

# Double channel programmable converter for Pt100

## DATEXEL DAT 2166



### FEATURES

- Pt100 input
- Input range programmable either with °C or °F unit measure
- Zero e Span values programmable by DIP-switches
- Voltage or current linearised outputs
- Good accuracy and performance stability
- EMC compliant – CE mark
- DIN rail mounting in according to EN-50022 and EN-50035 standards

### GENERAL DESCRIPTION

The double channel converter DAT 2166 is designed to provide on the output two linearised voltage or current signals proportional with the temperature characteristics of the Pt100 sensors connected on its inputs. It is possible to connect on the input both 3 wire Pt100 and 2 wire Pt100.

The user can program the input ranges and the output signal type of each channel by the proper DIP-switches available after opening the suitable door located on the side of device.

The regulation of Zero and Span values is made by the ZERO and SPAN potentiometers located on the front side of device.

Moreover, an isolation of 1000 Vac is provided among the channels; it allows to avoid signal errors due to the ground loops and to reduce eventual R.F. Interferences

It has been made in compliance with the Directive 2004/108/EC on the Electromagnetic Compatibility.

It is housed in a plastic enclosure of 12.5 mm thickness suitable for DIN rail mounting in according to EN-50022 and EN-50035 standards .

### OPERATIVE INSTRUCTIONS

The DAT 2166 converter must be powered by a direct voltage included in the 18 V to 30 V range. The power supply must be applied between the terminals N (+V1) and M (GND1) for the channel 1, between the terminals R (+V2) and Q (GND2) for the channel 2 as shown in the section "Power supply connections".

The output signals are measurable between the terminals P(OUTV/I 1) and M (GND1) for the channel 1, between the terminals O (OUT V/I 2) and Q (GND2) for the channel 2 as shown in the section "Output connections".

The input connections must be made as shown in the section "Input connections".

The channel 1 three wires Pt100 must be connected between the terminals G and I, while the third wire must be connected to the terminal L . If the measure is made with a two wires Pt100, the sensor must be connected between the terminals G and L, connecting the terminal I to the terminal L.

The channel 2 three wires Pt100 must be connected between the terminals E and H, while the third wire must be connected to the terminal F. If the measure is made with a two wires Pt100, the sensor must be connected between the terminals H and F, connecting the terminal E to the terminal F.

The configuration of input and output ranges values is made by DIP-switches (refer to the sections "Input ranges table" and "Output ranges table").

After the converter configuration, it is necessary to calibrate it using the ZERO and SPAN; this operation is illustrated in the section "DAT 2166: Configuration and calibration".

To install the device refer to the section "Installation instructions".

### TECHNICAL SPECIFICATIONS (Typical @ 25 °C and in nominal conditions)

|  |  |
|--|--|
| <b>Inputs</b>  |  |
| Sensor type  | 2 or 3 wire Pt100 in according to IEC60751 standard                            |
| Minimum input Span   | 40 °C (104 °F)   |
| Zero programmability   | From -80 °C (-112 °F) up to + 50 °C (122 °F)                                   |
| Span programmability   | From 40 °C (104 °F) up to 450 °C (842 °F)                                      |
| Sensor excitation current  | 1 mA   |
| Line resistance influence  | 0.05 % of f.s./ohm (100 ohm max. balanced per wire)                            |
| <b>Outputs</b>   |  |
| Signal type  | Configurable as 4 ÷ 20 mA, 0÷20 mA, 0÷10 Vdc or 2÷10 Vdc                       |
| Load resistance  | Voltage outputs: > 5 Kohm<br>Current outputs: < 500 ohm                        |
| Sensor burn-out signalling   | Positive out of scale (>20 mA or > 10 Vdc)                                     |
| Maximum output signal  | Current outputs: > 23 mA, 35 mA max.<br>Voltage outputs: > 11 Vdc, 16 Vdc max. |
| Response time (from 10 to 90 % of f.s.)                                | 300 ms   |
| Warm-up time   | 3 minutes  |
| <b>Performances</b>  |  |
| Calibration error  | ± 0.1 % of f.s.  |
| Linearity error (*)  | ± 0.15 % of f.s.   |
| Thermal drift  | 0.03 % of f.s./°C  |
| Power supply voltage (**)  | 18÷30 Vdc  |
| Current consumption for each channel                                   | Voltage output: 15 mA max. ; current output: 40 mA max.                        |
| Isolation among the channels   | 1000 Vac @ 50 Hz, 1 min.   |
| Electromagnetic Compatibility (EMC)<br>( for industrial environments ) | Immunity: EN 61000-6-2; Emission : EN 61000-6-4.                               |
| Operating temperature  | -20 ÷ 70 °C  |
| Storage temperature  | -40 ÷ 85 °C  |
| Relative humidity (non cond.)  | 0 ÷ 90%  |
| Weight   | approx. 90 g.  |

(\*) inclusive of hysteresis, power supply variation and linearisation error.

