LT1300

Wall Mount Load Cell Indicator

Operating Manual – English 4.06

- 7 Segment LED Display
- Graphic LCD Display (128x64 Pixels)
- Analog Re-Transmission (0-10V, 0-20mA, 4-20mA)
- 5VDC Excitation
- High Resolution ADC
- High Resolution DAC
- Modbus™ Communications (RTU, ASCII)
- Auto Zero Function
- Field upgradeable Firmware
- Scale Motion Indication
- Advanced Digital Filtering
- Real Time Clock
- Tare Function
- 4 Alarm Setpoints
- Gross/Net Function
- RS232, RS485, Ethernet

Introduction

The LT1300 wall mount load cell indicator is a precision digital indicator for load cell and strain gauge applications.

The high bright 6-digit 7-segment 20mm LED displays and the sunlight readable graphic LCD display make for easy setup and readability. A simple menu system allows for easy configuration of display and load cell settings. The load cell calibration can be done directly from the load cell calibration certificate or from using known weights.

Either a universal mains switch mode power supply (85-264VAC) or a low voltage (10-30VDC) isolated power supply can be installed.

The LT1300 contains precision front end circuitry for high accuracy and stability. The ratiometric ADC circuitry automatically compensates for temperature drift and excitation voltage variances due to cable loss. The load cell excitation voltage is +5VDC and can interface with both 4 wire and 6 wire load cells. The LT1300 can power up to 6x350Ω load cells.

RS232 and RS485 communications is supplied as standard with the Modbus RTU / ASCII protocol. A simple ASCII out protocol is also provided for serial printing and communicating to large displays. Ethernet communications optional. Both Modbus TCP/IP and Modbus RTU over TCP/IP supported.

The LT1300 also has analog out circuitry to generate a precision 0/4-20mA or a 0-10V analog output signal.

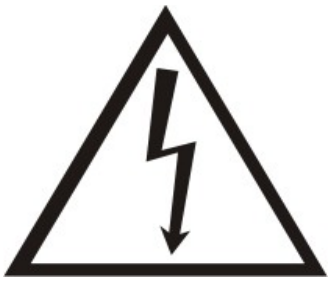
The LT1300 also includes advanced features such as auto-zero tracking, user input linearisation, max/min recording, programmable front push buttons, programmable digital inputs, security menu lockout, zero indication, motion indication, advanced digital filtering, PI control, Ticket Print function plus many more to provide an all in one precision load cell indicator.

1 Features

- **4 or 6 wire load cell / strain gauge input**
- **Can power up to 6x350Ω load cells at +5Vdc excitation voltage**
- **High precision 24 bit ADC front end circuitry**
- **-199999 to +999999 display counts**
- **High bright 6-digit 7-segment 20mm LED displays**
- **128x64 pixel backlit sunlight readable graphic LCD display for easy setup and calibration**
- **Easy calibration either from the load cell calibration certificate or by using known weights**
- **RS232 and RS485 communications (Modbus RTU / ASCII and a serial ASCII out protocol)**
- **Ethernet communications optional (Supports TCP Client, TCP Server, UDP Client, UDP Server)**
- **Both Modbus TCP/IP and Modbus RTU over TCP/IP supported**
- **180x180x60mm flame retardant ABS enclosure**
- **Universal mains switch mode power supply (85-264VAC) standard with built in EMI and fuse protection**
- **4x Mechanical (FORM-C) relays**
- **5x Programmable digital inputs (2x digital inputs are opto-isolated)**
- **16 Point lineariser**
- **Ability to enter and display a Tag number**
- **High precision 16 bit Analog output (0/4-20mA, 0-10V)**
- **Auto-zero tracking function**
- **Automatic or manual entry tare function**
- **PI Control function**
- **Selectable / adjustable advanced digital filtering**
- **Up to 8 front panel LED indicators for alarm set point status, print, net/gross toggle, motion and zero**
- **Full alpha-numeric keypad**
- **Front programmable function keys (Zero, Tare, Print, Gross/Net toggle, LED Display Toggle, Display Hold & Alarm latch reset**
- **Max/Min weight recording**
- **Ticket print function**
- **Smart Junction Box compatible**
- **RTC (Real Time Clock) for time and date stamping**
- **Field upgradable firmware via the RS232 interface**
- **1 Year Warranty**

Additional hardware options include:

- **Up to 4 solid state (FORM-A) relays**
- **Low voltage 10-30VDC Isolated power supply**
- **Ethernet communication module**



This instrument is marked with the international hazard symbol. It is important to read this manual before installing or commissioning your wall mount indicator as it contains important information relating to safety and Electromagnetic Compatibility EMC.

ENSURE THAT ALL POWER IS SWITCHED OFF TO THE INSTRUMENT BEFORE INSTALLING OR DOING MAINTENANCE WORK.

- **Do not place signal and power supply wiring in the same loom.**
- **Make sure that all anti-static precautions are adhered to when handling the circuit boards.**
- **Use screened cable for all signal inputs and attach to earth at one point only.**
- **Use ferrules with all input connections for greater reliability.**

The instrument contains a battery for data retention purposes. The battery should be disposed of correctly. Please contact your supplier or local council if in doubt.

2 Specifications

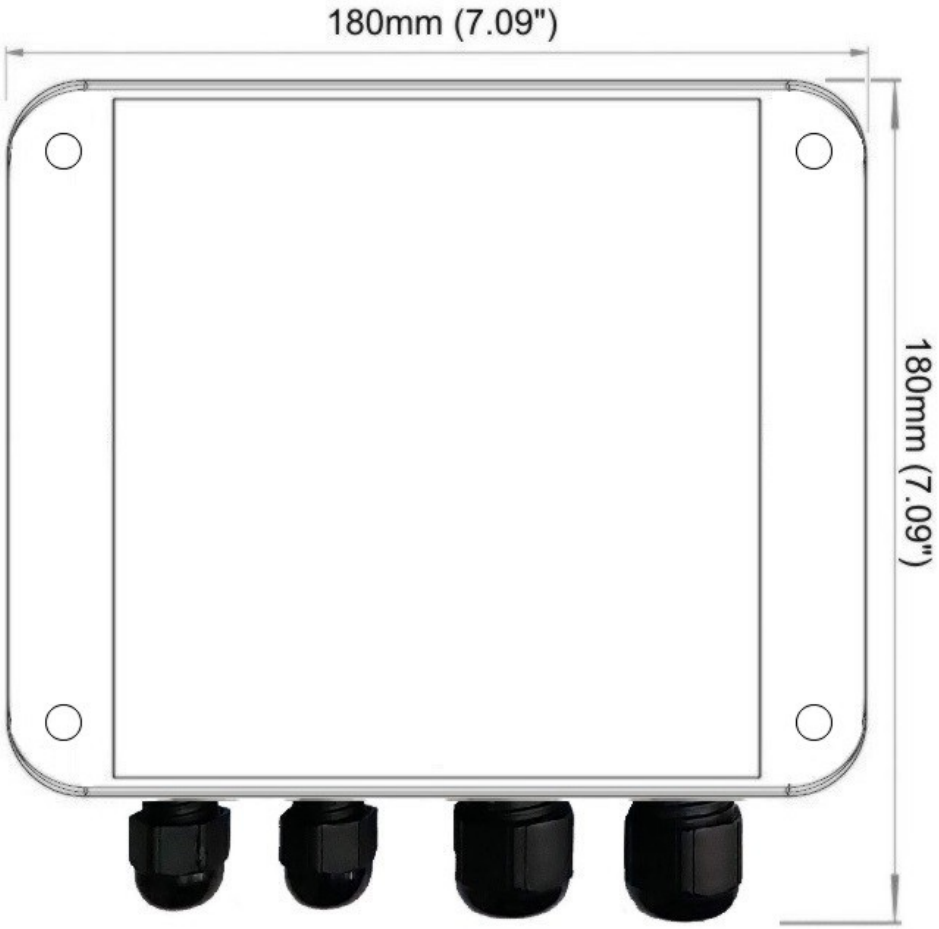
General:	
LED Display	6-Digit, 20mm (0.8”) 7 segment high brightness red LED
LCD Display	128x64 Full graphic sunlight readable monochrome display
LCD Backlight	Green, User defined on/off control
Display range	-199999 to +999999
Display decimal point	x to x.xxxxx
Status LEDS	8 LEDs total (SP1, SP2, SP3, SP4, Zero, Net, Motion & Print)
Digital Inputs	5 Programmable digital inputs **Digital Inputs 1, 2 & 3** Built in hysteresis, filter and input over voltage protection Maximum input voltage <30VDC Active/Non-Active input trigger: <2V Non-Active/Active input trigger: >2.5V **Digital Input 4 & 5** Opto-isolated PLC type input Supports NPN, PNP, Push-pull (Totem-Pole) sensors, switches and push buttons.
Keypad	Full 4x3 alpha-numeric keyboard 4 Dedicated function keys (Zero, Tare, Print, Gross/Net toggle) 3 Dual function keys (Display Toggle, Display Hold & Alarm latch reset)
Memory storage	Non-volatile EEPROM, 100000 write cycles minimum
Warm up time	15 minutes
Power Requirements:	
AC Power Supply	85-264VAC, 50/60Hz or 120-370VDC Isolation: 3000VAC/1min
DC Power Supply, 10-30VDC (Optional)	10-30VDC input Reverse and over voltage protected Isolation: >1000V/1min
Power Consumption	<10W
Fuse (Built in)	2A Slow Blow (Littlefuse part number 37212000431)
Environmental:	
Operating temperature	-10°C to 50°C (14°F to 122°F)
Storage temperature	-40°C to 80°C (-40°F to 176°F)
Operating and storage humidity	<85% RH non-condensing
Enclosure:	
Overall Dimensions	180x180x60mm (LxHxD) (7.09x7.09x2.36”) (Height includes cable glands)
Mounting Holes	160x94mm (6.3x3.7”)
Enclosure Material	ABS – Flame Retardant
IP Rating	IP65
Gland Ratings:	
Clamping/sealing range (Small gland)	4-8mm (0.157-0.314”) Diameter wire
Clamping/sealing range (Large gland)	7-13mm (0.276”-0.512”) Diameter wire

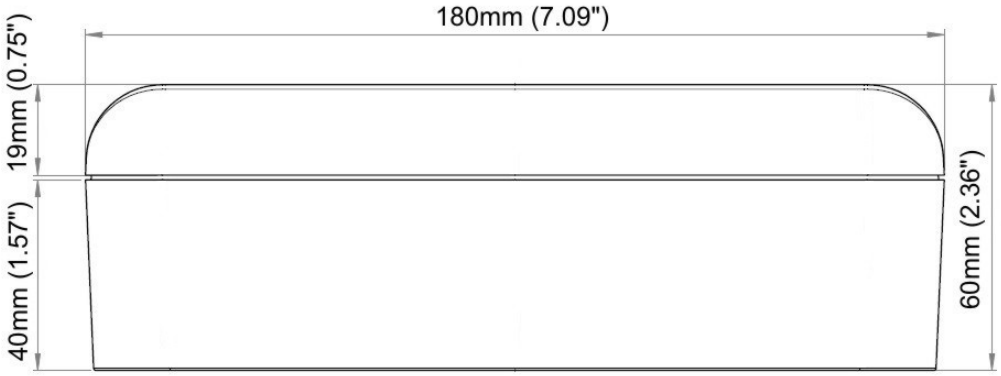
Input:	
ADC Resolution	24 bit Delta-sigma, Ratiometric
Input range	+-3.5mV/V
Conversion rate	80 updates/second
Filter	Moving average digital filter with programmable input step detection
Increment size	1, 2, 5, 10, 20, 50, 100, 200
Input Impedance	>100MΩ
CMRR	>-110dB
Linearity	<0.01% of full scale
Accuracy	0.05% of full scale
Calibration method	From the load cell calibration certificate or from using known weights
Load cell connection	4 or 6 wire connection + shield (Sense included)
Load Cell Excitation:	
Excitation Voltage (Sense included)	+5Vdc Fixed
Excitation current	Max. 90mA Up to 6x350Ω load cells or 10x1000Ω load cells
Cable compensation	Ratiometric
Analog Out:	
Ranges (Selectable through menu)	0-20mA 4-20mA 0-10V
DAC Resolution	16 Bit
Update rate	10 Hz
Current output compliance (max load)	500Ω **(Current is source, not sink)**
Voltage output compliance (min load)	1kΩ
Current open loop detection	LCD display flashes “Loop Error” error message
Linearity	<0.02% of full scale
Accuracy	0.05% of full scale
Communications:	
Protocol	Modbus RTU Modbus ASCII ASCII In ASCII Out (Various Protocols) - Output data rate 10 Hz
RS232 Communications	Baud rate: 1200,2400,4800,9600,19200,38400,57600,115200 Data bits: 7 or 8 bits Parity: Odd, Even or None Stop bits: 1 or 2 stop bits Non isolated
RS485 Communications	Baud rate: 1200,2400,4800,9600,19200,38400,57600,115200 Data bits: 7 or 8 bits Parity: Odd, Even or None Stop bits: 1 or 2 stop bits Internal 120Ω field jumper selectable termination resistor Max 32 instruments per line
Ethernet TCP/IP Communications	
Network Protocols	TCP Client, TCP Server, UDP Client, UDP Server
Modbus Support	Supports Modbus TCP/IP and Modbus RTU over TCP/IP
Interface	8 pin RJ45
Protection	1.5KV electromagnetism isolation
Rate	10/100 Mbps auto-detection
Access way to IP	Static IP, DHCP

SetPoints: **Electro-mechanical Relays:**	
Contact rating	2A@240VAC or 30VDC (Resistive load)
Isolation to input circuitry	>1000Vrms for 1 minute
Type	FORM-C (Change over contact (NO/NC))
Life expectancy	>100K cycles min. at full load rating. External RC snubber extends relay life for operation with inductive loads
Solid-State Relays (SSR): (Optional, Up to 4 can be fitted)	
Contact rating	120mA@400VAC/DC
Isolation to input circuitry	>1000Vrms for 1 minute
Type	FORM-A (Normally open)

3 Installation

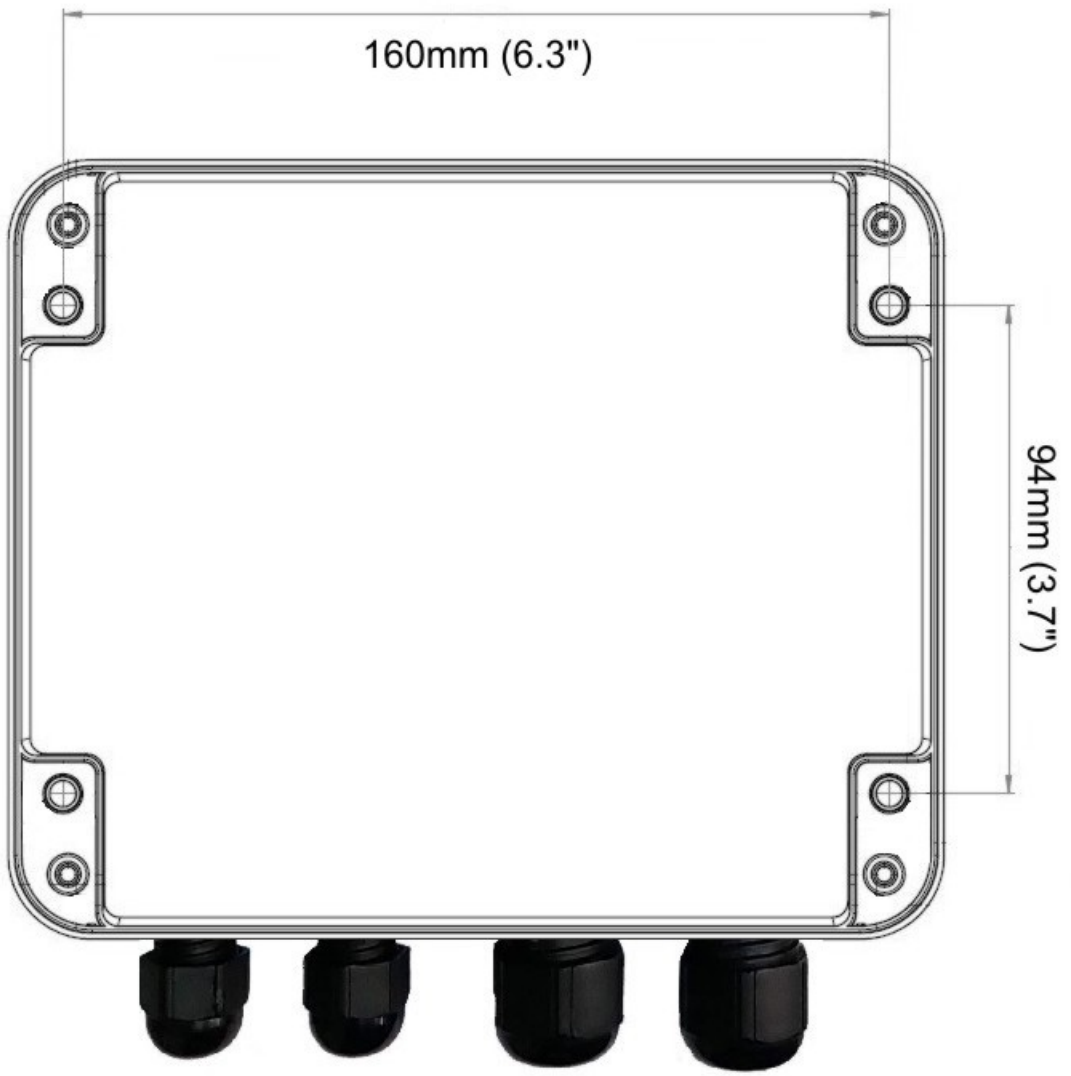
3.1 Enclosure Dimensions





3.2 Mounting Template

The below diagram shows the location of the enclosure mounting holes.



