# General Description

The T121 instrument converts and transmits the input read into a normalized signal current for 4–20 mA loop. The signal input may come from thermocouples (J, K, R, S, T, E, B, N, EN60584) sensors or RTDs (thermoresistances) like Pt100 (EN 60751), Pt500, Pd100, T121 besides can read voltages and resistances. The RTD input may be with 2 or 4 wire connection.

## General Features
- High precision.
- 15-bit resolution.
- Isolation 1500 Vac.
- Compact size and fast connection with spring terminals.
- Configuration by PC with dedicated software downloadable at www.seneca.it.

## Electrical Connection

**Input**

This module allows you to read voltages, J, K, R, S, T, E, B, N and resistance – Pt100 (EN 60751), Pt500, Pt1000, N100, web 2 or 4 wire connection, besides T121 can be used to read voltage (mV) and resistance.

The use of shield cables is recommended for the electronic connections.

**2-wire connection**

The connection can be used for short distances (≤ 10 m) between module and probe. The instrument performs the measurement. The module must be programmed by PC for 2 wire connection.

**3-wire connection**

This can be used for medium-long distances (> 10 m) between module and probe. The instrument performs the measurement. For a correct compensation the resistance values of each conductors must be the same. The module must be programmed by PC for 3 wire connection.

**4-wire connection**

This can be used for medium-long distances (> 10 m) between module and probe. If the potentiometer has a resistance greater than 1700 Ω, the module must be programmed by PC for 4 wire connection.

## Output

Output: Current Loop connection (regulated current).

The use of shield cables is recommended for the electronic connections.

Note: In order to reduce the instrument’s dissipation, we recommend guaranteeing a load with a resistance of at least 500 Ω.

## Pattern of connecting terminal with push-wire connection

1. Installing the plastic protection using the appropriate slot.
2. Move the plastic protective as in the drawing.

## 3-wire connection

This connection can be used for medium-long distances (> 10 m) between module and probe. The instrument performs the measurement. For a correct compensation the resistance values of each conductors must be the same. The module must be programmed by PC for 3 wire connection.

## 4-wire connection

This can be used for medium-long distances (> 10 m) between module and probe. The instrument performs the measurement. If the potentiometer has a resistance greater than 1700 Ω, the module must be programmed by PC for 4 wire connection.

## Electrical Characteristics

- **Input impedance:** 10 MΩ
- **Output impedance:** 10 MΩ
- **Current output:** 20 mA
- **Load resistance:** 1 KΩ @ 26 V, 2 mA (see on pag. 2)
- **Voltage output:** 0..1700 mV
- **Input impedance:** 10 MΩ
- **Exitation current:** 375 µA
- **Input resistance:** 10 MΩ
- **Video voltage:** 0.05 %
- **Temperature Coefficient:** 0.005 % / °C
- **Calibration and Resolution:** 2 µA ( > 13 bit)
- **Input range:** ± 5 %
- **Limit Over-range:** ± 0.5 %
- **Fault:** ± 105 %
- **Accuracy:** ± 0.1 %
- **Ingress:** IP54
- **Dimensions:** 20,0 mm x 40,0 mm
- **Temperature range:** 20 °C – 80 °C
- **Altitude:** up to 2000 m a.s.l.
- **Ingress:** 0.003 /ncs cable resistance
- **Max. temperature:** 80 °C
- **Normal components:** Reversed output, TC type, Measurement Range Start, Measurement Full-Scale, Output signal in case of fault, Over-Range
- **Customized Setting by PC and accessories**

## Configuration of Fabrication

The instrument is set by the factory with the following configuration (except for other indications on the box):

- **TC wiring:** @ 31..4-
- **Cold junction compensation:** YES
- **Input filter:** YES
- **Reverse output:** NO
- **TC type:** K
- **Resistance F.S.:** 400 Ω
- **Resistance F.S.:** 1760 Ω
- **Voltage mV:** 0.05 %
- **Thermocouple:** K, J, N, T, E, B, S
- **Resistance F.S.:** 1760
- **Potentiometer:** 0.05 %
- **Thermocouple:** J, K, T, N, E
- **Thermocouple:** J, K, T, N, E
- **Thermocouple:** J, K, T, N, E
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- **Thermocouple:** J, K, T, N, E

