

DIGIRAIL-2A

UNIVERSAL ANALOG INPUT MODULES

INSTRUCTION MANUAL – V1.0x H



INTRODUCTION

The universal analog input Modbus module **DigiRail-2A** is a remote measuring unit with two configurable analog inputs. An RS485 serial interface allows reading and configuring these inputs through the communication network. It is appropriate for mounting on DIN 35 mm rails.

The inputs are electrically insulated from the serial interface and the module supply. There is no electrical insulation between inputs. There is also no electrical insulation between serial interface and supply.

DigiRail-2A configuration is performed through the RS485 interface by using Modbus RTU commands. The **DigiConfig** software allows configuring all **DigiRail** features as well as performing its diagnostic.

DigiConfig offers features for detecting the devices present in the Modbus network and for configuring the **DigiRail-2A** communication parameters.

This manual provides instructions to install and connect the module. The **DigiConfig** installer and the documentation regarding Modbus communication for **DigiRail-2A** (*DigiRail-2A Communication Manual*) are available at www.novusautomation.com.

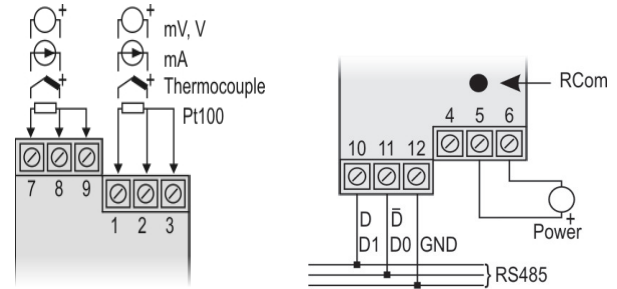


Figure 1 – Electrical connections

Table 1 shows how to connect the connectors to the RS485 communication interface:

D1	D	D+	B	Bidirectional data line.	Terminal 10
D0	$\overline{D}$	D-	A	Inverted bidirectional data line.	Terminal 11
C				Optional connection which improves the communication performance.	Terminal 12
GND					

Table 1 – RS485 Connections

ELECTRICAL INSTALLATION

INSTALLATION RECOMMENDATIONS

- Input and communication signal conductors must pass through the system plant separated from the electrical network conductors. If possible, in grounded conduits.
- The supply for the instruments must be provided from a proper instrumentation network.
- In control and monitoring applications, it is essential considering what may occur if any of the system parts should fail.
- We recommend the use of RC FILTERS (47 Ω and 100nF, series) in parallel with contactor and solenoid coils which are close or connected to **DigiRail**.

ELECTRICAL CONNECTIONS

Figure 1 shows the necessary electrical connections. The terminals 1, 2, 3, 7, 8 and 9 are intended for the input connections, 5 and 6 for the module supply and 10, 11 and 12 for the digital communication.

For obtaining a better electrical contact with the connectors, we recommend the use of pin terminals at the conductor end. For direct wire connection, the minimum gage recommended is 0.14 mm², not exceeding 4.00 mm².



Be careful when connecting the supply terminals to the **DigiRail**. If the positive conductor of the supply source is connected, even momentarily, to one of the communication connection terminals, the module may be damaged.



The RS485 interface of the **DigiRail-2A** features a 1/4 UL (Unit Load) class transceiver. According to the TIA/EIA-485 standard, this allows the hardware to support addressing of up to 128 devices on the same physical bus without the need for repeaters. The actual maximum number of devices in a network also depends on the Unit Load class of the other devices connected to the same bus.

CONNECTIONS – INPUT 0-5 VDC / 0-10 VDC

For using the 0-5 Vdc and 0-10 Vdc input types, it is necessary to switch the position of the inner module jumpers. To this end, the module must be opened and jumpers J1 and J2 (input 1 and input 2, respectively) must be changed due to the following options:

- For 0-5 Vdc and 0-10 Vdc input types, positions 1 and 2 must be strapped.
- For all other input types, positions 2 and 3 must be strapped (factory position).

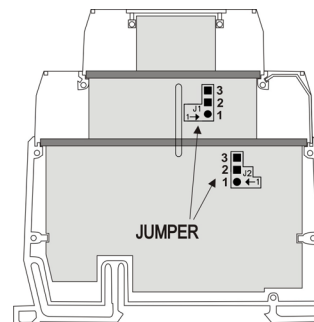


Figure 2 – Jumper for 0-5 Vdc and 0-10 Vdc input

CONFIGURATION

The user will receive the module perfectly calibrated. No adjustment will be required. The original configuration features the following features:

Sensor thermocouple type J, Indication °C, Filter = 0
Address = 247, Baud Rate = 1200, Parity = Even,
1 Stop Bit

The application **DigiConfig** is a program for Windows used to configure the **DigiRail** modules. For its installation, run the **DigiConfigSetup.exe** file, available on our website and follow the instructions as shown.

