

# Process transmitter RMA 421

**Multi-function 1 channel DIN rail mounted transmitter with universal input, loop power supply, limit monitor and analogue output**



### Application areas

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

### Features and benefits

- Multi-functional:  
 All normal measurement signals can be directly connected (bipolar voltage and current, thermocouple, RTD, resistance)

- Alarm:  
 Flexible set point monitor with 2 changeover contacts
- Active:  
 Scalable current or voltage output
- Power:  
 Integrated loop power supply for connected sensors
- Communicative:  
 RS232 interface for setting up and measured value output, HART® communication sockets for sensor setting up
- Operation:  
 LC display and push buttons for front end setting up



Endress+Hauser  
 Nothing beats know-how

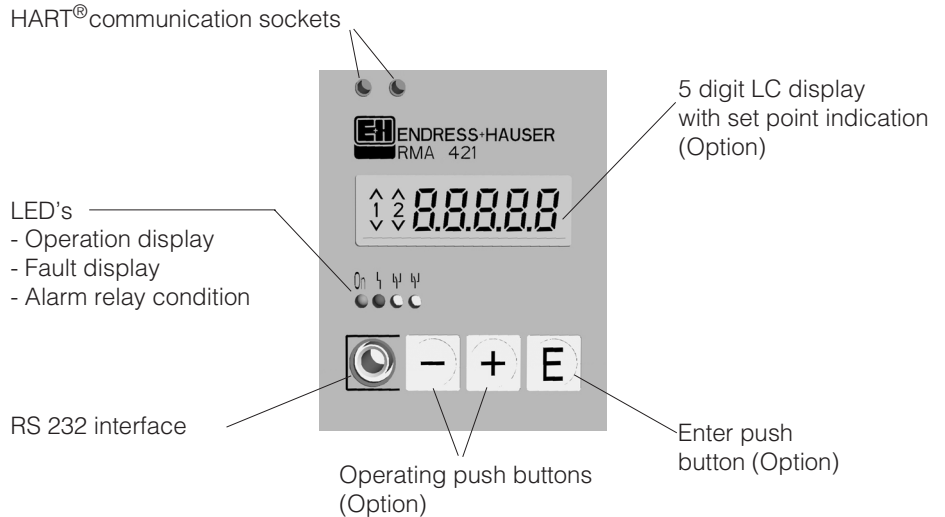


## Function

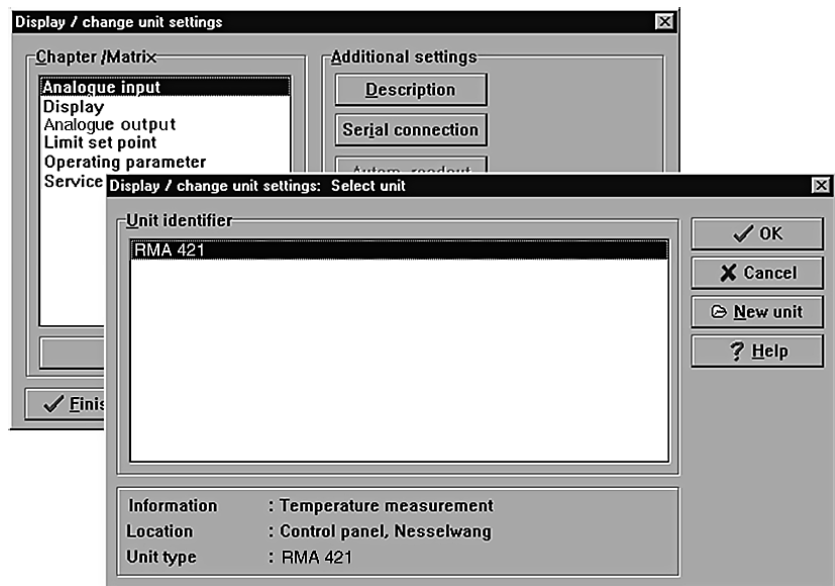
The presettable universal input enables direct connection of various sensors, whether current, voltage, potentiometer, RTD or thermocouple. Using the built-in loop power supply the unit can also power the connected sensor and then evaluate the returning sensor signal at the input of the transmitter. 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 scalable analogue output offers an instrument from which a matched signal can be obtained and transmitted to other instrumentation for further analysis. Simple setting up using a serial interface and PC programme as well as manual front end setting up are available.

