Technical Manual for
RT-EX-9041D

Version 2.01

14 x Digital Input

Introduction

The EX9041D MODBUS I/O Expansion module is a high-quality and low-cost add-on data acquisition device that allows expanding the on-board digital input capabilities on X32-based RTCU units almost indefinitely and completely transparent using MODBUS communication protocol.

The EX9041D uses EIA RS-485 - the industry's most widely used bi-directional, balanced transmission line standard. It lets the module transmit and receive data at high data rates over long distances.

The EX9041D can expand the RTCU with additional 14 digital inputs.

The EX9041D works in a variety of environments and applications, including:

- ➢ Factory automation and control
- ➢ SCADA applications
- ➢ HVAC applications
- ➢ Remote measuring, monitoring and control
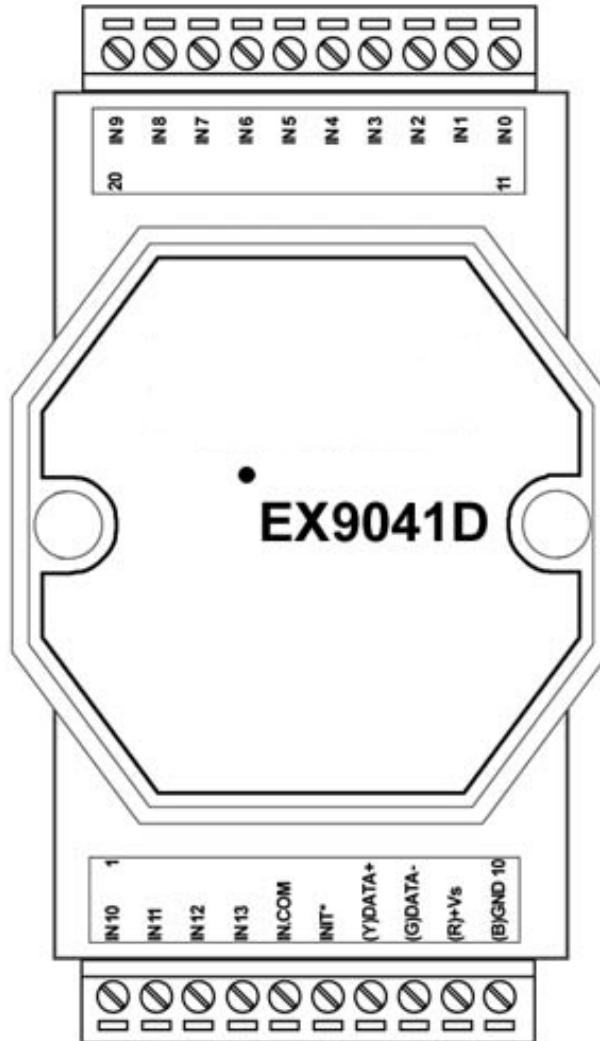- ➢ Security and alarm systems, etc.

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Graphical view

Pin Assignment

The 2 x 10-pins plug-terminals as seen in the following figure allow connecting supply, communication lines and digital inputs. The table below shows pin names and their function.

Pin	Name	Description
1	IN10	Digital input 10
2	IN11	Digital input 11
3	IN12	Digital input 12
4	IN13	Digital input 13
5	IN COM	Digital common input
6	INIT*	Pin for initialization of the configuration routine
7	(Y)DATA+	RS485+ data signal
8	(G)DATA-	RS485- data signal
9	(R)+VS	(+) Supply. Please refer to the specification for correct voltage level
10	(B)GND	Supply ground.

Pin	Name	Description
11	IN0	Digital input 0
12	IN1	Digital input 1
13	IN2	Digital input 2
14	IN3	Digital input 3
15	IN4	Digital input 4
16	IN5	Digital input 5
17	IN6	Digital input 6
18	IN7	Digital input 7
19	IN8	Digital input 8
20	IN9	Digital input 9

Please refer to the section "Wire Connections" for correct wiring to the external device/sensor.

Default Settings

Name	Description
Baud rate	9600
Data bits	8
Parity	None
Stop bit	1
Device address	1

These settings can easily be changed in RTCU IDE. Please refer to "Appendix A – Using the module as I/O extension in the RTCU IDE" for details.

LED Indicator

The EX9041D is provided with a system LED to indicate power status and communication, and LEDs to indicate state of their respective inputs. In the following table description of the different states of the LEDs can be found:

Name	Pattern	Description
System	ON	Power on
	OFF	Power off
Inputs	ON	Input is HIGH*
	OFF	Input is LOW*

Please note that the inputs are internally pulled up, and will therefore appear high when not connected or idle.

