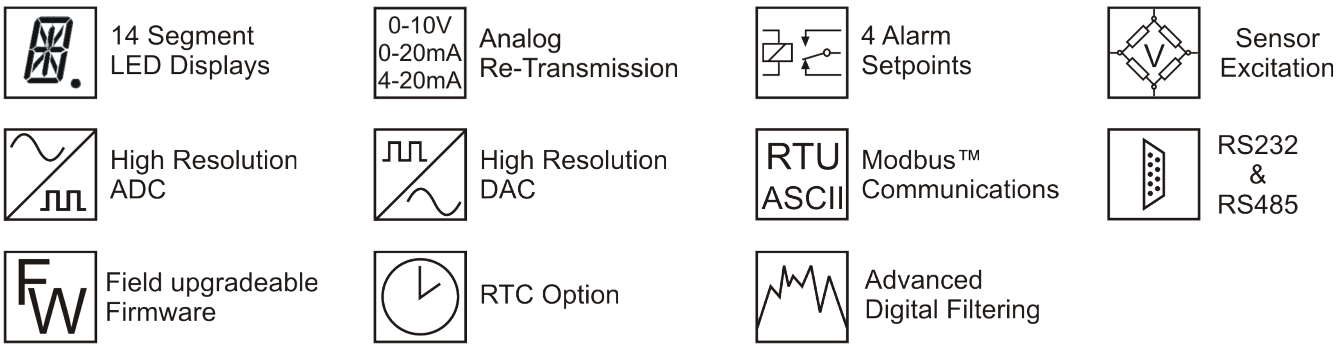
IQ201

Panel Mount Universal Process Indicator

Operating Manual – English 1.02

mA
Volts
mV
Frequency
Counting
Thermocouples
Ohms
RTD
Potentiometer
Event Timer
Real Time Clock
Manual Analog Out Station



Introduction

The IQ201 panel mount universal process indicator is a precision digital indicator for interfacing to and measuring most process variables. The IQ201 is capable of measuring and processing variables such as mA, Volts, Potentiometers, Frequency, Counting, Ohms, mV, Thermocouples, RTDs and also has built in functions such as an Event Timer, Real Time Clock (RTC option required) and a manual analog output station (Analog out option required). The IQ201 also includes a multiple output excitation voltage selection for sensor excitation of 2 or 3 wire transmitters, encoders, potentiometers and many more.

Calibration of the analog process variables is simply done by either entering in the display range selection or by direct sensor injection calibration.

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 sensor 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.

RS232 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. A second communication RS485 interface can be added in conjunction with the standard RS232 interface.

The IQ201 also has an analog out or an isolated analog out option to generate a precision 0/4-20mA and 0-10V analog output signal.

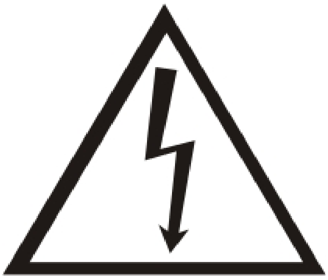
The IQ201 also includes advanced features such as user input linearisation, max/min recording, programmable front push buttons, programmable digital inputs, security menu lockout, advanced digital filtering, plus many more to provide a truly universal process indicator.

1 Features

- **High bright 6-digit 14 segment LED displays for easy setup and calibration**
- **Inputs for mA, Volts, Potentiometer, Frequency, Counting, mV, Thermocouples, Ohms & RTDs.**
- **Built in functions such as an Event Timer, Real Time Clock (RTC option required), manual setpoint station (Analog output option required)**
- **Multiple output excitation voltage for transmitter and sensor excitation.**
- **High precision 24 bit ADC front end circuitry (Bi-polar input circuitry)**
- **-199999 to +999999 display counts**
- **Easy calibration of analog process variables from display ranges or by direct sensor injection**
- **RS232 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**
- **16 Point lineariser on analog process variables (mA, V, mV, Potentiometer)**
- **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:

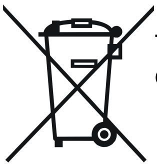
- **Up to 4 Mechanical (FORM-C) or solid state (FORM-A) alarm set points**
- **16 Bit analog output (0/4-20mA, 0-10V)**
- **16 Bit Isolated analog output (0/4-20mA, 0-10V)**
- **Second communication RS485 interface**
- **RTC (Real Time clock) option for time and date stamping**
- **Low voltage 10-30VDC 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
Status LEDS	5 LEDs (SP1 to SP4 & Totaliser)
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
Wiring connections	Removable terminal blocks
Input:	
ADC Resolution	24 bit Delta-sigma
Input	Bi-polar on all inputs
mA Input:	
Measurement range	+-27mA (Bi-polar)
Programmable range	All ranges have a programmable zero, span and decimal point 0 to 20mA 4 to 20mA Direct sensor calibration
Accuracy	<= 0.05% of reading +-4uA (Typically 0.02%)
Temperature Coefficient	<= +-0.4uA/°C
Input impedance	18Ohms
Decimal point	Programmable on all digits

Filter	Moving average digital filter with programmable input step detection
Conversion rate	10 updates/second
Increment size	1, 2, 5, 10, 20, 50, 100, 200
Lineariser	16 Point
Voltage Input:	
Measurement ranges	+-23V (Bi-polar)
Programmable range	All ranges have a programmable zero, span and decimal point 0-2V 0-5V 1-5V 0-10V 2-10V 0-15V 3-15V 0-20V Direct sensor calibration
Accuracy	0.05% of reading +-20uV (Typically 0.02%)
Temperature Coefficient	<= +-2uV/°C
Input impedance	>1Mohm
Decimal Point	Programmable on all digits
Filter	Moving average digital filter with programmable input step detection
Conversion rate	10 updates/second
Lineariser	16 Point
mV Input:	
Measurement range	+-100mV (Bi-polar)
Accuracy	<= 0.05% of reading +-4uA (Typically 0.02%)
Temperature Coefficient	<= +-2uV/°C
Input impedance	>20Mohm
Decimal point	Programmable on all digits
Filter	Moving average digital filter with programmable input step detection
Conversion rate	10 updates/second
Increment size	1, 2, 5, 10, 20, 50, 100, 200
Lineariser	16 Point
Frequency Input:	
Maximum Frequency	250KHz, RF noise filter plus Schmitt-trigger based input
Input voltage	Typical 5V, Maximum 24V, NPN / PNP 4k7 Ohm Jumper Selectable
Factor	Programmable (999.999)
Scale	Selectable 0.001, 0.010, 0.1, 1.0, 10.0, 100.0
Decimal Point	Programmable on all digits
Filter/Gate time	0.5 Seconds 1 Second 5 Seconds
Counting Input:	
Maximum Frequency	250KHz, RF noise filter plus Schmitt-trigger based input
Input voltage	Typical 5V, Maximum 24V, NPN / PNP 4k7 Ohm Jumper Selectable
Factor	Programmable (999.999)
Scale	Selectable 0.001, 0.010, 0.1, 1.0, 10.0, 100.0
Modes	Up or Down Counter
Decimal Point	Programmable on all digits
Reset/Preset	Via an external digital input Via a front panel push button
Potentiometer Input:	

Minimum resistance of Potentiometer	1K Ohm
Accuracy	0.05% of reading +-20uV (Typically 0.02%)
Temperature Coefficient	<= +-2uV/°C
Input impedance	>1Mohm
Decimal Point	Programmable on all digits
Filter	Moving average digital filter with programmable input step detection
Conversion rate	10 updates/second
Lineariser	16 Point

Thermocouple Input:

Type	Min Value	Max Value	Standard	Accuracy	Temperature Coefficient
B	0°C	1820°C	IEC 60584-1	<= +-2°C	<= +-0.2°C/°C
C	0°C	2310°C	IEC 60584-1	<= +-1°C	<= +-0.2°C/°C
D	0°C	2310°C	IEC 60584-1	<= +-1°C	<= +-0.2°C/°C
E	-270°C	1000°C	IEC 60584-1	<= +-1°C	<= +-0.05°C/°C
J	-210°C	1200°C	IEC 60584-1	<= +-1°C	<= +-0.05°C/°C
K	-270°C	1372°C	IEC 60584-1	<= +-1°C	<= +-0.05°C/°C
L	-200°C	900°C	DIN 43710	<= +-1°C	<= +-0.05°C/°C
N	-270°C	1300°C	IEC 60584-1	<= +-1°C	<= +-0.05°C/°C
R	-50°C	1767°C	IEC 60584-1	<= +-2°C	<= +-0.2°C/°C
S	-50°C	1767°C	IEC 60584-1	<= +-2°C	<= +-0.2°C/°C
T	-270°C	400°C	IEC 60584-1	<= +-1°C	<= +-0.05°C/°C
U	-200°C	600°C	DIN 43710	<= +-1°C	<= +-0.05°C/°C

Input impedance	>20Mohm
Display Resolution	0.1 or 1 °C/°F/K
Cold Junction Compensation (CJC)	Via internal sensor (Accuracy: +-2°C) or via manual entry
Unit	°C, °F or ABS (Kelvin)
Sensor error detection	Yes, on all TC types
Sensor error detection current	When detecting 2uA else 0uA
Lineariser	10 updates/second

RTD Input::

Type	Min Value	Max Value	Standard	Accuracy	Temperature Coefficient
Pt50	-200°C	850°C	IEC 60751	<= +-0.2°C	<= +-0.05°C/°C
Pt100	-200°C	850°C	IEC 60751	<= +-0.2°C	<= +-0.05°C/°C
Ni100	-60°C	250°C	DIN 43760	<= +-0.3°C	<= +-0.05°C/°C
Ni120	-60°C	250°C		<= +-0.3°C	<= +-0.05°C/°C

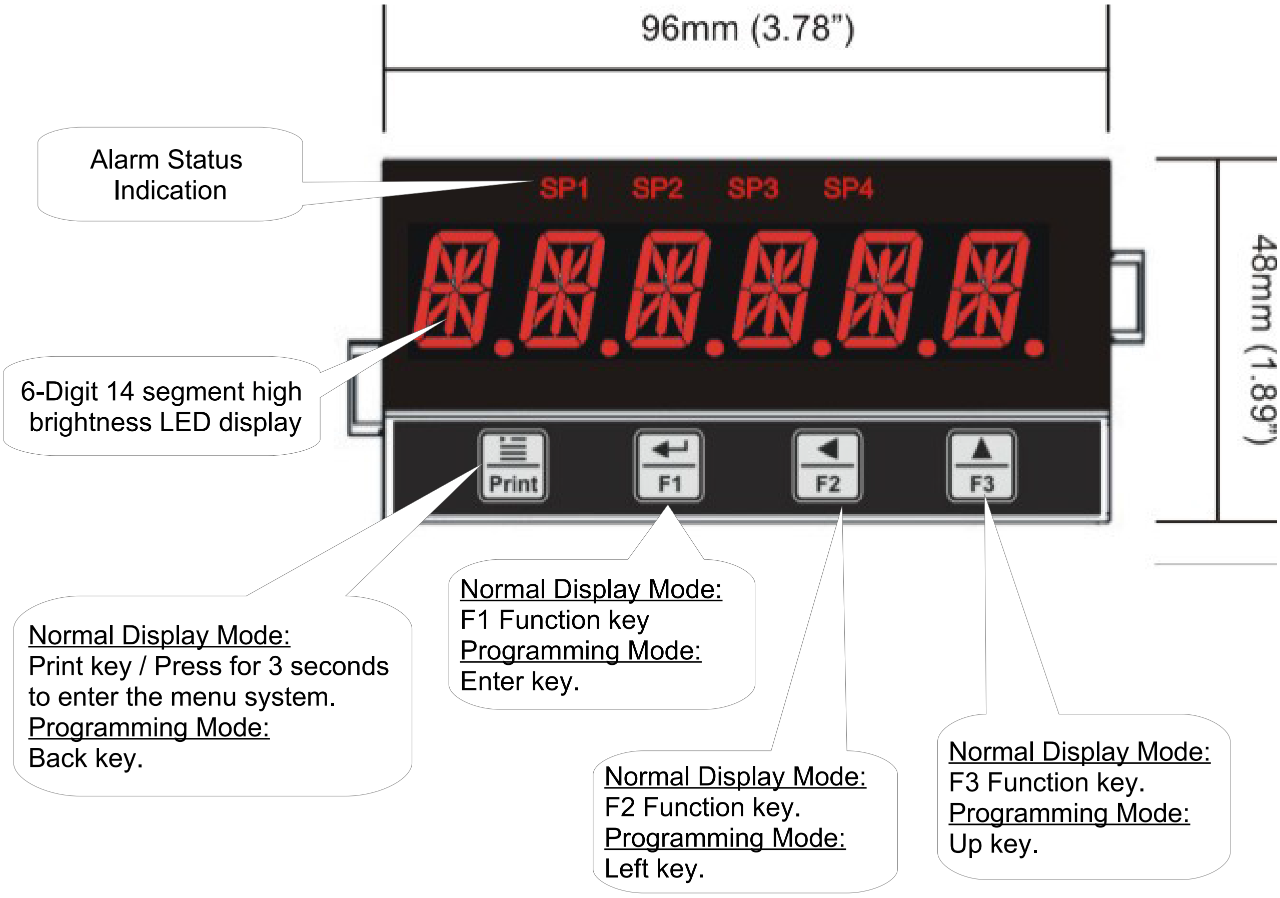
Measurement technology	24 bit Delta-sigma Ratiometric

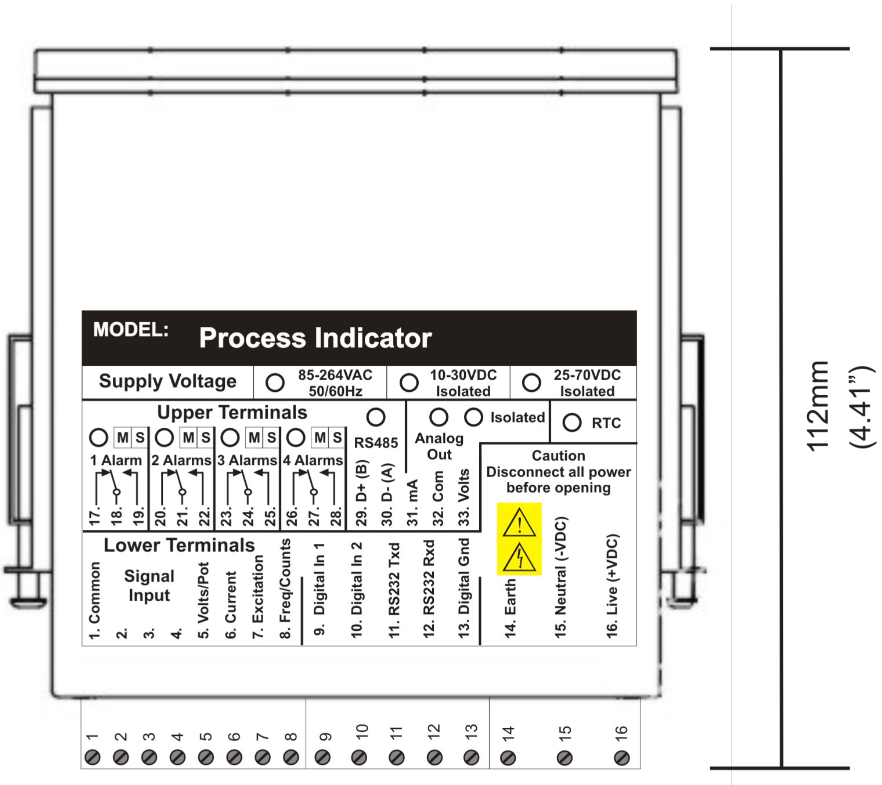
RTD sensors	2 and 3 wire supported. (Pin 3 and 4 on the input connector must be linked for 2 wire RTDs)
Display Resolution	0.1 or 1 °C/°F/K
Unit	°C, °F or ABS (Kelvin)
Sensor error detection	Yes, on all RTD types
RTD sensor current	500uA
Conversion rate	10 updates/second
Ohms Input:	
Measurement technology	24 bit Delta-sigma Ratiometric
Ohm connection	2 and 3 wire supported (Pin 3 and 4 on the input connector must be linked for 2 wire Ohms measurement)
Temperature Coefficient	<= +-2uV/°C
Input impedance	>1Mohm
Decimal Point	Programmable on all digits
Filter	Moving average digital filter with programmable input step detection
Ohm sensor current	500uA
Conversion rate	10 updates/second
Lineariser	16 Point
Event Timer:	
Time mode:	HHHH.MM HH.MM.SS SSSSSS SSSSS.S SSSS.SS
Reset / Preset / Start / Stop	Via an external digital input
Manual Analog Output Station: (Optional with analog out option)	
Decimal Point	Programmable on all digits
Sensor Excitation Voltage: (Jumper selectable)	
Excitation Voltage	+2.048V, Max 2mA +5VDC, Max 50mA +12VDC, Max 50mA +24VDC, Max 50mA
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 (Optional)	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

