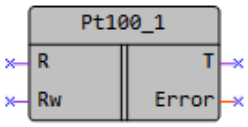
Resistance-to-temperature converter Pt100



Input	Data type	Description	Range
R	REAL	Resistance, ohm	18.52…390.48
R_W	REAL	Wire resistance, ohm	
Output	**Data type**	**Description**	**Range**
T	REAL	Temperature, °C	-200.0…+850.0
Error	INT	Conversion error: 0 – No error 1 – Input resistance below valid range 2 – Input resistance above valid range	0…2

Function

Resistance at the input R is converted to temperature and the calculated value is set to the output T. The calculation is carried out in accordance with IEC 60751:2008 [Pt100, W100=1.385 (α=0,00385)].

Set the wire resistance value to the input Rw to compensate a measurement error caused by transmitter wires.
The macro is an interpolation equation for the platinum resistance thermometer with temperature coefficient α = 0,00385 $°C^{-1}$.
In the temperature range from -200 ° C to 0 ° C, the function is almost inverse, so the temperature can be calculated using the resistance of the resistance thermometer:

$$t = \sum_{i=1}^{4} D_i \left(\frac{R_t}{R_O} - 1\right)^i$$

where t – Temperature at the T macro output, ° C

R_t – Resistance at the R macro input, ohm

R_0 – Nominal resistance at temperature 0 °C, ohm

D_i – constant coefficients:

D_1 = 255,819 °C

D_2 = 9,14550 °C

D_3 = - 2,92363 °C

D_4 = 1,79090 °C

In the temperature range from 0°C to 850°C, the reverse function for NSX is defined as follows:

$$t = \frac{\sqrt{A^2 - 4B(1 - \frac{R_t}{R_0})} - A}{2B}$$

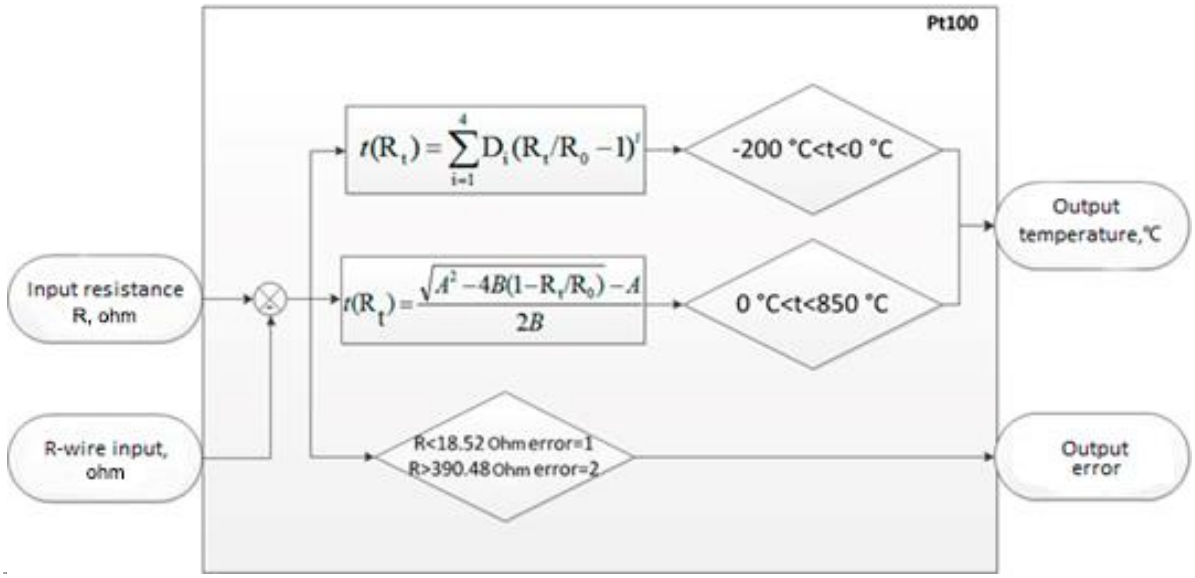
where t - Temperature at macro output, ° C

R_t – Resistance at macro input, ohm

R_0 – Nominal resistance at temperature 0 °C, ohm

A = 3,9083·10^{-3} °C^{-1}

B = -5,775·10^{-7} °C^{-1}



Structure (function) diagram of the macro

Devices	PR200, SMI200
Version	1.1
Last change	04.2020