

# 1/16 & 1/8 DIN INDUSTRIAL CONTROLLER CONCISE PRODUCT MANUAL (59557-3)

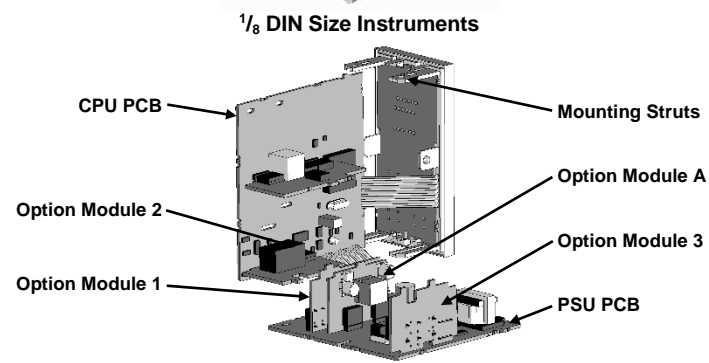
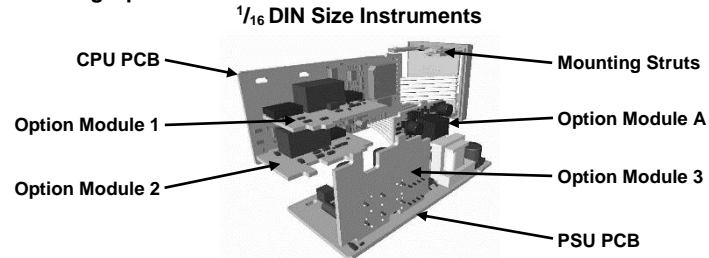
**CAUTION:** Installation should only be performed by technically competent personnel. Local Regulations regarding electrical installation & safety must be observed.

## 1. INSTALLATION

The models covered by this manual have two different DIN case sizes (refer to section 10). Some installation details vary between models. These differences have been clearly shown.

**Note:** The functions described in sections 2 thru 9 are common to all models.

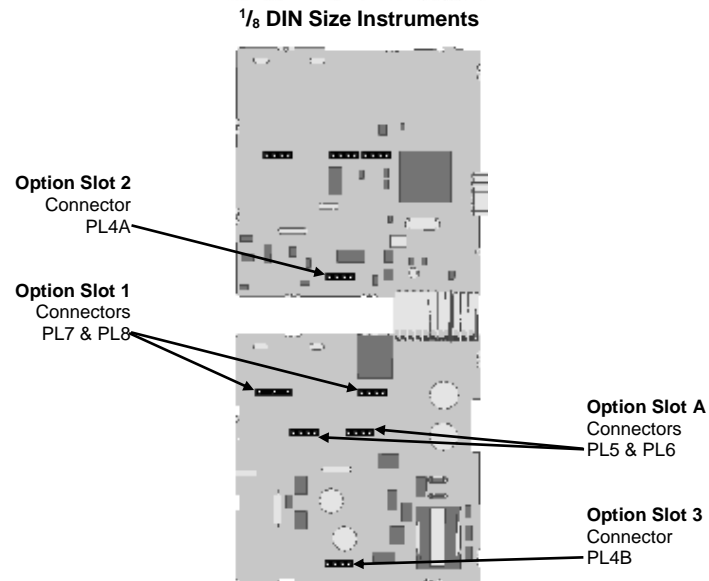
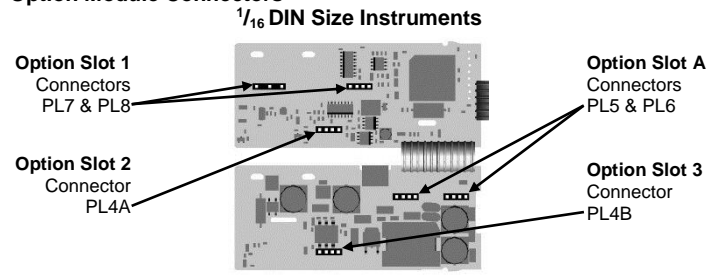
### Installing Option Modules



- To access modules 1 or A, first detach the PSU and CPU boards from the front by lifting first the upper, and then lower mounting struts. Gently separate the boards.
- Plug the required option modules into the correct connectors, as shown below.
  - Locate the module tongues in the corresponding slot on the opposite board.
  - Hold the main boards together while relocating back on the mounting struts.
  - Replace the instrument by aligning the CPU and PSU boards with their guides in the housing, then slowly push the instrument back into position.

