Technical Manual for
RT-EX-9044D

Version 2.01

4 x Digital Input / 8 x Digital Output

Introduction

The EX9044D 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/output capabilities on X32-based RTCU units almost indefinitely and completely transparent using MODBUS communication protocol.

The EX9044D 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 EX9044D can be used to expand the RTCU with additional 4 digital inputs and 8 digital outputs.

The EX9044D works in a variety of environments and applications, including:

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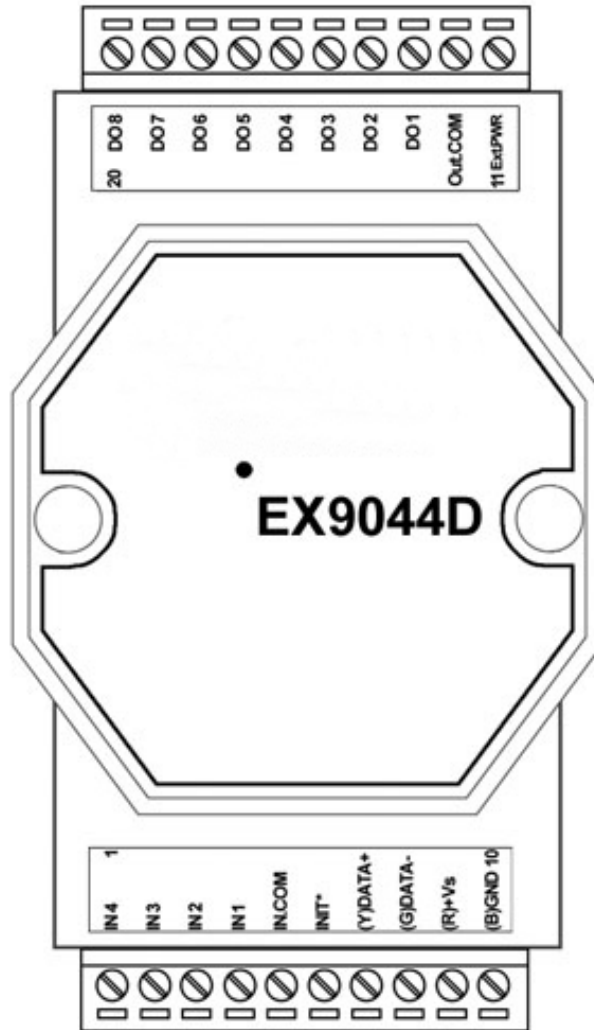- ➢ Security and alarm systems, etc.

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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/outputs. The following table shows pin names and their function.

Pin	Name	Description
1	IN4	Digital input 4
2	IN3	Digital input 3
3	IN2	Digital input 2
4	IN1	Digital input 1
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
11	Ext.PWR	Digital output power supply input

Pin	Name	Description
12	Out.COM	Digital output common
13	DO1	Digital output 1
14	DO2	Digital output 2
15	DO3	Digital output 3
16	DO4	Digital output 4
17	DO5	Digital output 5
18	DO6	Digital output 6
19	DO7	Digital output 7
20	DO8	Digital output 8

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 EX9044D is provided with a system LED to indicate power status and communication, and LEDs to indicate state of their respective inputs/outputs. 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*
Outputs	ON	Output is HIGH*
	OFF	Output is LOW*

Please refer to the wiring scheme for correct indication

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.
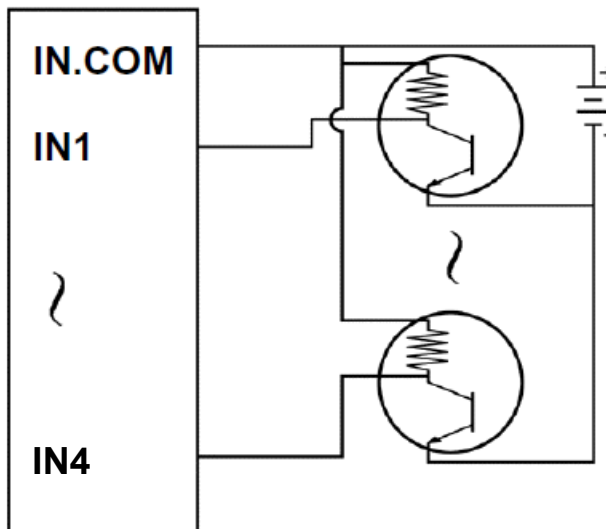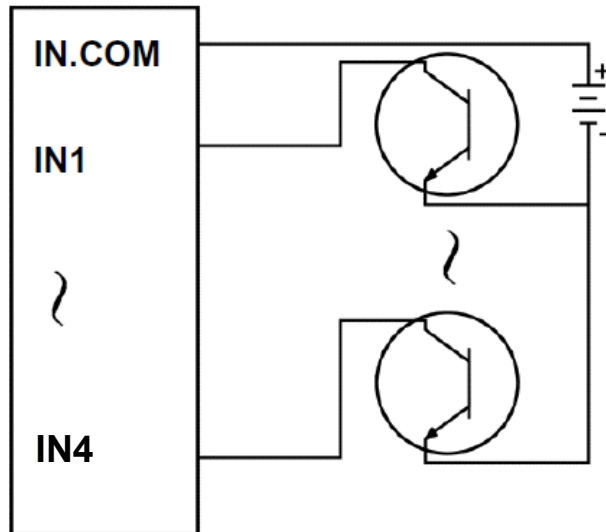3. Power on the module.

