Installation

### Requirements

1. The PC must be running Windows XP or Windows 7.
2. At least 1GB RAM is required.

Procedure

1. Insert the DVD into the PC drive. The setup program should run automatically unless 'autorun' has been disabled.
2. If the DVD fails to autorun, in Windows Explorer double-click the DVD icon to see contents, then double click the **setup.exe** file.
3. In the **Do Install** section of the dialog, click the required button to start the installation.
4. Follow the instructions shown on-screen for each item of the installation.

Mechanical Installation

96mm (3.78in)

90mm (3.54in)

Depth behind panel excluding wiring

96mm (3.78in)

Front View   Side View
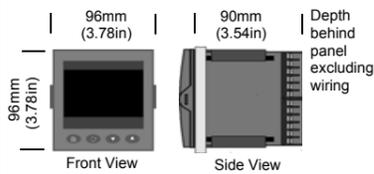
Panel Cutout

92mm (3.62in) × 92mm (3.62in)
[both −0 +0.8mm (0.03in)]

Minimum inter-unit spacing

Horizontal = 10mm (0.4in).
Vertical = 38mm (1.5in)

Labelling

Symbols used on this instrument

One or more of the symbols may appear as a part of the instrument labelling.

When connecting a USB device, it must be plugged directly into the instrument. The use of extension USB leads may compromise the ESD compliance.

Observe static precautions when accessing the rear terminals. Take special care with respect to USB and Ethernet connections.

Symbol	Meaning
⚠	Refer to User Manual for instructions.
CE	This unit is CE approved.
Ⓒ	C-Tick mark for Australia (ACA) and New Zealand (RSM).
c UL us LISTED 13DO E57766	Underwriters laboratories listed mark for Canada and the U.S.
40	For environmental reasons, this unit must be recycled before its age exceeds the number of years shown in the circle.
⚡	Risk of electric shock.
⚠	Precautions against static electrical discharge must be taken when handling this unit.
🖧	Ethernet connector.
⚡ USB	USB connector.
⏚	Protective-conductor terminal (Earth)

Restriction of Hazardous Substances (RoHS)

This certificate relates to the product model mentioned above. The data shown here is related to the following version of the China RoHS 2.0:
Administrative Measures for the Restriction of Hazardous Substances in Electric Appliances and Electronic Products" released January 21st 2016.

部件名称 Part Name	有害物质 - Hazardous Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
金属部件 Metal parts	O	O	O	O	O	O
塑料部件 Plastic parts	O	O	O	O	O	O
电子件 Electronic	X	O	O	O	O	O
触点 Contacts	O	O	X	O	O	O
线缆和线缆附件 Cables & cabling accessories	O	O	O	O	O	O

本表格依据SJ/T11364的规定制订。
O: 表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
X: 表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。

This table is made according to SJ/T 11364.
O: indicates that the concentration of hazardous substance in all of the homogeneous materials for this part is below the limit as stipulated in GB/T 26572.
X: indicates that concentration of hazardous substance in at least one of the homogeneous materials used for this part is above the limit as stipulated in GB/T 26572

Signed (Kevin Shaw, R&D Director):   Date: 24th June 2016

Specification

General

General

I/O types	Analogue input:	Four/eight
	Digital input:	Two
	Digital (logic) output:	Two max. (dependent on build variant)
	Relay output:	Four max. (dependent on build variant)
	DC output:	Three max. (dependent on build variant)

Environmental Performance

Ambient temperature range	Operating:	0 to 55 ℃
	Storage:	−20 to +70 ℃
Humidity range:	Operating:	5% to 85% RH non condensing
	Storage:	5% to 85% RH non condensing
Protection	Front panel:	IP65, NEMA12
	Front panel washdown:	IP66, NEMA12
	Behind panel:	IP10 (International)
	Shock/Vibration:	To BS EN61131-2: (5 to 150Hz at 1g; 1 octave per min.)
Altitude:		<2000 metres
Atmosphere:		Not suitable for use in explosive or corrosive atmospheres
Electrical safety:		BS EN61010-1 (Installation category Ⅱ; Pollution degree 2)