## Display/operating elements



## Interface/ReadWin PC software



The RMA 421 can be set up extremely easily using the built-in RS232 serial interface and the ReadWin®2000 PC software package. Safe and secure setting up is made possible by the on-line available help text. The ReadWin®2000 software package as well as the interface cable are available as accessories.

### Special features:

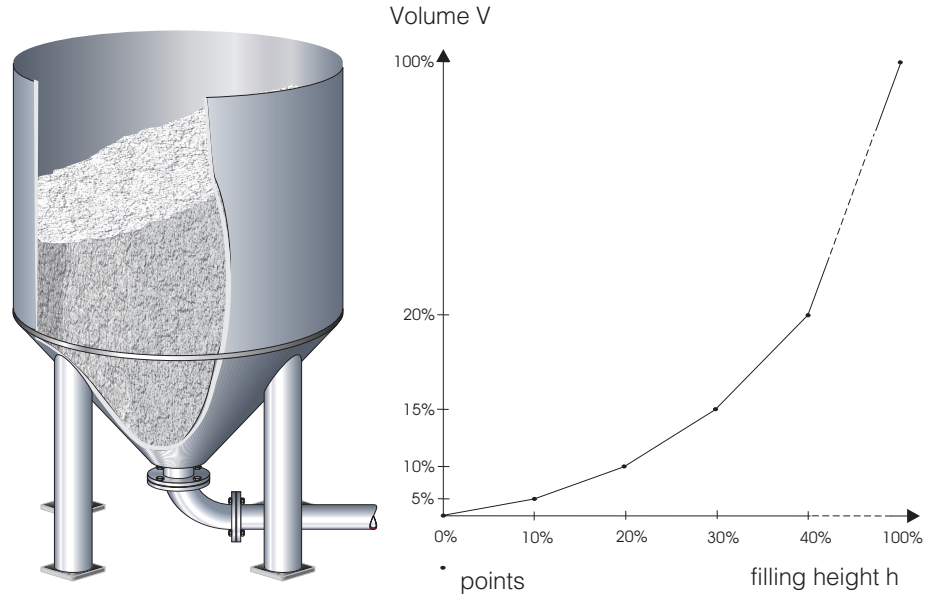
- Uniform Windows 95/98/NT4.0/2000/XP operating system.
- Storage of unit settings in a data bank
- Instantaneous value display
- Print out of unit settings

# Linearisation

The RMA 421 process transmitter has a built-in linearisation function. It is possible for the user to set up a connection between the input signal and the process value. These points can be set up using the 3 front mounted push buttons or they can be comfortably defined and

transmitted using the ReadWin operating software.

Example:  
Linearisation of a vessel signal that describes the relationship between the filling height and the vessel volume.



# Transmitter

Using the linearisation function and the analogue output the RMA 421 becomes a powerful and easy to use amplifier. In addition to the linearisation possibility the unit also has a large number of stored temperature sensor linearisation tables as well as a signal square root function. Selection of these can be easily done via the selection menu.

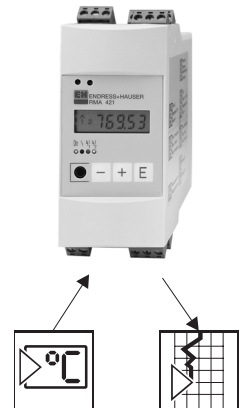
**Special features:**

- Current/voltage output
- Galvanic isolation
- Infinite scaling within the display range
- Presettable fault operation to NAMUR recommendation NE43
- Invertable measurement signal output

Example:

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

The analogue output is made available as a current/voltage signal proportional to the displayed value within preset values for further instrumentation e.g. data loggers or recorders.



