ISOCON-6

24V AC or DC POWERED ISOLATING SIGNAL CONVERTER

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IMO

ISOCON-6 USERS GUIDE

CONTENTS

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24V AC or DC POWERED ISOLATING SIGNAL CONVERTER

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ISOCON-6 USERS GUIDE

1. INTRODUCTION:

1.1 Hardware Features:

The ISOCON-6 is a universal input Isolating Signal Converter. It can accept virtually every type of analogue input signal from millivolts to 40Vdc, mA, thermocouples, RTD's etc. It also produces 3 types of analogue output; voltage, mA source, or mA sink.

The unit can be powered by any DC voltage between 12 and 36Vdc or 12 and 32Vac. For mains AC voltage the ISOCON-3 is available which can be powered from any supply from 90Vac to 264Vac at 50 or 60Hz.

The instrument is packaged in a very compact 12.5mm wide enclosure which can be mounted on standard TS35 DIN-rail.
The unit can also be equipped with 1 digital output which can be either a relay or an open collector output, or a second analogue output (see DUALCON-6). Note, units with above options are housed in a 17.5mm wide box.

1.1.1 Isolation Details

The ISOCON-6 has full 3 port isolation of 1000V between the Input Stage, Output Stage and Power Supply for functional reasons.

2. UNPACKING:

The instrument should be carefully inspected for signs of damage which may have occurred in transit. In the unlikely case that damage has been sustained, DO NOT use the instrument, but please retain all packaging for our inspection and contact your supplier immediately.

The instrument comes with the following items as standard:

1 Isocon-6 Isolating Signal Converter
1 Isocon-6 User Guide

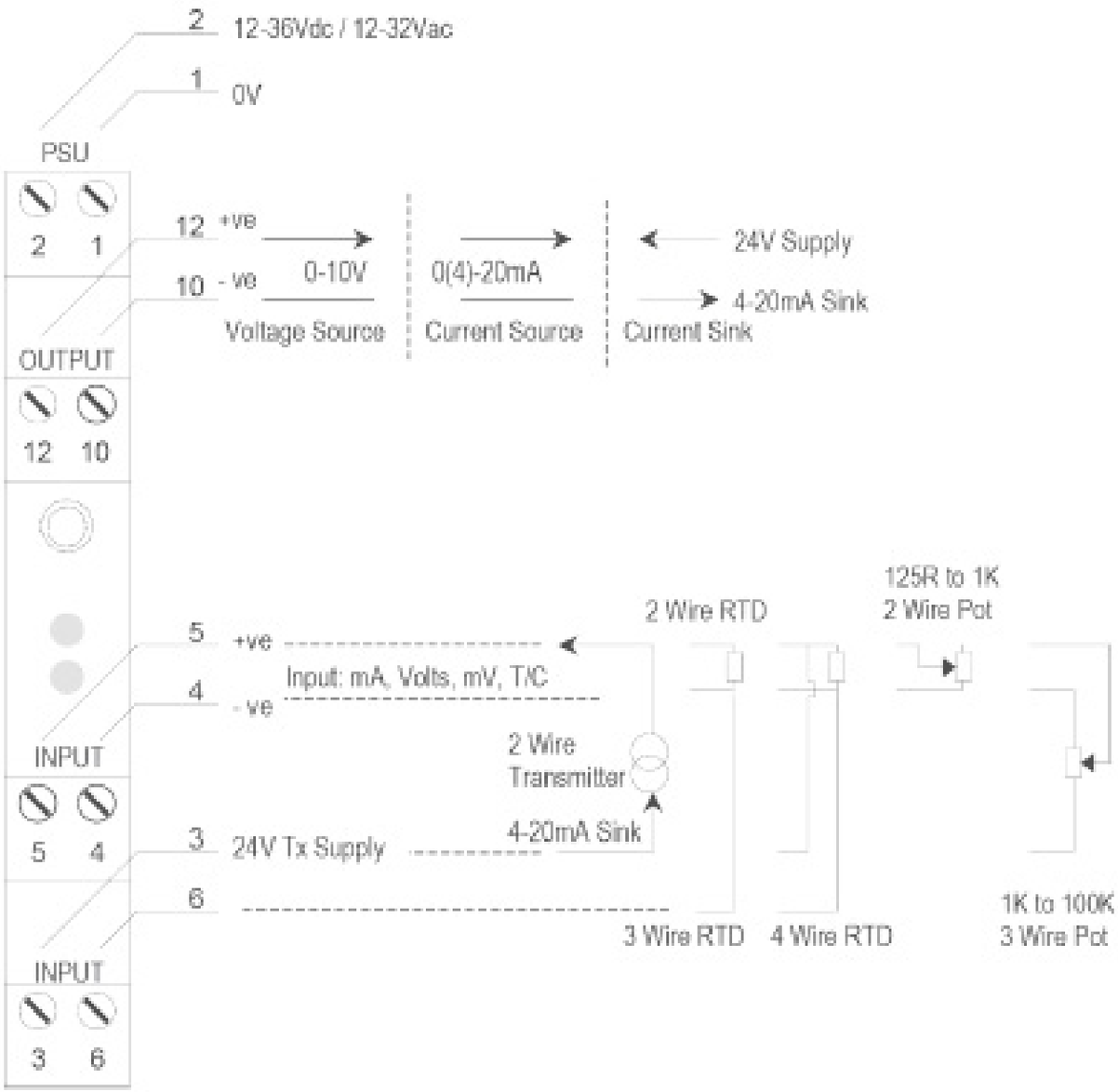
If the instrument has been factory configured the input and output details will be listed on the Serial number label on the side of the unit. If this label is blank then the unit will be set to its default configuration which is 4-20mA input and 4-20mA source output. Please check that the details on the side label are correct, especially the power supply voltage.