Electromagnetic compatibility

Emissions	Standard units:	BS EN61326 Class B—Light industrial
	Low voltage option:	BS EN61326 Class A—Heavy industrial
Immunity:		BS EN61326 Industrial

Other approvals and compliance details

General:	CE and cUL, EN61010
PV input:	AMS2750 compliant
RoHS:	EU; China
Packaging:	BS61131-2 section 2.1.3.3

Physical

Panel mounting:		¼ DIN
Weight:	Instrument only:	0.44kg (15.52ozs)

Operator Interface

Display:	3.5" TFT colour display (320 pixels wide × 240 pixels high)
Controls	Four navigation pushbuttons below the display screen (Page, Scroll, Lower, Raise)

Power requirements

Supply voltage:		
	Standard:	100 to 230V ac ±15% at 48 to 62Hz
	Low voltage:	24V ac (+10% −15%) at 48 to 62Hz, or 24V dc (+20% −15%)
Power dissipation:		9W (max.)
Fuse type:		No internal fuse fitted
Interrupt protection:		
	Standard:	Holdup >20ms at 85V RMS supply voltage
	Low voltage:	Holdup >20ms at 20.4V RMS supply voltage

Battery backup

Stored data:		Time, date
Replacement period:		Three years typical
Clock (real-time clock) data:		
	Support time:	Minimum of 1 year with unit unpowered
	Temperature stability:	0 to 55 ℃ ≤ ±3.5ppm
	RTC Ageing:	First year to 10 year <± 5ppm
Type:		Poly-carbonmonofluoride/lithium Eurotherm Part Number PA260195

> ⚠ **Caution:** Battery may explode if mistreated. Do not recharge, disassemble or dispose of in fire.

Ethernet communications

Type:	10/100baseT Ethernet (IEEE802.3)
Protocols:	Modbus TCP/IP master/slave, FTP, DCHP, EtherNet/IP client/ server
Cable type:	Category 5
Maximum length:	100metres (110yards)
Termination:	RJ45
LEDs:	Green LED illuminated = link connected; Amber LED flashing shows link activity

USB port

Number of ports:	One at rear of instrument
Standard:	USB1.1
Transmission speeds:	1.5MBit/s (low speed device)
Maximum current:	<100mA
Peripherals supported:	Memory stick (8GB max), bar code reader, QWERTY keyboard

Update/Archive rates

Sample rate (input/output):	8Hz
Trend update:	8Hz max.
Archive sample value:	Latest value at archive time
Display value:	Latest value at display update time

Analogue Input

General

Number of Inputs:	Four/eight
Input types:	dc Volts, dc mV, dc mA, dual mA, (external shunt required), dual mV, Thermocouple, dual TC (refer to User Manual HA030554) RTD (2-wire and 3-wire) Digital (Contact closure)
Input type mix:	Freely configurable
Sample rate:	8Hz (125ms); 4Hz (250ms) dual i/p
Conversion method:	16 bit delta sigma
Input ranges:	See Table 1 and Table 2
Mains rejection (48 to 62Hz)	
Series mode:	> 95dB
Common mode:	>179dB
Common mode voltage:	250V ac max.
Series mode voltage:	280mV at lowest range; 5V peak to peak at highest range
Input Impedance:	40mV, 80mV, 2V ranges > 100MΩ; 62.5kΩ for input voltages > 5.6V 667kΩ for input ranges < 5.6V
Overvoltage protection	
Continuous:	±30V RMS
Transient (<1ms):	±200V pk–pk between terminals
Sensor break detection	
Type:	ac sensor break on each input giving quick response with no associated dc errors
Recognition time:	<3 seconds
Minimum break resistance:	40mV, 80mV ranges: 5kΩ; other ranges: 12.5kΩ
Shunt (mA inputs only):	1Ω to 1kΩ mounted externally
additional error due to shunt:	0.1% of Input
Isolation:	(Dual inputs are not isolated from each other)
Channel to Channel:	300V RMS or dc (Single insulation)
Channel to common electronics:	300V RMS or dc (Single insulation)
Channel to ground:	300V RMS or dc (Single insulation)
Dielectric strength	
Test:	BS EN61010, 1 minute type test
Channel to Channel:	2500V ac
Channel to Ground:	1500V ac