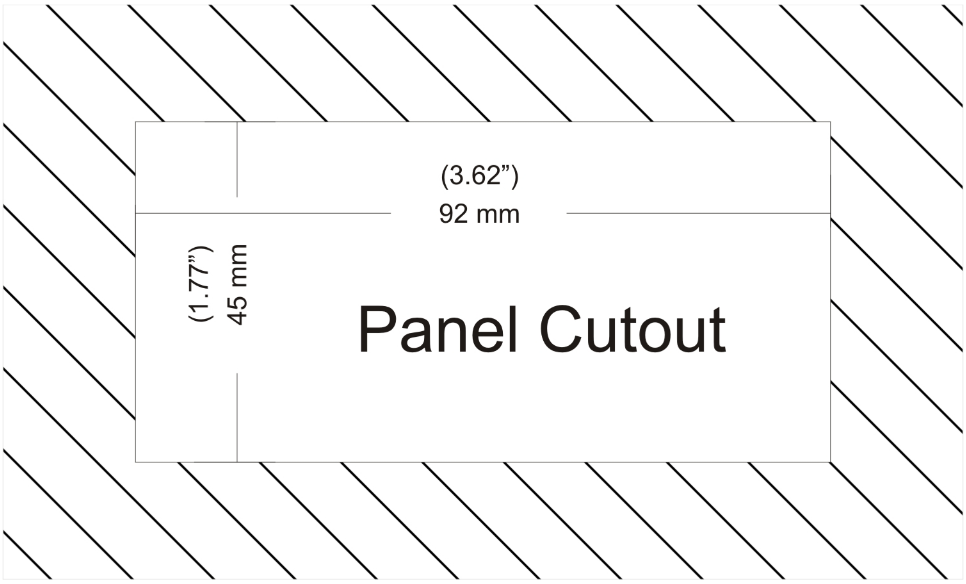
3.1 Dimensions & Front panel layout



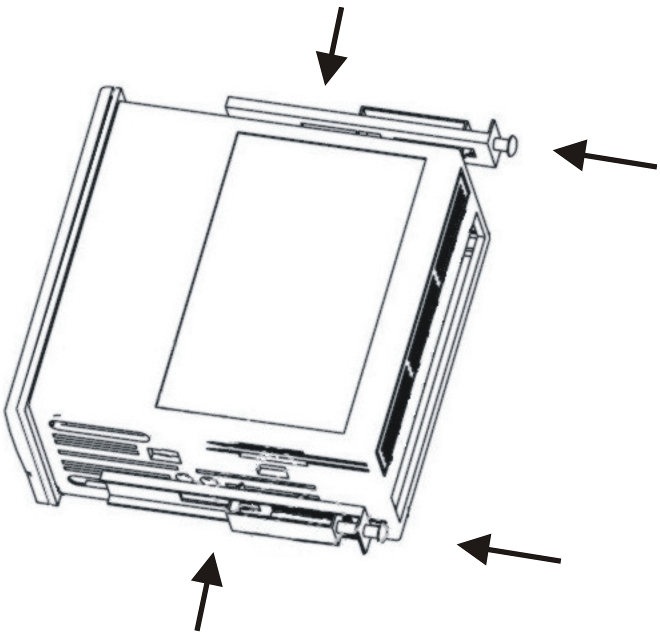


3.2 Panel Cutout

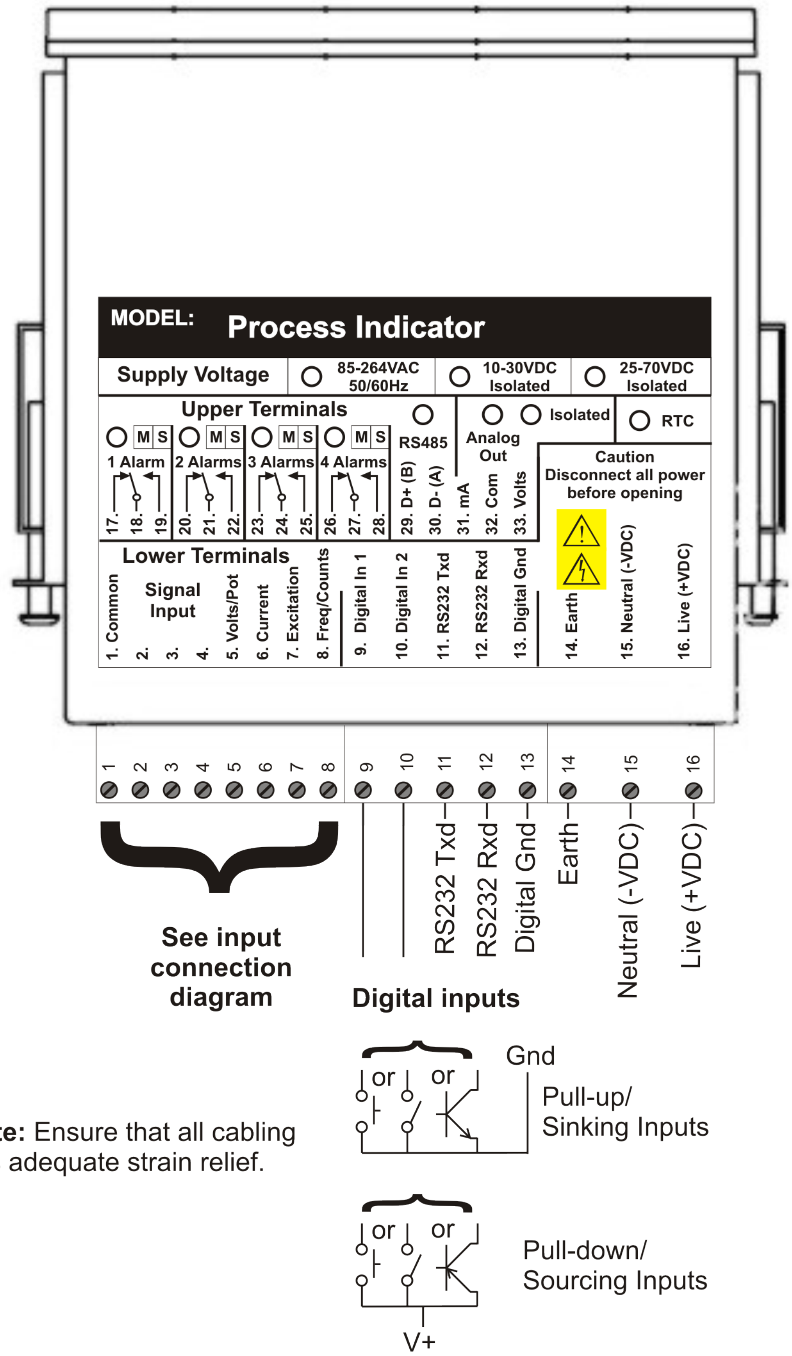
A rectangular cutout measuring 92x45mm (3.62”x1.77”) must be made in the mounting enclosure. The IQ201 instrument should preferably be mounted in a grounded metal enclosure.



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.

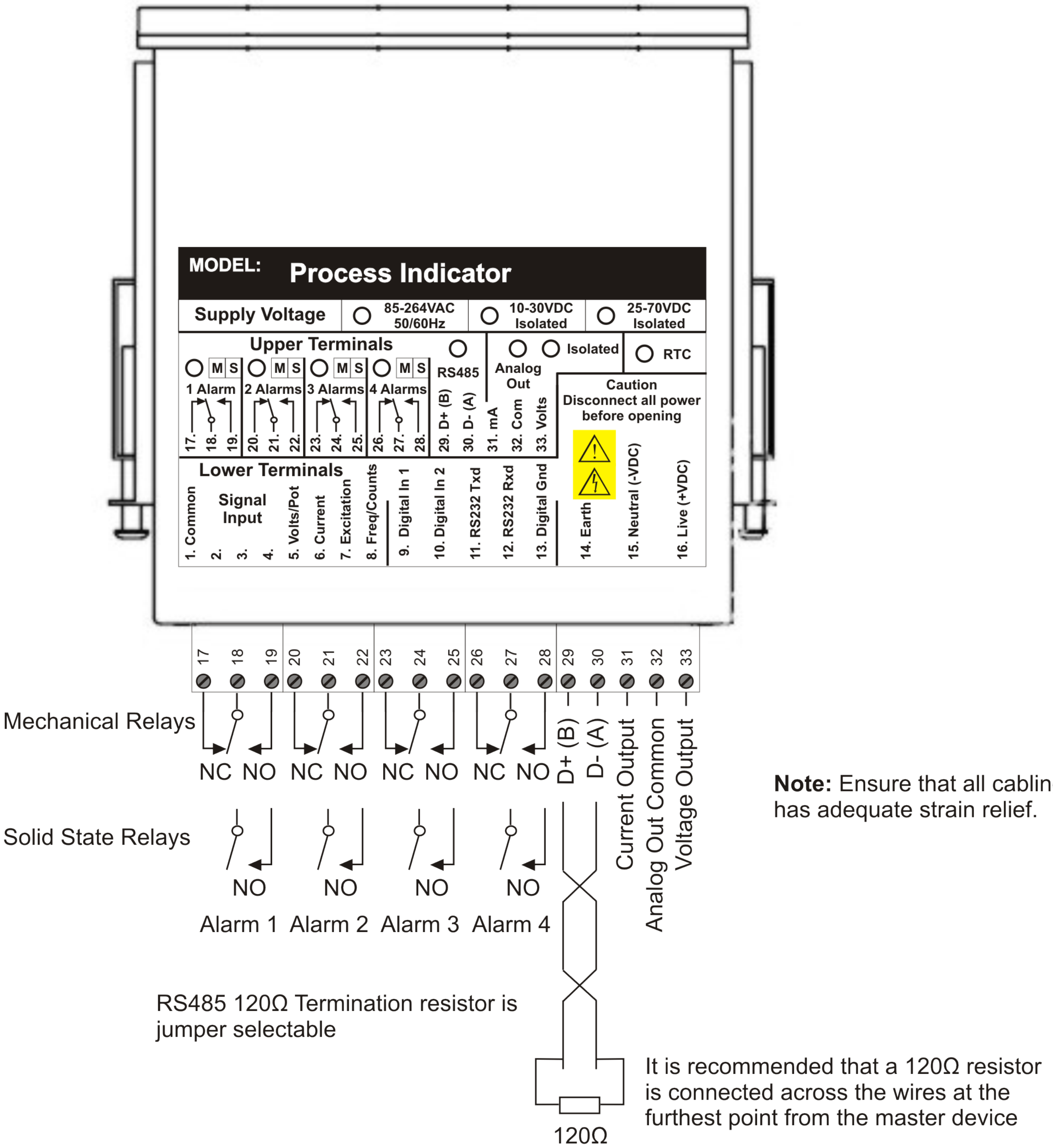


3.3 Hardware Connection (Lower Terminals)



Note: Ensure that all cabling has adequate strain relief.

3.4 Hardware Connection (Upper Terminals – Option PCB)



Note: Ensure that all cabling has adequate strain relief.

3.5 Opening the Unit

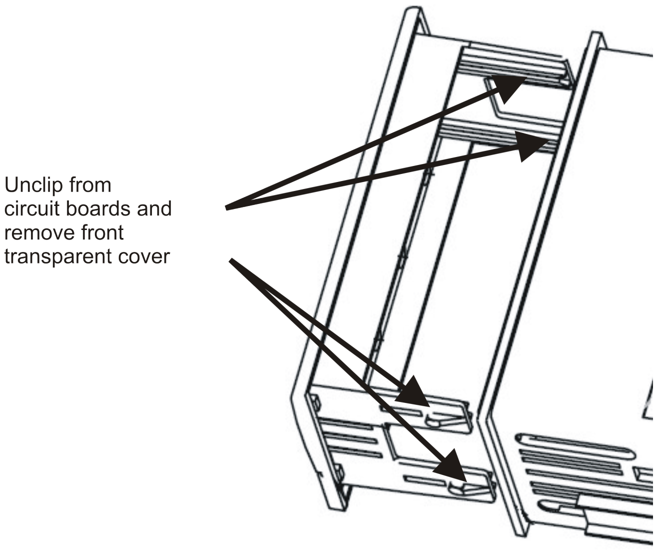
Make sure power and all connectors have been removed before opening the unit.

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.



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

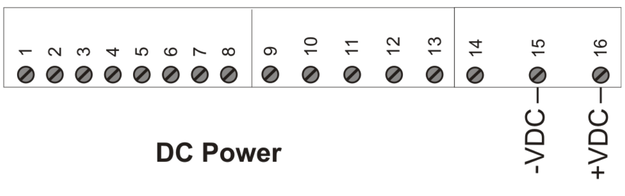
There are 3 different power supply variants! Please check which power supply is installed before connecting power by checking the marking on the sticker on the top of the instrument.

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.

