LT1230

Panel Mount Serial Input Indicator

Operating Manual – English 1.01

14 Segment LED Displays

0-10V
0-20mA
4-20mA
Analog Re-Transmission

RTU
ASCII
Modbus™ Communications

RTC Option

RS232 & RS485

High Resolution DAC

FW
Field upgradeable Firmware

4 Alarm Setpoints

Introduction

The LT1230 panel mount serial input indicator is used as a remote display of serial data either from the RS232 or RS485 port. The display can be programmed to flash whenever serial data is not received within a certain time period to indicate a communication error condition. The LT1230 is ideal where multiple slave units are required.

Typical uses of the serial input display include:

- Remote display of serial data *
- RS232 or RS485 to 0/4-20mA or 0-10V conversion
- Serial data bus snooper. E.G. Display a specific modbus variable *
- Load cell summation unit **
- Software protocol conversion E.G. Customer specific software protocol received via the RS232 or RS485 port can be converted and then retransmitted in a different protocol via the RS485 or RS232 port. **

RS232 and RS485 communications is supplied as standard with the MODBUS™ RTU and MODBUS™ ASCII protocol. A simple ASCII out protocol is also provided for serial printing and communicating to large displays.

The high bright 6-digit 14 segment LED displays make for easy setup and readability. A simple menu system with built in help hints allows for easy configuration of display and unit settings.

A universal mains switch mode power supply (85-264VAC) is provided as standard but an optional low voltage (10-30VDC) isolated power supply or a high voltage (25-70VDC) isolated power supply can be installed.

The LT1230 also has an analog out or an isolated analog out option to generate a precise 0/4-20mA or 0-10V analog output signal.

The LT1230 also includes advanced features such as max/min value recording, programmable front push buttons, programmable digital inputs, security menu lockout plus many more.

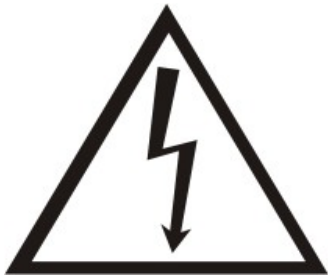
* Special serial protocols can be written on request
** Special firmware required

1 Features

- **High bright 6-digit 14 segment LED displays**
- **-199999 to +999999 display counts**
- **RS232 and RS485 communications standard (MODBUS™ RTU/ASCII and an Infiniteq ASCII out protocol)**
- **Type 4X, NEMA 4X front panel. 96X48 ABS/Polycarbonate enclosure**
- **Universal mains switch mode power supply (85-264VAC) standard with built in EMI and fuse protection**
- **2x Programmable digital inputs (pull up or pull down field jumper selectable)**
- **3x Programmable front panel push buttons**
- **Up to 4 front panel LED indicators for alarm set point status (Mechanical or solid-state option required)**
- **Maximum/Minimum recording**
- **Built in menu help hints**
- **Field upgradable firmware via the RS232 interface**
- **1 Year Warranty**

Additional hardware options include:

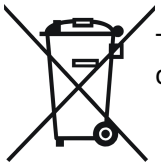
- **Up to 4 Mechanical (FORM-C) or solid state (FORM-A) alarm set points**
- **16 Bit analog output (0/4-20mA, 0-10V)**
- **16 Bit Isolated analog output (0/4-20mA, 0-10V)**
- **RTC (Real Time Clock) option for time and date stamping**
- **Low voltage 10-30VDC Isolated power supply**
- **High voltage 25-70VDC Isolated power supply**



This instrument is marked with the international hazard symbol. It is important to read this manual before installing or commissioning your panel meter 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 may contain a battery for data retention purposes. The battery should be disposed of correctly. Please contact your supplier or local council if in doubt.

