Model 144H

PC-Programmable Temperature Transmitter

FEATURES
• Configurable using the Model 144C Configuration Interface hardware and software
• Programmable via standard personal computer (PC)
• DIN Form B/A head mounting
• 3-wire RTD configuration
• Programmable alarm levels

KEY SPECIFICATIONS
• Accuracy: 0.1% of span or 0.3 °C, whichever is greater.
• Pt 100 and Ni 100 inputs
• Open sensor detection
• CENELEC EEx ia IIC T1 to T6 Intrinsic Safety
• Flameproof Operations (Zones 1 or 2) EEx de IIC T6 (T_{ambient} = –40 to 60 °C)

COMPLETE POINT SOLUTIONS™
• Installation ready
• Complete temperature measurement assembly includes:
  • Pre-calibrated, pre-wired, and pre-configured transmitter
  • Temperature sensor
  • Extension
  • Thermowell
• Assembly is ready to be tapped into the process
• Easy to order transmitter sensor assembly option
INTRODUCTION

The Rosemount® Model 144H PC-Programmable Temperature Transmitter is configurable using the Model 144C Configuration Interface hardware and software. The transmitter converts RTD input to 4–20 mA, 2-wire output that is less susceptible to electrical noise.

FEATURES

- Capability to linearize RTD inputs with temperature
- Electronics encapsulated in epoxy and enclosed in a plastic housing, making the transmitter durable and ensuring long-term reliability
- Compact size with multiple enclosure options, allowing mounting flexibility for the control room or in the field

The Model 144H can be installed either in a DIN Form B/A connection-head, mounted directly on a sensor assembly, or mounted remotely from a sensor assembly using a pre-mounted junction box or DIN rail clip.

Rosemount Inc. has a full range of compatible connection-heads, sensors, and thermowells that provide complete assemblies for process temperature measurements. For DIN-style sensors and accessories refer to the Rosemount Temperature Sensors and Accessories for Temperature Transmitter Assemblies Product Data Sheet.

Rosemount Complete Point Solutions™

The Rosemount® Complete Point Solutions™ program provides fully engineered measurement solutions, combining the best products and practices for improved performance, reliability and cost of ownership.

Rosemount Inc. will supply the complete temperature measurement assembly, including transmitter, sensor, connection-head, extension and thermowell. When you purchase the complete measurement assembly from Rosemount Inc., you need only remove it from the box, tap into the process, and make electrical connections.

To order Rosemount temperature sensors and accessories, refer to the Temperature Sensors and Accessories for Temperature Transmitter Assemblies Product Data Sheet.

TRANSMITTER DESCRIPTION

Inputs

The Model 144H PC-Programmable Temperature Transmitter is compatible with 3-wire RTDs as well as resistance inputs(1). The sensor type and configuration are software-selectable using the Model 144C Configuration Interface hardware and software.

Platinum RTDs to IEC 751 (α = 0.00385)

- 3-wire
- Pt 100
- –200 to 850 °C (–328 to 1562 °F)

Nickel RTDs to DIN 43760

- 3-wire
- Ni 100
- –60 to 250 °C (–76 to 482 °F)

Linear resistance

- 0 to 10 kΩ

(1) In case of 2-wire connection, terminals three and four are to be short circuited on the transmitter (no cable compensation).
The analog 2-wire output of 4–20 mA can be reversed to a 20–4 mA signal or set up to supply a fixed mA signal (input is disabled). Maximum load is dependent on the supply voltage, as $R_{\text{load max}} (\Omega) = (V_{\text{supply}} - 8 \text{ V}) / 0.023 \text{ A}$.

**TRANSMITTER CONFIGURATION SYSTEM**

**System Requirements**

Table 1 shows the recommended computer hardware and software for complete functionality of the Model 144C Configuration Interface software.

### TABLE 1. Recommended Computer Hardware and Software.

<table>
<thead>
<tr>
<th>Hardware/Software</th>
<th>Minimum Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Compatible PC:</td>
<td>Pentium processor</td>
</tr>
<tr>
<td>Memory:</td>
<td>16 MB accessible memory</td>
</tr>
<tr>
<td>Hard Drive:</td>
<td>10 MB</td>
</tr>
<tr>
<td>Display (Monitor):</td>
<td>CGA, HCG, EGA, OR VGA</td>
</tr>
<tr>
<td>Resolution:</td>
<td>800 x 600</td>
</tr>
<tr>
<td>Operating System:</td>
<td>Microsoft® Windows® 95, Windows 98, or Windows NT</td>
</tr>
<tr>
<td>Printer (optional):</td>
<td>Epson or IBM compatible ASCII printer</td>
</tr>
<tr>
<td>Mouse (optional):</td>
<td>Microsoft compatible mouse</td>
</tr>
</tbody>
</table>

**Model 144C Configuration Interface**

The Model 144C Configuration Interface is a portable, self-contained communication link between your PC and the Model 144H temperature transmitter.

