

# TECH LIBRARY

## VR2 OEM IP Control

### Operating a Soleux Power Distribution Unit (PDU).



#### Introduction

This document assumes the user is familiar with our control application, D-Net.

The VR2 PoE Touch Remote can be used to transmit IP based control strings to operate OEM equipment as well as all NST Audio products.

As well as direct control of AV equipment such as projectors and displays, power control of peripheral equipment such as amplifiers or lighting is possible using an Ethernet-enabled Power Distribution Unit (PDU) such as the Soleux SLX Series.

We will explore the control of a typical model and how to set this up on a VR2. It is important to note that not all commands discussed may be supported across the entire Soleux product line. Therefore, please verify compatibility with your specific device before purchasing a particular model.



This range is available with:

- A variety of socket types (Schuko, UK, powerCon etc)<sup>1</sup>
- Rack brackets
- An optional WiFi module

There is a model available with no manual (front panel) controls, meaning there is space for an extra output socket on the panel. As mentioned above, please check if choosing a different model, that the commands are supported by your particular device.

<sup>1</sup> The output socket options dictate the number of outlets available in the 19" rackmount format enclosure

## IP Control Implementation on a VR2 – Start Simple

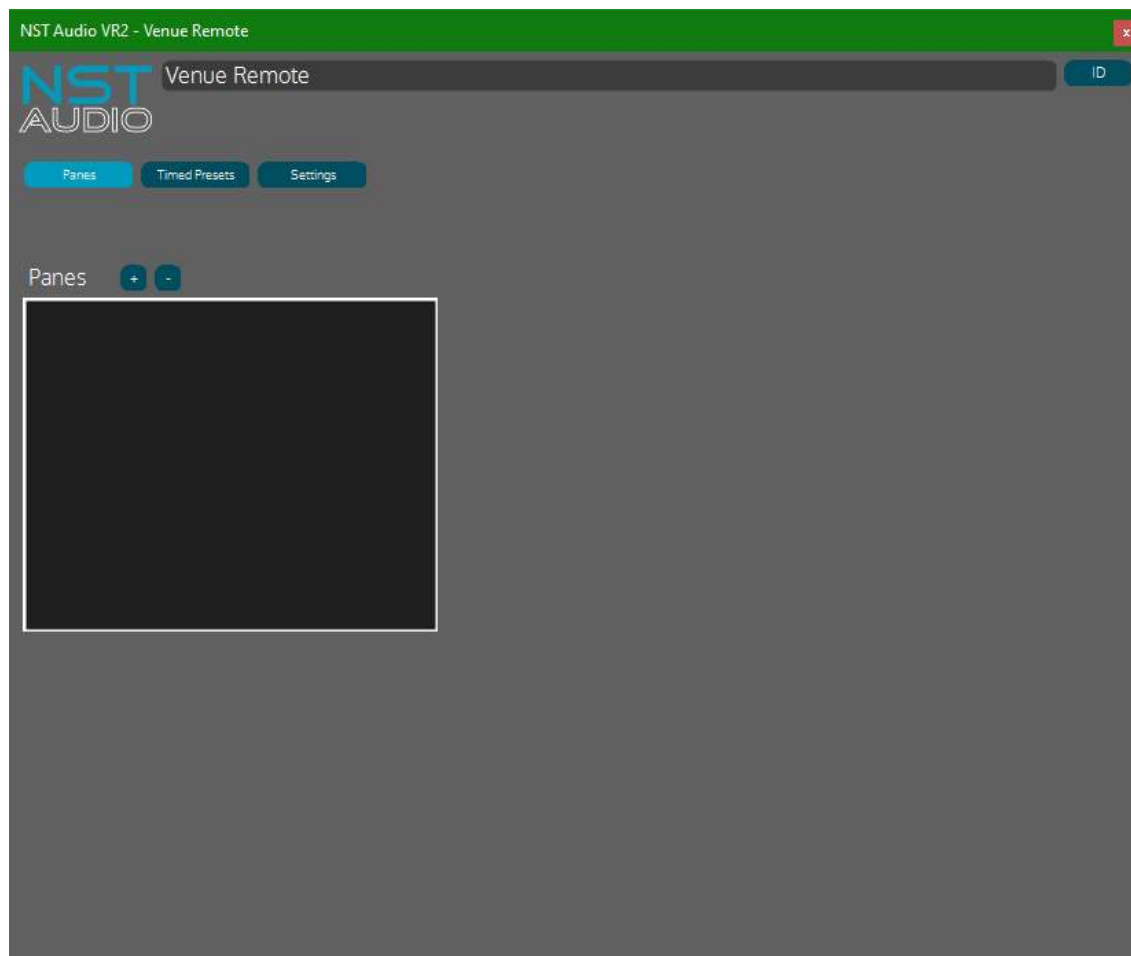
To establish the method of setting up an IP Control Pane, let's start with a simple command for an NST Audio product.

We will create a pane that will send a "Global Mute" command to a device. It doesn't matter what NST product this is, as they all respond to a "Global Mute" command, and it's possible to see this working on any product (all Mute LEDs on D48, all Clip LEDs on other products), so it's the ideal starting point.