# Contactors

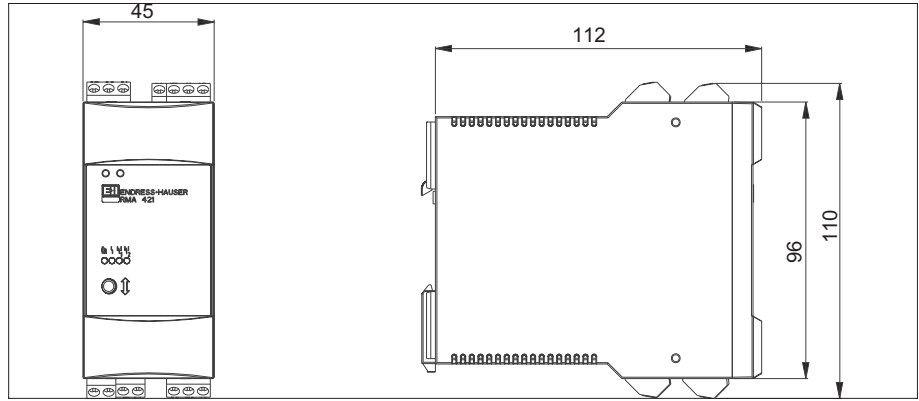
The alarm limit function monitors the measured signal once per second in order to check that the preset conditions have been adhered to. Both set points can be individually set up for minimum or maximum security, as a high or low set point with presetable hysteresis as well as being able to define a switch time delay. Monitoring the set points for a change in signal per time unit gives further possibilities for process control. Switch condition is indicated in accordance to NAMUR NE44 by an front mounted LED.

Further information to the set point condition can be displayed in the LC display when using the transmitter with the display/operation option. Front end setting up without the need for further equipment is also made possible with this option.

