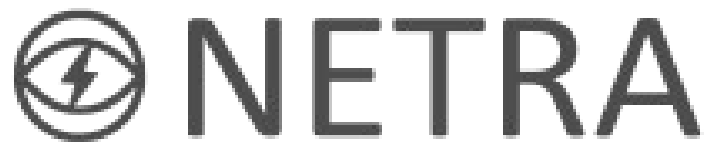


# *Netra User Manual Guide*

**Rev 1.0 April 2026**



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## **Introduction to Netra**

Netra is a cutting-edge Industrial Energy Management and Automation System designed to transform how industries monitor, control, and optimize their energy consumption. Built on advanced Modbus communication protocols and real-time data acquisition technologies, Netra provides comprehensive solutions for modern industrial facilities seeking intelligent energy management.

## **What Makes Netra Unique?**

In today's rapidly evolving industrial landscape, energy efficiency isn't just an operational concern—it's a strategic imperative. Netra addresses this challenge by offering a unified platform that seamlessly integrates hardware control, software intelligence, and user-friendly interfaces to deliver unprecedented visibility and control over industrial energy systems.

## **Comprehensive Industrial Solution**

Netra is engineered specifically for industrial environments where reliability, accuracy, and real-time performance are non-negotiable. Whether you're managing a manufacturing facility, data centre, commercial building, or renewable energy installation, Netra provides the robust foundation needed for effective energy management.

## **Real-Time Energy Intelligence**

At its core, Netra delivers real-time energy monitoring with microsecond precision. The system continuously tracks power consumption, power factor variations, environmental conditions, and equipment performance, providing operators with instant insights into their facility's energy profile. This real-time capability enables immediate response to efficiency opportunities and potential issues.

## **Advanced Automation & Control**

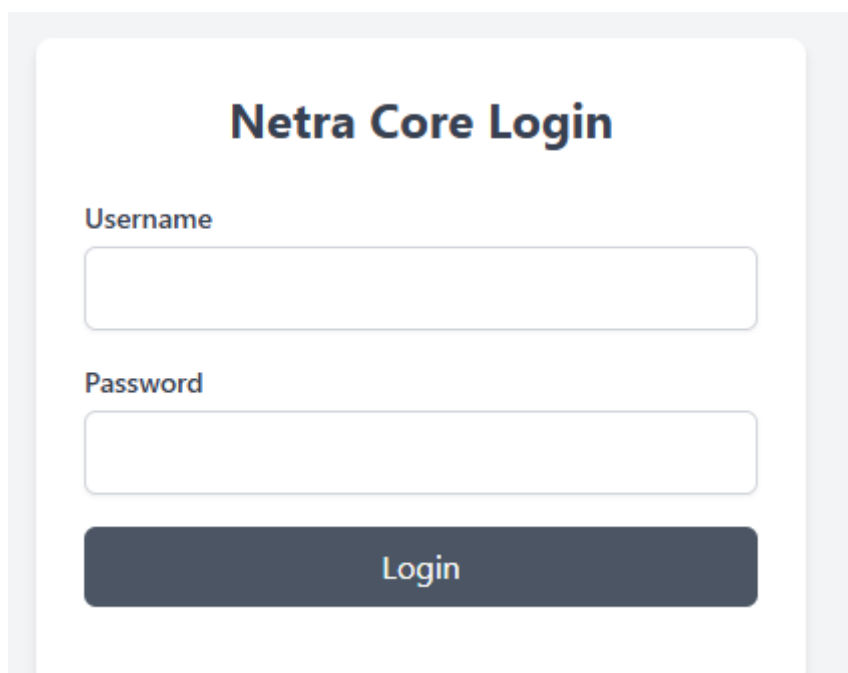
Beyond monitoring, Netra excels in intelligent automation. The system can automatically adjust power factor correction capacitors, manage energy distribution, control environmental systems, and optimize equipment operation based on real-time conditions and predefined parameters. This automation reduces human intervention while maximizing efficiency and equipment lifespan.

## **Multi-Protocol Communication Excellence**

Netra's communication architecture supports multiple industrial protocols including Modbus RTU, Modbus TCP, MQTT, HTTP, and FTP, ensuring seamless integration with existing infrastructure. The system's protocol flexibility enables connection to diverse equipment manufacturers and legacy systems, eliminating the need for costly infrastructure replacement while maximizing return on existing investments.

## LOGIN PAGE – NETRA INTERFACE

The Netra Login Page is your secure gateway to the Netra system. This page provides authenticated access to all system configuration modules, monitoring dashboards, and administrative functions. The login page displays "Netra Core Login" as the main heading with a centered authentication form on a clean white background. The interface includes username and password input fields with proper validation and security measures. The form automatically prevents submission with empty credentials and provides real-time feedback for authentication attempts.



The image shows a screenshot of the Netra Core Login interface. It consists of a white rectangular form centered on a light gray background. At the top of the form, the text "Netra Core Login" is displayed in a bold, dark blue font. Below this heading, there are two input fields. The first is labeled "Username" in a dark blue font, and the second is labeled "Password" in a dark blue font. Both input fields are empty and have a light gray border. At the bottom of the form, there is a dark blue button with the word "Login" written in white text.

### Login Process

1. Open a browser and enter the IP address or URL provided by your administrator to access Netra.
2. On the login screen:
  - ✓ Enter your Username in the designated field
  - ✓ Enter your Password in the secure password field
3. Click the Login button to submit your credentials.
4. If credentials are correct, you will be redirected to the Dashboard or Home screen.
5. If credentials are incorrect, an error message will appear prompting you to retry.

### Security Features

The login system implements secure credential transmission and protection against common web vulnerabilities. Authentication requests are sent via encrypted POST methods to prevent credential exposure. The system includes proper session management with automatic timeout mechanisms for enhanced security.

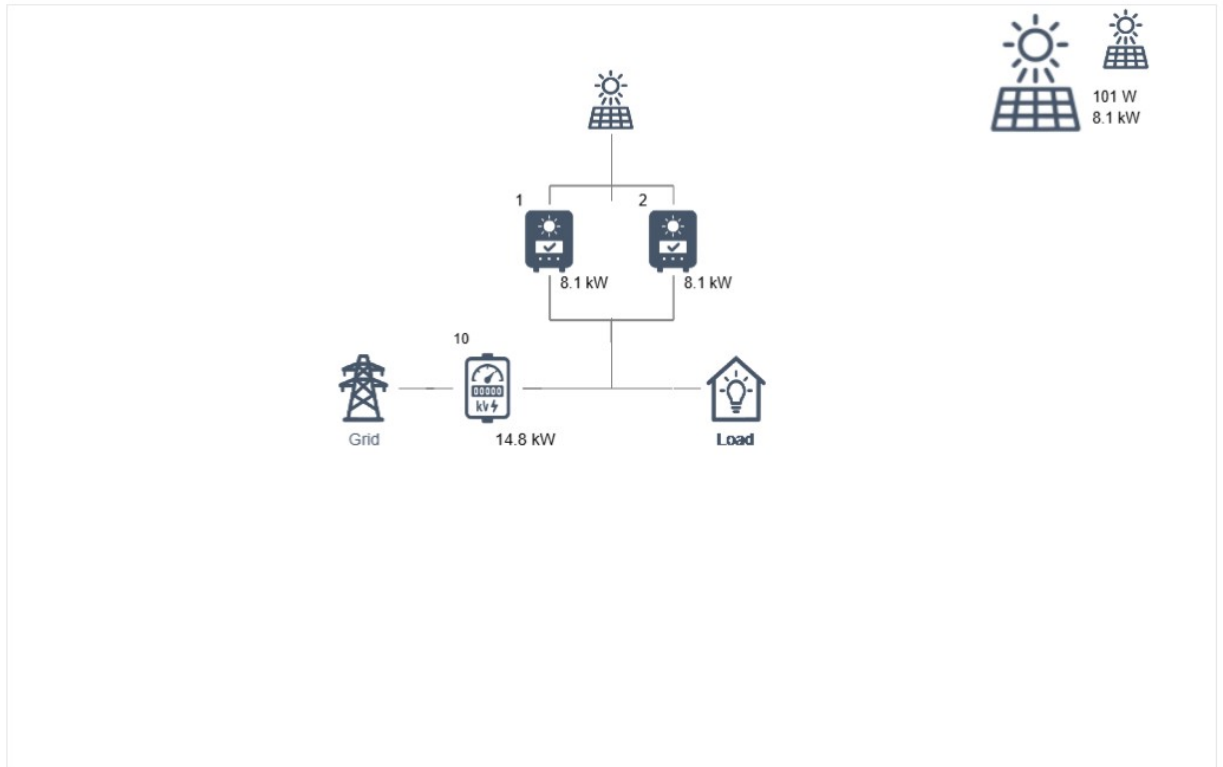
### Error Handling

Failed login attempts display clear error messages such as "Invalid login credentials" or "An error occurred. Please try again." for technical issues. Error messages appear in red text below the login form and automatically clear when users modify their input or retry authentication.

# DASHBOARD PAGE – NETRA INTERFACE

The Dashboard serves as the central visual interface of your Netra energy management system, providing comprehensive monitoring and control capabilities through an intuitive web-based interface. This dynamic platform automatically adapts to your system configuration and installed packages, delivering real-time insights into your energy infrastructure.

