RTD to Digital PLC Module
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UNI EN ISO 9001:2008

# A/D interface for PLC 2 Channel for RTD or Resistance

# DAT 6012

## FEATURES

- Acquisition of analogue signals on PLC's digital I/O
- Analogue input to any PLC or micro PLC
- Up to 16-bit resolution with Full Scale high accuracy
- 2 input channels
- Configurable input for Pt100, Pt1000, Ni100, Ni1000, Resistance and Potentiometers up to 2 Kohm
- Configurable by DIP-switch
- Galvanic isolation at 2000 Vac on three ways
- EMC compliant – CE mark
- Suitable for DIN rail mounting in compliance with EN 50022 and EN-50035

## GENERAL DESCRIPTION

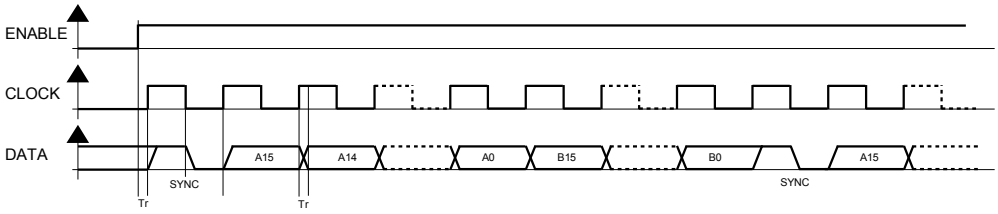
The device DAT6012 is designed to measure, amplify and linearise two analogue signals coming from RTDs type Pt100, Pt1000, Ni100 and Ni1000, Resistance and Potentiometers sensors in a 16 bits resolution digital words that contain the input values. The digital signal is transferred to PLC by one of its digital inputs. The data transfer must be controlled by the PLC by the generation of a clock signal over one of its digital ports.
It is housed in a plastic enclosure of 12.5 mm thickness suitable for DIN rail mounting in compliance with EN-50022 and EN-50035 standards.

## USER INSTRUCTIONS

**Before to install the device, read carefully the section "Installation instructions"**
Connect the power supply, the PLC and the analogue inputs as shown in the section "Wiring".
If necessary, configure the devices by dip-switch on the side of the device as shown in the section "Configuration"
I LED "PWR" and "DATA" indicates the status of the device: refer to the section "Light Signalling" to verify the device working.

## DATA ACQUISITION PROCEDURE (example in the picture)

To get data from the device, the PLC must generate an enabling signal (ENABLE) and a clock (CLK) to the proper device's terminals. If the enable is high, at each rise edge of the clock signal, the device provides on the data line (DATA) one of the bit of reading. Each word is built of 1 synchronism bit followed from 16 bit for each analogue input. Each word has 33 bits length. The rise edge of the ENABLE signal allow the reset of reading cycle.




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

| Input type | Min | Max |
|---|---|---|
| **RTD** | | |
| Pt100 | -200 °C | +850 °C |
| Pt1000 | -200 °C | +200 °C |
| Ni100 | -80 °C | +180 °C |
| Ni1000 | -60 °C | +150 °C |
| **Resistance** | | |
| 500 Ω | 0 Ω | 500 Ω |
| 2 KΩ | 0 Ω | 2000 Ω |
| **Potentiometer** | | |
| < 500 Ω * | 0 % | 100 % |
| < 2 KΩ * | 0 % | 100 % |
| * nominal value | | |

**Input channels:** 2

**Input calibration (1)** ±0.1% f.s.

**Linearity (1)**
**Res, Pot.** ±0.1% f.s.
RTD ±0.2% f.s.

**RTD / Res. excitation current** 0.350 mA typ.

**ANALOG INPUT**

**Thermal drift (1)**
Full Scale ± 0.005 % / °C

**Input line impedance influence (1)**
RTD, Res. < 0.05 %/ ohm
(50 max., 3 wires connection)

**Warm-up time** 3 minutes

**Sampling time** ~ 0.3 sec.

**DIGITAL INTERFACE**
**Voltage on terminals** typical 24 Vdc
( 30 Vdc max.)
ON state > 9 Vdc
**Input impedance**
(ENABLE, CLK) 4.7 KOhm
**Minimum output load**
(DATA) 560 Ohm (2)

**Max. clock signal frequency** 500 Hz
**Rise / Fall time (Tr)** <0.2 ms

**POWER SUPPLY**

| | |
|---|---|
| Supply voltage | 18 .. 30 Vdc |
| Current consumption | 30 mA @ 24 Vdc |
| Reverse polarity protection | 60 Vdc max |
| Max. current consumption | 45 mA |

