



FEATURES

- N°1 serial interface RS-485 Modbus RTU Master
- N°1 serial interface RS-485/232 Modbus RTU Slave
- 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 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. 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 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 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 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 | | | | | Digital Outputs | | | |
|---------------------------|-----------------|--------------|--------------|---------------|---|---|-------------------------------|--|
| Type | Range | Calibration | Linearity | Thermal Drift | N.2 SPDT Relays | | | |
| 100 mV | -100 ÷ +100 mV | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Switching Power (resistive load) | 2 A @ 250 Vac (per contact) 2 A @ 30 Vdc (per contact) | | |
| 10 V | -10 ÷ +10 V | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Minimum load | 5Vdc , 10mA | | |
| 20 mA | -20 ÷ +20 mA | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Max. voltage | 250 Vac (50 / 60 Hz), 110 Vdc | | |
| Pt100 | -200 ÷ +850 °C | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Dielectric strength between contacts | 1000 Vac, 50 Hz, 1 min. | | |
| Pt1K | -200 ÷ +200 °C | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Dielectric strength between coil and contacts | 4000 Vac, 50 Hz, 1 min. | | |
| Ni100 | -60 ÷ +180 °C | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | In compliance with Ethernet IEEE 802.3 EIA RS485 and RS232 | | | |
| Ni1K | -60 ÷ +150 °C | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Network interface | Ethernet 10Base-T | | |
| Res | 0 ÷ 2000 Ohm | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Protocol | Modbus TCP | | |
| Pot | 20 ÷ 50000 Ohm | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Serial Ports RS-485 (Master & Slave) | | | |
| Tc J | -210 ÷ +1200 °C | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Protocol | Modbus RTU | | |
| Tc K | -210 ÷ +1370 °C | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Baud Rate | up to 115200 bps | | |
| Tc R | -50 ÷ +1760 °C | ±0.1 % f.s. | ±0.2 % f.s. | 100 ppm/°C | Max. recommended distance (1) | 1.2 Km @ 38.4 Kbps | | |
| Tc S | -50 ÷ +1760 °C | ±0.1 % f.s. | ±0.2 % f.s. | 100 ppm/°C | Number of modules in multipoint | 32 max. | | |
| Tc B | +400 ÷ +1825 °C | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Internal termination resistance (optional) | 120 Ohm (optional) | | |
| Tc E | -210 ÷ +1000 °C | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Power supply | | | |
| Tc T | -210 ÷ +400 °C | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Supply voltage | 9 ÷ 30 Vdc | | |
| Tc N | -210 ÷ +1300 °C | ±0.05 % f.s. | ±0.1 % f.s. | 100 ppm/°C | Current consumption @ 24 Vdc | 60 mA (170 mA max) | | |
| Input impedance | | | | | Tc, mV >= 10 MΩ | Current consumption @ 10 Vdc | 147 mA (300 mA max) | |
| Auxiliary voltage | | | | | Volt >= 1 MΩ | Polarity reverse protection | 60 Vdc max | |
| Line resistance influence | | | | | Current ~ 50 Ω | Isolation | | |
| Sensor excitation current | | | | | >14 V @ 20 mA | Isolation Voltage (50 Hz, 1 min) | 1500 Vac (on all the ways) | |
| CJC comp. | | | | | 0.05 %/Ω (50 Ω max) | Connections | | |
| Sample time | | | | | < 0.8 uV/Ohm | Ethernet | RJ-45 (on terminals side) | |
| Warm-up time | | | | | ~ 400 uA | RS-232D | RJ-45 (on front side) | |
| Digital Inputs | | | | | ± 1 °C | RS-485 Master / Slave | Screw terminals pitch 5.08mm | |
| Number of channels | | | | | 1 sec. | Relay Outputs | Screw terminals pitch 5.08mm | |
| Input voltage (bipolar) | | | | | 3 min. | Supply/Inputs/Analogue outputs | Screw terminals pitch 3.81mm | |
| Input impedance | | | | | | EMC (industrial environments) | | |
| N°2 Digital counter | | | | | | Immunity | in compliance to EN 61000-6-2 | |
| Analogue outputs | | | | | | Emission | in compliance to EN 61000-6-4 | |
| Type | Range | Calibration | Linearity | Thermal Drift | Temperature & Humidity | | | |
| 20 mA | 4 ÷ 20 mA | ±0.05 % f.s. | ±0.05 % f.s. | 100 ppm/°C | Operative temperature | -20°C .. +60°C | | |
| Load Resistance | | | | | see "Load Characteristic" | Storage temperature | -40°C .. +85°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. 190 g | |

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

LIST OF SUPPORTED FUNCTION

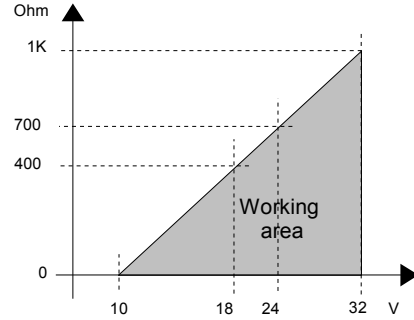
- Communication:
- Read data from "slave" devices (Modbus function 04)
 - Write data to "slave" devices (Modbus function 16)
- Logical:
- Boolean(And, Or,)
 - Compare (>, <, =,
 - Arithmetical (Sum, Subtraction, Multiplication, Division
 - Calculation (Scaling, Exponential functions, Square root extraction, 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.