Live Energy Overview



## 1. Live Energy Overview

The Live Energy Overview widget forms the heart of your dashboard, presenting a dynamic visualization of your complete energy ecosystem. This intelligent display automatically populates based on your system's configuration, showing the real-time flow of energy between solar generation, inverters, grid connection, and load consumption.

The visual diagram illustrates your energy flow patterns with animated connections, allowing you to instantly understand how power moves through your system. Solar generation appears at the top, flowing through your configured inverters, and distributing to both grid export and local load consumption. Real-time power values update continuously, providing immediate feedback on system performance.

Key energy statistics display alongside the diagram, including daily generation totals, grid export amounts, and self-consumption rates. This comprehensive view enables you to monitor system efficiency and optimize energy usage patterns throughout the day.

The Insight package generates a widget that shows on the main dashboard. It has a large canvas that dynamically adapts to the configuration set in Insight *and* PC. Inverters appear in a single row, displaying

their Modbus Address or IDs, and the AC Active Power in kilowatts. Meters will appear in their respective places (grid, solar output, or genset) and the flow of energy will indicate import or export power. If a pyranometer is installed, the solar irradiance and potential generation are shown at the top right as seen in the image.

## **2. Power Control Package**

When the Power Control Package is installed and enabled, advanced system management capabilities become available directly from your dashboard. This powerful widget provides centralized control over your energy system's operation and configuration.

System control functions include start, stop, and reset operations, allowing you to manage your system's operational state remotely. Power limit controls enable you to set export and import thresholds, ensuring your system operates within desired parameters and grid requirements.

The operating mode selector offers three distinct operational states: Automatic mode for hands-off operation, Manual mode for direct control, and Maintenance mode for service and troubleshooting activities. Each mode adapts the system's behaviour to match your specific operational requirements.

## Power Control Package

### PC Configuration

Power Control System Status

STATUS ● Active	MODE Average	INVERTERS 2	METERS 1
--------------------	-----------------	----------------	-------------

### Inverter Control

2 inverters configured

ID	POWER %	RATING	GROUP	STATUS
1	<input type="range"/> 0%	50kW	Group 1	● Active
2	<input type="range"/> 0%	50kW	Group 1	● Active

### Power Meter Control

1 meters configured

ID	TYPE	MIN/MAX	PRIORITY	STATUS
1	Load	3/5kW	Priority 10	● Active

### PC Statistics

Real-time power control metrics

TOTAL SOLAR <b>0.00kW</b> ● Idle	CURTAILMENT <b>0.00kWh</b> ● Today	GRID POWER <b>0.00kW</b> ● Unknown	DG STATUS <b>Not Configured</b> ● Standby
--	--	--	---

Lifetime Statistics Total Curtailed **0.00 kWh**

### 3. Devices Widget

The Devices widget provides comprehensive monitoring of all connected hardware components within your Netra system. This real-time display automatically detects and lists inverters, meters, sensors, and other connected devices, showing their current operational status and key performance metrics.

Each device appears as an individual card displaying connection status, current performance data, and quick access to configuration options. Online devices show green status indicators with live performance metrics, while offline or malfunctioning devices display appropriate warning indicators.

Device-specific information includes power output for inverters, import/export data for meters, and environmental readings for sensors. Quick configuration access allows you to modify device settings

without navigating away from the main dashboard.

**Devices**

**Inverters** (PC Controlled)

Inverter 1 PC Group 0 ▼

Inverter 2 PC Group 0 ▼

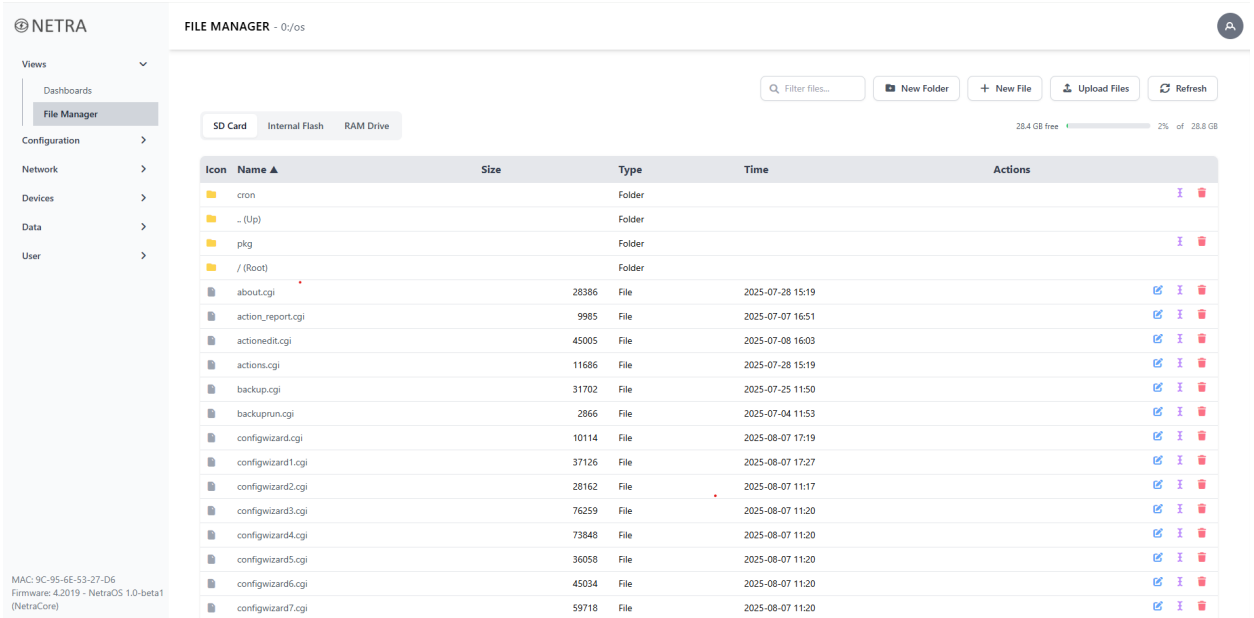
**Power Meters** (PC Controlled)

Meter 1 Grid Meter ▲

PC Configuration	Device Details
Device ID: 10	Bus: 100
Type: Grid	Type: 0
Group: 0	Model: 0
Priority: 10	

# FILE MANAGER PAGE – NETRA INTERFACE

The File Manager page provides comprehensive file and folder management capabilities for the Netra Energy device storage systems. This interface allows users to navigate, create, modify, and organize files across different storage drives including SD card and flash memory. The file manager supports common file operations while providing real-time storage monitoring and drive management functionality.



The **User Dropdown Menu** is in the top-right corner of every Netra page, providing quick access to system administration functions, flash storage management, and user account controls. This circular gray button with a user icon opens a comprehensive menu for system management tasks.

## Unlock Flash / Lock Flash

Enables or disables write access to the device's flash memory for making configuration changes. Shows "Unlock Flash" when locked, "Lock Flash" when unlocked. Lock it again after use to prevent accidental edits and protect system integrity.

## Tail Log

Shows the latest system log entries in real time for monitoring activity and troubleshooting issues. Opens live log viewer at `/os/log_tail.cgi` to display current system events, errors, and operational messages.

## Configuration Wizard

Guides you through system setup or reconfiguration with step-by-step instructions. Opens at `/os/configwizard.cgi` for initial device setup or comprehensive system reconfiguration assistance.

## Clear Cached Files

Deletes temporary stored files to fix display or data issues caused by outdated cache. Clears browser and system cache via AJAX call to improve performance and resolve caching-related problems.

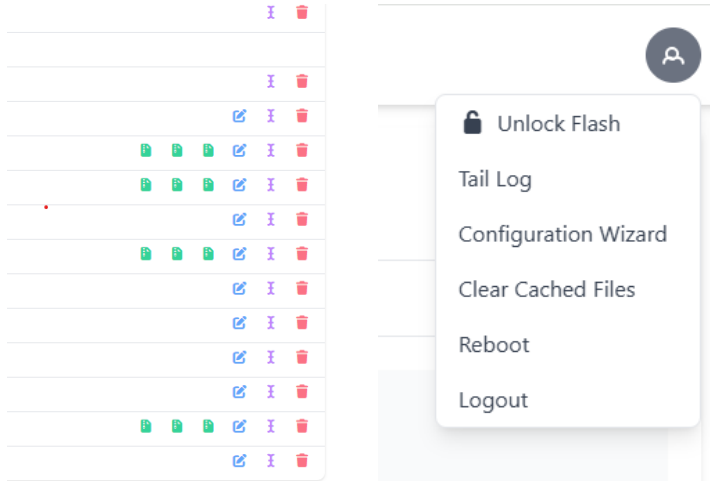
## Reboot

Restarts the entire Netra system at `/os/task.cgi?action=reboot`. Use this after major changes, updates, or

when the device is unresponsive. Warning: All unsaved changes will be lost during restart.

## Logout

Ends the current user session and returns to login page at `/os/login.cgi?logout=1`. Use when finished working or switching to another user account for security purposes.



Files and folders are displayed in rows, each showing information such as the name, size, type, last modified date, and available options.

Each file or folder row displays a set of action icons on the right side, such as edit, rename, extract, compress, or delete. These icons vary based on file type and offer quick access to essential file management tasks. Refer to the image for a visual guide to each icon's function.