Low Range	High Range	Resolution	Maximum error (instrument at 25 ℃)	Temperature performance
−40mV	40mV	1.9µV	4.6µV + 0.053% of reading	13ppm of input per ℃
−80mV	80mV	3.2µV	7.5µV + 0.052% of reading	13ppm of input per ℃
−2V	2V	82µV	420µV + 0.044% of reading	13ppm of input per ℃
−3V	10V	500µV	1.5mV + 0.063% of reading	45ppm of input per ℃

Table 1: Voltage input ranges (restricted to 2000mV if dual input mode enabled)

Resistance Input Ranges

Temperature scale:	ITS90
Types, ranges and accuracies:	See Table 3
Maximum source current:	200µA
Pt100 figures	
Range:	0 to 400Ω (−200 to +850 ℃)
Resolution:	0.05 ℃
Calibration error:	±0.31 ℃ ±0.023% of measurement in ℃ at 25 ℃ ambient
Temperature coefficient:	±0.01 ℃ / ℃ ±25ppm/ ℃ measurement in ℃ from 25 ℃ ambient
Measurement noise:	0.05℃ peak–peak with τ =1.6s input filter
Linearity error:	0.0033% (best fit straight line)
Lead resistance:	0 to 22Ω matched lead resistances
Bulb current:	200µA nominal

Low Range	High Range	Resolution	Maximum error (instrument at 25 ℃)	Temperature performance
0Ω	400Ω	20mΩ	120mΩ + 0.023% of reading	25ppm of input per ℃

Table 2: Ohms (RTD) input ranges

RTD type	Overall range (℃)	Standard	Max. linearisation (℃)
Cu10	−20 to +400	General Electric Co.	0.02
Cu53	−70 to +200	RC21-4-1966	0.01
JPT100	−220 to +630	JIS C1604:1989	0.01
Ni100	−60 to +250	DIN43760:1987	0.01
Ni120	−50 to +170	DIN43760:1987	0.01
Pt100	−200 to +850	IEC751	0.01
Pt100A	−200 to +600	Eurotherm Recorders SA	0.09

Table 3: RTD type details

Thermocouple Data

Temperature scale:	ITS90
CJC Types:	Off, internal, external, remote.
Remote CJC source:	Any input channel
Internal CJC error:	<1 ℃ max., with instrument at 25 ℃
Internal CJC rejection ratio:	40:1 from 25 ℃
Upscale/downscale drive:	High, low or none independently configurable for each channel's sensor break detection
Types, ranges and accuracies:	See Table 4

T/C type	Range (℃)	Standard	Max. lin. error (℃)
B	0 to +1820	IEC584.1	0 to 400 = 1.7 400 to 1820 = 0.03
C	0 to +2300	Hoskins	0.12
D	0 to +2495	Hoskins	0.08
E	−270 to +1000	IEC584.1	0.03
G2	0 to +2315	Hoskins	0.07
J	−210 to +1200	IEC584.1	0.02
K	−270 to +1372	IEC584.1	0.04
L	−200 to +900	DIN43710:1985 (to IPTS68)	0.02
N	−270 to +1300	IEC584.1	0.04
R	−50 to +1768	IEC584.1	0.04
S	−50 to +1768	IEC584.1	0.04
T	−270 to +400	IEC584.1	0.02
U	−200 to + 600	DIN43710:1985	0.08
NiMo/NiCo	−50 to + 1410	ASTM E1751-95	0.06
Platinel	0 to + 1370	Engelhard	0.02
Ni/NiMo	0 to + 1406	Ipsen	0.14
Pt20%Rh/ Pt40%Rh	0 to + 1888	ASTM E1751-95	0.07

