NPServe Users Guide

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Powering Business Worldwide

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Contents

 Safety for life

Eaton meets or exceeds all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Eaton employees involved in product design, manufacture, marketing, and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment, and support our "Safety For Life" mission.

Safety information

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians who are familiar with this equipment should install, operate, and service it.

A competent technician has these qualifications:

- Is thoroughly familiar with these instructions.
- Is trained in industry-accepted high and low-voltage safe operating practices and procedures.
- Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
- Is trained in the care and use of protective equipment such as arc flash clothing, safety glasses, face shield, hard hat, rubber gloves, clampstick, hotstick, etc.

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

⚡ **DANGER**

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ **WARNING**

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ **CAUTION**

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.

Safety instructions
Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

⚡ **DANGER**

Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment. G103.3

⚠ **WARNING**

Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage. G101.0

⚠ **WARNING**

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage. G102.1

⚠ **WARNING**

Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage. G122.2

NPServe Users Guide

Figure 1. NPServe Layout

The NPServe must be viewable via its web page in order to use this guide. The IP address and subnet mask must be set up accordingly. Type in the IP address in the user's desired web browser and the NPServe can be accessed.

This guide is intended solely to provide user guidelines on the features, connections, and possible troubleshooting points of the NPServe device.

Connections
The NPServe has the following connections:

- Relay 1 (30A)
- INCOM
- Ethernet
- Micro USB
- DNP Port 2
- DNP Port 1
- Analog Inputs
- Analog PS
- MPCV Pendant
- Digital Inputs
- Power
- Relay 2 (10A)
- Relay 3 (10A)

Note: Each connection can be selected via the Home web page shown in Figure 2. If a connection is made, the ICON will be active and not grayed out.
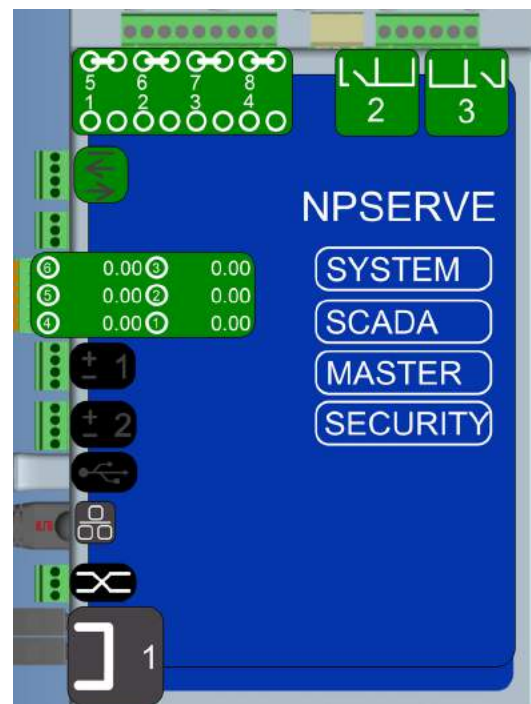

Figure 2. Home web page

Connection details

Relays

1. Relay contacts (1, 2, 3) – Relay 1 is NO contact that can handle 30 Amps. Relay 2 and 3 are 10A form C contacts. All three contacts can be controlled by activating the contact on the NPServe web page (see Figure 2). Each contact will change state after selection and will show the state change once action is complete (see Figures 1 and 2).
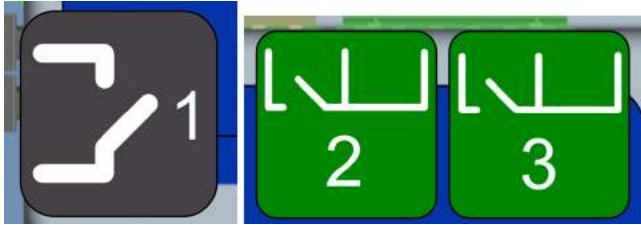

Figure 3. Open contact

Figure 4. Closed contact

2. When the contact is activated, the user will be asked if the action is to be executed. Click OK. A successful contact state change note will appear.