3.3 Opening the Unit

Make sure power has been removed before opening the unit.

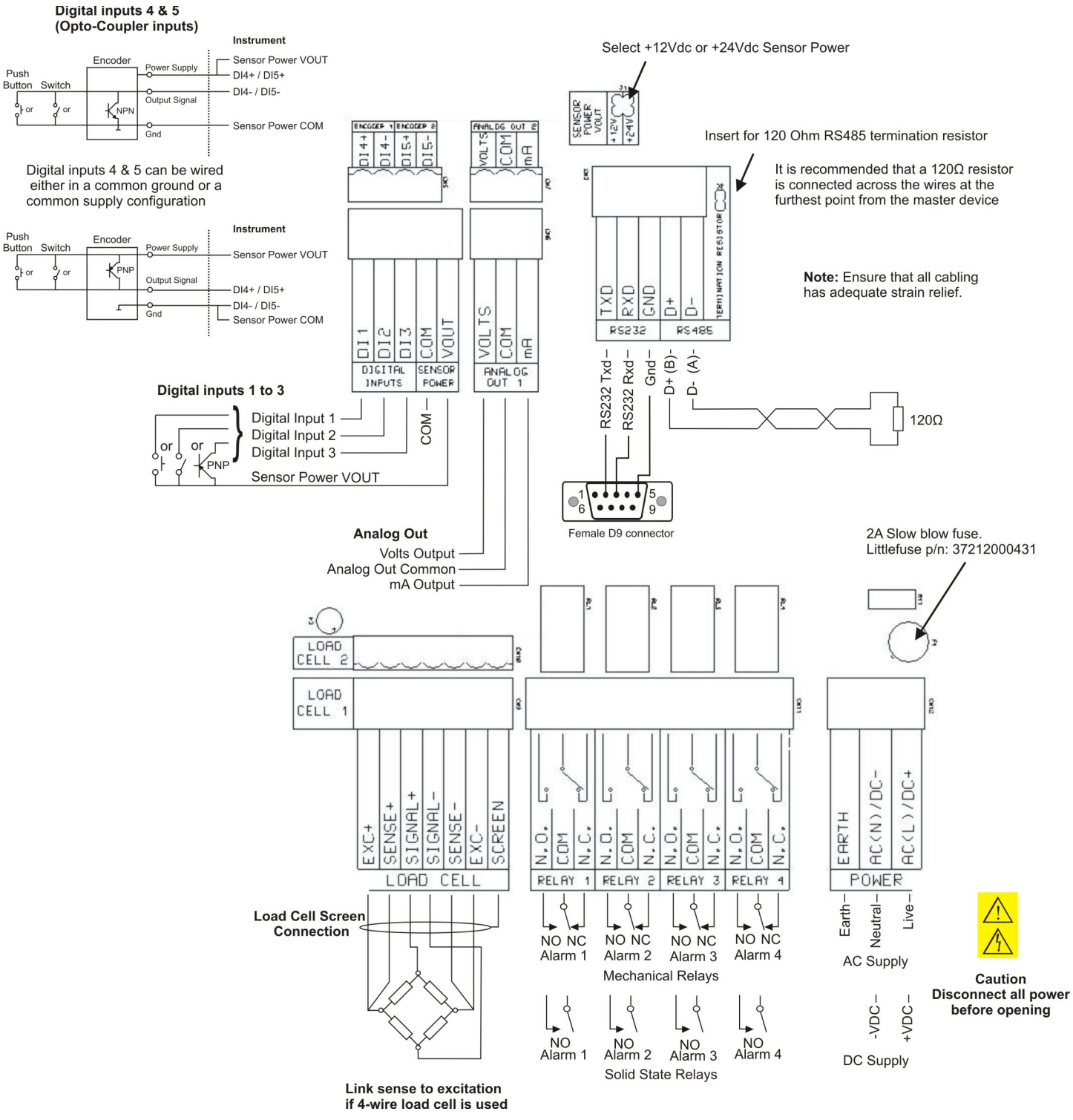
Simply unscrew the 4 screws on the sides of the lid to open the unit. Be careful when removing the lid as not to damage the ribbon cable connecting the lid to the base PCB.

Make sure full anti-static precautions are adhered to when handling the circuit boards.

Do not apply power to the instrument until the instrument has been carefully reassembled back in to its enclosure.

3.4 Hardware Connections, Jumpers and Fuse position

Below is an exploded view of the hardware connections and jumper locations of the main circuit board.



3.5 Power Supply Wiring

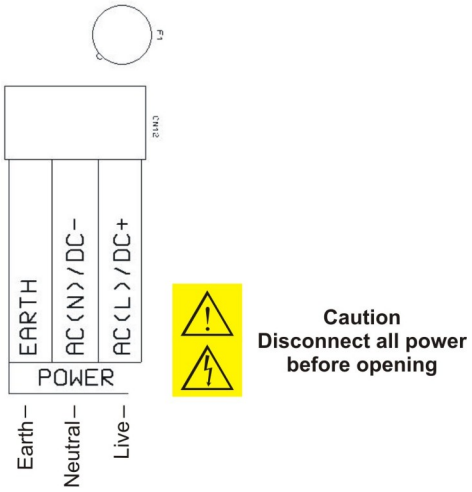
There are 2 different power supply variants! Please check which power supply is installed before connecting power by checking the sticker on the gland side of the instrument.

A universal mains switch mode power supply (85-264VAC) is provided as standard but an optional low voltage (10-30VDC) isolated power supply can be installed.

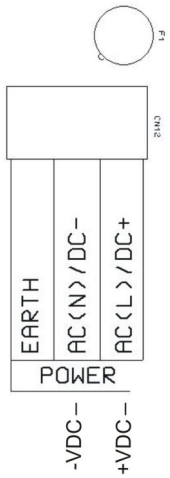
The instrument will consume a maximum of 10W with 6x350 ohm load cells, all relays on, mA analog output fully loaded, all led segments illuminated and the LCD backlight on.

WARNING - Access to power terminals should be restricted to authorised skilled personnel only. Application of supply voltages higher than those for which the instrument is intended may compromise safety and can cause permanent damage.

AC Power Supply

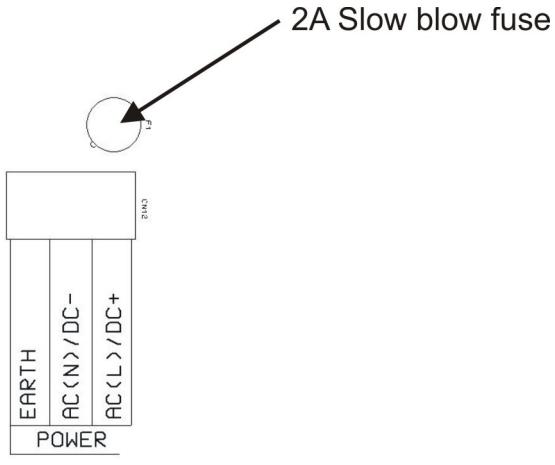


DC Power Supply



3.6 Fuse Replacement

The instrument contains a built in fuse. The fuse is a slow blow 2A Littlefuse part number 37212000431. The diagram below illustrates the position of the fuse on the main circuit board.



3.7 Load Cell Connection

The load cell should be connected to the instrument as in the diagrams below. When making connection to the load cell make sure you use screened cable connected to a ground point at one side only. Avoid running cables in the same trunking as high current/voltage cables and cables supplying DC motors or contactors etc.

It is recommended to use 6-wire load cells for the best results. When using 6-wire load cells make sure you connect the sense+ and sense- wires as close as possible to the load cell. The sense lines compensate for any voltage loss due to the wiring impedance.

If using 4-wire load cells then the sense+ must be connected to the excitation+ and the sense- must be connected to the excitation- as close as possible to the instrument.

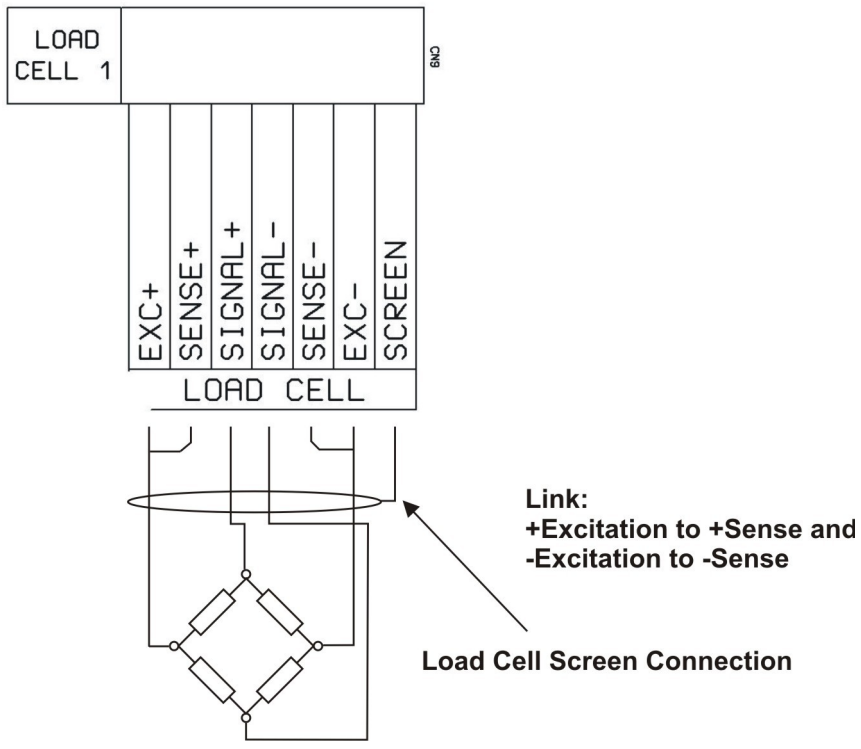
Automatic offset calibration

The instrument contains a unique feature in that it automatically does an offset calibration to cancel out any temperature effects in the electronics. This is to maintain optimum accuracy. The automatic offset calibration happens at power on as well as every few minutes. **Care must be taken to ensure that a load cell is connected before power is applied to the instrument otherwise an incorrect reading will be displayed until the next offset calibration takes place.**

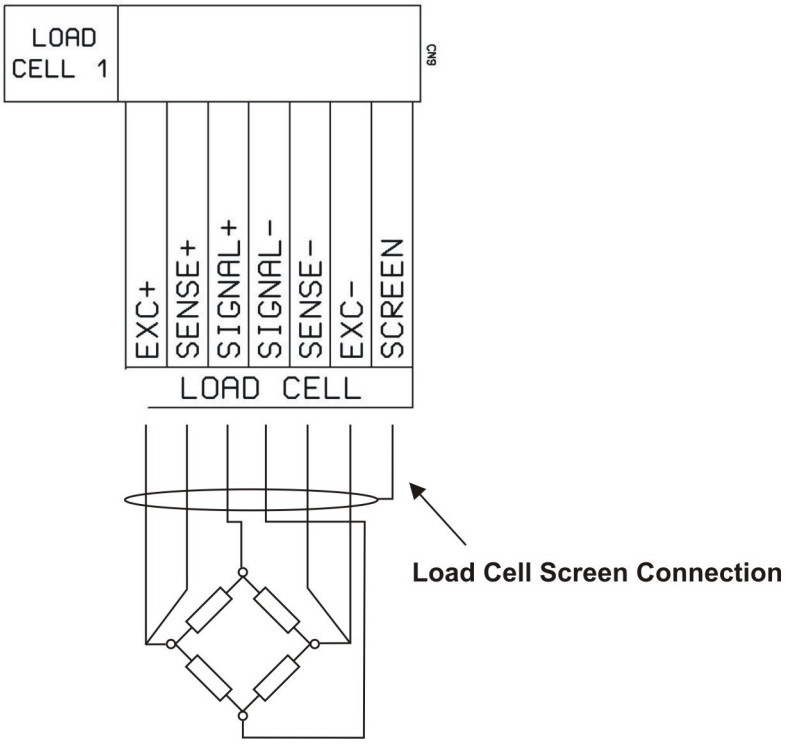
Load Cell Excitation Voltage

The instrument provides a stable built in +5VDC load cell excitation voltage. The instrument can power up to 6x350Ω load cells using +5VDC excitation. Connect the sense+ to excitation+ and sense- to excitation- if using a 4-wire load cell.

4-Wire Load Cell Connection

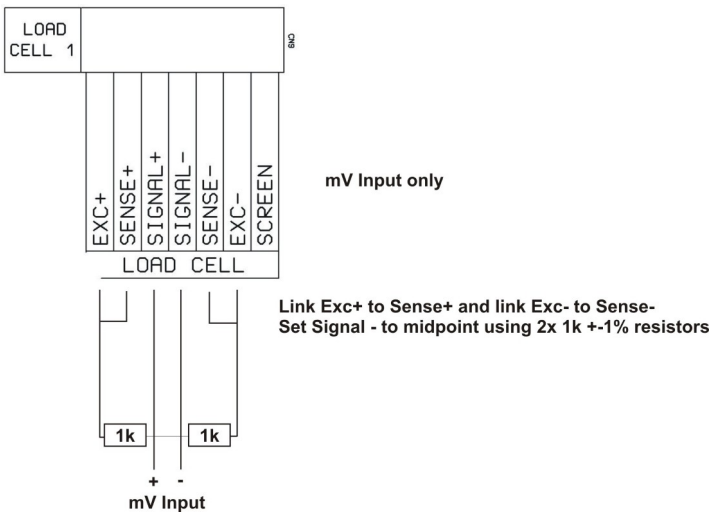


6-Wire Load Cell Connection



Millivolt (mV) only input

If the instrument is used as a millivolt meter or if a true mV output calibrator is used then the input must be connected as in the diagram below. This is necessary to maintain the common mode voltage for the ratiometric ADC.

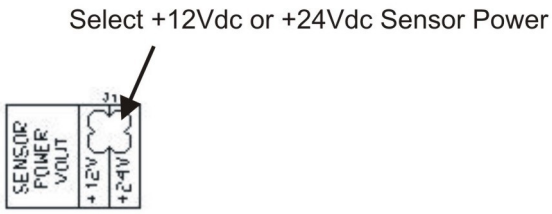


ADC Ratiometric input

The instrument uses a ratiometric ADC (Analog to Digital Converter) to obtain its precision. This means it uses the sense lines as the reference to the ADC. If the excitation voltage to the load cells varies (i.e. due to cable length, temperature etc) then the output voltage of the load cell will vary in proportion to the excitation voltage. This form of measurement improves the accuracy of the instrument and is perfectly suited for bridge circuits such as load cells.

3.8 Sensor Power

The instrument provides a stable +12Vdc or +24Vdc to power sensors, switches & push buttons. The sensor power supply voltage is jumper selectable with a maximum current consumption of 100mA.



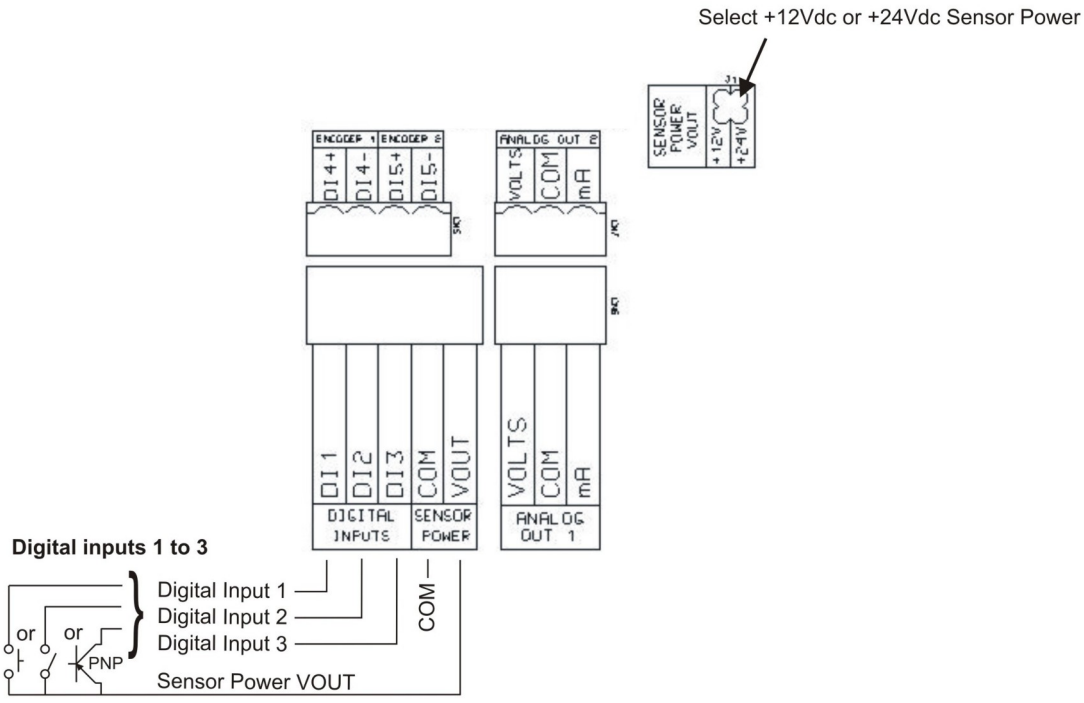
3.9 Digital Input Connection

The instrument has 5 programmable digital inputs.

