The nanodac™ recorder/controller offers the ultimate in graphical recording combined with PID control for a box of its size. The compact ¼ DIN panel mount unit offers four high accuracy universal inputs for data recording and PID control. This secure data recording device with accurate control is enhanced by a full colour, ¼ VGA display to bring a crystal clear operator interface to even the smallest of machines.

Crystal clear, colour display

The 3.5” TFT display offers incredibly clear visualisation of process parameters with a wide selection of configurable views to best suit the application. Views include: Horizontal and vertical trends, Horizontal and vertical bar graphs, Numeric, Alarm panel, Alarm status, and control loops. The unit also provides user wiring from the front of the product for detailed configuration without the need to connect to a PC.

Data Acquisition and Recording

The nanodac™ recording functionality utilises the secure strategies and UHH format developed by Eurotherm through years of recording expertise. As well as multiple real-time views and historical review on the product, multiple data archiving strategies are provided utilising the 50MB onboard Flash memory, removable USB and data transfer via FTP to a specified server. The four universal input channels provide high accuracy (suitable for use in Nadcap applications) and 125ms parallel sampling. An additional 30 virtual channels can be utilised to provide maths, counter, slave communications and totaliser functionality within the instrument.

- Secure data recording
- 2 PID control loops
- Dual programmer
- High accuracy universal inputs
- USB removable data storage facility
- Compact design
- 50MB flash memory
- Ethernet communications
- ¼ VGA crystal clear display
- 30 virtual channels
- Steriliser Application Block
- Relative Humidity Application Block
- Multiple I/O options
- Cascade with auto-tune
- Multi-language support (French, German, Italian and Spanish)
- Webserver

Bigger  Better  Smaller
PID Control Loops

The nanodac instrument can also provide up to three independent control loops (optional). This control functionality utilises the advanced Eurotherm PID algorithm providing high performance and reliability to your process. Functionality includes one of the best autotune facilities available along with overshoot inhibition (cutbacks); compensation for power fluctuations using power feedforward; linear, fan, oil and water cooling.

Heat Treatment is one of the many processes that often need to vary the setpoint of the control process over a set period of time; this is achieved by using a set-point program. The nanodac offers an optional Dual Programmer supporting up to 100 programs locally, each program supporting 25 segments. The nanodac also provides remote access to a further 100 programs that can be easily retrieved via FTP or USB memory stick.

Specification

General

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</table>

Environmental performance

| Operating:             | 0 to 55°C |
| Storage:               | –20 to +70°C |
| Humidity:              | 5% to 85% RH non condensing |
| Protection:            | IP65 |
| Front panel washdown:  | IP66, NEMA 12 (International) |
| Behind panel:          | IP10 (International) |
| Shock/Vibration:       | ≤2000 m/s² |
| Altitude:              | Not suitable for use in explosive or corrosive atmospheres |
| Electrical safety:     | BS EN61010-1 (Installation category II; Pollution degree 2) |
| Electromagnetic compatibility |
| Emissions:             | 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:              | AMS2750D compliant |
| RoHS EU:               | China |
| Packaging:             | BS61131-2 section 2.1.3.3. |

Physical

| Panel mounting:        | 1/4 DIN |
| Weight: Instrument only: | 0.44kg (15.52ozs) |
| Panel cutout dimension: | 92 mm x 92 mm (both -0.0 +0.8) |
| Depth behind panel:    | 90 mm (3.54 in) excluding wiring |

Operator interface

| Display:               | 3.5” TFT colour display |
| Controls:              | Four navigation pushbuttons below the display screen (Page, Scroll, Lower and 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 >10ms at 85V RMS supply voltage |
| Low voltage:           | Holdup >10ms at 20.4V RMS supply voltage |