The COPY TO FLASH button lets you duplicate the current folder into the flash memory.

Control buttons available may include:

NEW FILE – create a new file

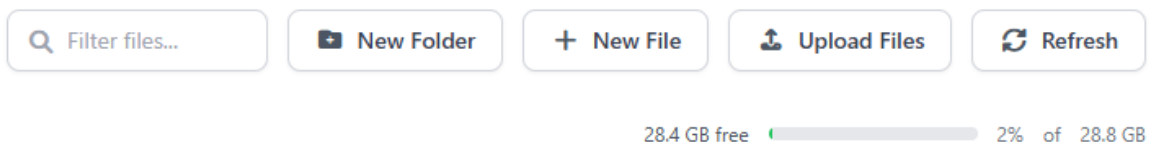
UPLOAD FILES – add files from your computer

NEW FOLDER – create a folder

REFRESH – reload the folder list

SEARCH – find files quickly

SPACE - The space bar below the toolbar shows real-time storage usage for the selected drive.





can immediately affect system operation. Users should leverage the renaming functionality to create backups before making significant changes to critical system files. The real-time error detection helps identify obvious syntax issues, but users should still test changes carefully in non-production environments when possible.

## NAVIGATION MENU PAGE – NETRA INTERFACE

The Navigation Menu serves as the primary control center for your Netra energy management system, strategically positioned on the left side of the interface for convenient access to all system functions. This comprehensive menu structure organizes the system's extensive capabilities into logical sections, enabling efficient navigation and system management regardless of your technical expertise level.

### Views

Views provide access to the Dashboard and File Manager. The Dashboard displays real-time energy monitoring and system status, while File Manager enables comprehensive file system navigation and document management.

### Configuration

Configuration includes System Settings, Package Settings, Firmware Update, OS Update, Flash Settings, Backup Data, Widgets, About, and Scheduled Tasks. This section manages all system setup, customization options, and maintenance functions for optimal system operation.

### Network

Network allows configuration of Networking, HTTP, and NetraOS. These settings control connectivity, web interface access, and operating system level network functions including security and remote access capabilities.

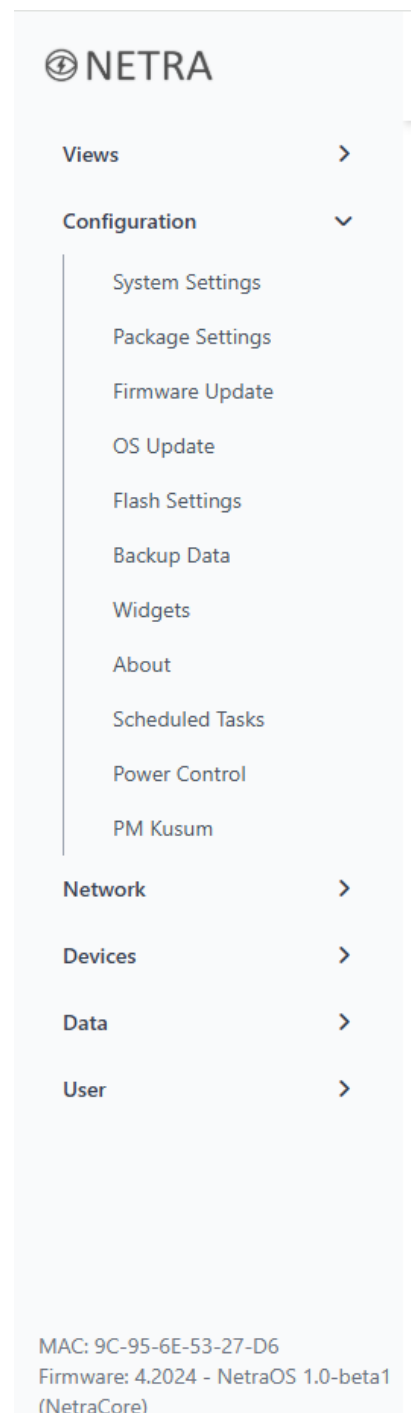
### Devices

Devices are used to manage Devices, Device Types, and Modbus. This section handles hardware component configuration, device categorization, and industrial communication protocol setup for connected equipment.

### Data

Data handles Data Export and Data Collection. These functions control information gathering, processing, storage management, and system data extraction for analysis and reporting purposes.

### User



The screenshot shows the NETRA navigation menu. At the top is the NETRA logo. Below it are several menu items, each with a right-pointing chevron (>) or a downward-pointing chevron (v). The items are: Views (>), Configuration (v), System Settings, Package Settings, Firmware Update, OS Update, Flash Settings, Backup Data, Widgets, About, Scheduled Tasks, Power Control, PM Kusum, Network (>), Devices (>), Data (>), and User (>). At the bottom of the menu, there is a footer containing the MAC address (9C-95-6E-53-27-D6), the firmware version (4.2024 - NetraOS 1.0-beta1), and the core name (NetraCore).

User includes Actions, Configuration Wizard, and E-mail settings. This section manages user access, guided system setup procedures, and automated communication configuration for notifications and alerts.

The Configuration menu automatically updates to include only the packages that are installed and activated, giving users direct access to their specific settings.

When the Power Control (PC) package is active, a "Power Control Settings" option appears, allowing access to key features such as Zero Feed-In (ZFI) control, genset protection, dynamic power limiting, multi-cluster mode setup, reactive power compensation, and license management.

Similarly, when the PM Kusum package is active, a "PM Kusum" option appears in the menu. This provides access to PM-Kusum portal integration, MQTT communication settings, device registration, data export scheduling, and portal compliance tools.

This dynamic integration keeps the interface clean and ensures that only active packages are visible, making system configuration simpler and more efficient.

## System Information Display

The bottom of the navigation panel displays critical system identification information including:

- **MAC Address:** 9C-95-6E-53-27-D6
- **Firmware Version:** Current system firmware for compatibility and support
- **NetraOS Version:** Operating system version information
- **NetraCore Status:** Core system component status indication

## SYSTEM SETTINGS PAGE – NETRA INTERFACE

The System Settings page contains critical configuration options that define how the Netra operates at the core level. These settings control debugging, performance optimization, system security, and operational behavior. Proper configuration of these settings is essential for optimal system performance and reliability.

The Debug Configuration section controls how the Netra system outputs diagnostic information for troubleshooting and monitoring purposes.

The Debug Method dropdown allows you to choose between "Serial Port" (for developers working directly with hardware) and "Log File" (recommended for production use) to determine where debug output is sent.

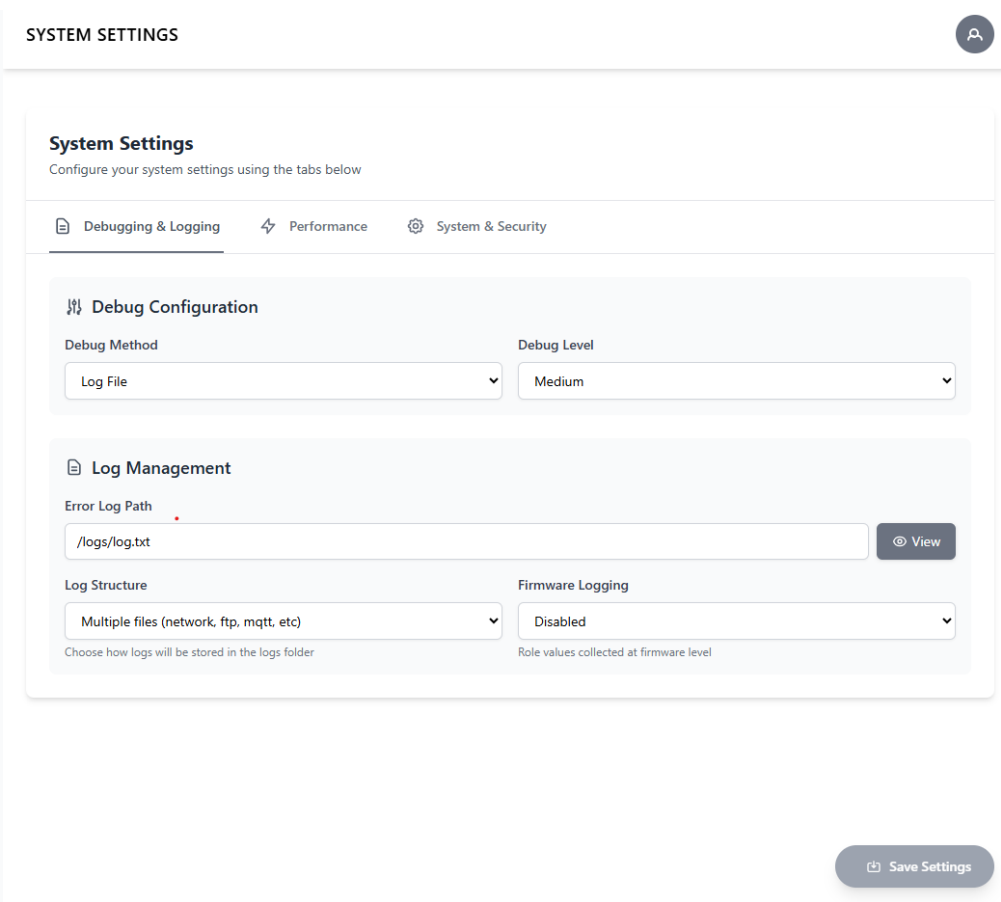
The Debug Level setting controls the verbosity of logged in

formation - "Minimal: Only Errors" captures just critical failures, "Medium" logs important operational events without overwhelming detail, and "Verbose" provides comprehensive logging including communication data and detailed system activities.

