

## Signal Conditioning Modbus

# DAT 3011

### FEATURES

- Modbus Server device on RS-485
- Modbus RTU/Modbus ASCII Protocol
- 1 Universal Analogue Input + 1 Analogue Input V/mA
- 2 Analogue Outputs 0-20mA
- 3 Digital Inputs with pulse counters up to 3 kHz
- 1 SSR Digital Output + 2 SPST Relay Outputs
- Watch-Dog Alarm
- 1500 Vac galvanic isolation on all the ways
- High Accuracy
- UL / CE / UKCA mark
- DIN rail mounting in compliance with EN-50022



### GENERAL DESCRIPTION

The device DAT 3011 is able to acquire RTD or Tc sensors, mV, V or mA input signals connected to the universal analog input in engineering units in digital format. Moreover it is available an additional isolated analog input for V or mA. The device is able to acquire up to 3 digital inputs and to drive one solid-state relay and two SPST relays. The data are transmitted with MODBUS RTU/MODBUS ASCII protocol on the RS-485 network. The device guarantees high accuracy and a stable measure versus time and temperature. To ensure the plant safety, it is provided a Watch-Dog timer alarm. The isolation between the parts of circuit removes eventual ground-loop effects, allowing the use of the device even in the heavy environmental conditions. The device is in compliance with the Directive UL 61010-1 for US market and with the Directive CSA C22.2 No 61010-1 for the Canadian market. It 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's configuration is unknown, with device powered off, connect the INIT terminal to the GND terminal, at the next power on the device will be auto-configured with the default settings (refer to the User Guide of the device). Connect power supply, serial bus, analogue 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				
<b>Voltage</b> 100 mV 10 Volt (Channels 1&2)	-100 mV -10 V	100 mV 10 V	<b>Data Transmission</b> Baud Rate 115.2 kbps Max. distance 1.2 km – 4000 ft		Power supply voltage 18 .. 30 Vdc Reverse polarity protection 60 Vdc max Current consumption 100 mA max	
<b>TC</b>			<b>DIGITAL INPUTS (WET CONTACTS)</b>		<b>ISOLATION</b>	
J	-210°C	1200°C	Number of channels 3		Among all of the ways 1500 Vac, 50 Hz, 1 min	
K	-210°C	1370°C	Counters 3 up to 3 kHz		<b>ENVIRONMENTAL CONDITIONS</b>	
R	-50°C	1760°C	Counters register bit-length 32bit		Operative Temperature -10°C .. +60°C	
S	-50°C	1760°C	Input voltage (bipolar) OFF state: 0÷3 V ON state:10÷30 V		UL Operative Temperature -10°C .. +40°C	
B	400°C	1825°C	Input impedance 4.7 kΩ		Storage Temperature -40°C.. +85°C	
E	-210°C	1000°C	Frequency measurement range Min:1 Hz Max: 200 Hz		Humidity (not condensed) 0 .. 90 %	
T	-210°C	400°C	<b>DIGITAL OUTPUTS</b>		Maximum Altitude 2000 m	
N	-210°C	1300°C	<b>N.1 SSR Output</b>		Installation Indoor	
<b>RTD 2,3 wires</b>			Voltage 30 Vac / 48 Vdc		Category of installation II	
Pt100	-200°C	850°C	Current (resistive load) 0.4 A max		Pollution Degree 2	
Pt1000	-200°C	200°C	<b>N.2 Relays SPST</b>		<b>MECHANICAL SPECIFICATIONS</b>	
Ni100	-60°C	180°C	Maximum switching power per contact (resistive load) 2 A @ 250 Vac 2 A @ 30 Vdc 250Vac (50 / 60Hz) 30Vdc		Material Self-extinguish plastic	
Ni1000	-60°C	150°C	Max. voltage		IP Code IP20	
<b>Resistance 2,3 wires</b>			Dielectric Strength between contacts 1000 Vac, 50 Hz, 1 min.		Wiring wires with diameter 0.8÷2.1 mm <sup>2</sup> AWG 14-18 0.5 N m	
Low	0 Ω	500 Ω	Dielectric Strength between coil and contacts 4000 Vac, 50 Hz, 1 min.		Tightening Torque 0.5 N m	
High	0 Ω	2000 Ω	<b>ANALOG OUTPUT (2 CHANNELS)</b>		Mounting (DIN rail) in compliance with standard EN-50022	
<b>Potentiometer</b>			Output type		Weight about 150 g.	
Current	20 Ω	50 kΩ	Min 0 mA		<b>CERTIFICATIONS</b>	
<b>Current</b>			Max 20 mA		<b>EMC ( for the Industrial Environments )</b>	
20 mA (Channels 1&2)	-20 mA	20 mA	Accuracy (2) ± 0.05 % f.s.		Immunity EN 61000-6-2	
<b>Accuracy (1)</b>			Linearity (2) ± 0.05 % f.s.		Emission EN 61000-6-4	
mV, Volt, mA	± 0.05 % f.s.		Thermal Drift (2) ± 0.01 % / °C		<b>UKCA (ref S.I. 2016 N°1091 )</b>	
Pot, RTD, Res.	± 0.05 % f.s.		Load resistance < 500 Ω		Immunity BS EN 61000-6-2	
TC	> ± 0.05 % f.s. or 5 uV		Auxiliary voltage > 12V @ 20 mA		Emission BS EN 61000-6-4	
<b>Linearity (1)</b>					<b>UL</b>	
mV, Volt, mA	± 0.05 % f.s.				US Standard UL 61010-1	
Pot, RTD, Res.	± 0.1 % f.s.				Canadian Standard CSA C22.2 No 61010-1	
TC	± 0.2 % f.s.				CCN NRAQ/NRAQ7	
<b>Excitation current sensor RTD, Res, Pot</b>					Typology Open Type device	
Typical	0.700 mA				Classification Industrial Control	
<b>Line resistance R influence</b>					Equipment	
RTD 3 wires(50 Ω max balanced)	0.05 %/Ω				File Number E352854	
mV, Tc	< 0.8 uV/Ω					
<b>CJC compensation Error</b>						
	± 1 °C					
<b>Input impedance</b>						
mV, TC	10 MΩ					
Volt	1 MΩ					
mA	22 Ω					
<b>Thermal drift input (1)</b>						
	± 0.01 % f.s./ °C					
<b>Thermal drift CJC</b>						
	± 0.02 °C / °C					
<b>Sample time</b>						
	150 ms					
<b>Warm-up time</b>						
	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.