Table 4: Thermocouple types, ranges and accuracies

Relay and Logic I/O

O/P1, O/P2, O/P3, O/P4 and O/P5 logic I/O and relay specification

Active (current on) current sourcing logic output (O/P1 or O/P2 only)

Voltage output across terminals:	+11V min.; +13V max.
Short circuit output current:	6mA min. (steady state); 44mA max. (switch current)

Inactive (current off) current sourcing logic output (O/P1 or O/P2 only)

Voltage o/p across terminals:	0V (min.); 300mV (max.)
Output source leakage current into short circuit:	0µA (min.); 100µA (max.)

Active (current on) contact closure sourcing logic input (O/P1 only)

Input current	Input at 12V:	0mA (min.); 44mA (max.)
	Input at 0V:	6mA min. (steady state); 44mA max. (switch current)
Open circuit input voltage:		11V (min.); 13V (max.)
Open circuit (inactive) resistance:		>500Ω (min.); ∞ (max.)
Closed circuit (active) resistance:		0Ω (min.); 150Ω (max.)

Relay Contacts (O/P1, O/P2, and O/P3)
- O/P4 and O/P5 shown in parentheses '()'

Contact switching power (resistive):	Max. 2A (1A) at 230V RMS ±15% Min. 100mA (5mA) at 12V
Maximum current through terminals:	2A (1A)

Digital Inputs

Dig InA and Dig InB contact closure logic input

Contact Closure

Short circuit sensing current (source):	5.5mA (min.); 6.5mA (max.)
Open circuit (inactive) resistance:	>600Ω (min.); ∞ (max.)
Closed circuit (active) resistance:	0Ω (min.); 300Ω (max.)

DC Output (Option)

Output 1, Output 2, Output 3 DC analogue outputs

Current outputs (O/P1, O/P2 and O/P3)

Output ranges:	Configurable within 0 to 20mA
Load resistance:	500Ω max.
Calibration accuracy:	< ±100µA ±1% of reading

Voltage outputs (OP3 only)

Output ranges:	Configurable within 0 to 10V
Load resistance:	500Ω min.
Calibration accuracy:	< ±50mV ±1% of reading

General

Isolation:	300V RMS or dc (double insulation) relays to common electronics
Resolution:	> 11 bits
Thermal drift:	< 100ppm/ ℃

Safety Notes

⊗ **Warning:** Any interruption of the protective conductor inside or outside the apparatus, or disconnection of the protective earth terminal is likely to make the apparatus dangerous under some fault conditions. Intentional interruption is prohibited.

Safety requirements for permanently connected equipment state:
- A switch or circuit breaker shall be included in the building installation
- It shall be in close proximity to the equipment and within easy reach of the operator
- It shall be marked as the disconnecting device for the equipment.
- Recommended external fuse ratings: For 100–230V ac, fuse type: T rated 2A 250V

1. Before any other connection is made, the protective earth terminal shall be connected to a protective conductor. The mains (supply voltage) wiring must be terminated in such a way that, should it slip, the earth wire would be the last wire to become disconnected.
2. Whenever it is likely that protection has been impaired, the unit shall be made inoperative, and secured against accidental operation. The manufacturer's nearest service centre should be contacted for advice.
3. Where conductive pollution (e.g. condensation, carbon dust) is likely, adequate air conditioning/filtering/ sealing etc. must be installed in the enclosure.
4. Signal and supply voltage wiring should be kept separate from one another. Where this is impractical, shielded cables should be used for the signal wiring.
5. If the unit is used in a manner not specified by the manufacturer, the protection provided by the equipment might be impaired.
6. Installation must only be carried out by suitably qualified personnel.
7. To prevent hands or metal tools touching parts that may be electrically live, the unit must be installed in an enclosure.