For normal operation, select "Log File" as the method and "Medium" as the level to ensure proper remote access to logs while maintaining manageable file sizes.

During troubleshooting, temporarily switch to "Verbose" level to capture detailed system behavior for analysis.

These settings are essential for maintaining system health monitoring and enabling effective remote diagnostics when issues arise.



## 1. Performance

The Execution & Timing section controls critical timeouts and performance parameters that directly affect system responsiveness and reliability. Max Execution Time sets the maximum duration (default 20 seconds) that System Settings scripts can run before automatic termination, preventing runaway processes from consuming system resources - increase this value if pages fail to load due to large datasets or complex operations.

Role Timeout determines how long data roles retain their last known values before resetting to zero (default 15 seconds), which is crucial for preventing stale data when Modbus devices become unresponsive - if you see random zero values in CSV exports, increase this timeout. Device Timeout controls how long devices can remain inactive before being marked as "Error" state (default 30 seconds), balancing quick error detection with tolerance for slower devices or network delays.

Session Lifetime manages automatic user logout timing (default 6000 seconds or 100 minutes) for security purposes, preventing unauthorized access from unattended sessions. These timing parameters must be carefully balanced based on your network conditions, device response characteristics, and security requirements.

Proper configuration prevents both false error states and security vulnerabilities while maintaining optimal system performance.



### System Settings

Configure your system settings using the tabs below

[Debugging & Logging](#) [Performance](#) [System & Security](#)

#### Execution & Timing

Max Execution Time	Role Timeout	Device Timeout
<input type="text" value="20"/>	<input type="text" value="15"/>	<input type="text" value="15"/>

Session Lifetime

#### Resource Management

Max Concurrent	Stack Size	Call Depth
<input type="text" value="6"/>	<input type="text" value="1200"/>	<input type="text" value="5"/>

[Save Settings](#)

## 2. System & Security

The System Configuration section manages fundamental system startup behavior and device compatibility settings that are critical for proper operation.

Start Script specifies which script executes at system startup (default `"/scripts/runonce.cgi"`) and is critical for Netra OS initialization - this should never be changed unless implementing custom programming with proper backup procedures, as incorrect values can prevent system boot.

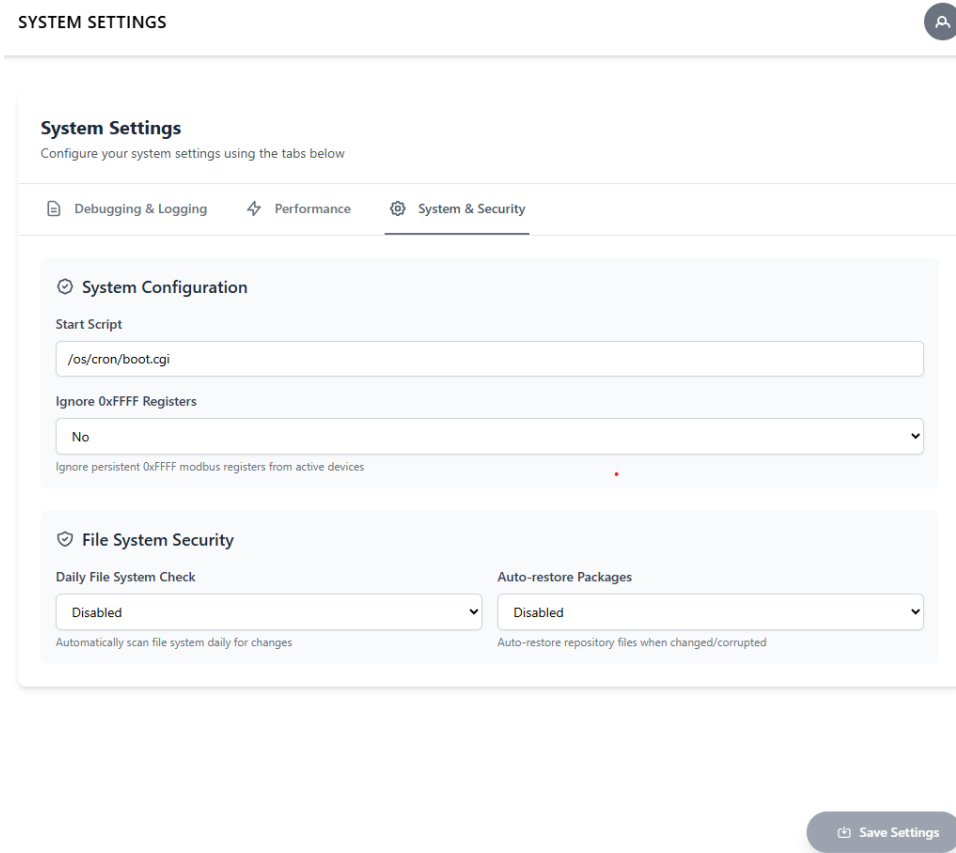
Ignore 0xFFFF Registers handles persistent 0xFFFF values returned by certain devices like SMA inverters (which return 0xFFFF at night) or industrial equipment during standby modes - selecting "Yes" retains last known good values instead of logging meaningless 0xFFFF readings.

This setting is particularly important for solar monitoring systems where inverters naturally return invalid values during non-operational periods, and selecting "Yes" maintains more meaningful historical data.

The start script setting is a system-critical parameter that controls essential startup procedures including

device initialization, communication setup, and service activation.

Only experienced developers with full understanding of system initialization should consider modifying the start script setting, and only with proper recovery procedures in place.



## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## NETWORK SETTINGS PAGE – NETRA INTERFACE

The Network Settings page provides comprehensive configuration options for all network connectivity aspects of your Netra Energy Management System. This page controls Ethernet interfaces, cellular connections, and remote access capabilities. Proper network configuration is essential for reliable remote monitoring, data communication, and system management

### 1. Network Configuration

The Network Configuration section controls the primary wired network connection that provides the most stable and reliable connectivity for industrial applications.

IP Address Configuration offers two essential modes: DHCP (automatic IP assignment from

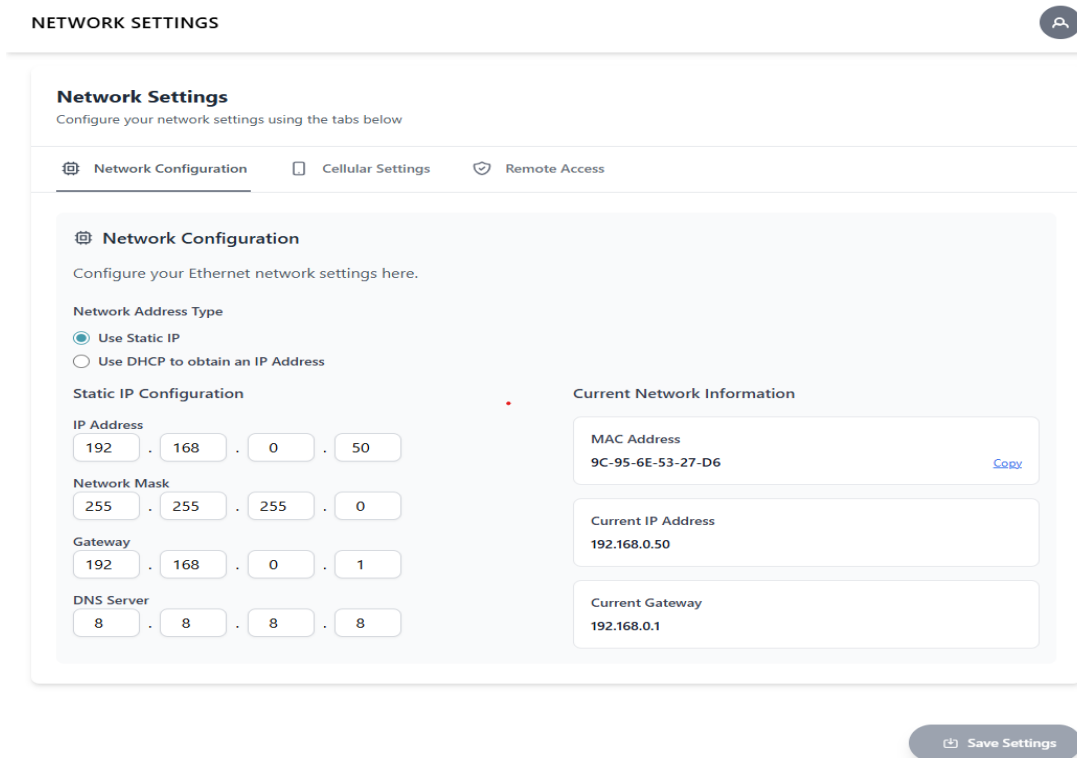
router/DHCP server) for simple plug-and-play connectivity, and Static IP (manually configured fixed address) for installations requiring predictable network addressing and integration with existing network infrastructure.