If re-configuration is required please refer to Section 4 of this manual.

3.CONNECTIONS:

The ISOCON is housed in a compact DIN rail mounting enclosure, with 8 terminals, arranged in 4 rows of 2 terminals. Two rows are at the top of the front panel and 2 rows are at the bottom. All the sensor input terminals are on the bottom rows and the power supply and analogue outputs are on the top terminals.

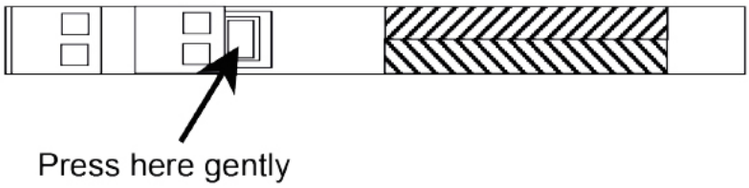
The diagram below shows how to connect all the different input, output and power supply types.



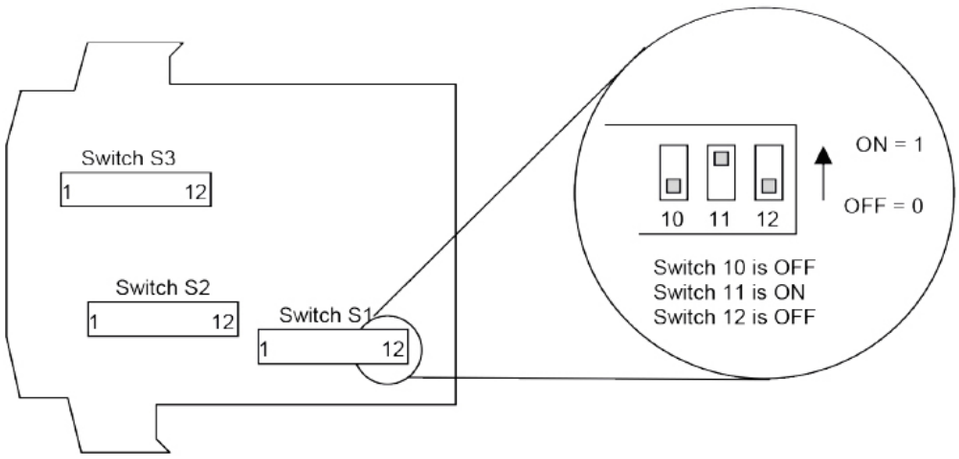
4. CONFIGURING THE ISOCON:

Warning: DO NOT OPEN UNIT OR ADJUST SWITCHES WITH POWER SUPPLY, INPUT OR OUTPUT CONNECTED

The ISOCON is an extremely versatile device which can support many different types of input. The unit is configured by turning the power off, selecting the internal switch settings required and turning the power back on.
To open the Isocon, 2 catches just below the outer terminal blocks must be pushed in gently, one at a time. The front of the case can then be pulled and the unit will come out of the box.