Possible troubleshooting

1. If an error arises when the contact is selected, please verify that NPServe is active.

Note: Relay will change states with no connections.

2. Ensure that the relay is not configured to energize on bootup. (This is configurable from the Configuration page.)

INCOM

1. The icon is for EATON's INCOM protocol devices. See IL TD17513 for wiring specification.

2. Clicking the INCOM connection will allow for quick access to the set of INCOM devices polled by the NPServe.

Possible troubleshooting

If no device shows up once the icon is selected, verify the INCOM compatible device is connected:

1. Verify that INCOM wiring is carried out per IL TD17513.

2. Verify the INCOM device is powered and active.

3. Verify that NPServe has auto learned devices connected to it or has INCOM devices in the configuration uploaded.

Ethernet connection

The Ethernet connection is for the network LAN connections. The port can be used to connect the NPServe to any Ethernet capable device:

- Supports Web Page access
- DNP Slave/Master communications are also available via this connection
- Supports NTP time synchronization
- Selecting the Ethernet ICON will take the user to the NPServe Maintenance Configuration page.

Possible troubleshooting

If NPServe is unreachable over Ethernet or is unconfigured, see the USB Maintenance Configuration section.

DNP ports (1 and 2)

The DNP Ports (1 and 2) are RS485 ports:

- Can be used to connect to the VaultGard or other SCADA Master
- Can be used to connect downstream DNP devices

Possible Troubleshooting

See the DNP SCADA Section.

Analog inputs

NPServe provides three power rails:

- +5VDC, 150mA load
- -5VDC, 100ma load
- AGND (Analog ground)
- 250mA total load

1. Configurations uploaded to NPServe may contain scale factors to convert raw voltage readings to engineering units.

2. Clicking the green box containing the readings toggles between scaled and raw voltage readings.

Figure 5. XXXXXXXX

Possible troubleshooting

1. Verify the proper voltage supply is on the sensor.

2. Verify the multimeter and raw voltage readings match.

3. Verify supply voltages are +/- 5VDC.

4. Ensure there is no short between a power rail and AGND.

5. Verify that the proper configuration file is uploaded.

MPCV pendant connection

- Intended for direction connection to an MPCV relay

- Replaces need for pendant hookup to relay

- Detects +5V signal from MPCV relay

Digital input

- Eight individual dry contacts using 125 VAC

- Provides a user friendly way of reading the status of equipment

- An open contact will display no line (see Figure 6).

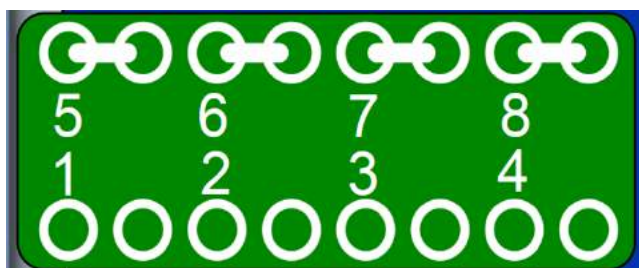- A closed contact will display a completed line connections.