Network Parameters including IP Address, Subnet Mask, Default Gateway, and DNS Server become configurable when Static IP mode is selected, requiring careful coordination with your network administrator to prevent IP conflicts and ensure proper routing to external networks and internet services.

DHCP Considerations include important warnings about router DHCP server requirements and alternative access methods like NetBIOS name resolution (default "Netra") for Windows environments when dynamic addressing is used.

Emergency Recovery procedures include a hardware reset button option that restores the device to a default static IP address (192.168.0.55) if network connectivity is lost due to configuration errors. Network Status Monitoring provides real-time feedback on connection quality, link state, and configuration validity with visual indicators for successful connectivity and error conditions.

Security Features include MAC address display for network access control lists and integration with enterprise network security policies for secure industrial network deployment.



## 2. Cellular Settings

The Cellular Configuration section manages 3G/4G cellular connectivity for installations requiring mobile data access or backup internet connectivity when primary connections fail.

Cellular Data Status provides enable/disable control for the cellular modem with options to activate or deactivate mobile data connectivity based on operational requirements and data cost considerations. APN (Access Point Name) Configuration requires the exact APN provided by your

cellular carrier - this critical setting determines how your device connects to the carrier's data network and must match your data plan specifications exactly.

Dial Number Settings specify the carrier-specific dial string (typically "99\*\*1#" for most carriers) that initiates the data connection, with some carriers requiring custom dial numbers for specific data plans or network configurations.

Network Parameters include MTU (Maximum Transmission Unit) size configuration for optimizing data packet transmission over cellular networks, and packet interval settings that control timing between data transmissions for efficient bandwidth utilization.

Connection Management includes automatic retry logic, connection monitoring, and failover capabilities that ensure reliable cellular connectivity with intelligent switching between cellular and other available network connections.

Data Usage Monitoring provides real-time tracking of cellular data consumption to prevent overage charges, with configurable alerts and automatic disconnection when approaching data plan limits for cost-effective mobile connectivity management.

**NETWORK SETTINGS**

**Network Settings**  
Configure your network settings using the tabs below

Network Configuration Cellular Settings Remote Access

**Cellular Settings**  
Configure your Cellular network settings here.

Cellular Data Status	APN
Enabled	bsnlnet
Number to Dial	MTU
*99**1#	1000
Packet Interval	Username
1	undefined
Password	
.....	

Save Settings

### 3. Remote Access

The Remote Access Configuration section provides proxy server connectivity for secure system management and data access from external networks through intermediary servers.

Proxy Server Status Control offers enable/disable functionality through radio button selection, allowing administrators to activate or deactivate proxy-based remote connectivity based on network security policies and operational requirements.

Remote Host Configuration requires the hostname or IP address of the proxy server that will act as an intermediary for external connections, enabling secure communication through corporate firewalls or network security infrastructure.

Server Port Settings specify the network port number for establishing proxy server connections, typically using standard proxy ports (8080, 3128) or custom ports defined by organizational network policies and security requirements.

Connection Management handles automatic proxy connection establishment, authentication protocols, and failover mechanisms to ensure reliable remote access even when primary proxy servers become unavailable or experience connectivity issues.

NETWORK SETTINGS 🔍

---

**Network Settings**  
Configure your network settings using the tabs below

🏠 Network Configuration 📶 Cellular Settings 🔒 Remote Access

---

**Remote Access Settings**  
Configure proxy server settings for remote access.

Proxy Server Status •

Disabled  
 Enabled

Remote Host  Server Port

Enter the hostname or IP address of the remote proxy server Enter the port number for the proxy server connection

💾 Save Settings

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

# SNMP CONFIGURATION PAGE – NETRA INTERFACE

The SNMP Settings page provides configuration options for Simple Network Management Protocol (SNMP) functionality in your Netra Energy Management System. SNMP enables remote monitoring and management of the device through network management systems, allowing integration with enterprise monitoring tools and automated alerting systems.

## 1. SNMP Agent Configuration

**SNMP Agent Status Control:** Simple Enable/Disable dropdown that activates or deactivates the entire SNMP service - when enabled, external SNMP management tools can query the device for system information, energy data, and operational status.

**Read Community Authentication:** Specifies the authentication string (default "public") that SNMP management systems must provide to read data from the device - acts as a password for read-only access to system status, network configuration, and energy monitoring data.

**Write Community Security:** Defines the authentication string (default "private") required for SNMP write operations that allow external systems to modify device configuration remotely - provides administrative access through SNMP for changing settings and controlling device operation.

**Security Best Practices:** Default community strings ("public"/"private") should be changed in production environments to prevent unauthorized access, as these strings function as passwords for SNMP operations requiring enhanced protection through network-level restrictions and firewall rules.



### SNMP Configuration

Configure your SNMP settings and trap management

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[SNMP Agent Configuration](#) [SNMP Trap Configuration](#)

---

#### SNMP Agent Configuration

Configure SNMP agent settings and community strings for remote monitoring and management.

**SNMP Agent Status**  
Enabled/Disabled dropdown menu with 'Disabled' selected.  
Enable the SNMP agent to allow for remote SNMP read/write operations

**Read Community Name**  
Text input field containing 'public'.  
The default read community is 'public'

**Write Community Name**  
Text input field containing 'private'.  
The default write community is 'private'

[Save Settings](#)

## 2. SNMP Trap Configuration

**SNMP Trap Status Control:** Enable/Disable dropdown that activates or deactivates the entire trap notification system - when enabled, the device automatically sends SNMP trap messages to designated management systems when alarms, errors, or significant events occur on the Netra device.

**Trap Community Authentication:** Specifies the authentication string (default "public") that identifies trap messages to receiving SNMP managers - this community string must match the configuration on the receiving management system for proper trap processing, filtering, and security validation.

**SNMP Manager IP Address:** Four-field IP input that requires the exact IP address of the network management system that will receive trap notifications - ensures trap messages are delivered to the correct monitoring system for immediate alert processing and operator notification.

**Automatic Event Notifications:** System automatically generates trap messages for critical events including system startup/shutdown, communication failures, power quality alarms, energy threshold violations, and device configuration changes - providing proactive monitoring and immediate alerting capabilities for effective troubleshooting and response procedures.



### SNMP Configuration

Configure your SNMP settings and trap management

SNMP Agent Configuration
**SNMP Trap Configuration**

#### SNMP Trap Configuration

Configure SNMP trap settings and manager details for automatic notifications.

**SNMP Trap Status**

Enabled
▼

Enable SNMP trap to send trap messages to an SNMP manager

**Trap Community Name**

public

The default trap community is 'public'

**SNMP Manager IP Address**

0

.

0

.

0

.

0

[copy]

The IP address of the SNMP manager that will receive trap notifications

Save Settings

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## USERS AND SECURITY PAGE – NETRA INTERFACE

The Users and Security Settings allow you to manage user accounts, configure device identification, and customize system behavior. This page provides secure access control through administrator and guest accounts while enabling device customization for different deployment scenarios.

### 1. User Accounts

**Administrator Account Setup:** Configure the main administrative user credentials that provide complete system access and configuration capabilities - default credentials are admin/admin and should be changed immediately for security purposes with strong passwords containing mixed case letters, numbers, and special characters.

**Full Administrative Access:** Administrator account can modify all system settings including user management, network configuration, device setup, firmware updates, security policies, and

system maintenance functions with unrestricted access to all configuration areas and sensitive operational data.

**Guest Account Configuration:** Configure limited-access user credentials designed for monitoring-only access without administrative privileges - default credentials are guest/guest and should be customized based on your specific access requirements and security policies.

**Limited Guest Capabilities:** Guest users can view dashboards, monitor energy data, access reports, and basic system information while maintain security boundaries that prevent configuration changes, device modifications, or administrative function access.

**Security Best Practices:** Use strong passwords for both accounts, avoid common dictionary words or easily guessed combinations, regularly update credentials, and clearly define access roles for facility managers, contractors, public displays, and stakeholders requiring energy data without administrative responsibilities.

USERS AND SECURITY

### Users and Security

Configure your user accounts and security settings

User Accounts Device Settings

#### Administrator Account

Configure the main administrator credentials with full system access.

Username  
admin

Password  
.....

#### Guest Account

Configure the guest user credentials with limited system access.

Username  
guest

Password  
.....

