The nanodac™ Boiler Controller/Recorder offers the ultimate in graphical recording combined with PID control for a box of its size. The compact 1/4 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 color, 1/4 VGA display to bring a crystal clear operator interface to even the smallest of process control needs.

**Crystal clear, color display**
The 3.5" TFT display offers incredibly clear visualization 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 utilizes 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 utilizing the 50MB onboard Flash memory, removable USB and data transfer via FTP to a specified server. The four standard universal input channels provide high accuracy and 125ms parallel sampling. An additional 30 virtual channels can be utilized to provide math, counter, slave communications and totalizer functionality all within the nanodac™ Boiler Controller/Recorder.

- One, Two or Three Element Control
- Onboard Secure Data Recording
- High Accuracy Analog Inputs (4 standard–max of 8)
- Multi-use USB Port
- Compact Design with UL Approval
- Built-in Web Server for Remote Connection
- Ethernet Communications
- Up to 30 Virtual Channels
- Multiple I/O Options
- Multi-language Support
- Free Programming Software
- 1/4 VGA Crystal Clear Display
- Simple 4 Button Operation
- Multiple Security Levels for Complete Ease of Use

**PID Control Loops**

The nanodac instrument can also provide up to three independent control loops (optional). This control functionality utilizes 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.

Often times processes 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

<table>
<thead>
<tr>
<th>I/O types Analog i/p:</th>
<th>Four/eight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital i/p:</td>
<td>Two</td>
</tr>
<tr>
<td>Digital (logic) o/p:</td>
<td>Two max (see order code)</td>
</tr>
<tr>
<td>Relay o/p:</td>
<td>Four max (see order code)</td>
</tr>
<tr>
<td>DC output:</td>
<td>Three max (see order code)</td>
</tr>
<tr>
<td>Features:</td>
<td>Modbus TCP master/slave (optional) USB configuration save/restore Programmer (optional) Two control loops (optional) Zirconia probe support (optional) 30 Virtual channels (each configurable as counter, maths, totalizer or comms input) Sterilizer (optional) Relative humidity (optional) Customized start up screen EtherNet/IP*</td>
</tr>
</tbody>
</table>

### 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: IP66
  - Front panel washdown: IP66, NEMA 12 (International)
  - Behind panel: IP10 (International)
- Shock/Vibration: 0.5 to 150 Hz at 1g; 1 octave per min. (class B)
- 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: BS EN61236 Class B – Light industrial BS EN61236 Class A – Heavy industrial BS EN61236 Industrial

### Other approvals and compliance details

- General: CE and cUL, EN61010
- PV input: AMS2750D compliant China
- RoHS EU: BS61131-2 section 2.1.3.3.

### Physical

- Panel mounting: 1/4 DIN
- Weight: 0.44kg (15.52ozs)
- Panel cutout dimension: 92 mm x 92 mm (both -0.0 +0.8) or 3.62 in x 3.62 in (both -0.00 +0.03 in)
- Depth behind panel: 90 mm (3.54 in) excluding wiring

### Operator interface

- Display: 3.5" TFT color display (320 pixels wide x 240 pixels high)
- 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
- Interlock 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) data:
  - Support time: Minimum of 1 year with unit unpowered
  - Temperature stability: First year to 20 years ± 5ppm
  - Type: Poly-carbonmonofluoride/lithium (BR2330) (PA260195)

### Ethernet communications

- Type: Modbus TCP/IP master/slave, EtherNet/IP client/server
- Cable type: Category 5
- 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): 8Hz
- Archive sample value: Latest value at archive time
- Display value: Latest value at display update time

### Analog 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)
- Input type mix:
  - Freely configurable
  - Sample rate: 8Hz (125ms)
  - 4Hz (250ms) if dual input enabled
- Conversion method: 16 bit delta sigma
- Input ranges:
  - See Table 1 and Table 2
- Mains rejection (48 to 62Hz):
  - Series mode: >95dB
  - Common mode: >170dB
- 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
  - 66kΩ 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 recognition response with no associated dc errors
- Recognition time: <3 seconds
- 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)
- Note: If Dual Channel mode enabled primary and secondary inputs are not electrically isolated from each other.