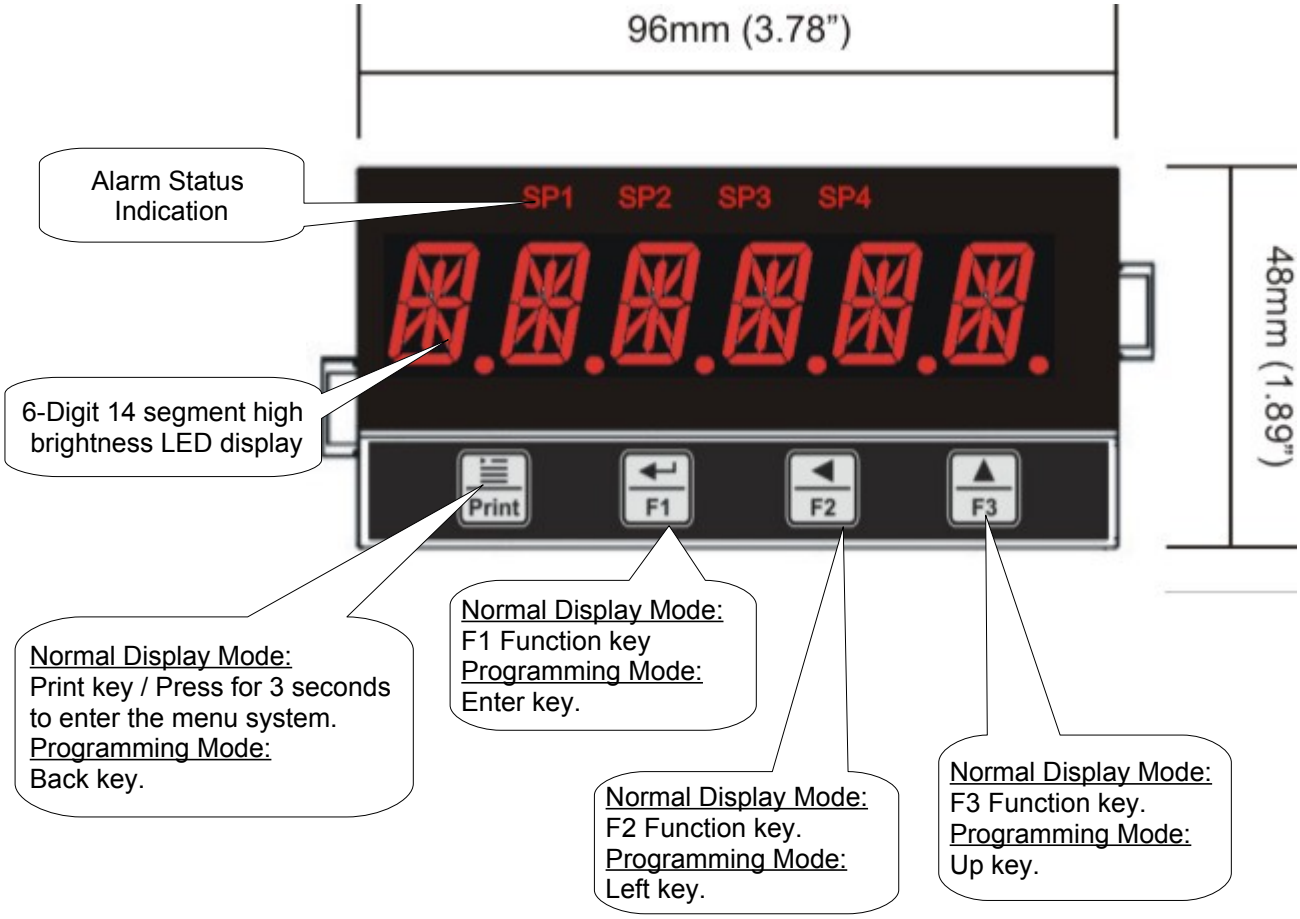
2 Specifications

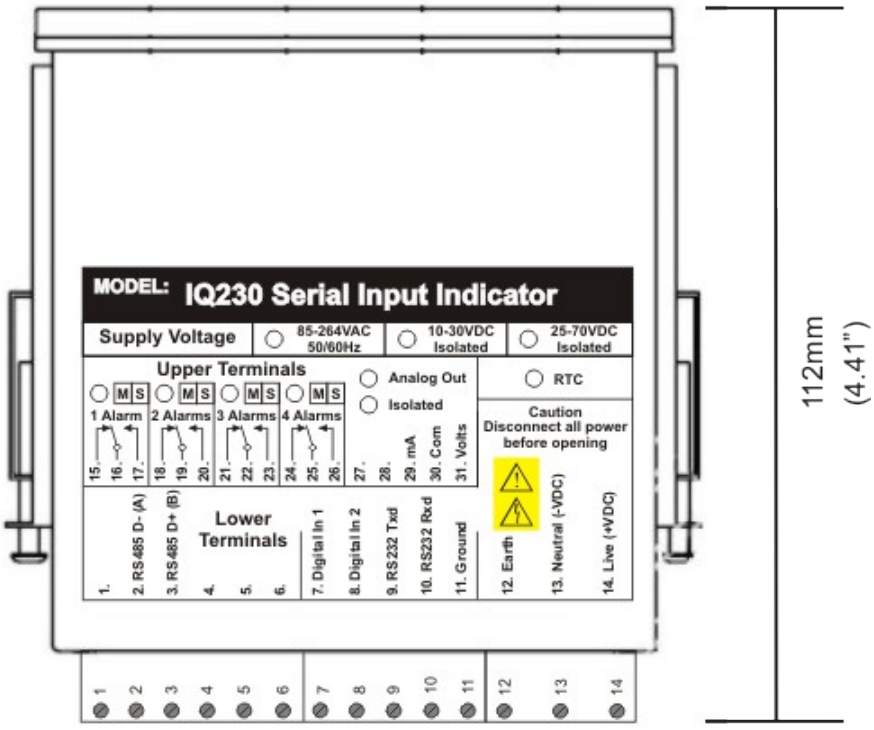
General:	
Display	6-Digit, 13.8mm (0.543") 14 segment high brightness red LED
Display range	-199999 to +999999
Display decimal point	0 to 0.00000
Status LEDS	4 LEDs total (SP1 to SP4)
Digital Inputs	2 Programmable digital inputs Built in hysteresis, filter and input over voltage protection Maximum input voltage <30VDC Input logic is field jumper selectable (Pull up, sinking inputs) - 10kΩ internal resistor to 5V (Pull down, sourcing inputs) – 10kΩ internal resistor to common Active/Non-Active input trigger: <1.9V Non-Active/Active input trigger: >2.3V
Keypad	4 keys total, 3 programmable keys
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
DC Power Supply, 20-70VDC (Optional)	25-70VDC input Reverse and over voltage protected Isolation: >1000V/1min
Power Consumption	<6W (Depending on options selected)
Fuse (Built in)	2A Slow Blow (Wickmann 3721200000) RS components part number 226-6599
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	96x48x112mm (LxHxD) (3.78x1.89x4.41") (Depth includes connectors)
Mounting	92x45mm (3.62x1.77")
Enclosure Material	Rear ABS plastic, Front Polycarbonate
Front Facia Rating	IP65, with o-ring supplied as standard
Wiring connections	Removable terminal blocks
Analog Out: (Optional)	
Ranges (Selectable through menu)	0-20mA 4-20mA 0-10V
DAC Resolution	16 Bit
Update rate	10 updates/second
Current output compliance (maximum load)	500Ω (Current is source, not sink)
Voltage output compliance (minimum load)	1kΩ
Current open loop detection	Display flashes "mA.Loop" error message
Linearity	<0.02% of full scale
Accuracy	0.05% of full scale

Isolation (Optional)	1000VDC @ 1mA for 1 minute
Communications:	
Protocol	MODBUS RTU MODBUS ASCII ASCII In (Infiniteq Protocol) ASCII Out (Infiniteq Protocol)
RS232 Communications (Standard)	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 (Standard)	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
SetPoints: (Optional, Up to 4 can be fitted) **Electro-mechanical Relays:**	
Contact rating	3A@250VAC or 30VDC (Resistive load)
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):	
Contact rating	120mA@400VAC/DC
Dielectric strength	>1000VAC for 1 minute
Type	FORM-A (Normally open)
RTC (Real Time Clock): (Optional)	
Battery	CR2032
Accuracy	Better then 2 seconds per day (Temperature dependent)

3 Installation

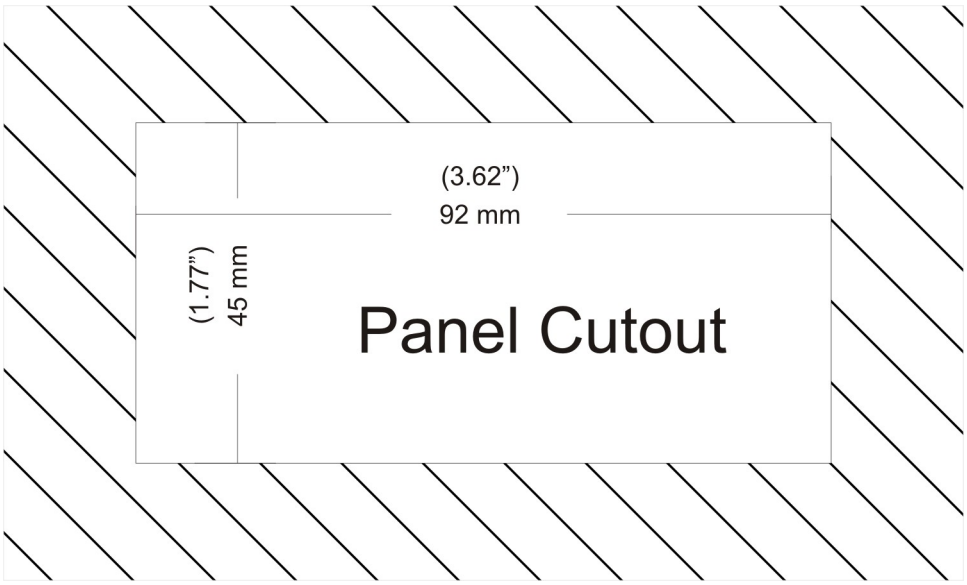
3.1 Dimensions & Front panel layout



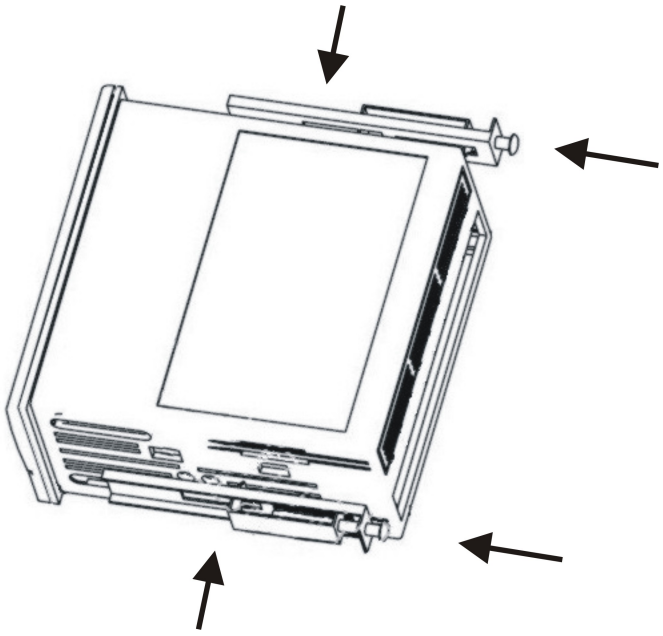


3.2 Panel Cutout

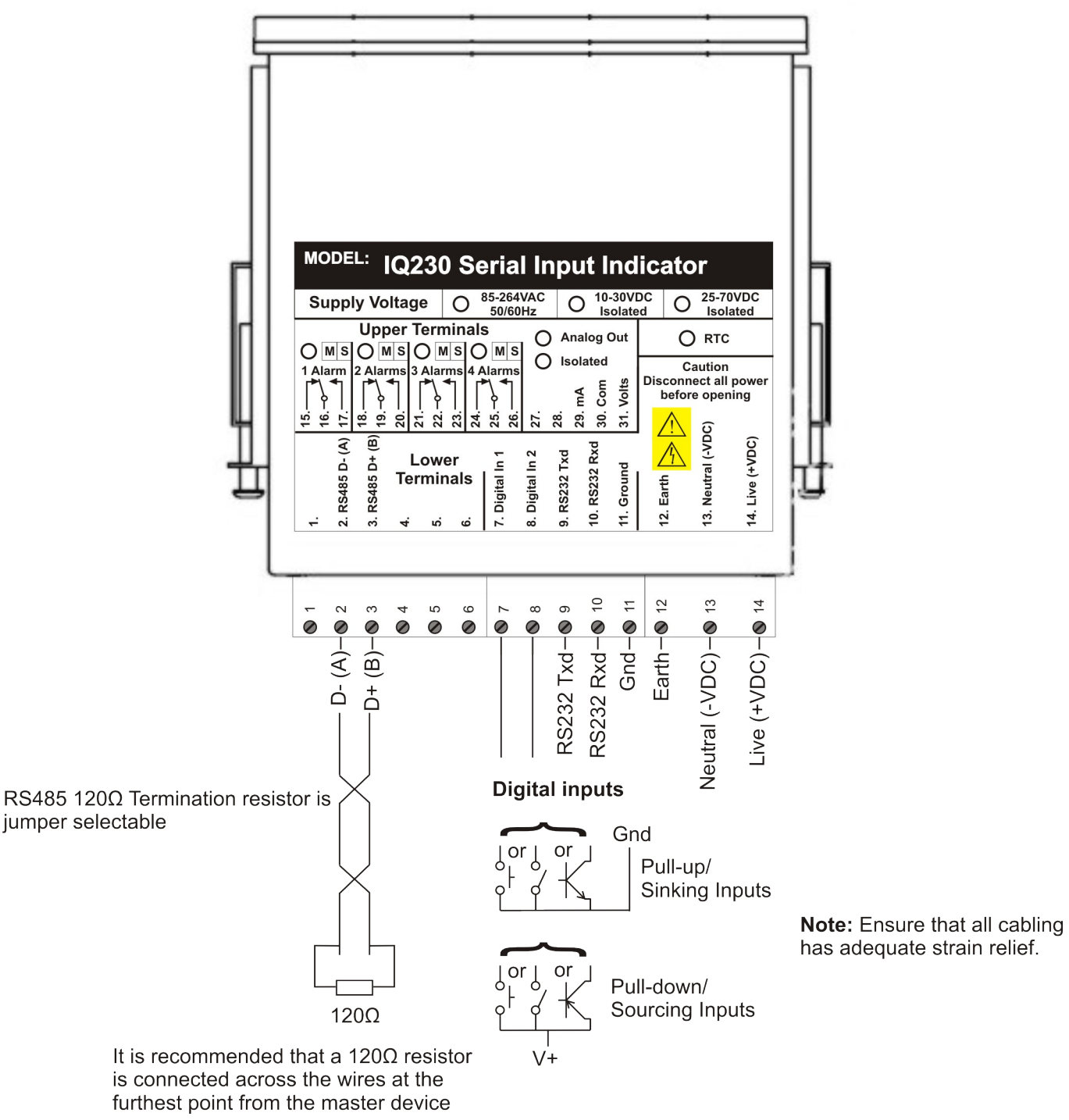
A rectangular cutout measuring 92x45mm (3.62”x1.77”) must be made in the mounting enclosure. The LT1230 instrument should preferably be mounted in a grounded metal enclosure.