Save Settings

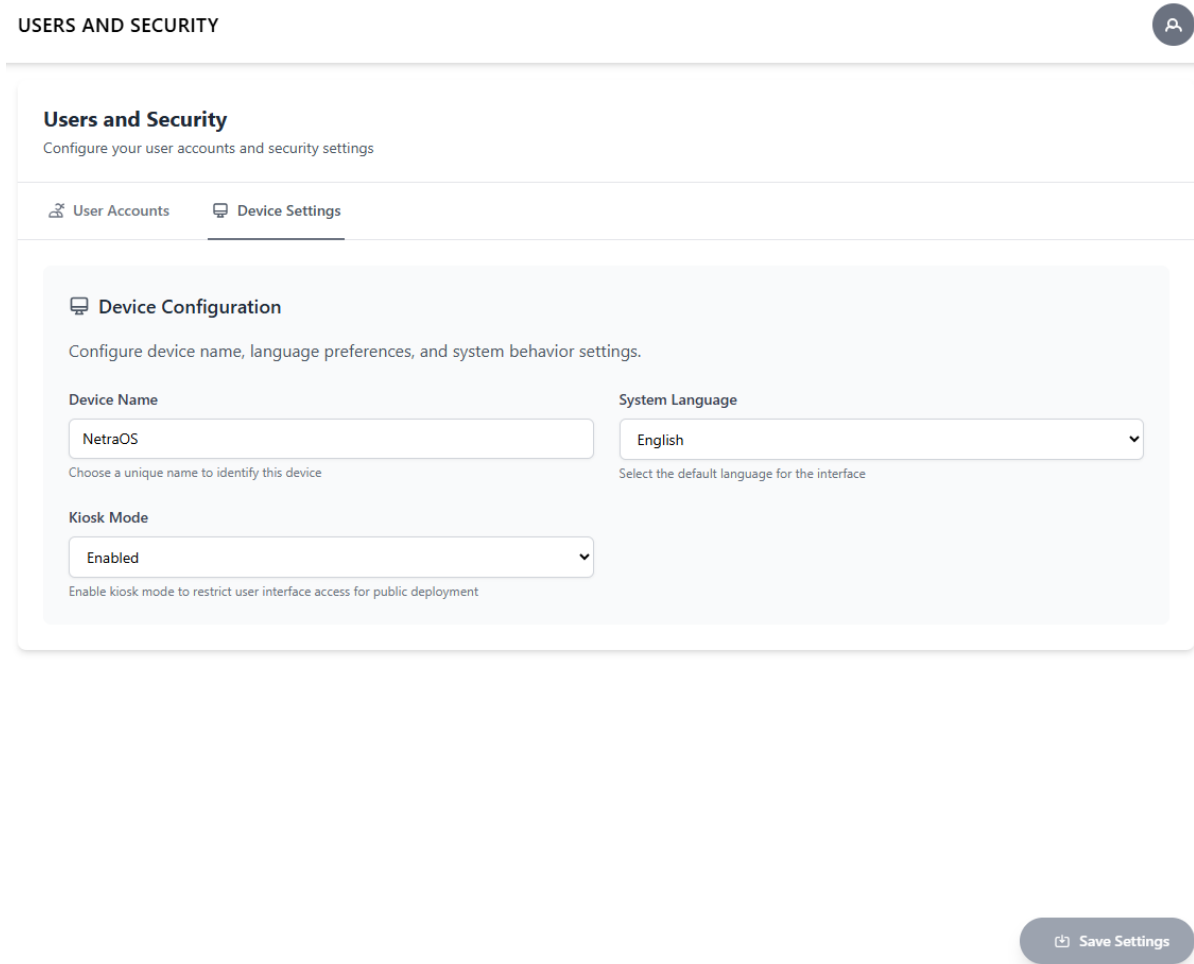
## 2. Device Settings

Configure fundamental system identification and operational behavior settings that affect system presentation across different deployment scenarios.

**Device Name Configuration** lets you choose a name for your Netra which will be displayed at the top of the browser window and when you add it to the Netra App - this should be descriptive and meaningful for easy identification in multi-device environments.

System Language Selection provides comprehensive internationalization support with languages supported by Netra including English, Spanish, German, Hindi and Tamil - the interface is changed into the languages in varying degrees, while the actual settings and scripts stay unchanged.

Kiosk Mode Configuration allows you to enable a view without logging in for display on an HMI - this enables public display functionality that restricts user interface access for deployment in lobbies, public areas, or unmanned monitoring stations with automatic login bypass and security restrictions.



## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## MAIL SETTINGS PAGE – NETRA INTERFACE

The Mail Settings page provides comprehensive SMTP email configuration for your Netra. This page enables email notifications, alerts, and reports by configuring your email server connection

details and authentication credentials through a clean, intuitive interface.


## 1. Email Credentials

**Email Address Configuration:** Enter the complete email address that will appear as the sender for all system notifications - this should be a valid, monitored email account that recipients can recognize and reply to if needed, providing consistent identification and professional appearance in recipient inboxes.

**Username Authentication:** Specify the SMTP authentication username which is typically the same as your email address but may differ depending on your email provider's requirements - consult your email provider's documentation for exact username requirements and authentication format.

**Password Security:** Enter the account password or application-specific password for SMTP authentication - for Gmail and many other providers, you must use an "App Password" rather than your regular account password for enhanced security and two-factor authentication compatibility.

**Provider Compatibility:** Supports all major email providers including Gmail, Outlook, Yahoo, and corporate email systems that provide SMTP access with proper authentication credentials, ensuring reliable delivery across different email platforms and services.

MAIL SETTINGS 

---

### Mail Settings

Configure your SMTP email settings

#### @ Email Credentials

Configure your email account authentication details.

**Email Address**

The email address that will appear as the sender

**Username**

SMTP authentication username

**Password**

SMTP authentication password

#### Server Settings

Configure your SMTP server connection details.

**SMTP Host**


SMTP server hostname (e.g., smtp.gmail.com)


**Port**

SMTP port (587 for TLS, 465 for SSL, 25 for plain)

**Encryption**

Encryption method for secure connection

 Test Email

 Save Settings

## 2. Server Settings

**SMTP Host Configuration:** Enter the exact hostname of your email provider's SMTP server - common examples include smtp.gmail.com for Gmail, smtp-mail.outlook.com for Outlook, smtp.mail.yahoo.com for Yahoo Mail, with corporate environments providing custom SMTP server addresses from IT administrators.

**Port Number Selection:** Specify the network port for SMTP communication with standard options including Port 587 for TLS encryption (recommended for most providers), Port 465 for SSL encryption (still supported by some providers), and Port 25 for unencrypted connections (not recommended for production use).

**Encryption Method Selection:** Choose security options including TLS (Transport Layer Security) for modern encrypted connections, SSL (Secure Socket Layer) for older encrypted connections, or No Encryption for testing purposes only. TLS on Port 587 is the recommended configuration for maximum compatibility and security.

**Provider-Specific Settings:** Configure based on email service requirements with Gmail using smtp.gmail.com on Port 587 with TLS, Outlook using smtp-mail.outlook.com on Port 587 with TLS, and corporate environments requiring specific SMTP server details that must be obtained from network administrators.

**Network Compatibility:** Ensure outgoing SMTP ports are open on your network firewall, verify proxy server compatibility for corporate environments, confirm DNS resolution for SMTP hostname lookup, and review troubleshooting support for connection failures, authentication problems, and configuration issues with detailed error logging

### Save Settings & Test Functionality

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

Click Save Settings to save the settings. Finally, click Test Email to see if it all works.



## ABOUT DEVICE PAGE – NETRA INTERFACE

The About Device page provides comprehensive system information and diagnostic details about your Netra Energy Management System. This read-only information page displays hardware specifications, firmware capabilities, memory status, network connections, and running processes through a clean, tabbed interface.

### 1. System Info

**System Info** provides detailed information about the application, memory, and storage status of the device.

The **Memory Information** section displays real-time memory usage based on the hardware platform.

Depending on the hardware version, devices may have RAM ranging from a few hundred kilobytes up to 32 MB, with available memory shown in kilobytes.

The **Available RAM** value indicates the current free memory available for system operations.

The **Storage Information** section includes SD card storage details, showing the total space (in MB) and the free space available for data logging and configuration

For Platform 11 devices, internal flash storage details are also displayed, including the total capacity (in KB) and the free space available for storing system files.



### About The Device

System information and device details

System Info Hardware Firmware Network Processes

#### Application Information

Application	NetraOS 1.0-beta1 (NetraCore)
-------------	-------------------------------

#### Memory

Total RAM	32 MB
Available RAM	10750 KB

#### Storage

SD Card	
Total Space	29532 MB
Free Space	29077 MB

Close

## 2. Hardware

The Hardware Information section displays detailed specifications of the device's processor and network identifiers.

For Mini platforms (8, 9, 10, 11), the device uses a PIC32MZ2048EFH064 microcontroller, while Platform 12 is powered by an ESP32 wireless microcontroller.

Network identifiers include the Ethernet MAC address, which is the unique hardware address used for network identification, and for Platform 11 devices, the Wi-Fi MAC address for wireless connectivity.

Cellular models also display the IMEI (International Mobile Equipment Identity), which is used for 3G/4G network authentication and communication.



### About The Device

System information and device details

System Info Hardware Firmware Network Processes

#### Hardware Information

Processor:	PICMZ2064DAR176
Ethernet MAC:	9C-95-6E-53-27-D6

### 3. Firmware

The Firmware Features section provides key details about the system's software version and capabilities.

It includes the **Firmware Version** (currently 4.2019), which indicates the installed system software, and the **Compiler Version** (4450), which identifies the build environment used for development.

In terms of system capabilities, the firmware supports up to **255 connected devices**, allows configuration of up to **150 data point roles**, and can handle **47 simultaneous TCP socket connections** for network communication

### About The Device (i)

System information and device details

---

System Info
 Hardware
 Firmware
 Network
 Processes

---

#### Firmware Features

Firmware Version:	4.2017
Compiler Version:	4450
Device Limit:	255
Device Max Roles:	150
USB Support:	Enabled
Network Support:	Enabled
Onewire Support:	Enabled
TCP Socket Count:	47
Modbus TCP Support:	Enabled
Max TCP Channels:	30
Modbus 2nd Channel:	Enabled

✕ Close

## 4. Network

Network provides a real-time view of the device's network connection status and active sessions.