There are 3 switch banks, S1, S2, and S3, located inside the ISOCON as shown below:



Switch S1 and S2 configure the input type and range, and switch S3 configures the output type, range and a few additional functions. The switch settings are explained in the next few pages. The diagrams refer to switch positions 0 and 1, with 0 being OFF and 1 being ON. This is illustrated in the picture above.

4.1.1 Voltage Input:

Select the range from the table below and set Switch S1 to the required values.

Voltage Range	Switch S1											
	1	2	3	4	5	6	7	8	9	10	11	12
0-1V	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**0**
0-2V	0	0	0	1	0	1	0	0	1	1	0	0
0-4V	0	0	1	0	0	1	0	0	1	1	0	0
0-5V	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**0**
0-7.5V	1	0	0	0	0	1	0	0	1	1	0	0
0-8V	0	0	1	1	0	1	0	0	1	1	0	0
0-10V	**0**	**1**	**0**	**1**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**0**
0-15V	1	0	0	1	0	1	0	0	1	1	0	0
0-20V	0	1	1	0	0	1	0	0	1	1	0	0
0-30V	1	0	1	0	0	1	0	0	1	1	0	0
0-40V	0	1	1	1	0	1	0	0	1	1	0	0
1-5V	**0**	**1**	**0**	**0**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**1**
-5 to +5V	1	1	0	0	0	1	0	0	1	1	0	1
-10 to +10V	1	1	0	1	0	1	0	0	1	1	0	0

Then select the required setting from the table below for switch S2

Voltage Range	Switch S2											
	1	2	3	4	5	6	7	8	9	10	11	12
0-30V & 0-40V	0	0	1	1	0	0	1	1	0	0	0	0
All other Ranges Listed Above	0	0	1	0	1	0	1	0	0	0	0	0

Warning: DO NOT OPEN UNIT OR ADJUST SWITCHES WITH POWER SUPPLY, INPUT OR OUTPUT CONNECTED

Please note that PC Software is available to provide information on switch settings for your input and output requirements.

4.1.2 Current Input:

Select the range from the table below and set Switch S1 to the required values.

mA Range	Switch S1											
	1	2	3	4	5	6	7	8	9	10	11	12
0-1mA	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**0**
0-2mA	0	0	0	1	0	0	0	0	1	1	1	0
0-4mA	0	0	1	0	0	0	0	0	1	1	1	0
0-5mA	0	1	0	0	0	0	0	0	1	1	1	0
0-8mA	0	0	1	1	0	0	0	0	1	1	1	0
0-10mA	0	1	0	1	0	0	0	0	1	1	1	0
0-15mA	1	0	0	1	0	0	0	0	1	1	1	0
0-20mA	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**0**
0-30mA	1	0	1	0	0	0	0	0	1	1	1	0
4-20mA	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**1**
4-40mA	0	1	1	1	0	0	0	0	1	1	1	1
4-30mA	1	0	1	0	0	0	0	0	1	1	1	1
-5 to +5mA	1	1	0	0	0	0	0	0	1	1	1	1
-10 to +10mA	1	1	0	1	0	0	0	0	1	1	1	0

Then select the required setting from the table below for switch S2

mA Range	Switch S2											
	1	2	3	4	5	6	7	8	9	10	11	12
Using Internal 24V Tx Supply for 4 to 20mA	1	1	0	1	0	0	1	1	0	0	1	0
Unipolar Ranges (e.g. 0-20mA, 4-20mA)	1	1	0	0	0	0	1	1	0	0	0	0
Bipolar Ranges (e.g. -10 to +10mA)	1	1	0	0	1	0	1	0	0	0	0	0

Warning: DO NOT OPEN UNIT OR ADJUST SWITCHES WITH POWER SUPPLY, INPUT OR OUTPUT CONNECTED

Please note that PC Software is available to provide information on switch settings for your input and output requirements.