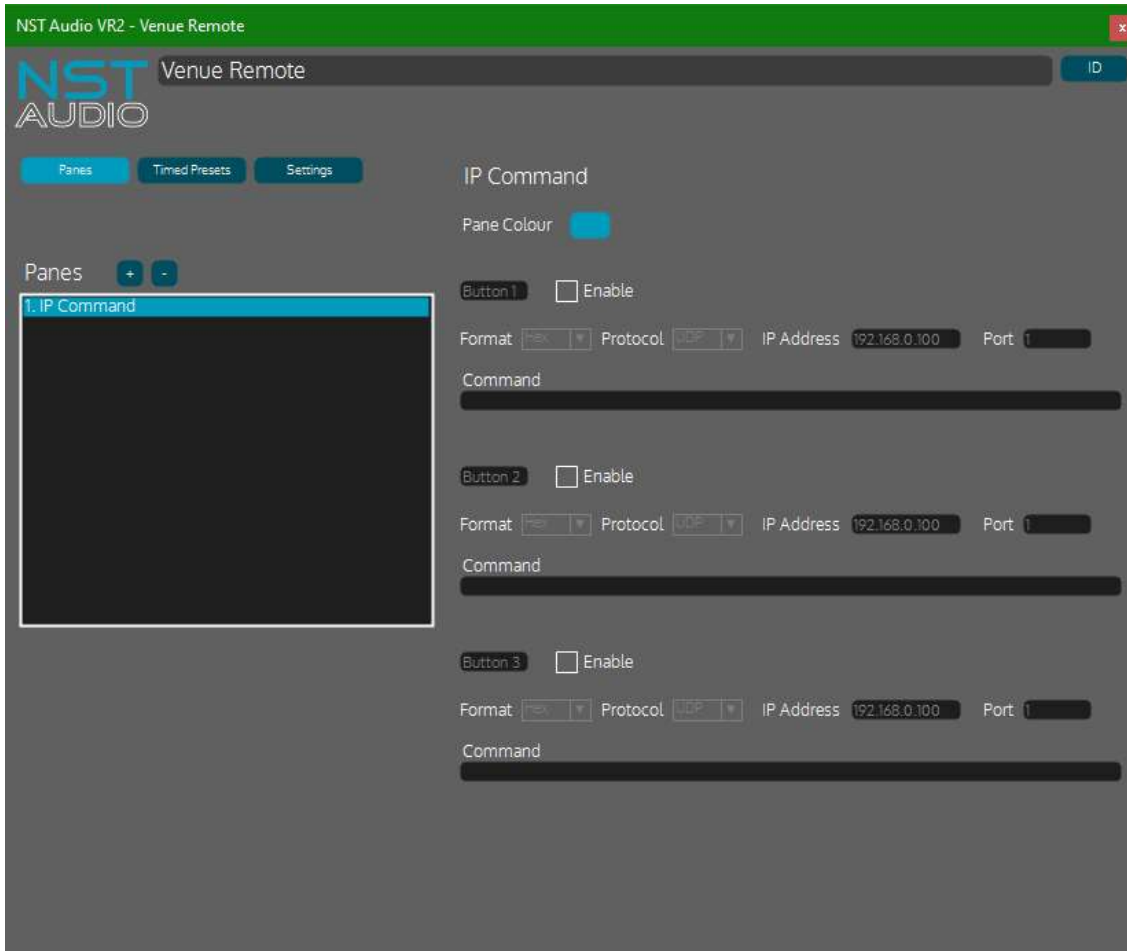
*If you are familiar with the process of configuring an IP pane, you may jump straight to page 7 for the PDU control set-up.*

All NST Products also support a simple remote protocol layer, and we will use this to test out the system. Documentation on this protocol is available upon request.

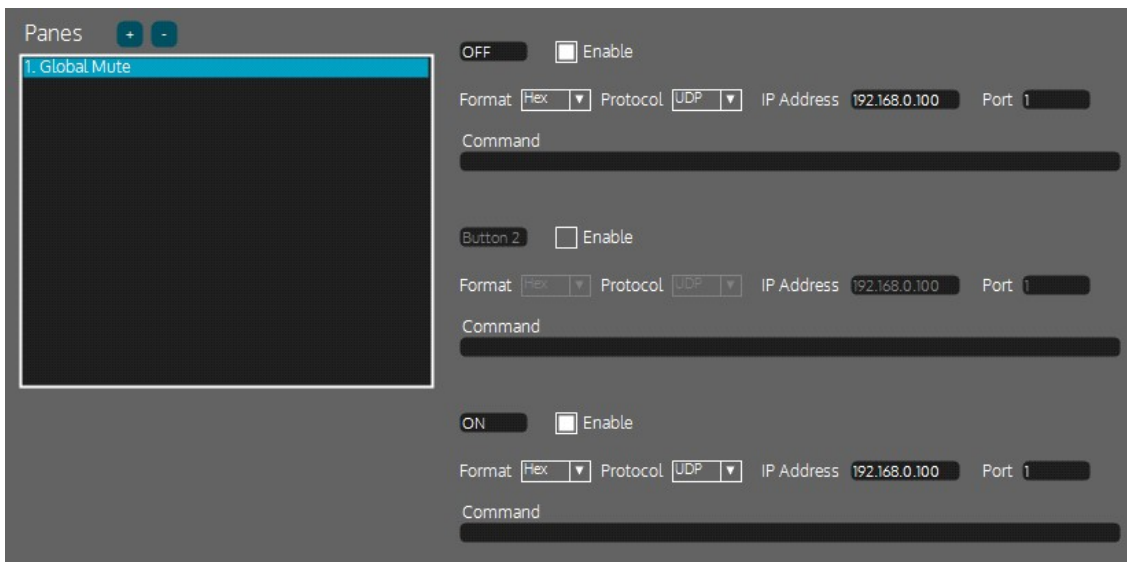
Setting up a control pane for IP control follows the same procedure as for other operations. Open D-Net and go online to discover the VR2 on the network.



Click on the "+" button above and choose "Add IP Command Pane"



Enable two buttons on this pane, label them “OFF” and “ON”, and name the pane “Global Mute”.



The pane and the labels will update in real time on the VR2.

At this point we are ready to set up the control aspects of the pane. We need to know the protocol (UDP or TCP), the transmit port and of course the IP address of the device to be controlled.