Battery backup

| Stored data:           | Time, date |
| Replacement period:    | Three years typical |
| Clock (real-time clock): | Minimum of 1 year with unit unpowered |
| Temperature stability: | 0 to 55°C ≤ ±3.5ppm |
| RTC Aging:             | Poly-carbononfluoride/lithium (BR2330) (PA260195) |
| Replace battery with Panasonic BR2330/BE only. Use of another battery may present a risk of fire or explosion. See owners manual for safety instructions. |

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, EtherNet/IP client/server |
| Cable type:            | Category 5 |
| Maximum length:        | 100 metres (110 yards) |
| Termination:           | RJ45 |
| Green LED Iuminated = 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/sec (low speed device) |
| Maximum current:       | <100mA |
| Peripherals supported: | Memory stick (8GB max), Bar code reader, QWERTY keyboard |

Update/Archive rates

| Sample rate (input/output): | BH2 |
| BH max.                     | 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, dual TC, Thermocouple, RTD (2-wire and 3-wire), Digital (Contact closure) |
| Conversion method: | 16 bit delta sigma |
| Low Input Voltage: | 4Hz (250ms) if dual input enabled |
| Common voltage:   | >95dB |
| Common mode voltage: | >179dB |
| Common mode voltage: | 250V ac max. |
| Series mode:      | 280mV at lowest range; 5V peak to peak at highest range |
| Input Impedance:  | 40mΩ, 80mΩ, 2 V ranges > 100mΩ; 62.5kΩ for input voltages > 5.6V; 667kΩ for input ranges < 5.6V |
| Overvoltage protection: | ±30V RMS |
| Continuous:       | ±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: | 12.5kΩ |
| Shunt (mA inputs only): | 1Ω to 1KΩ mounted externally |
| Additional error due to shunt: | 0.1% of Input |
Isolation:
- Channel to Channel: 300V RMS or dc (Double insulation)
- Channel to common electronics: 300V RMS or dc (Double insulation)
- Channel to ground: 300V RMS or dc (Double insulation)
- Dielectric strength Test: BS EN61010, 1 minute type test

Note: If Dual Channel mode enabled primary and secondary inputs are not electrically isolated from each other.

**Upscale/downscale drive:** High, low or none independently configurable

**Dielectric strength Test:** BS EN61010, 1 minute type test

**Types, ranges and accuracies:** See Table 4

**Temperature scale:** ITS90

**Thermocouple data**
- Pt100 figures
  - Range: 0 to 400Ω (–200 to +850°C)
  - Maximum source current: 200μA
  - Types, ranges and accuracies: See Table 3
  - Temperature scale: ITS90

**Resistance input ranges**
- Isolation:
  - 0Ω 400Ω 20mΩ 120mΩ +0.023% of reading 25ppm of input per °C
- Low Range High Range Resolution Maximum error Temperature Performance
- –3V 10V 500μV +0.044% of reading +0.063% of reading 45ppm of input per °C
- –2V 2V 82μV +0.044% of reading 25ppm of input per °C
- –2V 2V 82μV +0.044% of reading 25ppm of input per °C

**Voltage input ranges**
- Low Range High Range Resolution Maximum error Temperature Performance
- 0Ω 400Ω 20mΩ 120mΩ +0.023% of reading 25ppm of input per °C

**Channel to common**
- Voltage output across terminals: 0V (min.); 300mV (max.)
- Short circuit output current: 0mA (min.); 44mA max. (switch current)
- Isolation: 300V ac double insulated from instrument and other I/O
- Resolution: >11 bits
- Thermal drift: <100ppm/°C

**Channel to Ground**
- Voltage output across terminals: +11V min.; +13V max.
- Short circuit output current: 6mA min. (steady state); 44mA max. (switch current)
- Isolation: 300V ac double insulated from instrument and other I/O
- Resolution: >11 bits
- Thermal drift: <100ppm/°C

**Channel to Channel**
- Voltage output across terminals: +11V min.; +13V max.
- Short circuit output current: 6mA min. (steady state); 44mA max. (switch current)
- Isolation: 300V ac double insulated from instrument and other I/O
- Resolution: >11 bits
- Thermal drift: <100ppm/°C

