DATEXEL

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**Intelligent Unit
with Data-Logger function,
Ethernet Interface
+ Digital And Analogue I/O**

DAT 9011-DL

CSQ UNI EN ISO 9001:2008 IQNet

CE

FEATURES

- N°1 serial interface RS-485 Modbus RTU Master
- N°1 serial interface RS-485/232 Modbus RTU Slave
- N°1 Slot for microSD card
- Interface Ethernet 10Base-T, Modbus TCP
- N°1 universal analogue input + N°1 current and voltage analogue input
- N°2 digital Inputs
- Auxiliary supply to power sensors on field
- N°2 passive 4-20 mA analogue outputs
- N°2 SPDT Relay Outputs
- Functional Block programming software
- Remotely programmable
- Connection by removable screw-terminals
- LED signalling for Link/Act Ethernet, serial RX-TX, power supply
- LED signalling for digital inputs and digital outputs state
- 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-DL is an Intelligent unit able to control a network of slave Modbus RTU devices connected on serial line RS-485 Master executing the reading and writing of the field values and performing the logical and mathematical functions necessary for the system working and managing up to 8 tasks of storage data. The data are saved on microSD card; it is possible to get access to the saved files by means of the Ethernet connection .
The device is equipped with one universal analogue input channel, one channel for Volt and mA input, two digital inputs 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 RS-232 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 RS-232 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-DL is configurable by the software *DEV9K*, an easy and intuitive free IDE 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 and RS-232). The device DAT9011-DL 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 DAT9011 -DL is in compliance with the Directive 2004/108/EC on the Electromagnetic Compatibility. 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)

Analogue Inputs

Type	Range			Calibration	Linearity	Thermal Drift
100 mV	-100 ÷	+100	mV	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
10 V	-10 ÷	+10	V	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
20 mA	-20 ÷	+20	mA	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Pt100	-200 ÷	+850	°C	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Pt1K	-200 ÷	+200	°C	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Ni100	-60 ÷	+180	°C	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Ni1K	-60 ÷	+150	°C	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Res	0 ÷	2000	Ohm	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Pot	20 ÷	50000	Ohm	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Tc J	-210 ÷	+1200	°C	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Tc K	-210 ÷	+1370	°C	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Tc R	-50 ÷	+1760	°C	±0.1 % f.s.	±0.2% f.s.	100 ppm/°C
Tc S	-50 ÷	+1760	°C	±0.1 % f.s.	±0.2 % f.s.	100 ppm/°C
Tc B	+400 ÷	+1825	°C	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Tc E	-210 ÷	+1000	°C	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Tc T	-210 ÷	+400	°C	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C
Tc N	-210 ÷	+1300	°C	±0.05 % f.s.	±0.1 % f.s.	100 ppm/°C

Input impedance		Tc, mV >= 10 MΩ
		Volt >= 1 MΩ
		Current ~ 50 Ω
Auxiliary voltage		>14 V @ 20 mA
Line resistance influence	RTD 3 wires	0.05 %/Ω (50 Ω max)
	mV, Tc	< 0.8 uV/Ohm
Sensor excitation current	RTD, Res, Pot	~ 400 uA
CJC comp.		± 1 °C
Sample time		1 sec.
Warm-up time		3 min.

Digital Inputs

Number of channels	2
Input voltage (bipolar)	OFF condition : 0÷3 V
	ON condition: 10÷30 V
Input impedance	4.7 Kohm
N°2 Digital counter	32 bit (up to 300 Hz)

Analogue outputs

Type	Range			Calibration	Linearity	Thermal Drift
20 mA	4 ÷	20	mA	±0.05 % f.s.	±0.05 % f.s.	100 ppm/°C

Load Resistance	see Load Characteristic

Digital Outputs

N.2 SPDT Relays	
Switching Power (resistive load)	2 A @ 250 Vac (per contact)
	2 A @ 30 Vdc (per contact)
Minimum load	5Vdc , 10mA
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 EIA RS485 and RS232

Network interface	Ethernet 10Base-T
Protocol	Modbus TCP

Serial Ports RS-485 (Master & Slave)

Protocol	Modbus RTU
Baud Rate	up to 115200 bps
Max. recommended distance (1)	1.2 Km @ 38.4 Kbps
Number of modules in multipoint	32 max.
Internal termination resistance (optional)	120 Ohm (optional)