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.



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;
- high 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.

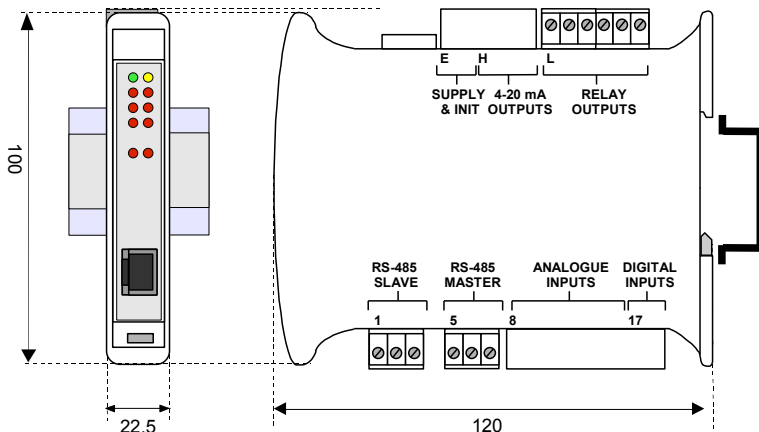
Install the device in a place without vibrations.

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 <i>n</i> | RED | BLINK | PORT <i>n</i> – Data received (the blink frequency depends on Baud-rate) |
| | | OFF | No reception in progress. |
| TX <i>n</i> | RED | BLINK | PORT <i>n</i> – Data transmitted (the blink 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. |

MECHANICAL DIMENSIONS (mm)



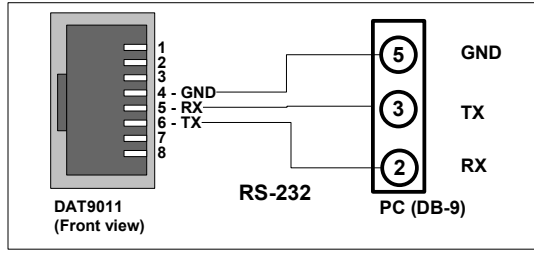
MODBUS REGISTERS MAPPING

| 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 Enabled | R/W |
| %S21 | --Reserved-- | - |
| %R22 | --Reserved-- | - |
| ---- | --Reserved-- | - |
| %R25 | --Reserved-- | - |
| %R26 | Analogue input ch. 0 | - |
| %R27 | Analogue input ch. 1 | - |
| %R28 | --Reserved-- | R |
| ---- | --Reserved-- | - |
| %R31 | --Reserved-- | - |
| %R32 | Analogue output ch. 0 | - |
| %R33 | Analogue output ch. 1 | R/W |
| %R34 | Program. sensor ch. 0 & 1 | R/W |
| %R35 | "General Purpose" Registers | R/W |
| ---- | --Reserved-- | - |
| %R927 | --Reserved-- | - |
| %R928 | Frequency dig. input 0 | R |
| %R929 | Frequency dig. input 1 | R |
| %R930 | --Reserved-- | - |
| %R931 | --Reserved-- | - |
| %R932-933 | Counter dig. input 0 | R/W |
| %R934-935 | Counter dig. input 1 | R/W |
| %R936 | --Reserved-- | - |
| ---- | --Reserved-- | - |
| %R940 | --Reserved-- | - |
| %R941 | "General Purpose" Registers | R/W |
| ---- | --Reserved-- | - |
| %R959 | --Reserved-- | - |
| %R960 | Retentive Registers | R/W |
| ---- | --Reserved-- | - |
| %R1023 | --Reserved-- | - |

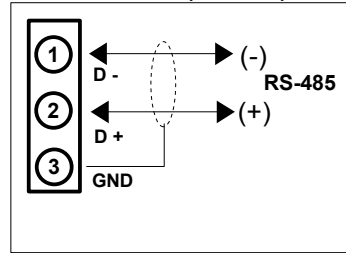
CONNECTIONS

SERIAL PORTS CONNECTION

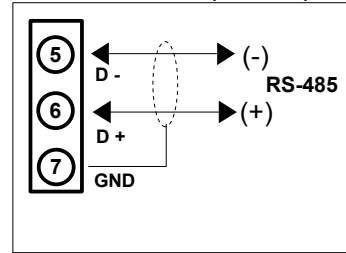
RS-232D SLAVE (PORT 0)



