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Modbus Datalogger to USB with Digital and Analog I/O

DAT9011-USB-2.0

FEATURES

- **N.1 serial interface RS-485 Modbus RTU Client**
- **N.1 serial interface RS-485/uUSB Modbus RTU Server**
- **Interface Ethernet 10/100 Base-T, Modbus TCP Client/Server**
- **N°1 universal input + N°1 current and voltage analog 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 analog outputs**
- **N.1 slot for USB memory stick**
- **Client function both on RS-485 (Modbus RTU) and on Ethernet (Modbus TCP)**
- **Remotely programmable by programming software with "flow chart" structure**
- **Connection by removable screw-terminals**
- **Programmable without external sources via uUSB and optional cable CVPROG**
- **LED signaling for Link/Act Ethernet, serial RX-TX, power supply**
- **LED signaling for digital inputs and outputs status**
- **Galvanic Isolation on all the ways**
- **CE / UKCA mark**
- **In compliance to EN-50022 DIN rail mounting**

GENERAL DESCRIPTION

The DAT9011DL-2.0 device is an intelligent unit designed to control a network of Modbus RTU server devices connected via RS-485 Master or Modbus TCP through the Ethernet interface. It can read and write field values, perform logical and mathematical functions necessary for system operation, and manage up to ten recording tasks saved on a USB memory stick. Access to the saved files is possible through the Ethernet connection. The device features one universal analog input channel, one channel for voltage and current input, two digital inputs with 32-bit pulse counters, two relay outputs, and two 4-20mA outputs. An auxiliary source is available on the input to supply passive sensors in the field. Real-time reading and writing of internal register values are possible through the Ethernet interface, RS-485 "SLAVE" ports, or uUSB ports. Additionally, these interfaces allow for programming the control logic, monitoring data, requesting data, and performing real-time programming of the Intelligent Unit. Direct programming and data requests from slave devices connected to the RS-485 Master are also supported. The DAT9011DL-2.0 is configurable using the DEV9K 2.0 software (and later versions) developed by DATEXEL, which runs on Windows. The device provides full electrical isolation between lines, offering effective protection against ground loops common in industrial applications. LED indicators for Ethernet activity and data Rx-Tx flow on the serial line allow for direct monitoring of system functionality. Connections are made via removable screw terminals (for power supply and RS-485) and an RJ45 plug (for Ethernet). The device is housed in a rugged, self-extinguishing plastic enclosure with a slim profile of only 22.5 mm, allowing for high-density mounting on a standard EN-50022 DIN rail.

SUPPORTED FUNCTION

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

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

INPUT (2 CHANNELS)

Input type	Min	Max
Voltage		
100 mV	-100 mV	100 mV
10 Volt (channels 1&2)	-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(channels 1&2)	-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.
Excitation current sensor RTD, Res, Pot	
Typical	0.400 mA
Line resistance R influence	
RTD 3 wires(50 Ω max balanced)	0.05 %/Ω
mV, Tc	< 0.8 uV/Ohm
CJC compensation Error	± 1.5 °C
Auxiliary voltage	> 14 Vdc @ 20 mA
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	250 ms
Warm-up time	3 minutes

NOTES:
(1) Referred to input Span (difference between max. and min. values)
(2) Referred to output Span (difference between max. and min. values)

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"
Response Time	about 1 sec

DIGITAL INPUTS (WET CONTACTS)

Channels	2
Input voltage (bipolar)	
OFF state	0 ÷ 3 V
ON state	10 ÷ 30 V
Impedance	4.7 KΩ
Number of counters	4
Counters register bit-length	32 bit
Counters Type	Fast / Slow

The type of counters can be set from web interface.

Max signal frequency	
Fast Counters	5kHz
Slow Counters	300Hz

The debounce function works on all the slow counters and it's the same for all. There is no debounce for fast counters.

DIGITAL OUTPUTS

Channels	2
Type	SPDT relay
Max. switching power with resistive load per contact	2 A @ 250 Vac 2 A @ 30 Vdc
Max. voltage:	250Vac(50/60Hz)/ 30Vdc
Dielectric strength between contacts	1000 Vac, 50 Hz, 1 min.
Dielectric strength between coil and contacts	4000 Vac, 50 Hz,1 min.