Consulting the “Simple Remote Protocol” specification for NST Products we can ascertain the first two of these:



NST Simple Control Protocol v0.9.doc - 26/05/22

## Requirements

This document applies to the following NST devices and firmware versions :

D48 / ID48 firmware v0.7.0.3xx and above (also any OEM products using a DX1 DSP card)

D48S / ID48S firmware v0.2.0.1xx and above (also any OEM products using a DX2 DSP card)

VMX88 firmware v0.2.0.95 and above (including all FFA G3 amplifiers)

VMO16 firmware v0.2.0.37 and above

## Ethernet Configuration

### IP Configuration

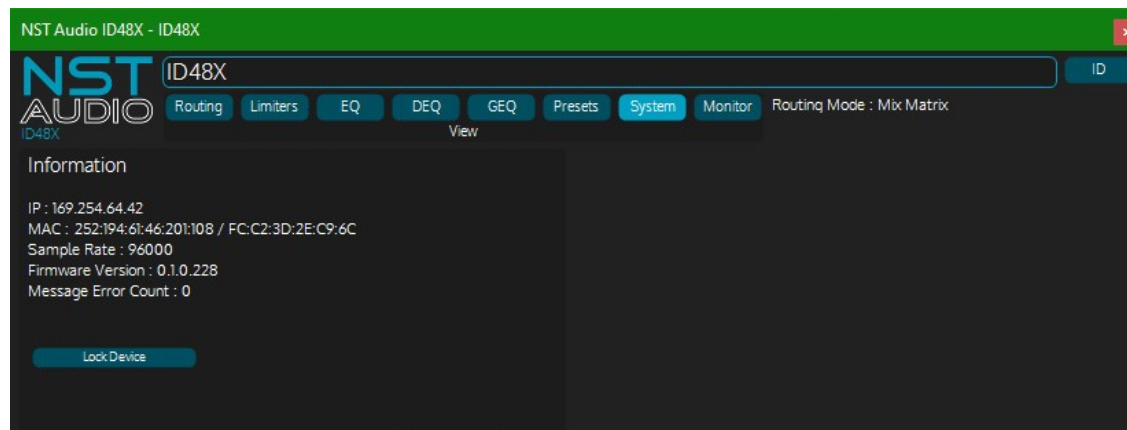
The NST device will allocate itself an IP address using a DHCP server if there is one available on the network, otherwise it will automatically allocate itself an IP address in the 169.254.xxx.xxx range.

If a fixed IP address is required for the device, this should be configured in the DHCP server on the network. The device MAC address is shown either on the System page of the device control panel in the NST D-Net software, or in the System menu on the front panel of a D48/D48S.

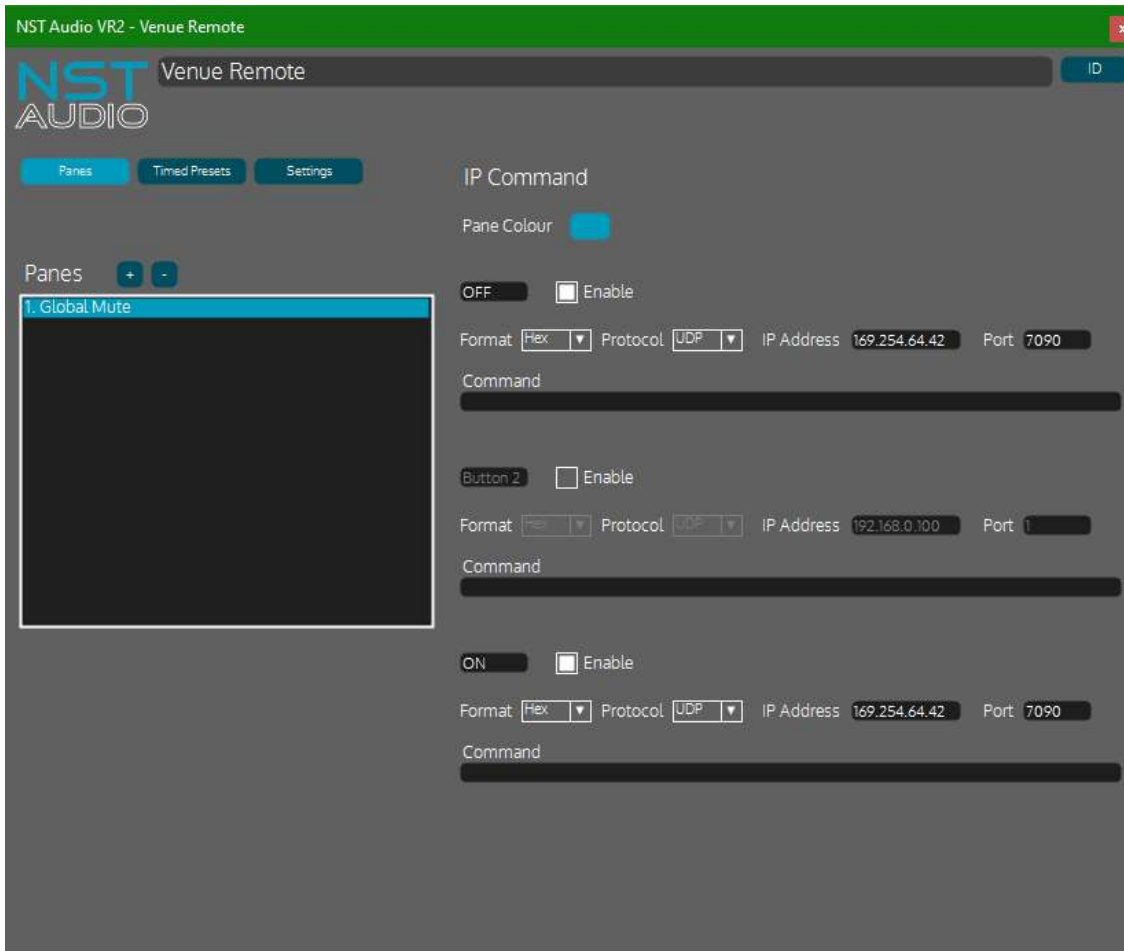
### UDP Configuration

All messages should be sent to the device using UDP. Messages should be sent to the NST device on port 7090 and replies will be returned on the port that the request was sent on.