**Note:** 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 4000 (–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 ±25ppm/°C measurement in °C
  - Measurement noise: 0.05°C peak-peak with 1.6s input filter
  - Linearity error: 0.0033% (best fit straight line)
  - Lead resistance: 0 to 22Ω matched lead resistances
  - Bulb current: 200μA nominal

**Internal CJC rejection ratio:** 40:1 from 25°C ambient

**Calibration accuracy:** <±100μA ±1% of reading

**Lead resistance:** 0 to 22Ω matched lead resistances

**Channel to common**
- Voltage output across terminals: 0V (min.); 300mV (max.)
- Short circuit output current: 0mA (min.); 44mA max. (switch current)
- Closed circuit (active) resistance: 0Ω (min.); 150Ω (max.)

**Relay and Logic I/O**
- O/P1, O/P2 and O/P3 logic I/O and relay specification

**Active (current on) contact closure logic output**
- (O/P1 or O/P2 only)
  - Input current
    - Input at 12V: 0mA (min.); 44mA max.
    - Input at 0V: 6mA min. (steady state); 44mA max. (switch current)
  - Output source leakage
    - current into short circuit: 0μA (min.); 100μA (max.)

**Relay contacts**
- Contact switching power (resistive):
  - Max. 2A at 230V RMS ±15%
  - Min. 100mA at 12V
- Current through terminals: 2A

**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)**
- O/P1, O/P2, O/P3 DC analogue outputs

**Current outputs**
- Configurable within 0 to 20mA
- Load resistance: 500Ω max.
- Calibration accuracy:
  - <100μA ±1% of reading

**Voltage outputs**
- O/P3 only
  - Voltage output across terminals: 0V (min.); 300mV (max.)
  - Short circuit output current: 0μA (min.); 100μA (max.)

**General**
- Isolation: 300V ac double insulated from instrument and other I/O
- Resolution: >11 bits
- Thermal drift: <100ppm/°C

* Consult Factory
† Refer to Manual

- Table 4 Thermocouple types, ranges and accuracies

**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 ambient
- Internal CJC rejection ratio: 40:1 from 25°C ambient
- 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**
- Overall range (°C)
- Standard
- Max. linearisation error
- 0 to ±1820
- IEC684.1
- 0 to 400°C = ±1.7°C
- 400 to 1820°C = ±0.000°C
- Cooling (source): 5.5mA (min.); 6.5mA (max.)
- Closed circuit (active) resistance: 0Ω (min.); 150Ω (max.)

**Table 4 Thermocouple types, ranges and accuracies**

**Table 3 RTD type details**

**Table 2 Ohms (RTD) input ranges**

**Table 1 Voltage input ranges**

**Table 3 Digital inputs**

**Table 2 Thermocouple types, ranges and accuracies**

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**Termination details**

The screw terminals accept wire sizes in the range:
- Single wire 0.205 to 2.08mm² (14 to 24 AWG)
- 2 wires 0.205 to 1.31mm² (16 to 24 AWG) inclusive.

Screw terminals should be tightened to a torque not exceeding 0.4Nm (3.54 lb in).

**O/P1**

- Contact closure
- Logic O/P (active high)
- Relay output
- Isolated DC O/P (mA)

**O/P2**

- Isolated DC O/P (mA)
- Logic O/P (active high)
- Relay output

**O/P3**

- Relay output
- Isolated DC O/P (mA / V)
- Contact closure
- Contact closure
- Relay output

**An In 1, An In 2, An In 3, An In 4**

- T/C, Volts, millivolts
- Milliamps
- FTD (three wire)
- RTD (two wire)
- Ohms
- Digital
- mV/TC
- mA

**Dual An In 1 to An In 4**

- Primary
- Secondary
- Primary
- Secondary