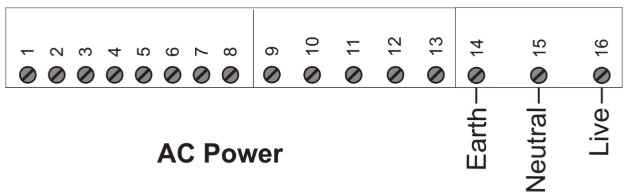
AC Power Supply

Bottom Terminals



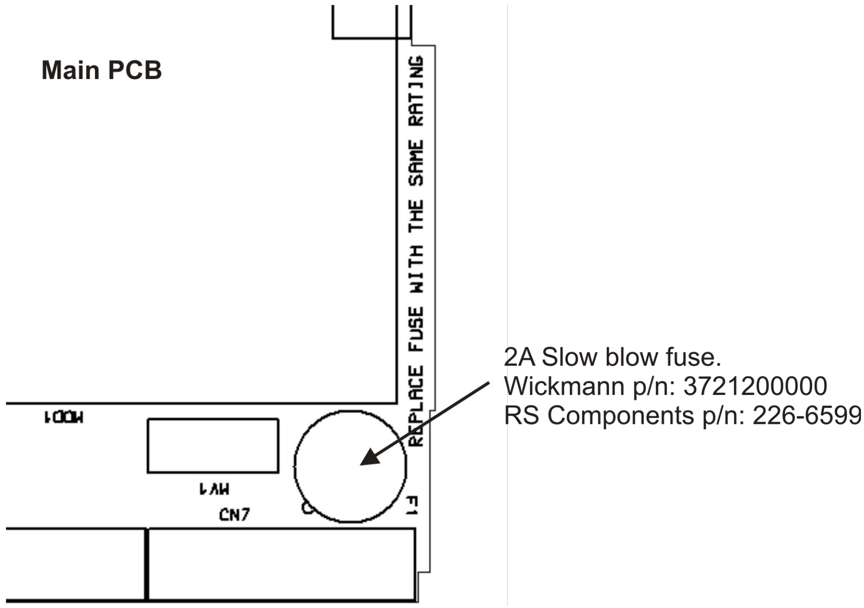
DC Power Supply

Bottom Terminals

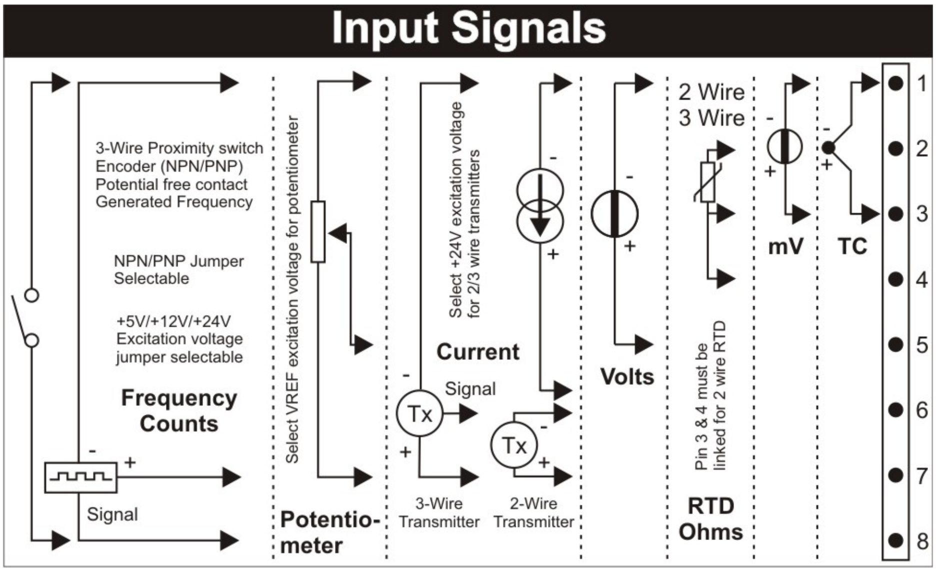


3.8 Fuse Replacement

The IQ201 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.



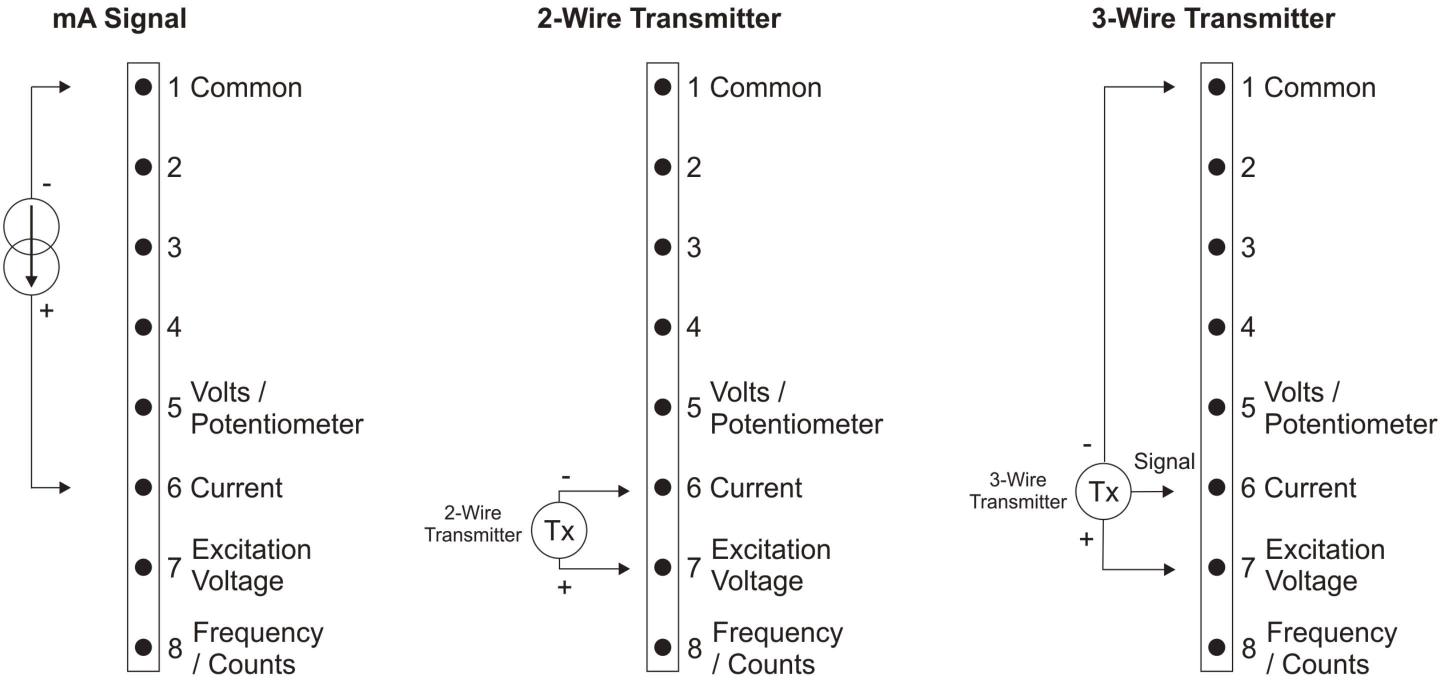
3.9 Input Signal Connection



3.91 Current Input

The IQ201 can accept a bi-polar mA signal between -20mA to +20mA. The IQ201 can also be used with 2 or 3 wire transmitters. An internal 24V excitation voltage can be used to power up an external sensor (Excitation voltage is jumper selectable, default setting is +24V). Software ranges of the mA signal are 0-20mA, 4-20mA or a user defined range. All ranges have a programmable zero, span, decimal point, filter and 16 point lineariser.

Connect the mA signal to the IQ201 as in the diagram below.

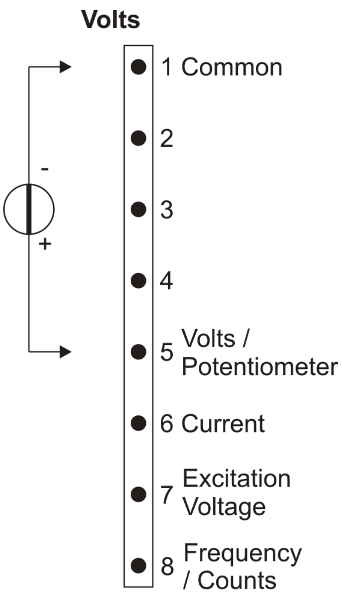


Select +24V excitation voltage (default jumper setting) for 2 or 3 wire transmitters

3.92 Voltage Input

The IQ201 can accept a bi-polar voltage signal between -20V to +20V. An internal excitation voltage can be used to power up an external sensor (Excitation voltage is jumper selectable, default setting is +24V). Software ranges of the voltage signal are 0-2V, 0-5V, 1-5V, 0-10V, 2-10V, 0-15V, 3-15V, 0-20V or a user defined range. All ranges have a programmable zero, span, decimal point, filter and 16 point lineariser.

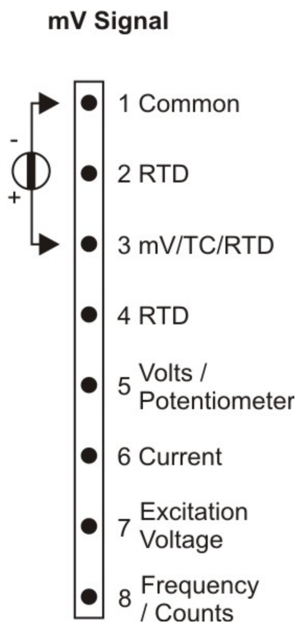
Connect the voltage signal to the IQ201 as in the diagram below.



3.93 mV Input

The IQ201 can accept a bi-polar mV signal between -100mV to +100mV. An internal excitation voltage can be used to power up an external sensor (Excitation voltage is jumper selectable, default setting is +24V). The mV input has a programmable zero, span, decimal point, filter and 16 point lineariser.

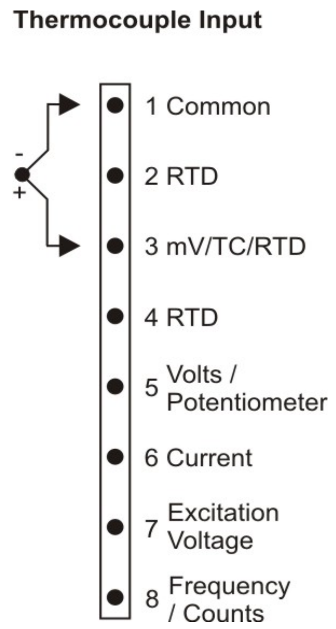
Connect the mV signal to the IQ201 as in the diagram below.



3.94 Thermocouple Input

The IQ201 can interface to a wide range of thermocouples (See specification for a list of supported thermocouples). The IQ201 can be set to use an internal temperature sensor or to a manual user input for the cold junction compensation temperature. The temperature can be displayed in degrees Celcius, Fahrenheit or absolute (Kelvin). If extending thermocouples please use the correct thermocouple extension cable. The IQ201 also includes a broken thermocouple detection feature.

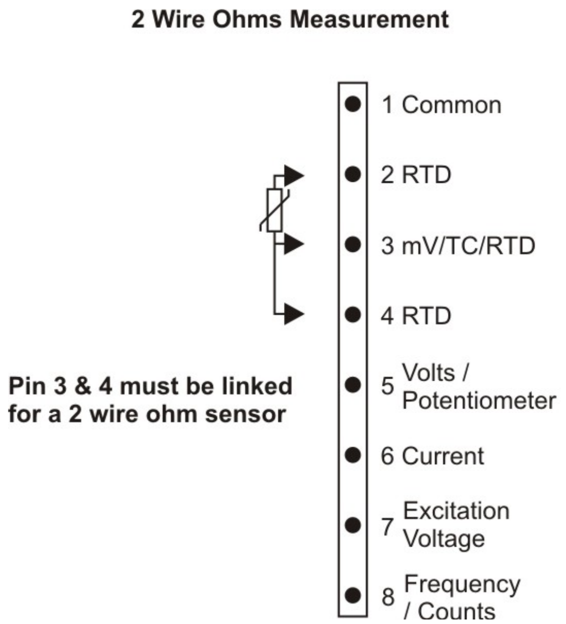
Connect the Thermocouple to the IQ201 as in the diagram below.

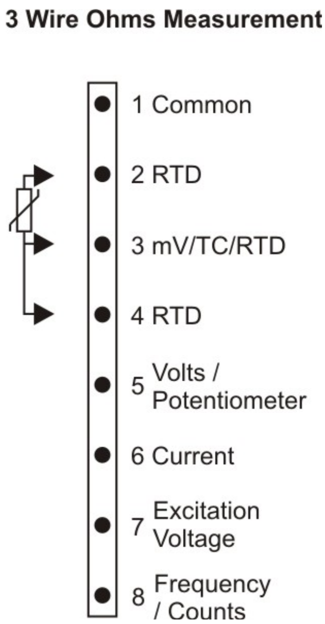


3.95 Ohms Input

The IQ201 can measure resistance between 0 and 400 Ohms using either 2 wire or 3 wire ohms measurement. If using 2 wire ohms measurement then pin 3 & 4 on the input connector must be linked as in the diagram below. An internal excitation voltage can be used to power up an external sensor (Excitation voltage is jumper selectable, default setting is +24V). The ohm input has a programmable zero, span, decimal point, filter and 16 point lineariser.

Connect the Ohms signal to the IQ201 as in the diagram below.



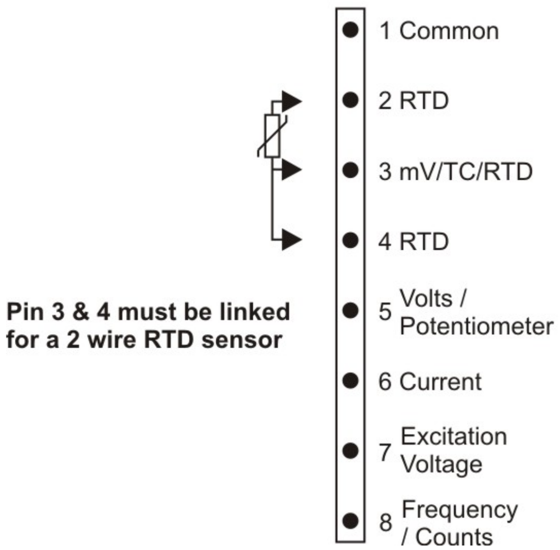


3.96 RTD Input

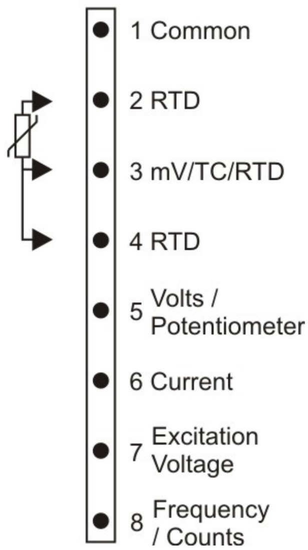
The IQ201 can interface to a wide range of RTDs (See specification for a list of supported RTDs). The IQ201 can measure temperature using either 2 wire or 3 wire RTDs. The temperature can be displayed in degrees Celcius, Fahrenheit or absolute (Kelvin).

Connect the RTD sensor to the IQ201 as in the diagram below.

