User manual

26.9.2007

V1.0

RTB231
RTB232
RTD transmitter

Nokeval

INTRODUCTION

RTB231 and RTB232 are basic level DIN rail mounted transmitter for RTD sensors. The range and sensor type are programmable using an USB connected programming unit, or the thransmitters may be ordered ready programmed. The sensor repertoire includes any Pt, Ni, or Cu sensor. Also bare ohms can be measured, e.g. a potentiometer resistance. The sensor may be conneced with either two, three or four wire configuration.

The transmitter has exceptionally fast start-up. After the power is applied, it takes 1.5 seconds to settle the output completely. The input is not isolated from the output, but the RTB232 channels are totally isolated from each other. RTB231 uses internally one HTB230 in-head transmitter circuit board and RTB232 two.

SPECIFICATIONS

Input

Pt100

Range	-200…+700 °C
Accuracy	0.05% rdg + 0.1°C
Thermal drift	0.02°C / °C
Connection	2, 3 and 4 wire

Ni100

Range	-60…+180 °C
Accuracy	0.05% rdg + 0.1°C

Cu10

Range	-200…+260 °C

PtXXX, NiXXX, CuXXX

Range Same as Pt100, Ni100 etc

Ohm

Range	0…2000 ohm
Accuracy	0.1% rdg + 1 ohm

mV

Range	0…100 mV
Accuracy	5% rdg + 0.1 mV

Common

A/D conversion	24 bits
Update rate	2.5 updates / s
Start-up time	1 s (4% of final) 1.5 s (fully stabilised)

Analog output

Voltage:	6.5…30 VDC
Current:	3.5…23 mA
Accuracy:	8 µA (25°C)
Thermal drift:	1 µA / °C
Fault indication:	23 mA or 3.5 mA

Isolation

Input-output	No
Inter-channel	4000 VDC/AC

Environment

Operating temp:	-40...+85 °C
Mounting	35mm DIN rail

Other

Weight:	115 g
Connectors:	2.5 mm^2, detachable

Regulations

EMC immunity

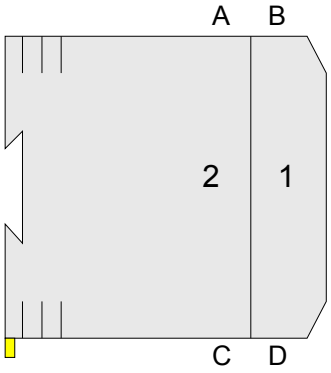
EN 61326

EMC emissions

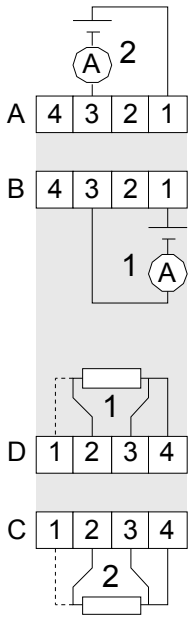
EN 61326 class B

INSTALLING

Connections



RTB231 has only B and D connectors.



RTD sensors

- Channel 1 sensor is connected in connector D. Channel 2 sensor (RTB232 only) in connector C.
- Two-wire sensor is connecterd in terminals 2 and 3, and terminal 3 is linked to terminal 4.
- In three-wire configuration, two wires are connected in terminals 3 and 4 (usually red) and one wire in terminal 2 (white).
- Four-wire connection includes connecting the fourth wire (white) in terminal 1.
- The sensor must be of isolated type.

mV input

This transmitter is not intended for mV signals, but has a non-calibrated mV input for special purposes. The signal is brought in terminals 3+ and 4-.

Current loop

The channel 1 output loop is connected in connector B. Terminal 1 is positive and terminal 3 negative. The channel 2 is similar in connector A.

Configuration

The settings can be made using a separate programming unit HTB-PROG that has a USB connection to the PC and two wires with crocodile clips for the transmitter poles. It is recommended to pull off the detachable screw terminal blocks from connectors B and A, exposing pins suitable for the clips. The red clip is connected in terminal 1 and black in terminal 3.