**Note:** Option modules are automatically detected at power up.

### Option Module Connectors

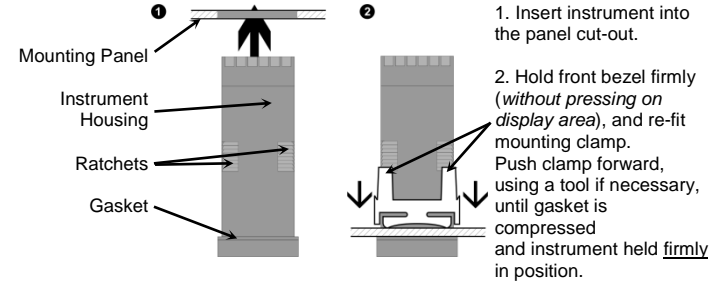


### Panel-Mounting

The mounting panel must be rigid, and may be up to 6.0mm (0.25 inch) thick. Cut-out sizes are:

Cut-Out Dim A: 1/16 & 1/8 DIN = 45mm  
Cut-Out Dim B: 1/16 DIN = 45mm, 1/8 DIN = 92mm

For *n* multiple instruments mounted side-by-side, cut-out A is 48*n*-4mm.

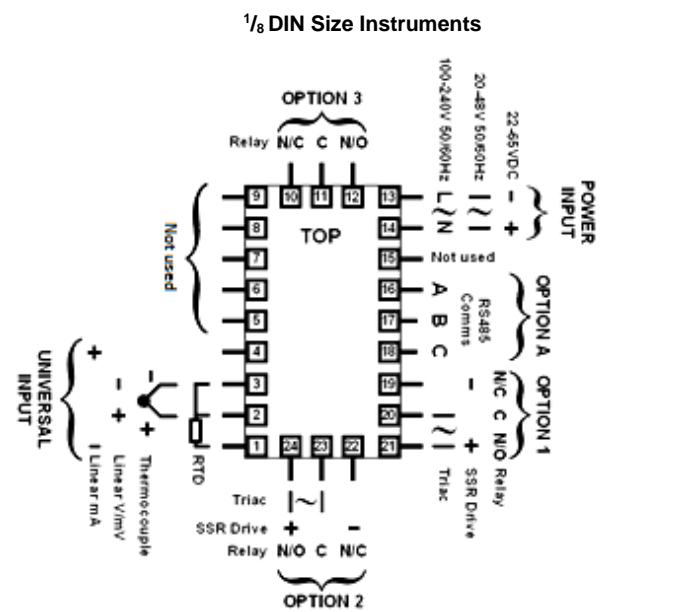
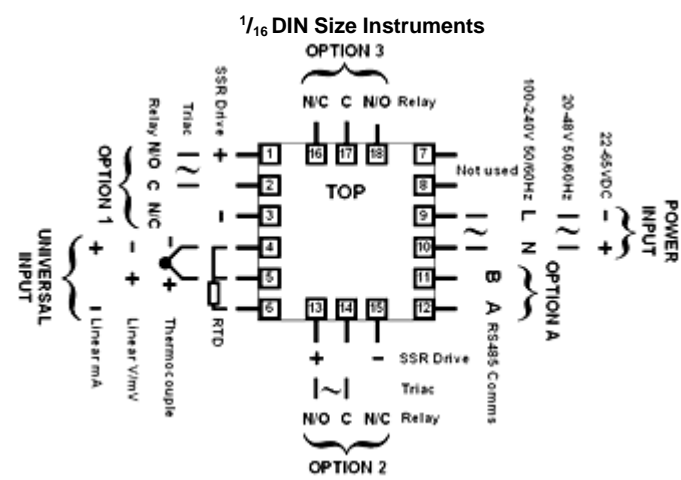


**CAUTION:** For an effective IP66 seal against dust and moisture, ensure gasket is well compressed against the panel, with the 4 tongues located in the same ratchet slot.