Compatible SD card

Type	microSD
Memory size	Up to 8 GB
Format	FAT16 or FAT32

Power supply

Supply voltage	9 ÷ 30 Vdc
Current consumption @ 24 Vdc	60 mA (170 mA max)
Current consumption @ 10 Vdc	147 mA (300 mA max)
Polarity reverse protection	60 Vdc max

Isolation

Isolation Voltage (50 Hz, 1 min)	1500 Vac (on all the ways)

Connections

Ethernet	RJ-45 (on terminals side)
RS-232D	RJ-45 (on front side)
RS-485 Master / Slave	Screw terminals pitch 5.08mm
Relay Outputs	Screw terminals pitch 5.08mm
Supply/Inputs/Analogue outputs	Screw terminals pitch 3.81mm

EMC (industrial environments)

Immunity	in compliance to EN 61000-6-2
Emission	in compliance to EN 61000-6-4

Temperature & Humidity

Operative temperature	-20°C .. +60°C
Storage temperature	-40°C .. +60°C
Relative Humidity (not cond.)	0 .. 90 %

Housing

Material	Self-extinguishing plastic
Mounting	DIN rail EN-50022
Dimensions in mm.(W x H x T)	100 x 120 x 22.5
Weight	approx. 200 g

(1) – The maximum distance depends of: number of devices connected, type of cabling, noises, etc...

LIST OF SUPPORTED FUNCTION

Communication: - Read data from "slave" devices (Modbus function 04)
- Write data to "slave" devices (Modbus function 16)

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-DL 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 / Wrong RS-485 connection
STS	YELLOW	BLINK	DEBUG modality
		OFF	RUN 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 1Digital Inputs.
		OFF	State 0 Digital Inputs.
O *n*	RED	ON	State 1Digital Outputs.
		OFF	State 0 Digital Outputs.

MECHANICAL DIMENSIONS (mm)
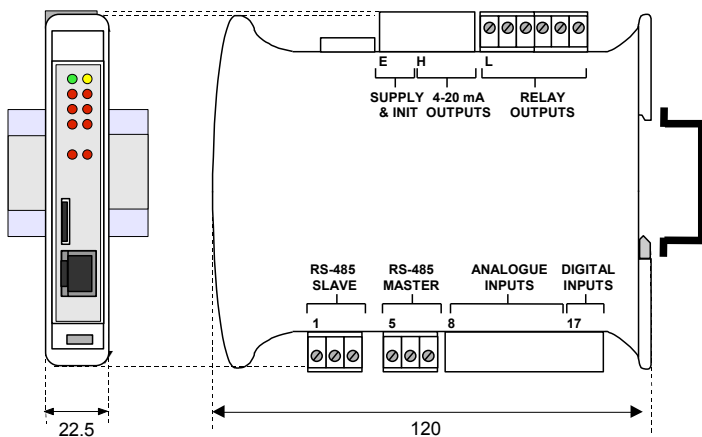
LOAD CHARACTERISTIC

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.
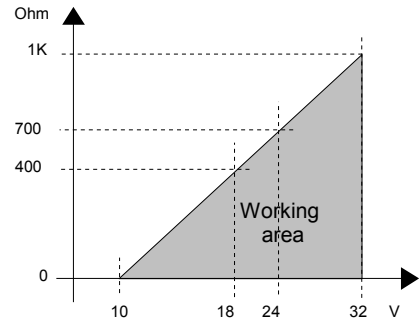
MODBUS REGISTERS MAPPING