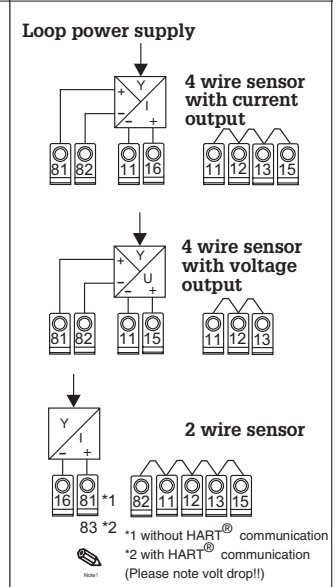
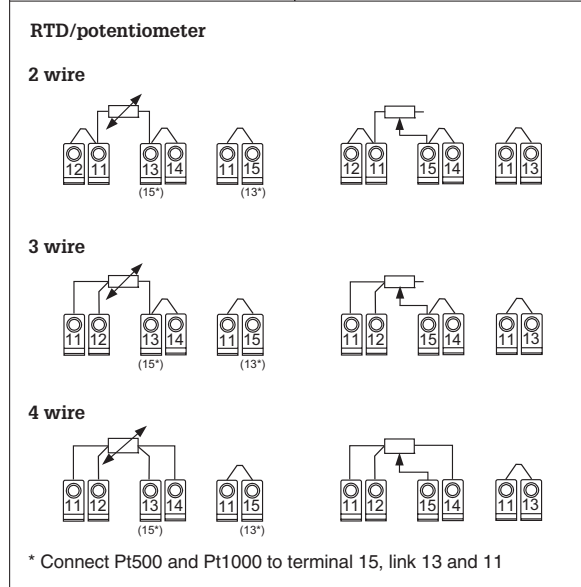
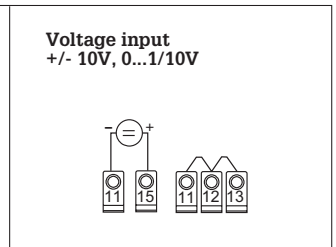
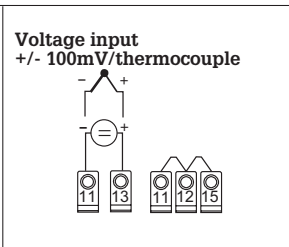
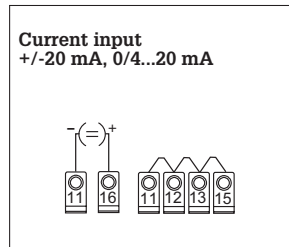
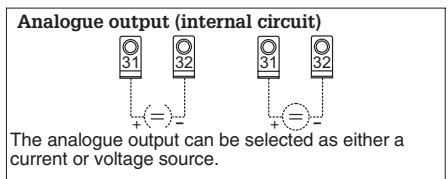
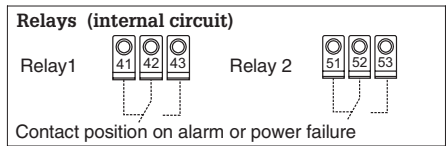
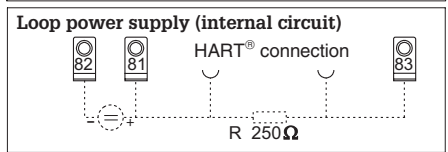
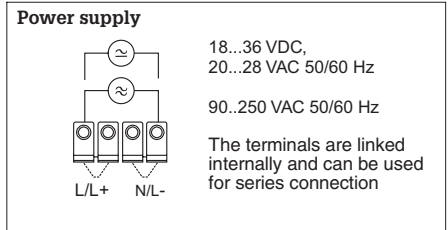
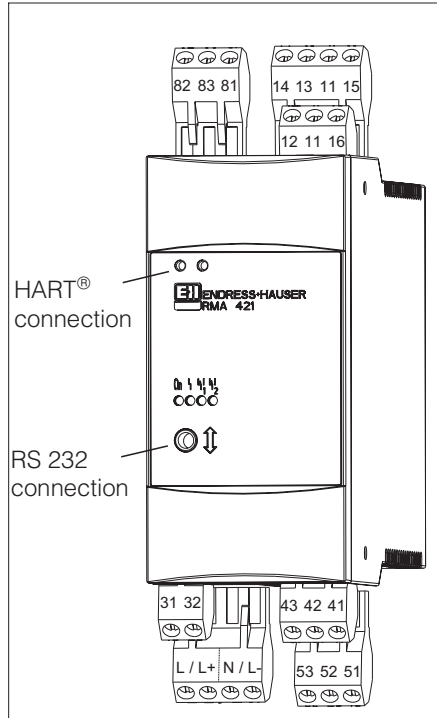
**Special features:**

- Presettable operating modes
- Setting up the switch points and hysteresis in engineering units
- Display of switch conditions according to the NAMUR NE44 recommendation
- Simple front end setting up

# Dimensions



# Electrical connection



Please always take note of the safety instructions in the operating manual (51000853) before installing!

# Technical data

## General

Manufacturer	Endress+Hauser
Description	RMA 421
Application	Process transmitter for DIN rail mounting

## Application

Process transmitter	Dependent on the model used the analogue measured value is displayed in the 5 digit display, transmitted as a scaled voltage or current signal at the analogue output and is monitored for infringement of preset conditions by the two programmable alarm relays.
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## Operation and system construction

Principle	The analogue signal connected is digitalised, analysed and indicated in the display. A digital/analogue convertor makes a proportional current or voltage signal available for additional peripheral equipment connected to the output terminals.
Measurement system	Microcontroller controlled measurement system with LC display, analogue input, analogue output, alarm relays and loop power supply.