Digital Inputs 1, 2 and 3

Digital inputs 1, 2 and 3 require a voltage (Sensor Power VOUT on the instrument) to activate the digital input. Leaving the digital input floating / unconnected will deactivate the digital input. The instrument provides a stable +12Vdc or +24Vdc to power sensors, switches & push buttons. The sensor power supply voltage is jumper selectable with a maximum current consumption of 100mA. Digital inputs 1,2 & 3 have built in hysteresis, filter and input over voltage protection. Maximum input voltage <30VDC

Active/Non-Active input trigger: <2V
Non-Active/Active input trigger: >2.5V



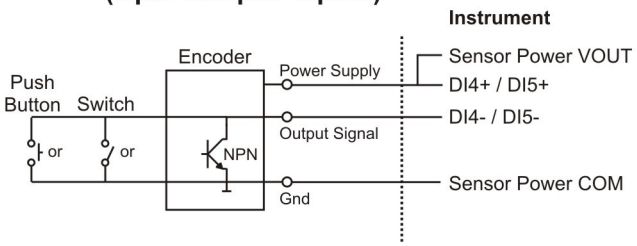
Digital Input 4 and 5

Digital input 4 and 5 are opto-isolated and are based on a PLC type input which can handle both NPN, Push-pull (Totem-Pole), PNP switches and push buttons.

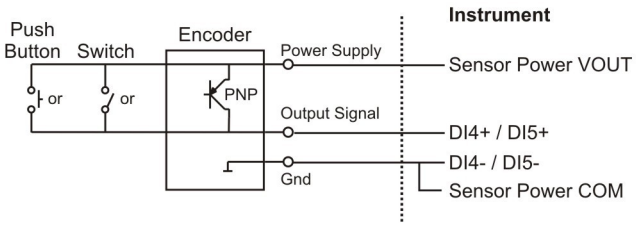
The instrument provides a stable +12Vdc or +24Vdc to power sensors, switches & push buttons. The sensor power supply voltage is jumper selectable with a maximum current consumption of 100mA.

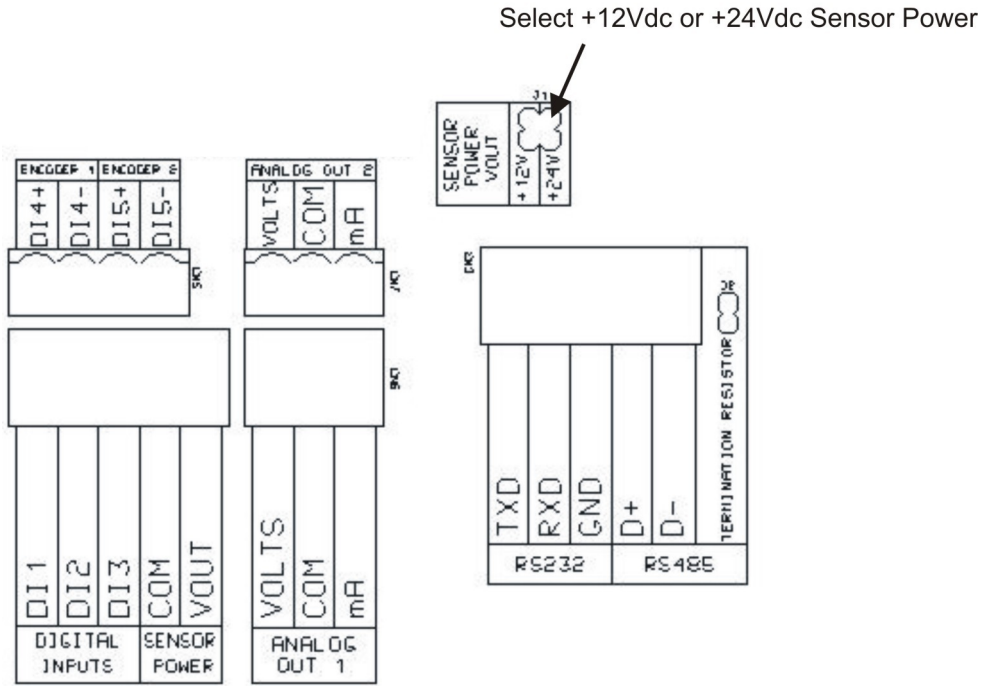
Please see the diagrams below on how to connect the digital inputs 4 and 5.

Digital inputs 4 & 5
(Opto-Coupler inputs)



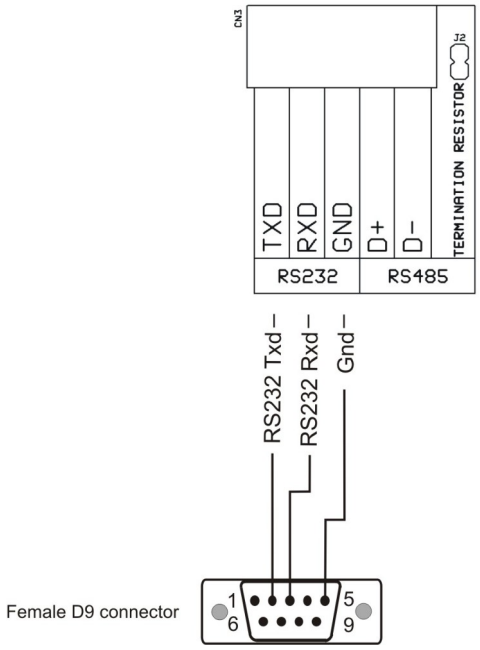
Digital inputs 4 & 5 can be wired either in a common ground or a common supply configuration





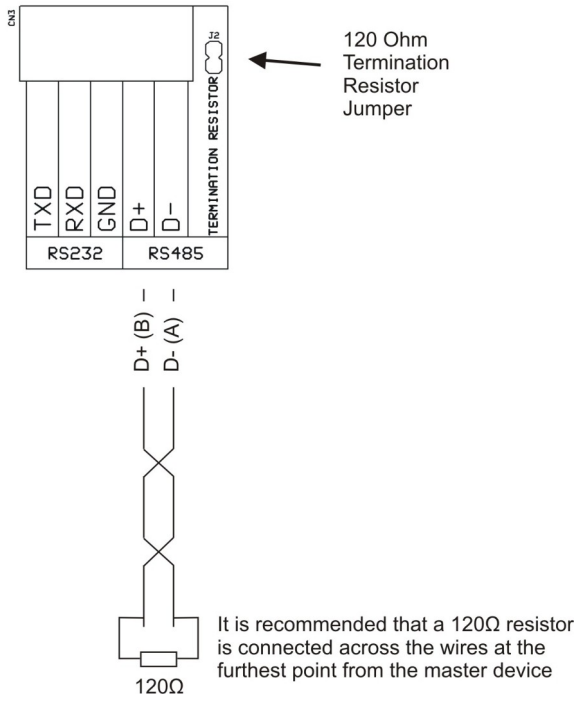
3.10 RS232 Communications

The RS232 protocol allows for a wired connection to be established as far as 100ft (30m). The RS232 port is also used for firmware upgrades.



3.11 RS485 Communications

The RS485 protocol allows for a wired connection to be established as far as 4000ft (1200m). RS232 only allows for a wired connection up to 100ft (30m). The instrument includes an on-board termination resistor which can be selected by linking J2 on the main circuit board. The termination resistor is 120 Ohms.



3.12 Ethernet Communications

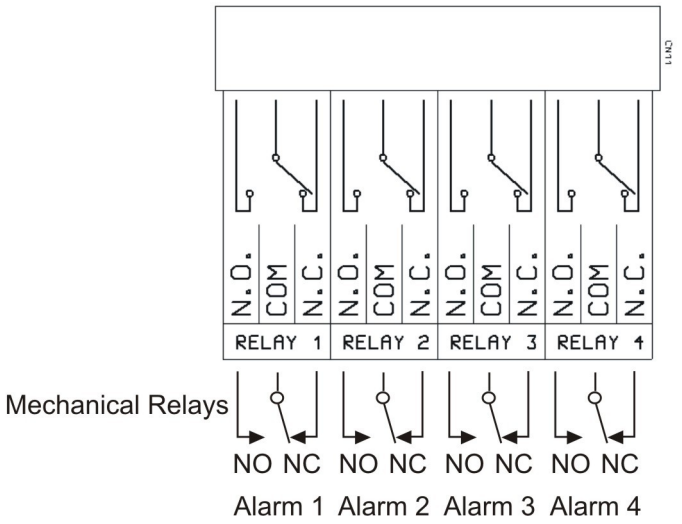
A RJ45 port is provided for the ethernet network connection.

RJ45 cable installation Tip:

Remove the gland outer nut and rubber grommet from one of the big cable glands. Slip the RJ45 plug through the gland outer nut, through the rubber grommet and then through the gland. Click the RJ45 plug into the ethernet module and reassemble the cable gland.

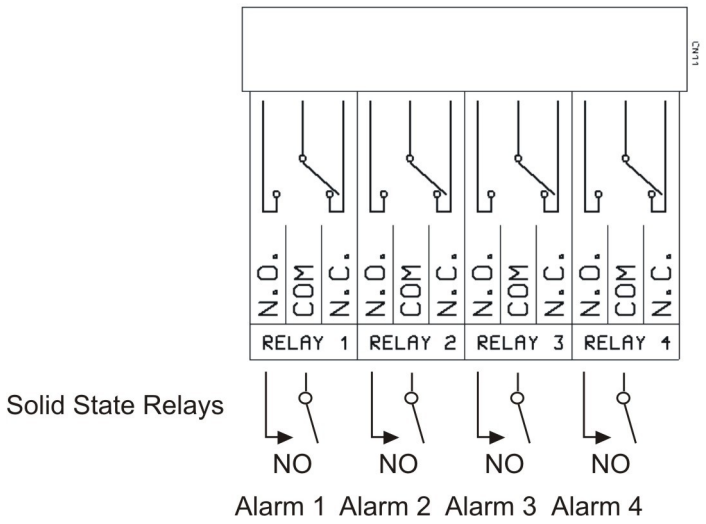
3.13 Mechanical Relays

4 Mechanical relays are provided as standard. Interposing relays are recommended for heavy duty applications. A R-C Snubber network or MOV maybe required for switching AC loads and a freewheeling diode or MOV maybe required for switching DC loads. An optional inductive load suppressor can be ordered and added to every relay output to suppress transient surges. Avoid running the alarm cables in the same trunking as the load cell cable.

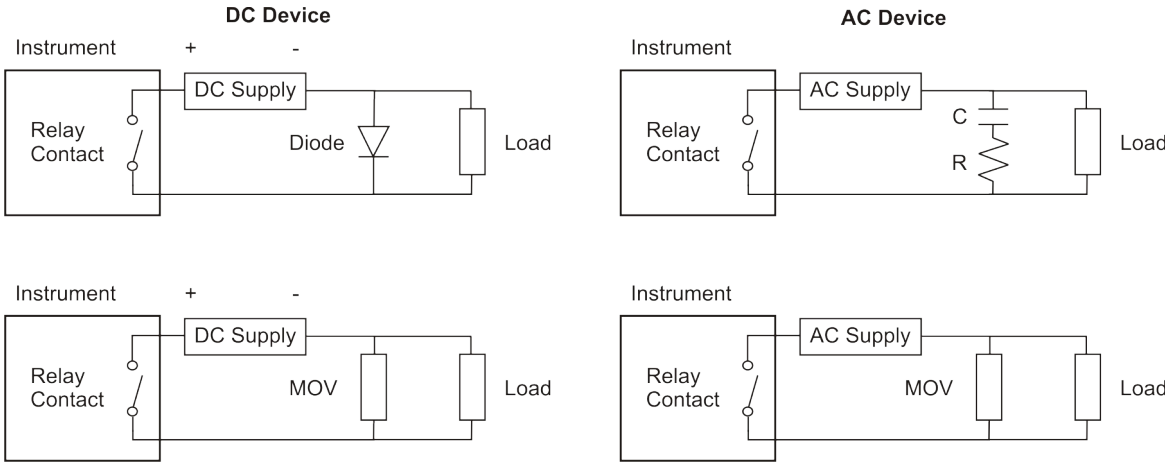


3.14 Solid-State Relays (Optional)

Up to 4 solid-state relays can be added as an option. T**hese are factory fitted and take the position of the equivalent mechanical relay**. Interposing relays are recommended for heavy duty applications. A R-C Snubber network or MOV maybe required for switching AC loads and a freewheeling diode or MOV maybe required for switching DC loads. An optional inductive load suppressor can be ordered and added to every relay output to suppress transient surges. Avoid running the alarm cables in the same trunking as the load cell cable.



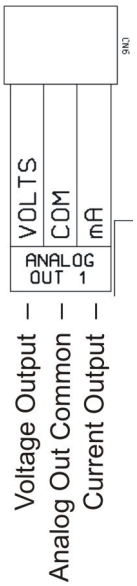
Noise suppression device for switching AC or DC devices



An optional noise suppression device can be ordered. Install these devices as close to the load as possible.

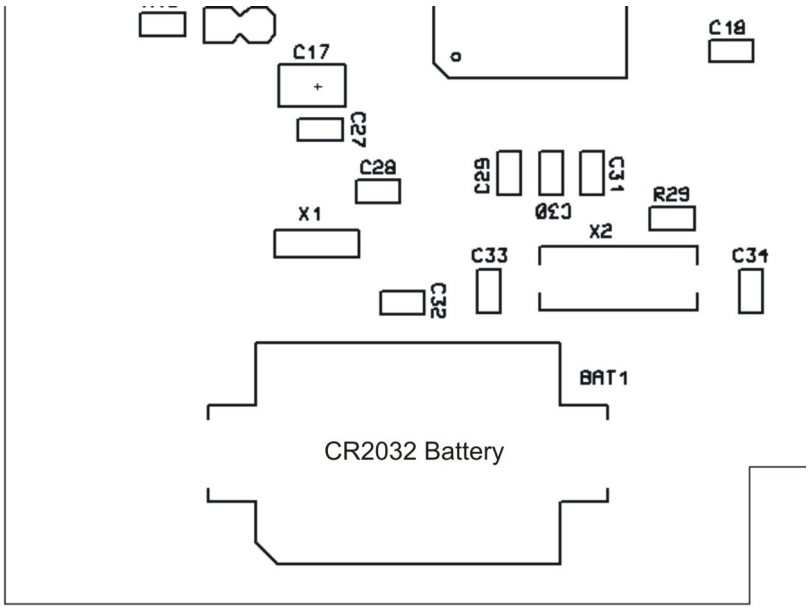
3.15 Analog Out

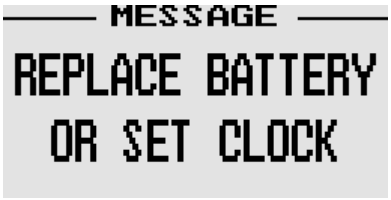
The Analog output uses a high precision 16 bit DAC (Digital to Analog converter) to provide analog ranges of 0-20mA, 4-20mA and 0-10V. The current output is source, not sink and can drive a maximum of 500Ω. The voltage output can drive a minimum load of 1kΩ. The current output also has a unique open loop detection feature. If the current loop is broken then the words “LOOP ERROR” will be briefly displayed on the LCD display. Connect the analog output as in the diagram below.



3.16 RTC Battery Replacement

The internal battery will have to be replaced if the instrument looses its time when the instrument is switched off and on. The battery is of type CR2032. The battery is located on the underside of the display circuit board. The diagram below shows the location of the battery.