(\*\*) internally protected against polarity reversion.

**DAT 2166: CONFIGURATION & CALIBRATION**

- 1) Calculate the difference between the maximum and the minimum value of the input range (Span).
  - 2) Refer to the " Input range table " and determine in the column " SPAN " the position where the calculated value is included, then referring to the position obtained determine in the column "ZERO", the line in which the minimum value is included .
  - In the correspondent line is shown as to set the DIP-switches .
  - 3) Set the DIP-switches as indicated .
  - 4) Connect on input a 3 wire Pt100 simulator programmed to supply the maximum and minimum values of the input range or a fixed resistor of the same values.
  - 5) Set the simulator at the minimum temperature or to connect a fixed resistor correspondent to the minimum value .
  - 6) By the ZERO potentiometer of the channel in use calibrate the output at the 4 mA value .
  - 7) Set the simulator at the maximum temperature or to connect a fixed resistor correspondent to the maximum value .
  - 8) By the SPAN potentiometer of the channel in use calibrate the output at the 20 mA value .
  - 9) Repeat the operation from the step 5 to the step 8 until the output value will be correct ( 3 attempts typically required).
- Note: the procedure of configuration is the same for twice measure channels.

**Example of configuration:** -50/200 °C out 0÷10 Vcc  
 Span => 200°C - (-50°C) = 250°C;  
 Input switches configuration (SW1 and/or SW3): Off, Off, Off, Off.  
 Output switches configuration (SW2 and/or SW4): Off, On, Off, On, Off

**INPUT RANGE TABLE**

| Channels 1 & 2       |                        | SW1 & SW3 |   |   |   |
|----------------------|------------------------|-----------|---|---|---|
| SPAN                 | ZERO                   | 1         | 2 | 3 | 4 |
| < 95°C (203°F)       | - 80÷-30°C(-112÷-22°F) | ●         |   |   |   |
| < 95°C (203°F)       | - 30÷15°C(-22÷59°F)    |           | ● | ● |   |
| < 95°C (203°F)       | 15 ÷ 50°C(59÷122 °F)   |           | ● | ● | ● |
| 95÷200°C(203÷392°F)  | - 80÷-30°C(-112÷-22°F) | ●         | ● |   |   |
| 95÷200°C(203÷392°F)  | - 30÷15°C(-22÷59°F)    | ●         | ● | ● |   |
| 95÷200°C(203÷392°F)  | 15÷50°C(59÷122 °F)     | ●         | ● | ● | ● |
| 200÷300°C(392÷572°F) | - 80÷50°C(-112÷122°F)  |           |   |   |   |
| 300÷450°C(572÷842°F) | - 80÷50°C(-112÷122°F)  | ●         |   |   |   |

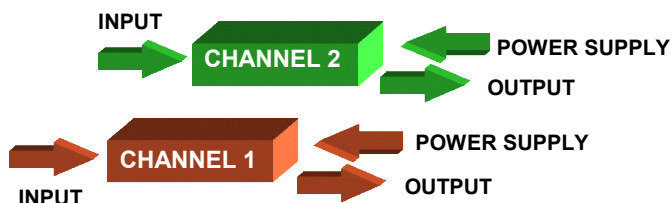
● = DIP SWITCH " ON"

**OUTPUT RANGE TABLE**

| Channel 1 & 2 | SW2 & SW4 |   |   |   |   |
|---------------|-----------|---|---|---|---|
| OUTPUT SIGNAL | 1         | 2 | 3 | 4 | 5 |
| 0÷20 mA       | ●         | ● | ● |   |   |
| 4÷20 mA       | ●         |   | ● |   | ● |
| 0÷10 V        |           | ● |   | ● |   |
| 2÷10 V        |           |   |   | ● | ● |

