



Level



Pressure



Flow



Temperature



Liquid  
Analysis



Registration



Systems  
Components



Services



Solutions

## Technical Information

# RIA250

### Process display

Multifunctional 1 channel display with universal input, loop power supply, limit monitor and analog output



### Application

- Plant and machine construction
- Control panels
- Laboratory fittings
- Temperature display and monitoring
- Process display and monitoring
- Process control
- Signal match and transforming

### Benefits at a glance

- All normal measurement signals can be directly connected (bipolar voltage and current, thermocouple, RTD)
- Active numeric measured value display with bar graph
- Flexible set point monitor with 2 relay contacts
- Adjustable current or voltage analog output
- Integrated loop power supply for connected sensors
- RS232 interface for setup configuration and measured value output
- Certification:



## Function and system design

### Measuring principle

The display receives an analog signal and shows the corresponding value on the display. The analog output transmits this displayed value either as a current or voltage. Two presettable limit values monitor the measured value for any infringement of the preset conditions and control the two output relays. Transmitters connected are directly powered by the unit.

### Measuring system

The presettable universal input enables direct connection of various sensors, whether current, voltage, RTD or thermocouple. Using the built-in loop power supply the unit can also power the connected sensors and then evaluate the signal returning from the sensor to the input of the unit. Two presettable set points monitor the measured value for any deviation from the preset conditions.

This opens up a number of possibilities for direct process control. The scaleable analog output offers an instrument from which a matched signal for further analysis equipment can be obtained. Simple setting up using an interface and PC program as well as manual on site setting up are available.

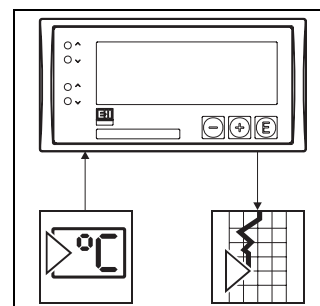
### Transmitter

Using the linearization function and the analog output, the RIA250 process display can also be applied as an easy-to-use amplifier. The large number of already stored temperature linearization tables as well as a square root function can be easily selected from the setup menu.

#### Example:

The signal from a temperature sensor is connected to the input of the unit, then linearized and displayed as a temperature value.

The analog output is made available to other instrumentation (e.g. data loggers or recorders) as a current or voltage signal proportional to the displayed value.

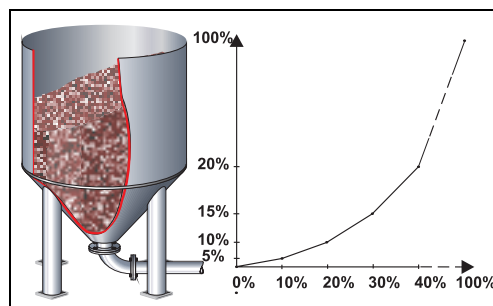


### Linearization

Up to 32 points maximum.

The RIA250 display has a built-in linearization function. It is possible for the user to set up a connection between the input signal and the value to be displayed on the unit. These points can be set up using the three front mounted push buttons, or they can be easily defined and transmitted using the ReadWin® 2000 configuration software.

Example: Linearization of a tank signal that describes the relationship between the filling height and the tank volume.



### Limit function

The additional limit function monitors the measured signal once per second in order to see that the preset parameters have been adhered to. Both limits can be individually set up for minimum or maximum security, as a high or low limit with presettable hysteresis as well as being able to define a switch time delay. The set point infringement is indicated using 2 LEDs, as an option, an output relay can be activated.

## Input

**Measured variable** Voltage, current, resistance thermometer (RTD), thermocouple (TC)

### Measuring range

Voltage	+/-100mV; max. +/-5V, +/-10V; max. +/-50V R <sub>i</sub> : 1MΩ
Current	0/4...20mA; max. 200mA; R <sub>i</sub> : 5Ω
RTD	Pt100, -200 to +850°C (-328 to +1652°F), DIN EN60751) Ni100, -60 to +180°C (-76 to +356°F, DIN 43760) Sensor current, approximately 250 µA, pulsed Connection: 2 wire, 3-wire, 4-wire Cable compensation, 40Ω
Thermocouple	Type T, -270 to +400°C (-454 to +752°F) Type J, -210 to +1200°C (-346 to +2192°F) Type K, -200 to +1372°C (-328 to +2502°F) Type R, -50 to +1800°C (-58 to +3272°F) Type S, 0 to 1800°C (32 to 3272°F) Type B, 0 to 1820°C (32 to 3308°F) Type N, -270 to +1300°C (-454 to +2372°F) Type U, -200 to +600°C (-328 to +1112°F) Type L, -200 to +900°C (-328 to +1652°F) Type W3, 0 to 2315°C (+32 to +4199°F) Type W5, 0 to 2315°C (32 to 4199°F)
Type T, J, K, R, S, B, N to DIN EN60584 Type U, L to DIN 43710; Type W3, W5 to ASTM E988-96	