The IP address of the unit is found in D-Net on the unit’s “System” page. We will address an ID48X in our example.



So, our destination IP address is 169.254.64.42. Note that this is a self-assigned IP address in the absence of a DHCP server. For consistent operation we recommend using reserved IP addresses set via a router’s management console for control of NST equipment, or a static IP address accessed through the device itself. This second method will be used later in this document when we set up the projector control.



Finally, we add the command strings to be sent on pressing each of the buttons. Referring to the protocol document again and looking up the commands for Global Mute we find:



NST Simple Control Protocol v0.9.doc - 26/05/22

## 1006 – Global Mute

Command Format :

char - Mute status (0x00 = OFF, 0x01 = ON)

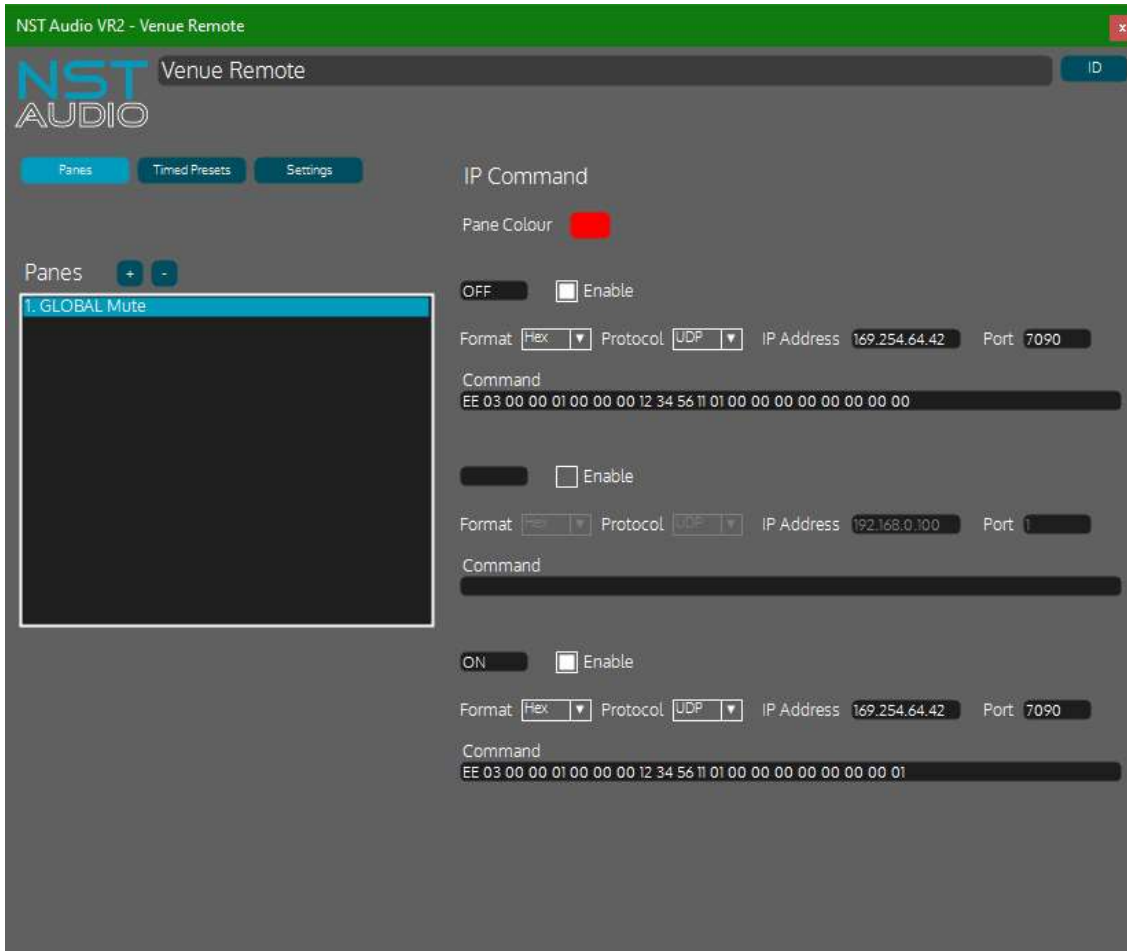
Reply Format :

Header only, no data. MessageDirection value indicates success or failure.

Example Hex Bytes:

EE	03	00	00	01	00	00	00	12	34	56	11	01	00	00	00	00	00	00	01	--	--	--
Message Type		Message Size		Message Counter		Dir	Reserved										Global Mute State					
Message Header																		Message Data				

Adding the string (in hex) to each button, we only change the final byte in the command to set Global Mute On (01) and Global Mute Off (00):



And that's it - pressing the buttons on the VR2 will now mute/unmute all the inputs and outputs on the ID48X.

## Soleux PDU Control

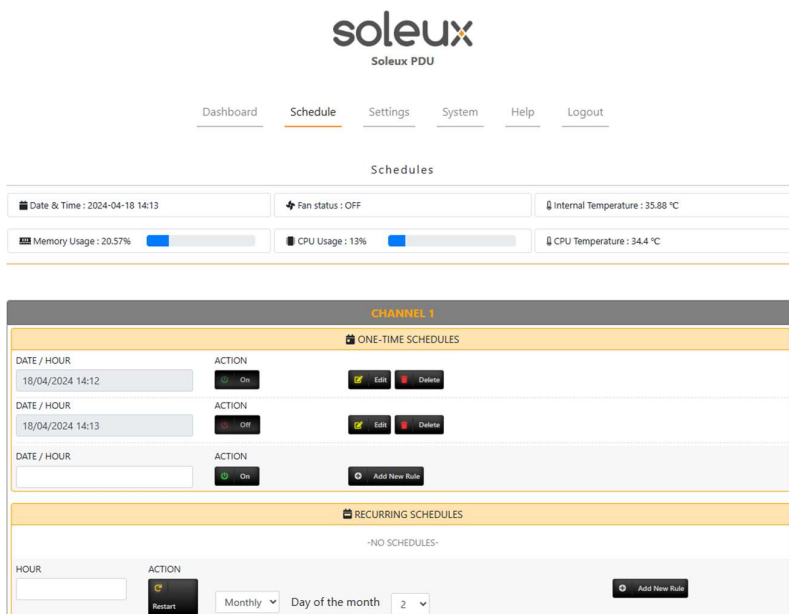
The PDU we are using in this example is a Soleux SLX-20070M0IP. This variant has UK sockets so we lose one of the outputs and have six on the panel. EU and powerCon versions will have seven. It is available directly from [www.soleux.com](http://www.soleux.com)



