 1 in 400 000 max. over full range
Display update rate	10 readings per second.
Display Range (max)	-199999 to +999999, depending on available signal level.

Plug-In Output Options			
Analogue O/P	0-10VDC	0-20mA	4-20mA
Drive capacity	>1K Ohms	<500 Ohms	<500 Ohms
Isolation	250 VAC Optically isolated		
Accuracy	+/-0.1% range, +/-10mV for ANV, +/-10uA for ANI, 50ppm/C stab.		
Linearity	+/-0.02% of range		
Resolution	better than 0.2mV for 10v, 0.4uA for 20mA range		
Scaling	Fully adjustable, direct or inverse		

Alarm Relay O/P	2 or 4 alarms SPST rated 2 Amperes at 250 VAC, resistive load. All relays must switch power from the same phase. Selectable normally open or normally closed by on-board switches. Selectable energise or de-energise on trip by menu Independant hysteresis on each alarm relay.
ASCII Data O/P	RS232 or RS485 ASCII Value of reading.
Format	1 start bit, 8 data, no parity. <Measurement><CR>
Isolation	250 VAC optically isolated

Ordering Guide. Create a full part number like this:-

Display Height	Digits and format	Function type	Analogue Output	Alarm Output	Serial Data Output	Colour & brightness	Supply Voltage	Mounting & Gland position & Sealing	Special Requirements
2" 57mm digits -F2	4 digits numeric -4N	Counter -C	No output -0	No alarms -0	No data -0	Normal Inside	95-265VAC -AC	Panel, IP65 front -1	None -0
4" 102mm digits -F4	4 digits clock -4C	Clock/Timer -H	4-20mA -ANI	2 alarms -AL2	RS232 -232	Red -R	11-30VDC -DC	Wall, bottom, IP65 -2	Specify -"Special"
6" 150mm digits -F6	6 digits numeric -6N	Loadcell -L	0-10V -ANV	4 alarms -AL4	RS485 -485	Green -G		Suspension, top, IP65 -3	
8" 200mm digits -F8	6 digits clock -6C	Process -P	+/-10V -ANB	2xSPCO -SPCO		Yellow -Y		Wall, top, IP54 -4	
12" 300mm digits -F12	8 digits numeric -8N	Serial slave -S		2xSolid State -DSS		Blue -B		Suspension, top,IP54 -5	
16" 400mm digits -F16		Temperature -T				White -W		Suspension, rear,IP54 - 6	
		Time +Temp. -TT				Outdoor bright			
		Time +RS485 -TZ				Red -RDLV			
						Green -GDLV			
						Yellow-YDLV			
						Blue -BDLV			

Example part number = Fusion2-6N-P-ANI-AL2-0-R-AC-2-0

Dimensions

	Fusion 2	Fusion 4	Fusion 6	Fusion 8	Fusion 12	Fusion 16
4 digit	279w x 154.5h	434w x 195.5h	514w x 247h	664w x 297.5h	984w x 397.5h	1304w x 497.5h
6 digit	376w x 154.5h	616w x 195.5h	744w x 247.5h	984w x 297.5h	1464w x 397.5h	1944w x 497.5h
8 digit	504w x 154.5h	824w x 195.5h	984w x 247.5h	1304w x 297.5h	-	-