4.1.3 Millivolt (mV) Input:

Select the range from the table below and set Switch S1 to the required values.

mV Range	Switch S1											
	1	2	3	4	5	6	7	8	9	10	11	12
0-25mV	0	0	0	0	0	0	0	1	1	1	0	0
0-50mV	0	0	0	1	0	0	0	1	1	1	0	0
0-100mV	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**0**
0-125mV	0	1	0	0	0	0	0	1	1	1	0	0
0-150mV	1	0	0	0	0	0	0	1	1	1	0	0
0-200mV	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**0**
0-250mV	0	1	0	1	0	0	0	1	1	1	0	0
0-300mV	1	0	0	1	0	0	0	1	1	1	0	0
0-500mV	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**0**
0-600mV	1	0	1	0	0	0	0	1	1	1	0	1
0-1000mV	0	1	1	1	0	0	0	1	1	1	0	1
0-1200mV	1	0	1	1	0	0	0	1	1	1	0	1
-125 to +125mV	1	1	0	0	0	0	0	1	1	1	0	1
-125 to +1000mV	1	1	1	1	0	0	0	1	1	1	0	0

Then select the required setting from the table below for switch S2

mV Range	Switch S2											
	1	2	3	4	5	6	7	8	9	10	11	12
All Unipolar Ranges (e.g. 0-500mV)	0	1	0	0	0	0	1	1	0	0	0	0
S2Bipolar Ranges (e.g. -125 to +125mV)	0	1	0	0	1	0	1	0	0	0	0	0

Warning: DO NOT OPEN UNIT OR ADJUST SWITCHES WITH POWER SUPPLY, INPUT OR OUTPUT CONNECTED

Please note that PC Software is available to provide information on switch settings for your input and output requirements.

4.1.4 Potentiometer Input:

Select the range from the table below and set Switch S1 to the required values.

Potentiometer Input	Switch S1											
	1	2	3	4	5	6	7	8	9	10	11	12
2 Wire 0-125R	0	0	0	0	0	0	0	1	1	1	0	1
2 Wire 0-250R	0	0	0	1	0	0	0	1	1	1	0	1
2 Wire 0-500R	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**1**
2 Wire 0-625R	0	1	0	0	0	0	0	1	1	1	0	1
2 Wire 0-750R	1	0	0	0	0	0	0	1	1	1	0	1
2 Wire 0-1K	**0**	**0**	**1**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**1**
3 Wire from0-1K to 0-100K	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**1**	**1**	**0**

Then select the required setting from the table below for switch S2

Potentiometer Input	Switch S2											
	1	2	3	4	5	6	7	8	9	10	11	12
2 Wire Potentiometer	0	1	0	0	1	0	0	1	0	0	0	1
3 Wire Potentiometer	0	0	1	1	0	0	1	1	0	0	1	0

Warning: DO NOT OPEN UNIT OR ADJUST SWITCHES WITH POWER SUPPLY, INPUT OR OUTPUT CONNECTED

Please note that PC Software is available to provide information on switch settings for your input and output requirements.

4.1.5 Thermocouple Input:

Select the range from the table below and set Switch S1 to the required values.

Switch S1 for Thermocouple Input															T/C Type
Temperature Range in °C			Switch												
K J R S N E	B	T	1	2	3	4	5	6	7	8	9	10	11	12	
0 to 100	400 to 500	0 to 50	0	0	0	0		0	0		0	0	0	0	K
0 to 200	400 to 600	0 to 100	0	0	0	1		0	0		0	0	0	1	J
0 to 400	400 to 800	0 to 200	0	0	1	0		0	0		0	0	1	0	R
0 to 800	400 to 1200	0 to 400	0	0	1	1		0	0		0	0	1	1	S
0 to 125	400 to 525	-50 to 50	0	1	0	0		0	0		0	1	0	0	N
0 to 250	400 to 650	-50 to 100	0	1	0	1		0	0		0	1	0	1	E
0 to 500	400 to 900	-50 to 200	0	1	1	0		0	0		0	1	1	0	B
0 to 1000	400 to 1400	-50 to 400	0	1	1	1		0	0		0	1	1	1	T
0 to 150	400 to 550	-100 to 50	1	0	0	0		0	0		0				
0 to 300	400 to 700	-100 to 100	1	0	0	1		0	0		0				
0 to 600	400 to 1000	-100 to 200	1	0	1	0		0	0		0				
0 to 1200*	400 to 1600	-100 to 400	1	0	1	1		0	0		0				
0 to 175	400 to 575	-200 to 50	1	1	0	0		0	0		0				
0 to 350	400 to 750	-200 to 100	1	1	0	1		0	0		0				
0 to 700	400 to 1100	-200 to 200	1	1	1	0		0	0		0				
0 to 1400**	400 t0 1800	-200 to 400	1	1	1	1		0	0		0				