The Model 144C Configuration Interface connects to the serial port on your PC with a standard 9-pin interconnecting plug and connects to the transmitter with two MINIGRABBER™ clips. Power to operate the Model 144C Configuration Interface is provided by a replaceable 9-volt battery.

The Model 144C Configuration Interface contains the following items:

- Programming unit
- 9 pin com port connection wire
- 25 pin to 9 pin converter
- Programming software (CD ROM)

The software makes the following parameters available:

- Sensor type
- Response time (damping)
- Sensor error action (failure mode)
- Linearization
- Upper and lower range values
- Transmitter tag number (electronic tag)
- Temperature units (Celsius, Fahrenheit, Kelvin, Rankine)

Software for the Model 144C Configuration Interface is available in English and German.

**Special Mounting Considerations**

Special mounting hardware is available for mounting a Model 144H head mount temperature transmitter to a DIN rail (part number 00144–0020–0001).
SPECIFICATIONS

Functional Specifications

Supply Voltage DC
Standard: 8.0 to 35 V.
Intrinsic Safety: 8.0 to 28 V.

Minimum Voltage Across Terminals
8 V dc.

Turn-on Time
Performance within specification less than 5.0 minutes after power is applied to the transmitter.

Isolation
No input to output isolation.

Communication Interface
Model 144C Configuration Interface software.

Calibration Temperature
20 °C to 28 °C (68 °F to 82.4 °F).

Temperature Coefficient (spans greater than 100 °C)
Less than ±0.01% of configured span / °C.

Temperature Coefficient (spans less than 100°C)
±0.01 °C / °Cambient.

Ambient Temperature Limits
Operating: –40 to 85 °C (–40 °F to 185 °F).

Humidity Limits
0 to 95% relative humidity, non-condensing.
Input

<table>
<thead>
<tr>
<th>RTD type</th>
<th>Minimum Value</th>
<th>Maximum Value</th>
<th>Recommended Minimum Span</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>°C</td>
<td>°F</td>
<td>°C</td>
</tr>
<tr>
<td>Pt 100</td>
<td>−200</td>
<td>−328</td>
<td>850</td>
</tr>
<tr>
<td>Ni 100</td>
<td>−60</td>
<td>−76</td>
<td>250</td>
</tr>
<tr>
<td>Linear Resistance</td>
<td>0 kΩ</td>
<td>10 kΩ</td>
<td>30 Ω</td>
</tr>
</tbody>
</table>

Maximum Offset
50% of selected maximum value recommended.

NOTE
In order to meet specification, the minimum temperature value of span (°C) must be less than or equal to 50% of the maximum temperature in the span. For example, a span of 50 to 100 °C is recommended but a span of 75 to 100 °C is not recommended.

Maximum Cable Resistance Per Wire
10 Ω.

Sensor Current
0.2 < I < 4 mA.

Linear Resistance Input

Measurement Range
0 to 10 kΩ.

Minimum Measurement Span
30Ω.

Output

Signal Range
4–20 mA.

Update
135 milliseconds.

Load Resistance (Ω)
Less than/equal to (V supply – 8 V) / 0.023 A.

Load Stability
Less than ±0.01% of configured span / 100 Ω.

Alarm Levels

Programmable
3.5 to 4 mA downscale.
20 to 23 mA upscale.

NAMUR NE43 Upscale
21 ≤ I ≤ 23 mA.

NAMUR NE43 Downscale
I ≤ 3.6 mA.

Performance Specifications

Accuracy
See Table 4 on page 6.

Programmable Response Time (Damping)
0.33 to 60 seconds.

Linearity Error
Less than 0.1% of configured span.

Effect of Supply Voltage Change
Less than/equal to 0.005% of configured span V dc.

EMC-Immunity Influence
Less than ±0.5% of configured span.

Improved EMC Immunity
Namur NE21 A – criteria for burst < ±1% of configured span.

Vibration
IEC 68–2–6 Test FC.

Lloyd’s Specifications No. 1
4 g / (2 to 100 Hz).

Effect of Sensor Cable Resistance (3-wire)
Less than 0.002 Ω / Ω. Equal in each lead.
Hazardous Approvals

CENELEC Approvals

E1 Flameproof Operation (Zones 1 or 2).

Ex de IIC T6 (T_{ambient} = –40 to 60 °C).