2 Wire RTD Measurement



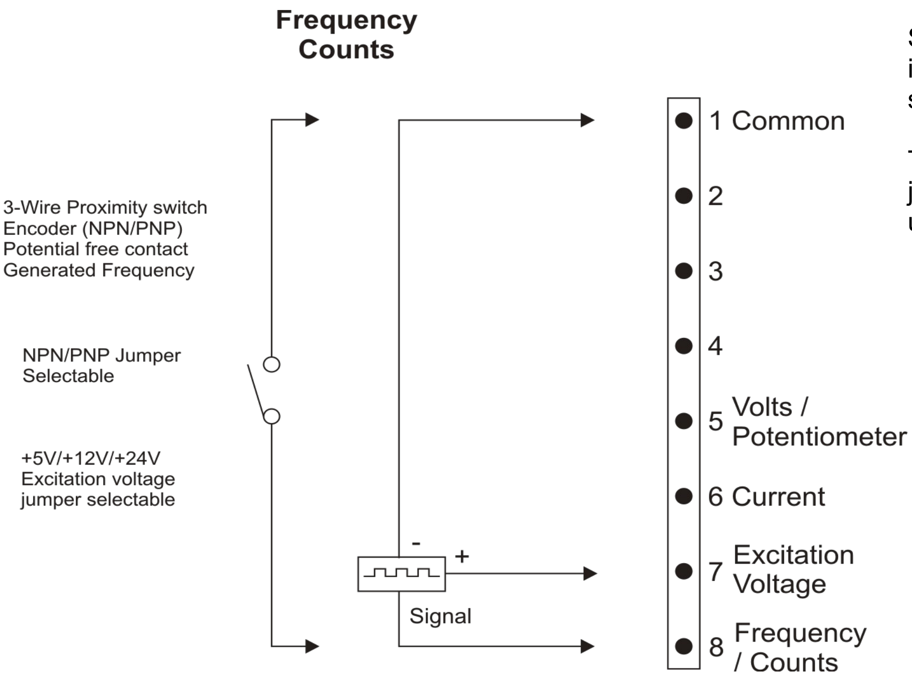
3 Wire RTD Measurement



3.97 Frequency / Counter Input

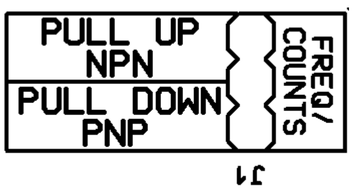
The IQ201 Frequency / Counter input is RF noise filtered and schmitt-trigger based and can handle a frequency input of 250Khz with a maximum voltage of 24V. An internal excitation voltage can be used to power up an external sensor (Excitation voltage is jumper selectable, default setting is +24V). The frequency software has a programmable factor, scaler and gate time. The counter software has a programmable factor, scaler and reset value. A configurable digital input or front panel pushbutton can be setup to reset / preset the counter value.

Connect the Frequency / Counter signal to the IQ201 as in the diagram below.



Select the NPN or PNP jumper for interfacing to NPN or PNP proximity switches/encoders.

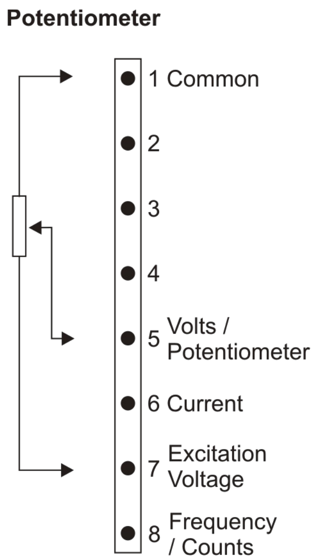
The NPN / pull-up jumper is the default jumper setting. The value of the pull-up/down resistor is 4k7.



3.98 Potentiometer Input

The IQ201 can read a potentiometer with a minimum resistance of 1K ohm. The potentiometer software has a programmable zero, span, decimal point, filter, calibration mode and 16 point lineariser. The internal excitation voltage jumper must be set to VREF. The VREF excitation voltage is a precision 2.048V with a maximum current of 2mA.

Connect the Potentiometer to the IQ201 as in the diagram below.



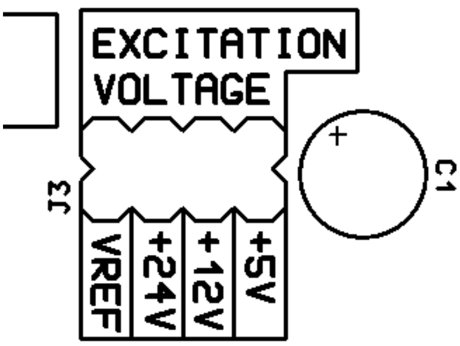
Select VREF excitation voltage for potentiometer

3.99 Event Timer

Configurable digital inputs can be setup for start, stop, start&stop and for resetting the event timer value to the reset/preset value.

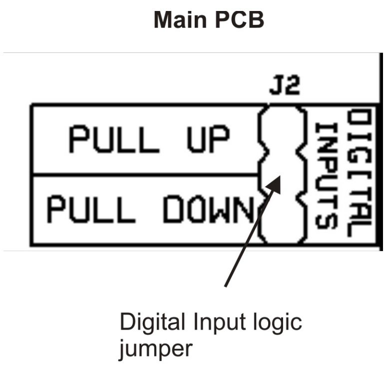
3.100 Excitation Voltage

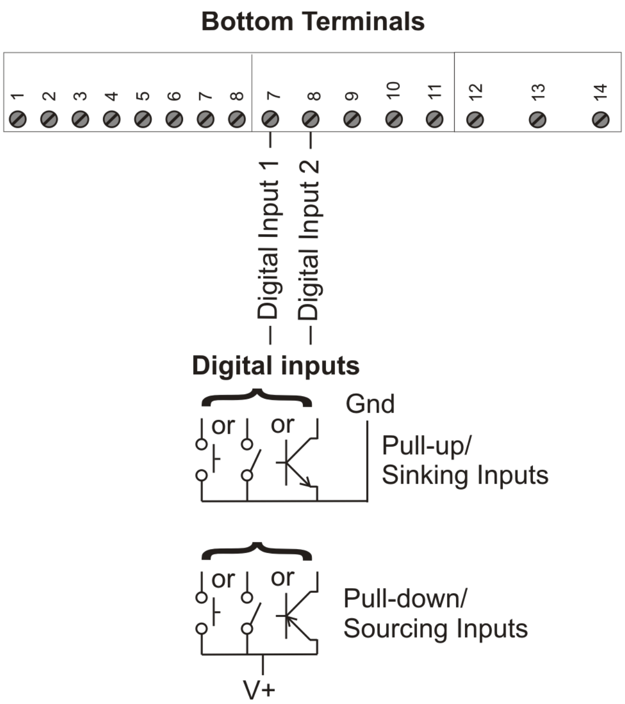
The IQ201 provides various excitation voltages for interfacing sensors directly to the IQ201 without the need for an external sensor power supply. An excitation voltage of +5V, +12V, +24V or VREF (2.048V) is jumper selectable by using J3 on the main PCB. The default jumper position is +24V.



3.10 Digital Input connection

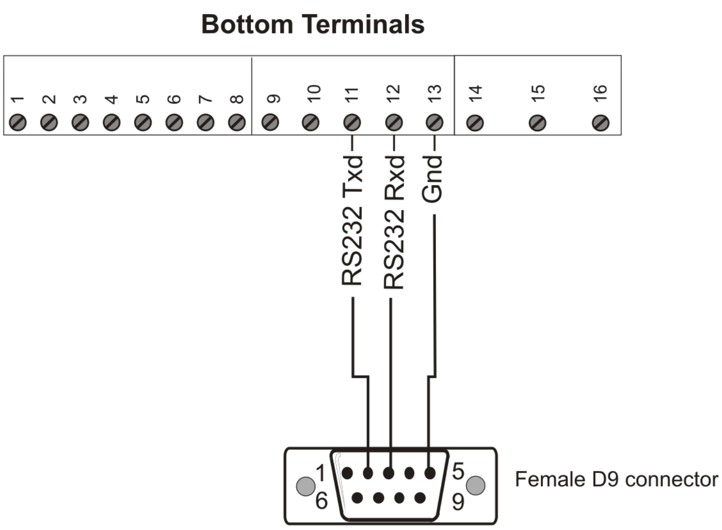
The IQ201 comes with 2 programmable digital inputs. The digital inputs can be used with either potential free contacts such as relay contacts, switches, transistor outputs or can be voltage driven. The inputs are not isolated from the instruments input circuitry. If the internal digital input jumper 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.





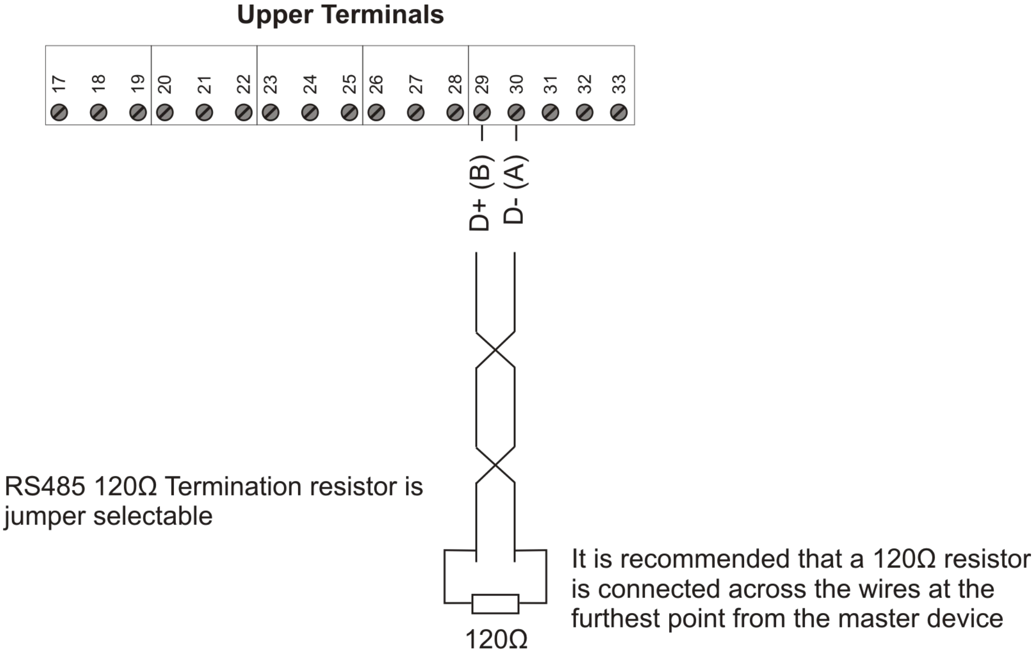
3.11 RS232 Communications

RS232 communications is standard on the IQ201. 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.



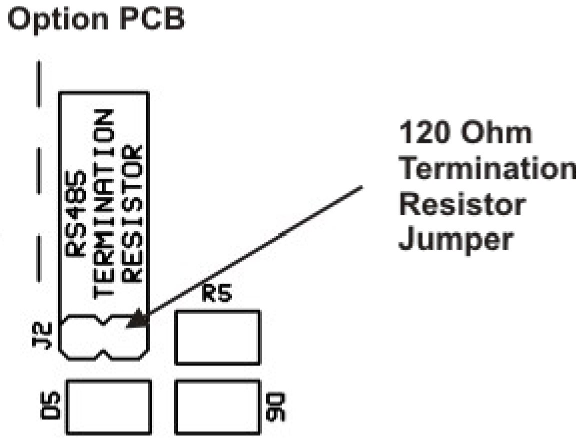
3.12 RS485 Communications (Optional)

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 IQ201 includes an on-board termination resistor which can be selected by linking J1 on the option circuit board inside the IQ201. The termination resistor is 120 Ohms.



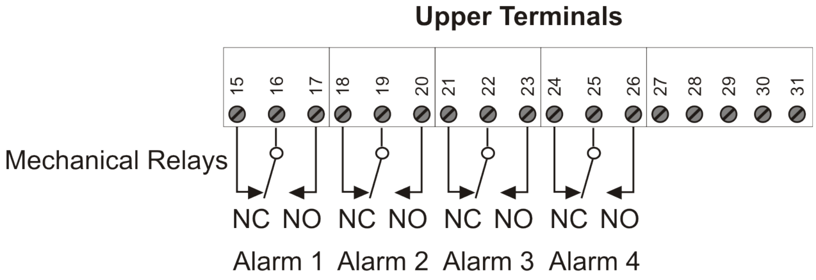
RS485 Termination Resistor Location

The 120 Ohm termination resistor is field jumper selectable using J1 and is located on the top side of the option circuit board.



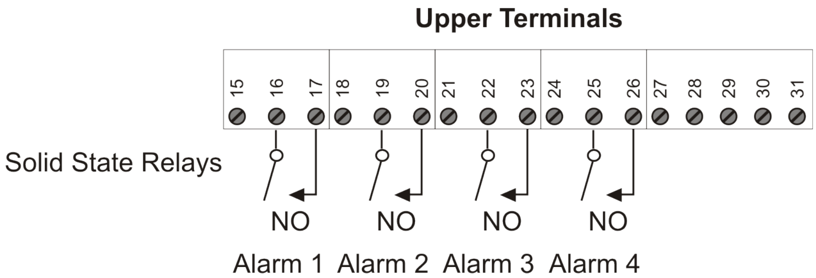
3.13 Mechanical Relays (Optional)

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.

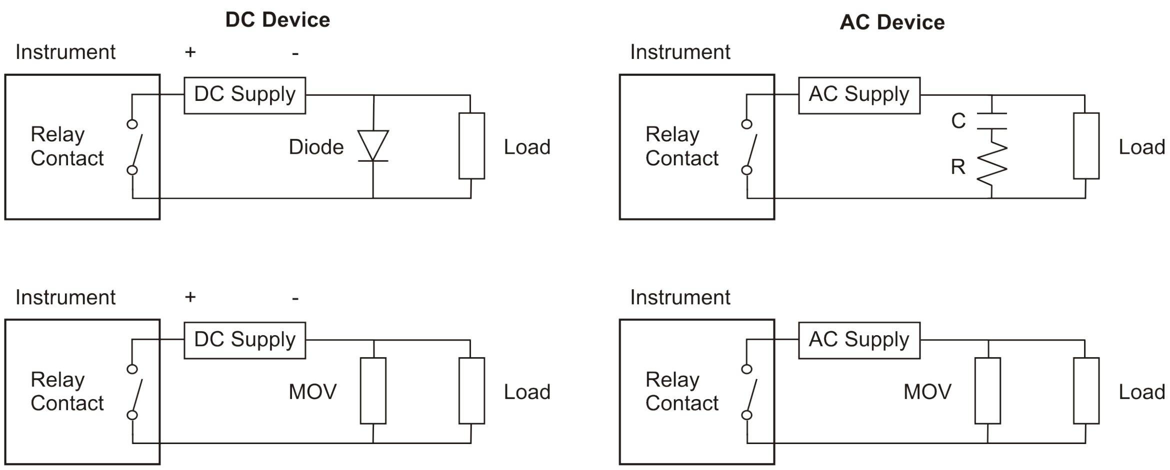


3.14 Solid-State Relays (Optional)

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.



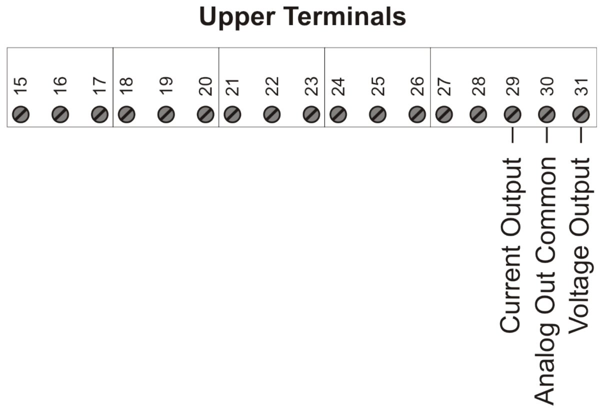
Noise suppression device for switching AC or DC devices



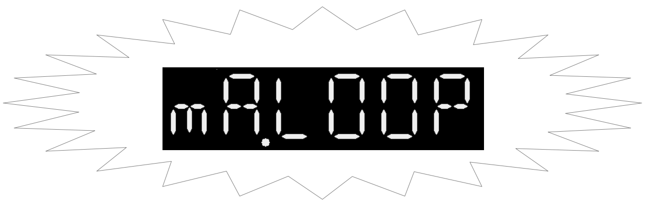
An optional noise suppression device can be ordered. Install these devices as close to the load as possible.