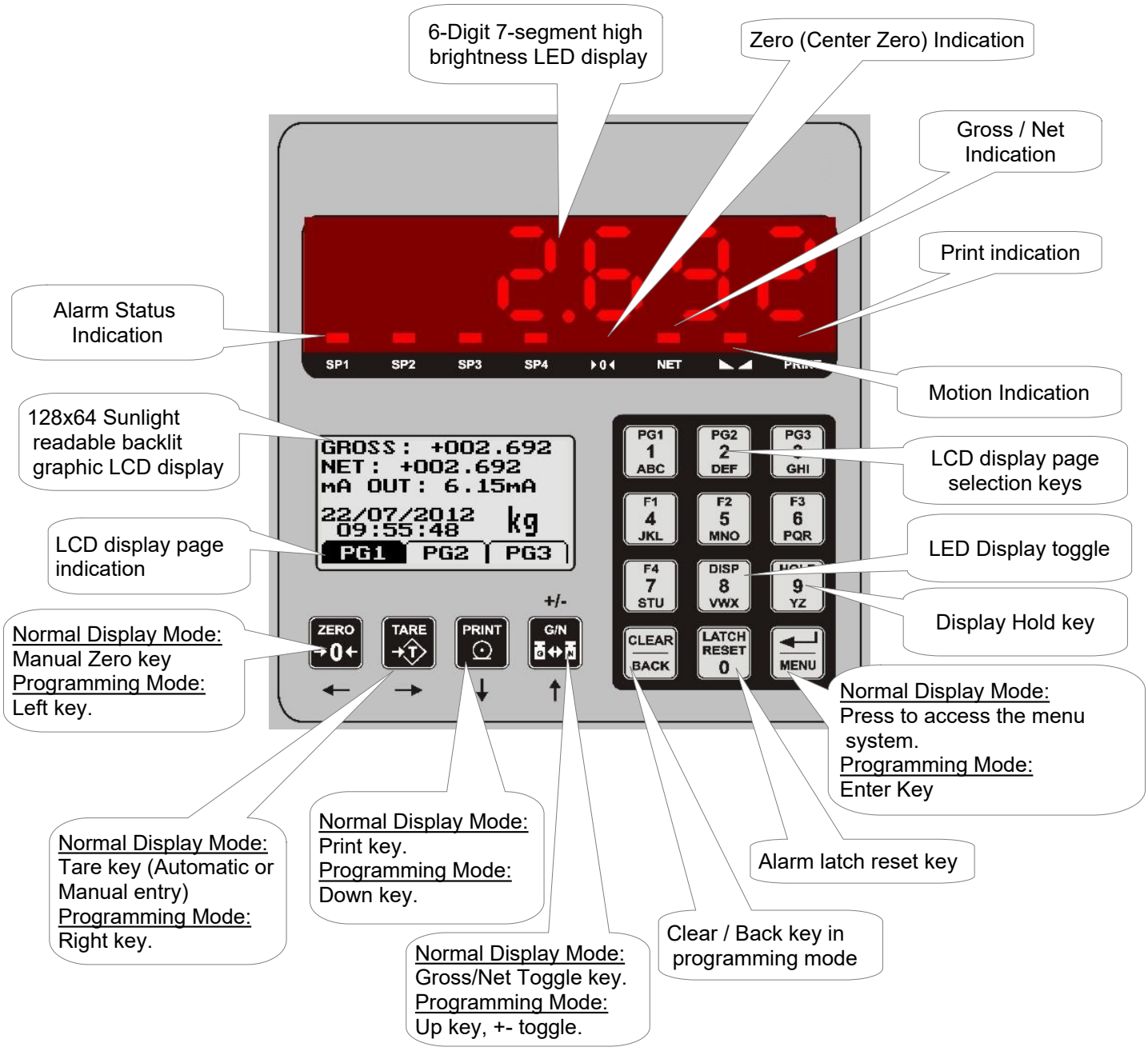
The internal CR2032 battery needs to be replaced or the clock needs to be set.

3.17 EMI Installation Guidelines

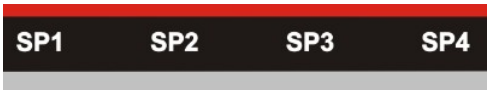
The instrument is designed with a high degree of immunity to EMI but the following guidelines will help in the successful installation of the instrument in the industrial environment. Cable length, routing and shielding can mean the difference between a successful or troublesome installation.

-Signal and control cables should be routed as far away as possible from contactors, DC motors etc.
-Never run signal or control cables in the same trunking as AC power lines or high current carrying conductors.
-Cables should be run in metal conduit that is grounded.
-Do not run cable near powerful radio transmitting devices eg. Two way radios.
-Keep cables as short as possible. Long cable runs are more susceptible to EMI then short run cables.
-Switching inductive loads cause high EMI. Use R-C Snubber networks or transient suppression devices across inductive loads.
-The instrument should be mounted in a grounded metal enclosure.
-Use shielded cables for all connections to the instrument. Some applications could require that one side of the screen is grounded.
-The use of external EMI suppression devices are recommended in high noise environments.

4 Front Panel Layout



4.1 LED Status Indicators



The SP1 to SP4 LED will illuminate when the corresponding alarm has been activated.

The Zero (Center Zero) LED will illuminate when the gross weight is within 0.25 counts.

The Net LED will illuminate when the LED display is showing the Net weight.

The display value must remain within the motion band for 1 second in order for the motion LED to illuminate.

The Print LED will briefly flash when a successful print has been completed.

4.2 Keyboard Description

The instrument contains 4 dedicated function keys which can be enabled in the Function Key menu option. During normal display mode these are:

This is the manual zero push button. If enabled, this function key will perform a manual zero within the zero band setting. This is a useful function if there is some residue material left on the scale.

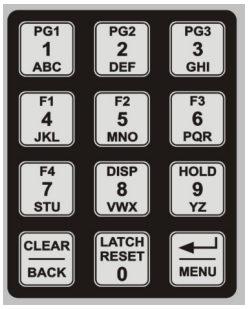
This is the tare push button. The tare function key can be selected between “AUTO”, “MANUAL” or “DISABLED”. If “AUTO” is selected then the tare push button will tare the gross weight automatically. If “MANUAL” is selected then the user can manually enter a tare value when the push button is pressed. The net LED will illuminate to indicate that the LED display is showing the net weight.

This is the print push button. If enabled, this function key allows the user to print the assigned value via the RS232 or the RS485 interface. The print LED will briefly illuminate when the print push button is pressed. The print button will only work if either the RS232 or RS485 ASCII Out mode is selected.

This is the gross/net toggle push button. If enabled, this function key will toggle the LED display between showing the gross and net weight. The net LED will illuminate to indicate that the LED display is showing the net weight.

These keys also serve as the up, down, left, right keys when navigating the menu system. The up key also changes the sign of a value when in editing a numeric value.

Keypad



The instrument contains a full alpha-numeric keypad for data entry in programming mode. During the normal display mode certain keys have alternate functions. These are:

These keys select page 1, page 2, page 3 or page 4 on the LCD display.

This is the LED display toggle push button. If enabled, this function key will toggle the display in the following order. The minimum recorded weight, the maximum recorded weight and then the current measured weight value. The LED display will flash either “MIN” or “MAX” to indicate that the displayed value is either the minimum or maximum recorded weight.

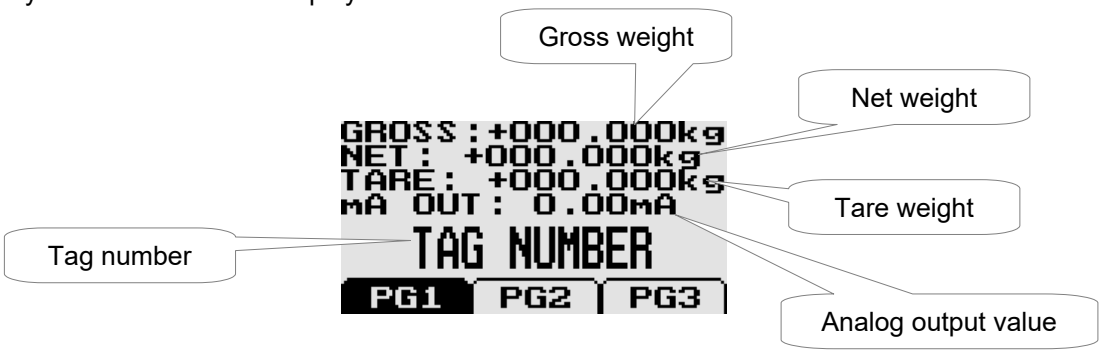
This is the display hold push button. If enabled, the function key will display hold the current measured weight value. The LED display will flash “HOLD” to indicate that the LED displayed value is the display hold value. Press the function key again to cancel the display hold function.

This is the alarm latch push button. If enabled, this function key will reset any of the latched alarms when the alarm condition has been removed. This menu option is only displayed if any of the alarm latch functions have been enabled.

4.3 LCD Display Pages

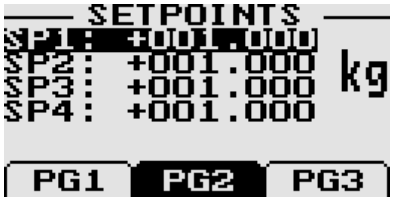
4.3.1 Main Display (Page 1)

Press the PG1 key to access the Main display.



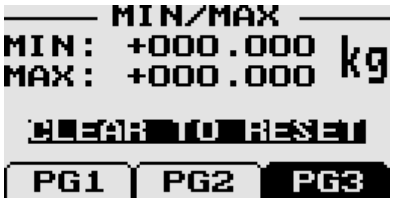
4.3.2 Setpoint Display (Page 2)

Press the PG2 key to access the editing Setpoint display. This page is a provided to allow for editing of the setpoint values. (Editing of the setpoints values can be security locked)



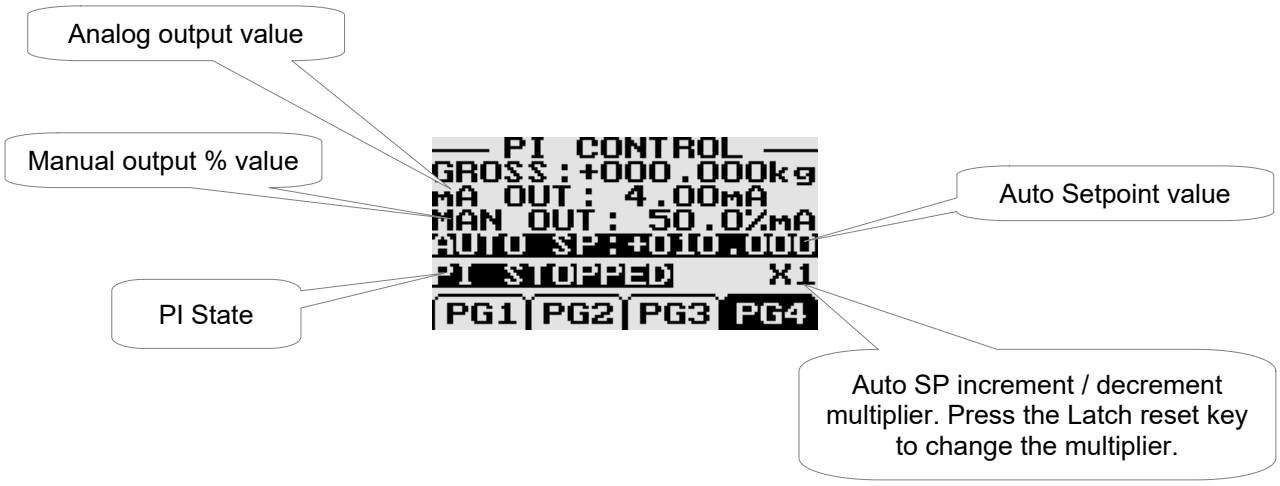
4.3.3 Min / Max Display (Page 3)

Press the PG3 key to access the Min / Max display. Press the clear key to reset the min / max values to the current values.



4.3.4 PI Control Display (Page 4)

Press the PG4 key to access the PI control main display (The PI Control function must be enabled).



Use the up/down and keypad to adjust the MAN OUT and AUTO SP value.

Manual Mode: Use the DISP and HOLD key to increment and decrement the MAN OUT value.

Auto Mode: Use the DISP and HOLD key to increment and decrement the AUTO SP value. Use the latch reset key to change the increment/decrement multiplier.

PI Control Push buttons

The following push buttons are automatically assigned to PI functions when the PI Control is enabled. These keys are only active when the PI Control main display is showing.

F2: PI Start

F3: PI Stop

F4: PI Manual/Auto mode

DISP: Manual analog output % increment (PI Manual mode). Auto SP increment (PI Auto mode).

HOLD: Manual analog output % decrement (PI Manual mode). Auto SP decrement (PI Auto mode).

5 Menu System

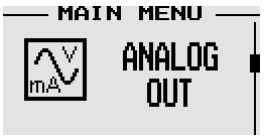
5.1 Main Menu

Enter the main menu by pressing the MENU key. The following menu items will be displayed.

Load Cell configuration setup menu

Press the down key to proceed to the next menu option

Alarm configuration setup menu



Analog output setup menu

RS232 and RS485 communications setup menu

Function keys setup menu

Digital inputs setup menu

PI Control setup menu

Miscellaneous items setup menu

Back to the start of the main menu

5.1.1 Exiting the menu system

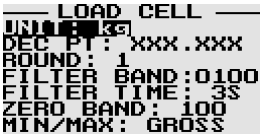
Press the 

key when the main menu items are showing to exit the menu system. All the settings are saved and the instrument will then return to the normal display mode.

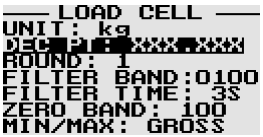
> **Note:** The menu system has a 2 minute program timeout. If no key has been pressed within this period then the instrument will save all settings and return to the normal display mode.

5.2 Load Cell Configuration Menu

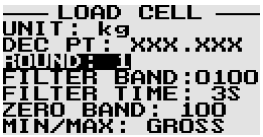
This menu configures the load cell parameters and also allows the user to calibrate the load cell system.



Select the engineering display units. The units can be selected from **"NONE"**, **"g"** grams, **"kg"** kilograms, **"t"** metric tonnes, **"oz"** ounces, **"lb"** pounds, **"T"** imperial tons and **"N"** newtons.



Select the display decimal point.



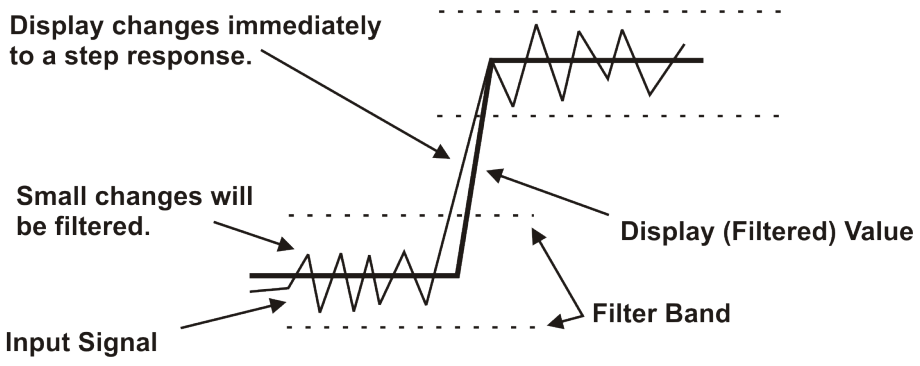
Select the display rounding in display counts. The round function rounds the display value to the nearest rounding increment. Eg. With a rounding setting of **"5"**, a display value of 233 will be rounded up to 235. A setting of **"10"** will create a dummy zero. The display rounding function can be used in conjunction with the digital filter settings to create a more stable display in noisy environments. The display rounding can be selected from **"1"**, **"2"**, **"5"**, **"10"**, **"20"**, **"50"**, **"100"** or **"200"** display counts.

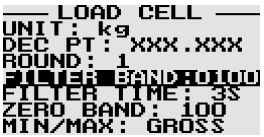
5.2.1 Advanced Digital Filtering

The instrument contains an advanced digital filter algorithm. The filter works by filtering small changes between measurements but will react instantaneously to a large step response. There are 2 settings that are used to setup the digital filter, namely the filter band and the filter time. The filter band is the threshold in counts that the value must change by in order for the instrument to recognise it as a step response. The display will jump to this value immediately if a step response is detected. The filter time is the time in seconds that the input signal will be filtered provided that the input remains within the filter band setting. The filter is achieved by taking the moving average of the input signal for the filter time setting.

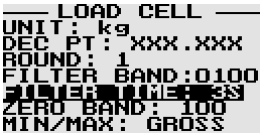
An increase in filter time leads to a more stable display but with a reduced reaction time. Use the filter time in conjunction with the filter band and display rounding settings to create a tradeoff between reaction time and display stability.

The diagram below illustrates the use of the filter time and the filter band.

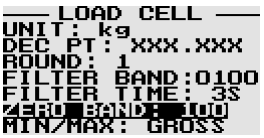




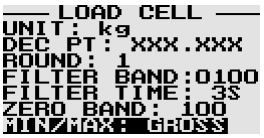
See the paragraph above for an explanation of the filter band.



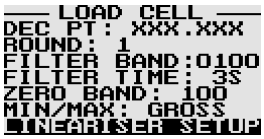
Select the filter time. See the paragraph above for an explanation of the filter time. A value of **"1"**, **"3" or "5"** seconds can be selected.



Enter the zero band setting in display counts. The auto-zero tracking and the manual gross zero will work within the limits of this band.



Select the minimum and maximum assignment. The instrument will use this variable for the minimum and maximum comparison. Select from **"GROSS"** or **"NET"**.

