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# Tech Note 5      How to setup Modbus IO transfers in RAM6000 or RAM9000



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## ***Abstract:***

This document provides a step by step procedure for configuring Modbus I/O transfers between a Red Lion Controls RAM 9731 and a Red Lion panel meter model PAX2A (Modbus Device).

## ***Product:***

Red Lion RAM 9731 & Red Lion PAX2A with PAXCDC10 RS-485 communications card.

## ***Use Case / Problem Solved:***

This procedure uses a Red Lion panel meter as the Modbus slave device and will configure Modbus I/O transfers in the RAM (master) to read/write values to the PAX2A. Instructions are provided to configure 2 different I/O transfers:

1. Write to PAX2A analog output (setpoint 1).
2. Read from PAX2A analog input (process variable).

## **RAM Firmware:**

4.20 or later.

**Procedure:**

1. Log into the SN/RAM Web Browser
  - a. Type the device's LAN/WAN IP, port 10000 into a web browser
  - b. **User Name:** *admin*
  - c. **Password:** Last six digits of the device's serial number
2. Go to **Services** → **Automation** → **Modbus** → **Local Station**.
3. Setup **Station Name**, **Station Number**, and **Modbus Local Port** number for the RAM.
  - a. **Station Name:** *Local* (your preference)
  - b. **Station Number:** *1*
  - c. **Modbus Local Port:** *502*

**Note:** Standard TCP Port number for Modbus is 502)

red lion Status Admin Network Services Automation Advanced

### Automation Local Station

**Define Local Station Properties**

Enable Modbus: Yes

Station Name: RAM Required

Station Number: 1 Required

Modbus Local Port: 502 Required

Modbus DNP3

RAM-9731 Refresh Save Apply

Got Feedback?

4. Click **Save**.  
Go to **Services** → **Automation** → **Modbus** → **Remote Station**  
Where you will add a remote station for Internal I/O transfer.
5. Click **Add**
6. Enter details of the Remote station. Here you will enter details of the Modbus device (IPM)
  - a. **Station Name:** *PAX2A*
  - b. **Station Number:** *2*
  - c. **Connection Type:** *Serial*
  - d. **Message Timeout:** *5000*
  - e. **Message Retries:** *3*
  - f. **Station Online Address:** *40001*

**Modbus Remote Station Settings** [X]

Station Name: PAX2A [Required]

Station Number: 2 [Required]

Connection Type: Serial

Message Timeout (ms): 5000 [Required]

Message Retries: 3 [Required]

Station Online Address: 40001 1:40001

Finish

7. Remote station appears in the table. Click **Save**.
8. Go to **I/O Transfers** on the bottom of the page. Or you can navigate to:  
**Services** → **Automation** → **Modbus** → **I/O Transfer**
9. Modbus I/O transfer page appears.
10. Click **Add** to add the Modbus I/O transfers
11. Add I/O transfer to Write to PAX2A setpoint in the **IO Transfer Settings** window.
  - a. **Station Name:** PAX2A
  - b. **Protocol:** Modbus
  - c. **Send Mode:** Wait for Reply
  - d. **Port:** ttyS5 (RS-485)

The screenshot shows the 'IO Transfer Settings' dialog box with the following fields:

- Station Name: PAX2A
- Protocol: Modbus
- Send Mode: Wait For Reply
- Port: ttyS5 (RS-485)

- e. **Command Type:** WRITE
- f. **Local:** SP\_HI (Tag Name if specified)
- g. *Analog Output*
- h. 4009
- i. *Analog Output*
- j. **Remote address:** 40009
- k. **Number of Registers:** 2

The screenshot shows the 'IO Transfer Settings' dialog box with the following fields:

- Command Type: Write
- Local: SP\_HI
- Local: Analog Output
- Local: 4009
- Local: 4:04009
- Remote: Analog Output
- Remote: 40009
- Remote: 4:40009
- Number Of Registers: 2 (Required)

**IO Transfer Settings**

2 Required

Enter Update Interval (ms):

5000 Required

Scan Enable Type:

None

Scan Enable Address:

Finish

12. Click **Finish** and the I/O transfer will appear in the table.

**Add a new I/O transfer to READ from PAX2A input**

1. Click **Add**

**IO Transfer Settings**

Command Type:

Read

**Local**

PV\_HI

Analog Output

4001 4:04001

**Remote**

Analog Output

40001 4:40001

Number Of Registers:

2 Required

2. Click **Save**.
3. Modbus I/O transfer setup is complete for RAM.
4. Click **Apply**.

**Note:** At this point the RAM I/O Transfer setup is complete. The following has been included as a method to test the transfer with the Red Lion panel meter. However, RAM will interface with any Modbus device.

## Testing Modbus I/O Transfer

Use the RAM Test I/O to test the newly-configured I/O transfers.

1. Go to **Test I/O**
2. Enter in a value (3604 is used in this example).

The screenshot shows the 'TEST I/O Access' web page. At the top, there is a navigation menu with options: Status, Admin, Network, Services, Automation, and Advanced. Below the menu, the title 'TEST I/O Access' is centered. A note states: 'Note: Display format is (native, modbus)'. The scan rate is set to 0 and is 'Paused'. The last scan time is 11:45:39 and data used is 2.3 kB. There are buttons for 'Start', 'Load On-board IO', and 'Idle Timeout'. Below this, there are input fields for 'Analog Out' (set to 'Analog Out'), 'Start Address' (4009), and 'Register Count' (2), with an 'Add' button. A table of analog outputs is shown:

Register	Value
(PV_HI, 4:04001)	0
(SP_HI, 4:04009)	3604
(PV_LO, 4:04002)	0
(SP_LO, 4:04010)	0

At the bottom, there is a 'Refresh' button and the device ID 'RAM-9731'.

The PAX2A displays the setpoint as follows:



3. The Modbus I/O transfer is successfully working between the RAM and PAX2A.

**Note** that the green totalizer value and units

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