**Integration time** 1 s

## Output

**Loop power supply** 24 V, ± 20%, 30 mA

**Number of outputs** 1

**Galvanic isolation** To all other current circuits.

**Optional analog output** The RIA250 display can be fitted with an analog output (optional). The output signal is proportional to the displayed measured value and the bar graph displays the input signal position.

Special features:

- Current/Voltage output
- Galvanic isolation
- Infinite scaling within the display range
- Presettable fault operation to NAMUR recommendation NE43

### Output signal

0/4 to 20 mA, 20 to 4/0 mA or 0 to 10 V, ± 10% over range

### Voltage

Output current maximum, 20 mA

### Current

Load maximum 500Ω

### Fault message

Presettable 3.6 mA or 21 mA. Actions to NAMUR recommendation NE43

### D/A resolution

Current; 13 bit; voltage, 15 bit

**Number of outputs**

1

**Galvanic isolation**

To all other current circuits

**Optional relay output****Output signal**

Binary, switches when set point is reached

**Number of relays**

2

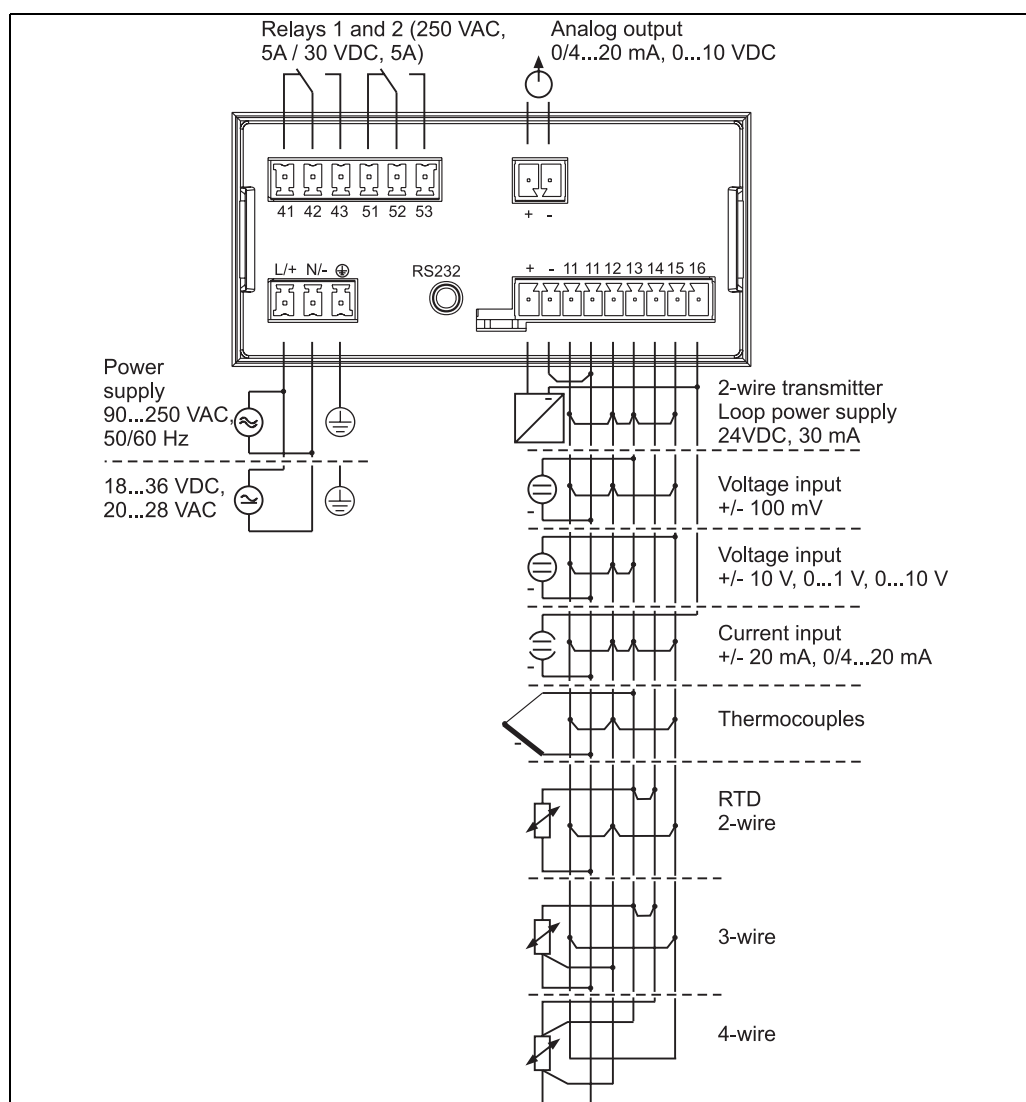
**Contact type**

DPDT

**Contact load**

&lt; maximum 250 VAC, 5A

## Electrical connection

**Electrical connection***Terminal assignment RIA250***Supply voltage**

90...250 VAC, 50/60 Hz  
 Optional: 18...36 VDC, 20...28 VAC 50/60Hz

<b>Power consumption</b>	11.5 VA (90...250 VAC)
	5.5 VA (18...36 VDC; 20-28 VAC)

## Performance characteristics

### Accuracy

<b>Voltage</b>	0.05% of end value
	Temperature drift, 0.01% / 10K ambient temperature
<b>Current</b>	0.05% of end value
	Temperature drift, 0.01% / 10K ambient temperature
