



# DigiRail-2R

## Digital Outputs Module

# COMMUNICATION MANUAL

## INTRODUCTION

The **DigiRail-2R** is provided with RS485 two wire serial communications, operating as slave in the Modbus RTU protocol. The entire equipment configuration, as well as activating of the output relays, is performed through serial communication.

This manual provides the information necessary for performing the output activation without using the software **DigiConfig**. In order to assure the correct configuration of DigiRail, always use the DigiConfig software. After being configured, the data of its inputs and/or outputs can be accessed by any other software having Modbus RTU communication capacity.

For further details regarding the implementation of a network of devices please refer to the document *Basic Concepts of RS485 and RS422*, available the website [www.novusautomation.com](http://www.novusautomation.com), for download.

## MODBUS ADDRESS ASSIGNMENT SYSTEMATICS

The **DigiRail** equipment does not have keys for determination of the Modbus communication address. This must be determined by using the communication in the Modbus protocol itself. This will require that the address of the device to be configured is known, this being possible by two different means:

- If the equipment is a new one, it will show the configuration as set by the factory: Address=247, Baud rate=1200, Parity Even, 1 Stop Bit.
- If the equipment has already been used and you do not know its address and/or other communication parameters, press the RCom button on your front panel. It will enter the diagnostics mode during 1 minute, assuming the following communication parameters: Address=246, Baud rate=1200, parity even, 1 stop bit.

The **DigiConfig** software configurator is provided with a function of searching the network for temporary devices, exactly the devices in the previous conditions. Once having been localized, the address and the other communication parameters of the device can be changed according to the necessity of the application.

The communication parameters in the two previous conditions are not very common in Modbus networks, and they may probably cause no conflicts with other equipment of the network. Obviously only one **DigiRail** in the network can be in each of the previous conditions so that the communication with the configurator **DigiConfig** is possible. If several new **DigiRail** are to be included in a network, they must be inserted individually. Only after changing the communication parameters for the definitive values, the next new **DigiRail** can be inserted. In an already existing network, only one **DigiRail** at a time can be set in diagnostics mode in order to be detected by the **DigiConfig**.

It is important to emphasize that the **DigiConfig** software acts as a master in the Modbus network. Its utilization requires that the original master of the network (SCADA software, for instance) be disconnected during its use. For further details please refer to the on-line Help of the **DigiConfig**.

## MODBUS COMMANDS

The Modbus RTU commands (functions) listed below are implemented. For further information with respect to each one of these commands and the Modbus protocol in general, please access the website:

<http://www.modbus.org>

### READ COILS – 01H

This command can be used for reading the current state of one or two digital outputs, according to the table below.

Address	Description
0	State of digital output 1 (0=off; 1=on)
1	State of digital output 2 (0=off; 1=on)

The specified *addresses* correspond to the low level physical addresses, where zero (0) corresponds to the address of PLC 00001.

The response of this command will inform the state of each requested input with one bit only. Thus the state of the first requested input comes at bit 0 (less significant bit), the state of the second at bit 1 and so on.

**READ HOLDING REGISTERS – 03H**

This command can be used for reading one or several holding registers, according to the table in the chapter apart.

**WRITE SINGLE COIL - 05H**

This command can be used for activating or deactivating one of the digital outputs, according to the table below.

Address	Description
0	State of digital output 1 (0000h=deactivate; FF00h=activate)
1	State of digital output 2 (0000h=deactivate; FF00h=activate)

The specified *addresses* correspond to the low level physical addresses, where zero (0) corresponds to the address of PLC 10001.

**WRITE SINGLE REGISTER – 06H**

This command can be used for writing in a holding register, according to the table in the chapter apart.

**WRITE MULTIPLE COILS – 0FH**

This command can be used for simultaneous activating or deactivating of the two digital outputs, according to the table below.

Bit	Description
0	State of digital output 1 (0=deactivate; 1=activate)
1	State of digital output 2 (0=deactivate; 1=activate)

**TABLE OF HOLDING REGISTERS**

The specified *addresses* correspond to the low level physical addresses, where zero (0) corresponds to the address of PLC 40001. The columns *minimum* and *maximum* contain the range of values valid for each parameter. The column *R/W* indicates if the parameter is for writing and reading (R/W) or for reading (R) only.