**ISOLATION**

| | |
|---|---|
| Inputs – PLC | 2000 Vac 50 Hz, 1 min. |
| Power supply – Inputs | 2000 Vac 50 Hz, 1 min. |
| Power supply – PLC | 2000 Vac 50 Hz, 1 min. |

**ENVIRONMENTAL CONDITIONS**

| | |
|---|---|
| Operative Temperature | -10°C .. +60°C |
| Storage Temperature | -40°C.. +85°C |
| Humidity (not condensed) | 0 .. 90 % |
| Maximum Altitude | 2000 m |
| Installation | Indoor |
| Category of installation | II |
| Pollution Degree | 2 |

**MECHANICAL SPECIFICATIONS**

| | |
|---|---|
| Material | Self-extinguish plastic |
| IP Code | IP20 |
| Wiring | wires with diameter 0.8÷2.1 mm² /AWG 14-18 |
| Tightening Torque | 0.8 N m |
| Mounting | in compliance with DIN rail standard EN-50022 and EN-50035 |
| Weight | about 50 g. |

**EMC ( for industrial environments )**

| | |
|---|---|
| Immunity | EN 61000-6-2 |
| Emission | EN 61000-6-4 |

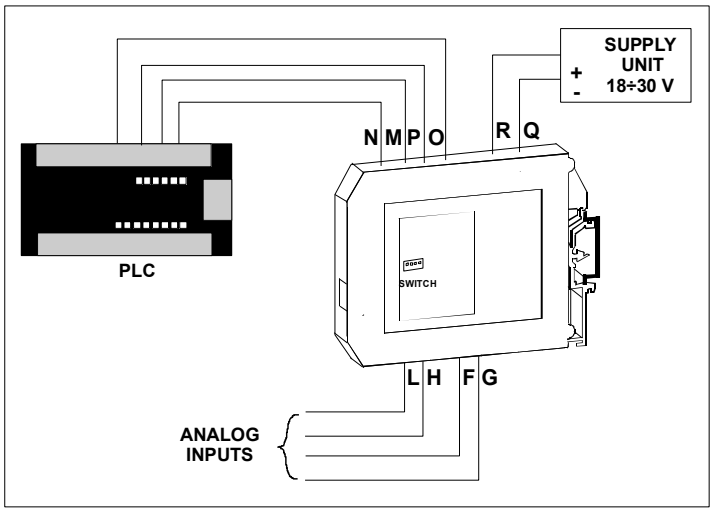
(1) referred to input Span (difference between max. and min. values)
(2) The load on the output DATA is controlled with the current taken from the ENABLE signal

## INSTALLATION INSTRUCTIONS

The DAT 6012 device is suitable for fitting to DIN rails in the vertical position.
For optimum operation and long life follow these instructions:
**When the devices are installed side by side it may be necessary to separate them by at least 5 mm in the following case:**
- If panel temperature exceeds 45°C device powered by an high power supply voltage: >27Vdc.

Make sure that sufficient air flow is provided for the device avoiding to place raceways or other objects which could obstruct the ventilation slits. Moreover it is suggested to avoid that devices are mounted above appliances generating heat; their ideal place should be in the lower part of the panel.
Install the device in a place without vibrations.
Moreover it is suggested to avoid routing conductors near power signal cables (motors, induction ovens, inverters, etc...) and to use shielded cable for connecting signals.