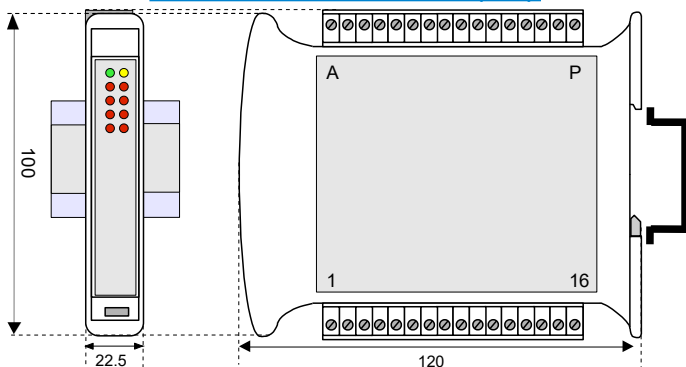
## LIGHT SIGNALLING

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

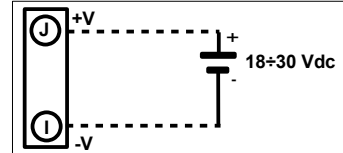
## MECHANICAL DIMENSIONS (mm)



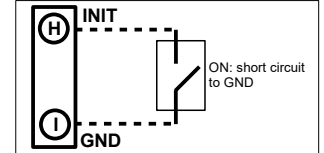
The symbol reported on the product indicates that the product itself must not be considered as a domestic waste. It must be brought to the authorized recycle plant for the recycling of electrical and electronic waste. For more information contact the proper office in the user's city, the service for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