### PDU Operation

The mains sockets on the PDU can all be individually addressed and controlled. This allows for operation of, for example, mains powered equipment such as amplifiers or lighting. The PDU's web interface offers a scheduling function for managing outputs either as one-time or recurring events.

In conjunction with the scheduling features built into the VR2, an entire audio system can be automated to power up and down with no user intervention (connecting amplifiers and NST processors to the PDU) and reconfigure itself every day or throughout the day as required.

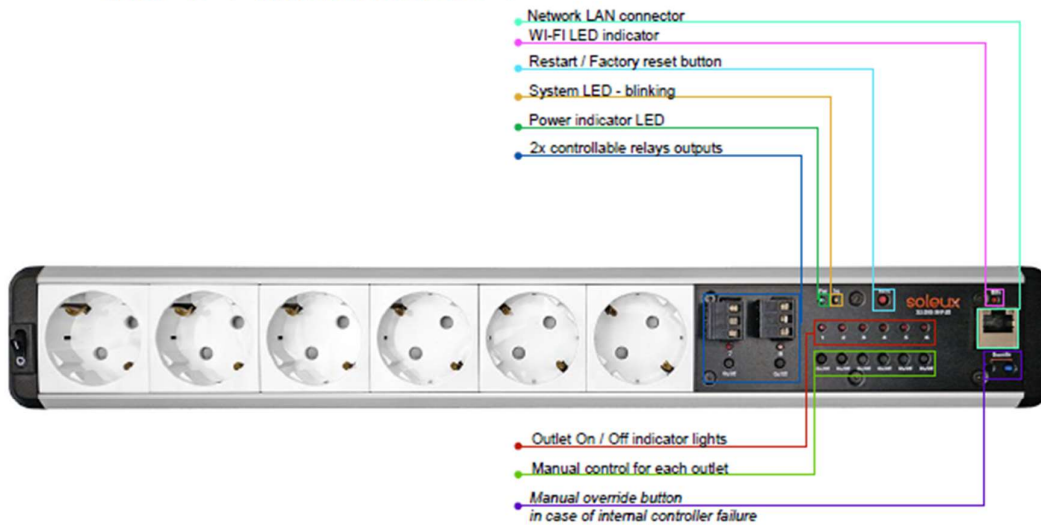


## IP Configuration of the PDU

Consulting the documentation for the PDU, we can find out what the default IP address of the board is, in the absence of a DHCP server.

IP CONTROLLED PDU - ENGINEERED AND ASSEMBLED IN EU

## APPEARANCE



## SETTING UP

- Connect the power cord of the PDU to the power supply outlet.
- Plug your equipment into any of the PDU's output plugs.
- Connect an Ethernet cable from the PDU to your network
- Turn the PDU's switch to the "I" position.
- By default, the PDU comes with the network setting on DHCP. Check your router DHCP lease list and identify the IP address assigned to the Soleux PDU.
- In case you have no DHCP server into the network, you can reset the PDU to the default network settings by push and hold the "reset" button for more then 12 seconds. The default IP address is: 10.10.10.10.
- Manually set the IP on your computer to 10.10.10.xxx (except 10.10.10.10).
- Open a browser and type the PDU IP address. The login page should open.
- Default credentials: User: admin / Password: admin

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### *DHCP and Static IP addresses...*

Soleux assume that you will have a DHCP server on your network, which will be responsible for issuing IP addresses to connected devices. For our use case, it is advantageous to fix the IP address of the PDU. Whilst most DHCP servers will try to reassign a device the same address (based on a connected hardware's fixed MAC address), it can't be guaranteed. As we need the VR2 to be communicating with the correct IP address each time a command is sent, the best option is a static IP address.

The Soleux documentation on the previous page mentions discovering the DHCP issued address of the PDU through your router's lease list. An explanation of how to do this is beyond the scope of this document. As we will be assigning a static IP address, we will *initially* assume there is NO DHCP server on your network and follow their procedure to reset to a default address of 10.10.10.10.

Log into the PDU's web interface using the IP address 10:10:10:10 and credentials user:admin, password:admin and navigate to the settings page:



Dashboard | Schedule | Settings | System | Help | Logout

### Settings

📅 Date & Time : 2024-04-22 10:45	🌀 Fan status : OFF	🌡 Internal Temperature : 28.75 °C
📊 Memory Usage : 19.76% <div style="width: 20px; height: 10px; background-color: #007bff; margin-left: 5px;"></div>	📊 CPU Usage : 21.6% <div style="width: 20px; height: 10px; background-color: #007bff; margin-left: 5px;"></div>	🌡 CPU Temperature : 27.98 °C

