

## Isolated Modbus RTU IO Module

**DAT 3012**

### FEATURES

- Modbus Server device on RS-485
- Modbus RTU/Modbus ASCII Protocol
- 2 Universal Analogue Input
- 2 Analogue Outputs 0-20mA
- 4 Digital Inputs with pulse counters up to 3 kHz
- 3 SPST Relay Outputs
- Watch-Dog Alarm
- 1500 Vac galvanic isolation on all the ways
- High Accuracy
- CE / UKCA mark
- DIN rail mounting in compliance with EN-50022



### GENERAL DESCRIPTION

The device DAT3012, through the two universal input channels isolated from each other, converts a signal coming from RTD, Tc, mV sensors, V or mA applied as input in engineering units in digital format. It can also acquire up to 4 digital inputs and supply 3 SPST Relay outputs.

The digital inputs are also equipped with pulse counters up to 3 kHz and a frequency meter up to 200 Hz. The data is transmitted using the MODBUS RTU protocol on RS-485 network. The device guarantees a high precision and a very stable measurement both in time and in temperature. In order to guarantee the system safety, the device is equipped with a Watch-Dog timer system for both analogue and digital outputs.

1500 VAC insulation on all streets eliminates all effects due to ground loops that may be present, allowing the use of the device even in the most harsh environmental conditions. The device is housed in a rough self-extinguishing plastic container which, thanks to its thin profile of 22.5mm only, allows a high density mounting on EN-50022 standard DIN rail.

### USER INSTRUCTIONS

Before to install the device, please read the "Installation Instruction" section. If the module configuration is unknown, with device powered off, connect the INIT terminal to the GND terminal (ground), at the next power on the device will be auto-configured in the default settings (refer to the User Guide of the device). Connect power supply, serial bus, analog and digital inputs and outputs as shown in the "Wiring" section. When the device is powered, the green LED "PWR" is fixed in ON condition, the yellow LED "STS" changes state and depends on the working condition of the device: refer to the "Light Signalling" section to verify the device working state. To perform configuration and calibration operations, read the instructions in the User Guide of the device. To simplify handling or replacing of the device, it is possible to remove the wired terminals even with the device powered.

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

INPUT (2 CHANNELS)			SERIAL OUTPUT		GENERAL SPECIFICATIONS	
Input type	Min	Max	Data Transmission		Power supply voltage	18 .. 30 Vdc
Voltage			Baud Rate	115.2 kbps	Reverse polarity protection	60 Vdc max
100 mV	-100 mV	100 mV	Max. distance	1.2 km – 4000 ft	Current consumption	100 mA max
10 Volt	-10 V	10 V	DIGITAL INPUTS (WET CONTACTS)		ISOLATION	
TC			Number of channels	4	Among all of the ways	1500 Vac, 50 Hz, 1 min
J	-210°C	1200°C	Counters	3 up to 3 kHz	ENVIRONMENTAL CONDITIONS	
K	-210°C	1370°C	Counters register bit-length	32bit	Operative Temperature	-10°C .. +60°C
R	-50°C	1760°C	Input voltage (bipolar)	OFF state: 0÷3 V ON state: 10÷30 V	Storage Temperature	-40°C.. +85°C
S	-50°C	1760°C	Input impedance	4.7 kΩ	Humidity (not condensed)	0 .. 90 %
B	400°C	1825°C	Frequency measurement range	Min: 1 Hz Max: 200 Hz	Maximum Altitude	2000 m
E	-210°C	1000°C	DIGITAL OUTPUTS		Installation	Indoor
T	-210°C	400°C	N.3 Relays SPST		Category of installation	II
N	-210°C	1300°C	Maximum switching power per contact (resistive load)	2 A @ 250 Vac 2 A @ 30 Vdc 250Vac (50 / 60Hz) 30Vdc	Pollution Degree	2
RTD 2,3 wires			Max. voltage		MECHANICAL SPECIFICATIONS	
Pt100	-200°C	850°C	Dielectric Strength between contacts	1000 Vac, 50 Hz, 1 min.	Material	Self-extinguish plastic
Pt1000	-200°C	200°C	Dielectric Strength between coil and contacts	4000 Vac, 50 Hz, 1 min.	IP Code	IP20
Ni100	-60°C	180°C	ANALOG OUTPUT (2 CHANNELS)		Wiring	wires with diameter 0.8÷2.1 mm <sup>2</sup> AWG 14-18
Ni1000	-60°C	150°C	Output type	Min	Tightening Torque	0.5 N m
Resistance 2,3 wires			Current	0 mA	Mounting (DIN rail)	in compliance with standard EN-50022
Low	0 Ω	500 Ω	Accuracy (2)	± 0.05 % f.s.	Weight	about 150 g.
High	0 Ω	2000 Ω	Linearity (2)	± 0.05 % f.s.	CERTIFICATIONS	
Potentiometer	20 Ω	50 kΩ	Thermal Drift (2)	± 0.01 % / °C	EMC ( for the Industrial Environments )	
Current	-20 mA	20 mA	Load resistance	< 500 Ω	Immunity	EN 61000-6-2
Accuracy (1)			Auxiliary voltage	> 12V @ 20 mA	Emission	EN 61000-6-4
mV, Volt, mA	± 0.05 % f.s.				UKCA (ref S.I. 2016 N°1091 )	
Pot, RTD, Res.	± 0.05 % f.s.				Immunity	BS EN 61000-6-2
TC	> ± 0.05 % f.s. or 5 uV				Emission	BS EN 61000-6-4
Linearity (1)						
mV, Volt, mA	± 0.05 % f.s.					
Pot, RTD, Res.	± 0.1 % f.s.					
TC	± 0.2 % f.s.					
Excitation current sensor RTD, Res, Pot						
Typical	0.700 mA					
Line resistance R influence						
RTD 3 wires(50 Ω max balanced)	0.05 %/Ω					
mV, Tc	< 0.8 uV/Ohm					
CJC compensation Error	± 1 °C					
Input impedance						
mV, TC	10 MΩ					
Volt	1 MΩ					
mA	22 Ω					
Thermal drift input (1)	± 0.01 % f.s./ °C					
Thermal drift CJC	± 0.02 °C / °C					
Sample time	150 ms					
Warm-up time	3 minutes					