DigiConfig is provided with a help file. For using it, start the application and select the "Help" menu or press the F1 key.

Go to www.novusautomation.com to obtain the **DigiConfig** installer and the additional product manuals.

SPECIFICATIONS

Inputs: 2 universal analog inputs.

Input signals: Configurable. Refer to **Table 2**.

Thermocouples: Types J, K, T, R, S, B, N and E, according to NBR 12771. Impedance >> 1M Ω

Pt100: 3-wires type, $\alpha = .00385$, NBR 13773, Excitation: 700 μ A. For using Pt100 2-wires, interconnect terminals 2 and 3.



When gauging the module using the calibrator for Pt100, be sure that the minimum current required for it is compatible with the specified excitation current: 700 μ A.

Other Signals:

- 0 to 20 mV, -10 to 20 mV, 0 to 50 mV.
Impedance >> 1 M Ω
- 0 to 5 Vdc, 0 to 10 Vdc. Impedance >> 1 M Ω
- 0 to 20 mA, 4 to 20 mA.
Impedance = 100 Ω (+ 1.7 Vdc)

Overall accuracy (at 25°C): Thermocouples: 0.25 % of the maximum range, ± 1 °C; Pt100, voltage and current: 0.15 % of the maximum range.



In the standard model, the 0-5 Vdc and 0-10 Vdc inputs are not factory calibrated and have an accuracy of about 5 %.
 When properly calibrated, they can have an accuracy of up to 0.15 %.

INPUT SIGNAL	MAXIMUM MEASURING RANGE
Thermocouple J	-130 to 940 °C (-202 to 1724 °F)
Thermocouple K	-200 to 1370 °C (-328 to 2498 °F)
Thermocouple T	-200 to 400 °C (-328 to 752 °F)
Thermocouple E	-100 to 720 °C (-148 to 1328 °F)
Thermocouple N	-200 to 1300 °C (-328 to 2372 °F)
Thermocouple R	0 to 1760 °C (-32 to 3200 °F)
Thermocouple S	0 to 1760 °C (-32 to 3200 °F)
Thermocouple B	500 to 1800 °C (932 to 3272 °F)
Pt100	-200 to 650 °C (-328 to 1202 °F)

INPUT SIGNAL	MAXIMUM MEASURING RANGE
0 to 20 mV	Adjustable between -31000 and +31000
-10 to 20 mV	
0 to 50 mV	
* 0 to 5 Vdc	
* 0 to 10 Vdc	
0 to 20 mA	
4 to 20 mA	

Table 2 – Sensors and signals accepted by the module

Sampling rate: from 2.5 to 10 samples per second

Internal compensation of Cold Junction for thermocouples.

Power: 10 to 35 Vdc. Typical consumption: 50 mA @ 24 V. Internal protection against polarity inversion.

Electrical insulation between inputs and supply/serial port: 1000 Vac.

Serial communication: RS485 at two wires (1/4 UL), Modbus RTU protocol. Configurable parameters: Communication speed: From 1200 to 115200 bps; Parity: Even, odd or none

Key for restoring communication parameters: The RCom key, at the front panel, will set the device in diagnostics mode (Address = 246; Baud rate = 1200; Parity = Even, Stop Bit = 1), able to be detected and configured by the **DigiConfig** software.

Frontal light indicators for communication and status:

TX: Signalizes that the device is sending data on the RS485 line.

RX: Signalizes that the device is receiving data on the RS485 line.

Status: When the light is permanently on, this means that the device is in normal operation. When the light is flashing in a second interval (approximately), this means that the device is in diagnostics mode. When the light is flashing fast, this means that there is an internal error.

Operating temperature: 0 to 70 °C

Operational relative humidity: 0 to 90 % RH

Envelope of the terminals: Polyamide

Assembly: DIN 35 mm rail

Dimensions: Refer to **Figure 3**.

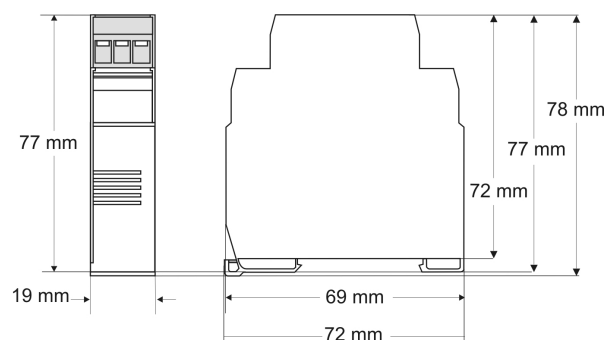


Figure 3 – Dimensions

WARRANTY

Warranty conditions are available on our website www.novusautomation.com/warranty.