INIT* Pin Operation (Configuration mode)

The module has a build-in EEPROM to store configuration information such as address, type, baud rate and other information. Sometimes a user may forget the configuration of the module, or simply need to change it. Therefore, the module has a special mode named **"INIT mode"** to allow the system to change the configuration. To enable INIT mode, please follow these steps:

1. Power off the module.
2. Connect the INIT* pin to the GND pin.
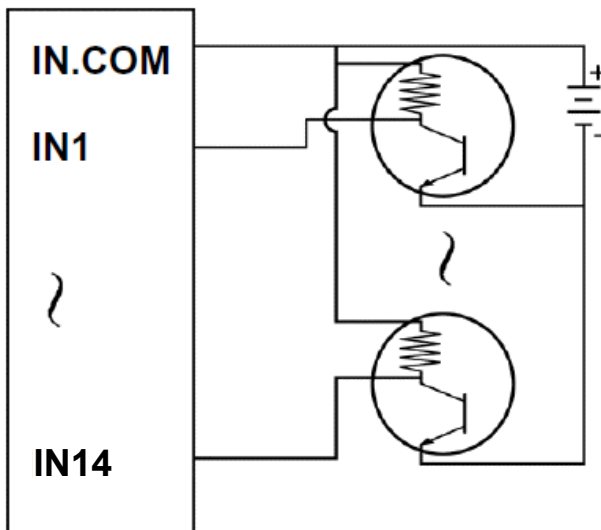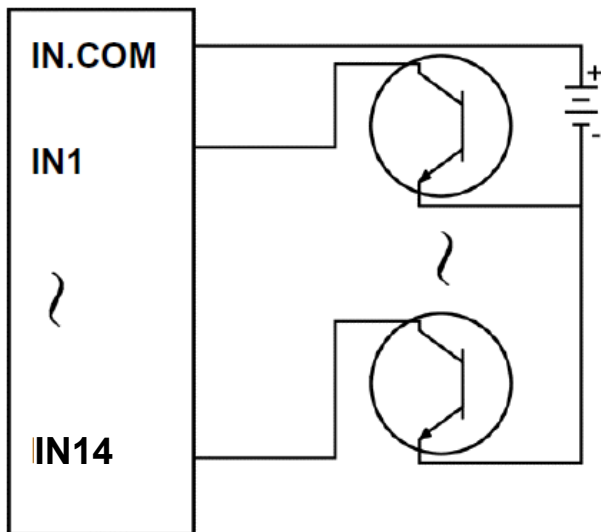3. Power on the module.

The module is now ready to be configured, afterward remove the power.

When using the RTCU IDE to change the setting, select "setup module" from the right-click menu of the node in "I/O – Extension" tree, and a guide will go through each step of the configuration process. Please refer to the RTCU IDE on-line help for further information.
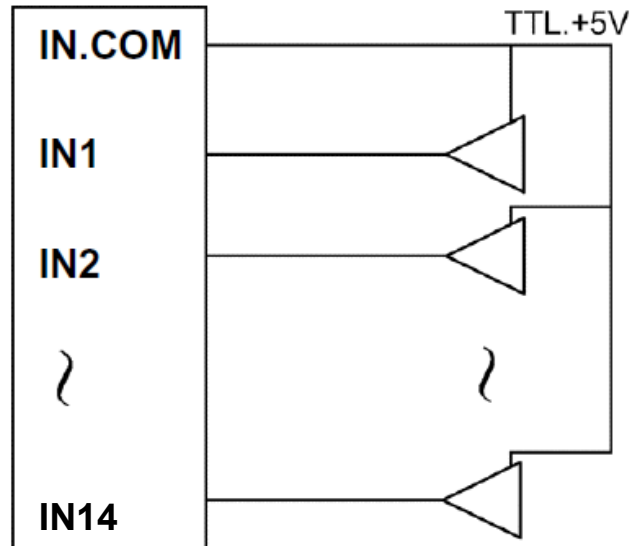
Wire Connections

Open Collector signal input:

When connecting open collector signals into the digital inputs please follow one of the wiring schemes below:
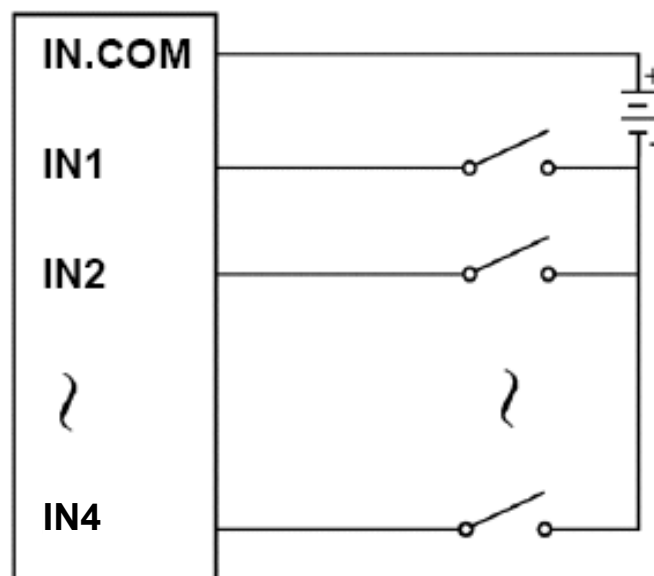
TTL/CMOS signal input:

When connecting a device with TTL/CMOS outputs to the EX9041D please follow the wiring scheme:

Dry contact signal input:

When connecting dry contact signals to the input of the module please follow the wiring scheme below:
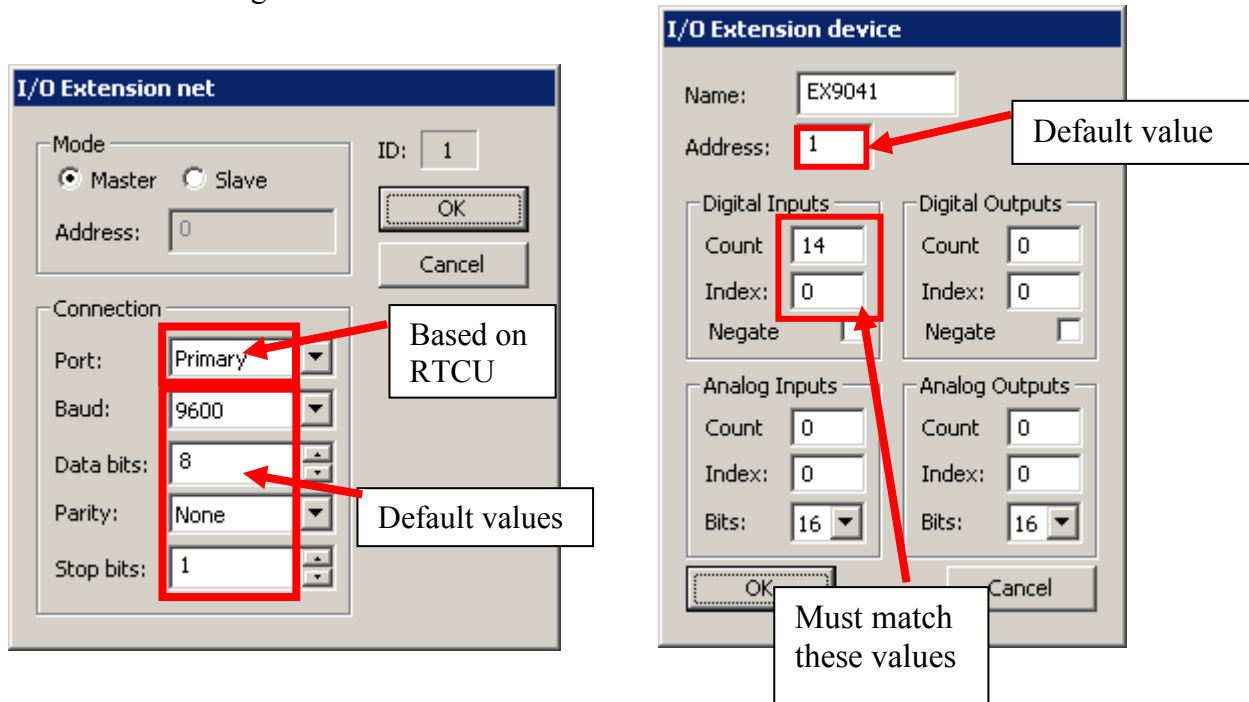
Technical Specifications

Input Channel	14
Isolation	Isolation with Common Sources
Isolation Voltage	3750 Vrms
Digital Level 0	+1 V max
Digital Level 1	+4 V to +30 V
Input Impedance	3K Ohms
Power Input	+10 V to + 30 V
Power Consumption	0,9 W
Operating Temperature	-25 ~ 75°C
Dual Watchdog Timer	√

Appendix A – Using the module as I/O extension in the RTCU IDE

To be able to use the MODBUS I/O Expansion module as an I/O extension, the RTCU IDE project needs to be configured correctly, by entering the correct parameters for the expansion module into the "I/O Extension device" dialog[1].

The following figure shows the correct setting for an EX9041 connected to the RS485_1 port on a RTCU DX4 with default settings:

To change the above mentioned default values, new values must be entered and transferred to the module[2].

Values in the "I/O Extension net" must be set according to communication between the module and the RTCU unit, the port numeration follows the principles of the serOpen function, which is described in the IDE online help. When changing baud, data bit(s), parity or stop bit(s) all units on the net must be reconfigured[3].

The address field is per default "1"; if more modules are connected to same net each must have a unique address. Changing the address of a module is done, by selecting the new value and then reconfigure the module.

A close attention must be paid to the Count, Index in the Digital Inputs section, which must be 14 and 0 respectively, else will communication with the module fail. Optional all readings can be inverted by selecting "Negate"

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[1] Please refer to the RTCU IDE online help for creating and editing I/O extension
[2] Please see "Project Control - I/O Extension" in the IDE online help.
[3] To reconfigure: right click the device in the IDE and select "setup module", and then follow the guide.