Modbus RTU Master/Slave with Analog and Digital IO
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Intelligent Unit with Ethernet Interface + Digital And Analogue I/O

DAT9011-2.0

FEATURES
- **N°1 serial interface RS-485 Modbus RTU Master**
- **N.1 serial interface RS-485/uUSB Modbus RTU Slave**
- **Interface Ethernet 10/100 Base-T, Modbus TCP Client/Server**
- **N°1 universal analogue input + N°1 current and voltage analogue input**
- **N°2 digital Inputs with 32 bit pulse counters + N°2 SPDT Relay Outputs**
- **Auxiliary supply to power sensors on field**
- **N°2 passive 4-20 mA analogue outputs**
- **Master both on RS-485 (Modbus RTU) and on Ethernet (Modbus TCP)**
- **Programming software with "flow chart" structure**
- **Remotely programmable**
- **Connection by removable screw-terminals**
- **LED signalling for Link/Act Ethernet, serial RX-TX, power supply and digital inputs/outputs**
- **Programmable without external sources via uUSB and CVPROG cable**
- **Galvanic Isolation on all the ways**
- **EMC compliance – CE mark**
- **Suitable for DIN rail mounting in compliance with EN-50022 standard**

GENERAL DESCRIPTION

The device DAT9011 is an Intelligent unit able to control a network of slave Modbus RTU devices connected on serial line RS-485 Master or Modbus TCP through the Ethernet interface executing the reading and writing of the field values and performing the logical and mathematical functions necessary for the system working.
The device is equipped with one universal analogue input channel, one channel for Volt and mA input, two digital inputs with 32 bit pulse counters and 2 relay outputs.
On input an Auxiliary source is available to supply passive sensors on the field. By means of the Ethernet interface or the RS-485 "SLAVE" or uUSB ports it is possible to read and write, in real time, the internal registers value. Moreover, by means of the Ethernet interface, or by the RS-485 "SLAVE" or uUSB ports it is possible to program the Control Logic,to monitor, to request data and programming in real time the Intelligent Unit,to program directly the Slave devices connected on the RS-485 Master and to request data from them. The device DAT9011 is configurable by the software *DEV9K* 2.0 and successive versions developed by DATEXEL and running under Windows. The LED of signaling of Ethernet activity and data Rx-Tx flow on the serial line allows a direct monitoring of the system functionality. The connection is made by removable screw-terminals (supply and RS-485) and RJ45 plug (Ethernet). The device DAT9011-USB realizes a full electrical isolation between the lines, introducing a valid protection against the effects of all ground loops eventually existing in industrial applications. The device is housed in a rough self-extinguishing plastic enclosure which, thanks to its thin profile of 22.5 mm only, allows a high density mounting on EN-50022 standard DIN rail.

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

INPUT

Input type	Min	Max
Voltage		
100 mV	-100 mV	100 mV
10 Volt	-10 V	10 V
TC		
J	-210°C	1200°C
K	-210°C	1370°C
R	-50°C	1760°C
S	-50°C	1760°C
B	400°C	1825°C
E	-210°C	1000°C
T	-210°C	400°C
N	-210°C	1300°C
RTD 2,3 wires		
Pt100	-200°C	850°C
Pt1000	-200°C	200°C
Ni100	-60°C	180°C
Ni1000	-60°C	150°C
Resistance 2,3 wires		
Low	0 Ω	500 Ω
High	0 Ω	2000 Ω
Potentiometer	20 Ω	50 kΩ
Current		
20 mA	-20 mA	20 mA

Accuracy (1)	
mV, Volt, mA	± 0.05 % f.s.
Pot, RTD, Res.	± 0.05 % f.s
TC	> ± 0.05 % f.s. or 5 uV
Linearity (1)	
mV, Volt, mA	± 0.05 % f.s.
Pot, RTD, Res.	± 0.1 % f.s
TC	± 0.2 % f.s.
RTD, Res, Pot excitation current	
Typical	0.400 mA
Lead wire resistance influence	
RTD/Res 3 wires(50 Ω max balanced)	0.05 f.s. %/Ω
mV, Tc	< 0.8 uV/Ohm
CJC Compensation error	± 1.5 °C
Auxiliary voltage	> 14 Vdc @ 20 mA

NOTES:
(1) Referred to input Span (difference between max. and min. values)
(2) Referred to output Span (difference between max. and min. values)
(3) – The maximum distance depends of: number of devices connected, type of cabling, noises, etc...