Figure 6. Open contact displays no line

Possible troubleshooting

1. Verify no voltage is present on the contact before connection.

2. Verify the device changes state before connection.

3. Verify the Status change of the device via the Web Home page Digitial Input display (see Figure 6).

4. Ensure that there are 0 V between RET and AC Neutral.

5. Ensure there are 120 V across an open connection.

Real-time data

Once various INCOM and DNP devices are connected, all of the various data will be displayed under the Real-Time Data link at the bottom of the web Home Page (see Figure 7).
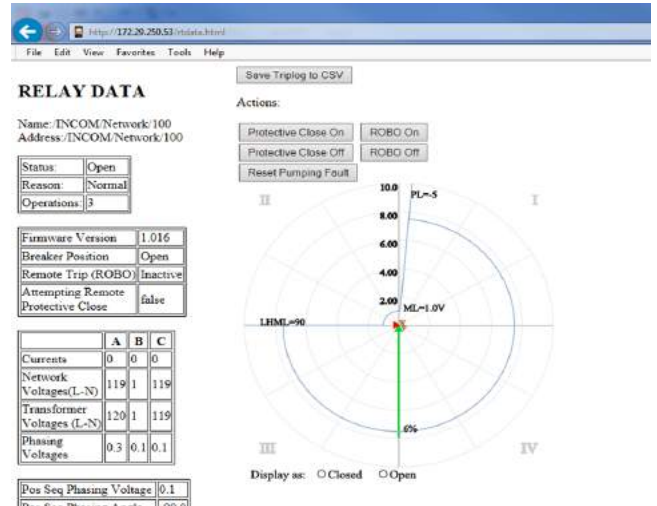

Figure 7. Real-time data

All connected devices are viable in this location. The devices currently supported are:

- MPCV Relay and ARMS

- Digitrip

- Analog and digital input readings

Possible troubleshooting

If no data is viewable, verify that all devices are connected correctly per INCOM and RS-485 standards.

Configuration

Configuration files

This page allows the user to back up the current NPServe configuration to a downloadable file. This file may later be reimported into an NPServe to apply the exported configuration:

- If an NPServe must be reset to factory defaults, importing this file will bring it back to the prior configuration.

- The configuration may be imported into another NPServe.

Operation

1. By default, leave all checkboxes checked. Only during certain custom procedures should the user pick and choose which files to export.

2. Press "Create Configuration Archive" to begin the export process. The web page will create a downloadable link.

3. Click the downloadable link to save the file.

Save configuration

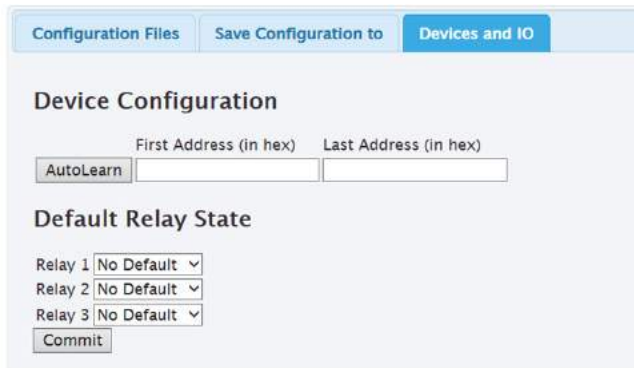This is a minimal file upload to import a configuration exported by NPServe.

Figure 8. Save configuration

Devices and IO

NPServe can autolearn INCOM devices connected to it. The user can supply an address range to minimize autolearn time, if the addresses are known a priori:

- First Address – Autolearn scan starts at this address and should be less than or equal to lowest address on network.

- Last Address – Autolearn scans up to and including this address and should be greater than or equal to highest address on network.

Possible Troubleshooting

1. If no INCOM devices are found, please make sure they are properly connected.

2. Please refer to TD 17513 for wiring specifications.

Default relay state

1. On startup, the NPServe can by default energize or leave idle the three output relays.

2. The default state for each relay is toggled by the pull down box:

    a. "No Default" – Relay is not energized on startup.

    b. "Force Closed" – Relay is energized on startup and cannot be changed by control.

3. Press the "Commit" button to save the relay states to NPServe.

DNP SCADA

Status

- Link Type – How NPServe hooks up to DNP Master; may be UDP or RS-485

- Link Status – Whether NPServe is responding to DNP requests

- Bytes Transmitted – How many bytes NPServe has sent to Master since bootup or communications reconfiguration

- Bytes Received – How many bytes NPServe has received since bootup or communications reconfiguration

Note: This is a raw count of bytes, not what NPServe has determined to be valid DNP.

- Start Traffic Capture – Brings up a window showing the raw communications on the DNP port (UDP or RS-485)

- Stop Traffic Capture – Stops the traffic capture process

Communications

1. Select the Communications tab on the SCADA (DNP Slave) web page to configure the communications Network interface. Network options include RS485 serial or DNP over Ethernet (TCP or UDP).