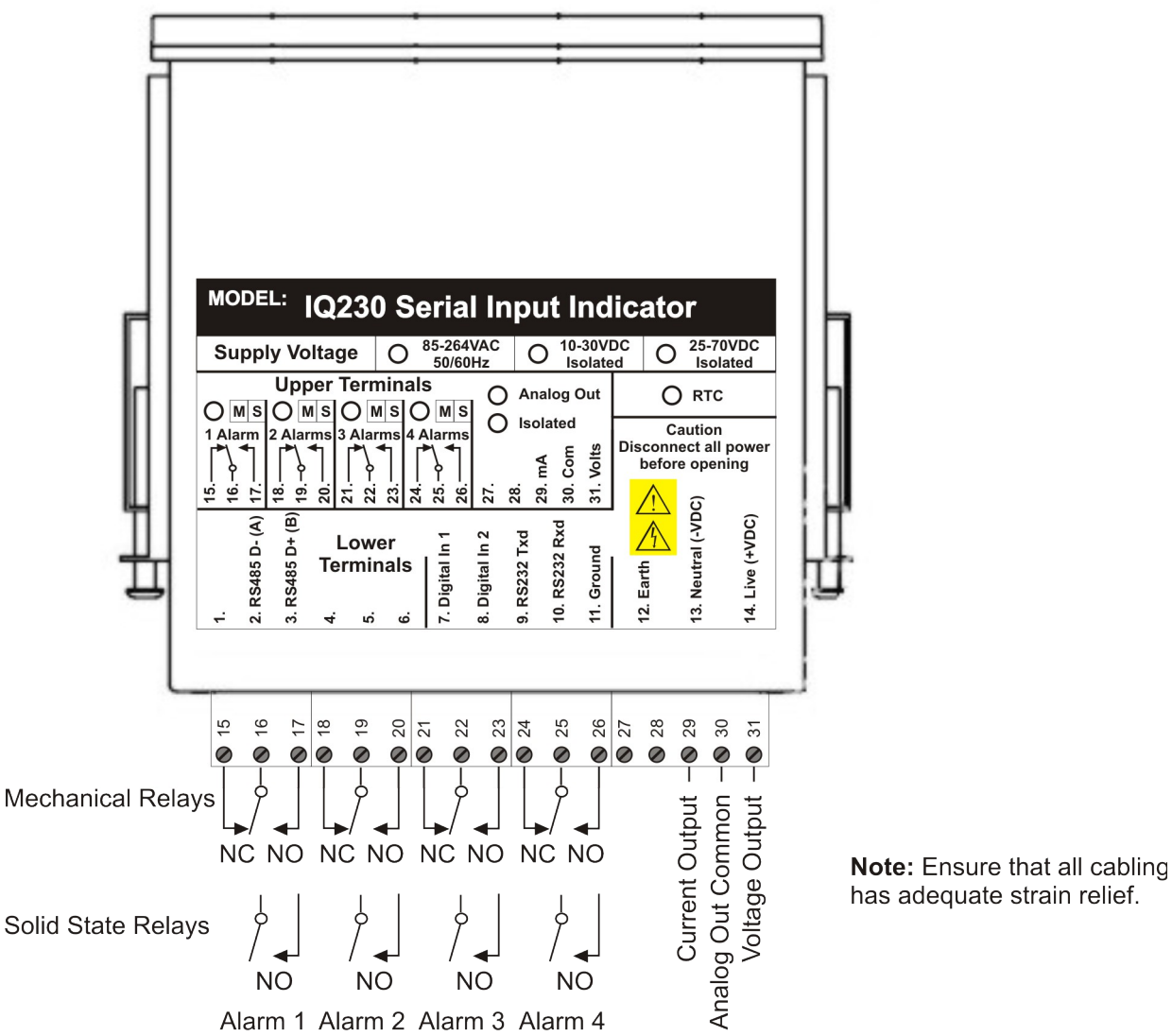
The supplied o-ring must be attached to the front cover to provide sealing between the indicator and the mounting enclosure. The two supplied fastening metal side clips must be attached to either side as in the diagram below. Do not over tighten the screws.



3.3 Hardware Connection (Lower Terminals)



3.4 Hardware Connection (Upper Terminals – Option PCB)



Note: Ensure that all cabling has adequate strain relief.

3.5 Opening the Unit

Make sure power and all connectors have been removed before opening the unit.

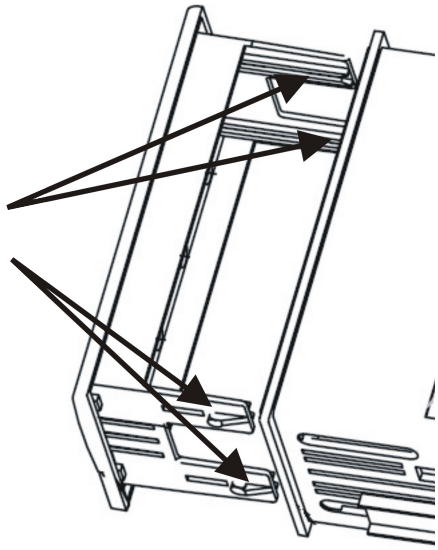
To open the unit simply remove all the connectors from the rear and unscrew the 2 or 4 (Depending if an option board has been installed) screws and simply slide out the instrument from the enclosure.

The front transparent face needs to be clipped off from the top and bottom circuit boards in order to add or remove the option circuit board. When reassembling the unit, please make sure that the front push buttons are seated correctly before clipping the front transparent cover onto the circuit boards.

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 placed back in to its enclosure.

Unclip from circuit boards and remove front transparent cover



3.6 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.

3.7 Power Supply Wiring

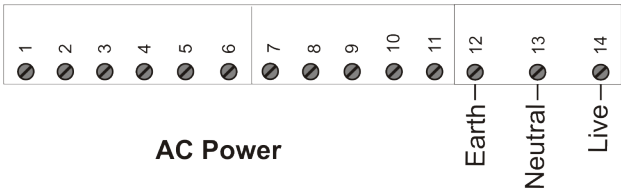
There are 3 different power supply variants! Please check which power supply is installed before connecting power by checking the marking on the sticker on the top of the instrument.

A universal mains switch mode power supply (85-264VAC) is provided as standard but an optional low voltage (10-30VDC) isolated power supply or a high voltage (25-70VDC) isolated power supply can be installed.

WARNING - The instrument is designed for installation in an enclosure which provides adequate protection against electric shock. 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.

