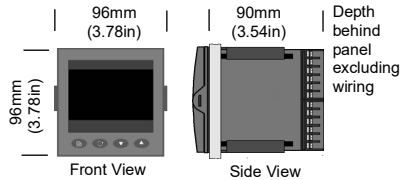


Mechanical Installation



Panel Cutout

92 mm (3.62 in) × 92 mm (3.62 in)
[both −0 +0.8 mm (0.03 in)]
Minimum inter-unit spacing
Horizontal = 10 mm (0.4 in).
Vertical = 38 mm (1.5 in)

Labeling

Symbols used on this instrument

One or more of the symbols may appear as a part of the instrument labeling.
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.
	This unit is CE approved.
	C-Tick mark for Australia (ACA) and New Zealand (RSM).
	Underwriters laboratories listed mark for Canada and the U.S.
	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 connector.
	Protective-conductor terminal(Earth)

Restriction of Hazardous Substances (RoHS)

China RoHS Compliance - Nanodac

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的规定编制。
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.

Specification

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 °C
	Storage:	−20 to +70 °C
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 150 Hz 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:		0.44 kg (15.52 ozs)
Operator Interface			
Display:			3.5" TFT colour display (320 pixels wide × 240 pixels high) Four navigation pushbuttons below the display screen (Page, Scroll, Lower, Raise)

Controls

Power requirements

Supply voltage:		
	Standard:	100 to 230 Vac ±15% at 48 to 62Hz
	Low voltage:	24 Vac (+10% −15%) at 48 to 62Hz, or 24 Vdc (+20% −15%)
Power dissipation:		9W (max.)
Fuse type:		No internal fuse fitted
Interrupt protection:		
	Standard:	Holdup >20 ms at 85 V RMS supply voltage
	Low voltage:	Holdup >20 ms at 20.4 V 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 °C ≤±3.5 ppm
RTC Ageing:	First year to 10 year ≤± 5 ppm
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 (110 yards)
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:	1.5 MBit/s (low speed device)
Maximum current:	<100 mA
Peripherals supported:	Memory stick (8 GB max), bar code reader, QWERTY keyboard

Update/Archive rates

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

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) Freely configurable	
Input type mix:	8Hz (125ms); 4Hz (250ms) dual i/p	
Sample rate:	16 bit delta sigma	
Conversion method:	See Table 1 and Table 2	
Input ranges:		

Mains rejection (48 to 62Hz)		
Series mode:	> 95dB	
Common mode:	>179dB	
Common mode voltage:	250 Vac max.	
Series mode voltage:	280 mV at lowest range; 5 V peak to peak at highest range	
Input Impedance:	40 mV, 80 mV, 2 V ranges > 100 MΩ;	
	62.5 kΩ for input voltages > 5.6 V 667 kΩ for input ranges < 5.6 V	

Overvoltage protection		
Continuous:	±30 V RMS	
Transient (<1ms):	±200 V 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:	40 mV, 80 mV 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:	2500 Vac	
Channel to Ground:	1500 Vac	

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

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 °C)
Resolution:	0.05 °C
Calibration error:	±0.31 °C ±0.023% of measurement in °C at 25 °C ambient
Temperature coefficient:	±0.01 °C / °C ±25 ppm/ °C measurement in °C from 25 °C ambient
Measurement noise:	0.05 °C 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 °C)	Temperature performance
0Ω	400Ω	20 mΩ	120mΩ + 0.023% of reading	25 ppm of input per °C

Table 2: Ohms (RTD) input ranges

RTD type	Overall range (°C)	Standard	Max. linearisation (°C)
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 °C max., with instrument at 25 °C
Internal CJC rejection ratio:	40:1 from 25 °C
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 (°C)	Standard	Max. lin. error (°C)
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:	+11 V min.; +13 V max.
Short circuit output current:	6 mA min. (steady state); 44 mA max. (switch current)

Inactive (current off) current sourcing logic output

(O/P1 or O/P2 only)	
Voltage o/p across terminals:	0V (min.); 300 mV (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:	0 mA (min.); 44 mA (max.)
	Input at 0V:	6 mA min. (steady state); 44 mA max. (switch current)
Open circuit input voltage:		11 V (min.); 13 V (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 230 V RMS ±15% Min. 100 mA (5 mA) at 12 V
Maximum current through terminals:	2A (1A)

Digital Inputs

Dig InA and Dig InB contact closure logic input

Contact Closure	
Short circuit sensing current (source):	5.5 mA (min.); 6.5 mA (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 20 mA
Load resistance:	500Ω max.
Calibration accuracy:	< ±100 µA ±1% of reading
Voltage outputs (OP3 only)	
Output ranges:	Configurable within 0 to 10 V
Load resistance:	500Ω min.
Calibration accuracy:	< ±50 mV ±1% of reading
General	
Isolation:	300 V RMS or dc (double insulation)
Resolution:	relays to common electronics
Thermal drift:	> 11 bits < 100 ppm/ °C

Safety Notes

Warning: This product can expose you to chemicals including lead and lead compounds which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to: <https://www.P65Warnings.ca.gov>

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 100–230 Vac, fuse type: T rated 2A 250V
- 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.
- 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.
- Where conductive pollution (e.g. condensation, carbon dust) is likely, adequate air conditioning/ filtering/ sealing, etc. must be installed in the enclosure.
- 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.
- If the unit is used in a manner not specified by the manufacturer, the protection provided by the equipment might be impaired.
- Installation must only be carried out by suitably qualified personnel.
- 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 240 Vac 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.