ETHERNET

In compliance with standard Ethernet IEEE 802.3	
Ethernet interface	Ethernet 10/100Base-T
Ethernet connection	RJ-45
Protocol	Modbus TCP
TCP Port	502 (Modbus TCP) 80 (HTTP)
Number of sockets	
Modbus TCP	16
HTTP	3
Modbus TCP Client function	
IP Table Size	max 8 devices (IP)

OPTIONAL PROGRAMMING PORT

Connection	uUSB micro-B (on front)

It is requested the use of the dedicated cable CVPROG.
It doesn't work with standard USB cables

DATA LOGGER

N° Logging task	up to 8
Min. schedule rate	10 seconds
Compatible USB devices	
Type	Pen drive
Memory size	Up to 32 GB
Format	FAT16 or FAT32
Connector	USB type A on front

RS-485

In compliance with standard RS485

Baud-rate	up to 115.2 Kbps
Cable Length	1200 m / 4000 ft max

The reachable maximum distance depends on the number of devices connected, on the type of cable used and its immunity against noises.

Number of modules	up to 32
Switching time TX/RX	150 us.

GENERAL SPECIFICATIONS

DC power supply voltage	9 .. 30 Vdc
Reverse polarity protection	60 Vdc max
Max. Current consumption	300 mA
ISOLATION (test time 1 min)	
Among all ways	1500 Vac, 50 Hz
CONNECTIONS (screw terminals)	
RS-485 Master / Slave	Terminals pitch 5.08 mm
Relay Outputs	Terminals pitch 5.08 mm
Supply/In/Analogue out	Terminals pitch 3.81 mm
ENVIRONMENTAL CONDITIONS	
Operative temperature	-20°C .. +60°C
Storage temperature	-40°C .. +85°C
Humidity (not condensing)	0 .. 90 %
Maximum Altitude	2000 m slm
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	0.5 N m
Mounting	in compliance with DIN rail standard EN-50022
Weight	about 190 g.
CERTIFICATIONS	
EMC (for the Industrial Environments)	
Immunity	EN 61000-6-2
Emission	EN 61000-6-4
UKCA (ref S.I. 2016 N°1091)	
Immunity	BS EN 61000-6-2
Emission	BS EN 61000-6-4

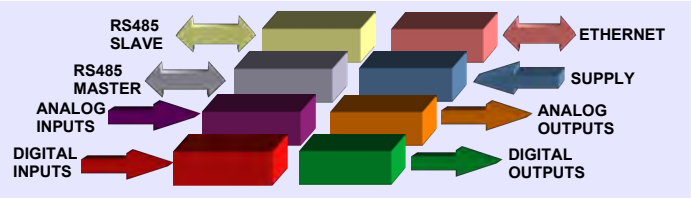
INSTALLATION INSTRUCTIONS

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 may be necessary to separate them by at least 5 mm if panel temperature exceeds 35°C or 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.

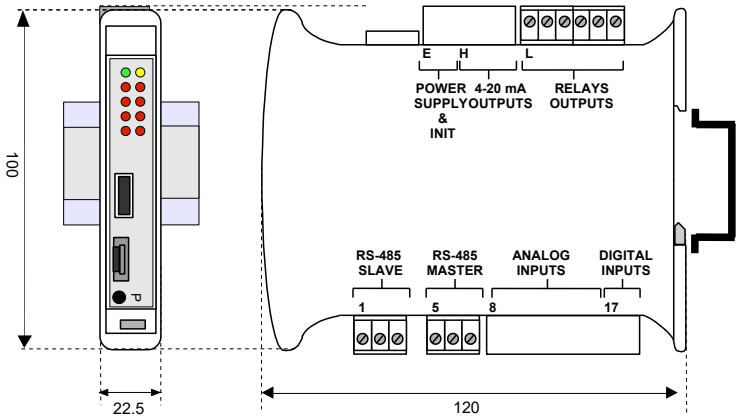
LIGHT SIGNALLING

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 blinking frequency depends on Baud-rate)
		OFF	No reception in progress.
TX *n*	RED	BLINK	PORT *n* – Data transmitted (the blinking 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.