Linearisation ON	0
Linearisation off	1

CJC ON	0
CJC off	1

*n/a for types N and E
**n/a for types K, J, N and E

Then select the required setting from the table below for switch S2

Thermocouple	Switch S2											
All Ranges	1	2	3	4	5	6	7	8	9	10	11	12
	0	1	0	0	1	1	1	0	0	0	0	0

Warning: DO NOT OPEN UNIT OR ADJUST SWITCHES WITH POWER SUPPLY, INPUT OR OUTPUT CONNECTED

Please note that PC Software is available to provide information on switch settings for your input and output requirements.

4.1.6 RTD Input:

Select the range from the table below and set Switch S1 to the required values.

Range in °C	Switch S1											
	1	2	3	4	5	6	7	8	9	10	11	12
0 to 100	0	0	0	0		0	0		1	0	0	
0 to 200	0	0	0	1		0	0		1	0	0	
0 to 400	0	0	1	0		0	0		1	0	0	
0 to 800	0	0	1	1		0	0		1	0	0	
-50 to 50	0	1	0	0		0	0		1	0	0	
-50 to 150	0	1	0	1		0	0		1	0	0	
-50 to 250	0	1	1	0		0	0		1	0	0	
-50 to 350	0	1	1	1		0	0		1	0	0	
-100 to 50	1	0	0	0		0	0		1	0	0	
-100 to 100	1	0	0	1		0	0		1	0	0	
-100 to 200	1	0	1	0		0	0		1	0	0	
-100 to 400	1	0	1	1		0	0		1	0	0	
-200 to 200	1	1	0	0		0	0		1	0	0	
-200 to 400	1	1	0	1		0	0		1	0	0	
-200 to 600	1	1	1	0		0	0		1	0	0	
-200 to 800	1	1	1	1		0	0		1	0	0	