## CABLING



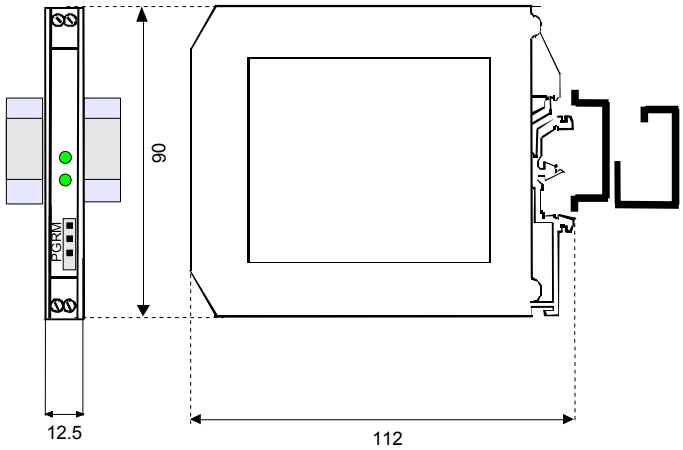

## PROGRAMMING TABLE

| SW4 | Filter (CLK) |
|---|---|
| | 1 ms (500 Hz) |
| ● | 10 ms (50 Hz) |

● = Switch ON

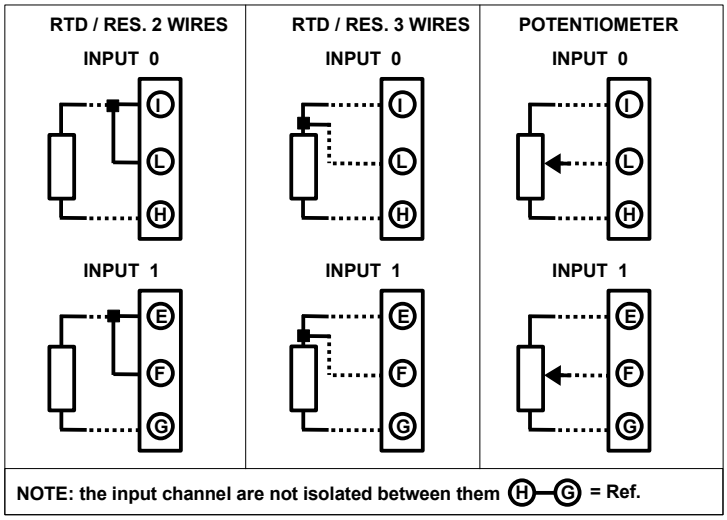
| SW3 | SW2 | SW1 | Input |
|---|---|---|---|
| | | | Res. 500 Ω |
| | | ● | Res. 2 KΩ |
| | ● | | Pt100 |
| | ● | ● | Ni100 |
| ● | | | Pt1000 |
| ● | | ● | Ni1000 |
| ● | ● | | Pot. < 500 Ω |
| ● | ● | ● | Pot. < 2 KΩ |

## DIMENSIONS (mm)



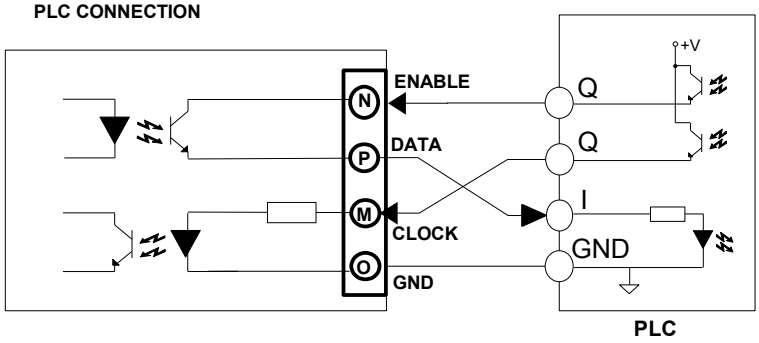

## WIRING

ANALOG INPUTS CONNECTIONS

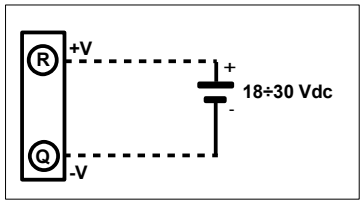



NOTE: the input channel are not isolated between them (H)—(G) = Ref.

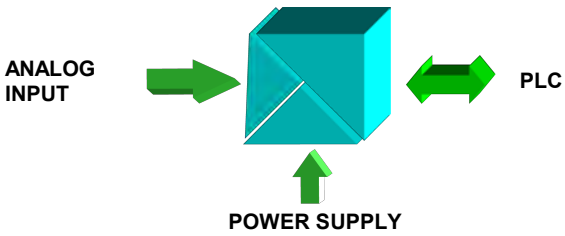
PLC CONNECTION




POWER SUPPLY CONNECTIONS




## ISOLATION STRUCTURE




## LIGHT SIGNALLING

| LED | COLOUR | STATE | DESCRIPTION |
|---|---|---|---|
| PWR | GREEN | ON | Device powered |
| | | OFF | Device not powered |
| DATA | GREEN | ON | "DATA" Line = 1 |
| | | OFF | "DATA" Line = 0 |

## HOW TO ORDER

In phase of order it is necessary to specify the type of table for the input.
The DAT 6012 is supplied as requested from the Customer. Refer to the section "Programming table" for the available options

**DAT 6012 Pt100 / 10mS**

Pt100: Input type (see programming table)
10mS: CLK filter

= Requested
= Optional

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