(1) Referred to input Span (difference between max. and min. )

(2) Referred to output Span (difference between max. and min. )

## INSTALLATION INSTRUCTIONS

The 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 is necessary to separate them by at least 5 mm if panel temperature exceeds 45°C. 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.

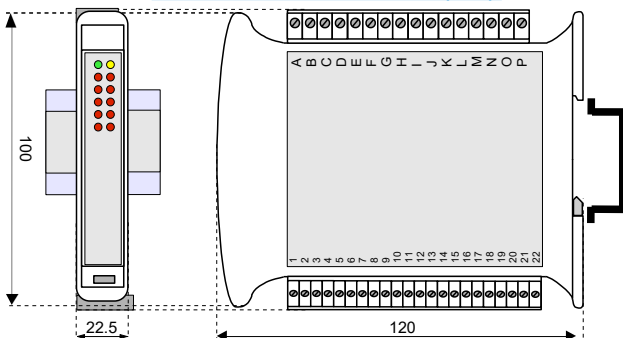
## LIGHT SIGNALLING

LED	COLOR	STATE	DESCRIPTION
PWR	GREEN	ON OFF BLINK	Device powered Device not powered Watch-dog Alarm
STS	YELLOW	OFF	Correct working
RX	RED	BLINK OFF	Data receiving from RS-485 No Data receiving
TX	RED	BLINK OFF	Data Transmission on RS-485 No Data Transmission
I(n)	RED	ON OFF	Digital Input 'n': ON State Digital Input 'n': OFF State
R(n)	RED	ON OFF	Digital Output 'n': ON State Digital Output 'n': OFF State

## MODBUS REGISTERS MAPPING

Register	Description	Access
40001	--Reserved--	R/W
40002	Firmware Version	RO
40003		RO
40004	Name	R/W
40005		R/W
40006	--Reserved--	RO
40007	Address	R/W
40008	--Reserved--	RO
40009	Digital Input	RO
40010	Digital Output	R/W
40011	System Flags	R/W
40012	Enable Power Up/Safe Dig. Out	R/W
40013	Watch Dog Timer	R/W
40014+18	--Reserved--	RO
40019	Communication	R/W
40020+26	--Reserved--	RO
40027	Analog Input #1	RO
40028	Analog Input #2	RO
40029+32	--Reserved--	RO
40033	Analog Output #1	R/W
40034	Analog Output #2	R/W
41204	Reset Digital Counter	R/W
41205	Freq. Digital input #0	RO
41206	Freq. Digital input #1	RO
41207	Freq. Digital input #2	RO
41208	Freq. Digital input #3	RO
41209+10	Counter Digital input #0 (32bit)	R/W
41211+12	Counter Digital input #1 (32bit)	R/W
41213+14	Counter Digital input #2 (32bit)	R/W
41215+16	Counter Digital input #3 (32bit)	R/W
41217	Input Type	R/W
41221	Power Up Analog Output #1	R/W
41222	Power Up Analog Output #2	R/W
41223	Safe Analog Output #1	R/W
41224	Safe Analog Output #2	R/W

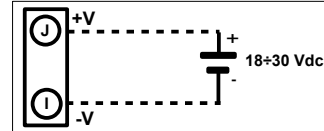
## MECHANICAL DIMENSIONS (mm)



The symbol reported on the product indicates that the product itself must not be considered as a domestic waste. It must be brought to the authorized recycle plant for the recycling of electrical and electronic waste. For more information contact the proper office in the user's city, the service for the waste treatment or the supplier from which the product has been purchased.