ISOLATION STRUCTURE



MECHANICAL DIMENSIONS (mm)



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!

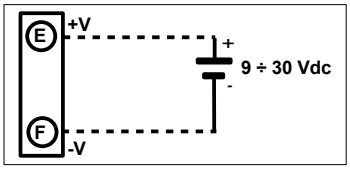
"CVPROG" INTERFACE CABLE

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 could be necessary to install the drivers 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.
- Factory Modbus Address: 10

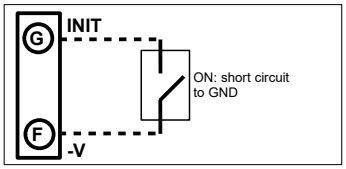
The symbol reported on the product indicates that the product itself must not be considered as a domestic waste. It must be brought to the authorized recycle plant for the recycling of electrical and electronic waste.
For more information contact the proper office in the user's city , the service for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

WIRING

POWER SUPPLY

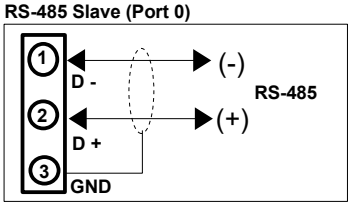


INIT

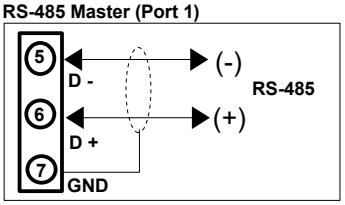


Note: the device must be powered using a power supply unit classified NEC class 2 or SELV with limited energy

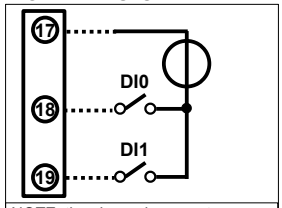
RS-485 Slave (Port 0)



RS-485 Master (Port 1)

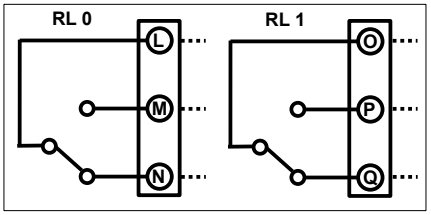


DIGITAL INPUTS



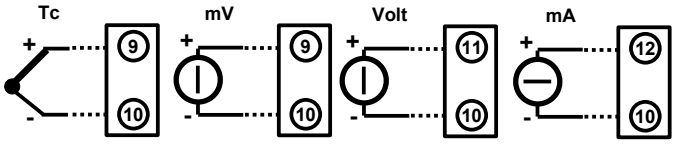
NOTE: the channels are not isolated between them

RELAY OUTPUTS

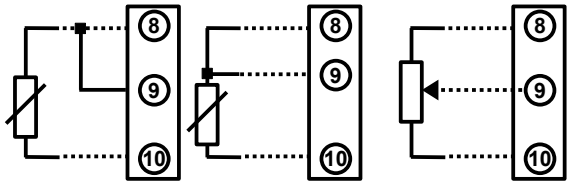


ANALOG INPUTS

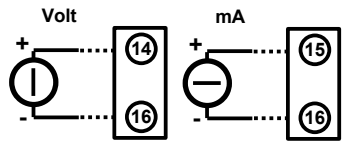
CHANNEL 0 UNIVERSAL INPUT



RTD/RES 2 WIRES **RTD/RES 3 WIRES** **POTENTIOMETER**

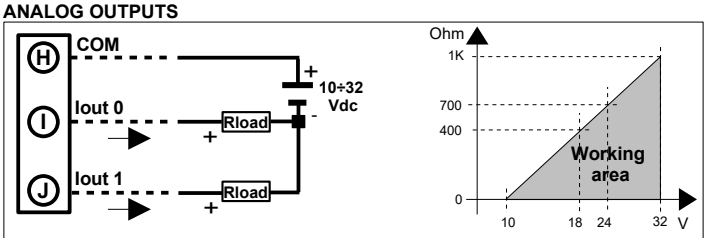


CHANNEL 1 VOLT/ mA INPUT



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

ANALOG OUTPUTS



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

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.

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.

HOW TO ORDER

" DAT9011USB-2.0 "