### Rear Terminal Wiring

USE COPPER CONDUCTORS (EXCEPT FOR T/C INPUT)

Single Strand wire gauge: Max 1.2mm (18SWG)



These diagrams show all possible option combinations. The actual connections required depends on the exact model and options fitted.

**CAUTION:** Check information label on housing for correct operating voltage before connecting supply to Power Input  
Fuse: 100 - 240V ac - 1A anti-surge  
24/48V ac/dc - 315mA anti-surge

**Note:** At first power-up the message `LoCo Conf` is displayed, as described in section 8 of this manual. Access to other menus is denied until configuration mode is completed

## 2. OPERATOR MODE

This mode is entered at power on, or accessed from Select mode (see section 2).

**Note:** All Configuration mode and Setup mode parameters must be set as required before starting normal operations.

Press  $\leftarrow$  to scroll through the parameters, then press  $\Delta$  or  $\nabla$  to set the required value.

**Note:** All Operator Mode parameters in Display strategy 6 are read only (see d 5P in configuration mode), they can only be adjusted via Setup mode.

Upper Display	Lower Display	Display Strategy and When Visible	Description
PV Value	Active SP Value	1 & 2 (initial screen)	PV and target value of selected SP <i>Local Setpoints are adjustable in Strategy 2</i>
PV Value	Actual SP Value	3 & 6 (initial screen)	PV and actual value of selected SP (e.g. ramping SP value). <i>Read only</i>
PV Value	(Blank)	4 (initial screen)	Process variable only <i>Read only</i>
Active SP Value	(Blank)	5 (initial screen)	Target value of selected setpoint only. <i>Read only</i>
*Power Level	P <sub>U</sub> Jr	Current % Power Level (Read Only)	-100% (cool) to +100% (heat)
Actual SP Value	SPrP	rP is not blank	Actual (ramping) value of selected SP. <i>Read only</i>
Ramp Rate	rP	SPr enabled in Setup mode	SP ramping rate, in units per hour <i>Adjustable except in Strategy 6</i>
*Active Alarm Status	ALSt	When one or more alarms are active. LOW BAND indicator will also flash	<ul style="list-style-type: none"> <li>Alarm 2 active</li> <li>Alarm 1 active</li> <li>Loop Alarm active</li> </ul>

\* NOT AVAILABLE ON INDICATORS.

### Operating Mode Selection

Press  $\leftarrow$ , then press  $\Delta$  or  $\nabla$  to select operating mode.

Ctrl	OFF	Control and alarms off
Auto	Auto	Controller in Automatic mode
Man	Man	Controller in Manual mode

### Manual Control

While in Manual Control mode, the LOW and BAND indicators will flash and the lower display will show P<sub>xxx</sub> (where xxx is the current manual power level). Switching to/from manual mode is via Bumpless Transfer. Press  $\Delta$  or  $\nabla$  to set the required output power.

**Caution:** Manual power level is not restricted by the DP<sub>UL</sub> power limit.

## 3. SELECT MODE

Select mode is used to access the configuration and operation menu functions.

It can be accessed at any time by holding down  $\leftarrow$  and pressing  $\Delta$ .

In select mode, press  $\Delta$  or  $\nabla$  to choose the required mode, press  $\leftarrow$  to enter. An unlock code is required to prevent unauthorised entry to Configuration, Setup and Auto-tune modes. Press  $\Delta$  or  $\nabla$  to enter the unlock code, then press  $\leftarrow$  to proceed.

Mode	Upper Display	Lower Display	Description	Default Unlock Codes
Operator	OPtr	SLCt	Normal operation	None
Set Up	SEtP	SLCt	Tailor settings to the application	44
Configuration	Conf	SLCt	Configure the instrument for use	44
Product Info	inFo	SLCt	Check manufacturing information	None
Auto-Tuning	Autun	SLCt	Invoke Pre-Tune or Self-Tune	44

**Note:** The instrument will always return automatically to Operator mode if there is no key activity for 2 minutes.

## 4. CONFIGURATION MODE

First select Configuration mode from Select mode (refer to section 3).