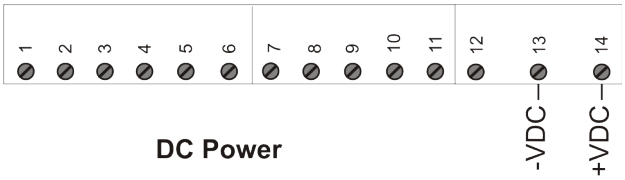
AC Power Supply

Bottom Terminals



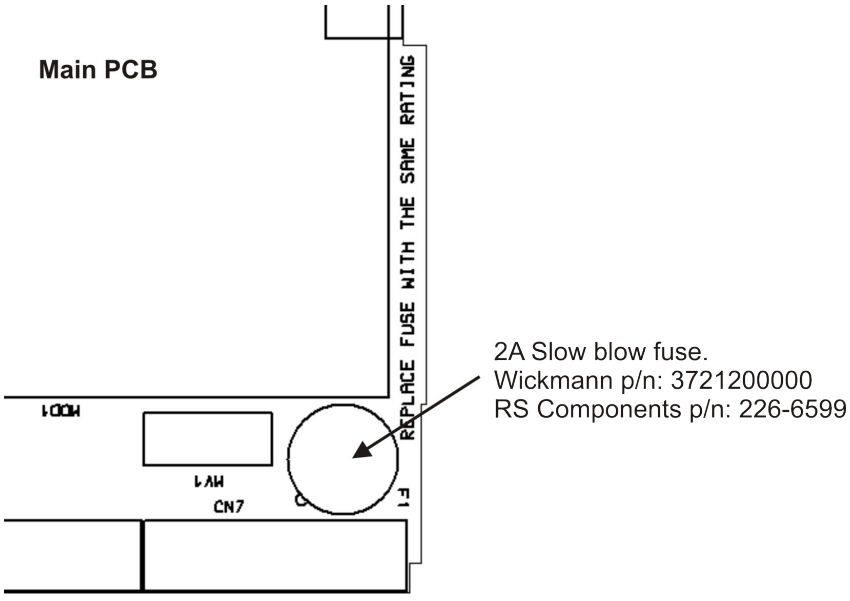
DC Power Supply

Bottom Terminals



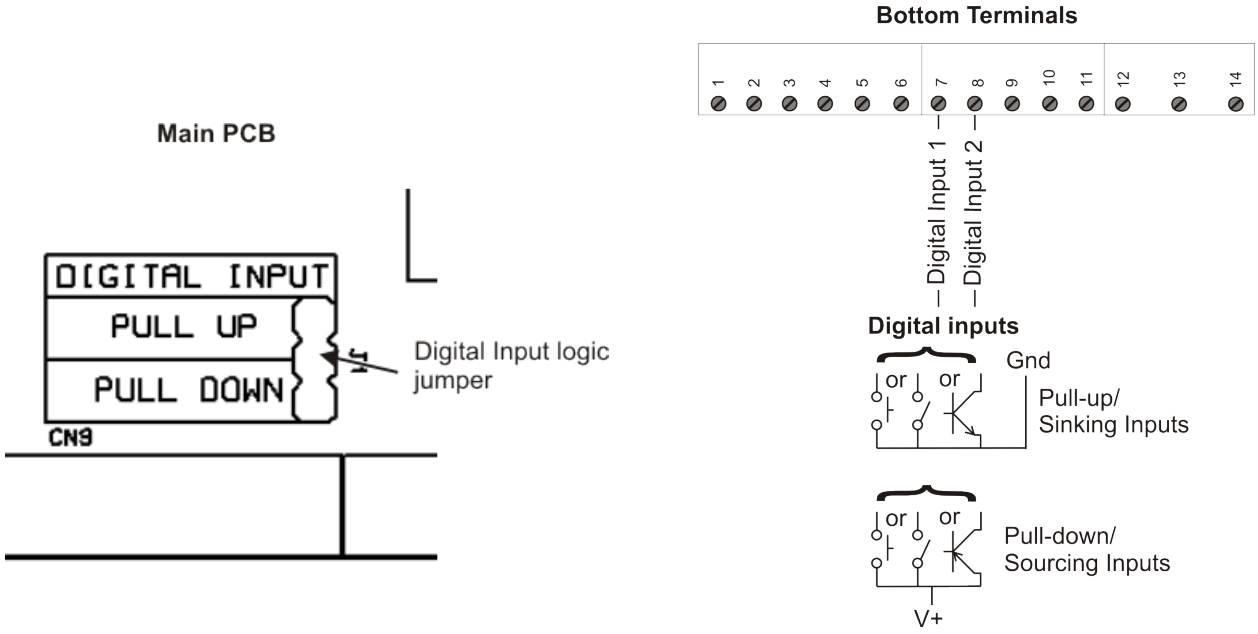
3.8 Fuse Replacement

The LT1230 contains a built in fuse. The fuse is a slow blow 2A Wickmann part number 3721200000. The fuse can also be purchased from RS Components part number 226-6599. The diagram below illustrates the position of the fuse on the main circuit board.



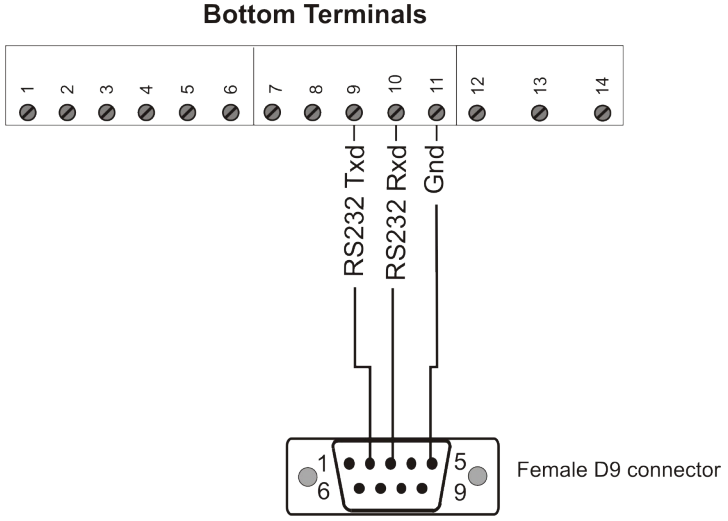
3.9 Digital Input connection

The LT1230 comes with 2 programmable digital inputs. The digital inputs can be used with either potential free contacts such as relay contacts, switches, transistor outputs or can be voltage driven. The inputs are not isolated from the instruments input circuitry. If the internal digital input jumper is set on pull up/sink input then the digital input line is pulled up to +5VDC with a 10kΩ resistor. If the internal digital input jumper is set on pull down/sourcing input then the digital input line is pulled down to ground with a 10kΩ resistor.



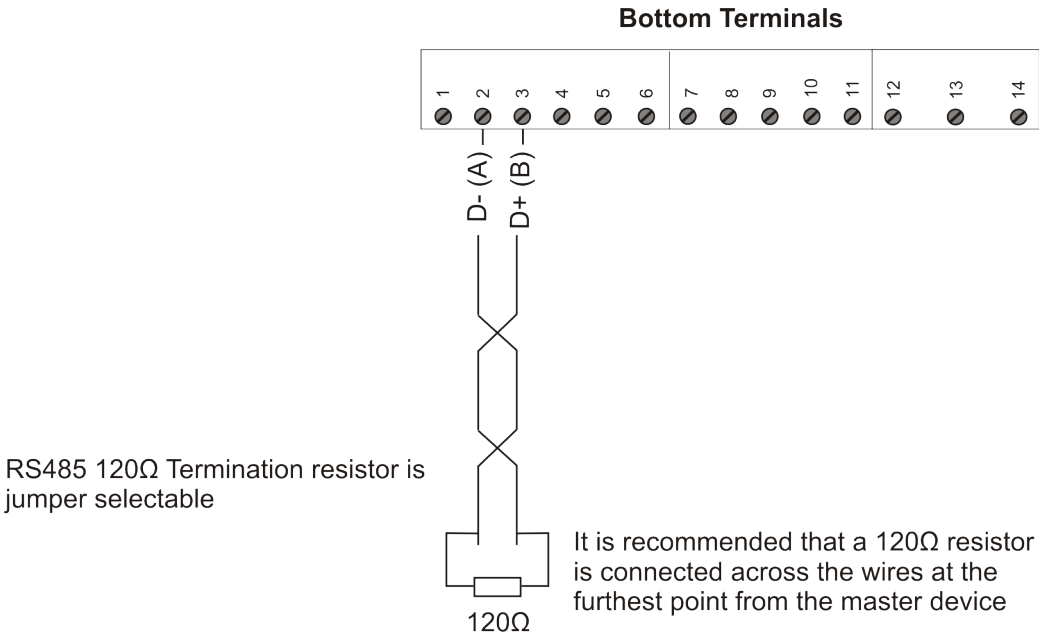
3.10 RS232 Communications

RS232 communications is standard on the LT1230. 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.