- The maximum continuous voltage applied between any of the following terminals must not exceed 240 Vac:
 - 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 240 Vac with respect to ground and the product would not be safe.
- 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.
- 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.
- 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.
- 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.
- 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.

- Precautions against electrostatic discharge should be taken when the unit terminals are being accessed. The USB and Ethernet connections are particularly vulnerable.
- 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.
- When using a USB extension cable, a high quality screened cable must be used with a maximum length of 3 metres (10ft.).

Eurotherm: International Sales and Support

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Scan for local contacts

<https://www.eurotherm.com>

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Product Tools Updates



<https://www.eurotherm.com/en/products/temperature-controllers-en/software/eurotherm-itools/>

Eurotherm[®]
by Watlow

GB

nanodac

Installation Sheet

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 <https://www.eurotherm.com>.

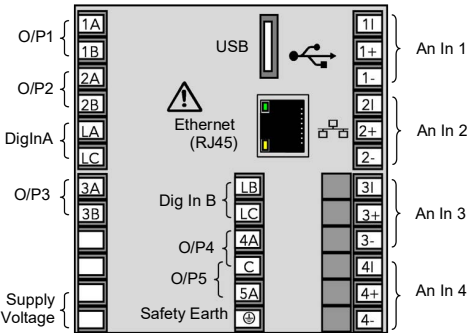


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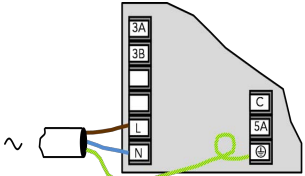


Rear Terminals



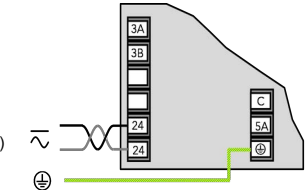
Mains (Line) voltage supply wiring

100 to 230 Vac $\pm 15\%$,
48 to 62 Hz

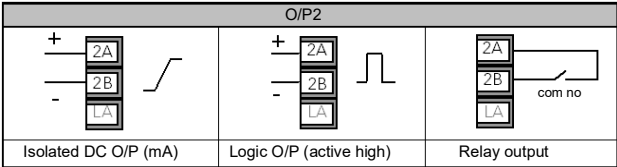
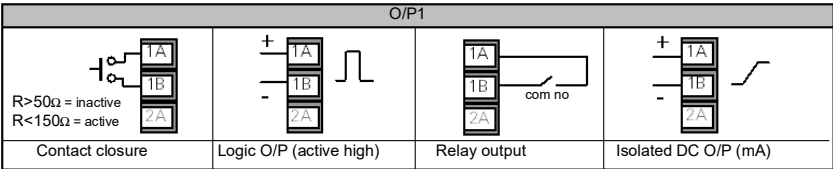


Low voltage option supply wiring

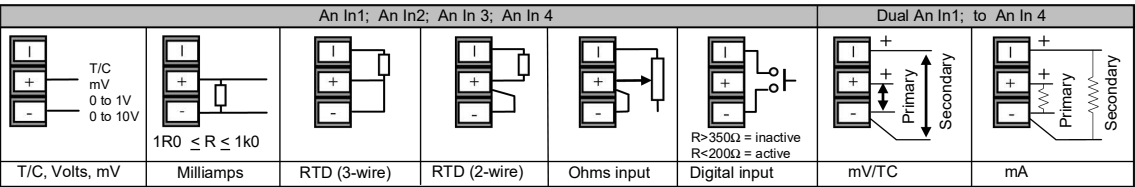
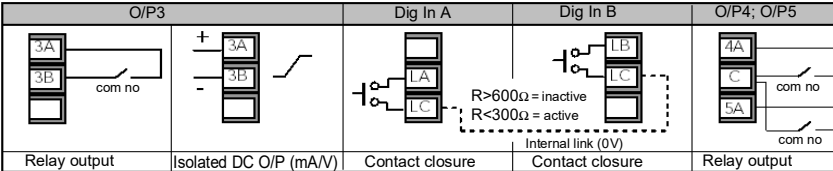
24 Vac (-15% , $+10\%$),
48 to 62 Hz
or 24 Vdc (-15% , $+20\%$)



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 1.31mm² (16 to 24 AWG) inclusive.
Screw terminals should be tightened to a torque not exceeding 0.4 Nm (3.54lbin).



Use copper conductors only.
The power supply input is not fuse protected. This should be provided externally.



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+

LEDs:
Green= link connected
Amber= network activity

Each wire connected to LA, LB and LC must be less than 30 metres in length.