GENERAL SETTINGS

<p><b>PDU Name</b></p> <input style="width: 90%;" type="text" value="Soleux PDU"/> <div style="background-color: #333; color: white; text-align: center; padding: 2px 5px; margin-top: 5px;">Update PDU Name</div>	<p><b>Timezone</b></p> <div style="border: 1px solid #ccc; padding: 2px; display: flex; justify-content: space-between; align-items: center;"> <span>+01:00 Europe/Paris</span> <span>▼</span> </div> <div style="background-color: #333; color: white; text-align: center; padding: 2px 5px; margin-top: 5px;">Set Timezone</div>
<p><b>Username</b></p> <input style="width: 90%;" type="text" value="admin"/> <p><input type="checkbox"/> Change password</p> <div style="background-color: #333; color: white; text-align: center; padding: 2px 5px; margin-top: 5px;">Update User Settings</div>	<p><b>Current Date/Time</b></p> <div style="border: 1px solid #ccc; padding: 2px; display: flex; justify-content: space-between; align-items: center;"> <span>dd/mm/yyyy --:--</span> <span>🕒</span> </div> <div style="background-color: #333; color: white; text-align: center; padding: 2px 5px; margin-top: 5px;">Set Date Time</div> <div style="background-color: #333; color: white; text-align: center; padding: 2px 5px; margin-top: 5px;">Sync With Computer Time</div>
<p><b>Backup config file</b></p> <div style="background-color: #333; color: white; text-align: center; padding: 2px 5px; margin-bottom: 5px;">Download</div> <p><small>*Press "Download" button to save configuration</small></p> <hr/> <p><b>Upload config file</b></p> <div style="background-color: #333; color: white; text-align: center; padding: 2px 5px; margin-bottom: 5px;">Upload</div> <p><small>* The system will restore the configuration to uploaded backup file.</small></p>	<p><b>Time sync interval (min)</b></p> <div style="border: 1px solid #ccc; padding: 2px; width: 80%;">30</div> <p><b>NTP server</b></p> <div style="border: 1px solid #ccc; padding: 2px; width: 90%;">time.google.com</div> <p><input type="checkbox"/> Enable</p> <div style="background-color: #333; color: white; text-align: center; padding: 2px 5px; margin-top: 5px;">NTP Test</div> <div style="background-color: #333; color: white; text-align: center; padding: 2px 5px; margin-top: 5px;">Update NTP Setting</div>

NETWORK SETTINGS

🏠
Connected

<p>IP Address: 192.168.0.224</p> <p>Subnet mask: 255.255.255.0</p> <p>Default gateway: 192.168.0.226</p> <p><input type="radio"/> Dynamic <input checked="" type="radio"/> Static</p>	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">IP Address:</td> <td><input style="width: 90%;" type="text" value="192.168.0.224"/></td> </tr> <tr> <td>Subnet mask:</td> <td><input style="width: 90%;" type="text" value="255.255.255.0"/></td> </tr> <tr> <td>Default gateway:</td> <td><input style="width: 90%;" type="text" value="192.168.0.226"/></td> </tr> </table>	IP Address:	<input style="width: 90%;" type="text" value="192.168.0.224"/>	Subnet mask:	<input style="width: 90%;" type="text" value="255.255.255.0"/>	Default gateway:	<input style="width: 90%;" type="text" value="192.168.0.226"/>
IP Address:	<input style="width: 90%;" type="text" value="192.168.0.224"/>						
Subnet mask:	<input style="width: 90%;" type="text" value="255.255.255.0"/>						
Default gateway:	<input style="width: 90%;" type="text" value="192.168.0.226"/>						

Set the Network Settings IP address to "Static" and enter an IP address - as we are on a DHCP server supported network, we have entered one in the address range of 192.168.x.x. Reboot the PDU and wait for the SYS LED to start flashing - 30-45 seconds.

### Other required set-up

Log back into the PDU web interface using the newly assigned static IP of 192.168.0.224 and navigate to the "Settings" page again.

Scroll down to the "ALLOW TCP CONTROL FROM" section and make sure "Disable" is ticked:

The screenshot shows two adjacent configuration panels. The left panel, titled "ALLOW TCP CONTROL FROM", has a grey header and contains a single row with the text "Disable" and a checked checkbox. The right panel, titled "FAN COOLER TEMPERATURE SETTINGS", has a grey header and contains two input fields: "Low Temperature" with the value "30" and "High Temperature" with the value "32". Below these are three radio buttons labeled "ON", "OFF", and "AUTO", with "OFF" selected. A black "Save" button is at the bottom of the right panel.

Press the reboot button at the bottom of the page and wait for the SYS LED to begin flashing again before continuing.

Check the firmware version of your PDU -to offer TCP control on port 5006, it must be version 2.5 or later.

The screenshot shows a grey header titled "SYSTEM VERSION". Below the header, the text "Current version: v2.5 / 2024-04-18" is displayed. To the right of this text are two buttons: "Upload firmware" and "Online Update".

## TCP Commands

In addition to their standard TCP support, the Soleux PDU series support TCP control on another port (5006). This port includes a subset of commands and does not reply with an ACK handshake. The supported commands are as follows:

- Output ON  
Use the command **AT+ON : N**, where N is the output number 0-5 for outputs 1-6)
- Output OFF  
Use the command **AT+OFF : N**, where N is the output number 0-5 for outputs 1-6)
- Output TOGGLE  
Use the command **AT+TOGGLE : N**, where N is the output number 0-5 for outputs 1-6)
- Output RESTART  
Use the command **AT+RESTART : N**, where N is the output number 0-5 for outputs 1-6 - off/5 sec/on)
- Device REBOOT  
Use the command **AT+REBOOT** - use with caution as device will go off-line for up to 60 seconds!