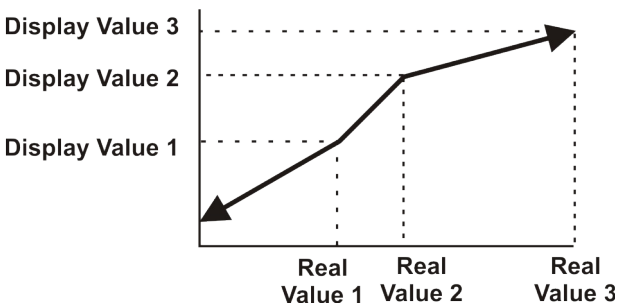


Lineariser setup sub-menu

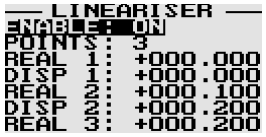
For non-linear processes, up to 16 scaling points may be used to provide a piece-wise linear approximation. The greater the number of points the greater the accuracy. Each point has a real value and a corresponding display value. The real value is the actual value of the input as it would be with the lineariser feature turned off, the display value is the desired value.

Setup the lineariser as follows:

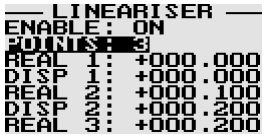
-The instrument must be setup and calibrated as normal.
-Apply test signals and record the actual readings on the display.
-Activate the lineariser and enter the real values and its corresponding display/desired value.
-The instrument can be checked by applying the original test signal and verifying the display value.



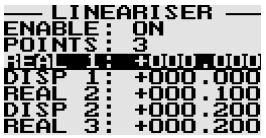
Note:
If the measured value is above the last actual point then the lineariser will use the last 2 points to calculate the slope and similarly is the measured value is below the first actual point then it will use the first 2 points to calculate the slope.



Select to enable the lineariser feature.

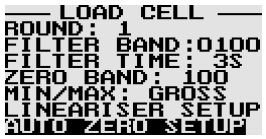


Select the number of lineariser scaling points.



Enter the actual or real value.

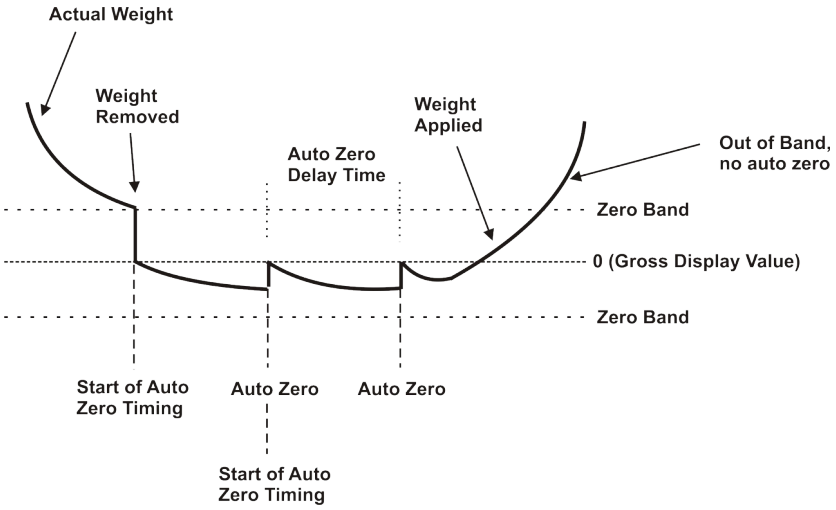
Enter the display or desired value.

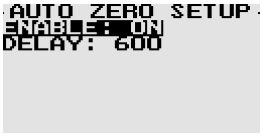


Auto-Zero Tracking Sub-Menu

The auto-zero tracking feature will zero the weight display at regular intervals as long as the measured weight is within the zero band setting. The LCD display will briefly flash “AUTO-ZERO” when an auto-zero has been performed. When the instrument restarts, the auto zero correction is lost, but it will start again with a new auto zero correction. Manual zeroing can also be done via a front push button or via a rear digital input. The auto-zero tracking function can be used to compensate for zero drift. Zero drift may be caused by changes in the electronics or accumulation of material on the weight system. The auto-zero band should be set large enough to track normal zero drift, but small enough not to interfere with normal measuring.

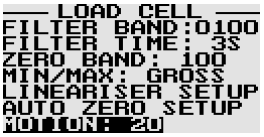
The diagram to the right illustrates the use of the auto-zero tracking function.





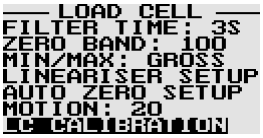
Select to enable the auto-zero tracking feature.

Auto-zero tracking delay time. This defines how often an auto zero is attempted.



Select the motion indication band in display counts. The display value must remain within the motion band for 1 second in order to illuminate the motion indication LED. A motion band of **"OFF"**, **"1"**, **"2"**, **"3"**, **"5"**, **"10"**, **"20"** or **"50"** can be selected. The print on demand will only print when the motion LED is on.

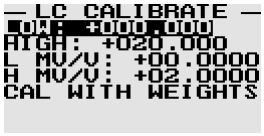
5.2.2 Load Cell Calibration Sequence



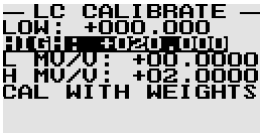
The instrument can be calibrated in 2 ways. Either by using known weights or from the load cell calibration certificate.

Calibration using the load cell calibration certificate

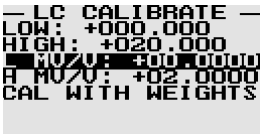
The following parameters must be entered into the instrument from the load cell calibration certificate.



Enter the value in engineering units of the low calibration point of the system. This is normally zero.



Enter the value in engineering units of the high calibration point of the system eg. 5000kg. This is normally the full rating value of the load cells.



Enter the value in mV/V that corresponds to the low display value. This value is normally found on the load cells calibration certificate. The load cells offset zero error is normally expressed as uV (microvolts) at 10V excitation. Eg. A load cell zero error with no load is 560uV (0.56mV) at 10V excitation. To convert to mV/V divide by 10 which equals 0.056mV. This value must then be entered into the low mV/V setting.

Enter the value in mV/V that corresponds to the high display value. This value is normally found on the load cells calibration certificate. The required value is the rated value of the load cell in mV/V at full load.

Calibration using known weights menu.

Calibration using known weights

This allows the user to calibrate the instrument using known weights. Before the instrument can calculate the weight accurately it must know the mV/V and display values of 2 known weights. The calibration sequence will prompt the user to apply known weights and enter the corresponding weight.

For best results the system should be given a warm up time of a minimum of 15 minutes before calibration takes place, and the 2 known weights should be as different from each other as possible to allow the instrument to try and obtain the greatest resolution. The high calibration mass should also be as close to the maximum system capacity as possible (Full load on the load cells)

The low and high display and corresponding mV/V values can be entered manually in the “LC CALIBRATE” menu option.

This allows the user to enter and apply the low load cell calibration weight. The low weight is normally zero.

Apply the low calibration weight to the scale and enter the display value that corresponds to the low calibration weight.

The instrument will start to average and calculate the mV/V value that corresponds to the low calibration weight.

Select if you wish to save the new calibration. The low calibration weight can now be removed. The low display value and its corresponding mV/V value will be saved in the “LC CALIBRATE” menu settings.

This allows the user to enter and apply the high load cell calibration weight.

Apply the high calibration weight to the scale and enter the display value that corresponds to the high calibration weight.

The instrument will start to average and calculate the mV/V value that corresponds to the high calibration weight.

Select if you wish to save the new calibration. The high calibration weight can now be removed. The high display value and its corresponding mV/V value will be saved in the “LC CALIBRATE” menu settings.

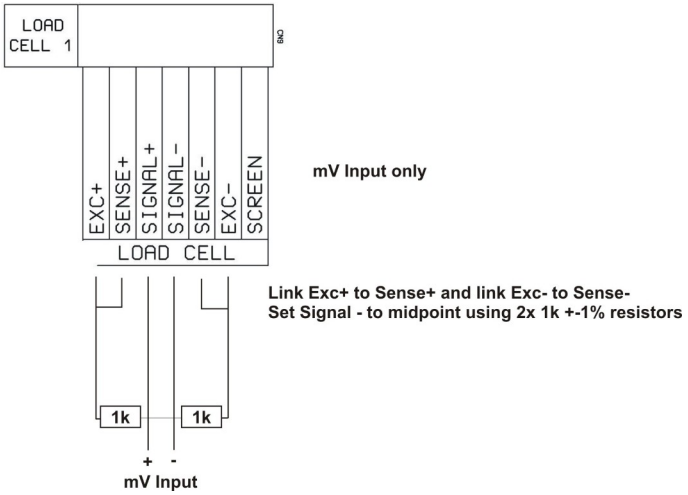
Back to the start of the calibration using known weights menu.

Calibrating using a Load Cell Simulator or mV simulator

Calibrating the instrument using known weights is the most accurate way to calibrate the instrument. Other calibration equipment such as a load cell simulator or mV calibrator can also be used.

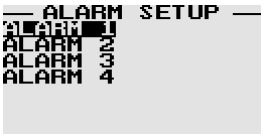
Using a load cell simulator is the easiest and best way to calibrate the instrument and this requires no additional interface circuitry because the load cell simulator will setup the common mode voltage required by the input to the ADC.

The circuit as illustrated to the right must be constructed if trying to calibrate the instrument using a pure mV signal such that of a pure mV output calibrator. The resistors can be of a type 1k Ohm 1/4W 50ppm 1%. Please note that the resistor junction is only connected on the negative signal input. The below circuit is required to setup a common mode voltage for the ratiometric ADC.



5.3 Alarm Configuration Menu

This menu configures the alarm parameters.

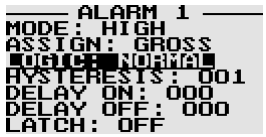


The Alarm 1 setup menu is shown below. The setup menu is identical for each of the alarms.

Select the alarm mode. The alarm mode can be set to:

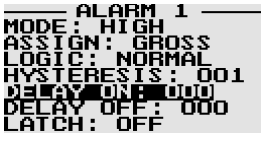
"OFF":	The alarm is disabled
"LOW":	A low alarm is activated when the measured value is below the alarm setpoint.
"HIGH":	A high alarm is activated when the measured value is higher then the alarm setpoint
"DEV"	A deviation alarm which is activated when the measured value falls outside of the deviation band.

Select the alarm assignment. The alarm will use this value to compare against the set point value. The alarm can be selected to work off the **"GROSS"**, **"NET"**, **"MIN"** or **"MAX"** recorded weight.



Select the alarm logic. The alarm can be set to **"NORMAL"** or **"INVERT"**.

Enter the alarm hysteresis value. The hysteresis value is normally used to prevent an alarm being activated and deactivated when a noisy measurement dithers around the set point value.



Enter the alarm on delay value in seconds that the alarm condition must persist before the alarm is activated.

Enter the alarm off delay value in seconds that the alarm condition must persist before the alarm is de-activated.

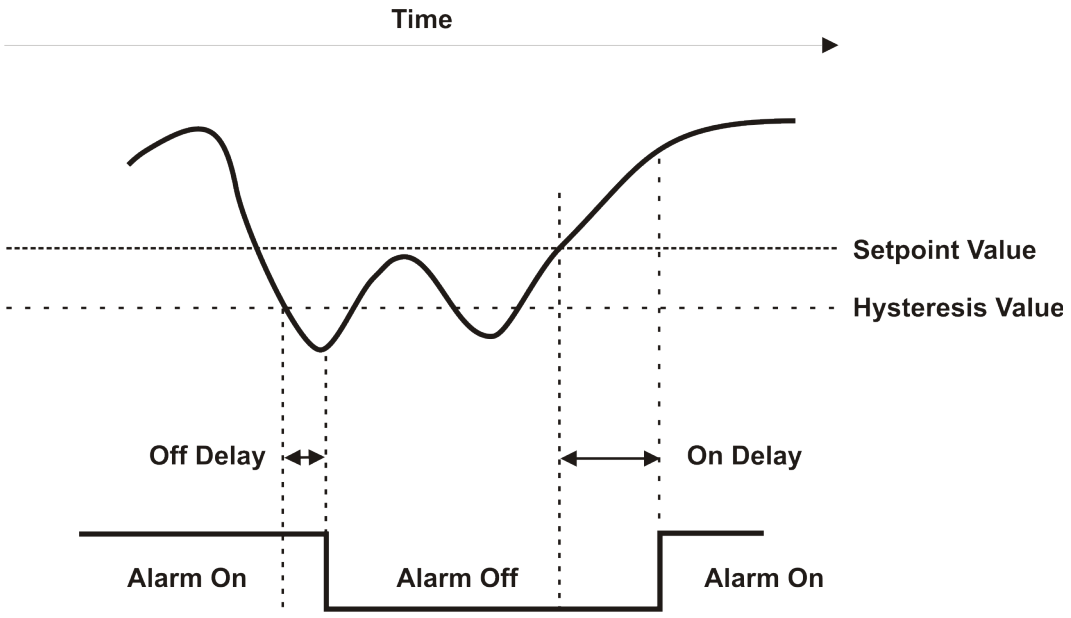
The alarm can be set to remain activated even if the alarm condition has been removed. When the alarm condition has gone then the alarm latch can be reset by either a digital input or via the front alarm latch reset push button.

Back to the start of the alarm configuration menu

If the deviation alarm mode is selected.

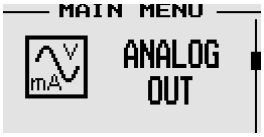
Enter the deviation low value. The low value of the band is the set point minus the deviation low value. This menu option is only shown if the alarm mode is set to deviation.

Enter the deviation high value. The high value of the band is the set point plus the deviation high value. This menu option is only shown if the alarm mode is set to deviation.

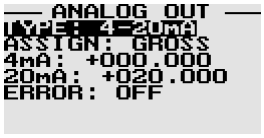


The above diagram illustrates the use of a high alarm with hysteresis and on/off delay.

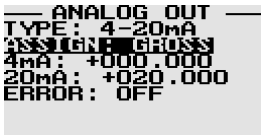
5.4 Analog Out Configuration Menu



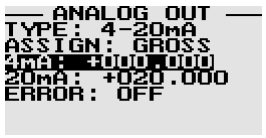
This menu configures the analog output parameters.



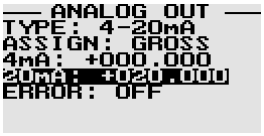
Select the analog output type. The analog output type can be selected from **"OFF"**, **"0-20mA"**, **"4-20mA"** or **"0-10V"**.



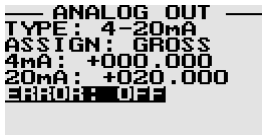
Select the source for the analog retransmission. The source can be selected from the **"GROSS"**, **"NET"**, **"MIN"** or **"MAX"** recorded weight.



Enter the display value that corresponds to the selected analog output low value. E.G. 0.000 display counts = 4mA. (4-20mA analog output type shown).



Enter the display value that corresponds to the selected analog output high value. E.G. 20.000 display counts = 20mA. (4-20mA analog output type shown).



Enter what must happen to the analog output when an error occurs with the measured weight. eg. Over-range, Under-Range etc. The analog error can be set to:

"OFF": The analog error feature is disabled.
"OUT LOW": The analog output will go to the minimum value when an error occurs.
"OUT HIGH": The analog output will go to the maximum value when an error occurs.

5.5 Communications Configuration Menu

This menu configures the RS232, RS485 and Ethernet communication parameters.

Enter the communication address of the instrument. If more then one instrument is connected via a multidrop network then the address of each instrument must be unique. A unique address allows commands to be sent to an individual instrument as well as it also prevents all the instruments on the bus replying simultaneously.

The ASCII out protocol address range is 0 to 255. The Modbus address range is 001 to 247.

RS232 Communications setup menu.

RS485 Communications setup menu.

Smart Junction Box setup menu.

Ethernet Communications setup menu.

Reset the Ethernet adapter and Ethernet settings.

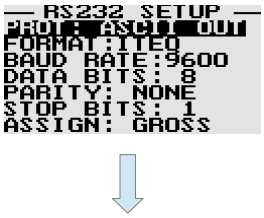
The instrument has 3 built in communication protocols:

1) MODBUS RTU
2) MODBUS ASCII
3) Various ASCII protocols for interfacing to large displays and serial printers.

Please see below for the MODBUS registers.

5.5.1 RS232 / RS485 Communication Setup Menu

The RS232 Communications setup menu is shown below. The setup for the RS485 communications setup is identical.



Select the communication protocol. The communication protocol can be set to:

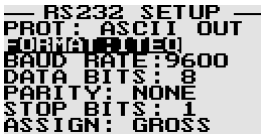
"ASCII OUT": Various ASCII protocols to interface to serial printers and large displays. Please see the format of the ASCII out protocol in section 5.5.1

"ASCII IN": The instrument can act as a slave indicator to another instrument. One instrument must be setup for continuous ASCII Out and the other instrument must be setup for ASCII IN.

"MODBUS RTU": Modbus RTU protocol

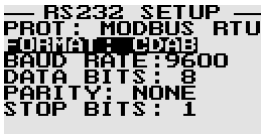
"MODBUS ASC": Modbus ASCII protocol.