⚠ **Caution: Live sensors**. The unit is designed to operate if the temperature sensor is connected directly to an electrical heating element. However, you must ensure that service personnel do not touch connections to these inputs while they are live. With a live sensor, all cables, connectors and switches for connecting the sensor must be mains rated for use in 240V ac CAT.

⚠ **Caution: Wiring**: It is important to connect the unit in accordance with the data in this sheet ensuring that the protective earth connection is ALWAYS fitted first and disconnected last. Wiring must comply with all local wiring regulations, i.e. UK, the latest IEE wiring regulations, (BS7671), and USA, NEC Class 1 wiring methods. Do not connect ac supply to low voltage sensor input or low level inputs and outputs.

8. The maximum continuous voltage applied between any of the following terminals must not exceed 240V ac:
    — relay output to logic, dc or sensor connections;
    — any connection to ground.
    The unit must not be wired to a three phase supply with an unearthed star connection. Under fault conditions such a supply could rise above 240V ac with respect to ground and the product would not be safe.
9. Grounding of the temperature sensor shield. In some installations it is common practice to replace the temperature sensor while the unit is still powered up. Under these conditions, as additional protection against electric shock, we recommend that the shield of the temperature sensor is grounded. Do not rely on grounding through the framework of the machine.
10. Over Temperature Protection. To prevent overheating of the process under fault conditions, a separate over-temperature protection unit should be fitted which will isolate the heating circuit. This must have an independent temperature sensor. Alarm relays within the unit will not give protection under all failure conditions.
11. Isopropyl alcohol, water or water based products may be used to clean labels. A mild soap solution may be used to clean other exterior surfaces.
12. Before removing a unit from its sleeve, disconnect the supply and wait at least two minutes to allow capacitors to discharge. Avoid touching the exposed electronics of an unit when withdrawing it from the sleeve.
13. This unit is intended for industrial temperature and process control applications within the requirements of the European Directives on Safety and EMC.

USB Device Precautions

ⓘ **Note:** the use of U3 USB Flash drives is not recommended.

1. Precautions against electrostatic discharge should be taken when the unit terminals are being accessed. The USB and Ethernet connections are particularly vulnerable.
2. Ideally, the USB device should be plugged directly into the unit, as the use of extension leads may compromise the unit's ESD compliance. Where the unit is being used in an electrically 'noisy' environment, however, it is recommended that the user brings the USB socket to front of panel using a short extension lead. This is because the USB may 'lock up' or reset in noisy environments and the only means of recovery is to remove the device, then reinsert it. EMC-related failure during a write operation might cause corruption of the data held on a USB memory stick. For this reason, the data on the memory stick should be backed up before insertion and checked after removal.
3. When using a USB extension cable, a high quality screened cable must be used with a maximum length of 3 metres (10ft.).

nanodac ⟨GB⟩

Installation Guide

nanodac is a ¼ DIN instrument that combines graphical recording with precise PID control. Four high accuracy universal analogue inputs may be configured to provide data recording or two control loops. Secure recording and archiving strategies provide compliance with industry standards.

It has the following features:
- Crystal clear 1/4 VGA operator display
- Dual Programmer
- Cascade control with autotune
- EtherNet/IP client or server mode
- Webserver
- OEM security
- 1 x logic I/O, 2 x isolated DC outputs
- Steriliser and humidity application blocks

Further information is available in the *nanodac User Manual*, part number HA30554, which may be downloaded from www.eurotherm.co.uk.