The Network Status section presents current connections in a tabular format, displaying key details for each entry.

The ID column shows the unique connection identifier number, while STA indicates the connection stage or status code.

The IP field lists the remote client's IP address, and the INFO column provides additional details, including CL/OP to show whether the connection is closed or open, AB to indicate the abort flag status, and PR to display the process flag status.

The description field offers further connection-specific information for monitoring and troubleshooting purposes.



### About The Device

System information and device details

System Info Hardware Firmware **Network** Processes

#### Network Status

	ID	STA	IP	INFO
0	13	0.0.0.0	CL	(null)
1	4	0.0.0.0	CL	(null)
2	4	0.0.0.0	CL	(null)
3	0	192.168.0.45	CL	dashboard.cgi

## 5. Processes

Processes provide an overview of all running system processes along with their current execution status.

The Running Processes section displays active processes in a tabular format, including the PID (process identifier number), SCRIPT (name of the executing script or program), FLG (process flags and status indicators), LINE (the current execution line within the script), and RUN MS (runtime in milliseconds).

This tab also supports process monitoring features, enabling real-time tracking of process execution, performance monitoring for system optimization, and script execution status checks for troubleshooting.

Additionally, it provides runtime statistics to assist in analyzing and improving system performance.



**About The Device** (i)  
System information and device details

System Info
Hardware
Firmware
Network
**Processes**

---

**Running Processes**

	PID	SCRIPT	FLG	LINE	RUN	MS
1	about.cgi	66	358	835		

## BACKUP DATA AND SETTINGS PAGE – NETRA INTERFACE

Backup Data and Settings enable you to back up your configurations by creating a .tar file with the selected data on the Netra. You can choose to backup entire data or specific parts of it. There are four Backup Options: Month Data, Entire Log Folder, Configuration Files, and All Files on SD Card. Month Data backs up the logged data for a specific month. If you select it, a drop-down allows you to select the month you wish to download the data for.

**BACKUP DATA AND SETTINGS** (u)

---

**Backup Data and Settings** (u) Ready  
Create backups of your system data and configuration files

**Backup Configuration**

**Backup Option**

- Month Data**  
Backup data for a specific month
- Entire Log Folder**  
Backup all logging data
- Configuration Files**  
Backup system configuration only
- All files on SD card**  
Complete system backup

Select the backup type you wish to carry out

Start Backup

The Entire Log Folder option downloads the logs folder, as seen in the File Manager, which includes the complete logged data as well as the System Logs recorded since your Netra was setup and running. Selecting Configuration Files backs up the configuration settings of your

Netra.

These are most essential as they are very often unique to your device based on your setup.

All Files on SD Card backs up everything on the microSD card, as is visible in the File Manager.

Upon selecting any of the four provided options, you can click on Start Backup and the download link of the backup of your choice will show in a pop-up window.

Download the backupxxxxx.tar file onto your computer and keep it safe, in case a restore is ever required. All Files on SD Card and Entire Log Folder could result in a large file and may take a while to generate and download.

## Backup Process

Starting a Backup

Backup Type: Choose one of the four radio button options

Month Selection: If "Month Data" is selected, choose specific month from dropdown

Click "Start Backup" floating button (bottom-right corner)

New Window Opens: Backup process runs in separate browser tab

Download Begins: Backup file automatically downloads when complete

Backup Process Flow

File Download

Automatic Download: Backup file downloads directly to your device

File Format: Compressed archive containing selected data

File Naming: Includes date/time and backup type for easy identification

Storage Location: Downloads to your default browser download folder

**Note: We recommend that you make a backup of your configuration once you have set your system up, or even in case you received it preconfigured, so that restoring it, if required, will be a very straightforward process.**

## MODBUS COMMUNICATION PAGE – NETRA INTERFACE

The Modbus Communication Settings page allows you to configure Modbus communication protocols for connecting energy meters, inverters, and other industrial devices to your Netra Energy Management System. This page supports RS-485, RS-232, and Modbus TCP protocols through an intuitive tabbed interface.

### 1. RS-485 Channel 1

General Settings is for enabling the Modbus engine on the Netra, which allows for communication with devices over RS-485 Modbus RTU.

If the Modbus Engine is set to Enabled, Modbus devices on the RS-485 port will be polled automatically, at a particular polling interval. If the Modbus Engine is Disabled, the RS-485 port can be used for polling devices over proprietary protocols through custom scripts or packages.

If you are interfacing the Netra with Modbus devices, set it to Enabled.

If the Modbus Engine is set to Enabled, a section called Modbus RTU (RS-485) Settings will be visible. Here you can set the Baud Rate, Parity, Inter-packet delay, Time-out, Retry Interval and Maximum retries.

The Baud Rate specifies the speed at which information is communicated over a data channel. The default on the Netra is set to 9600.

The Parity bit is an optional error checking bit that some devices require.

Select between Even Parity and Odd Parity or use the default Parity setting No Parity. Inter-packet delay sets the interval in milliseconds between the Modbus packets of data transmission.

The default is set to 10. For longer cable runs and older devices, you may need to increase this to 20 or 30 ms.

Time-out sets the time in milliseconds the Netra waits for a Modbus packet response. If a Modbus device does not respond within the stipulated time, that packet is timed out.

The default is set to 300. The Retry Interval sets the time in milliseconds after which a failed or timed-out Modbus packet is resent. The default is set to 1000.

Maximum retries sets the number of times a failed or timed-out Modbus packet is resent before being cancelled.

If you wish to not retry any failed packet, set this to 0. The default is set to 5.

## **2. RS-485 Channel 2**

You can enable or disable it, and an option RTU Bridge option lets you pass packets through between channel 2 and channel 1.

Like the previous section, if set to Enabled, a new section will be visible, where you can set the Baud Rate, Parity, Inter-packet delay, Time-out, Retry Interval and Maximum retries for devices communicating over channel 2.

Bridge Mode allows you use more than one Modbus master where the Netra acts as a transparent bridge between the second master and the modbus devices on channel 1.



### Modbus Communication Settings

Configure your Modbus Communication settings for RS-485, RS-232, and TCP protocols

RS-485 Channel 1   RS-485 Channel 2   Modbus TCP

#### Modbus Channel 2 Configuration

**Modbus Engine**

Enabled - RS-485 (and Modbus TCP if available) will be polled automatically

Disabled - Use the RS-485 port for proprietary protocols through scripts

RTU Bridge

If you have external devices connected using Modbus, make sure this is enabled. For proprietary protocols you may choose to disable this.

Save Settings

### 3. Modbus TCP

If you have devices which need to be interfaced over Modbus TCP, set the Modbus TCP Engine to Enabled.

Once Enabled, you can configure the Inter-packet delay, Time-out, Retry Interval and Maximum retries settings as well.

The Inter-packet delay is the interval in milliseconds between the Modbus packets of data transmission.

The default is set to 100 for Modbus TCP. Time-out sets the time in milliseconds the Netra waits for a Modbus packet response.

If a Modbus TCP device does not respond within the stipulated time, that packet is timed out. The default is set to 300, much like for Modbus RTU devices.

The Retry Interval sets the time in milliseconds after which a failed or timed-out Modbus packet is resent. The default is set to 1000.

Maximum retries sets the number of times a failed or timed-out Modbus packet is resent before being cancelled. If you wish to not retry any failed packet, set this to 0. The default is set to 1.

Auto Close is a setting for certain Modbus TCP devices that have limited sockets and require the connection to be closed to not freeze data transmission.

There are two options provided here – Close after every Modbus operation and Re-use the same connection. If possible, re-use the same connection to increase performance.

In the Modbus TCP Device IP Address option, enter the IP Address of the Modbus TCP device you wish to interface with.

If there is no device being interfaced on the channel, leave the IP address as 0.0.0.0. The TCP Port is the port number for the Modbus TCP connection.

The default port for most connections is 502, which is the default on the Netra, but can be changed if it does not match that of your inverter.

As shown in the image below, if Modbus TCP Channel 1 is used for a device with a TCP/IP address, the IP address of that device is entered in the Modbus TCP Device IP Address option.

The TCP Port is left at the default of 502, since that is the most used port number in Modbus TCP.

The consecutive channels, if any, which are not being used, are left at the default IP address of 0.0.0.0, with the port number also left at the default 502, as seen here for Modbus TCP Channel 2.

## MODBUS DEVICES



### Modbus Communication Settings

Configure your Modbus Communication settings for RS-485, RS-232, and TCP protocols

RS-485 Channel 1   RS-485 Channel 2   **Modbus TCP**

#### Modbus TCP Settings

**Modbus TCP Engine**

Disabled  
 Enabled

If you have Modbus TCP devices, enable the engine and configure the virtual channels so that you can configure them using the device manager.

**Time Out**

300

The time in milliseconds to wait for a packet response

**Maximum retries**

1

Number of times a packet is resent before erroring out. Set this to 0 to not retry.

**Inter-packet delay**

10

The interval between modbus packet transmission in milliseconds

**Retry Interval**

15

The time in milliseconds after which a failed packet is resent

**Connection Management**

Re-use the same connection  
 Close after every modbus operation

Certain Modbus TCP devices that have limited sockets require the connection to be closed in order to prevent freezing after some time. If possible, re-use the same connection to increase performance.