This menu option is only shown if the ASCII Out / In protocol has been selected.



Select the format of the ASCII Out / In protocol

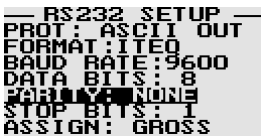
This menu option is only shown if the MODBUS protocol has been selected.



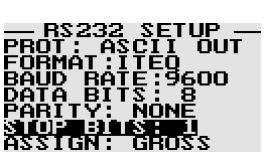
Select the float format of certain Modbus variables

Select the communication baud rate. The baud rate can be selected from **"1200"**, **"2400"**, **"4800"**,**"9600"**, **"19200"**, **"38400"**, **"57600"** and **"115200"** baud.

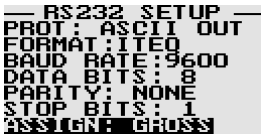
Select the communication data bits. **"7"** or **"8"** data bits can be selected.



Select the communication parity bit. **"NONE"**, **"ODD"** or **"EVEN"** parity can be selected.



Select the communication stop bit. **"1"** or **"2"** stop bits can be selected.



Select the source for the communication data. This menu option is only shown if the ASCII Out mode is selected. The communication source can be selected from the **"GROSS"**, **"NET"**, **"MIN"** or **"MAX"** recorded weight.

This menu option is only shown if the ASCII Out mode is selected.

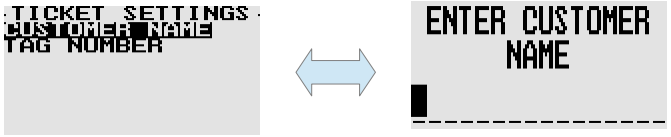
Select between print **"ON DEMAND"** or **"CONTINUOUS"** printing. Print on demand will print the ASCII string by either pressing the front print push button or by using a digital input. Continuous printing will transmit the ASCII string at a rate of 10 times a second. The print on demand will only print when the Motion LED is on.

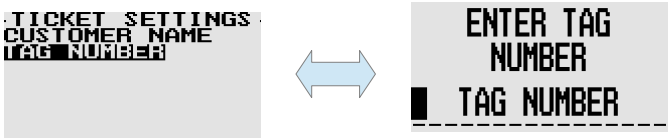
This menu option is only shown if the Print on demand is selected.

This menu option enables the Ticket Print function.

Ticket Print Settings sub-menu

Ticket Settings Menu:





Ticket printer output:

04/01/1970 10:00:10
Customer: CUSTOMER
Tag: TAG NUMBER

25.807 kg

This menu option is only shown if the ASCII In mode has been selected.

This menu option is only shown if the ASCII In mode has been selected. This menu option sets the communication timeout period. If no valid communications is received within the timeout period then the display will flash to indicate an error.

Back to the start of the RS232 or RS485 configuration menu

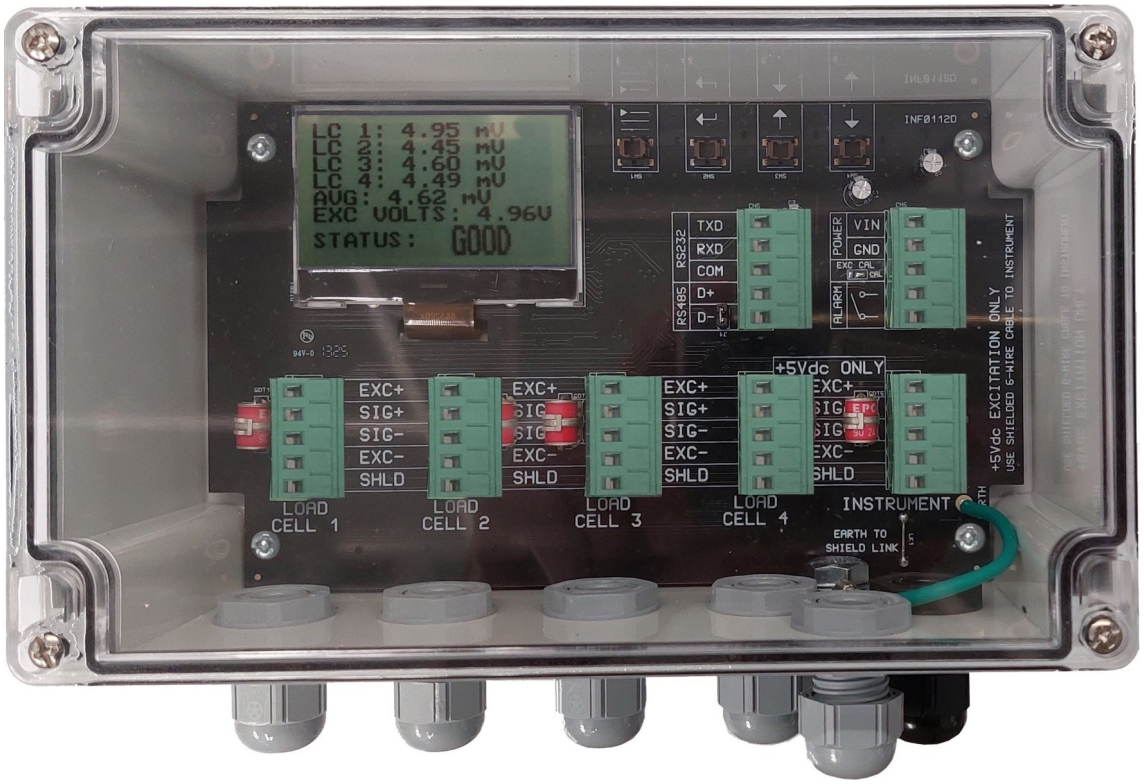
5.5.2 Smart Junction Box Setup Menu

Enabling the Smart Junction Box interface allows for the Instrument to mimic the display of the connected Smart Junction Box and simultaneous updates the internal modbus registers. The Smart Junction Box can be connected to the instrument either via RS232 or RS485 (user selectable). Com Port settings are taken from the RS232 or RS485 setup menu. The instrument will poll the Smart Junction Box every 500mS.

This menu option enables or disables the Smart Junction Box interface.

Select which port the Smart Junction Box is connected to.

Pressing the PG1 (1 Key) during the normal run time toggles between the instruments normal display and the Smart Junction Box display.



5.5.3 Ethernet Communication Setup Menu

Only Modbus RTU is supported over the ethernet connection.

This menu option lists the ethernet parameters in an easy to read list

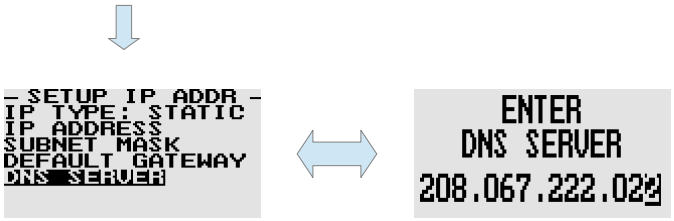
IP Address setup sub-menu

Ethernet Mode setup sub-menu

IP Address Setup Menu:

Select Static IP or DHCP (automatic IP address)

The below menu items are only shown if Static IP address is selected



Ethernet Mode Setup Menu:

Select “ON” for Modbus TCP/IP or “OFF” for Modbus RTU over TCP/IP.

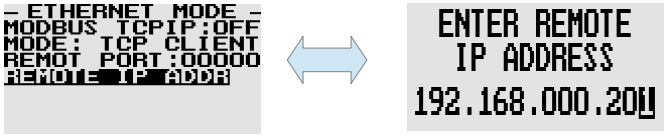
Select the Ethernet mode. Select between “TCP Server”, “TCP Client”, “UDP Server” or “UDP Client”

The below menu items are only shown if “TCP Server” or “UDP Server” is selected

Enter the Local Port.

The below menu items are only shown if “TCP Client” or “UDP Client” is selected

Enter the Remote Port.



Default Ethernet Settings:

Error Code	Error Description
IP Type	Static
IP address	192.168.0.7
Subnet Mask	255.255.255.0
Gateway	192.168.0.1
DNS Server	208.67.222.22
Ethernet Mode	TCP Server
Local Port	23
Remote IP address	192.168.0.201

Testing the Ethernet connection in Microsoft Windows

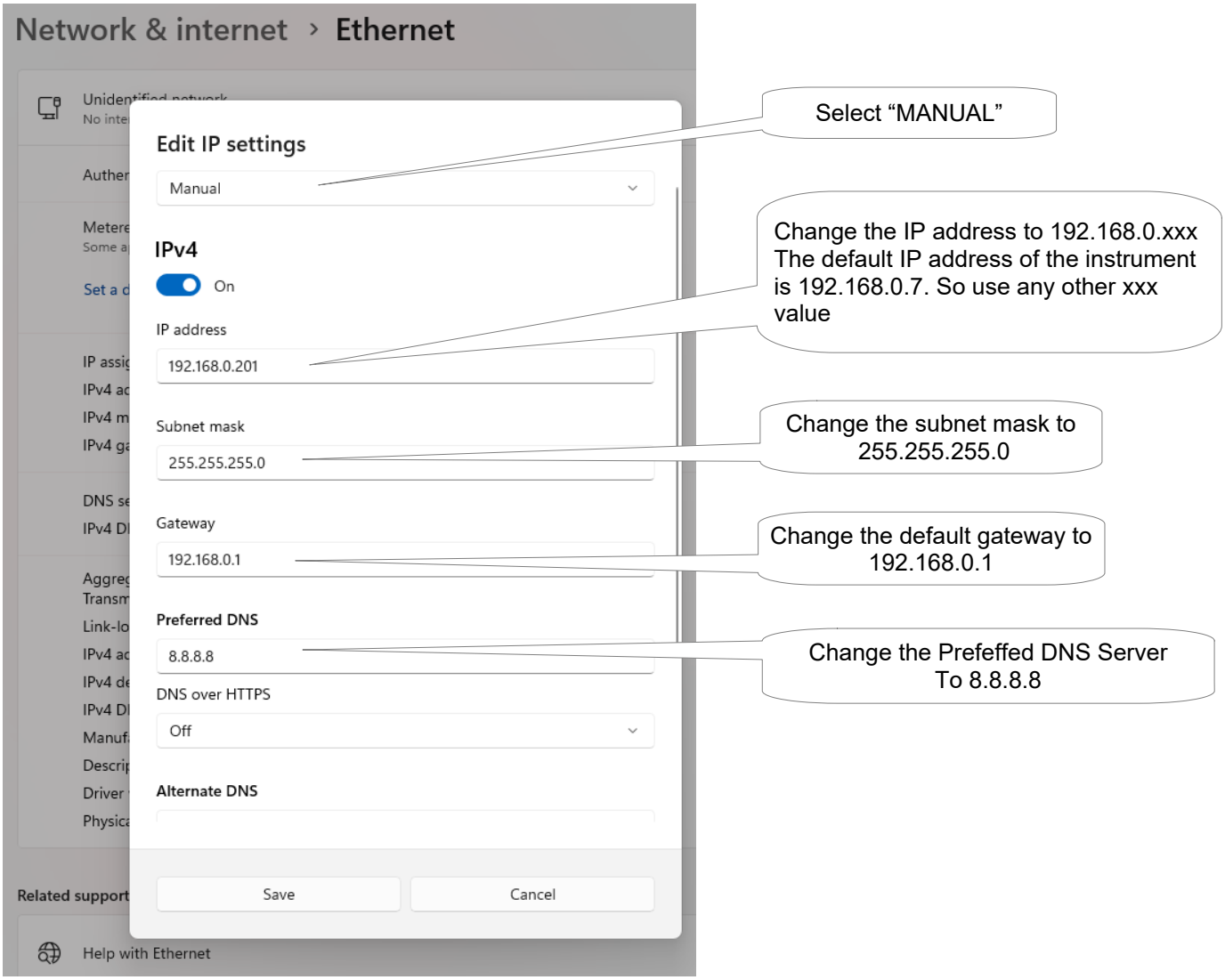
The following will explain how to setup and test the instrument in Microsoft Windows by using either a direct Ethernet connection or via a router.

Connect the instrument to the PC or routers Ethernet port using a standard Ethernet cable. Apply power to the instrument.

If the DHCP is used, it must be sure that both the instrument and the test PC have IP addresses in the same subnet address range. For example. The instrument is in DHCP mode and it is allocated to “192.168.0.xxx” but your PC is set for “192.168.11.xxx” and subnet mask “255.255.255.0”. Then, they can’t communicate with each other because they are in different IP address scope. You must be sure that your PC is in “192.168.0.xxx” address range.

PLEASE NOTE THAT YOU WILL LOSE CONNECTION WITH YOUR COMPANY NETWORK BY RECONFIGURING YOUR PC ETHERNET NETWORK ADAPTER. THIS ONLY APPLIES IF YOU CONNECT TO YOUR COMPANY NETWORK VIA YOUR PC'S ETHERNET PORT.

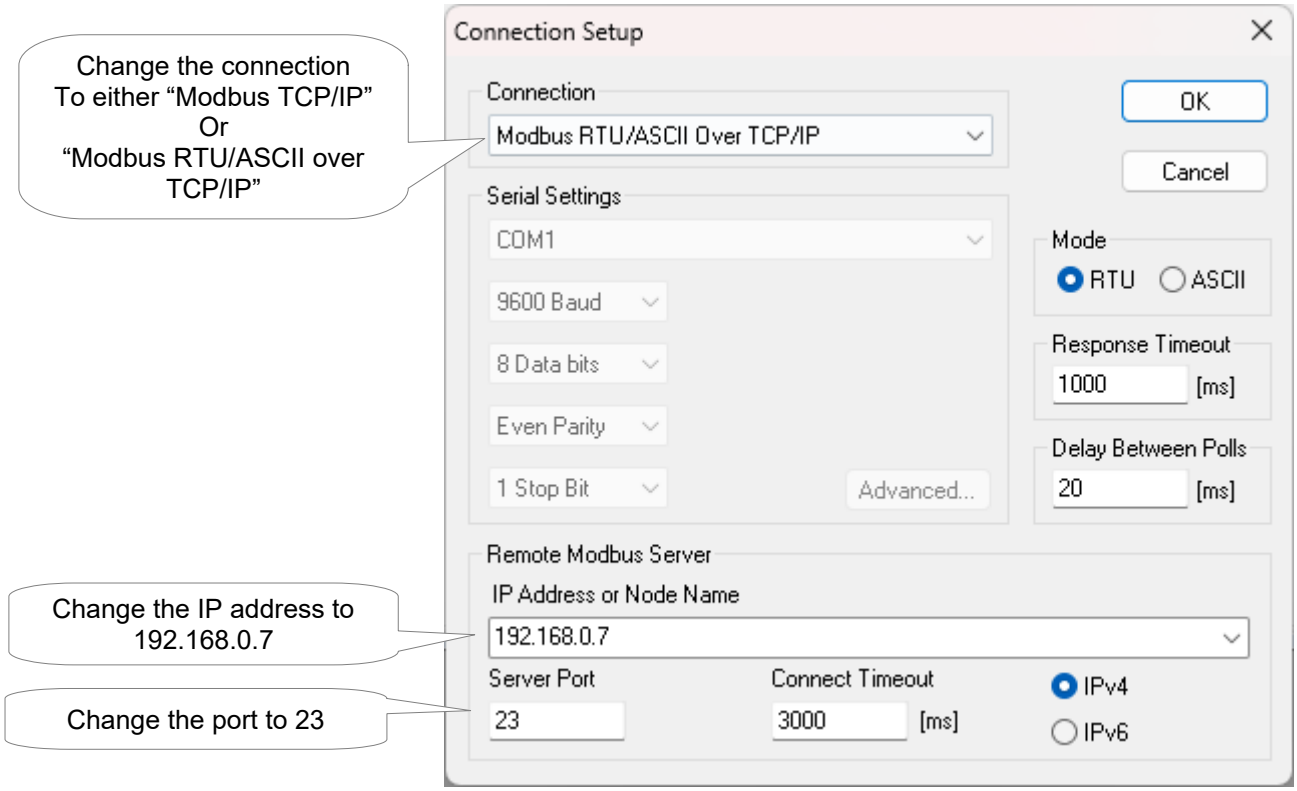
To change your IP address of the PC you need to right click on “Windows start”, select “Network Connections”, select “Ethernet”. Edit the IP settings. A window similar to the below will be displayed.