3.15 Analog Out / Isolated Analog Out (Optional)

Analog out or an Isolated analog out option can be fitted to the IQ201. 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:

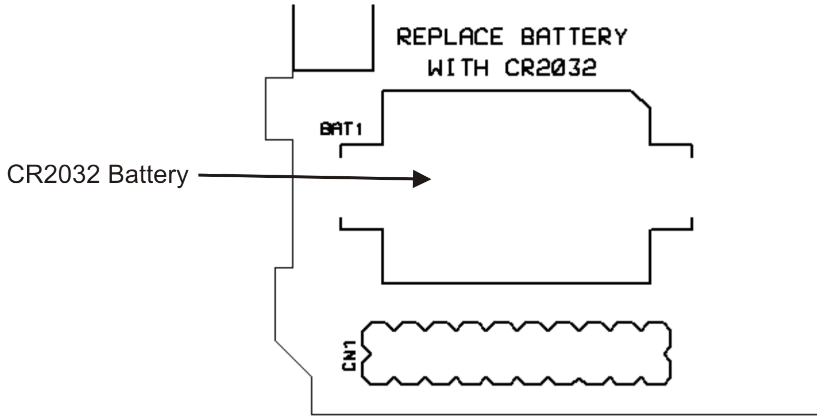


The display will flash the error message every 5 seconds to indicate that a mA loop error has occurred. This message will only be shown if the analog out option has been ordered and the analog out has been set for any of the mA ranges.

3.16 RTC Battery Replacement (Optional)

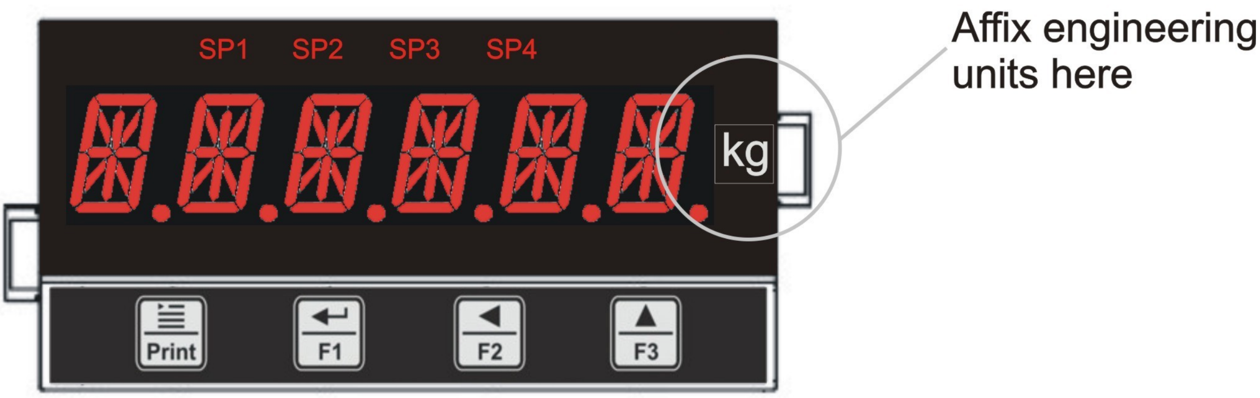
The internal battery will have to be replaced if the IQ201 looses its time when the instrument is switched off and on. The battery is of type CR2032. The battery is located on the underside of the option circuit board. The diagram below shows the location of the battery. The option PCB will have to be removed to replace the battery. Please see section 3.5 on how to add and remove the option circuit board.

Underside Option PCB



3.17 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 IQ201 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**

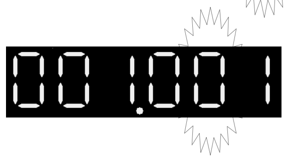
Example:

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 edited the next digit.

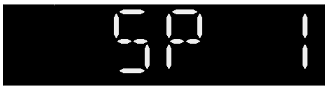


Continue until the value has been set to the desired value.

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

4.4 Main Menu

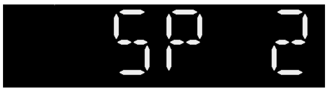
The main menu is entered by pressing and holding down the menu key for 3 seconds. The following will be displayed. Use the Up, Left, Enter and Menu keys to navigate the menu system.



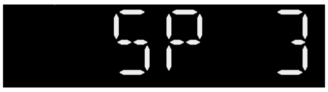
Alarm 1 setpoint (Only shown if 1 or more alarm options have been ordered)

Press the “UP” 

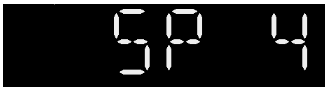
key to progress to the next menu option



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)

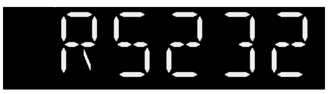


Alarm 4 setpoint (Only shown if 4 alarm options have been ordered)

Input configuration setup menu

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

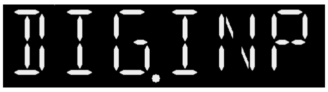
Analog output setup menu (Only shown if the analog output option has been ordered)



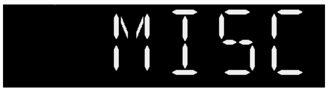
RS232 communications setup menu

RS485 communications setup menu (Only shown if the RS485 option has been ordered)

Function key setup menu



Digital input setup menu



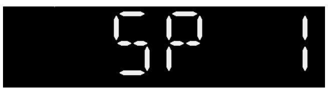
Miscellaneous items setup menu

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

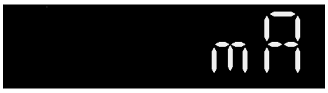


The alarm setpoints are only shown if any of the alarm options have been ordered.

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

4.6 Input Configuration Menu

This menu selects and configures the input signal.



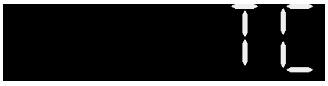
Current Input

Voltage input

mV Input

Frequency input

Counter input



Thermocouple input

RTD Input

Ohms Input

Potentiometer input

Event Timer

Real Time clock (RTC option required)

Manual analog output station. (Analog output option required)

4.6.1 mA Input Configuration menu

mA

This menu option allows the user to set the mA input settings.

RANGE

Select the range of the mA input signal / sensor

0-20mA — 0-20mA

4-20mA — 4-20mA

mA CAL — User mA input range.

DEC PT

Select the display decimal point.

XXX.XXX — Use the up arrow to select the decimal point.

The IQ201 can be configured by using data either from the mA sensor datasheet ("0-20mA" or "4-20mA" selected) or by using direct mA signal injection ("mA CAL" selected).

DISP L

Enter the display value of the system that corresponds to the low value of the "RANGE" selection. E.G. if 4-20mA is selected for "RANGE" then enter a value that corresponds to 4mA. If "mA CAL" has been selected for "RANGE" then enter the display value of the system that corresponds to the "LOW mA" value.

000.000 — Use the front panel push buttons to enter the low display value.

DISP H

Enter the display value of the system that corresponds to 20mA. If "mA CAL" has been selected for "RANGE" then enter the display value of the system that corresponds to the "HIGH.mA" value.

020.000 — Use the front panel push buttons to enter the high display value.

The following 3 menu items are only shown if "mA CAL" has been selected for the "RANGE" setting.

Enter the value in mA that corresponds to the low display value ("DISP L").

Use the front panel push buttons to enter the low mA value.

Enter the value in mA that corresponds to the high display value ("DISP H").

Use the front panel push buttons to enter the high mA value.

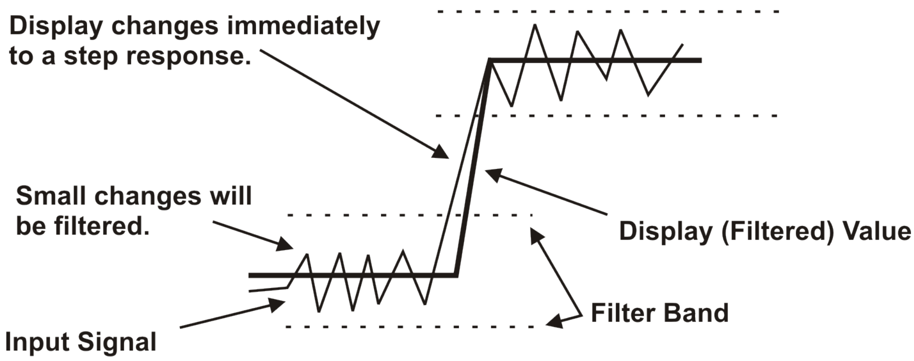
Calibration using direct mA signal injection menu. See section 4.6.1.1

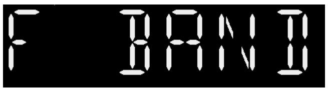
Select the display rounding in display counts. The round function rounds the display value to the nearest rounding increment. Eg. With a rounding setting of 5, a display value of 233 will be rounded up to 235. A setting of "10" will create a dummy zero. The display rounding function can be used in conjunction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

The IQ201 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.

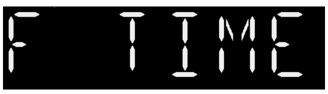
The diagram below illustrates the use of the filter time and the filter band.





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

Use the front panel push buttons to enter the filter band.



Select the filter time. See the paragraph above for an explanation of the filter time.

1 Second

3 Seconds

5 Seconds

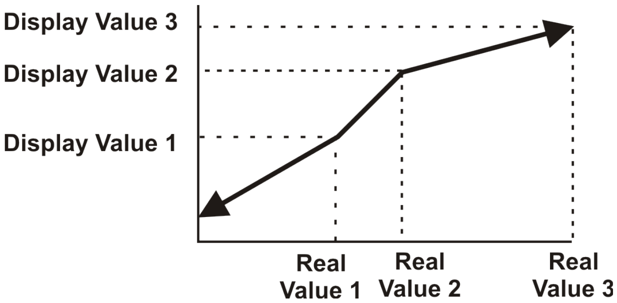
10 Seconds

LINEAR

Lineariser 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.

ENABLE

Select to enable the lineariser feature.

ON — The lineariser feature is turned on.

OFF — The lineariser feature is turned off.

POINTS

Select the number of lineariser scaling points.

03 — Use the up arrow to select the number of lineariser scaling points

REAL.01

Enter the actual or real value.

000.000 — Use the front panel push buttons to enter the actual or real value.

DISP.01

Enter the display or desired value

000.000 — Use the front panel push buttons to enter the display or desired value.

Back to the start of the Lineariser sub-menu.

4.6.1.1 Calibration using Direct mA Signal Injection

SIGNAL

This allows the user to calibrate the IQ201 using direct mA from the system. Before the IQ201 can calculate the display value accurately it must know the the mA and display values of 2 known signals. The calibration sequence will prompt the user to apply a signal and enter the corresponding value.

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 signals should be as different from each other as possible to allow the IQ201 to try and obtain the greatest resolution.

mA. LOW — This allows the user to enter and apply the low signal to the instrument.

000.000 — Use the front panel push buttons to enter the display value that corresponds to the low calibration signal.

APPLY — Apply the low calibration signal to the instrument and then press enter.

WAIT 8 — The IQ201 will start to average and calculate the mA value that corresponds to the low calibration signal.

DONE — Done! The low calibration signal can now be removed. The low display value and its corresponding mA value will be saved.

mA.HIGH — This allows the user to enter and apply the high signal to the instument.

020.000 — Use the front panel push buttons to enter the display value that corresponds to the high calibration signal.

APPLY — Apply the high calibration signal to the instrument and then press enter.

WAIT 8 — The IQ201 will start to average and calculate the mA value that corresponds to the high calibration signal.

DONE — Done! The high calibration signal can now be removed. The high display value and its corresponding mA value will be saved.

Back to the start of the calibration using direct mA signal injection.

4.6.2 Voltage Input Configuration menu

VOLTS

This menu option allows the user to set the Voltage input settings.

RANGE

Select the range of the Voltage input signal / Sensor

Display	Description
0-2V	0-2V
0-5V	0-5V
1-5V	1-5V
0-10V	0-10V
2-10V	2-10V
0-15V	0-15V
3-15V	3-15V
0-20V	0-20V
V CAL	User volts input range. Calibrated using the direct signal injection menu option.

DEC PT

Select the display decimal point.

XXX.XXX

Use the up arrow to select the decimal point.

The IQ201 can be configured by using data either from the Volts sensor datasheet or by using direct Volts signal injection ("V CAL" selected).

DISP L

Enter the display value of the system that corresponds to the low value of the "RANGE" selection. E.G. if 2-10V is selected for "RANGE" then enter a value that corresponds to 2V. If "V CAL" has been selected for "RANGE" then enter the display value of the system that corresponds to the "LOW V" value.

888.888

Use the front panel push buttons to enter the low display value.

DISP H

Enter the display value of the system that corresponds to the high value of the "RANGE" selection. E.G. if 2-10V is selected for "RANGE" then enter a value that corresponds to 10V. If "V CAL" has been selected for "RANGE" then enter the display value of the system that corresponds to the "HIGH V" value.

020.000

Use the front panel push buttons to enter the high display value.

The following 3 menu items are only shown if "V CAL" has been selected for the "RANGE" setting.

LOW V

Enter the value in volts that corresponds to the low display value ("DISP L").

000.000

Use the front panel push buttons to enter the low volts value.

HIGH V

Enter the value in volts that corresponds to the high display value ("DISP H").

020.000

Use the front panel push buttons to enter the high volts value.

SIGNAL

Calibration using direct volts signal injection menu. See section 4.6.2.1

ROUND

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.

1

2

5

10

20

50

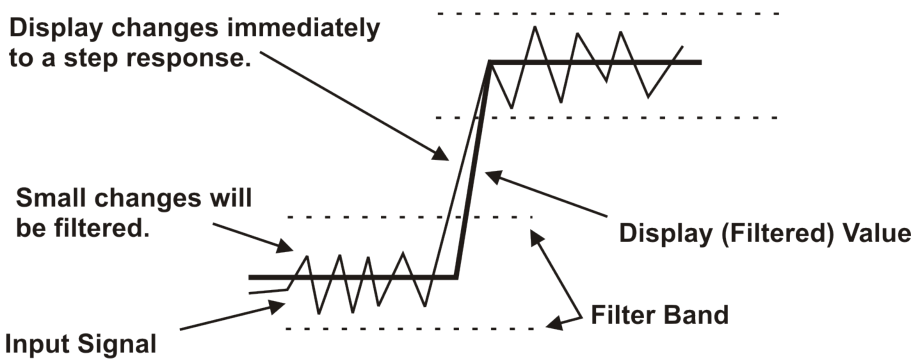
100

200

The IQ201 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.



F BAND

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

0 100

Use the front panel push buttons to enter the filter band.

F TIME

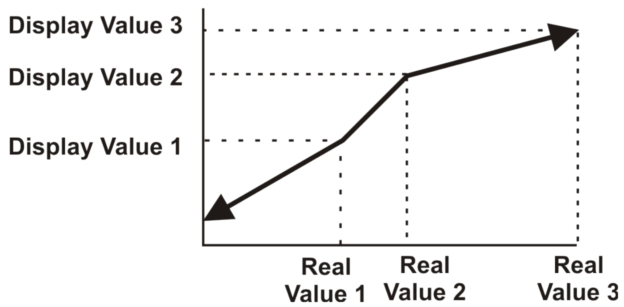
Select the filter time. See the paragraph above for an explanation of the filter time.

1 S	1 Second
3 S	3 Seconds
5 S	5 Seconds
10 S	10 Seconds

LINEAR Lineariser 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.

ENABLE Select to enable the lineariser feature.