Mekuwin software is used. When the programming unit is used, the transmitter should be disconnected from the normal mA loop, as the programming unit provides the supply voltage for the transmitter. The sensor may retain connected.

OPERATION

Measurement system

The transmitter feeds a continuous current through the sensor from the input connector terminal 2 to terminal 4. There is an internal 10 kohm resistor in series with the sensor, and these are supplied with a 2.5 V voltage, to form about 250 µA sensor current.

The transmitter measures the voltage over the sensor, the series resistor and over the other sensor wires. Some calculations are performed to calculate the sensor resistance. In addition, a weak current of about 5 µA is intermittently fed to the non-current carrying sensor wires to check their condition.

The resistance is converted to a temperature reading using polynomial function. This measured temperature can be observed in the Monitor menu item Mea.

Scaling

The user is provided a possibility to correct or scale the measured reading using one or two points.

One-point correction can be used to cancel a small sensor error. Enter the wrong reading (seen in Monitor menu Mea) in Mea1 and the correct reading in Sca1. Now on, the transmitter will apply an offset correction of Sca1-Mea1. The corrected reading can be seen in Monitor menu Sca.

The same applies for two-point correction or scaling. Measurement result Mea1 is converted to Sca1 and Mea2 to Sca2. A linear interpolation/-extrapolation is used. These can be used to perform a two-point sensor calibration or to scale e.g. potentiometer endpoints to show a real angle or position.

Analog output

The output is formed from the scaled or corrected reading Sca. In the Out settings, scaled readings corresponding to 4 and 20 mA output are set.

Monitoring

Some of the internal readings can be observed using the Monitor function in the configuration program. Mea is the un-corrected reading, Sca is the user corrected/scaled reading, and Out is the current analog output value in milliamps.

Simulation

The transmitter provides means to test the scaling and output operation using simulated values. The simulation is started by giving a Lock command for any item in the Monitor menu. This is done by clicking the small L button in Mekuwin and then entering the desired simulated value.

Mea

Simulating Mea reading can be used to see how the user scaling (Sca) works.

Sca

Simulating Sca reading can be used to see the output current and the actual output change.

Out

Simulating the Out item means giving the analog output current in milliamps.

SETTINGS

Menu tree

The configuration menu is divided in In and Out submenus. In menu is used to configure the sensor type and other input related settings. Out menu is used to scale the analog output.

In submenu

Sensor

Sensor type. See also R0.
- **Pt**: Platinum RTD sensor, resul in °C.
- **Ni**: Nickel RTD sensor.
- **Cu**: Copper RTD sensor.
- **ohm**: Resistance measurement, in ohms.
- **mV**: Millivolt measurement 0-2500 mV, not very precise.

R0

Resistance of the sensor at 0°C (or at 25° with Cu sensor). E.g. with Pt100 set to 100. If the precise resistance of the sensor is known, it can be entered here (e.g. 99.83 ohms).

4W

Four-wire measurement selection.
- **No**: 3-wire (or 2-wire).
- **Yes**: 4-wire.

Lopass

Lowpass filter to attenuate noise and disturbances. Set time constant (63%) in seconds, 0 to disable.

Pts

Number of correction/scaling points.
- **0**: No scaling or correction. Sca reading is equal to Mea reading.
- **1**: offset correction. Measured reading in Mea1 is converted to correspond to Sca1 by adding Sca1-Mea to every measurement result.
- **2**: two-point correction. Reading Mea1 corresponds to corrected reading Sca1 and Mea2 corresponds to Sca2.

Mea1, Sca1, Mea2, Sca2

Scaling or correction points, see Pts. The current measured reading can be copied to Mea1 or Mea2 by giving the Lock command in the configuration program, and then the correct reading entered in Sca1 or Sca2.

Out submenu

Lo

Scaled reading (Sca), that corresponds to output of 4 mA.

Hi

Scaled reading (Sca), that corresponds to output of 20 mA.

Fault

The output during sensor or other fault.
- **Dscale**: driven to 3.5 mA.
- **Uscale**: driven to 23 mA.

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