Input Impedance	
mV, TC	10 MΩ
Volt	1 MΩ
mA	22 Ω
Thermal Drift (1)	
Inputs - Full Scale	± 0.01 % / °C
Thermal Drift CJC	
Full Scale	± 0.02 °C/ °C
Sample time	500 ms
Warm-up time	3 minutes

OUTPUT (2 channels)

Output type	Min	Max
Current	4 mA	20 mA

Accuracy (2)	± 0.05 % f.s.
Linearity (2)	± 0.05 % f.s.
Thermal Drift (2)	± 0.01 % / °C
Load resistance	see "Load Characteristic"

DIGITAL INPUTS

Number of Channels	2
Input voltage	OFF State : 0÷3 V
(bipolar)	ON State : 10÷30 V
Input Impedance	4.7 Kohm
N°2 Digital counter	32 bit (up to 5 kHz)

DIGITAL OUTPUTS
N.2 Relays SPDT

Maximum switching power per contact (resistive load)
2 A @ 250 Vac
2 A @ 30 Vdc

Max. voltage 250Vac (50 / 60 Hz), 110Vdc
Dielectric Strength between contacts
1000 Vac, 50 Hz, 1 min.
Dielectric Strength between coil and contacts
4000 Vac, 50 Hz, 1 min.

In compliance with Ethernet IEEE 802.3

Network interface	Ethernet 10/100Base-T
Protocol	Modbus TCP
IP Table size	max 8 devices (IP)
Socket Modbus TCP	16 (port 502)
Socket HTTP	3 (port 80)

Serial Ports RS-485 (Master & Slave)
In compliance with EIA 485

Protocol	Modbus RTU
Baud Rate	up to 115.2 kbps
Max. recommended distance (3)	1.2 km @ 115.2 kbps
Number of modules in multipoint	32 max.

POWER SUPPLY

Supply voltage	9 ÷ 30 Vdc
Current cons. @ 24 V	60 mA (170 mA max)
Current cons. @ 10 V	147 mA (300 mA max)
Polarity rev. protection	60 Vdc max.

ISOLATION
1500 Vac, 50 Hz, 1 min

CONNECTIONS

Ethernet	RJ-45 (on term. side)
uUSB	uUSB micro-B (front)
RS-485 Master / Slave	Screw term. 5.08mm
Relay Outputs	Screw term 5.08mm
Supply/In/Analogue out	Screw term. 3.81mm

ENVIRONMENTAL CONDITIONS

Operative Temperature	-20°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 mm^2 /AWG 14-18
Tightening Torque	0.5 N m
Mounting	in compliance with DIN rail standard EN-50022
Weight	about 190 g.

CERTIFICATIONS
EMC (for industrial environments)

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

LIST OF SUPPORTED FUNCTION

Communication: - Read/Write data from/to “slave” devices (referred to the user guide)

Logical: - Boolean(And, Or, ….)
- Compare (>, <, =, ……)
- Arithmetical (Sum, Subtraction, Multiplication, Division ……)
- Calculation (Scaling, Exponential functions, Square root extraction, Arithmetic mean, …..)

Process: - Conditional statements (IF)
- Flow control (Goto, Call, ……)

For the complete list of functions and their operation, refer to the Programming software User Guide.

INSTALLATION INSTRUCTIONS

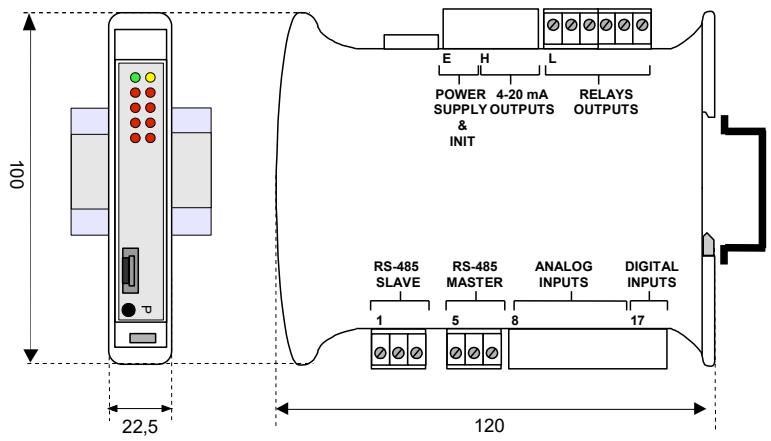
The Intelligent Unit DAT9011 is suitable for fitting to DIN rails in the vertical position.
For optimum operation and long life follow these instructions:
When the devices are installed side by side it may be necessary to separate them by at least 5 mm in the following case:
- If panel temperature exceeds 35°C
- power supply value < 15 Vdc.