2. Port 20000 is the default port for DNP3 communication over Ethernet.

3. NPSERVE supports a single SCADA master. Up to four (4) backup master IPs are supported, but only one master may be active at a time.

4. To change the network interface, click the radio button for the chosen interface, enter the requested parameters, and click the <Submit Changes> button.

5. A built-in DNP sniffer provides traffic capture of the DNP interaction between NPSERVE and the DNP master. Click the <Start Traffic Capture> button to begin the capture and the <Stop Traffic Capture> button to stop. A new browser window will open and display the bytes transmitted and received from NPSERVE.

6. DNP is a very extensive protocol with multiple conformance levels and various data representations. Inconsistencies between what a SCADA Master expects and what a virtual DNP profile specifies lead to puzzling results in the control room. SCADA Masters are complex software themselves and getting access to the raw data may be incongruous. Raw traffic capture data is critical for Eaton engineers when diagnosing these issues.

Virtual settings

1. Upload Profile – Select a file provided by Eaton to configure the NPServe DNP Virtual configuration.

2. Profile – Select which uploaded profile to use.

3. Slave Address – Set the DNP Slave address of the NPServe.

4. Master Address – Set the expected DNP Master address.

5. Submit Changes – Apply changes in this tab to the NPServe Configuration.

Possible troubleshooting

1. Ensure that the NPServe has a valid SCADA configuration.

2. Ensure that Communications settings are set up correctly.

3. If bytes are received, then Master is not reaching the NPServe.

4. If bytes are received but not transmitted, NPServe is rejecting requests from the Master, possibly due to mismatched DNP addresses.

5. Traffic capture can provide insights into some issues; please initiate to find more low level information.

Diagnostics

1. Download a diagnostic file to submit to Eaton for further troubleshooting.

2. Display INCOM Comm Statistics:

   ● Displays low-level INCOM communications statistics. Most counters are intended for Eaton troubleshooting but the following are end user interpretable:

   ● BCH Errors – Counts the number of corrupted data messages due to bad wiring, mismatched addresses or other INCOM issues

   ● The second table is a per device statistics table. Non-zero values for any statistic indicate possible problems with the specific device or wiring.

System

This page is used to verify the firmware version and to upload necessary firmware updates as necessary.

Note: NPServe can be reset to factory default status if desired. It is recommend to save the configuration before resetting.

USB maintenance port

The USB Maintenance port provides access to a graphical maintenance web page via a USB-to-Ethernet connection.

Required components

● Ethernet Cable

● Recommended connector – Plugable USB 2.0 OTG Micro-B to 10/100 Fast Ethernet Adapter for Windows Tablets & Raspberry Pi Zero (ASIX AX88772A chipset)

● Host PC or Laptop

Accessing the maintenance web page

1. If using a laptop, disable the wireless Ethernet functionality.

2. Connect one end of the Ethernet cable to the plugable adapter.

3. Connect the other end of the Ethernet cable to the host PC.

4. Plug the MicroUSB end of the adapter into the NPServe MicroUSB port.

5. Open a web browser and go to the following URL: http://eaton.console.

You should now be at the maintenance page.

Troubleshooting the access procedure

1. Make sure the wireless is disabled.

2. Try to browse to http://10.42.83.1 instead of http://eaton.console.

3. Make sure your IP address is similar to 10.42.83.100 (last number can vary).

4. Try rebooting the Host PC.

Changing the NPServe IP

IMPORTANT

When configuring the NPServe network configuration, the Ethernet port on the NPServe must be connected to a live device (for example, a switch). If the web page indicates "No Ethernet Carrier", then you do not have a working Ethernet connection.

1. Populate the "Maintenance IP Configuration" fields as per your network specification.

2. Click "Commit" and the present setting will update to reflect your input.

Test mode

Test mode turns off the normal functionality of the NPServe and gives access to low-level functions:

- Reboot – Reboots the NPServe

- Reset to Factory Defaults – Clearing the configuration from this page will do a low-level format of the data storage and will clear network settings, etc. This normally is not necessary and a clearing configuration from the Ethernet interface is recommended.

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