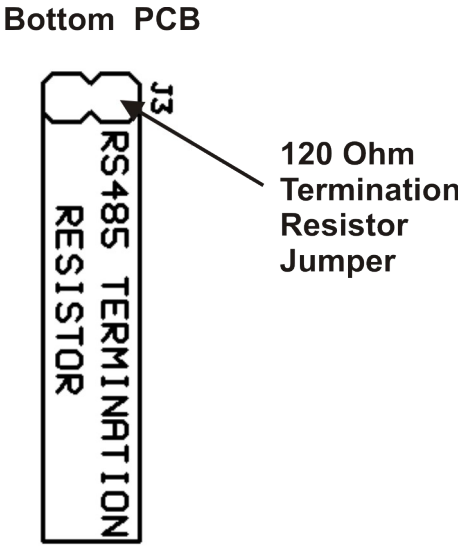
3.11 RS485 Communications

RS485 communications is standard on the LT1230. 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 (30.5m). The LT1230 includes an on-board termination resistor which can be selected by linking J3 on the main circuit board inside the LT1230. The termination resistor is 120 Ohms.



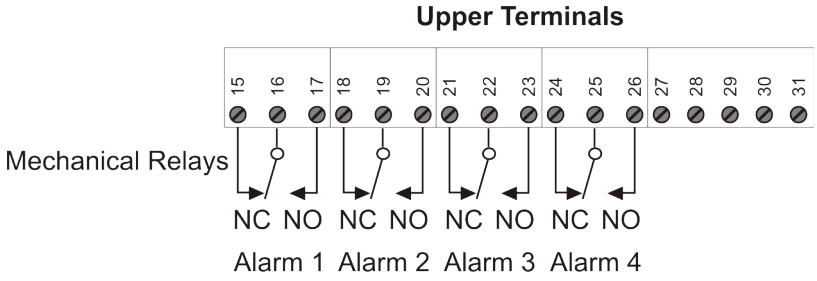
RS485 Termination Resistor Location

The 120 Ohm termination resistor is field jumper selectable using J3 and is located on the main circuit board.



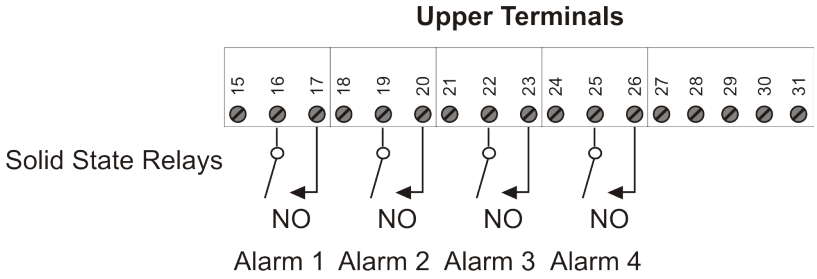
3.12 Mechanical Relays (Optional)

Up to 4 mechanical relays can be added as an option. 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.

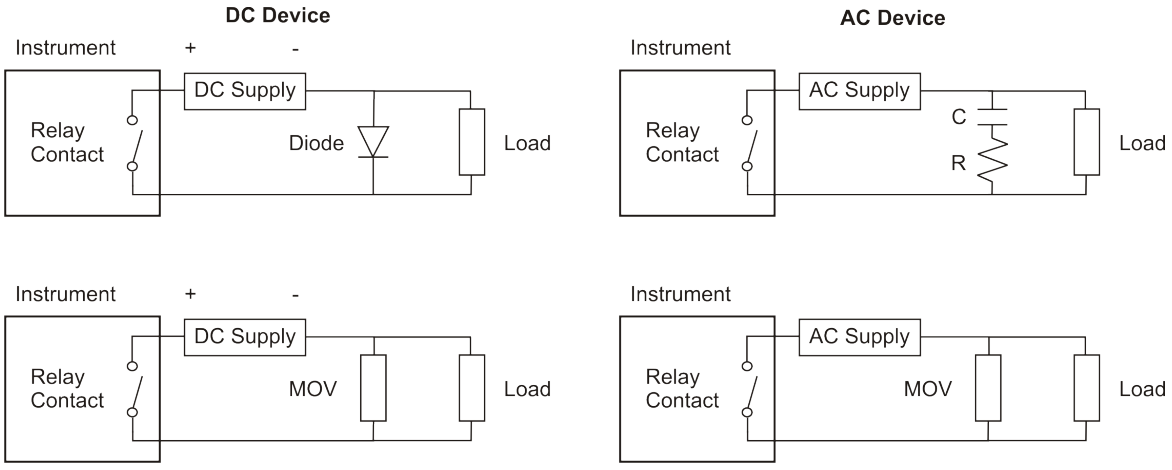


3.13 Solid-State Relays (Optional)

Up to 4 solid-state relays can be added as an option. 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.



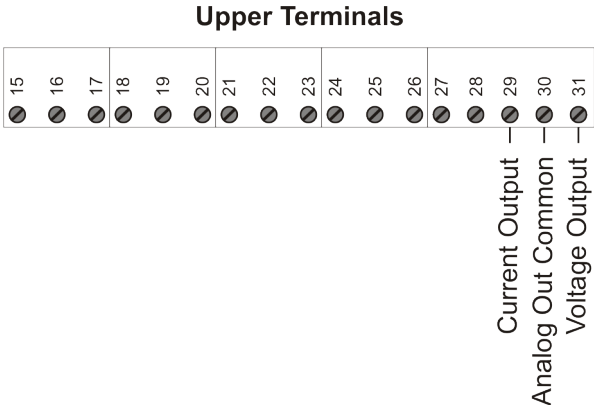
Noise suppression device for switching AC or DC devices



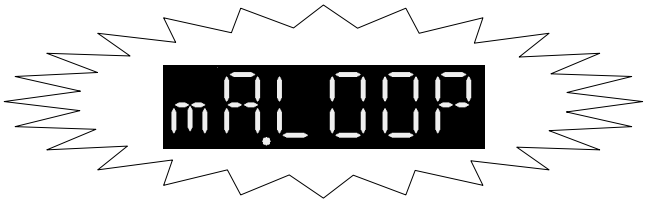
An optional noise suppression device can be ordered. Install these devices as close to the load as possible.

3.14 Analog Out / Isolated Analog Out (Optional)

Analog out or an Isolated analog out option can be fitted to the LT1230. The Analog out 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 “mA.LOOP” will be briefly displayed on the display. Connect the analog out as in the diagram below.



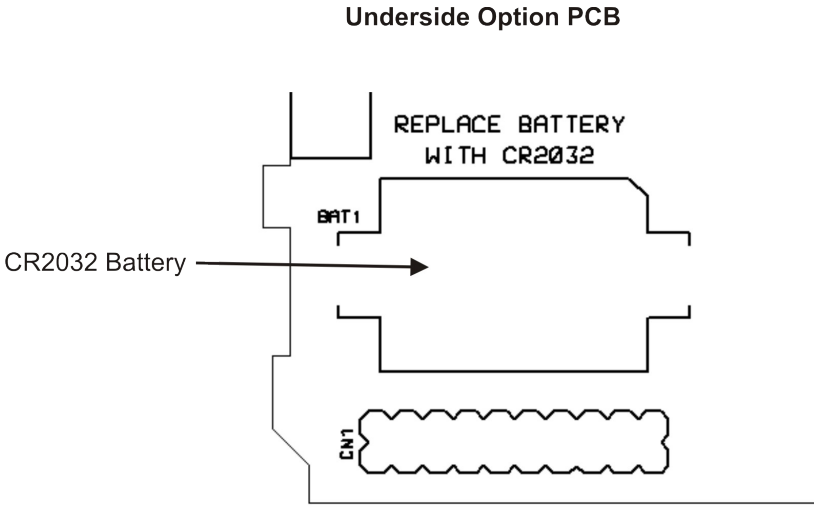
Analog Out mA Open Loop Error:



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

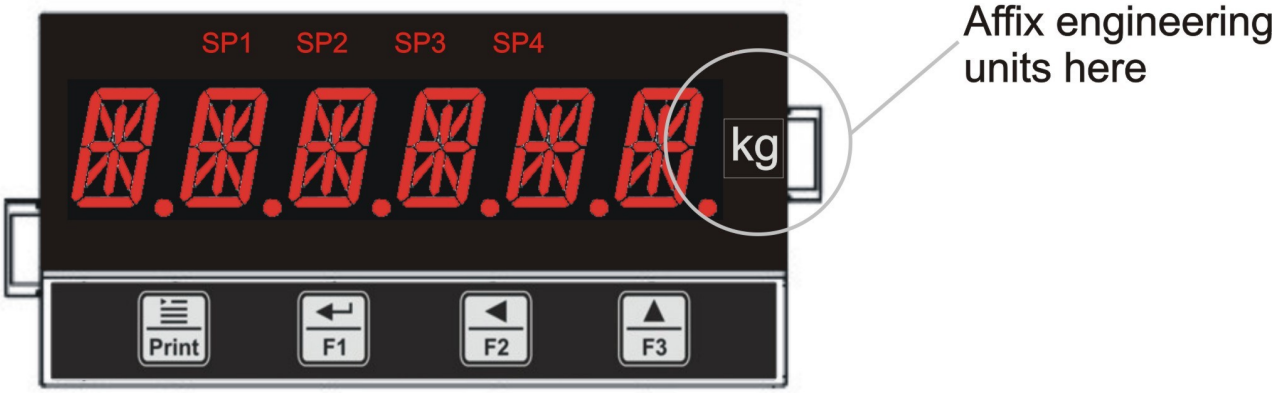
3.15 RTC Battery Replacement (Optional)

The internal battery will have to be replaced if the LT1230 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 option circuit board. The diagram below shows the location of the battery. The option PCB will have to be removed to replace the battery. Please see section 3.5 on how to add and remove the option circuit board.



