AT-1I

Analogue temperature
transducer
(4÷20 mA)

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Purpose

Temperature transducer AT-1I is designed for temperature measurement by means of an external temperature sensor and converting measured value to unified analog output current signal in the range of 4÷20 mA.

Features

The AT-1I module continuously converts the resistance of an external temperature sensor to a DC output signal in the range 4÷20 mA. As a result of the transformation, a current proportional to the temperature of the environment in which the temperature sensor is located appears at the output.

> The module works with a resistance temperature sensor type KTY81-210 (or equivalent).

> Dedicated temperature probes manufactured by F&F: RT probe or RT2 probe. Probes available separately.

The signal output of the module is protected by an interference filter, which eliminates mains interference affecting the accuracy of the transmitted signal. The protection allows the use of signal cables with a length of up to 300 m.

Based on the linear function y= ax+b, we calculate from the formulas:

[1] Iw = [0,106667 × Tm + 9,334] ±0,5%, where:

$$a = \frac{20 - 4}{100 - (-50)} = 0,106667$$

[2] Tm = [9,375 × Iw -87,5] ±0,5%, where:

$$a = \frac{100 - (-50)}{20 - 4} = 9,375$$

Iw – output current [mA]
Tm – sensor environment temperature [°C]
4÷20 mA – signal output current range
-50÷100°C – temperature sensor measuring range
±0,5% – conversion error

⚠ Recommended use of interference and surge filters (e.g. OP-230) from the F&F range.

⚠ Recommended use of UTP (twisted pair) signal cables to connect the module to another device.

⚠ If shielded cables are used, ground the screens on one side only, as close to the device as possible.

⚠ Do not lay signal cables in parallel in close proximity to high and medium voltage lines.

⚠ Do not install the module in close proximity to high-power electrical consumers, electroma-gnetic measuring instruments, phase-controlled power devices or other devices that may introduce interference.

1. Switch off the power supply to the switchboard.
2. Mount the module on the DIN rail in the distribution box.
3. Connect the probe to terminals 10-12 (polarity optional).
4. Connect signal output 1-3 to the power supply and the analogue current input (AI) of the consumer unit (polarity independent).

<table>
<tr><td>⚠</td><td>The maximum length of the UTP cable must not exceed 300 m.</td></tr>
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⚠ Due to the differences between the internal resistances (RAI) of the analogue current inputs of the devices that can be used with the AT-1I module, it is necessary to supply the module with an appropriate V+ voltage. The minimum voltage value can be calculated from the formula.

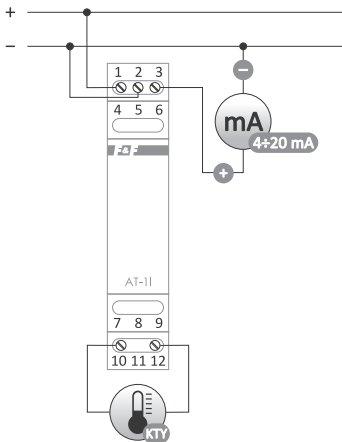$$U_{V+} > \frac{R_{AI}[\Omega] + 400}{50} \, [V]$$

R_{AI} – internal resistance of the receiving equipment input.

⚠ W przypadku zasilania modułu napięciem niższym niż wymagane wynik pomiaru będzie obarczony błędem.

5. Switch on the power supply to the switchboard.

1-3 – power supply
  3 – 4÷20 mA current output
10-12 – KTY temperature sensor – power supply

Technical data

power supply	9÷30 V DC
output current	4÷20 mA
measurement range	-50÷130°C
maximum measurement error	±1.5°C
conversion error	±0.5°C
signal wire	300 m
temperature sensor	KTY
temperature probe	RT/RT2
power consumption	≤0.8 W
working temperature	-20÷50°C
terminal	2.5 mm² screw terminals
tightening torque	0.4 Nm
dimensions	1 module (18 mm)
mounting	on TH-35 rail
ingress protection	IP20

Dedicated temperature probes

probe identification	RT
measurement range	-50÷130°C
temperature sensor	KTY81-210
sensor dimensions	ø5; H= 20 mm
sensor insulation	shrink sleeve
wire length	OMY 2×0.34 mm², L= 2.5 m
working temperature	-50÷65°C
probe identification	RT2
measurement range	-50÷130°C
temperature sensor	KTY81-210
sensor dimensions	ø8; H= 40 mm

sensor insulation	metal sleeve
wire length	heat-resistant SIHF 2×0.5 mm², L= 2.5 m
working temperature	-50÷130°C

Operation with MAX [F&F] programmable controller

Example of a programmatic instruction in ForthLogic to read an input current value and convert it to a measured temperature value:

1 AI? 9.375 F* 87,5 F-

For more information, see the Forthlogic programming guide.

Warranty

The F&F products are covered by a warranty of the 24 months from the date of purchase. Effective only with proof of purchase. Contact your dealer or directly with us.

CE declaration

F&F Filipowski L.P. declares that the device is in conformity with the essential requirements of The Low Voltage Directive (LVD) 2014/35/EU and the Electromagnetic Compatibility (EMC) Directive 2014/30/UE.

The CE Declaration of Conformity, along with the references to the standards in relation to which conformity is declared, can be found at www.fif.com.pl on the product page.

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