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

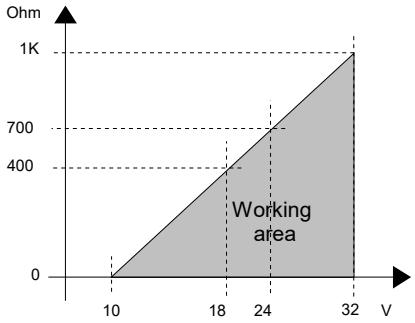
LED	COLOR	STATE	DESCRIPTION
PWR	GREEN	ON	Device powered
		OFF	Device not powered
		BLINK	Watchdog Alarm
STS	YELLOW	BLINK	DEBUG modality
		OFF	RELEASE modality
RX *n*	RED	BLINK	PORT *n* – Data received (the blink frequency depends on Baud-rate)
		OFF	No reception in progress
TX *n*	RED	BLINK	PORT *n* – Data transmitted (the blink frequency depends on Baud-rate)
		OFF	No reception in progress
I *n*	RED	ON	State 1 Digital Inputs
		OFF	State 0 Digital Inputs
O *n*	RED	ON	State 1 Digital Outputs
		OFF	State 0 Digital Outputs

MECHANICAL DIMENSIONS (mm)



LOAD CHARACTERISTIC

Rload: express the value of load in the current loop and it is calculated as function of the power supply value of the output loop.
The 4÷20 mA output signal is measurable in series to the output loop as shown in the section “Analogue output connection”; Rload is the input impedance of the instruments on the loop; to obtain a correct measure it is recommended that the maximum value of Rload will be calculated in function of the value of loop supply voltage.



PUSH-BUTTON “P” FUNCTIONALITY

This button, located on the front of the device allow to load the following factory defaults in the following two modes:
A) With the device on, press the button until the green LED (PW) goes off; immediately after release it to load the factory default parameters (modbus parameters, default IP, login credentials to the web server).
B) Turn on the device by keeping the button pressed and keep the pressure until the green LED (PW) goes off; immediately after release it to load the factory firmware.

While the default parameters or the factory firmware are loaded, the yellow STS LED remains permanently switched on. At the end of the loading it switches off.
ATTENTION: do not switch off the device during the loading phase!

"CVPROG" INTERFACE CABLE

Description
The CVPROG cable is an interface consisting of the physical cable, a uUSB port that must be connected to the DATEXEL device in use, a USB port that must be connected to the user PC and a chip to recognize the USB port as VCP (Virtual Com Port).
Due to this the CVPROG interface cable is not a simple uUSB-USB cable.
Through the CVPROG cable it is possible to communicate and program the DATEXEL devices without external power.
This allows a simple use of the device.
WARNING: the uUSB port and the RS485 slave port (Port 0) cannot be used simultaneously and the communication parameters are common to both ports.
When connecting the CVPROG cable to the PC, it will be necessary to install the drivers supplied with the CDROM supplied with the device or downloaded from the website www.datexel.it

Verify of the generated COM port
When the CVPROG cable is inserted into the PC, a virtual COM port is automatically generated and it can be displayed in the "Device Management" window → Ports (COM and LPT) of the operating system in use.

ACCESS TO THE INTEGRATED WEB SERVER

To access the integrated web server, open a browser on your PC and type the IP address of the device in the address bar of the browser.
- **Factory IP Address:** 192.168.1.100

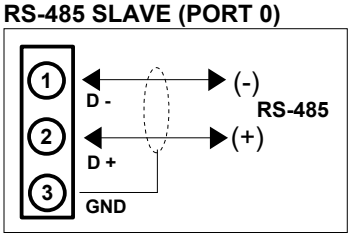
WARNING: make sure that the PC is in the same subnet as the device in use (see user guide of the device).
The factory / default login credentials that are requested on the "Login" page are:
- **Username:** Fact_user
- **Password:** Fact_pwd

Once you have logged in for the first time, you can change the credentials in the "Username and Password" section.