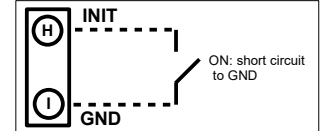
## WIRING

### POWER SUPPLY (\*)

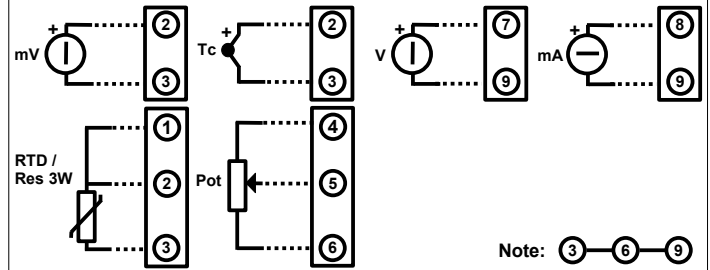


Note: the device must be powered using a power supply unit classified NEC class 2 or SELV with limited energy

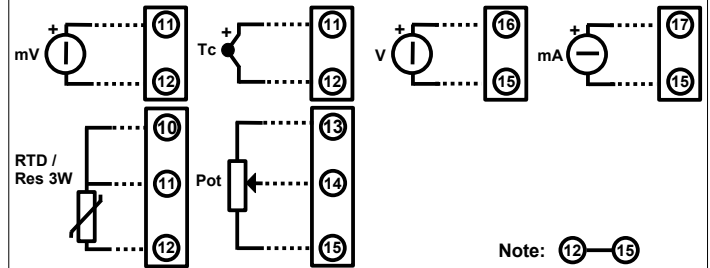
### INIT



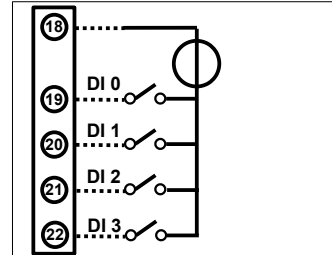
### ANALOG INPUT 0 - UNIVERSAL



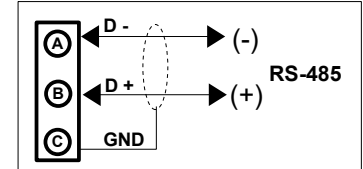
### ANALOG INPUT 1 - UNIVERSAL



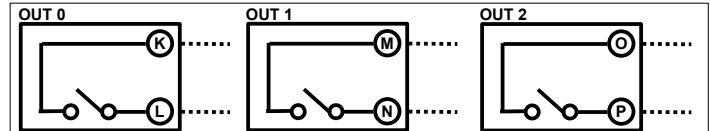
### DIGITAL INPUTS



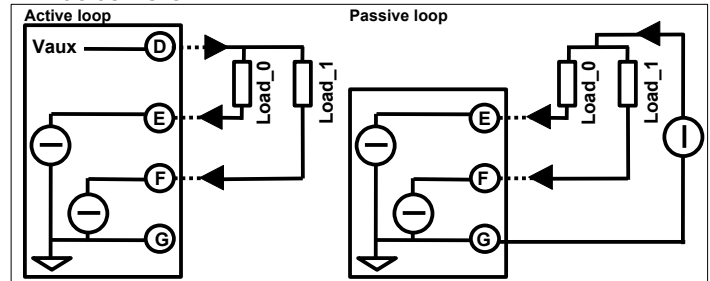
### RS-485



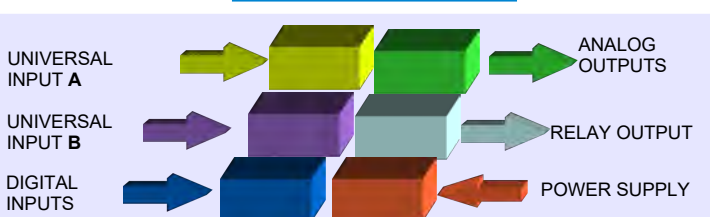
### DIGITAL OUTPUTS



### ANALOG OUTPUTS - mA



## ISOLATION STRUCTURE



## HOW TO ORDER

The device can be supplied with the configuration specified by the customer.

### ORDER CODE

DAT3012 / Pt100 / 20 mA

Input type channel 1

Input type channel 2

■ = Requested  
□ = Optional