RTD linearisation ON	0
RTD linearisation off	1

RTD 2 or 4 wire	0
RTD 3 wire	1

PT1000	0
PT1000	1

Then select the required setting from the table below for switch S2

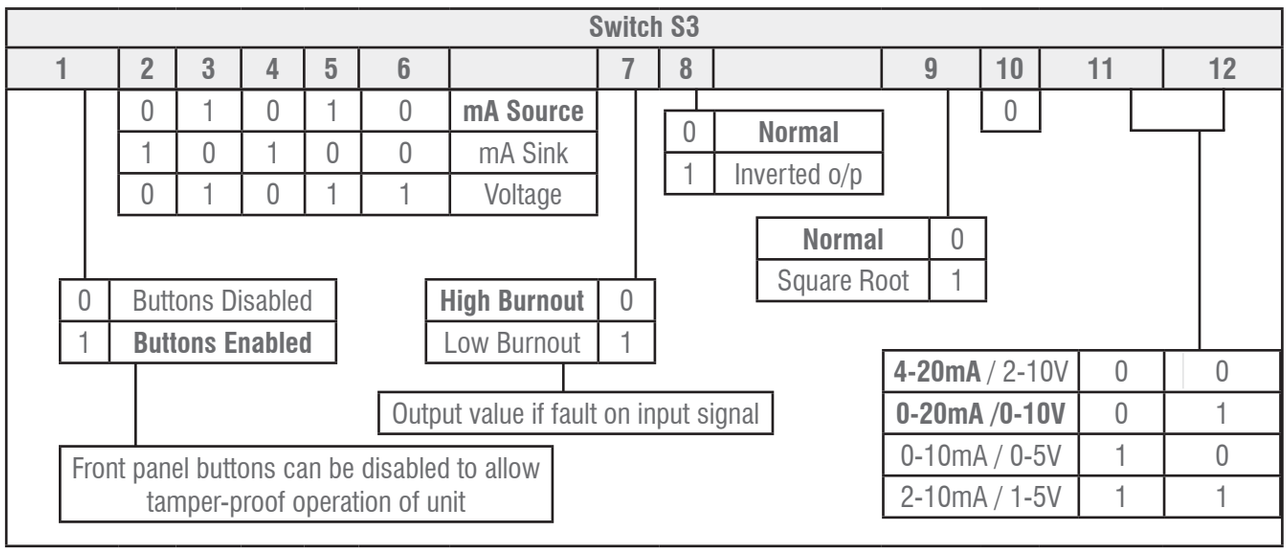
RTD	Switch S2											
	1	2	3	4	5	6	7	8	9	10	11	12
2 Wire RTD	0	1	0	0	1	0	0	1	0	0	0	1
3 Wire RTD	0	1	0	0	0	0	0	0	1	0	0	1
4Wire RTD		1	0	0	0	0	0	1	0	1	0	0

Warning: DO NOT OPEN UNIT OR ADJUST SWITCHES WITH POWER SUPPLY, INPUT OR OUTPUT CONNECTED

Please note that PC Software is available to provide information on switch settings for your input and output requirements.

4.1.7 Output Configuration:

Select the range from the table below and set Switch S3 to the required values.



Examples:

Switch S3 Examples												
	1	2	3	4	5	6	7	8	9	10	11	12
4-20mA Source	1	0	1	0	1	0	0	0	0	0	0	0
0-20mA Source	1	0	1	0	1	0	0	0	0	0	0	1
0-10V	1	0	1	0	1	1	0	0	0	0	0	1
4-20mA Sink	1	1	0	1	0	0	0	0	0	0	0	0

Warning: DO NOT OPEN UNIT OR ADJUST SWITCHES WITH POWER SUPPLY, INPUT OR OUTPUT CONNECTED

Please note that PC Software is available to provide information on switch settings for your input and output requirements.

5. CALIBRATING THE ISOCON:

When the unit is shipped the ISOCON will be calibrated for the input and output types and ranges noted on the side label. If this label is blank then the unit will be calibrated for 4-20mA input and 4-20mA source output.

If the unit is re-ranged by the user it is necessary to re-calibrate the unit to obtain the maximum accuracy. The calibration is achieved by using both switches on the front panel to select the zero or span input and then using the switches as raise/lower buttons to adjust the output to the value required.

The mode the unit is in is indicated by the colour of the LED:
Green - Normal Operation
Red - Span Adjust
Yellow - Zero Adjust

Setting of the zero and span points is non-interactive, so each point need only be set once. A typical calibration sequence would be as follows:

LED Colour	Mode	Action
Green	Normal	Apply full scale input. Press and release both buttons together to enter span mode
RED	Span Adjust	Press raise / lower buttons to adjust output value Press and release both buttons together to return to normal mode
Green	Normal	Apply zero scale input Press and release both buttons together to enter zero mode
YELLOW	Zero Adjust	Press raise / lower buttons to adjust output value Press and release both buttons together to return to normal mode
Green	Normal	Use product

The unit is now calibrated and ready for use.

Note: The unit will retain the new settings on power down.

When the unit is used to convert a thermocouple input it is important when calibrating to ensure that the thermocouple simulator employed is switched to automatic cold junction compensation and is at the same ambient temperature as the ISOCON. Note that this is not always easy to achieve, especially if the ISOCON is mounted in a warm cabinet. An altenative method is to use an ice-point reference and a mV source.