**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
- Channel to Channel: 2500V ac
- Channel to Ground: 1500V ac

**Isolation:**
- Restricted to 2000mV if dual input mode enabled

**Resistance input ranges**
- Temperature scale: ITS90
- Types, ranges and accuracies: See Table 3

<table>
<thead>
<tr>
<th>Low Range</th>
<th>High Range</th>
<th>Resolution</th>
<th>Maximum error (Instrument at 25°C)</th>
<th>Temperature Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>–400mV</td>
<td>400mV</td>
<td>9.1μV</td>
<td>4.4μV + 0.005% of reading</td>
<td>13ppm of input per °C</td>
</tr>
<tr>
<td>–2V</td>
<td>2V</td>
<td>82μV</td>
<td>429μV + 0.044% of reading</td>
<td>13ppm of input per °C</td>
</tr>
<tr>
<td>–3V</td>
<td>10V</td>
<td>500μV</td>
<td>1.58μV + 0.003% of reading</td>
<td>45ppm of input per °C</td>
</tr>
</tbody>
</table>

Table 1 Voltage input ranges

**Note:** Restricted to 2000mV if dual input mode enabled

**Thermocouple data**
- Temperature scale: ITS90
- Types, ranges and accuracies: See Table 4

**RTD Type**
- Cu10
- Cu50
- JPT100
- Ni100
- Ni200
- Pt100
- Pt100A

**Voltage output across terminals:**
- 0V (min.); 300mV (max.)

**D C Output (option)**
- (O/P1, O/P2 and O/P3) DC analog outputs
- Current outputs
  - (O/P1, O/P2 and O/P3)
  - Calibration accuracy: <±100μA ±1% of reading
- Voltage outputs
  - (O/P3 only)
  - Calibration accuracy: 300V ac double insulated from instrument and other I/O

**Relay and Logic I/O**
- O/P1, O/P2 and O/P3 logic I/O and relay specification
- 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): 500Ω (min.); = (max.)
- Closed circuit (active resistance): 0Ω (min.); 300Ω (max.)
### Order Code

<table>
<thead>
<tr>
<th>Code</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>NANODAC</td>
<td>Graphical Recorder/Controller</td>
</tr>
<tr>
<td>1</td>
<td>Supply Voltage</td>
</tr>
<tr>
<td>VH</td>
<td>100-230V ac ±15% at 48-62Hz</td>
</tr>
<tr>
<td>VL</td>
<td>24V ac (+10% ~15%) at 48-62Hz, or 24V dc (+20% ~15%)</td>
</tr>
<tr>
<td>2</td>
<td>Controller</td>
</tr>
<tr>
<td>X</td>
<td>None (default)</td>
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<tr>
<td>C</td>
<td>2 Control loops</td>
</tr>
<tr>
<td>A</td>
<td>Advanced control loop (includes 2 control loops)</td>
</tr>
<tr>
<td>3</td>
<td>Programmer</td>
</tr>
<tr>
<td>X</td>
<td>None (default)</td>
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<tr>
<td>P</td>
<td>Dual programmer</td>
</tr>
<tr>
<td>4</td>
<td>Output Options 1-2-3</td>
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<tr>
<td>LRR</td>
<td>Logic/Relay/Relay (default)</td>
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<tr>
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<td>Logic/Relay/Iso DC output</td>
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<td>Logic/Logic/Relay</td>
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<tr>
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<td>Relay/Iso DC/Iso DC</td>
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<tr>
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<td>Iso DC/Iso DC/Iso DC</td>
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<td>LDD</td>
<td>Logic/Iso DC/Iso DC</td>
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<td>Communications Protocol</td>
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<td>Modbus TCP/IP slave (default)</td>
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<td>Modbus TCP/IP master</td>
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<tr>
<td>ES</td>
<td>EtherNet/IP* client/server</td>
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<tr>
<td>TE</td>
<td>Modbus TCP Master and EtherNet/IP*</td>
</tr>
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<td>7</td>
<td>Bezel</td>
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<tr>
<td>SV</td>
<td>Silver (standard)</td>
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<td>WD</td>
<td>Wash down front*</td>
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<td>8</td>
<td>Toolkit Blocks</td>
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<td>BASIC</td>
<td>Basic toolkit blocks</td>
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<td>9</td>
<td>Operating Language</td>
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<td>ENG</td>
<td>English (default)</td>
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<td>FRA</td>
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<td>German</td>
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<td>Spanish</td>
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<td>Labels</td>
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<td>Special</td>
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<td>XXXXX</td>
<td>Default</td>
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<tr>
<td>13</td>
<td>Dual Input Channels</td>
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<tr>
<td>07</td>
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<tr>
<td>08</td>
<td>8 inputs enabled</td>
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<td>14</td>
<td>Dual Thermocouple Support</td>
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<tr>
<td>XXX</td>
<td>None</td>
</tr>
<tr>
<td>TC</td>
<td>Dual T/C support enabled</td>
</tr>
</tbody>
</table>

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**Installation**

- **Panel cutout:** 92mm (3.62in) x 92mm (3.62in) (both -0 + 0.8mm (0.03in))
- **Minimum inter-unit spacing:**
  - Horizontal (‘x’) = 10mm (0.4in)
  - Vertical (‘y’) = 38mm (1.5in)