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.
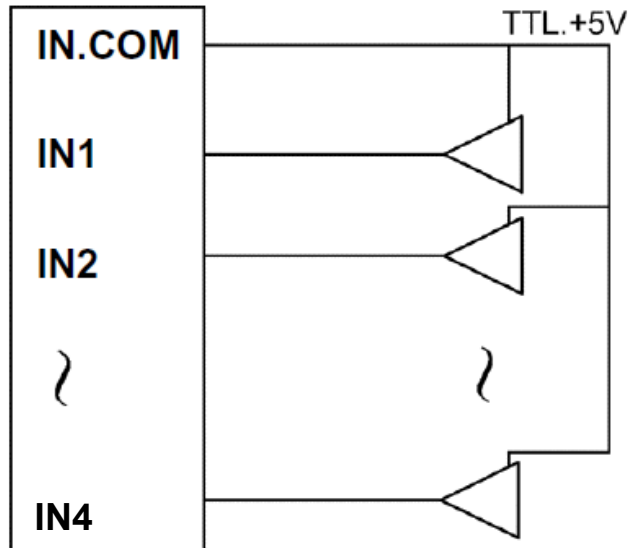
Wire Connections

Open Collector signal input:

When connecting open collector signals into the digital inputs please follow one of the wiring schemes below:

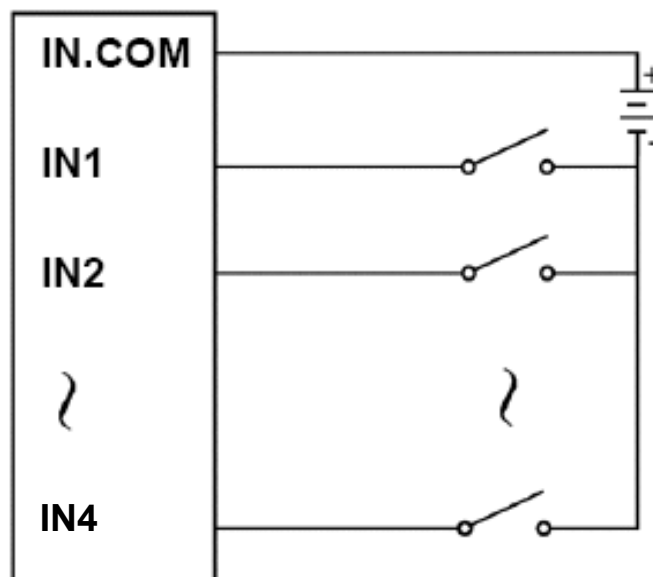Logic IO ApS.
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Ph: (+45) 7625 0210
Fax: (+45) 7625 0211
Email: info@logicio.com
Web: www.logicio.com

TTL/CMOS signal input:

When connecting a device with TTL/CMOS outputs to the EX9044D please follow the wiring scheme:
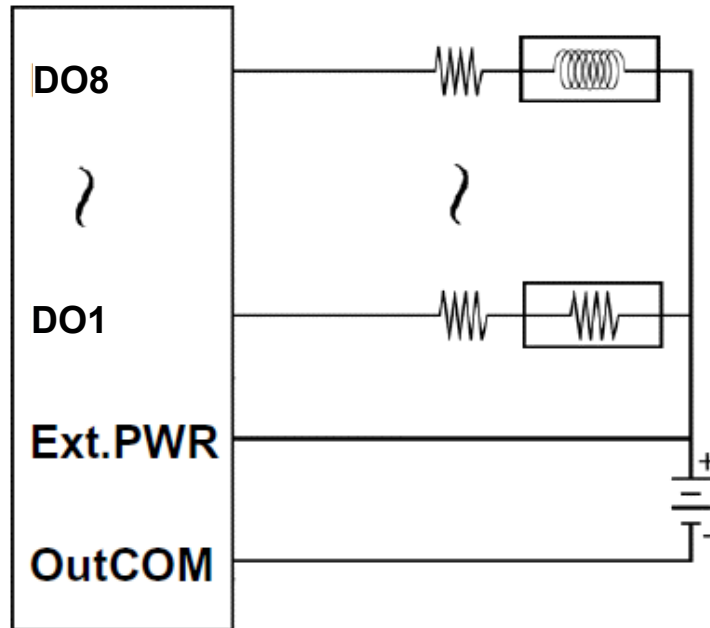