3.16 Engineering Units

Identify your display with one of the different engineering units. Simply select the appropriate label from the labeling sheet and apply it to the right hand side of the display as in the diagram below.



4 Menu System

The menu system can be entered by pressing and holding the menu button Print for 3 seconds. Use the up F3, left F2, enter F1 and back keys Print to navigate through the menu system. All the settings are saved in non-volatile memory when exiting the menu system. 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.

4.1 Print Button Print

The menu/print button functions as the print button during the normal display mode. The print button is only enabled if either the RS232 or RS485 is set to the ASCII Out mode and the print on demand menu option has been selected. The display will briefly flash “PRINT” when the print button is pressed.

4.2 Built in Help Feature

The LT1230 includes a menu help feature which gives a better explanation of the menu option. If navigating the menu system and no keys are pressed within 10 seconds, then a help hint will be scrolled across the screen.

Wait 10 seconds

Help hint will scroll across the display.

4.3 Editing and Entering Values

The instrument will occasionally prompt the user to enter a value by flashing the digit. Use the up, and left keys to change the value, enter to accept or menu to return back to the previous menu option.

Print	F1	F2	F3
Return	**Enter/Accept**	**Next Digit**	**Increment Digit**

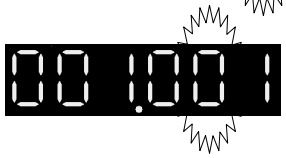
Example:

Print Press the “Menu” key for 3 seconds to access the menu system.

Press the “Enter” key to see the setpoint 1 value.

Press the “Up” key to increment the digit.

Press the “Left” key to edit the next digit.



Continue until the value has been set to the desired value.

Press the “Enter” key to accept the value and return to the menu system.

4.4 Main Menu

The main menu is entered by pressing and holding down the menu key for 3 seconds. The following will be displayed. Use the Up, Left, Enter and Menu keys to navigate the menu system.

Alarm 1 setpoint (Only shown if 1 or more alarm options have been ordered)

Press the "UP" ▲ F3 key to progress to the next menu option

Alarm 2 setpoint (Only shown if 2 or more alarm options have been ordered)

Alarm 3 setpoint (Only shown if 3 or more alarm options have been ordered)

Alarm 4 setpoint (Only shown if 4 alarm options have been ordered)

Alarm configuration setup menu (Only shown if any of the alarm options have been ordered)

Analog output setup menu (Only shown if the analog output option has been ordered)

RS232 communications setup menu

RS485 communications setup menu

Function key setup menu

Digital input setup menu

Miscellaneous items setup menu

Exit menu. Settings are saved on menu exit and the instrument will return to the normal display mode

Back to the start of the main menu.

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.

4.5 Setpoint Values

The alarm setpoints are only shown if any of the alarm options have been ordered.

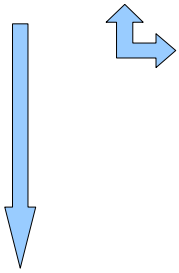
Use the front panel push buttons to adjust the alarm setpoint value.

4.6 Alarm Configuration Menu

This menu configures the alarm parameters. This menu is only shown if any of the alarm options have been ordered.

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

Select the alarm assignment. The alarm will use this value to compare against the set point value.

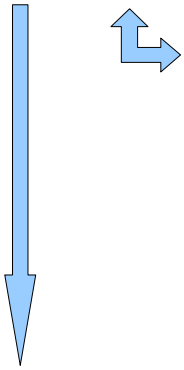


Serial Input.

Minimum value recorded.

Maximum value recorded.

Select the alarm mode.



Alarm is disabled and the set point value is ignored.

Low acting alarm. A low alarm is activated when the measured value is below the alarm setpoint.

High acting alarm. A high alarm is activated when the measured value is higher then the alarm setpoint.

Deviation Alarm. A deviation alarm is activated when the measured value falls outside the deviation band.

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.

Use the front panel push buttons to enter the deviation low alarm.

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.

Use the front panel push buttons to enter the deviation high alarm.

Select the alarm logic.

Alarm logic is normal.

Alarm logic is inverted.

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.

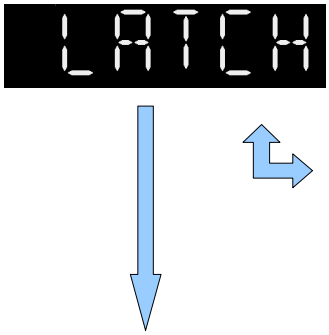
Use the front panel push buttons to enter the hysteresis value.

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

Use the front panel push buttons to enter the alarm on delay.

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

Use the front panel push buttons to enter the alarm off delay.

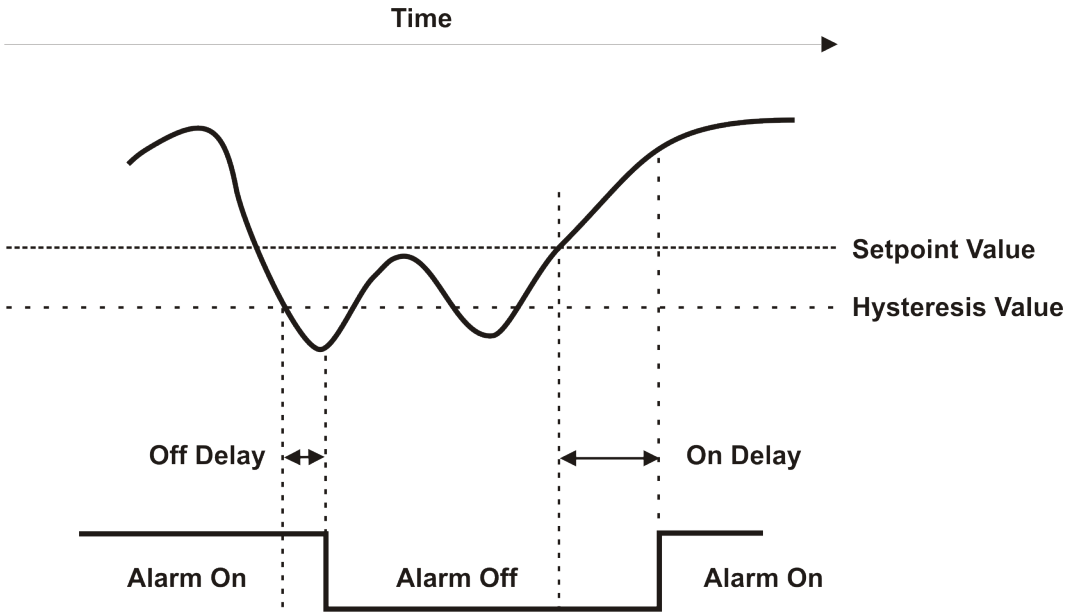


The alarm can be set to remain activated even if the alarm condition has gone. When the alarm condition has gone then the alarm latch can be reset by either a digital input or via the front push buttons.

Alarm latch function is turned on.

Alarm latch function is turned off.

Back to the start of the alarm configuration menu.

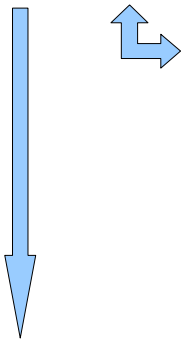


The above diagram illustrates the use of a high alarm with hysteresis and on/off delay.

4.7 Analog Out Configuration Menu

This menu configures the analog output parameters. This menu is only shown if the analog output option has been ordered.

Select the source for the analog retransmission.

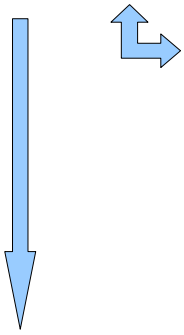


Serial Input.

Minimum value recorded

Maximum value recorded

Select the analog out type.



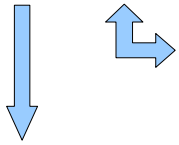
The Analog output is disabled.