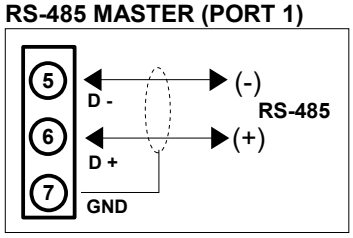
CONNECTIONS

SERIAL PORTS CONNECTION

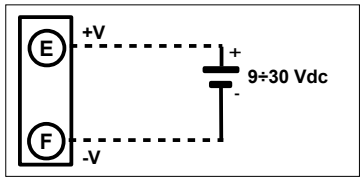
RS-485 SLAVE (PORT 0)



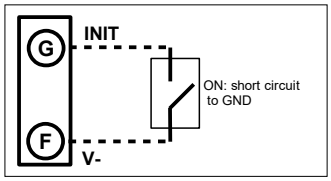
RS-485 MASTER (PORT 1)



POWER SUPPLY CONNECTION



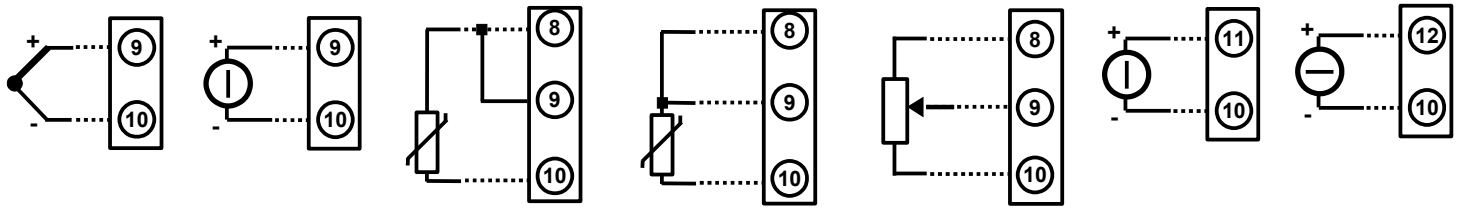
INIT CONNECTION



ANALOGUE INPUTS CONNECTION

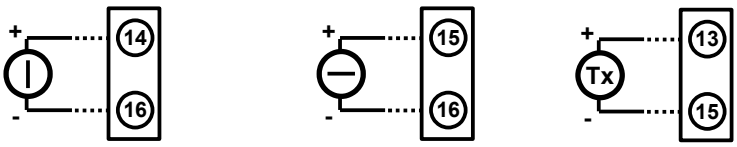
CHANNEL 0 - UNIVERSAL INPUT

Tc | mV | RTD/RES 2 WIRES | RTD/RES 3 WIRES | POTENTIOMETER | VOLT | mA



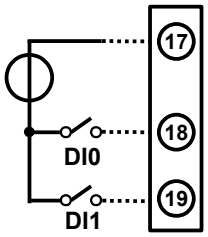
CHANNEL 1 - VOLT / mA INPUT

VOLT | ACTIVE mA | PASSIVE mA



NOTE: the analogue input channels are not isolated between them.

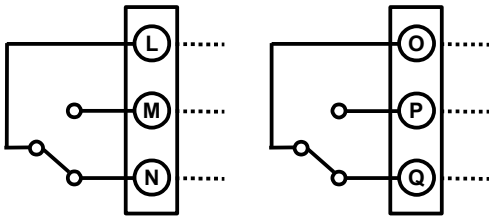
DIGITAL INPUTS



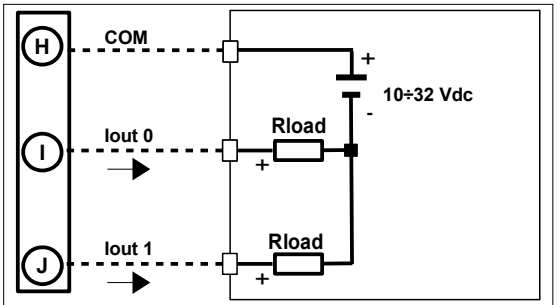
NOTE: the analogue input channels are not isolated between them.

RELAY OUTPUTS

RL 0 | RL 1



ANALOGUE OUTPUT CONNECTION



NOTE: the analogue output channels are not isolated between them.

INSULATIONS

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.

HOW TO ORDER

“ DAT9011-2.0 “