Press  $\leftarrow$  to scroll through the parameters, then press  $\Delta$  or  $\nabla$  to set the required value. Press  $\leftarrow$  to accept the change, otherwise parameter will revert to previous value. To exit from Configuration mode, hold down  $\leftarrow$  and press  $\Delta$ , to return to Select mode.

**Note:** Parameters displayed depends on how instrument has been configured. Refer to user guide (available from your supplier) for further details. Parameters marked \* are repeated in Setup Mode.

Parameter	Lower Display	Upper Display	Adjustment range & Description	Default Value
Function	Func	HEAt	Heat Only	HEAt
		COoL	Heat/Cool	
		Indc	Indicator Only	
Input Range/Type	inPt		See following table for possible codes	JC

Code	Input Type & Range	Code	Input Type & Range	Code	Input Type & Range
bC	B: 100 - 1824 °C	Lc	L: 0.0 - 537.7 °C	P24F	PtRh20% vs 40%: 32 - 3362 °F
bF	B: 211 - 3315 °F	Lf	L: 32.0 - 999.9 °F		
Cc	C: 0 - 2320 °C	Nc	N: 0 - 1399 °C	PtC	Pt100: -199 - 800 °C
Cf	C: 32 - 4208 °F	Nf	N: 32 - 2551 °F	PtF	Pt100: -328 - 1472 °F
Jc	J: -200 - 1200 °C	rc	R: 0 - 1759 °C	PtC	Pt100: -128.8 - 537.7 °C
Jf	J: -328 - 2192 °F	rf	R: 32 - 3198 °F	PtF	Pt100: -199.9 - 999.9 °F
Jc	J: -128.8 - 537.7 °C	Sc	S: 0 - 1762 °C	0_20	0 - 20 mA DC
Jf	J: -199.9 - 999.9 °F	Sf	S: 32 - 3204 °F	4_20	4 - 20 mA DC
Kc	K: -240 - 1373 °C	Tc	T: -240 - 400 °C	0_50	0 - 50 mV DC
Kf	K: -400 - 2503 °F	Tf	T: -400 - 752 °F	10_50	10 - 50 mV DC
Kc	K: -128.8 - 537.7 °C	Tc	T: -128.8 - 400.0 °C	0_5	0 - 5 V DC
Kf	K: -199.9 - 999.9 °F	Tf	T: -199.9 - 752.0 °F	1_5	1 - 5 V DC
Lc	L: 0 - 762 °C	P24C	PtRh20% vs. 40%: 0 - 1850 °C	0_10	0 - 10 V DC
Lf	L: 32 - 1403 °F			2_10	2 - 10 V DC

**Note:** Decimal point shown in table indicates temperature resolution of 0.1°

Parameter	Lower Display	Upper Display	Adjustment range & Description	Default Value
Scale Range Upper Limit	ruL		Scale Range Lower Limit +100 to Range Maximum	300
Scale Range Lower Limit	rlL		Range Minimum to Scale Range Upper Limit -100	0
Decimal point position	dPoS		0=XXXX, 1=XXX.X, 2=XX.XX, 3=X.XXX (non-temperature ranges only)	1
Primary Output Control Action	Ctrl	rEu	Reverse Acting	rEu
Alarm 1 Type*	ALR1	d r	Direct Acting	Controller P_H I Indicator P_H I
		P_H I	Process High Alarm	
		P_Lo	Process Low Alarm	
		dE	Deviation Alarm	
		bAnd	Band Alarm	
	nonE	No alarm		
High Alarm 1 value*	PhA1		Range Minimum to Range Maximum in display units	300
Low Alarm 1 value*	PLA1			130
Band Alarm 1 value*	bAL1		1 LSD to span from setpoint in display units	5
Dev. Alarm 1 value*	dAL1		+/- Span from setpoint in display units	5
Alarm 1 Hysteresis*	AHY1		1 LSD to full span in display units	1
Alarm 2 Type*	ALR2		Options as for alarm 1	Controller bAnd Indicator nonE
				Range Max
				Range Min
High Alarm 2 value*	PhA2			10
Low Alarm 2 value*	PLA2			5
Band Alarm 2 value*	bAL2			1
Dev. Alarm 2 Value*	dAL2			
Alarm 2 Hysteresis*	AHY2			
Loop Alarm	LAEr		d 5A (disabled) or EnAb (enabled)	EnAb
Loop Alarm Time*	LAt		1 sec to 99 mins. 59secs	99.59
Alarm Inhibit		nonE	No alarms Inhibited	nonE
		ALA1	Alarm 1 inhibited	
		ALA2	Alarm 2 inhibited	
Output 1 Usage		both	Alarm 1 and alarm 2 inhibited	Pr I
		P r	Primary Power	
		SEc	Secondary Power	
		A1_d	Alarm 1, Direct	
		A1_r	Alarm 1, Reverse	
		A2_d	Alarm 2, Direct	
		A2_r	Alarm 2, Reverse	
		LP_d	Loop Alarm, Direct	
		LP_r	Loop Alarm, Reverse	
		Dr_d	Logical Alarm 1 OR 2, Direct	
	Dr_r	Logical Alarm 1 OR 2, Reverse		
Output 2 Usage		Ad_d	Logical Alarm 1 AND 2, Direct	SEc or A2_d
		Ad_r	Logical Alarm 1 AND 2, Reverse	
		AA_d	Alarm 1, Alarm 2 OR Sensor Break, Direct	
		AA_r	Alarm 1, Alarm 2 OR Sensor Break, Reverse	