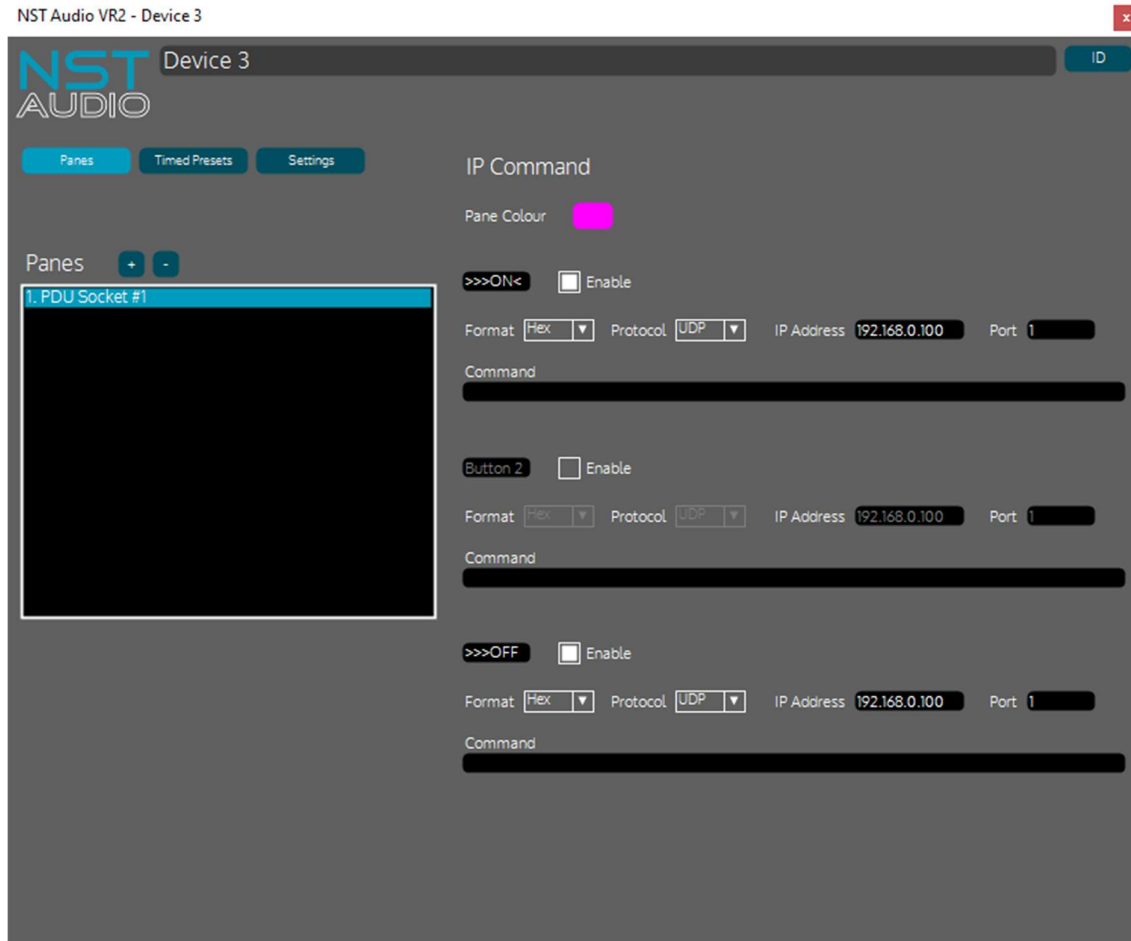
Additional commands not supported on port 5005 (which uses handshaking) are:

- Masked outputs ON  
Use the command **AT+MASKEDON : NNNNNN**, where N is the output number and is either "X" for ON or "-" for IGNORE. For example, "X---XX" would turn outputs 1, 5 and 6 on together in one command.
- Masked outputs OFF  
Use the command **AT+MASKEDOFF : NNNNNN**, where N is the output number and is either "X" for ON or "-" for IGNORE. For example, "X---XX" would turn outputs 1, 5 and 6 off together in one command.
- Masked outputs RESTART  
Use the command **AT+MASKEDRESTART : NNNNNN**, where N is the output number and is either "X" for RESTART or "-" for IGNORE. For example, "X---XX" would turn restart outputs 1, 5 and 6 (off, 5 seconds pause, on).

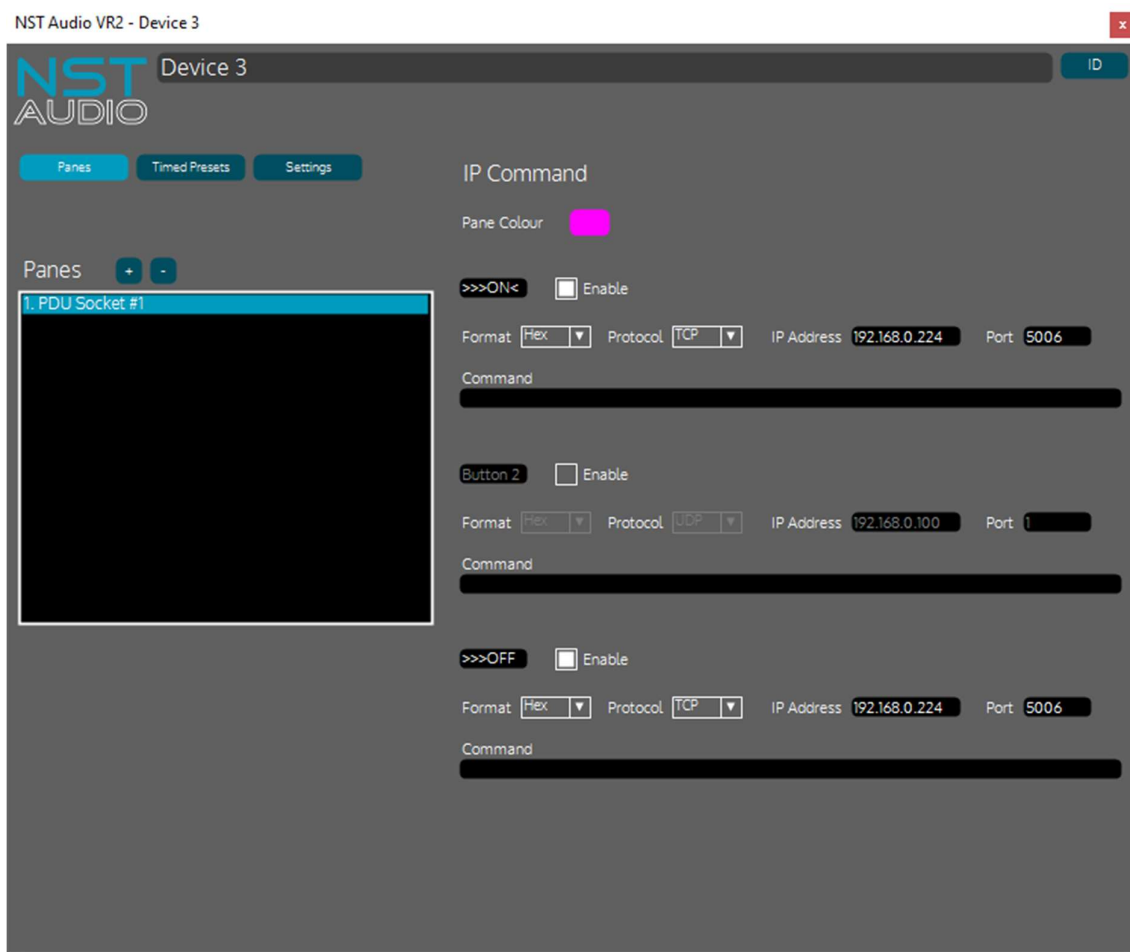
**Important Note:** Do **not** use port 5005 for these commands, as documented in the Soleux list of TCP messages. Using port 5005 may result in unreliable behaviour.