<b>RTD</b>	2-wire, $\pm 0.8^{\circ}\text{C}$ ( $\pm 1.4^{\circ}\text{F}$ )
	3-wire, $\pm 0.5^{\circ}\text{C}$ ( $\pm 0.9^{\circ}\text{F}$ )
	4-wire, $\pm 0.3^{\circ}\text{C}$ ( $\pm 0.5^{\circ}\text{F}$ )
	Temperature drift, 0.01% / 10K ambient temperature
Thermocouple	Type T: $\pm 0.2^{\circ}\text{C}$ ( $\pm 0.4^{\circ}\text{F}$ ); $T < -150^{\circ}\text{C}$ , $\pm 1.0^{\circ}\text{C}$ ( $T < -238^{\circ}\text{F}$ )
	Type J: $\pm 0.2^{\circ}\text{C}$ ( $\pm 0.4^{\circ}\text{F}$ ); $T < -150^{\circ}\text{C}$ , $\pm 1.0^{\circ}\text{C}$ ( $T < -238^{\circ}\text{F}$ )
	Type K: $\pm 1.0^{\circ}\text{C}$ ( $\pm 1.8^{\circ}\text{F}$ )
	Type R: $\pm 1.0^{\circ}\text{C}$ ( $\pm 1.8^{\circ}\text{F}$ )
	Type S: $\pm 1.0^{\circ}\text{C}$ ( $\pm 1.8^{\circ}\text{F}$ )
	Type N: $\pm 1.0^{\circ}\text{C}$ ( $\pm 1.8^{\circ}\text{F}$ )
	Type B: $T > 400^{\circ}\text{C}$ , $\pm 1.0^{\circ}\text{C}$ ( $T > 752^{\circ}\text{F}$ , $\pm 1.8^{\circ}\text{F}$ )
	Type U: $\pm 0.5^{\circ}\text{C}$ ( $\pm 0.9^{\circ}\text{F}$ )
	Type L: $\pm 0.5^{\circ}\text{C}$ ( $\pm 0.9^{\circ}\text{F}$ )
	Type W3: $\pm 1.0^{\circ}\text{C}$ ( $\pm 1.8^{\circ}\text{F}$ )
	Type W5: $\pm 1.0^{\circ}\text{C}$ ( $\pm 1.8^{\circ}\text{F}$ )
	Temperature drift, 0.01% / 10K ambient temperature
<b>Analog output</b>	0.04% of end value
	Temperature drift, 0.05% / 10K ambient temperature
<b>Thermocouple cold junction</b>	$\pm 0.5^{\circ}\text{C}$ ( $\pm 0.9^{\circ}\text{F}$ )
	Resolution, $0.1^{\circ}\text{C}$ ( $0.2^{\circ}\text{F}$ )

## Installation

### Installation instructions

#### Mounting location

Panel cutout 48 x 96 mm (1.89 x 3.78 inches), see 'Mechanical construction'.