Parameter	Lower Display	Upper Display	Adjustment range & Description	Default Value
Output 3 Usage	USE3		As for output 1	Controller AA_d Indicator A I_d
Display Strategy	d SP		1, 2, 3, 4, 5 or 6 (refer to section 8)	I
Serial Communications Protocol	Prot	ASC I	ASCII	r7bn
		r7bn	Modbus with no parity	
		r7bE	Modbus with Even Parity	
Serial Communications Bit Rate	bAud	r7bo	Modbus with Odd Parity	9.6
		1.2	1.2 kbps	
		2.4	2.4 kbps	
		4.8	4.8 kbps	
Comms Address	Addr	1	1 to 255 (Modbus), 1 to 99 (ASCII)	I
		rLW	Read/Write	rLW
Comms Write	CoEn	r_0	Read only	
Configuration Lock Code	CLoc		0 to 9999	44

‡ For the alarms to align with the LEDs and labelling on the front of the controller Alarm 1 Type and Alarm 2 Type should be left at their default settings.

## 5. SETUP MODE

**Note: Configuration must be completed before adjusting Setup parameters.**

First select Setup mode from Select mode (refer to section 2). Press  $\leftarrow$  to scroll through the parameters, then press  $\Delta$  or  $\nabla$  to set the required value.

To exit from Setup mode, hold down  $\leftarrow$  and press  $\Delta$  to return to Select mode.  
**Note: Parameters displayed depend on how instrument has been configured.**

Parameter	Lower Display	Upper Display Adjustment Range & Description	Default Value
Input Filter Time Constant	F ILt	OFF or 0.5 to 100.0 secs	2.0
Process Variable Offset	OFFS	±Span of controller	0
Primary Power	PPUJ	Current power levels (read only)	N/A
Secondary Power	SPUJ		
		Heat	Heat/Cool
Primary Proportional Band	Pb_P	0.0% (ON/OFF) and 0.5% to 999.9% of input span	0.50
Secondary Proportional Band	Pb_S		5.50
Automatic Reset (Integral Time)	ARSt	1 sec to 99 mins 59 secs and OFF	20.00
Rate (Derivative Time)	rALt	00 secs to 99 mins 59 secs	5.00
Overlap/Deadband	OL	-20 to +20% of Primary and Secondary Proportional Band	0
Manual Reset (Bias)	b AS	0% (-100% if dual control) to 100%	25
Primary ON/OFF Differential	d IFP	0.1% to 10.0% of input span centered about the setpoint. (Entered as a percentage of span)	0.5
Secondary ON/OFF Diff.	d IFS		
Prim. & Sec. ON/OFF Differential	d IFF		
Setpoint Upper Limit	SPUL	Current Setpoint to Range max	R/max
Setpoint Lower limit	SPLL	Range min to Current Setpoint	R/min
Primary Output Power Limit	OPUL	0% to 100% of full power	100
		Heat	Heat/Cool
Output 1 Cycle Time	Ct1	0.5, 1, 2, 4, 8, 16, 32, 64, 128, 256 or 512 secs.	4
Output 2 Cycle Time	Ct2		8
High Alarm 1 value	PhA1	Range Minimum to Range Maximum	300
Low Alarm 1 value	PLA1		130
Deviation Alarm 1 Value	dAL1	±Span from SP in display units	5
Band Alarm 1 value	bAL1	1 LSD to span from setpoint	5
Alarm 1 Hysteresis	AHY1	1 LSD to full span in display units	I
High Alarm 2 value	PhA2	Range Minimum to Range Maximum	R/max
Low Alarm 2 value	PLA2		R/min
Deviation Alarm 2 Value	dAL2	±Span from SP in display units	5
Band Alarm 2 value	bAL2	1 LSD to span from setpoint	5
Alarm 2 Hysteresis	AHY2	1 LSD to full span in display units	I
Loop Alarm Time	LALt		99.59