● = DIP SWITCH " ON"

**ISOLATIONS**

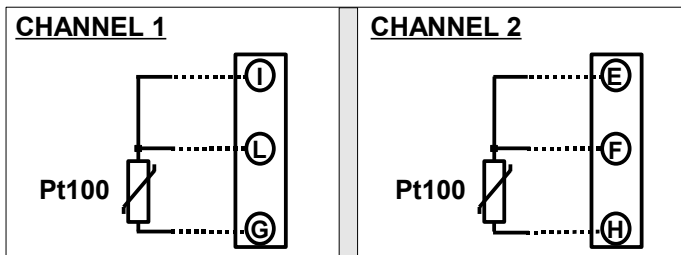


**INSTALLATION INSTRUCTIONS**

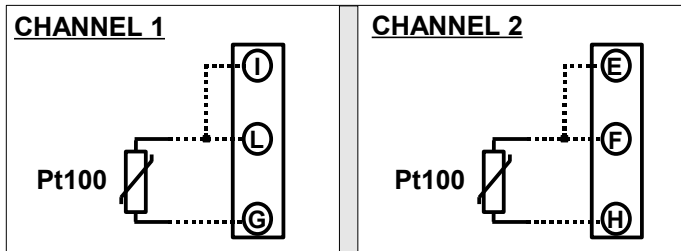
The device is suitable for DIN rail mounting in vertical position. It is necessary to install the device in a place without vibrations . Moreover, it is recommended to use shielded cable to connecting signals and to avoid routing conductors near power signal cables.

**DAT2166: WIRING DIAGRAM**

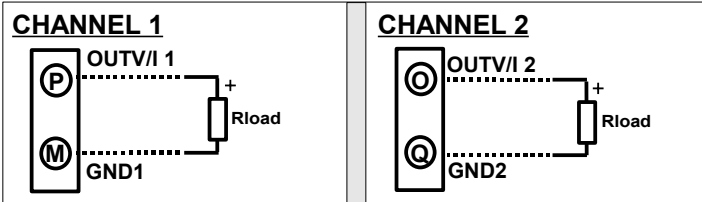
**INPUT CONNECTIONS Pt100 3 wires**



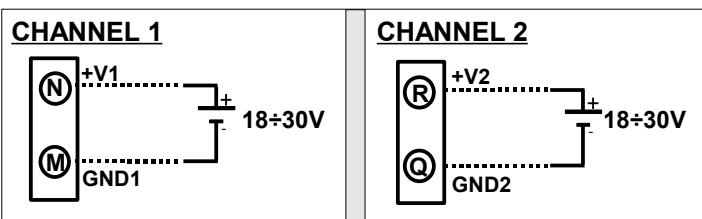
**INPUT CONNECTIONS Pt100 2 wires**



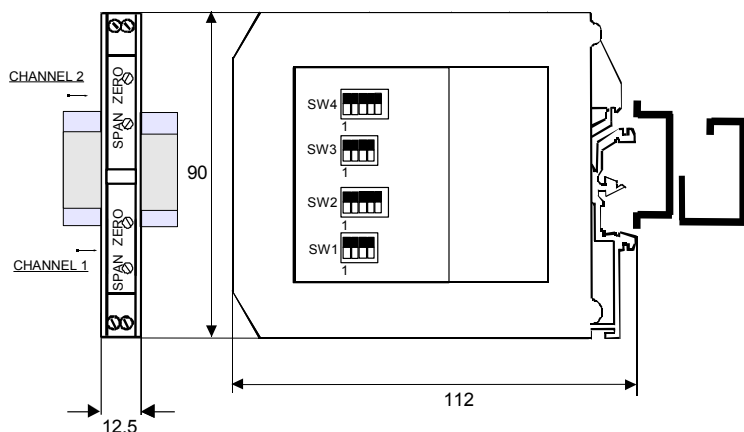
**OUTPUT CONNECTIONS**



**POWER SUPPLY CONNECTIONS**



**DIMENSIONS (mm) & REGULATIONS**



**HOW TO ORDER**

The DAT 2166 is provided as requested from the Customer in phase of order. In case of the configuration is not specified, the parameters must be set by the user.

**ORDER CODE EXAMPLE:**

**DAT2166 CH1=0÷200°C/4÷20mA, CH2=0÷200°C/4÷20mA**

