

Modbus Data Acquisition with Datalogger for SD Ram + Digital and Analog I/O

DAT9011-DL-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 analog 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 microSD card
- 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 signalling for Link/Act Ethernet, serial RX-TX, power supply
- LED signalling 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 microSD card. 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 analog 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)			ANALOG OUTPUT (2 CHANNELS)			DATA LOGGER	
Input type	Min	Max	Output type	Min	Max	N° Logging task	up to 8
Voltage			Current	4 mA	20 mA	Min. schedule rate	10 seconds
100 mV	-100 mV	100 mV	Accuracy (2)	± 0.05 % f.s.		Compatible devices	
10 Volt (channels 1&2)	-10 V	10 V	Linearity (2)	± 0.05 % f.s.		Type	microSD (SDHC)
TC			Thermal Drift (2)	± 0.01 % / °C		Memory size	Up to 32 GB
J	-210°C	1200°C	Load resistance	see "Load Characteristic"		Format	FAT16 or FAT32
K	-210°C	1370°C	Response Time	about 1 sec		Connector	microSD on front
R	-50°C	1760°C	DIGITAL INPUTS (WET CONTACTS)				
S	-50°C	1760°C	Channels	2			
B	400°C	1825°C	Input voltage (bipolar)	0 + 3 V			
E	-210°C	1000°C	OFF state	0 + 3 V			
T	-210°C	400°C	ON state	10 + 30 V			
N	-210°C	1300°C	Impedance	4.7 KΩ			
RTD 2,3 wires			Number of counters	4			
Pt100	-200°C	850°C	Counters register bit-length	32 bit			
Pt1000	-200°C	200°C	Counters Type	Fast / Slow			
Ni100	-60°C	180°C	The type of counters can be set from web interface.				
Ni1000	-60°C	150°C	Max signal frequency				
Resistance 2, 3 wires			Fast Counters	5kHz			
Low	0 Ω	500 Ω	Slow Counters	300Hz			
High	0 Ω	2000 Ω	The debounce function works on all the slow counters and it's the same for all. There is no debounce for fast counters.				
Potentiometer	20 Ω	50 kΩ	DIGITAL OUTPUTS				
Current			Channels	2			
20 mA(channels 1&2)	-20 mA	20 mA	Type	SPDT relay			
Accuracy (1)			Max. switching power with resistive load per contact	2 A @ 250 Vac			
mV, Volt, mA	± 0.05 % f.s.			2 A @ 30 Vdc			
Pot, RTD, Res.	± 0.05 % f.s.		Max. voltage:	250Vac(50/60Hz)/ 30Vdc			
TC	> ± 0.05 % f.s. or 5 uV		Dielectric strength between contacts	1000 Vac, 50 Hz, 1 min.			
Linearity (1)			Dielectric strength between coil and contacts	4000 Vac, 50 Hz,1 min.			
mV, Volt, mA	± 0.05 % f.s.		ETHERNET				
Pot, RTD, Res.	± 0.1 % f.s.		In compliance with standard Ethernet IEEE 802.3	Ethernet IEEE 802.3			
TC	± 0.2 % f.s.		Ethernet interface	Ethernet 10/100Base-T			
Excitation current sensor RTD, Res, Pot			Ethernet connection	RJ-45			
Typical	0.400 mA		Protocol	Modbus TCP			
Line resistance R influence			TCP Port	502 (Modbus TCP)			
RTD 3 wires(50 Ω max balanced)	0.05 %/Ω			80 (HTTP)			
mV, Tc	< 0.8 uV/Ohm		Number of sockets	16			
CJC compensation Error	± 1.5 °C		Modbus TCP	3			
Auxiliary voltage	> 14 Vdc @ 20 mA		HTTP	3			
Input impedance			Modbus TCP Client function	max 8 devices (IP)			
mV, TC	10 MΩ		IP Table Size				
Volt	1 MΩ		OPTIONAL PROGRAMMING PORT				
mA	22 Ω		Connection	uUSB micro-B (on front)			
Thermal drift input (1)	± 0.01 % f.s. / °C		It is requested the use of the dedicated cable CVPROG. It doesn't work with standard USB cables				
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)							
			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/Analog 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.

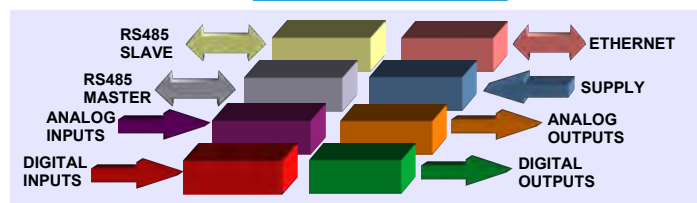
For optimum operation and long life follow these instructions:

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.