Parameter	Lower Display	Upper Display Adjustment Range & Description	Default Value
Auto Pre-tune	APt		
Setpoint ramp adjustment shown in Operator Mode	SPr	d, SA (disabled) or EnAb (enabled)	d, SA
SP Ramp Rate Value	rP	1 to 9999 units/hour or Off (blank)	Off
Setpoint Value	SP	Scale range upper to lower limits.	Scale Range Minimum
Setup Lock Code	SLoc	0 to 9999	44

## 6. AUTOMATIC TUNING MODE

First select Automatic tuning mode from Select mode (refer to section 2). Press  $\leftarrow$  to scroll through the modes, then press  $\Delta$  or  $\nabla$  to set the required value.

To exit from Automatic tuning mode, hold down  $\leftarrow$  and press  $\Delta$ , to return to Select mode.

Pre-tune is a single-shot routine and is thus self-disengaging when complete. If APt in Setup mode = EnAb, Pre-tune will attempt to run at every power up\*. Refer to the full user guide (available from your supplier) for details on controller tuning.

Parameter	Lower Display	Upper Display	Default Value
Pre-Tune	Ptun	On or OFF. Indication remains OFF if automatic tuning cannot be used at this time*	OFF
Self-Tune	Stun		
Tune Lock	tLoc	0 to 9999	44

\* Note: Automatic tuning will not engage if either proportional band = 0. Also, Pre-tune will not engage if setpoint is ramping, or the PV is less than 5% of input span from the setpoint.

## 7. PRODUCT INFORMATION MODE

First select Product information mode from Select mode (refer to section 2).

Press  $\leftarrow$  to view each parameter. To exit from Product Information mode, hold down  $\leftarrow$  and press  $\Delta$  to return to Select mode.

**Note: These parameters are all read only.**

Parameter	Lower Display	Upper Display	Description
Input type	In_ I	Un_ I	Universal input
Option 1 module type fitted	OPn1	rLY	Relay output
Option 2 module type fitted	OPn2	rLY	SSR drive output
Option 3 module type fitted	OPn3	rLY	Relay output
Auxiliary Option A Module type fitted	OPnA	nOnE	No option fitted
		r485	RS485 communications
Firmware Type	FLUJ		Value displayed is firmware type number
Firmware Issue	ISS		Value displayed is firmware issue number
Product Revision Level	PrL		Value displayed is Product Revision level
Date of manufacture	dOrr		Manufacturing date code (mmyy)
Serial number 1	Sn1		First four digits of serial number
Serial number 2	Sn2		Middle four digits of serial number
Serial number 3	Sn3		Last four digits of serial number

## 8. MESSAGES & ERROR INDICATIONS

These messages indicate that an error has occurred or there is a problem with the process variable signal or its wiring.