Rear Terminals

The screw terminals accept wire sizes in the range:
Single wire 0.205 to 2.08 mm² (14 to 24 AWG). Two wires 0.205 to 1.31 mm² (16 to 24 AWG) inclusive. Screw terminals should be tightened to a torque not exceeding 0.4 Nm (3.54 lbin).
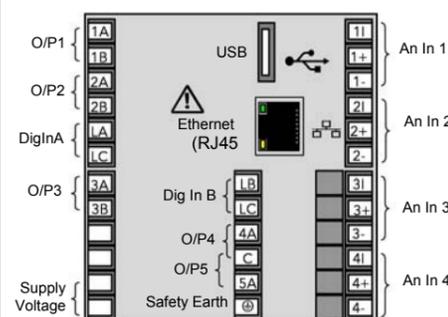
Mains (Line) voltage supply wiring

100 to 230Vac ±15%,
48 to 62Hz
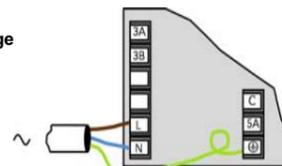
Low voltage option supply wiring

24Vac (−15%, +10%),
48 to 62Hz
or 24Vdc (−15%, +20%)

O/P1

Contact closure	Logic O/P (active high)	Relay output	Isolated DC O/P (mA)
R>50Ω = inactive R<150Ω = active		com no	

O/P2

Isolated DC O/P (mA)	Logic O/P (active high)	Relay output
		com no
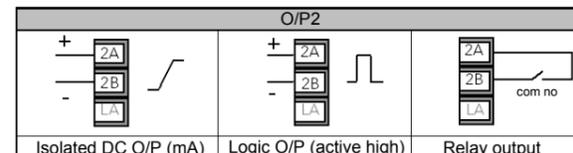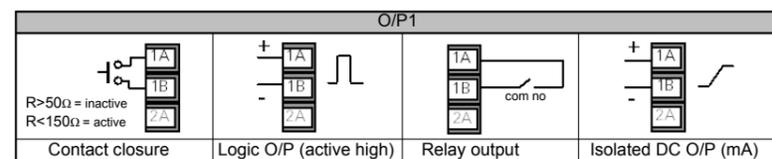
Use copper conductors only.

The power supply input is not fuse protected. This should be provided externally.

O/P3	Dig In A	Dig In B	O/P4; O/P5
Relay output	Isolated DC O/P (mA/V)	Contact closure	Relay output
		Contact closure	

R>600Ω = inactive
R<300Ω = active
Internal link (0V)
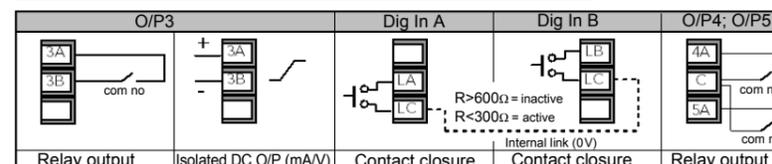
Each wire connected to LA, LB and LC must be less than 30 metres in length
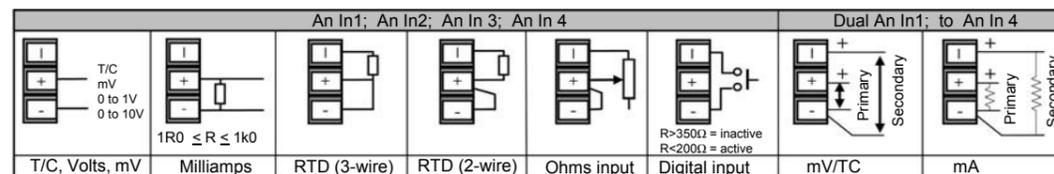
Communications

Ethernet
(10/100baseT)

Pin	Function
8	not connected
7	not connected
6	Rx−
5	not connected
4	not connected
3	Rx+
2	Tx−
1	Tx+

green ▼
amber ▲

LEDs:
Green= link connected
Amber= network activity

An In1; An In2; An In 3; An In 4

T/C, Volts, mV	Milliamps	RTD (3-wire)	RTD (2-wire)	Ohms input	Digital input
T/C mV 0 to 1V 0 to 10V	1R0 ≤ R ≤ 1k0				R>350Ω = inactive R<200Ω = active

Dual An In1; to An In 4

mV/TC	mA
Primary / Secondary	Primary / Secondary