#### Installation angle

No restrictions.

## Environment

### Ambient temperature

-10 to +50°C (15 to 120°F)

### Storage temperature

-30 to +70°C (-20 to +155°F)

### Climatic class

To EN 60654-1 Class B2

### Ingress Protection

NEMA 4x, IP 65 front; NEMA 1, IP 20 for terminals

### RFI protection

To EN 55011 Group 1, Class A

### Normal safety

To EN 61010-1 protection Class 1, over voltage category II, installation over current protection < 10 A

### Altitude

Up to 2000 m (6560 ft.) above sea level according to IEC 61010-1, EN 61010-1, CSA 1010.1-92

### ESD

To EN 61000-4-2, 6kV/8kV

### Electromagnetic fields

To EN 61000-4-3, 10V/m

### Burst (supply)

To EN 61000-4-4, 4 kV

### Burst (signal)

To EN 61000-4-4, 4 kV

### Surge (AC supply)

To EN 61000-4-5, sym. 1 kV, unsym. 2 kV

### Surge (DC supply)

To EN 61000-4-5, sym. 0.5 kV, unsym. 1 kV

### Cable high frequency

To EN 61000-4-6, 10 V

### Common mode noise rejection

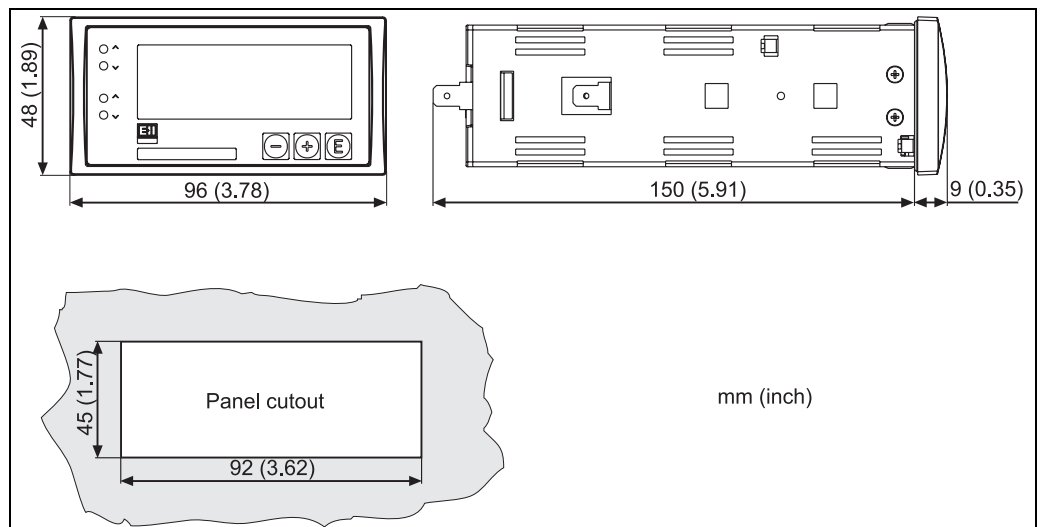
80 dB at 60 V, 50/60 Hz

### Normal mode noise rejection

60 dB at input range 1/10, 50/60 Hz

## Mechanical construction

### Design, dimensions



*Dimensions of the RIA250*

### Weight

approximately 600 g (1.32 lbs)