The analog output will be set to 0 to 20mA

The analog output will be set to 4 to 20mA

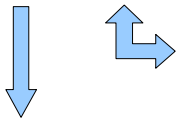
The analog output will be set to 0 to 10V

Enter the analog output low value.



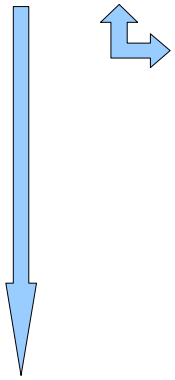
Use the front panel push buttons to enter the display value that corresponds to the selected analog out low value E.G. 0.000 display counts = 4mA.

Enter the analog output high value.



Use the front panel push buttons to enter the display value that corresponds to the selected analog out low value E.G. 20.000 display counts = 20mA.

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



Analog error output is disabled.

The analog output will go to the analog low value when an error condition occurs.

The analog output will go to the analog high value when an error condition occurs.

Back to the start of the analog out configuration menu.

4.8 RS232/RS485 Configuration Menu

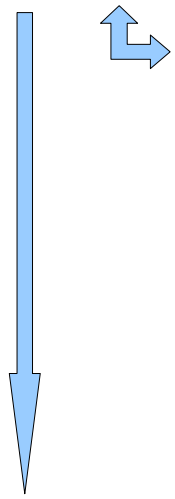
This menu configures the RS232 and RS485 serial port parameters.

The LT1230 has 3 built in communication protocols:

1) MODBUS™ RTU
2) MODBUS™ ASCII
3) Infiniteq ASCII protocol for interfacing to large displays and serial printers.

Please see below for the LT1230 MODBUS registers.

Select the communication protocol.



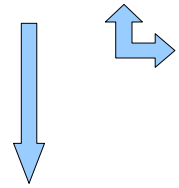
ASCII out protocol. A simple ASCII protocol to interface to serial printers and large displays. Please see the format of the ASCII out protocol in section 4.9.1

ASCII in protocol. This is the default setting for the RS232 configuration.

Modbus RTU protocol. See section for more details.

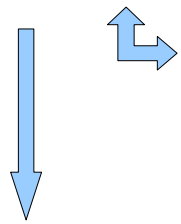
Modbus ASCII protocol. See section for more details.

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.



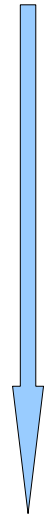
The ASCII out protocol address range is 0 to 255. The Modbus address range is 001 to 247. Use the front panel push buttons to enter the unit address.

Select the communication baud rate.



1200 Baud.

2400 Baud.



4800 Baud.

9600 Baud.

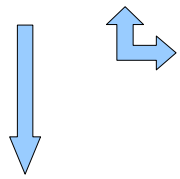
19200 Baud.

38.4k Baud.

57.6k Baud.

115.2k Baud.

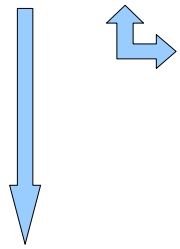
Select the communication data bits



7 data bits.

8 data bits.

Select the communication parity.

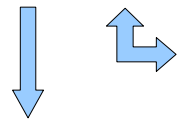


No parity.

Even parity.

Odd parity.

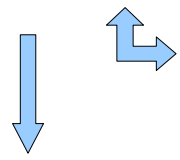
Select the communication stop bits.



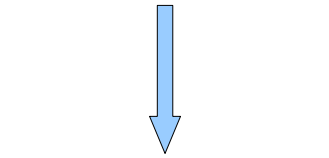
1 Bit.

2 Bits.

Select the source for the communication data. This menu option is only shown if the ASCII Out mode is selected



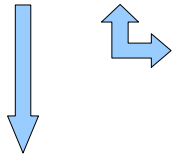
Serial Input.



Minimum weight recorded

Maximum weight recorded

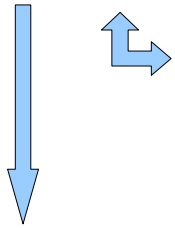
This menu option is only shown if the ASCII Out mode is selected.



Print on demand by either pressing the front push button or by a digital input.

Continuous printing. The instrument will transmit the ASCII string at a rate of 5 times a second.

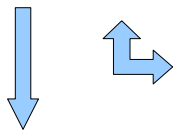
This menu option enables the date and time to be included in the ASCII output string. This menu option is only shown if the ASCII Out mode is selected and the RTC option has been ordered.



The date and time information is not included in the ASCII output string.

The date and time information is included in the ASCII output string.

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



Enter the communication timeout period in seconds. Select zero seconds to disable this feature.

Back to the start of the RS232 or RS485 configuration menu.

4.8.1 ASCII Out Protocol

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 (not transmitted if not received)
<10 digits right justified, leading zero suppression, including decimal point and polarity>
<SPACE> = Decimal 32
<UNIT>=

None=Unit not transmitted F=Fahrenheit, C=Celsius, K=Kelvin, mA, mV, V, Hz, g, kg, t, oz, lb, T, N, RPM, kg/min, kg/hr, t/hr, lb/min, T/hr

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

4.8.2 The Modbus Protocol

The IQ series instruments modbus implementation is based on the following documents:

“MODBUS over Serial Line Specification and Implementation Guide V1.02” from Modbus-IDA.ORG.

And

“MODBUS Application Protocol Specification V1.1b” from Modbus-IDA.ORG.

Details of the Modbus protocol is described in these documents and is available for free download from the following website URLs:

http://modbus-ida.org/docs/Modbus_over_serial_line_V1_02.pdf

http://www.infiniteq.co.za/manuals.aspx

4.8.3 Modbus Commands

The IQ series of 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

4.8.4 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: Serial Input 1: Min 2: 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: Serial Input 1: Min 2: 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: Serial Input 1: Min 2: 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: Serial Input 1: Min 2: 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: Serial Input 1: Min 2: Max
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: Serial Input 1: Min 2: Max
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 RTC 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: Serial Input 1: Min

			2: Max
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 RTC 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	F1 Key Assignment 0: None 1: Min/Max Toggle 2: Min/Max Value Reset 3: Latch Reset 4: Edit SP1 5: Edit SP2 6: Edit SP3 7: Edit SP4 8: Display Hold
181	8 bit unsigned	R/W	F2 Key Assignment 0: None 1: Min/Max Toggle 2: Min/Max Value Reset 3: Latch Reset 4: Edit SP1 5: Edit SP2 6: Edit SP3 7: Edit SP4 8: Display Hold
182	8 bit unsigned	R/W	F3 Key Assignment 0: None 1: Min/Max Toggle 2: Min/Max Value Reset 3: Latch Reset 4: Edit SP1 5: Edit SP2 6: Edit SP3 7: Edit SP4

			8: Display Hold
190	8 bit unsigned	R/W	Digital Input 1 Assignment 0: None 1: Min/Max Toggle 2: Min/Max Value Reset 3: Latch Reset 4: Display Hold 5: Print
191	8 bit unsigned	R/W	Digital Input 2 Assignment 0: None 1: Min/Max Toggle 2: Min/Max Value Reset 3: Latch Reset 4: Display Hold 5: 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
400	32 bit signed	R	ASCII Input Value High Word
401	32 bit signed	R	ASCII Input Value Low Word
402	8 bit unsigned	R	ASCII Input Decimal Point
403	32 bit signed	R/W	ASCII Input Zero Value High Word
404	32 bit signed	R/W	ASCII Input Zero Value Low Word
405	32 bit signed	R	ASCII Input Minimum Value High Word
406	32 bit signed	R	ASCII Input Minimum Value Low Word
407	32 bit signed	R	ASCII Input Maximum Value High Word
408	32 bit signed	R	ASCII Input Maximum Value Low Word

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	Set RTC
10	Execute Zero

4.9 Function Key Configuration Menu

This menu configures the front panel function key push buttons. Three of the front panel push buttons can be user configured for specific functions as listed below.

The function key is disabled.

The function key will toggle the display in the following order. The minimum recorded value, the maximum recorded value and then the current value. The display will flash either “MIN” or “MAX” to indicate that the displayed value is either the minimum or maximum recorded value.

The function key will reset the minimum and maximum recorded values to the current measured weight value.

The 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 options have been ordered and the alarm latch function has been activated.

This function will zero the ASCII in value.

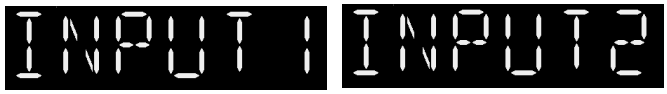
The function key will allow the user to edit the alarm 1 setpoint value. This menu option is only displayed if any of the alarm options have been ordered.

The function key will allow the user to edit the alarm 1 setpoint value. This menu option is only displayed if any of the alarm options have been ordered.