Dry contact signal input:

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

Digital Outputs:

When connecting a device to the digital outputs please follow the wiring scheme below:

Please note that when connecting inductive load to the digital outputs a diode needed to prevent counter EMF.
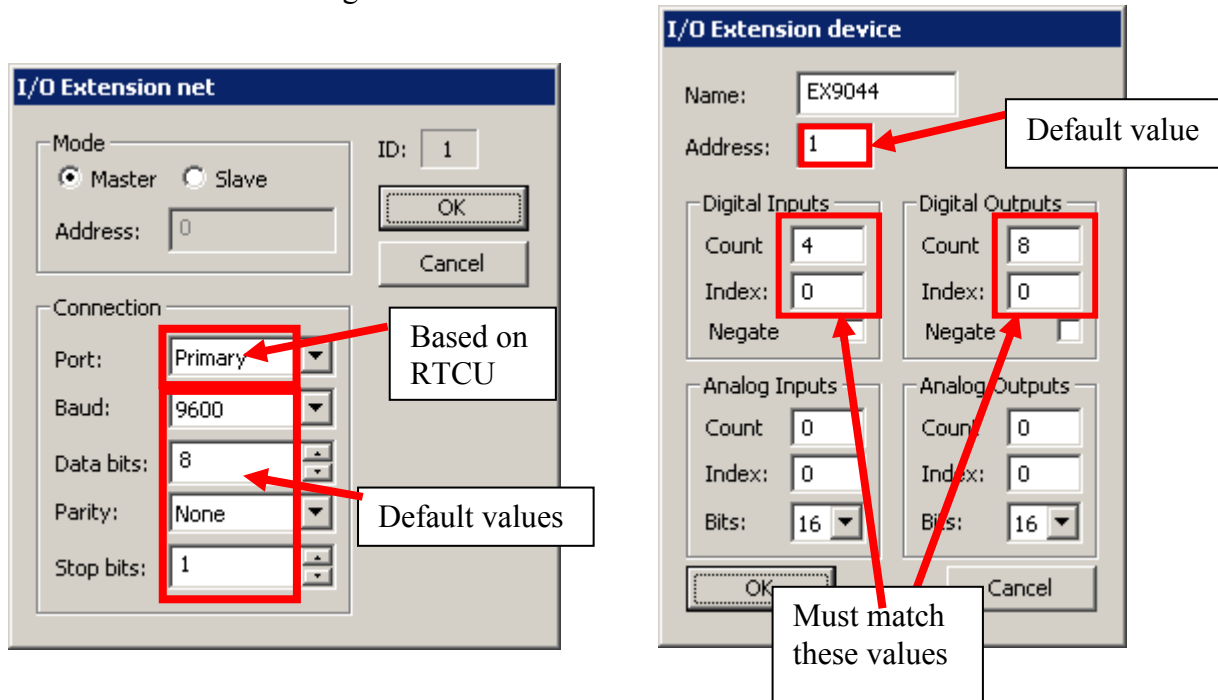
Technical Specifications

Input Channels • Isolation • Isolation Voltage • Over-voltage Protect • ESD (Electro Static Discharge) • Input Voltage • Input Impedance	4 Isolation with common sources 3750 Vrms 70 VDC 2000 VDC Digital Level 0: 1 V max Digital Level 1: 4V to 30V 3 KΩ
Output Channels • Isolation • Isolation Voltage • Load Voltage • Max Load Current	8 Isolation with common power 3750 Vrms Max to +30V 375 mA
Power Input	+10 V to + 30 V
Power Consumption	1,7 W
Operating Temperature	-25 ~ 75°C

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 EX9044D 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 4 and 0, and in the "Digital Outputs" section which must be 8 and 0 respectively, else will communication with the module fail. Optional all readings or writings 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.