**Caution: Do not continue with the process until the issue is resolved.**

Parameter	Upper Display	Lower Display	Description
Instrument parameters are in default conditions	CoCo	ConF	Configuration & Setup required. This screen is seen at first turn on, or if hardware configuration has been changed. Press $\leftarrow$ to enter the Configuration Mode, next press $\Delta$ or $\nabla$ to enter the unlock code number, then press $\leftarrow$ to proceed
Input Over Range	CHKJ	Normal	Process variable input > 5% over-range
Input Under Range	LLJ	Normal	Process variable input > 5% under-range
Input Sensor Break	OPEN	Normal	Break detected in process variable input sensor or wiring
Option 1 Error	Err	OPn1	Option 1 module fault
Option 2 Error		OPn2	Option 2 module fault
Option 3 Error		OPn3	Option 3 module fault
Option A Error		OPnA	Option A module fault

## 9. SERIAL COMMUNICATIONS

Refer to the full user guide (available from your supplier) for details.

## 10. SPECIFICATIONS

### UNIVERSAL INPUT

Thermocouple: ±0.1% of full range, ±1LSD (±1°C for Thermocouple CJC).  
Calibration: BS4937, NBS125 & IEC584.

PT100 Calibration: ±0.1% of full range, ±1LSD.  
BS1904 & DIN43760 (0.00385/°C).

Sampling Rate: 4 per second.  
Impedance: >10MΩ resistive.  
Sensor Break Detection: Thermocouple, RTD. Control outputs turn off.  
Isolation: Isolated from all outputs (except SSR driver).

Universal input must not be connected to operator accessible circuits if relay outputs are connected to a hazardous voltage source. Supplementary insulation or input grounding would then be required.

### OUTPUTS

#### Relay

Contact Type & Rating: Single pole double throw (SPDT); 2A resistive at 120/240VAC.  
Lifetime: >500,000 operations at rated voltage/current.  
Isolation: Basic Isolation from universal input and SSR outputs.

#### SSR Driver

Drive Capability: SSR drive voltage >10V into 500Ω min.  
Isolation: Not isolated from universal input or other SSR driver outputs.

#### Triac

Operating Voltage: 20 to 280Vrms (47 to 63Hz).  
Current Rating: 0.01 to 1A (full cycle rms on-state @ 25°C); derates linearly above 40°C to 0.5A @ 80°C.  
Isolation: Reinforced safety isolation from inputs and other outputs.

### SERIAL COMMUNICATIONS

Physical: RS485, at 1200, 2400, 4800, 9600 or 19200 bps.  
Protocols: Selectable between Modbus and West ASCII.  
Isolation: Reinforced safety isolation from all inputs and outputs.

### OPERATING CONDITIONS (FOR INDOOR USE)

Ambient Temperature: 0°C to 55°C (Operating), -20°C to 80°C (Storage).  
Relative Humidity: 20% to 95% non-condensing.  
Altitude: <2000m  
Supply Voltage and Power: 100 to 240VAC ±10%, 50/60Hz, 7.5VA

### ENVIRONMENTAL

Standards: CE, UL & cUL.  
EMI: EN61326-1:2013  
Safety: UL61010-1 Edition 3, Pollution Degree 2, Installation Category II.

Panel Sealing: Front to IP66 when correctly mounted – refer to section 1.  
Rear of panel to IP20.

### PHYSICAL

Front Bezel Size: 1/16 DIN = 48 x 48mm, 1/8 DIN = 96 x 48mm,

Depth Behind Panel: 1/16 DIN = 110mm, 1/8 DIN = 100mm.

Weight: 0.21kg maximum.

### SUPPLEMENTARY ADVICE

- Compliance shall not be impaired when fitted to the final installation.
- Designed to offer a minimum of Basic Insulation only.
- The body responsible for the installation is to ensure that supplementary insulation suitable for Installation Category II is achieved when fully installed.
- To avoid possible hazards, accessible conductive parts of the final installation should be protectively earthed in accordance with UL61010 for Class 1 Equipment.
- Output wiring should be within a Protectively Earthed cabinet.
- Sensor sheaths should be bonded to protective earth or not be accessible.
- Live parts should not be accessible without the use of a tool.
- When fitted to the final installation, an IEC/CSA APPROVED disconnecting device should be used to disconnect both LINE and NEUTRAL conductors simultaneously.
- Do not position the equipment so that it is difficult to operate the disconnecting device.