ON The lineariser feature is turned on.

OFF The lineariser feature is turned off.

POINTS Select the number of lineariser scaling points.

03 Use the up arrow to select the number of lineariser scaling points

REAL.01 Enter the actual or real value.

000.000 Use the front panel push buttons to enter the actual or real value.

DISP.01 Enter the display or desired value

000.000 Use the front panel push buttons to enter the display or desired value.

Back to the start of the Lineariser sub-menu.

4.6.2.1 Calibration using Direct Volts Signal Injection SIGNAL

This allows the user to calibrate the IQ201 using direct volts from the system. Before the IQ201 can calculate the display value accurately it must know the the volts and display values of 2 known signals. The calibration sequence will prompt the user to apply a signal and enter the corresponding value.

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 signals should be as different from each other as possible to allow the IQ201 to try and obtain the greatest resolution.

LOW V — This allows the user to enter and apply the low signal to the instrument.

000.000 — Use the front panel push buttons to enter the display value that corresponds to the low calibration signal.

APPLY — Apply the low calibration signal to the instrument and then press enter.

WAIT 8 — The IQ201 will start to average and calculate the volts value that corresponds to the low calibration signal.

DONE — Done! The low calibration signal can now be removed. The low display value and its corresponding volts value will be saved.

HIGH V — This allows the user to enter and apply the high signal to the instument.

020.000 — Use the front panel push buttons to enter the display value that corresponds to the high calibration signal.

APPLY — Apply the high calibration signal to the instrument and then press enter.

WAIT 8 — The IQ201 will start to average and calculate the volts value that corresponds to the high calibration signal.

DONE — Done! The high calibration signal can now be removed. The high display value and its corresponding volts value will be saved.

Back to the start of the calibration using direct volts signal injection.

4.6.3 mV Input Configuration menu

This menu option allows the user to set the mV input settings.

RANGE

Select the range of the mV input signal / Sensor

100mV 0-100mV

mV CAL User mV input range. Calibrated using the direct signal injection menu option.

DEC PT

Select the display decimal point.

XXX.XXX Use the up arrow to select the decimal point.

The IQ201 can be configured by using data either from the mV sensor datasheet or by using direct mV signal injection ("mV CAL" selected).

DISP L

Enter the display value of the system that corresponds to the low value of the "RANGE" selection. E.G. if 100mV is selected for "RANGE" then enter a value that corresponds to 0mV. If "mV CAL" has been selected for "RANGE" then enter the display value of the system that corresponds to the "LOW mV" value.

000.000 Use the front panel push buttons to enter the low display value.

DISP H

display

Enter the display value of the system that corresponds to the high value of the "RANGE" selection. E.G. if 100mV is selected for "RANGE" then enter a value that corresponds to 100mV. If "mV CAL" has been selected for "RANGE" then enter the value of the system that corresponds to the "HIGH.mV" value.

020.000 Use the front panel push buttons to enter the high display value.

The following 3 menu items are only shown if "mV CAL" has been selected for the "RANGE" setting.

LOW mV

Enter the value in mV that corresponds to the low display value ("DISP L").

000.000 Use the front panel push buttons to enter the low volts value.

HIGH.mV

Enter the value in mV that corresponds to the high display value (“DISP H”).

020.000

Use the front panel push buttons to enter the high volts value.

SIGNAL

Calibration using direct mV signal injection menu. See section 4.6.3.1

ROUND

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.

1

2

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10

20

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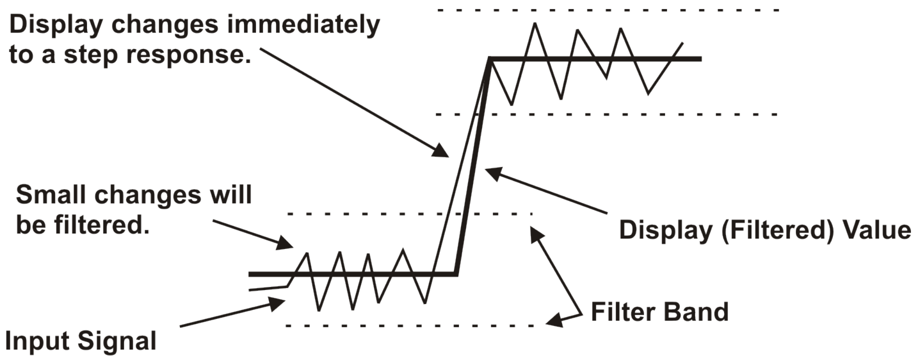
100

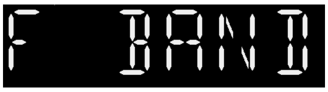
200

The IQ201 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.

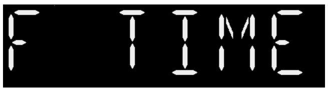
The diagram below illustrates the use of the filter time and the filter band.





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

Use the front panel push buttons to enter the filter band.



Select the filter time. See the paragraph above for an explanation of the filter time.

1 Second

3 Seconds

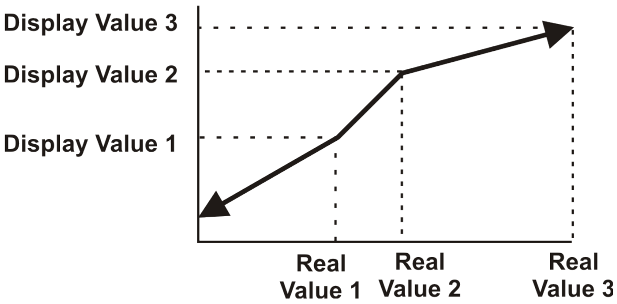
5 Seconds

10 Seconds

Lineariser 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.

ENABLE Select to enable the lineariser feature.

ON The lineariser feature is turned on.

OFF The lineariser feature is turned off.

POINTS Select the number of lineariser scaling points.

03 Use the up arrow to select the number of lineariser scaling points

REAL.01 Enter the actual or real value.

000.000 Use the front panel push buttons to enter the actual or real value.

DISP.01 Enter the display or desired value

000.000 Use the front panel push buttons to enter the display or desired value.

Back to the start of the Lineariser sub-menu.

4.6.3.1 Calibration using Direct mV Signal Injection

SIGNAL

This allows the user to calibrate the IQ201 using direct volts from the system. Before the IQ201 can calculate the display value accurately it must know the the volts and display values of 2 known signals. The calibration sequence will prompt the user to apply a signal and enter the corresponding value.

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 signals should be as different from each other as possible to allow the IQ201 to try and obtain the greatest resolution.

mV LOW This allows the user to enter and apply the low signal to the instrument.

000.000 — Use the front panel push buttons to enter the display value that corresponds to the low calibration signal.

APPLY — Apply the low calibration signal to the instrument and then press enter.

WAIT 8 — The IQ201 will start to average and calculate the volts value that corresponds to the low calibration signal.

DONE — Done! The low calibration signal can now be removed. The low display value and its corresponding volts value will be saved.

mV.HIGH — This allows the user to enter and apply the high signal to the instrument.

020.000 — Use the front panel push buttons to enter the display value that corresponds to the high calibration signal.

APPLY — Apply the high calibration signal to the instrument and then press enter.

WAIT 8 — The IQ201 will start to average and calculate the volts value that corresponds to the high calibration signal.

DONE — Done! The high calibration signal can now be removed. The high display value and its corresponding volts value will be saved.

Back to the start of the calibration using direct mV signal injection.

4.6.4 Frequency Input Configuration menu

FREQ

This menu option allows the user to set the Frequency input settings.

DEC PT

Select the display decimal point.

XXX.XXX

Use the up arrow to select the decimal point.

The IQ201 caters for a wide range of applications. The display value can be adapted to these applications using the factor and scale variables. **Display Value = Input x Factor x Scale.**

FACTOR

Enter the display factor

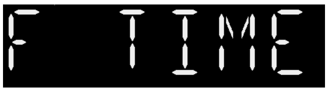
001.000

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

SCALE

Select the display Scale

000.001	The Display value will be multiplied by 0.001
000.010	The Display value will be multiplied by 0.01
000.100	The Display value will be multiplied by 0.1
001.000	The Display value will be multiplied by 1
010.000	The Display value will be multiplied by 10
100.000	The Display value will be multiplied by 100



Select the filter gate time. The frequency will be measured over this interval.

0.5 Seconds gate time

1 Second gate time

5 Seconds gate time

Back to the start of the Frequency setup menu.

4.6.5 Counter Input Configuration menu

COUNTS

This menu option allows the user to set the counter input settings.

MODE — Select the mode of the Counter input.

- DOWN — Counter counts down
- UP — Counter counts up

DEC PT — Select the display decimal point.

- X X X.X X X — Use the up arrow to select the decimal point.

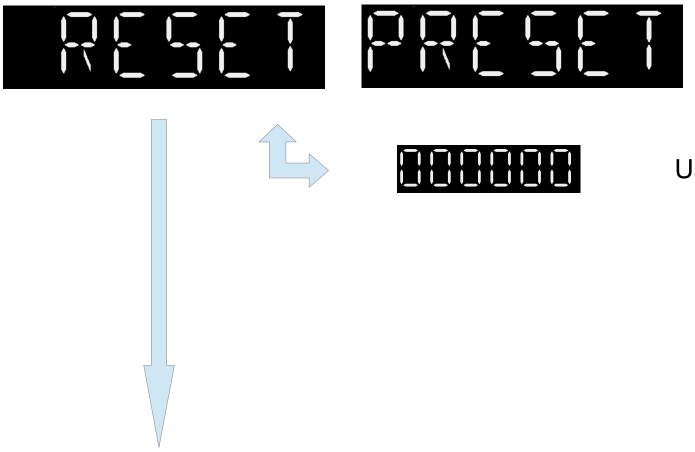
The IQ201 caters for a wide range of applications. The display value can be adapted to these applications using the factor and scale variables. **Display Value = Input x Factor x Scale.**

FACTOR — Enter the display factor

- 00 1.000 — Use the front panel push buttons to enter the factor value.

SCALE — Select the display Scale

- 000.00 1 — The Display value will be multiplied by 0.001
- 000.0 10 — The Display value will be multiplied by 0.01
- 000. 100 — The Display value will be multiplied by 0.1
- 00 1.000 — The Display value will be multiplied by 1
- 0 10.000 — The Display value will be multiplied by 10
- 100.000 — The Display value will be multiplied by 100



Enter the reset / preset value of the Counter.

Use the front panel push buttons to enter the reset preset value.

Back to the start of the Counter setup menu.

4.6.6 Thermocouple Input Configuration menu

TC

This menu option allows the user to set the thermocouple input settings.

TYPE — Select the Thermocouple type

TC B · TC C · TC D · TC E · TC J · TC K · TC L · TC N · TC R · TC S · TC T

CJC — Select the method of the thermocouple cold junction compensation

- INT — Internal temperature sensor (default)
- MANUAL — User manual input

CJC.VAL — Cold junction compensation temperature value. This menu item will show the internal temperature sensor value if the CJC menu option is set to "INT" or it will allow the user to enter a temperature value if the CJC menu option is set to "MANUAL".

DEC PT — Select the display decimal point. Only a decimal point of 1 decimal place or no decimal place can be selected.

- XXXXX.X — Use the up arrow to select the decimal point.

UNIT — Select the temperature unit

- °C — Degrees Celcius
- °F — Degrees Fahrenheit
- ABS — Absolute (Kevin)

Back to the start of the Thermocouple setup menu.

4.6.7 RTD Input Configuration menu

This menu option allows the user to set the RTD input settings.

Select the RTD type

Pt50

Pt100

Ni100

Ni120

Select the display decimal point. Only a decimal point of 1 decimal place or no decimal place can be selected.

Use the up arrow to select the decimal point.

Select the temperature unit

Degrees Celcius

Degrees Fahrenheit

Absolute (Kevin)

Back to the start of the RTD setup menu.

4.6.8 Ohms Input Configuration menu

This menu option allows the user to set the ohm measurement input settings.

Select the range of the Ohm input signal / Sensor

0-400 Ohms

User ohm input range. Calibrated using the direct signal injection menu option.

Select the display decimal point.

Use the up arrow to select the decimal point.

The IQ201 can be configured by using data either from the Ohm sensor datasheet or by using direct ohm signal injection (“OHM.CAL” selected).

Enter the display value of the system that corresponds to the low value of the “RANGE” selection. E.G. if 400 Ohm is selected for “RANGE” then enter a value that corresponds to 0 Ohms. If “OHM.CAL” has been selected for “RANGE” then enter the display value of the system that corresponds to the “LOW.OHM” value.

Use the front panel push buttons to enter the low display value.

Enter the display value of the system that corresponds to the high value of the “RANGE” selection. E.G. if 400 Ohm is selected for “RANGE” then enter a value that corresponds to 400 Ohms. If “OHM.CAL” has been selected for “RANGE” then enter the display value of the system that corresponds to the “HIGH mV” value.

Use the front panel push buttons to enter the high display value.

The following 3 menu items are only shown if “OHM. CAL” has been selected for the “RANGE” setting.

Enter the value in ohms that corresponds to the low display value (“DISP L”).

Use the front panel push buttons to enter the low volts value.

HIGH Ω

Enter the value in ohms that corresponds to the high display value (“DISP H”).

020.000

Use the front panel push buttons to enter the high volts value.

SIGNAL

Calibration using direct ohms signal injection menu. See section 4.6.8.1

ROUND

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.

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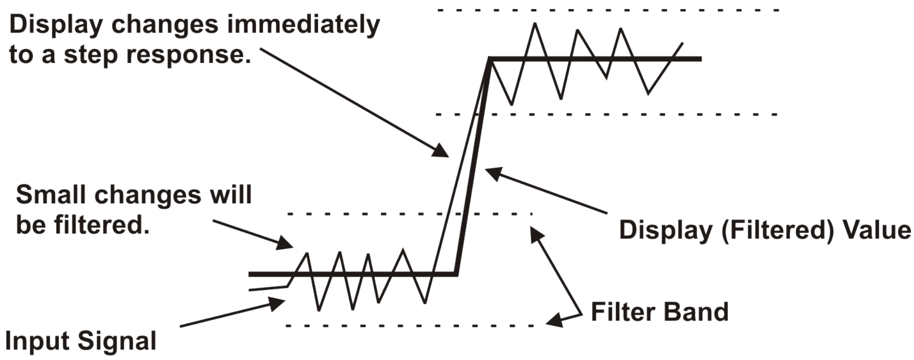
The IQ201 instrument contains an advanced digital filter algorithm. The filter works by filtering small changes between measurements but will react instantaneously to a large step response. There are 2 settings that are used to setup the digital filter, namely the filter band and the filter time. The 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.



F BAND

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

0 100

Use the front panel push buttons to enter the filter band.

F TIME

Select the filter time. See the paragraph above for an explanation of the filter time.

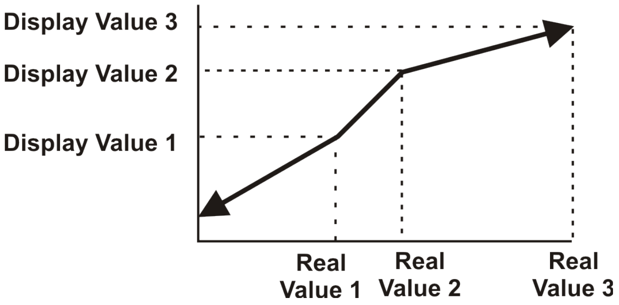
1 S	1 Second
3 S	3 Seconds
5 S	5 Seconds
10 S	10 Seconds

LINEAR

Lineariser 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.