Address	Description	SuperView Mnemonic	Minimum	Maximum	R/W
0	Series number (word high)	-	0	65535	R
1	Series number (word low)	-	0	65535	R
2	Baud-rate	-	0	7	R/W
3	Modbus Address	-	1	247	R/W
4	Parity	-	0	2	R/W
5	Firmware version	-	0	999	R
6	Diagnostic state timer (in tenths of seconds)	-	0	600	R/W
7	State of the digital outputs, where bit 0 represents output 1, bit 1 represents output 2 (0=off; 1=on), etc.	-	0	3	R/W
8	State of digital output 1 (0=off; 1=on)	Out1St	0	1	R/W
9	State of digital output 2 (0=off; 1=on)	Out2St	0	1	R/W
10	Reserved	-	0	0	R
11	Reserved	-	0	0	R
12	Value of timing for digital output 1, in hundredths of seconds - word high	Out1TH	0	65535	R/W
13	Value of timing for digital output 1, in hundredths of seconds - word low	Out1TL	0	65535	R/W
14	Value of timing for digital output 2, in hundredths of seconds - word high	Out2TH	0	65535	R/W
15	Value of timing for digital output 2, in hundredths of seconds - word low	Out2TL	0	65535	R/W
16-19	Reserved	-	0	0	R
20	Time for deactivating digital output 1, in hundredths of seconds - word high	Out1CurTH	0	65535	R
21	Time for deactivating digital output 1, in hundredths of seconds - word low	Out1CurTL	0	65535	R
22	Time for deactivating digital output 2, in hundredths of seconds - word high	Out2CurTH	0	65535	R
23	Time for deactivating digital output 2, in hundredths of seconds - word low	Out2CurTL	0	65535	R
24-33	Reserved	-	0	0	R

Address	Description	SuperView Mnemonic	Minimum	Maximum	R/W
34	Device tag - characters 1 and 2	-	0	65535	R/W
35	Device tag - characters 3 and 4	-	0	65535	R/W
36	Device tag - characters 5 and 6	-	0	65535	R/W
37	Device tag - characters 7 and 8	-	0	65535	R/W
38	Device tag - characters 9 and 10	-	0	65535	R/W
39	Tag of digital output 1 - characters 1 and 2	-	0	65535	R/W
40	Tag of digital output 1 - characters 3 and 4	-	0	65535	R/W
41	Tag of digital output 1 - characters 5 and 6	-	0	65535	R/W
42	Tag of digital output 1 - characters 7 and 8	-	0	65535	R/W
43	Tag of digital output 1 - characters 9 and 10	-	0	65535	R/W
44	Tag of digital output 2 - characters 1 and 2	-	0	65535	R/W
45	Tag of digital output 2 - characters 3 and 4	-	0	65535	R/W
46	Tag of digital output 2 - characters 5 and 6	-	0	65535	R/W
47	Tag of digital output 2 - characters 7 and 8	-	0	65535	R/W
48	Tag of digital output 2 - characters 9 and 10	-	0	65535	R/W
49-61	Reserved	-	0	0	R
62	DigiRail model	-	0	4	R
63-84	Reserved	-	0	0	R

## **DETAILS OF SOME REGISTERS**

### **REGISTER 2 – BAUD RATE**

Code of speed used in Modbus communication.

Code	Baud rate
0	1.200
1	2.400
2	4.800
3	9.600
4	19.200
5	38.400
6	57.600
7	115.200

### **REGISTER 3 – MODBUS ADDRESS**

Address of the device in the Modbus network. Valid values: from 1 to 247. We recommend using the lower addresses for the equipment.

### **REGISTER 4 – PARITY**

Code of the parity used in Modbus communication.

Code	Parity
0	No parity
1	Odd
2	Even

### **REGISTER 5 – FIRMWARE VERSION**

Indicates the firmware version of the equipment, according to the examples below:

If the version is "1.00", the value "100" will be read. If the version is "2.04", the value "204" will be read.

### **REGISTER 6 – DIAGNOSTIC STATE TIMER**

Internally used by the DigiConfig software.

**REGISTER 7 – STATE OF THE DIGITAL OUTPUTS**

Bit at 0: Output deactivated

Bit at 1: Output activated

Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Outlet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1

**REGISTERS 12 TO 15 – DURATION OF RELAY ACTIVATION**

Time, in hundredths of seconds, during which the relay stays active after an activation command. A zero time value will keep the relay active until a deactivation command is received.

**REGISTERS 20 TO 23 – TIME FOR DEACTIVATING THE RELAY (WHEN ACTIVATION TEMPORIZED)**

Time, in hundredths of seconds, which remains for the relay be deactivated after an activation command.

**REGISTERS 34 TO 48 – TAGS**

DigiRail features some identification tags, where characters can be written in order to help identifying the device and its outputs:

- Identification tag of the device (10 characters).
- Identification tag of the output channels (10 characters for each output).

**REGISTER 62 – DIGIRAIL MODEL**

Provides the code of the DigiRail model. Internally used by the DigiConfig software.

Model	Amount
2A	1
2R	3
4C	4