### Material

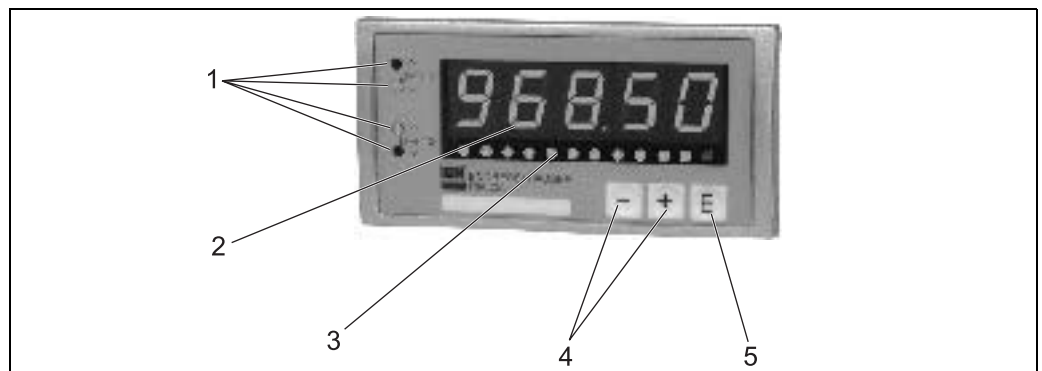
- Housing front: Die cast aluminium
- Housing casing: Galvanized sheet steel
- Housing rear panel: Plastic ABS

### Electrical connection

Plug on screw terminals, 1.5 mm<sup>2</sup> (16 AWG) solid, 1.0 mm<sup>2</sup> (18 AWG) stranded with ferrule

## Human interface

### Display and operating elements



*Display and operating elements RIA250*

- 1) Alarm limit indicators
- 2) 5-digit LED display
- 3) 12-segment LED bargraph display
- 4) Selection push buttons
- 5) Enter push button

- Display  
5-digit LED, 13 mm (0.5") character height, rear illuminated. Bargraph display in 10% increments, markers for over/under range display.
- Range  
-199999 to +99999

- Offset  
-199999 to +32767
- Signals  
Measurement range over/under value
- Rear illumination  
Illumination brightness increases with an increase in loop current

<b>Operation</b>	3 push button operation (-/+ /E), integrated in the unit, access when unit is opened
<b>Interface</b>	<p>RS232, connects to rear panel, 3.5 mm stereo connection.  The RIA250 can be set up extremely easily using the built-in RS232 serial interface and the Endress+Hauser ReadWin® 2000 PC software. Safe and secure setup is made possible via on-line help text. ReadWin® 2000 software and interface cable are optionally available.  Special features:</p> <ul style="list-style-type: none"> <li>■ Compatible with Windows® 95/98/2000/NT/XP/CE PC operating system</li> <li>■ Storage of unit settings in a data bank</li> <li>■ Instantaneous value display</li> <li>■ Printout of unit settings</li> </ul>

## Certificates and approvals

<b>CE</b>	By attaching the CE mark, Endress+Hauser confirms that the instrument fulfills all the requirements of the relevant EC directives (89/336/EEG)
<b>GL approval</b>	Certification for GL-Germanischer Lloyd marine approval
<b>UL</b>	Recognized component to UL 3111-1
<b>CSA</b>	CSA General purpose



## Ordering information

### Product structure

RIA250	Electronical indicator. 1 channel, scalable. Trend indication, limit marker yellow. Loop power supply 24VDC, 30mA. Interface RS232, ReadWin 2000. Approval: GL (German Llyod) Marine. UL listed + CSA GP. Linearization table 32-point.									
<b>Approval</b>										
A	Non-hazardous area									
<b>Power supply</b>										
1	90-250VAC									
2	18-36VDC, 20-28VAC									
<b>Measuring signal</b>										
1	0/4-20mA, +/-100mV, +/-10V Thermocouple, Pt100, Ni100									
<b>Display</b>										
R	5-digit LED, red									
G	5-digit LED, green									
<b>Output</b>										
1	Not selected									
2	2x relay limit DPDT									
3	Analog 0/4-20mA / 0-10V + 2x relay, Limit DPDT									
<b>Housing</b>										
1	Panel mounting, 48x96x150mm									
2	Panel mounting, 48x96x150mm + WCC=Works calib. certif.									
3	Field housing, IP65 204x155x215mm									
4	Field housing, IP65 204x155x215mm + WCC=Works calib. certif.									
J	Standard model Japan, panel mounting, 48x96x150mm									
<b>Marking</b>										
1	Tagging (TAG), on nameplate									
2	Tagging (TAG), metal									
5	Tagging (TAG), paper									
RIA250-	A	1								⇐ Order code

## Documentation

- System components - field and panel installation display unit, energy manager, active barrier, process transmitter and overvoltage protection: FA016K/09
- Operating instructions 'Process display RIA250': BA107R/09

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