Flameproof certification is only available as a complete assembly with approved Rosemount enclosures, such as Option Codes J1 or J3.

I1 Intrinsically Safe Operation (Zones 0, 1, or 2).

Ex ia IIC T1 – T4 (T_{ambient} = –40 to 85 °C).

Ex ia IIC T5 and T6 (T_{ambient} = –40 to 60 °C).

Authority Standards

EMC 89/336/EEC
Emission: EN 50 081-1.
Immunity: EN 50 082-2.

EX 76/117/EEC
EN 50 014
EN 50 020

TABLE 3. Entity Parameter.

<table>
<thead>
<tr>
<th>Power/Loop</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>U_{maxin}</td>
<td>28 V dc</td>
</tr>
<tr>
<td>I_{maxin}</td>
<td>120 mA dc</td>
</tr>
<tr>
<td>W_{maxin}</td>
<td>0.84 W</td>
</tr>
<tr>
<td>C_{eq}</td>
<td>\leq 1 nF</td>
</tr>
<tr>
<td>L_{eq}</td>
<td>\leq 10 µH</td>
</tr>
</tbody>
</table>

REFERENCE DATA

TABLE 4. Model 144H Input Options.

<table>
<thead>
<tr>
<th>Sensor Options</th>
<th>Input Ranges</th>
<th>Recommended Minimum Span(1)</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-, 3-wire RTDs</td>
<td>° C</td>
<td>° F</td>
<td>° C</td>
</tr>
<tr>
<td>Pt 100 (\alpha = 0.00385)</td>
<td>–200 to 850</td>
<td>–328 to 1562</td>
<td>25</td>
</tr>
<tr>
<td>Ni 100</td>
<td>–60 to 250</td>
<td>–76 to 482</td>
<td>25</td>
</tr>
<tr>
<td>Linear Resistance</td>
<td>0 to 10 kΩ</td>
<td></td>
<td>30 Ω</td>
</tr>
</tbody>
</table>

(1) No minimum or maximum span restrictions within the input ranges. Recommended minimum span will hold noise within accuracy specification with damping at zero seconds.
FIGURE 3. Model 144H PC-Programmable Temperature Transmitter Dimensional Drawing.

FIGURE 4. Universal Head (Junction Box).
### ORDERING INFORMATION
**Model 144H PC-Programmable Temperature Transmitter**

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>144H</td>
<td>Head Mount temperature transmitter</td>
</tr>
</tbody>
</table>

**Hazardous Area Certifications**

<table>
<thead>
<tr>
<th>Code</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>CENELEC Flameproof Approval (must have approved Rosemount enclosure, such as Option Codes J1 or J3)</td>
</tr>
<tr>
<td>I1</td>
<td>CENELEC Intrinsic Safety Approval</td>
</tr>
<tr>
<td>NA</td>
<td>No Approval</td>
</tr>
</tbody>
</table>

**Assembly Options**

<table>
<thead>
<tr>
<th>Code</th>
<th>Option Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>Assemble Transmitter to a Sensor Assembly (hand tight, Teflon® (PTFE) tape where appropriate, fully wired)</td>
</tr>
</tbody>
</table>

**Enclosure Options**

**Remote Mount**

- J1: Universal Head (Junction Box), M20 Conduit Entry, Aluminum Alloy with 50.8 mm (2-in.) Stainless Steel Pipe Bracket
- J3: Universal Head (Junction Box), 1/2–14 NPT Conduit Entry, Aluminum Alloy with 50.8 mm (2-in.) Stainless Steel Pipe Bracket

**Integral Mount**


**Configuration Options**

<table>
<thead>
<tr>
<th>Code</th>
<th>Option Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CN</td>
<td>Analog Output Levels Compliant with NAMUR Recommendation NE43; set fail low (downscale) at factory.</td>
</tr>
</tbody>
</table>

**Typical Model Number:** 144H I1 X1

1. Acceptable RTD input types are Pt 100, Ni 100, Linear Resistance (Ω) only.
2. Factory default configuration is a 3-wire Pt 100, 0 to 100 °C (32 to 212 °F). Output levels compliant with NAMUR Recommendations NE43; set fail high (upscale) at factory.
3. If no configuration information is specified by the customer, the transmitter will be configured to the factory default configuration.

### Model 144C Configuration Interface Hardware and Software

<table>
<thead>
<tr>
<th>Model</th>
<th>Product Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>144C</td>
<td>Configuration Interface hardware and software (Programming Unit, Computer Port Connection Cable, Converter, and CD ROM).</td>
</tr>
</tbody>
</table>

### Transmitter Accessories

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN Rail Mounting Kit</td>
<td>00144–0020–0001</td>
</tr>
</tbody>
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