ENABLE — Select to enable the lineariser feature.

ON — The lineariser feature is turned on.

OFF — The lineariser feature is turned off.

POINTS — Select the number of lineariser scaling points.

03 — Use the up arrow to select the number of lineariser scaling points

REAL.01 — Enter the actual or real value.

000.000 — Use the front panel push buttons to enter the actual or real value.

DISP.01 — Enter the display or desired value

000.000 — Use the front panel push buttons to enter the display or desired value.

Back to the start of the Lineariser sub-menu.

4.6.8.1 Calibration using Direct ohms Signal Injection

SIGNAL

This allows the user to calibrate the IQ201 using direct volts from the system. Before the IQ201 can calculate the display value accurately it must know the the volts and display values of 2 known signals. The calibration sequence will prompt the user to apply a signal and enter the corresponding value.

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 signals should be as different from each other as possible to allow the IQ201 to try and obtain the greatest resolution.

LOW Ω — This allows the user to enter and apply the low signal to the instrument.

Use the front panel push buttons to enter the display value that corresponds to the low calibration signal.

Apply the low calibration signal to the instrument and then press enter.

The IQ201 will start to average and calculate the volts value that corresponds to the low calibration signal.

Done! The low calibration signal can now be removed. The low display value and its corresponding volts value will be saved.

This allows the user to enter and apply the high signal to the instrument.

Use the front panel push buttons to enter the display value that corresponds to the high calibration signal.

Apply the high calibration signal to the instrument and then press enter.

The IQ201 will start to average and calculate the volts value that corresponds to the high calibration signal.

Done! The high calibration signal can now be removed. The high display value and its corresponding volts value will be saved.

Back to the start of the calibration using direct ohms signal injection.

4.6.9 Potentiometer Input Configuration menu

This menu option allows the user to set the Potentiometer input settings.

Select the display decimal point.

Use the up arrow to select the decimal point.

Enter the value in display units of the display value of the system that corresponds to the low calibration point.

Use the front panel push buttons to enter the low display value.

Enter the value in display units of the display value of the system that corresponds to the high calibration point.

Use the front panel push buttons to enter the high display value.

This allows the user to enter and apply the low point of the potentiometer.

Apply the low calibration signal to the instrument and then press enter.

The IQ201 will start to average and calculate the value that corresponds to the low calibration signal.

Done! The low calibration signal can now be removed. The low calibration value will be saved.

CAL.HGH

This allows the user to enter and apply the high point of the potentiometer.

YES **NO**

APPLY

Apply the high calibration signal to the instrument and then press enter.

WAIT 8

The IQ201 will start to average and calculate the value that corresponds to the high calibration signal.

DONE

Done! The low calibration signal can now be removed. The high calibration value will be saved.

ROUND

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.

1

2

5

10

20

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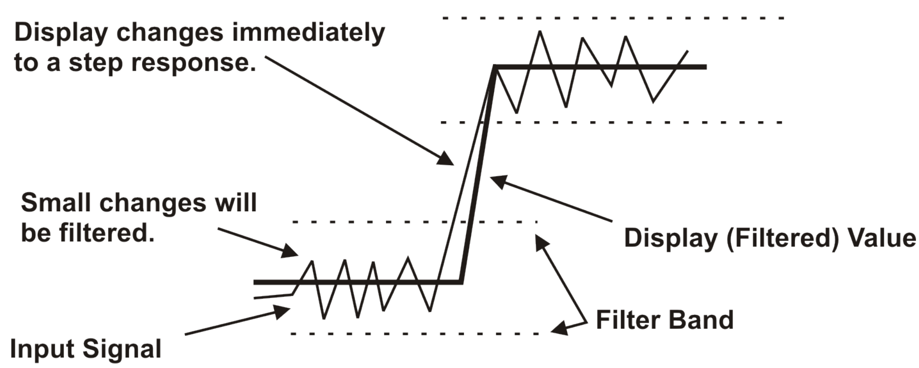
100

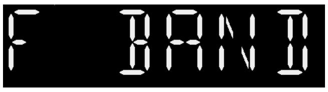
200

The IQ201 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.

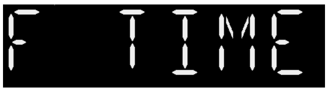
The diagram below illustrates the use of the filter time and the filter band.





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

Use the front panel push buttons to enter the filter band.



Select the filter time. See the paragraph above for an explanation of the filter time.

1 Second

3 Seconds

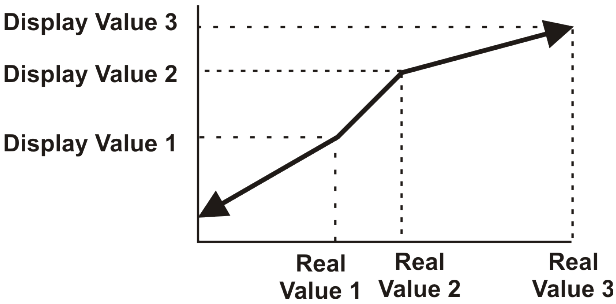
5 Seconds

10 Seconds

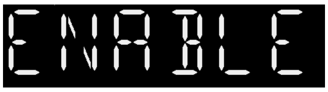
Lineariser Sub-Menu

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.

The lineariser feature is turned on.

The lineariser feature is turned off.

Select the number of lineariser scaling points.

Use the up arrow to select the number of lineariser scaling points

Enter the actual or real value.

Use the front panel push buttons to enter the actual or real value.

Enter the display or desired value

Use the front panel push buttons to enter the display or desired value.

Back to the start of the Lineariser sub-menu.

4.6.10 Event Timer Configuration menu EVENT

This menu option allows the user to set the Event Timer settings.

MODE — Select the mode of the Event Timer.

- DOWN — Event Timer counts down
- UP — Event Timer counts up

E.TIME — Select the Event Timer time format

- SSSS.SS — Seconds only (0.01 second resolution)
- SSSSS.S — Seconds only (0.1 second resolution)
- SSSSSS — Seconds only (1 second resolution)
- HH.MM.SS — Hours, Minutes and Seconds only (1 second resolution)
- HHHH.MM — Hours and Minutes (1 minute resolution)

RESET PRESET — Enter the reset / preset time of the Event Timer.

- 00.00.00 — Use the front panel push buttons to enter the reset / preset time.

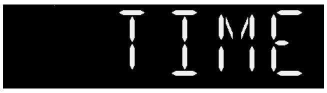
Back to the start of the Event Timer setup menu.

4.6.11 Real Time Clock setup menu. (RTC option required)

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.

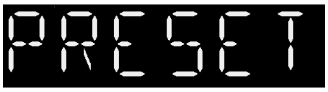
Set the RTC Date.

Use the front panel push buttons to set the date.



Set the RTC Time.

Use the front panel push buttons to set the time.



Enter the preset time of the RTC when the “CLK.SET” digital input has been activated.

Use the front panel push buttons to enter the preset time.

Back to the start of the Real Time Clock setup menu.

4.6.12 Manual analog output station setup (Analog output option required)

This menu option allows the user to set the decimal point of the value used for the analog out value. This menu option is only displayed if the analog output option has been ordered

Select the display decimal point.

Use the up arrow to select the decimal point.

4.7 Alarm Configuration Menu `ALM.CFG`

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

`ALARM1` `ALARM2` `ALARM3` `ALARM4`

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

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

`INPUT`	Input selection.
`MIN`	Minimum value recorded.
`MAX`	Maximum value recorded.

`MODE` Select the alarm mode.

`OFF`	Alarm is disabled and the set point value is ignored.
`LOW`	Low acting alarm. A low alarm is activated when the measured value is below the alarm setpoint.
`HIGH`	High acting alarm. A high alarm is activated when the measured value is higher then the alarm setpoint.
`DEV`	Deviation Alarm. A deviation alarm is activated when the measured value falls outside the deviation band.

`DEV.LOW` 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.

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

DEV.HGH

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.

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

LOGIC

Select the alarm logic.

NORMAL Alarm logic is normal.

INVERT Alarm logic is inverted.

HYST

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.

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

DEL. ON

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

0000 Use the front panel push buttons to enter the alarm on delay.

DEL.OFF

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

0000 Use the front panel push buttons to enter the alarm off delay.

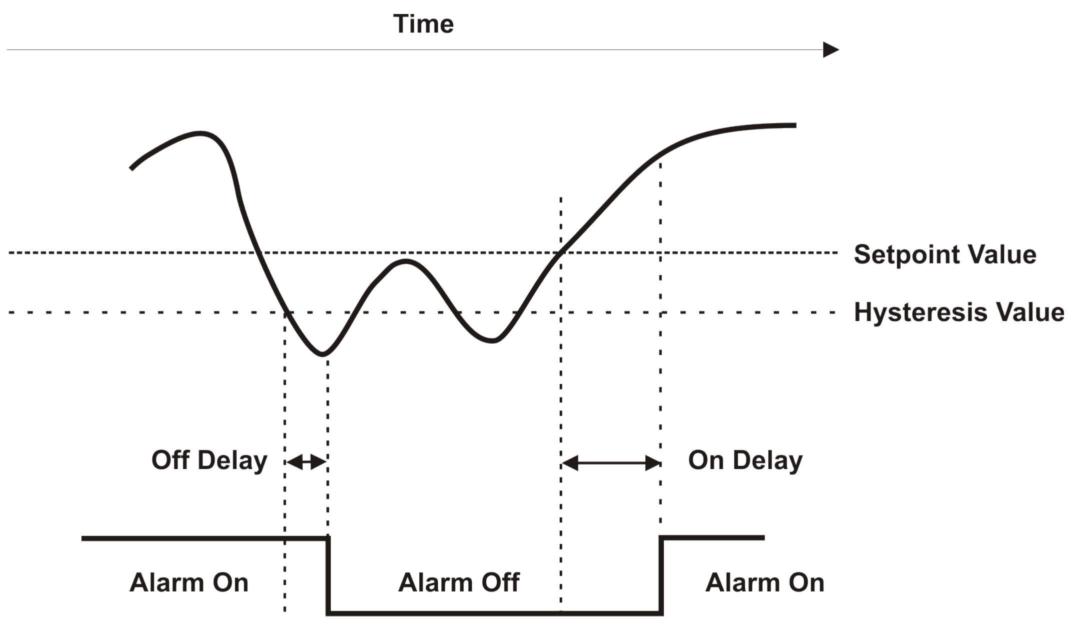
LATCH

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.

ON Alarm latch function is turned on.

OFF 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.

4.8 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.

Input selection.

Minimum value recorded

Maximum value recorded

TYPE

Select the analog out type.

OFF	The Analog output is disabled.
0-20mA	The analog output will be set to 0 to 20mA
4-20mA	The analog output will be set to 4 to 20mA
0- 10V	The analog output will be set to 0 to 10V

AN. LOW

Enter the analog output low value.

000.000	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.

AN.HIGH

Enter the analog output high value.

020.000	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.

AN. ERR

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

OFF	Analog error output is disabled.
AN. LOW	The analog output will go to the analog low value when an error condition occurs.
AN.HIGH	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.

4.9 RS232/RS485 Configuration Menu

RS232 RS485

This menu configures the RS232 and RS485 serial port parameters. The RS232 communication port is standard on the IQ201 but the RS485 menu will only be shown if the RS485 option has been ordered.

The IQ201 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 IQ201 MODBUS registers.

PRTCOL — Select the communication protocol.

- **ASC.OUT** — 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
- **ASC. IN** — ASCII in protocol. The IQ201 can act as a slave indicator to another IQ201 instrument. One IQ201 instrument must be setup for continuous ASCII Out and the other IQ201 must be setup for ASCII IN.
- **MB RTU** — Modbus RTU protocol. See section for more details.
- **MB ASC** — Modbus ASCII protocol. See section for more details.

ADDRES — 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.

- **001** — 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.

BAUD — Select the communication baud rate.

- **1200** — 1200 Baud.
- **2400** — 2400 Baud.

4800 — 4800 Baud.

9600 — 9600 Baud.

19200 — 19200 Baud.

38400 — 38.4k Baud.

57600 — 57.6k Baud.

115200 — 115.2k Baud.

DATA — Select the communication data bits

7 BIT — 7 data bits.

8 BIT — 8 data bits.

PARITY — Select the communication parity.

NONE — No parity.

EVEN — Even parity.

ODD — Odd parity.

STOP — Select the communication stop bits.

1 BIT — 1 Bit.

2 BIT — 2 Bits.

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

INPUT — Input Selection.

MIN Minimum value recorded

MAX Maximum value recorded

PRINT

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

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

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

RTC

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.

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

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

TIM.OUT

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.

001 Enter the communication timeout period in seconds.

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

4.9.1 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
<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

4.9.2 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

4.9.3 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

4.9.4 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
4	32 bit signed	R	ADC Zero mA calibration constant High word
5	32 bit signed	R	ADC Zero mA calibration constant Low word
6	32 bit signed	R	ADC Span mA calibration constant High word
7	32 bit signed	R	ADC Span mA calibration constant Low word
8	32 bit signed	R	ADC Zero V calibration constant High word
9	32 bit signed	R	ADC Zero V calibration constant Low word
10	32 bit signed	R	ADC Span V calibration constant High word
11	32 bit signed	R	ADC Span V calibration constant Low word
22	32 bit signed	R	ADC Zero Potentiometer calibration constant High word
23	32 bit signed	R	ADC Zero Potentiometer calibration constant Low word
24	32 bit signed	R	ADC Span Potentiometer calibration constant High word
25	32 bit signed	R	ADC Span Potentiometer calibration constant Low word
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: Input Selection 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: Input Selection 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: Input Selection 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: Input Selection 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: Input Selection 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: Input Selection 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: Input Selection 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: Zero 5: Edit SP1 6: Edit SP2 7: Edit SP3 8: Edit SP4 9: Display Hold 10: Counter Reset/Preset 11: Clock reset 12: User value edit
181	8 bit unsigned	R/W	F2 Key Assignment 0: None 1: Min/Max Toggle 2: Min/Max Value Reset 3: Latch Reset 4: Zero 5: Edit SP1 6: Edit SP2 7: Edit SP3 8: Edit SP4 9: Display Hold 10: Counter Reset/Preset 11: Clock reset 12: User value edit
182	8 bit unsigned	R/W	F3 Key Assignment 0: None 1: Min/Max Toggle 2: Min/Max Value Reset 3: Latch Reset 4: Zero 5: Edit SP1 6: Edit SP2 7: Edit SP3 8: Edit SP4 9: Display Hold 10: Counter Reset/Preset 11: Clock reset 12: User value edit
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: Zero 5: Display Hold 6: Print 7: Counter Reset/Preset 8: Event timer start 9: Event timer stop 10: Event timer start/stop 11: Event timer reset 12: Clock reset
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: Zero 5: Display Hold 6: Print 7: Counter Reset/Preset 8: Event timer start 9: Event timer stop 10: Event timer start/stop 11: Event timer reset 12: Clock reset
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	32 bit signed	R/W	Lineariser Real Point 1 High Word
303	32 bit signed	R/W	Lineariser Real Point 1 Low Word
304	32 bit signed	R/W	Lineariser Display Point 1 High Word
305	32 bit signed	R/W	Lineariser Display Point 1 Low Word
306	32 bit signed	R/W	Lineariser Real Point 2 High Word
307	32 bit signed	R/W	Lineariser Real Point 2 Low Word
308	32 bit signed	R/W	Lineariser Display Point 2 High Word
309	32 bit signed	R/W	Lineariser Display Point 2 Low Word
310	32 bit signed	R/W	Lineariser Real Point 3 High Word
311	32 bit signed	R/W	Lineariser Real Point 3 Low Word
312	32 bit signed	R/W	Lineariser Display Point 3 High Word
313	32 bit signed	R/W	Lineariser Display Point 3 Low Word
314	32 bit signed	R/W	Lineariser Real Point 4 High Word
315	32 bit signed	R/W	Lineariser Real Point 4 Low Word
316	32 bit signed	R/W	Lineariser Display Point 4 High Word
317	32 bit signed	R/W	Lineariser Display Point 4 Low Word
318	32 bit signed	R/W	Lineariser Real Point 5 High Word
319	32 bit signed	R/W	Lineariser Real Point 5 Low Word
320	32 bit signed	R/W	Lineariser Display Point 5 High Word