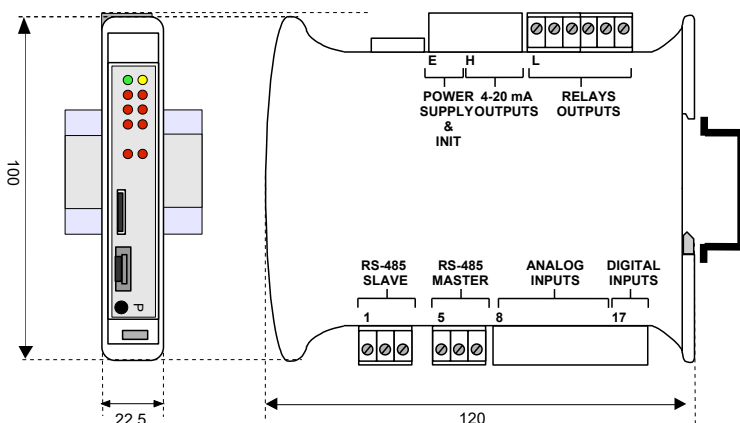
LIGHT SIGNALLING

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 <i>n</i>	RED	BLINK	PORT <i>n</i> – Data received (the blinking frequency depends on Baud-rate)
		OFF	No reception in progress.
TX <i>n</i>	RED	BLINK	PORT <i>n</i> – Data transmitted (the blinking frequency depends on Baud-rate)
		OFF	No reception in progress.
I <i>n</i>	RED	ON	State 1 Digital Inputs.
		OFF	State 0 Digital Inputs.
O <i>n</i>	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:

- 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).
- 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.

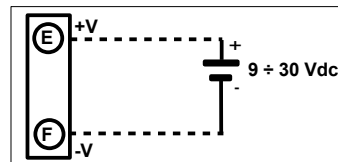
- **Factory Modbus Address:** 10



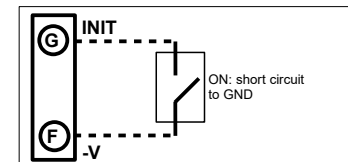
The symbol reported on the product indicates that the product itself must not be considered as a domestic waste. It must be brought to the authorized recycle plant for the recycling of electrical and electronic waste. For more information contact the proper office in the user's city , the service for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

WIRING

POWER SUPPLY

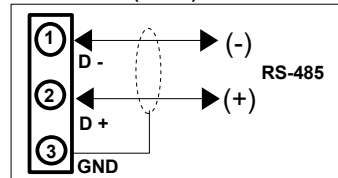


INIT

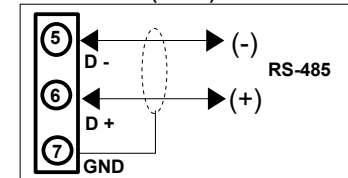


Note: the device must be powered using a power supply unit classified NEC class 2 or SELV with limited energy

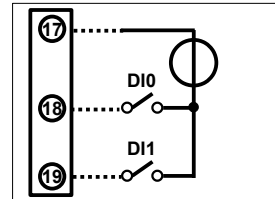
RS-485 Slave (Port 0)



RS-485 Master (Port 1)

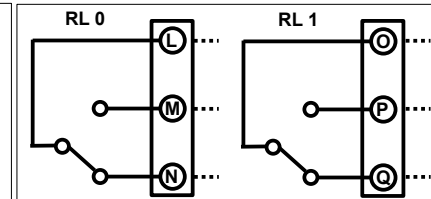


DIGITAL INPUTS



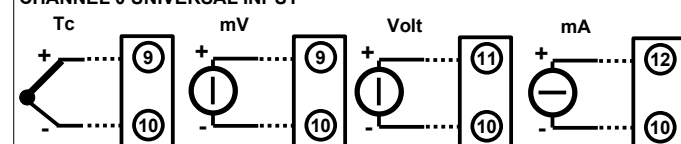
NOTE: the channels are not isolated between them

RELAY OUTPUTS

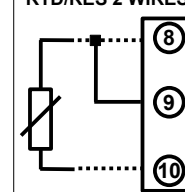


ANALOG INPUTS

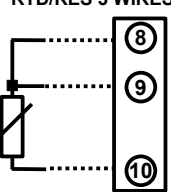
CHANNEL 0 UNIVERSAL INPUT



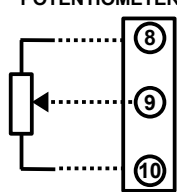
RTD/RES 2 WIRES



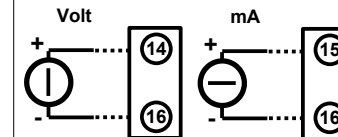
RTD/RES 3 WIRES



POTENTIOMETER

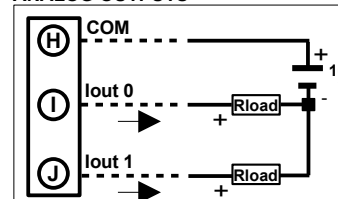


CHANNEL 1 VOLT/ mA INPUT



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

ANALOG OUTPUTS



NOTE: the analog 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 "Analog 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

" DAT9011-DL-2.0 "