Register	Description	Access
%S0	--Reserved--	R/W
%S1	Firmware [0]	R
%S2	Firmware [1]	R
%S3	Name [0]	R/W
%S4	Name [1]	R/W
%S5	Port 1 [BaudRate]	R/W
%S6	Node ID	R/W
%S7	Port 1 [Timeout RX]	R/W
%S8	Digital Inputs	R/W
%S9	Digital Outputs	R/W
%S10	System Flags	R/W
%S11	--Reserved--	-
%S12	--Reserved--	-
%S13	PC	R
%S14	Status [0]	R
%S15	Status [1]	R
%S16	COM Errors	R/W
%S17	Gateway Mask [L-H]	R/W
%S18	Port 0 [Settings]	R/W
%S19	Port 2 [Settings]	R/W
%S20	Timers Enable	R/W
%S21	--Reserved--	-
%R22	--RTC(0)	R/W
%R23	--RTC(1)	R/W
%R24	--RTC(2)	R/W
%R25	--RTC(3)	R/W
%R26	Analogue input ch. 0	R
%R27	Analogue input ch. 1	R
%R28 --- %R31	--Reserved--	-
%R32	Analogue output ch. 0	R/W
%R33	Analogue output ch. 1	R/W
%R34	Program. sensor ch. 0 & 1	R/W
%R35 --- %R927	"General Purpose" Registers	R/W
%R928	Frequency Digital input 0	R
%R929	Frequency Digital input 1	R
%R930	--Reserved--	-
%R931	--Reserved--	-
%R932-933	Counter Digital input 0	R/W
%R934-935	Counter Digital input 1	R/W
%R936 --- %R940	--Reserved--	-
%R941 --- %R959	"General Purpose" Registers	R/W
%R960 --- %R1023	Retentive Registers	R/W

MicroSD card HANDLING

Warning: execute this operation only if necessary; to get access to the data on the card it is suggested, if possible, to use the Ethernet interface.

Insertion and removing

Power off the device.

Open the plastic door located on the front of the device.

Insert the card into the slot in the correct way and push the card to block it inside the connector; to extract the card, push slightly the card on the border to unblock the connector and pull out the card.
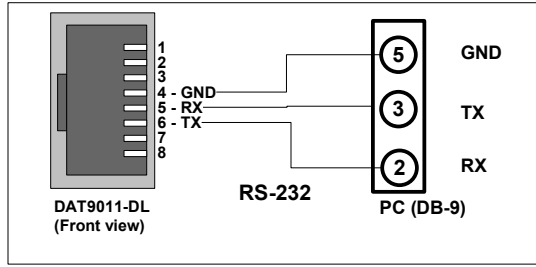
Close the plastic door located on the front of the device.
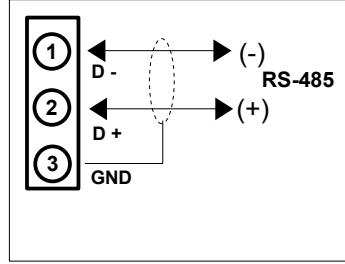
Power-on the device.
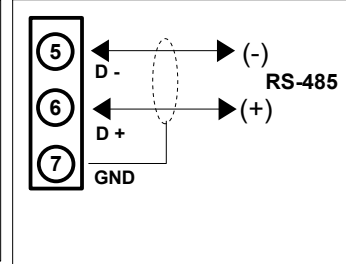
CONNECTIONS
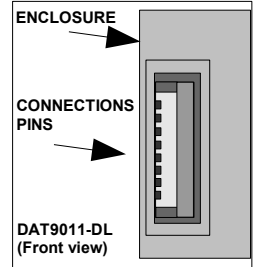
SERIAL PORTS CONNECTION

RS-232D SLAVE (PORT 0)

1
2
3
4 - GND
5 - RX
6 - TX
7
8

DAT9011-DL
(Front view)

RS-232

5 GND
3 TX
2 RX

PC (DB-9)

RS-485 SLAVE (PORT 0)

1 D - ◄----► (-)   RS-485
2 D + ◄----► (+)
3 GND

RS-485 MASTER (PORT 1)

5 D - ◄----► (-)   RS-485
6 D + ◄----► (+)
7 GND

MICRO SDCARD

ENCLOSURE

CONNECTIONS PINS

DAT9011-DL
(Front view)