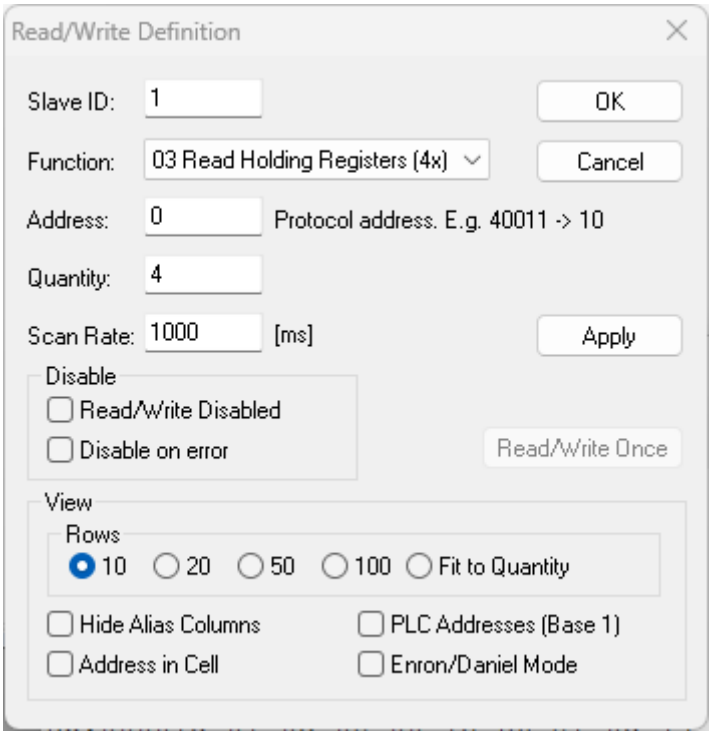
Click “SAVE” and close the window.

Run the **Modbus Poll PC** software, and configure as below.

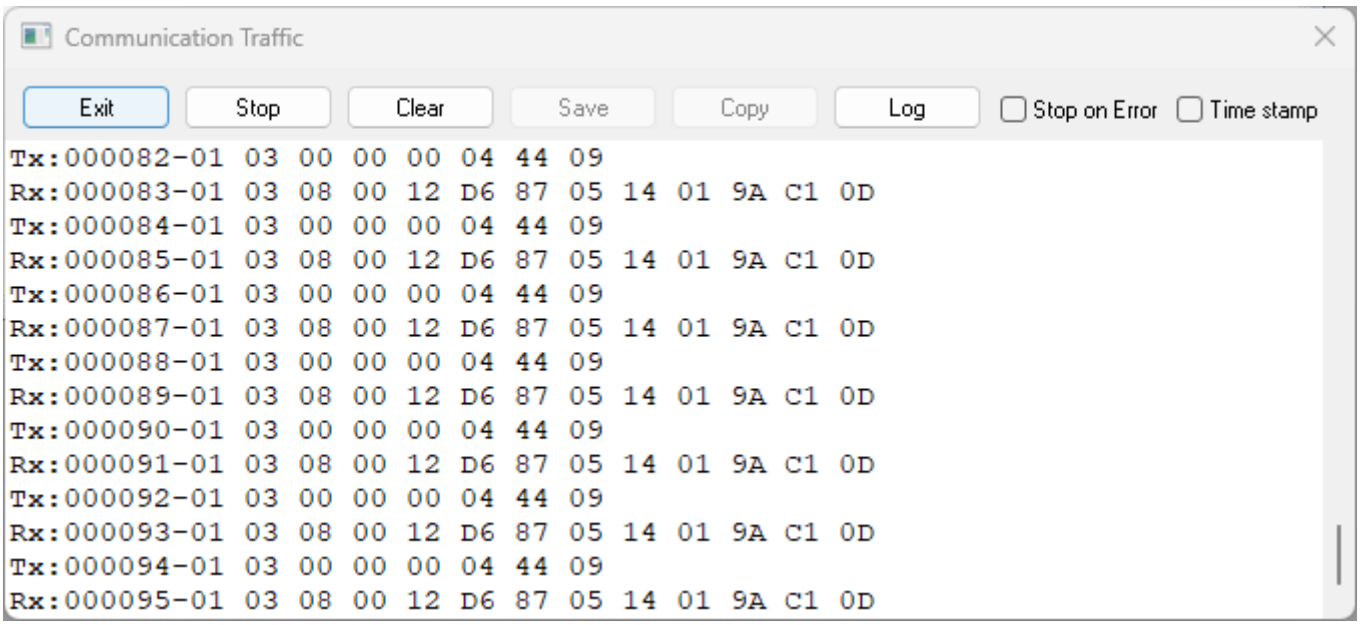
Connection → Connect:



Setup → Read / Write definition:



SUCCESS!!!!


Communication Traffic
Exit
Stop
Clear
Save
Copy
Log
Stop on Error
Time stamp
Tx:000082-01 03 00 00 00 04 44 09
Rx:000083-01 03 08 00 12 D6 87 05 14 01 9A C1 0D
Tx:000084-01 03 00 00 00 04 44 09
Rx:000085-01 03 08 00 12 D6 87 05 14 01 9A C1 0D
Tx:000086-01 03 00 00 00 04 44 09
Rx:000087-01 03 08 00 12 D6 87 05 14 01 9A C1 0D
Tx:000088-01 03 00 00 00 04 44 09
Rx:000089-01 03 08 00 12 D6 87 05 14 01 9A C1 0D
Tx:000090-01 03 00 00 00 04 44 09
Rx:000091-01 03 08 00 12 D6 87 05 14 01 9A C1 0D
Tx:000092-01 03 00 00 00 04 44 09
Rx:000093-01 03 08 00 12 D6 87 05 14 01 9A C1 0D
Tx:000094-01 03 00 00 00 04 44 09
Rx:000095-01 03 08 00 12 D6 87 05 14 01 9A C1 0D

5.5.4 ASCII Out Protocol (ITEQ format)

Example: *123 12:23:45 01/01/2011 N +123456.78 kg

<*> = Decimal 42
<AAA><SPACE> (Only transmitted if address > 0)
<HH:MM:SS><SPACE><DD/MM/YYYY><SPACE> (Optional field if RTC selected) = Time & Date
<G/N><SPACE> = G=Gross, N=Net
<10 digits right justified, leading zero suppression, including decimal point and polarity>
<SPACE> = Decimal 32
<UNIT>=

None=Unit not transmitted, g, kg, t, oz, lb, T, N

<CR> = Decimal 13
<LF> = Decimal 10

5.5.5 The Modbus Protocol

Both Modbus RTU and Modbus ASCII protocols are supported.

5.5.5.1 Modbus Commands

The instruments supports the following Modbus commands:

FC03 (0x03) – Read Holding Registers
FC05 (0x05) – Write Single Coil
FC06 (0x06) – Write Single Holding Register

Note: Broadcast read commands are ignored by the indicator, only broadcast write commands are processed.

Supported Modbus Error Messages:

Error Code	Error Description
0x01	Illegal function code
0x02	Illegal register address
0x03	Illegal data value or data length

5.5.5.2 Modbus Register Addresses

Read Holding Register (FC03), Write Single Holding Register (FC06):

Referenced to 4XXXX.

Address	Data Type	Operation	Description
0	32 bit unsigned	R	Serial Number High Word
1	32 bit unsigned	R	Serial Number Low Word
2	8 bit unsigned	R	Model Number
3	16 bit unsigned	R	Firmware Version
50	32 bit signed	R/W	Alarm 1 Setpoint High Word
51	32 bit signed	R/W	Alarm 1 Setpoint Low Word
52	8 bit unsigned	R/W	Alarm 1 Assignment 0: Gross 1: Net 2: Min 3: Max
53	8 bit unsigned	R/W	Alarm 1 Mode 0: Off 1: Low 2: High
54	8 bit unsigned	R/W	Alarm 1 logic 0: Normal 1: Inverted
55	16 bit unsigned	R/W	Alarm 1 Hysteresis
56	16 bit unsigned	R/W	Alarm 1 Deviation low
57	16 bit unsigned	R/W	Alarm 1 Deviation High
58	16 bit unsigned	R/W	Alarm 1 On Delay
59	16 bit unsigned	R/W	Alarm 1 Off Delay
60	8 bit unsigned	R/W	Alarm 1 Latch 0: Off 1: On
70	32 bit signed	R/W	Alarm 2 Setpoint High Word
71	32 bit signed	R/W	Alarm 2 Setpoint Low Word
72	8 bit unsigned	R/W	Alarm 2 Assignment 0: Gross 1: Net 2: Min 3: Max
73	8 bit unsigned	R/W	Alarm 2 Mode 0: Off 1: Low 2: High
74	8 bit unsigned	R/W	Alarm 2 logic 0: Normal

			1: Inverted
75		R/W	Alarm 2 Hysteresis
76	16 bit unsigned	R/W	Alarm 2 On Delay
77	16 bit unsigned	R/W	Alarm 2 Deviation low
78	16 bit unsigned	R/W	Alarm 2 Deviation High
79	16 bit unsigned	R/W	Alarm 2 Off Delay
80	8 bit unsigned	R/W	Alarm 2 Latch 0: Off 1: On
90	32 bit signed	R/W	Alarm 3 Setpoint High Word
91	32 bit signed	R/W	Alarm 3 Setpoint Low Word
92	8 bit unsigned	R/W	Alarm 3 Assignment 0: Gross 1: Net 2: Min 3: Max
93	8 bit unsigned	R/W	Alarm 3 Mode 0: Off 1: Low 2: High
94	8 bit unsigned	R/W	Alarm 3 logic 0: Normal 1: Inverted
95	16 bit unsigned	R/W	Alarm 3 Hysteresis
96	16 bit unsigned	R/W	Alarm 3 Deviation low
97	16 bit unsigned	R/W	Alarm 3 Deviation High
98	16 bit unsigned	R/W	Alarm 3 On Delay
99	16 bit unsigned	R/W	Alarm 3 Off Delay
100	8 bit unsigned	R/W	Alarm 3 Latch 0: Off 1: On
110	32 bit signed	R/W	Alarm 4 Setpoint High Word
111	32 bit signed	R/W	Alarm 4 Setpoint Low Word
112	8 bit unsigned	R/W	Alarm 4 Assignment 0: Gross 1: Net 2: Min 3: Max
113	8 bit unsigned	R/W	Alarm 4 Mode 0: Off 1: Low 2: High
114	8 bit unsigned	R/W	Alarm 4 logic 0: Normal 1: Inverted
115	16 bit unsigned	R/W	Alarm 4 Hysteresis

116	16 bit unsigned	R/W	Alarm 4 Deviation low
117	16 bit unsigned	R/W	Alarm 4 Deviation High
118	16 bit unsigned	R/W	Alarm 4 On Delay
119	16 bit unsigned	R/W	Alarm 4 Off Delay
120	8 bit unsigned	R/W	Alarm 4 Latch 0: Off 1: On
130	8 bit unsigned	R/W	Analog Out Assignment 0: Gross 1: Net
131	8 bit unsigned	R/W	Analog Out Type 0: 0 to 20mA 1: 4 to 20mA 2: 0 to 10V 3: Off
132	16 bit unsigned	R/W	Analog Out Low Value High Word
133	16 bit unsigned	R/W	Analog Out Low Value Low Word
134	16 bit unsigned	R/W	Analog Out High Value High Word
135	16 bit unsigned	R/W	Analog Out High Value High Word
136	8 bit unsigned	R/W	Analog Out Error 0: Off 1: Analog Low 2: Analog High
140	8 bit unsigned	R/W	Com Address
141	8 bit unsigned	R/W	COM 1 (RS232) Protocol 0: ASCII Out 1: ASCII In 2: Modbus RTU 3: Modbus ASCII
142	8 bit unsigned	R/W	COM 1 (RS232) ASCII Out Assignment 0: Gross 1: Net
143	8 bit unsigned	R/W	COM 1 (RS232) ASCII Out Mode 0: On Demand 1: Continuous
144	8 bit unsigned	R/W	COM 1 (RS232) ASCII Out Ticket Print 0: Off 1: On
145	8 bit unsigned	R/W	COM 1 (RS232) Baud 0: 1200 1: 2400 2: 4800 3: 9600 4: 19200 5: 38400 6: 57600 7: 115200
146	8 bit unsigned	R/W	COM 1 (RS232) Data Bits 0: 7 Bits

			1: 8 Bits
147	8 bit unsigned	R/W	COM 1 (RS232) Parity 0: None 1: Even 2: Odd
148	8 bit unsigned	R/W	COM 1 (RS232) Stop bits 0: 1 Stop Bit 1: 2 Stop Bits
160	8 bit unsigned	R/W	COM 2 (RS485) Protocol 0: ASCII Out 1: ASCII In 2: Modbus RTU 3: Modbus ASCII
161	8 bit unsigned	R/W	COM 2 (RS485) ASCII Out Assignment 0: Gross 1: Net
162	8 bit unsigned	R/W	COM 2 (RS485) ASCII Out Mode 0: On Demand 1: Continuous
163	8 bit unsigned	R/W	COM 2 (RS485) ASCII Out Ticket Print 0: Off 1: On
164	8 bit unsigned	R/W	COM 2 (RS485) Baud 0: 1200 1: 2400 2: 4800 3: 9600 4: 19200 5: 38400 6: 57600 7: 115200
165	8 bit unsigned	R/W	COM 2 (RS485) Data Bits 0: 7 Bits 1: 8 Bits
166	8 bit unsigned	R/W	COM 2 (RS485) Parity 0: None 1: Even 2: Odd
167	8 bit unsigned	R/W	COM 2 (RS485) Stop bits 0: 1 Stop Bit 1: 2 Stop Bits
180	8 bit unsigned	R/W	Zero Key 0: Disabled 1: Enabled
181	8 bit unsigned	R/W	Tare Key 0: Disabled 1: Auto 2: Manual entry
182	8 bit unsigned	R/W	Print Key 0: Disabled 1: Enabled

183	8 bit unsigned	R/W	Gross/Net Key 0: Disabled 1: Enabled
184	8 bit unsigned	R/W	Display Toggle Key 0: Disabled 1: Enabled
185	8 bit unsigned	R/W	Display Hold Key 0: Disabled 1: Enabled
186	8 bit unsigned	R/W	Alarm Latch Key 0: Disabled 1: Enabled
190	8 bit unsigned	R/W	Digital Input 1 Assignment 0: None 1: Min/Max value reset 2: Alarm latch reset 3: Gross/Net toggle 4: Zero 5: Tare 6: Display Hold 7: Print
191	8 bit unsigned	R/W	Digital Input 2 Assignment 0: None 1: Min/Max value reset 2: Alarm latch reset 3: Gross/Net toggle 4: Zero 5: Tare 6: Display Hold 7: Print
192	8 bit unsigned	R/W	Digital Input 3 Assignment 0: None 1: Min/Max value reset 2: Alarm latch reset 3: Gross/Net toggle 4: Zero 5: Tare 6: Display Hold 7: Print
200	8 bit unsigned	R/W	Code Level 0: Only Alarms Setpoints not locked 1: Full Lockout
201	16 bit unsigned	R/W	Password
202	16 bit unsigned	R/W	Set RTC Date Years
203	8 bit unsigned	R/W	Set RTC Date Months
204	8 bit unsigned	R/W	Set RTC Date Days
205	8 bit unsigned	R/W	Set RTC Time Hours
206	8 bit unsigned	R/W	Set RTC Time Minutes
207	8 bit unsigned	R/W	Set RTC Time Seconds

300	8 bit unsigned	R/W	Lineariser Enable
301	8 bit unsigned	R/W	Lineariser Points
302->362	32 bit signed	R/W	Lineariser Real Point 1 to 16 High Word
303->363	32 bit signed	R/W	Lineariser Real Point 1 to 16 Low Word
304->364	32 bit signed	R/W	Lineariser Display Point 1 to 16 High Word
305->365	32 bit signed	R/W	Lineariser Display Point 1 to 16 Low Word
400	8 bit unsigned	R/W	Load Cell Unit
401	8 bit unsigned	R/W	Load Cell Decimal Point
402	8 bit unsigned	R/W	Load Cell Display Step Increment
403	8 bit unsigned	R/W	Load Cell Filter Time
404	8 bit unsigned	R/W	Load Cell Zero Band
405	32 bit signed	R/W	Load Cell Low Display High Word
406	32 bit signed	R/W	Load Cell Low Display Low Word
407	32 bit signed	R/W	Load Cell High Display High Word
408	32 bit signed	R/W	Load Cell High Display Low Word
409	32 bit signed	R/W	Load Cell Low Display mV/V High Word
410	32 bit signed	R/W	Load Cell Low Display mV/V Low Word
411	32 bit signed	R/W	Load Cell High Display mV/V High Word
412	32 bit signed	R/W	Load Cell High Display mV/V Low Word
413	16 bit unsigned	R/W	Load Cell Zero Band
414	8 bit unsigned	R/W	Load Cell Auto Zero Enable
415	16 bit unsigned	R/W	Load Cell Auto Zero Delay
416	8 bit unsigned	R/W	Load Cell Min/Max Assignment
417	8 bit unsigned	R/W	Load Cell Motion Band
418	32 bit signed	R/W	Load Cell Tare Value High Word
419	32 bit signed	R/W	Load Cell Tare Value Low Word
420	32 bit signed	R	Load Cell Gross Value High Word
421	32 bit signed	R	Load Cell Gross Value Low Word
422	32 bit signed	R	Load Cell Net Value High Word
423	32 bit signed	R	Load Cell Net Value Low Word
424	32 bit signed	R	Load Cell Minimum Value High Word
425	32 bit signed	R	Load Cell Minimum Value Low Word
426	32 bit signed	R	Load Cell Maximum Value High Word
427	32 bit signed	R	Load Cell Maximum Value Low Word
428	8 bit unsigned	R	Instrument Status 0: Motion LED off 1: Motion LED on
500	8 bit unsigned	R/W	PI Control On/Off
501	8 bit unsigned	R/W	PI Control Action 0: Reverse 1: Direct