RS-485 SLAVE (PORT 0)

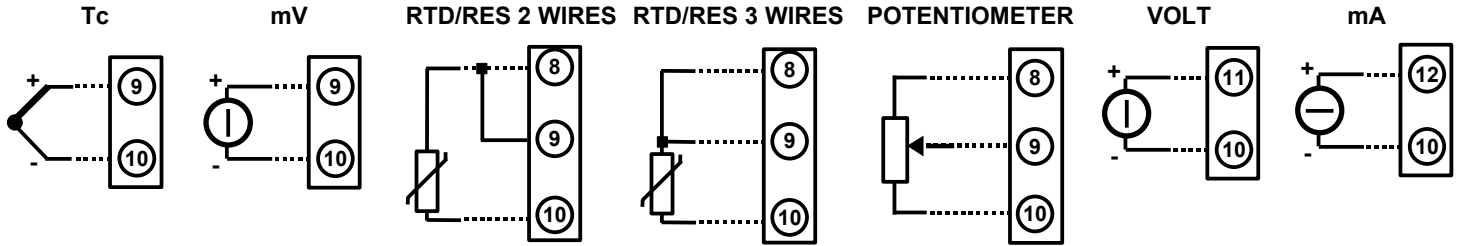


RS-485 MASTER (PORT 1)

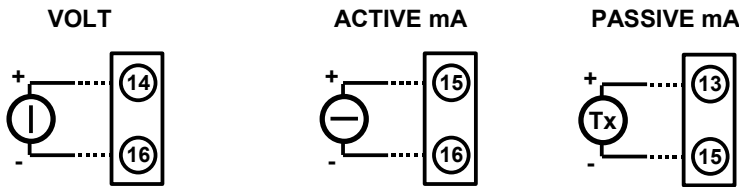


ANALOGUE INPUTS CONNECTION

CHANNEL 0 - UNIVERSAL INPUT

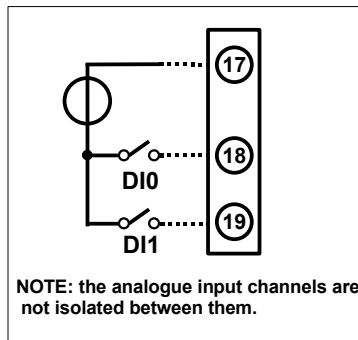


CHANNEL 1 - VOLT / mA INPUT



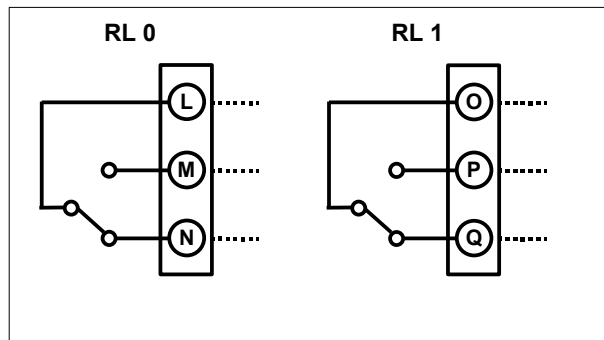
NOTE: the analogue input channels are not isolated between them.

DIGITAL INPUTS CONNECTION

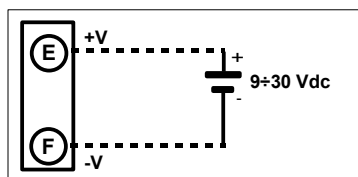


NOTE: the analogue input channels are not isolated between them.

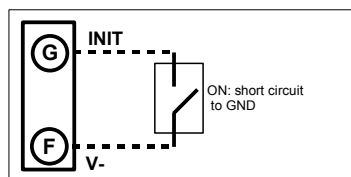
RELAY OUTPUTS CONNECTION



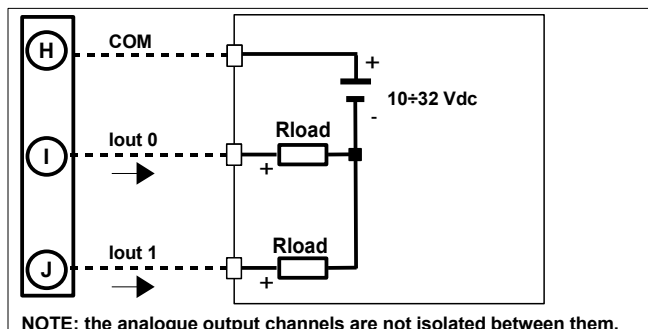
POWER SUPPLY CONNECTION



INIT CONNECTION



ANALOGUE OUTPUT CONNECTION



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

ISOLATION STRUCTURE



HOW TO ORDER

“ DAT 9011 “