## Standards

- EN61000-6-2/2006 (electromagnetic immunity, industrial environment)
- EN61000-6-4/2006-10 (electromagnetic emission, industrial environment)
- EN5000-2/2000-10 (electromagnetic interference, industrial environment)

## Diagram:

- **Load resistance vs minimum functioning voltage**
- **Minimum functioning voltage (U<V)**

## Output Table

<table>
<thead>
<tr>
<th>Input Range</th>
<th>Calibration and Resolution</th>
<th>Span</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>0..200 °C</td>
<td>± 0.1 %</td>
<td>5 °C</td>
<td>± 5 %</td>
</tr>
<tr>
<td>0..400 °C</td>
<td>± 0.1 %</td>
<td>5 °C</td>
<td>± 5 %</td>
</tr>
<tr>
<td>0..600 °C</td>
<td>± 0.1 %</td>
<td>5 °C</td>
<td>± 5 %</td>
</tr>
<tr>
<td>0..1000 °C</td>
<td>± 0.1 %</td>
<td>5 °C</td>
<td>± 5 %</td>
</tr>
<tr>
<td>0..1700 °C</td>
<td>± 0.1 %</td>
<td>5 °C</td>
<td>± 5 %</td>
</tr>
<tr>
<td>0..3000 °C</td>
<td>± 0.1 %</td>
<td>5 °C</td>
<td>± 5 %</td>
</tr>
<tr>
<td>0..5000 °C</td>
<td>± 0.1 %</td>
<td>5 °C</td>
<td>± 5 %</td>
</tr>
</tbody>
</table>

## Table of Summary Measures

<table>
<thead>
<tr>
<th>Type</th>
<th>A. % of Measure</th>
<th>B. % of Span</th>
<th>C. Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermocouple J, K, T, N, E</td>
<td>± 0.1 %</td>
<td>± 0.1 %</td>
<td>± 5 %</td>
</tr>
<tr>
<td>Thermocouple B, J, T, N, E</td>
<td>± 0.1 %</td>
<td>± 0.1 %</td>
<td>± 5 %</td>
</tr>
<tr>
<td>Thermoresistances</td>
<td>± 0.1 %</td>
<td>± 0.1 %</td>
<td>± 5 %</td>
</tr>
<tr>
<td>Resistance F.S.</td>
<td>± 0.1 %</td>
<td>± 0.1 %</td>
<td>± 5 %</td>
</tr>
<tr>
<td>Voltage mV</td>
<td>± 0.1 %</td>
<td>± 0.1 %</td>
<td>± 5 %</td>
</tr>
<tr>
<td>Temperature Coefficient</td>
<td>± 0.1 %</td>
<td>± 0.1 %</td>
<td>± 5 %</td>
</tr>
</tbody>
</table>

**ingress mV**

**TC B:** (between 0..250 °C the measure is null.)

**RTD:** (Errors calculate on the value of the resistive sensor.)

## Protection

**Resistance Connection**

**TC Connection**

**Potentiometer**

The module is programmed by PC for 4-wire connection.

**Other features**

- **Network freq.:** Rejection: 60 Hz and 60 Hz (Minimum 60 dB)
- **Insulation:** 500 V
- **Sampling Time:** 490 µs
- **Response time (10:90 %):** 500 µs
- **Regime protection:** YES
- **Temperature:** -40..+85 °C
- **Humidity:** 30 - 90 % at 40°C (non-condensing)
- **Storage Temperature:** 40 ± 10 °C
- **Connections:** Spring terminals
- **Dimensions:** 5,2 x 2,5 mm
- **Wire stripping:** 1 mm
- **Material:** nylon / glass, (black colour)
- **Minimum functioning voltage (U<V):** 0.5 µV

## Standards

- **EN5000-6-2/2006 (electromagnetic immunity, industrial environment)**
- **EN61000-6-4/2002-10 (electromagnetic emission, industrial environment)**
- **EN61000-6-4/2006-10 (electromagnetic immunity, industrial environment)**
- **EN5000-6-4/2000-10 (electromagnetic emission, industrial environment)**
- **EN5000-6-2/2006 (electromagnetic immunity, industrial environment)**

## Diagram:

**Load resistance vs minimum functioning voltage**

- **Minimum functioning voltage (U<V):**