502	8 bit unsigned	R/W	PI Control Start 0: Manual 1: Auto 2: Power On
503	16 bit unsigned	R/W	PI Control Proportional gain
504	16 bit unsigned	R/W	PI Control Integral time
505	16 bit unsigned	R/W	PI Control Manual setting
506	32 bit signed	R/W	PI Control Auto setpoint High word
507	32 bit signed	R/W	PI Control Auto setpoint Low word
900	8 bit unsigned	R	Number of Load Cells (Smart Junction Box)
901	Float	R	Load Cell 1 mV value (Smart Junction Box)
902	Float	R	Load Cell 1 mV value (Smart Junction Box)
903	Float	R	Load Cell 2 mV value (Smart Junction Box)
904	Float	R	Load Cell 2 mV value (Smart Junction Box)
905	Float	R	Load Cell 3 mV value (Smart Junction Box)
906	Float	R	Load Cell 3 mV value (Smart Junction Box)
907	Float	R	Load Cell 4 mV value (Smart Junction Box)
908	Float	R	Load Cell 4 mV value (Smart Junction Box)
909	Float	R	Load Cell Average value (Smart Junction Box)
910	Float	R	Load Cell Average value (Smart Junction Box)
911	Float	R	Excitation Voltage (Smart Junction Box)
912	Float	R	Excitation Voltage (Smart Junction Box)
913	32 bit unsigned	R	Alarm Status High Word (Bit pattern) 0x00000000: Status Good 0x00000001: Excitation Low 0x00000002: Excitation High 0x00000004: Load Cell 1 Minimum alarm 0x00000008: Load Cell 1 Maximum alarm 0x00000010: Load Cell 2 Minimum alarm 0x00000020: Load Cell 2 Maximum alarm 0x00000040: Load Cell 3 Minimum alarm 0x00000080: Load Cell 3 Maximum alarm 0x00000100: Load Cell 4 Minimum alarm 0x00000200: Load Cell 4 Maximum alarm 0x00000400: Load Cell 1 Wire alarm 0x00000800: Load Cell 2 Wire alarm 0x00001000: Load Cell 3 Wire alarm 0x00002000: Load Cell 4 Wire alarm 0x00004000: Load Cell 1 High alarm 0x00008000: Load Cell 2 High alarm 0x00010000: Load Cell 3 High alarm 0x00020000: Load Cell 4 High alarm 0x00040000: Load Cell Balance alarm 0x00080000: Load Cell 1 Under range alarm 0x00100000: Load Cell 2 Under range alarm 0x00200000: Load Cell 3 Under range alarm 0x00400000: Load Cell 4 Under range alarm 0x00800000: Load Cell 1 Over range alarm 0x01000000: Load Cell 2 Over range alarm 0x02000000: Load Cell 3 Over range alarm

			0x04000000: Load Cell 4 Over range alarm 0x08000000: SJB Communication Error
914	32 bit unsigned	R	Alarm Status Low Word (Smart Junction Box)

FC05: Write Single Coil

Referenced to 0XXXX. A value of 0xFF00 for the data will execute the function. An Echo of the original message will be returned.

Address	Action Command
0	Instrument Reset
1	Load Default Settings
2	Latched Alarm Reset
3	Min/Max Value Reset
4	0xFF00=Display Hold, 0x0000=Normal
5	Display Minimum Value
6	Display Maximum Value
7	Activate External Input 1
8	Activate External Input 2
9	Activate External Input 3
10	Activate External Input 4
11	Activate External Input 5
12	Set RTC
13	Execute Zero
14	Execute Tare
15	Display Gross
16	Display Net

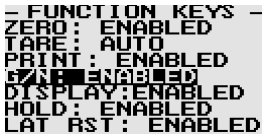
5.6 Function Key Configuration Menu

This menu configures the front panel function key push buttons.

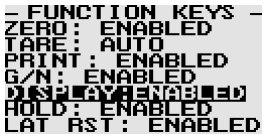
This function will enable the manual zero push button. If enabled, this function key will perform a manual zero within the zero band setting. This is a useful function if there is some residue material left on the scale.

This function selects the mode of the tare push button. The tare function key can be selected between “AUTO”, “MANUAL” or “DISABLED”. If “AUTO” is selected then the tare push button will tare the gross weight automatically. If “MANUAL” is selected then the user can manually enter a tare value when the push button is pressed.

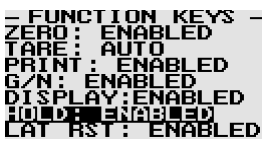
This function will enable the print push button. If enabled, this function key allows the user to print the assigned value via the RS232 or the RS485 interface. The print LED will briefly illuminate when the print push button is pressed. The print button will only work if either the RS232 or RS485 ASCII Out mode is selected.



This function will enable the gross/net toggle push button. If enabled, this function key will toggle the LED display between showing the gross and net weight. The net LED will illuminate to indicate that the LED display is showing the net weight.



This function key will enable the LED display toggle push button. If enabled, this function key will toggle the LED display in the following order. The minimum recorded weight, the maximum recorded weight and then the current measured weight value. The LED display will flash either “MIN” or “MAX” to indicate that the displayed value is either the minimum or maximum recorded weight.

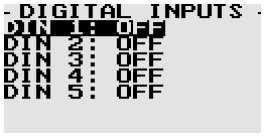


This function will enable the display hold push button. If enabled, this function key will display hold the current measured weight value. The LED display will flash “HOLD” to indicate that the led displayed value is the display hold value. Press the function key again to cancel the display hold function.

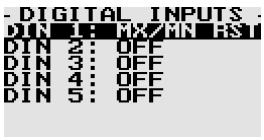
This function will enable the alarm latch push button. If enabled, this function key will reset any of the latched alarms when the alarm condition has been removed. This menu option is only displayed if any of the alarm latch functions have been enabled.

5.7 Digital Input Configuration Menu

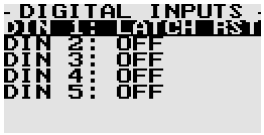
This menu configures the five digital inputs. The digital inputs can be configured for specific functions as listed below.



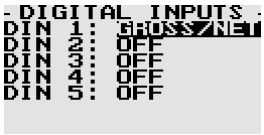
The digital input is disabled.



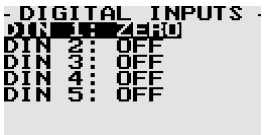
The digital input will reset the minimum and maximum recorded values to the current measured weight value.



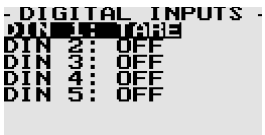
The digital input will reset any of the latched alarms when the alarm condition has been removed. This menu option is only displayed if any of the alarm latch functions have been enabled.



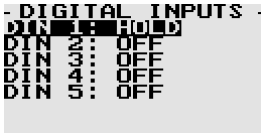
The digital input will toggle the LED display between showing the gross and net weight. The net LED will illuminate to indicate that the display is showing the net weight.



This function will perform a manual zero within the zero band setting. This is a useful function if there is some residue material left on the scale.

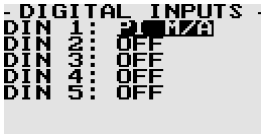


The digital input will tare the gross weight and it will then automatically swap the display to show the net value. The net LED will illuminate to indicate that the display is showing the net weight.

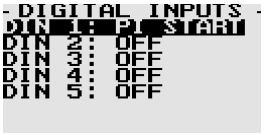


The digital input will display hold the current measured weight value. The LED display will flash “HOLD” to indicate that the displayed value is the display hold value. Activate the digital input again to cancel the display hold function.

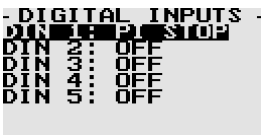
This menu option is only shown if either the RS232 or RS485 ASCII Out mode is selected. This digital input allows the user to print the display value via the RS232 or the RS485 interface. The print LED will briefly illuminate when the digital input is activated.



The digital input will change the PI control from manual to auto.



The digital input will start the PI control function.



The digital input will stop the PI control function.

5.8 PI Control Setup Menu

This menu configures the PI Control function

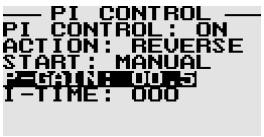
Select to enable the PI control feature.

Select reverse or direct action for the control loop. Normally PI control is set for reverse action (Increasing process variable (PV) decreases the output). Direct action (Increasing process variable (PV) increases the output).

Manual: Starting the PI function causes the analog output to go to a manual setting between 0 to 99.9%. The PI function will change over to the Auto SP value (bumpless) when the PI man/auto function to activated. The analog output will go to 0% when the PI Stop is activated.

Auto: Starting the PI function causes the analog output to go to a manual setting between 0 to 99.9% for 1 second before changing over to the Auto SP value (bumpless). The analog output will go to 0% when the PI Stop is activated.

Power On: The PI function will automatically start 25 seconds after power has been applied to the instrument. The PI function causes the analog output to go to a manual setting between 0 to 99.9% for 1 second before changing over to the Auto SP value (bumpless). The analog output will go to 0% when the PI Stop is activated.



Set the proportional gain (0.5 to 50.0). The lower the proportional gain the smaller the corrections. The higher the proportional gain the higher the correction (This could result in overshoot or oscillations).

Set the Integral time. A shorter time results in fast offset correction and a long time results in a slow offset correction. An integral time of 0 turns the integral part off. The integral time can be set from 1 to 999 seconds.

PI Control Push buttons

The following push buttons are automatically assigned to PI functions when the PI Control is enabled. These keys are only active when the PI Control main display is showing.

F2: PI Start

F3: PI Stop

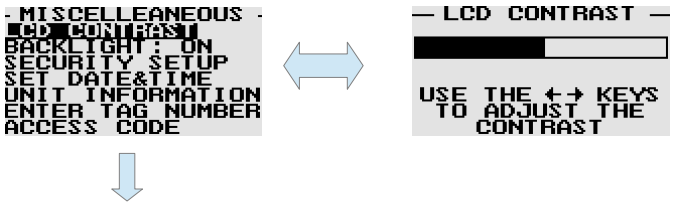
F4: PI Manual/Auto mode

DISP: Manual analog output % increment (PI Manual mode). Auto SP increment (PI Auto mode).

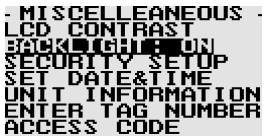
HOLD: Manual analog output % decrement (PI Manual mode). Auto SP decrement (PI Auto mode).

5.9 Miscellaneous Configuration Menu

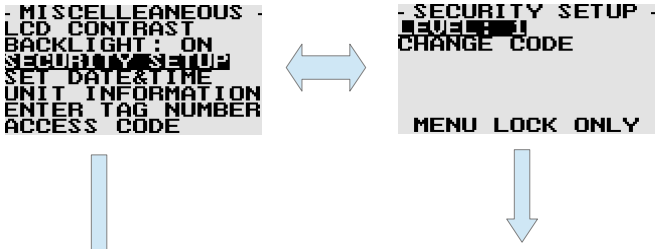
This menu configures the miscellaneous functions of the instrument.



Select this menu option to adjust the LCD display contrast.

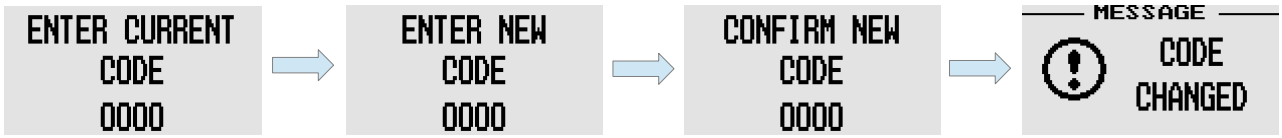


Select this menu option to turn the LCD backlight either on or off.

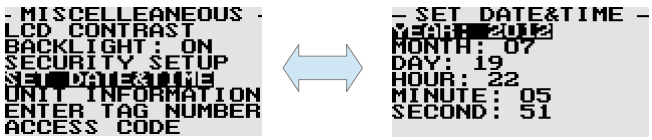


Select this menu option if you want to password protect the menu system and the alarm setpoints.

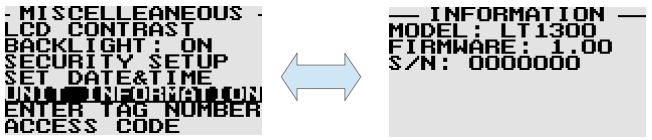
"**LEVEL: 0**": Full access, no protection.
"**LEVEL: 1**": Menu lock only. Allow editing of the alarm setpoints.
"**LEVEL: 2**": Full protection. Menu and alarm setpoints are password protected.



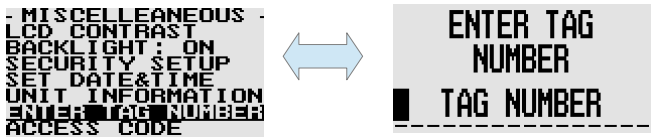
If a password has been set and one of the levels for access control has been selected then the instrument will prompt the user to enter the password. If the code is correct then it will allow the user into the menu system or edit the alarm setpoints otherwise it will return to the normal display mode.



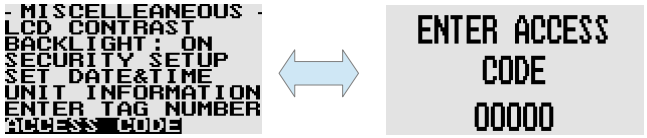
This menu option allows the user to set the RTC (Real Time Clock).



This menu option shows the system information.



Use the left, right and the alpha-numeric keypad to enter the tag number. Press CLEAR/BACK for a space character. If all the characters is a space then the date and time will be displayed on the main display instead of the tag number.



This menu option allows access to technical functions such as input signal and analog output calibration. These functions are accessed by the factory during the calibration of the instrument. Please consult the factory for more information.

Back to the start of the miscellaneous configuration menu.

6 Error Messages

Hardware Under Range:

If the input to the ADC (analog to digital converter) exceeds its negative limit then the hardware under range message is shown.

Hardware Over Range:

If the input to the ADC (analog to digital converter) exceeds its positive limit then the hardware over range message is shown.

Display Under Range:

If the display value exceeds the negative display threshold of -199999 then the LED display under range message is shown.

Display Over Range:

If the display value exceeds the positive display threshold of 999999 then the LED display over range message is shown.

Analog Out mA Open Loop Error:

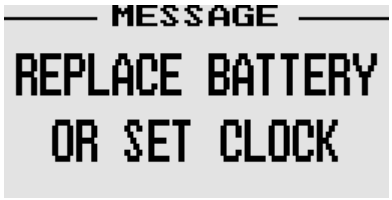
The LCD display will briefly flash the loop error message every 5 seconds to indicate that a mA loop error has occurred. This error message will only be shown if the analog out has been set for any of the mA ranges.

Other Error Messages:

Unit settings CRC error. Load default settings to restore to factory defaults. If the error message still persists then it could possibly be a non-volatile memory failure in which case the instrument will then have to be returned to the factory.

Unit settings 2 CRC error. Load default settings to restore to factory defaults. If the error message still persists then it could possibly be a non-volatile memory failure in which case the instrument will then have to be returned to the factory.

Calibration constants CRC error. The instrument could possibly have a non-volatile memory failure in which case the instrument will then have to be returned to the factory.



The internal CR2032 battery needs to be replaced or the clock needs to be set.

7 Display Test, Firmware and Model Number

On start up, the instrument will do a LED display test whereby all the segments of the LED display are turned on. It will also display the model number and firmware revision number on the LCD display.

8 Firmware Upgrading

The instrument can be upgraded in the field by connecting the RS232 port to a PC and running the firmware update program. **Note that only the RS232 port can be used to upgrade the firmware. Please see the instrument firmware upgrade document for more information.**

9 Loading Default (Factory) Settings

Default settings can be loaded by pressing the CLEAR/BACK key at power up. The words “LOADING DEFAULT SETTINGS” will briefly appear on the LCD display. All settings will be revert back to the factory defaults.

10 Cleaning

The unit should not be cleaned with any abrasive substances. The instrument is very sensitive to certain cleaning materials and should only be cleaned using a clean, damp cloth.

11 Ordering Information

Add option codes to suffix of model number separated by hyphens.

Option part numbers:

700 - Low voltage 10-30VDC isolated power supply
720 - 1 Solid-state relay
721 - 2 Solid-state relays
722 - 3 Solid-state relays
723 - 4 Solid-state relays
741 - Ethernet communication module
762 - 115VAC Inductive load suppressor
763 - 230VAC Inductive load suppressor
764 - 2A Slow blow replacement fuse
765 - R-C Snubber noise and arc suppressor
765 - R-C Snubber noise and arc suppressor

12 Notice

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13 Warranty

This product carries a warranty for a period of one year from date of purchase against faulty workmanship or defective materials, provided there is no evidence that the unit has been mishandled or misused. Warranty is limited to the replacement of faulty components and includes the cost of labor. Shipping costs are for the account of the purchaser.

Note: Product warranty excludes damages caused by unprotected, unsuitable or incorrectly wired electrical supplies and or sensors, and damage caused by inductive loads.