6. INSTALLATION:

The ISOCON's input and output circuits are classed as Separated Extra Low Voltage (SELV). This means that they must not be externally connected to voltages exceeding 30V ac or 60V dc, nor do they generate voltages above these limits internally. Where a higher voltage input is required a specially designed DIVIDER unit can be used to condition the input signal prior to connection to the process input terminals.
The ISOCON unit clips directly onto 'Top Hat' (TS35) symmetrical DIN rail. Ideally, mounting orientation should be vertical, with the power supply situated on the top face to minimise temperature rise. Good airflow around the unit will maximise reliability of the instrument.
The use of bootlace ferrules is recommended on wiring terminations.
Do not exceed terminal torque rating of 0.4 Nm – use an appropriate screwdriver. The unit can be removed from the DIN rail by sliding a small screwdriver into the slot at the rear of the enclosure on the lower face and gently levering the metal clip, whilst lifting the unit from the rail.

7. TROUBLESHOOTING:

The ISOCON has some built in self diagnostic functions. If the LED on the front panel is flashing then the fault mode can be found by counting the number of flashes between gaps and using the table below to locate the problem.

No of Flashes	Nature of Fault	Corrective Action
0 (Green On)	Unit Working – no suspected fault	Check Wiring and switch settings
2,3,4,5,6,8,9, 10,11,12 Green	Hardware Error, extreme noise, poor supply	Switch off unit, check switch settings, and wiring, and retry. If still faulty please contact supplier
7 Green	RTD / Thermocouple burnout	Repair RTD, T/C or wiring
3 or 4 Red	Span point is too close to zero point	Change input span value and retry
3 or 4 Yellow	Zero point is too close to span point	Change input zero value and retry
No LED	Power Failure	Check supply lines and voltage

7.1 Incorrect Reading:

- Check that Unit is configured for the correct Sensor
- Check that Input Scaling is as required.
- Check that Linearisation has not been set incorrectly.
- Check that Thermocouples have correct compensation cables, and polarity.
- Check that RTD is set for correct option 2, 3 or 4 Wire.
- Check that RTD leads are connected to appropriate terminal pins.

7.1 Incorrect Reading:

- Check that sensor wiring is correct.
- Check Thermocouple polarity.
- Check that all RTD leads are connected to correct terminals.
- Check that the ISOCON is configured for correct sensor.
- Check that applied voltage is not out of range.
- Check that applied current is not out of range.
- Check that applied millivoltage is out of range.

8. SPECIFICATIONS (@ 25°C):

Operating Temperature: 0 to 55 °C

Operating Altitude: Sea Level to 2000m

Humidity: 0-90% RH

Power Requirements:
DC Supply: 12 to 36Vdc
AC Supply: 12 to 32Vac

Current Consumption: 55mA @ 24Vdc (20mA in & out)
85mA @ 24Vdc (maximum load, tx supply)
200mA @ 12Vdc (maximum load, tx supply)
260mA for 50ms on 24Vdc power up

Transmitter Power Supply: 22V to 29V @ up to 24mA
Dependant on supply voltage and load

Calibration accuracy: ±0.05% full scale

Linearity: ±0.05% full scale

Temperature Stability: 50ppm / °C

Input Impedance:
Current Input: 15 ohms
Voltage Input: 1 Mohm
Millivolt Input: Greater Than 10 Mohm

Thermocouple Burn Out Current: 500nA Nominal

Cold junction compensation accuracy: ±0.5°C over operating range

Maximum Voltage Output: 11.5 V into a minimum of 7Kohm

Maximum Current Output: 23.0 mA into a maximum of 1Kohm

Time Response: (90% of step change): 50ms ± 10ms

Unit has full 3 port Isolation to 1kV between Power Supply, Input and Output.
The unit can also withstand transients of 2.5kV for 50 μsecs.

Dimensions: 114.5 mm x 99mm x 12.5mm (H x D x W)

Mounting: DIN Rail TS35

Connections: Screw Clamp with pressure plate

Conductor Size: 0.5 to 4.0 mm

Insulation Stripping: 12 mm

Maximum Terminal Torque: 0.4 Nm

Weight Approx. 95g

EMC Emissions:
EN50081-1:1992
EN50081-2:1993

EMC Immunity: EN50082-1:1997

LVD Standards: EN61010-1:1993

Installation Category (IEC 664): II

Pollution Degree (EN61010-1:1993): 2

Equipment Class (IEC 536): II