## Input

Input types	Voltage, current, RTD, potentiometer (R), thermocouple (TC)
Measurement range	Voltage: +/- 100 mV; max. voltage : +/- 5 V +/- 10 V; (without damage) : +/- 50 V Ri: 1 MOhm
	Current: 0/4...20 mA; max. current : +/- 150 mA Ri: 10 Ohm (without damage)
	RTD: Pt100: - 200 °...+ 850 °C (DIN EN60751) Ni100: - 60 °...+ 180 °C (DIN 43760) Pt500: - 200 °...+ 850 °C (DIN EN60751) Pt1000: - 200 °...+ 850 °C (DIN EN60751) Sensor current: approx. 250 µA, Connections: 2-, 3-, 4-wire Cable compensation: Up to 40 Ohm
	R: 0...4000 Ohm Sensor current: approx. 250 µA, Connections: 2-, 3-, 4-wire Cable compensation: Up to 40 Ohm
	TC: Type T: - 270...+ 400 °C    Type B: 0...+ 1820 °C Type J: - 210...+ 1200 °C    Type N: - 270...+ 1300 °C Type K: - 200...+ 1372 °C    Type U: - 200...+ 600 °C Type R: - 50...+ 1800 °C    Type L: - 200...+ 900 °C Type S: 0...+ 1800 °C        Type W3: 0...+ 2315 °C Type W5: 0...+ 2315 °C  Type T, J, K, R, S, B, N to DIN EN60584; Type U, L to DIN 43710; Type W3, W5 to ASTM E988-96
Linearisation	Possible using max. 32 points
Integration time	1s

## Output (loop power supply)

Output signal	Terminal 81: 24 V +/- 20 %, 30 mA Terminal 83: 24 V +/- 20 % - 250 Ω · I <sub>meas.</sub>
Communication resistance	250 Ω resistance for HART® - communication fitted.  Note 1 Volt drop at terminal 83!
Number of outputs	1
Galvanic isolation	To all other current circuits

## Output (analogue)

Output signal	0/4...20 mA, 20...4/0 mA or 0...10 V, overrange + 10 %
Voltage	max. load: 20 mA
Current	max. load: 500 Ohm
Fault message	Pre-settable 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

**Output (relays)**

Output signal	Binary, switches when set point is reached.
Number of relays	2
Contact type	1 potential free changeover contact (SPDT)
Contact load	<= 250 V AC, 5 A / 30 V DC, 5 A

**Accuracy**

Voltage	Accuracy: 0.05 % FSD Temperature drift: 0.01 % / 10 K ambient temperature			
Current	Accuracy: 0.05 % FSD Temperature drift: 0.05 % / 10 K ambient temperature			
RTD, R	Accuracy: 2 wire: +/- 0.8 °C 3 wire: +/- 0.5 °C 4 wire: +/- 0.3 °C Temperature drift: 0.01 % / 10 K ambient temperature (Pt100, Ni100) 0.1 % /10 K UT (Pt500, Pt1000, 0...4000 Ohm)			
TC	Type T	+/- 0.2 °C T < - 150 °C +/- 1.0 °C	Type N	+/- 1.0 °C
	Type J	+/- 0.2 °C T < - 150 °C +/-1.0 °C	Type U	+/- 0.5 °C
	Type K	+/- 1.0 °C	Type L	+/- 0.5 °C
	Type R	+/- 1.0 °C	Type W3	+/- 1.0 °C
	Type S	+/- 1.0 °C	Type W5	+/- 1.0 °C
	Type B	T > 400 °C +/- 1.0 °C		
Temperature drift: 0.01 % / 10 K ambient temperature				
Analogue output	Accuracy: 0.04 % FSD Temperature drift: 0.05 % / 10 K ambient temperature			
TC cold junction	Accuracy: +/- 0.5 °C; Resolution: 0.1 °C;			

**Application conditions**

<b>Installation conditions</b>	
Installation angle	No limit
<b>Ambient conditions</b>	
Ambient temperature	- 20 °C...+ 60 °C
Storage temperature	- 30 °C...+ 70 °C
Climatic class	to IEC 60 654-1 Class B2
Ingress protection	IP 20
<b>EMC/immunity</b>	
RF protection	To EN 55011 Group 1, Class A
<b>Safety</b>	
Norm	To IEC 61010-1 protection class 1, Overvoltage category II, Installation excess current protection ≤ 10 A
<b>Interference safety</b>	
ESD	To IEC 61000-4-2, 6 kV/8 kV
Electromagnetic fields	To IEC 61000-4-3, 10 V/m