ANALOGUE INPUTS CONNECTION

CHANNEL 0 - UNIVERSAL INPUT

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

+ 9
- 10

+ 9
- 10

8
9
10

8
9
10

8
9
10

+ 11
- 10

+ 12
- 10

CHANNEL 1 - VOLT / mA INPUT

| VOLT | ACTIVE mA | PASSIVE mA |

+ 14
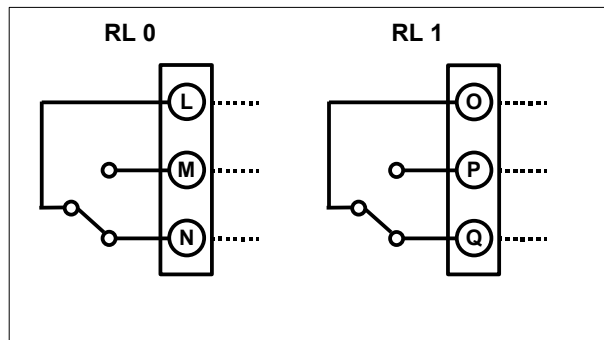- 16

+ 15
- 16

+ 13 (Tx)
- 15
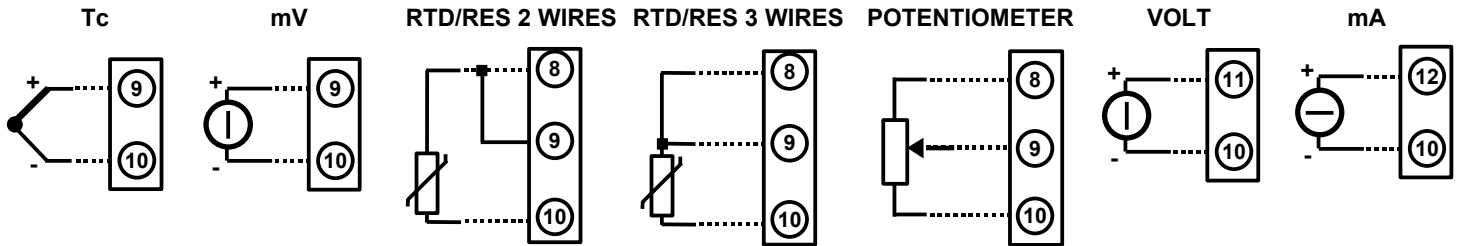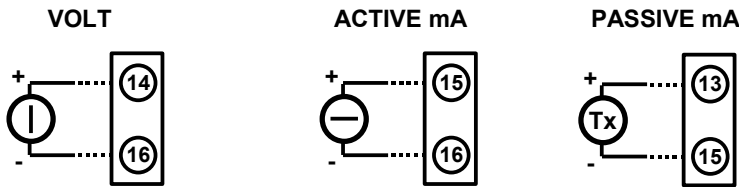
NOTE: the analogue input channels are not isolated between them.

DIGITAL INPUTS CONNECTION

17
18 DI0
19 DI1
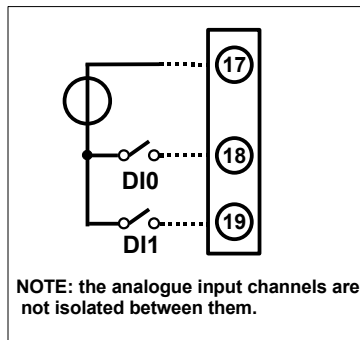
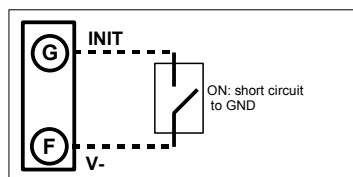NOTE: the analogue input channels are not isolated between them.

RELAY OUTPUTS CONNECTION

RL 0

L
M
N

RL 1

O
P
Q

POWER SUPPLY CONNECTION

E +V
F -V

9÷30 Vdc

INIT CONNECTION

G INIT
F V-

ON: short circuit to GND

ANALOGUE OUTPUT CONNECTION

H COM
I Iout 0
J Iout 1

Rload
Rload

10÷32 Vdc
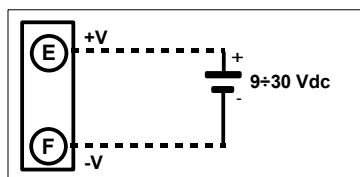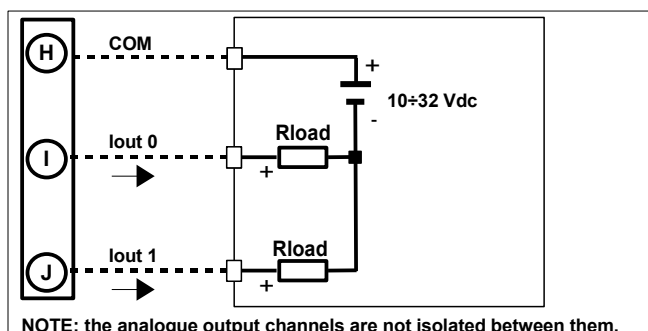
NOTE: the analogue output channels are not isolated between them.

HOW TO ORDER

" DAT 9011-DL "