321	32 bit signed	R/W	Lineariser Display Point 5 Low Word
322	32 bit signed	R/W	Lineariser Real Point 6 High Word
323	32 bit signed	R/W	Lineariser Real Point 6 Low Word
324	32 bit signed	R/W	Lineariser Display Point 6 High Word
325	32 bit signed	R/W	Lineariser Display Point 6 Low Word
326	32 bit signed	R/W	Lineariser Real Point 7 High Word
327	32 bit signed	R/W	Lineariser Real Point 7 Low Word
328	32 bit signed	R/W	Lineariser Display Point 7 High Word
329	32 bit signed	R/W	Lineariser Display Point 7 Low Word
330	32 bit signed	R/W	Lineariser Real Point 8 High Word
331	32 bit signed	R/W	Lineariser Real Point 8 Low Word
332	32 bit signed	R/W	Lineariser Display Point 8 High Word
333	32 bit signed	R/W	Lineariser Display Point 8 Low Word
334	32 bit signed	R/W	Lineariser Real Point 9 High Word
335	32 bit signed	R/W	Lineariser Real Point 9 Low Word
336	32 bit signed	R/W	Lineariser Display Point 9 High Word
337	32 bit signed	R/W	Lineariser Display Point 9 Low Word
338	32 bit signed	R/W	Lineariser Real Point 10 High Word
339	32 bit signed	R/W	Lineariser Real Point 10 Low Word
340	32 bit signed	R/W	Lineariser Display Point 10 High Word
341	32 bit signed	R/W	Lineariser Display Point 10 Low Word
342	32 bit signed	R/W	Lineariser Real Point 11 High Word
343	32 bit signed	R/W	Lineariser Real Point 11 Low Word
344	32 bit signed	R/W	Lineariser Display Point 11 High Word
345	32 bit signed	R/W	Lineariser Display Point 11 Low Word
346	32 bit signed	R/W	Lineariser Real Point 12 High Word
347	32 bit signed	R/W	Lineariser Real Point 12 Low Word
348	32 bit signed	R/W	Lineariser Display Point 12 High Word
349	32 bit signed	R/W	Lineariser Display Point 12 Low Word
350	32 bit signed	R/W	Lineariser Real Point 13 High Word
351	32 bit signed	R/W	Lineariser Real Point 13 Low Word
352	32 bit signed	R/W	Lineariser Display Point 13 High Word
353	32 bit signed	R/W	Lineariser Display Point 13 Low Word
354	32 bit signed	R/W	Lineariser Real Point 14 High Word
355	32 bit signed	R/W	Lineariser Real Point 14 Low Word
356	32 bit signed	R/W	Lineariser Display Point 14 High Word
357	32 bit signed	R/W	Lineariser Display Point 14 Low Word
358	32 bit signed	R/W	Lineariser Real Point 15 High Word
359	32 bit signed	R/W	Lineariser Real Point 15 Low Word
360	32 bit signed	R/W	Lineariser Display Point 15 High Word
361	32 bit signed	R/W	Lineariser Display Point 15 Low Word

362	32 bit signed	R/W	Lineariser Real Point 16 High Word
363	32 bit signed	R/W	Lineariser Real Point 16 Low Word
364	32 bit signed	R/W	Lineariser Display Point 16 High Word
365	32 bit signed	R/W	Lineariser Display Point 16 Low Word
400	8 bit unsigned	R/W	Input Type
410	8 bit unsigned	R/W	mA Input Range
411	8 bit unsigned	R/W	mA Decimal Point
412	8 bit unsigned	R/W	mA Display Round
413	8 bit unsigned	R/W	mA Filter Time
414	8 bit unsigned	R/W	mA Filter Band
415	32 bit signed	R/W	mA Low Display High Word
416	32 bit signed	R/W	mA Low Display Low Word
417	32 bit signed	R/W	mA High Display High Word
418	32 bit signed	R/W	mA High Display Low Word
419	8 bit unsigned	R/W	mA Lineariser Enable
420	32 bit signed	R	mA Processed Value High Word
421	32 bit signed	R	mA Processed Value Low Word
450	8 bit unsigned	R/W	Volts Input Range
451	8 bit unsigned	R/W	Volts Decimal Point
452	8 bit unsigned	R/W	Volts Display Round
453	8 bit unsigned	R/W	Volts Filter Time
454	8 bit unsigned	R/W	Volts Filter Band
455	32 bit signed	R/W	Volts Low Display High Word
456	32 bit signed	R/W	Volts Low Display Low Word
457	32 bit signed	R/W	Volts High Display High Word
458	32 bit signed	R/W	Volts High Display Low Word
459	8 bit unsigned	R/W	Volts Lineariser Enable
460	32 bit signed	R	Volts Processed Value High Word
461	32 bit signed	R	Volts Processed Value Low Word
550	8 bit unsigned	R/W	Frequency mode
551	8 bit unsigned	R/W	Frequency Decimal Point
552	32 bit signed	R/W	Frequency Factor High Word
553	32 bit signed	R/W	Frequency Factor Low Word
554	8 bit unsigned	R/W	Frequency Scale
555	8 bit unsigned	R/W	Frequency Gate Time
556	32 bit signed	R	Frequency Processed Value High Word
557	32 bit signed	R	Frequency Processed Value Low Word

600	8 bit unsigned	R/W	Counter mode
601	8 bit unsigned	R/W	Counter Decimal Point
602	32 bit signed	R/W	Counter Factor High Word
603	32 bit signed	R/W	Counter Factor Low Word
604	8 bit unsigned	R/W	Counter Scale
605	32 bit signed	R/W	Counter reset/preset High Word
606	32 bit signed	R/W	Counter reset/preset Low Word
607	32 bit signed	R	Counter Processed Value High Word
608	32 bit signed	R	Counter Processed Value Low Word
650	8 bit unsigned	R/W	TC Type
651	8 bit unsigned	R/W	TC CJC selection
652	32 bit signed	R/W	TC CJC User Value High Word
653	32 bit signed	R/W	TC CJC User Value Low Word
654	8 bit unsigned	R/W	TC Decimal Point
655	8 bit unsigned	R/W	TC Temperature unit
656	32 bit signed	R	TC Processed Value High Word
657	32 bit signed	R	TC Processed Value Low Word
700	8 bit unsigned	R/W	RTD Type
701	8 bit unsigned	R/W	RTD Decimal Point
702	8 bit unsigned	R/W	RTD Temperature unit
703	32 bit signed	R	RTD Processed Value High Word
704	32 bit signed	R	RTD Processed Value Low Word
750	8 bit unsigned	R/W	Ohm Range
751	8 bit unsigned	R/W	Ohm Decimal Point
752	8 bit unsigned	R/W	Ohm Display Round
753	8 bit unsigned	R/W	Ohm Filter Time
754	8 bit unsigned	R/W	Ohm Filter Band
755	32 bit signed	R/W	Ohm Low Display High Word
756	32 bit signed	R/W	Ohm Low Display Low Word
757	32 bit signed	R/W	Ohm High Display High Word
758	32 bit signed	R/W	Ohm High Display Low Word
759	8 bit unsigned	R/W	Ohm Lineariser Enable
760	32 bit signed	R	Ohm Processed Value High Word
761	32 bit signed	R	Omh Processed Value Low Word
800	8 bit unsigned	R/W	Potentiometer Decimal Point
801	8 bit unsigned	R/W	Potentiometer Display Round

802	8 bit unsigned	R/W	Potentiometer Filter Time
803	8 bit unsigned	R/W	Potentiometer Filter Band
804	32 bit signed	R/W	Potentiometer Low Display High Word
805	32 bit signed	R/W	Potentiometer Low Display Low Word
806	32 bit signed	R/W	Potentiometer High Display High Word
807	32 bit signed	R/W	Potentiometer High Display Low Word
808	8 bit unsigned	R/W	Potentiometer Lineariser Enable
809	32 bit signed	R	Potentiometer Processed Value High Word
810	32 bit signed	R	Potentiometer Processed Value Low Word
850	8 bit unsigned	R/W	Event Timer mode
851	8 bit unsigned	R/W	Event Timer Time selection
852	32 bit signed	R/W	Event Timer reset/preset High Word
853	32 bit signed	R/W	Event Timer reset/preset Low Word
854	32 bit signed	R	Event Timer Processed Value High Word
855	32 bit signed	R	Event Timer Processed Value Low Word
900	32 bit signed	R/W	Clock preset value High Word
901	32 bit signed	R/W	Clock preset value Low Word
950	8 bit unsigned	R/W	User Decimal Point
951	32 bit signed	R	User Value Processed Value High Word
952	32 bit signed	R	User Value Processed 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

4.10 Function Key Configuration Menu

F1 KEY F2 KEY F3 KEY

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. Certain options will be only be shown depending on the input type selected.

OFF — The function key is disabled.

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

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

LAT.RST — 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.

ZERO — This function will zero the display value.

SP1 — 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.

SP2 — 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.

SP3 — 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.

SP4 — 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.

HOLD — 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.

CNT.RST — Counter reset/preset. The function key can be used to reset/preset the counter to the counter reset/preset value.

CLK.SET — Clock reset. The function key can be used to reset the time to the time reset value. This is useful to synchronize the real time clock to an external source.

USER — The function key will allow the user to edit the user display value.

4.11 Digital Input Configuration Menu INPUT 1 INPUT 2

This menu configures the two digital inputs. The digital inputs can be configured for specific functions as listed below. Certain options will be only be shown depending on the input type selected.

OFF	The digital input is disabled.
MIN.MAX	The digital input will toggle the display in the following order. The minimum recorded value, the maximum recorded value and then the current measured value. The display will flash either "MIN" or "MAX" to indicate that the displayed value is either the minimum or maximum recorded value.
MM. RST	The digital input will reset the minimum and maximum recorded values to the current measured value.
LAT.RST	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.
ZERO	This function will zero the display value.
HOLD	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.
PRINT	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.
CNT.RST	Counter reset/preset. The digital input can be used to reset/preset the counter to the counter reset/preset value.
EV.STRT	Event timer start. The digital input can be used to start the event timer.
EV.STOP	Event timer stop. The digital input can be used to stop the event timer.
EV.ST.SP	Event timer start/stop. The same digital input can be used to start as well as to stop the event timer.
EV. RST	Event timer reset. The digital input can be used to reset the event timer to the event timer reset value.
CLK.SET	Clock reset. The digital input can be used to reset the time to the time reset value. This is useful to synchronize the real time clock to an external source.

4.12 Miscellaneous Configuration Menu

MISC

This menu configures the miscellaneous functions of the instrument.

LOCK

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.

NONE

FULL

ALM.VAL ↔ 0000

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

PASS

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.

RTC

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

DATE ↔ 12.04.18

Use the front panel push buttons to set the date.

TIME ↔ 14.13.16

Use the front panel push buttons to set the time.

SER.NUM

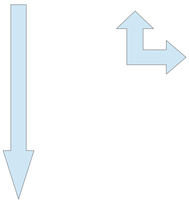
Select this menu option to display the instruments serial number.

DSP.TST

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.

8.8.8.8.8.8.

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

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.

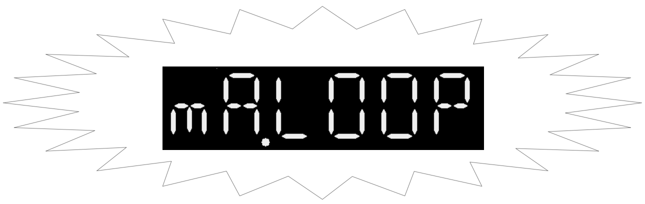
Display Under Range:

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

Display Over Range:

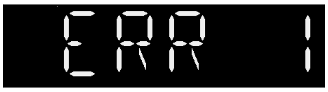
If the display value exceeds the positive display threshold of 999999 then the display over range message is shown.

Analog Out mA Open Loop Error:

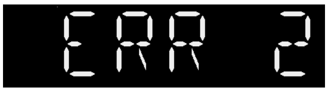


The display will flash the error message every 5 seconds to indicate that a mA loop error has occurred. This message will only be shown if the analog out option has been ordered and the analog out has been set for any of the mA ranges.

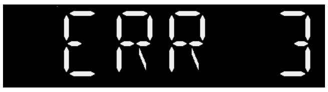
Other Error Messages:



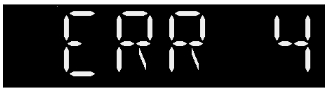
Unit settings CRC error. Load default settings to restore to factory defaults. If the error message still persists then it could possibly be a non-volatile memory failure in which case the instrument will then have to be returned to the factory.



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.



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.

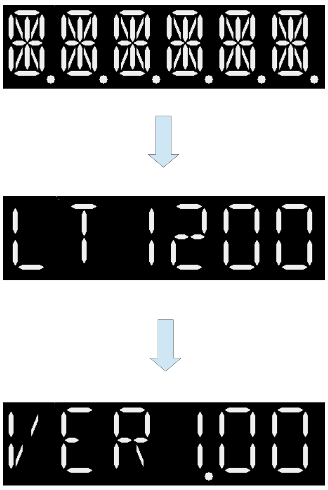


Analog out calibration CRC error. Please recalibrate the analog out option. If the error message still persists then it could possibly be a non-volatile memory failure in which case the instrument will then have to be returned to the factory.

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.

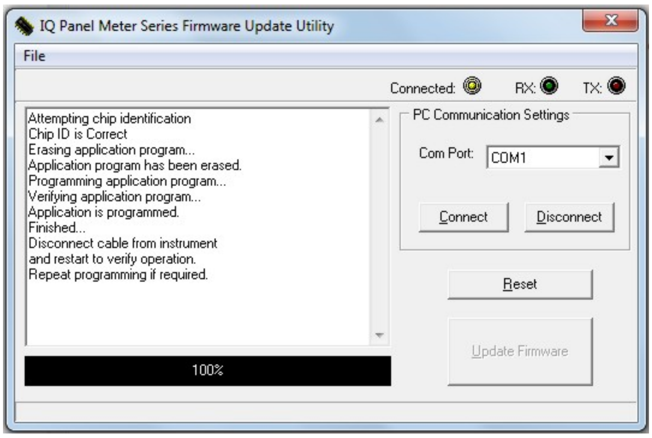


7 Firmware Upgrading

The IQ201 process 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	IQ201
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:
(IQ201 Process indicator with 2 mechanical relays, analog output and an additional RS485 interface)

IQ201-711-730-740

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)
740 - Second communication RS485 interface
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
767 – Indicator label kit
768 – Weighing Indicator label kit

11 Notice

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12 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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