**Application conditions  
(continued)**

Burst (supply)	To IEC 61000-4-4, 4 kV
Burst (signal)	To IEC 61000-4-4, 2 kV
Surge (AC supply)	To IEC 61000-4-5, sym. 1 kV
Surge (DC supply)	To IEC 61000-4-5, sym. 1 kV
Surge (signal)	To IEC 61000-4-5, unsym. 1 kV
Cable high frequency	To EN 61000-4-6, 10 V
Common mode noise rejection	To IEC 770, 110 dB at 250 V, 50/60 Hz
Normal mode noise rejection	To IEC 770, 50 dB at measurement range 1/10, 50/60 Hz

**Mechanical construction**

Type	Housing for mounting on DIN rail to IEC 60715TH35
Dimensions	H: 110 mm, W: 45 mm, D: 112 mm
Weight	approx. 280 g
Materials used	Housing: Plastic PC/ABS, UL 94V0
Electrical connection	Keyed, plug on screwed terminals, size 1.5 mm <sup>2</sup> solid core, 1.0 mm <sup>2</sup> multi core with ferrule

**Display and operating level**

Display	<p>Operation, 1 x green (2.0 mm)            LED: Fault condition, 1 x red (2.0 mm)            Limit, 2 x yellow (2.0 mm)</p> <p>LC display, optional:            Numeric display: 5 x 7 segment (6 mm)            Alarm condition: 2 x Channel number, 4 x 1 segment</p>
Range	- 19999 to + 99999
Offset	- 19999 to + 99999
Operation	Software and/or 3 push button (-/+E) operation
Interface	RS 232, 3.5 mm stereo socket in housing front

**Limit function**

Operation mode	Off, minimum safety, maximum safety, gradient (rate-of-change), alarm
Set point	- 19999 to + 99999
Hysteresis	- 19999 to + 99999
Time delay	0s to 99s
Number of set points	2
Display	1 yellow LED per set point, optional symbols in the LC display
Scan rate	1s

**Power supply**

Power supply	90...250 VAC 50/60 Hz (operating altitude < 2000 m above sea level) 18...36 VDC, 20...28 V AC 50/60 Hz
Power consumption	max. 11 VA
Fuses	315 mA, slow blow (90...250 V)          1 A, slow blow (20...28 V)

**Certification**

CE mark	89/336/EWG and 73/23/EWG guide lines
GL-Marine approval	Germanischer Lloyd / marine approval

**Order information**

Order structure	See section "How to order"
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**Technical alterations reserved.**

## How to order

### RMA 421 process transmitter

#### Certification

**A** Version for Non-Ex areas

#### Power supply

- 1** 90...250 V, 50/60 Hz
- 2** 18...36 VDC/20...28 VAC, 50/60 Hz

#### Input

- 1** 0/4...20 mA, 0...1/10 V, +/- 100 mV, +/- 10 V, thermocouple and Pt100, Pt500, Pt1000, Ni100, 0...4000  $\Omega$  resistance

#### Display

- A** 5 digit LC display with front end operation
- B** No LC display, setting up using RS 232\*

#### Analogue output/alarm relays

- 1** Analogue output and alarm relays not required\*
- 2** 2 alarm relays, each with one changeover contact
- 3** 0/4 ...20 mA / 0...10 V analogue output
- 4** 0/4...20 mA / 0...10 V analogue output and 2 alarm relays, each with one changeover contact

#### Model

- A** Standard
- B** Standard, with works calibration certificate

RMA421-

←Order code



Note!

\* RMA421- B 1 - Combination not possible!

## Accessories

ReadWin®2000 PC software with connection cable (length approx. 1 m) with 9 pin Sub D connector and 3.5 mm stereo plug for setting the unit up.

Order No. RMA421A - VK

#### United Kingdom

Endress+Hauser Ltd.  
Floats Road  
Manchester  
M23 9NF  
Tel. (0161) 286 - 5000  
Fax. (0161) 998 - 1841  
<http://www.endress.com>

#### Export division

Endress+Hauser  
GmbH+Co.  
Instruments International  
P.O. Box 2222  
D-79574 Weil am Rhein  
Germany  
Tel. (07621) 975-02  
Fax (07621) 975-345  
<http://www.endress.com>

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