## Initial Set-up

Let's set up a single pane with on/off controls for the first socket. In D-Net, we will start by setting up by adding an IP Command pane on the VR2 with the buttons we require, labelled as appropriate.

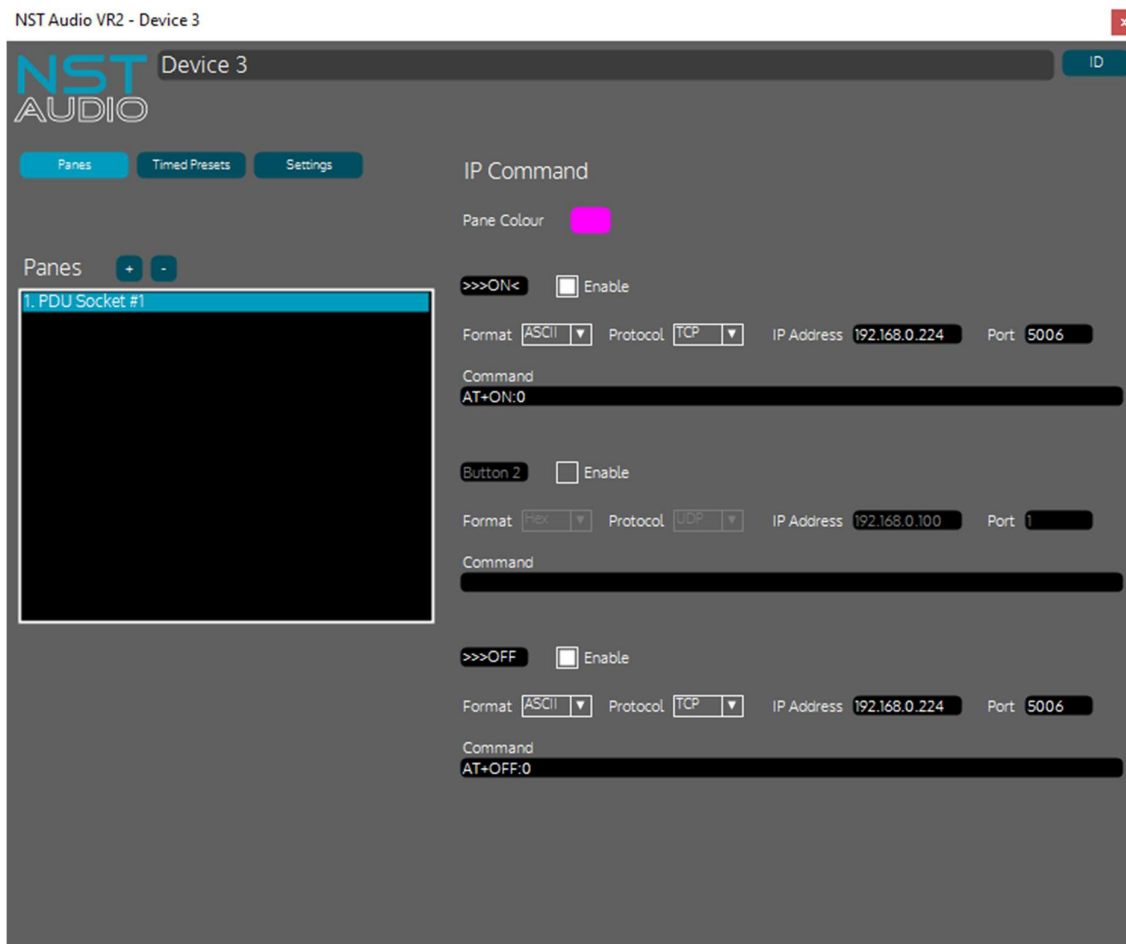


Next, we will add the correct IP address and port number and select TCP as the protocol type:



Finally, change the format of the command strings to ASCII and type in the commands to action turning ON and OFF socket #1 as described in the supported commands on page 12 of this document.  
Make sure you change the format to ASCII first or commands will not be accepted!

In this example these are for the ">>>ON<<<" button: **AT+ON:0**,  
 and for the ">>>OFF<<<" button: **AT+OFF:0**.



And we are done! The first socket on the PDU can now be turned on and off remotely.

To select other sockets, the change the number after the colon in the command string so **AT+ON:5** would turn on socket 6.

To turn multiple sockets on or off together, use the masked ON/OFF commands. Note that this is an OR type operation. Any sockets addressed with an "X" will be affected by the command, while those addressed with a "-" will be ignored.

This command is probably best used just to turn everything on (**AT+MASKEDON:XXXXXX**) or reset everything to off (**AT+MASKEDOFF:XXXXXX**). A short delay is introduced between sockets when using the masked operation to mitigate the risk of fuse or circuit breaker overload.

[ENDS]