The function key will allow the user to edit the alarm 1 setpoint value. This menu option is only displayed if any of the alarm options have been ordered.

The function key will allow the user to edit the alarm 1 setpoint value. This menu option is only displayed if any of the alarm options have been ordered.

The function key will display hold the current measured weight value. The display will flash “HOLD” to indicate that the displayed value is the display hold value. Press the function key again to cancel the display hold function.

4.10 Digital Input Configuration Menu 

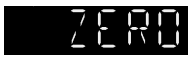
This menu configures the two digital inputs. The digital inputs can be configured for specific functions as listed below.

The digital input is disabled.

The digital input will toggle the display in the following order. The minimum recorded value, the maximum recorded value and then the current value. The display will flash either “MIN” or “MAX” to indicate that the displayed value is either the minimum or maximum recorded value.

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 options have been ordered and the alarm latch function has been activated.



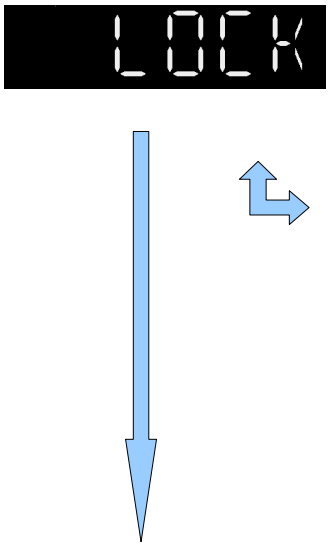
This function will zero the ASCII in value.

The digital input will display hold the current measured weight value. The 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.

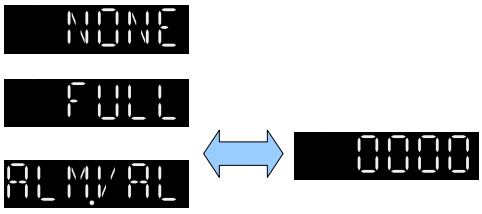
This menu option is only shown if either the RS232 or RS485 ASCII Out mode is selected. This digital input allows the user to print the display value either via the RS232 or the RS485 interface. The display will briefly flash “PRINT” when the digital input is activated.

4.11 Miscellaneous Configuration Menu

This menu configures the miscellaneous functions of the instrument.

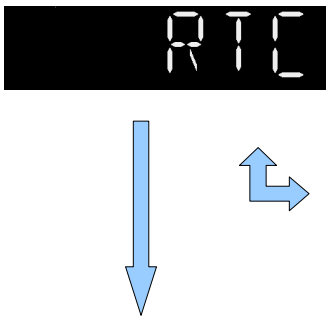


Select this option if you want to password protect the menu system. Select “NONE” for no menu protection, “FULL” for all menu options to be password protected, or “ALM.VAL” for all menu options except the alarm setpoints to be password protected.

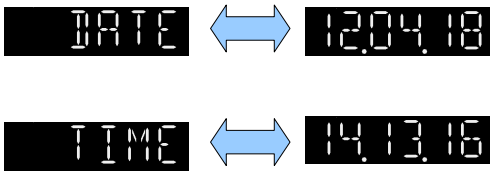


Use the front panel push buttons to enter a unique password.

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 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 is only displayed if the RTC option has been ordered

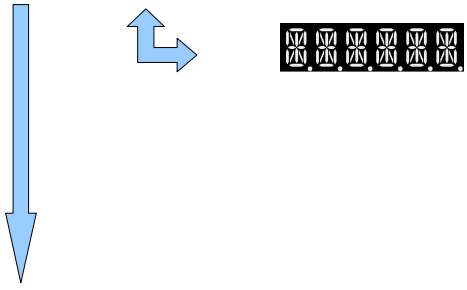


Use the front panel push buttons to set the date.

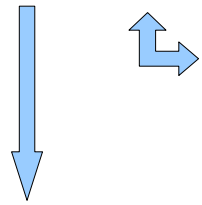
Use the front panel push buttons to set the time.

Select this menu option to display the instruments serial number.

This menu option will do a display test by turning all the segments on. Press enter or the menu key to return to the miscellaneous menu option.



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.



Use the front panel push buttons to enter the access code.

Back to the start of the miscellaneous configuration menu.

5 Error Messages

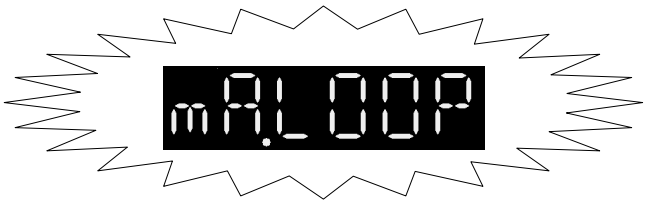
Display Under Range:

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

Display Over Range:

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

Analog Out mA Open Loop Error:



The display will flash the error message every 5 seconds to indicate that a mA loop error has occurred. This message will only be shown if the analog out option has been ordered and 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.

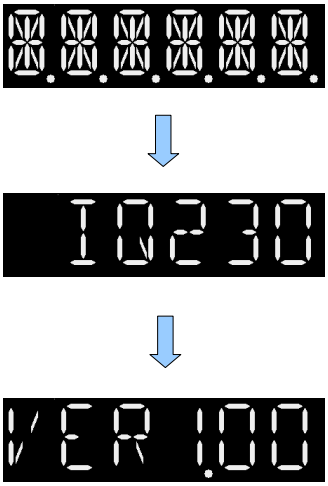
Option board CRC error. The instrument has found an error with the top option PCB. It could possibly be a non-volatile memory failure in which case the instrument will then have to be returned to the factory.

Analog out calibration CRC error. Please recalibrate the analog out option. 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.

Menu list display error. Please contact the factory with diagnostic information.

6 Display Test, Firmware and Model Number

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

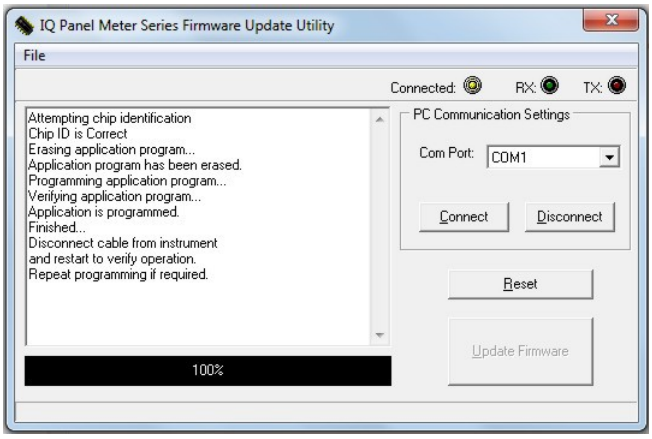


7 Firmware Upgrading

The LT1230 Load Cell indicator 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.**

Steps to follow to upgrade the firmware:

1) Connect the RS232 port on the instrument to the PC RS232 port as described in the table below
2) Run the upgrade program on the PC that matches your instrument
3) Select the correct Com Port and click the “Connect” button
4) Power up the instrument while pressing all 4 front panel push buttons.
5) The words “Ready to program” will be displayed in the text area and the “Update Firmware” button will be enabled
6) Click the “Update firmware” button and the firmware will begin to be updated
7) The following screen will be displayed if successful



PC connections:

D9 Female Connector	LT1230
Pin 2	Pin 9 (RS232 TXD)
Pin 3	Pin 10 (RS232 RXD)
Pin 5	Pin 11 (GND)

8 Loading Default Settings

Default settings can be loaded by pressing the left and up keys simultaneously at power up. The word “D.FAULT” will briefly appear on the display. All settings will be set back to the factory defaults.

9 Cleaning

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

10 Ordering Information

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

Example:
(LT1230 Serial Input indicator with 2 mechanical relays, non-isolated analog output)

LT1230-711-730

Option part numbers:

700 - Low voltage 10-30VDC isolated power supply
701 - High voltage 25-70VDC isolated power supply
710 - 1 Mechanical relay
711 - 2 Mechanical relays
712 - 3 Mechanical relays
713 - 4 Mechanical relays
720 - 1 Solid-state relay
721 - 2 Solid-state relays
722 - 3 Solid-state relays
723 - 4 Solid-state relays
730 - 16 Bit Analog Output (0/4-20mA, 0-10V)
731 - 16 Bit Isolated Analog Output (0/4-20mA, 0-10V)
750 - RTC (Real Time Clock)
760 - Panel mount engineering units
761 - Power connector protective cover
762 - 115VAC Inductive load suppressor
763 - 230VAC Inductive load suppressor
764 - 2A Slow blow replacement fuse
765 - R-C Snubber noise and arc suppressor
766 - Transparent protective front cover

11 Website

An electronic copy of this manual can be downloaded from www.loadtech.co.za.

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.

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