## WIRING

### POWER SUPPLY(\*)

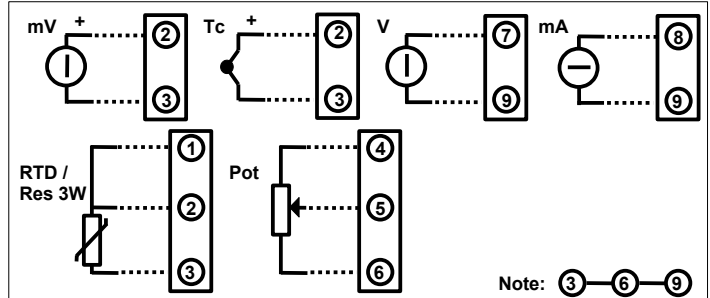


### INIT

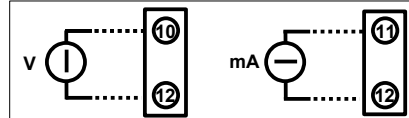


Note: for UL installation the device must be powered using a power supply unit classified NEC class 2 or SELV with limited energy

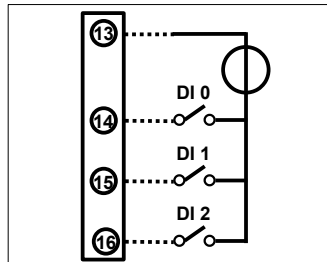
### ANALOG INPUT 0 - UNIVERSAL



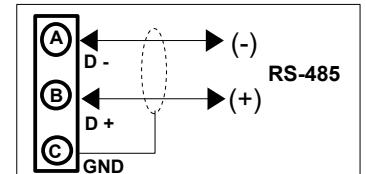
### ANALOG INPUT 1 - V/mA



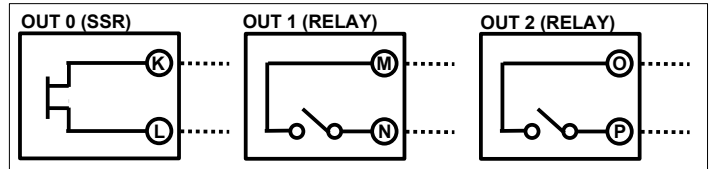
### DIGITAL INPUTS



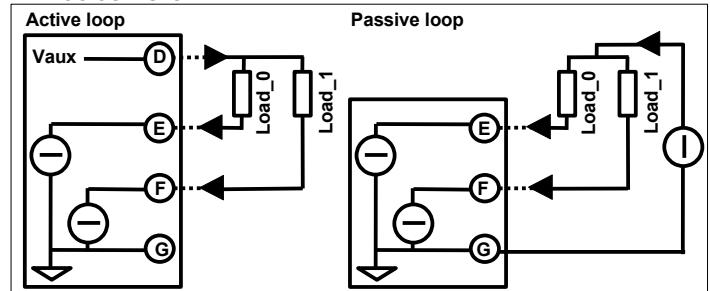
### RS-485



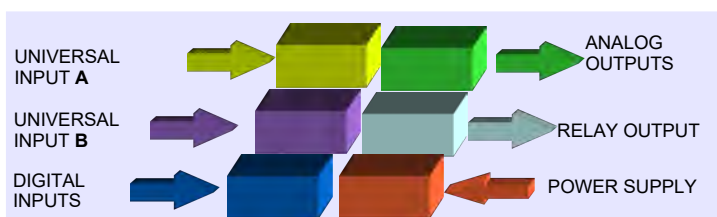
### DIGITAL OUTPUTS



### ANALOG OUTPUTS - mA



## ISOLATION STRUCTURE



## HOW TO ORDER

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

### ORDER CODE

DAT3011 / Pt100 / 20 mA

Input type channel 1

Input type channel 2

■ = Requested  
□ = Optional