The TCP Server check box can be enabled to allow other devices to connect to Netra to read information over Modbus TCP. Select the port number to listen to.

You can add multiple channels on the same port number to allow multiple remote connections.

The screenshot displays the 'Modbus TCP Channels Configuration' page. At the top, it shows '(20 of 30 channels)' and a '+ Add Channel' button. Below this, there are four channel configuration cards, each titled 'Modbus TCP Channel 1' through '4'. Each card contains a 'Server Mode' section with a checkbox for 'TCP Server (Listening)' and a note: 'Select whether this channel is a TCP Client or Modbus TCP Server'. To the right of the checkbox are two input fields: 'IP Address' (containing '0.0.0.0') and 'TCP Port' (containing '0'). Below these fields are instructions: 'Enter the IP Address of the Modbus TCP device or 0.0.0.0 if not used' and 'Enter a port number for the connection. The default Modbus TCP port is 502'. A trash icon is located in the top right corner of each card. At the bottom right of the interface, there is a 'Save Settings' button.

**Dynamic Channel Management** allows adding up to 30 TCP channels for different network devices. **Add Channel Button** creates new TCP connections with configurable parameters.

**Server Mode Checkbox:** Select TCP Server (Listening) for devices that connect to your Netra, or leave unchecked for TCP Client mode where Netra connects to devices

**IP Address Field:** Enter the IP address of the Modbus TCP device (or 0.0.0.0 if not used) - only visible in TCP Client mode

**TCP Port Field:** Enter port number for the connection (default Modbus TCP port is 502)

**Remove Channel Button:** Delete unnecessary TCP channels with the trash icon

**View Register Map Link** appears for TCP Server channels, providing access to the Modbus register mapping documentation

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings

## MODBUS TESTER PAGE – NETRA INTERFACE

The Modbus Tester page provides diagnostic and testing tools for Modbus communication channels on your Netra Energy Management System. This essential troubleshooting tool allows you to test RS-485, RS-232, and Modbus TCP connections, verify device responses, and diagnose communication issues before configuring devices in the system.

**RS-485 Channel 1 Testing:** Primary serial communication channel for testing RTU devices connected to the main RS-485 port - typically used for energy meters, inverters, and other industrial devices using standard Modbus RTU protocol with configurable baud rates and parity settings.

**RS-232 Channel Testing:** Secondary serial port testing for devices connected via RS-232 interface - available on specific hardware platforms ( $\leq 10$  or  $20$ ) and supports both Modbus RTU and DLMS communication modes for specialized device compatibility.

**RS-485 Channel 2 Testing:** Additional serial channel testing for newer hardware platforms - provides secondary RS-485 connectivity for expanded device testing and supports RTU Bridge mode for advanced applications and multi-device configurations.

**Modbus TCP Network Testing:** Network-based communication testing for Ethernet-connected devices using TCP/IP protocol - allows testing of network devices, PLCs, and other TCP-enabled equipment with configurable IP addresses and port settings.

**Slave Address & Function Codes:** Enter the Modbus slave ID (1-247) and choose function codes including Read Coils (01), Read Discrete Inputs (02), Read Holding Registers (03), Read Input Registers (04), Write Single Coil (05), and Write Single Register (06) for comprehensive device testing.

**Register Configuration:** Specify starting register or coil addresses and register count for test operations - addresses are typically 0-based or 1-based depending on device documentation with limits of 1-125 registers maximum per operation.

**Manual Command Builder:** Advanced hexadecimal command entry for custom protocols, automatic CRC calculation and verification, pre-built command templates for energy monitoring applications, and support for proprietary function codes beyond standard Modbus specifications.

**Data Format Display:** Multiple data interpretation options including signed/unsigned integers for numerical data, IEEE 754 floating-point for precision measurements, raw hexadecimal for debugging, and ASCII text interpretation for device names and status messages.

It is particularly important to have the Modbus Register Mapping from the manufacturer, as without the actual Modbus Registers, it is impossible to obtain a specific value through the Modbus Tester.



### Modbus Communication Tester

Test and verify Modbus communication with your devices

#### Communication Settings

Communication Channel

RS-485-1

Select communication channel type

Baud Rate

9600

Communication speed (e.g., 9600, 19200, 38400)

Parity

No Parity

Even Parity

Odd Parity

Error checking method for communication

#### Device & Register Settings

Modbus Device ID

1

Slave address (1-247)

Modbus Function

01 - Read Coil Status

Modbus function code to execute

#### Test Results

Click "Send Command" to run a Modbus communication test

[Send Command](#)

**Response Data Display:** Real-time display of received data in multiple formats including hexadecimal, decimal, floating-point, and ASCII representation for comprehensive data analysis and verification - enables complete understanding of device communication and data structure interpretation.

**Timing Information Analysis:** Response time measurements in milliseconds help identify communication performance issues, network latency problems, and device processing delays that may affect system operation - essential for optimizing communication parameters and timeout settings.

**Error Code Diagnostics:** Detailed Modbus exception codes including Illegal Function (01), Illegal Data Address (02), Illegal Data Value (03), and Server Device Failure (04) with explanations for troubleshooting - provides clear guidance for resolving communication problems.

**Frame Analysis Breakdown:** Complete breakdown of sent and received Modbus frames including slave address, function code, data bytes, and CRC verification for protocol-level debugging - enables deep technical analysis of communication protocols and frame structure validation.

**Test History & Performance Tracking:** Chronological log of all test commands and responses with success rate statistics, performance metrics including average response times, minimum/maximum delays, and export functionality for documentation and technical support purposes.

# SCHEDULED TASKS PAGE – NETRA INTERFACE

The Scheduled Tasks page allows you to manage automated cron scheduler tasks for your Netra Energy Management System. This powerful tool enables you to schedule scripts to run automatically at specific times, intervals, or conditions for automated system maintenance, data collection, and custom operations.

## SCHEDULED TASKS



### Scheduled Tasks

Manage cron scheduler tasks

+ Add Task

**Cron Format:**  
**s m h d /path/script.cgi** - Second, Minute, Hour, Day, Script Path

**Examples:**

- \* \* \* \* /script.cgi - Every second
- 1 \* \* \* /script.cgi - Every minute at second 1
- 1 \*/5 \* \* /script.cgi - Every 5 minutes

**Special Values:**

- \* - Every unit (any value)
- \*/x - Every x units
- number - Specific time/value

SECOND	MINUTE	HOUR	DAY	SCRIPT PATH	ACTIONS
<input type="text" value="*"/>	<input type="text" value="*"/>	<input type="text" value="*"/>	<input type="text" value="*"/>	<input type="text" value="/os/cron/cronsec.cgi"/>	
<input type="text" value="1"/>	<input type="text" value="*"/>	<input type="text" value="*"/>	<input type="text" value="*"/>	<input type="text" value="/os/cron/cronmin.cgi"/>	
<input type="text" value="15"/>	<input type="text" value="*/1"/>	<input type="text" value="*"/>	<input type="text" value="*"/>	<input type="text" value="/os/cron/ip.cgi"/>	
<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="*"/>	<input type="text" value="/os/cron/cronday.cgi"/>	
<input type="text" value="30"/>	<input type="text" value="59"/>	<input type="text" value="23"/>	<input type="text" value="*"/>	<input type="text" value="/os/cron/logrotate.cgi"/>	
<input type="text" value="30"/>	<input type="text" value="15"/>	<input type="text" value="0"/>	<input type="text" value="*"/>	<input type="text" value="/os/cron/time.cgi"/>	
<input type="text" value="10"/>	<input type="text" value="*"/>	<input type="text" value="*"/>	<input type="text" value="*"/>	<input type="text" value="/os/cron/ota_cron.cgi"/>	

Total Tasks: 7

Save Settings

## Cron Format and Task Management

The system scheduler operates using a 4-field cron format: s m h d /path/script.cgi. Each field represents a specific time unit—seconds (s) range from 0–59 or \* for every second, minutes (m) from 0–59 or \* for every minute, hours (h) from 0–23 or \* for every hour, and days (d) from 1–31 or \* for every day.

The /path/script.cgi specifies the full path to the script that will execute. Special values include the asterisk (\*) for every unit, interval notation (\* / x) to run every x second, minutes, hours, or days, and numeric values for exact scheduling. Common examples include \* \* \* \* /script.cgi to run continuously every second, 1 \* \* /script.cgi to run every minute at second 1, and 0 0 12 \* /script.cgi to run daily at noon.

The Tasks Management interface displays all scheduled jobs in an editable table with columns for Second, Minute, Hour, Day, Script Path, and Actions.

Valid entries can include wildcards, intervals such as \*/5 or \*10, or specific numeric values within the allowed range. Script paths must be non-empty and typically begin with /.

Invalid entries are immediately flagged with a red border and background for quick identification, and validation occurs in real time as you type.

To **add a new task**, click the “Add Task” button in the header, which creates a new row with default values (\* for all time fields and /os/cron/ for the script path).

You can then edit the fields, validate entries, and save the settings.

**Editing an existing task** is done by clicking directly on the desired field, with real-time validation ensuring correctness before saving.

**Deleting a task** is performed by clicking the trash icon in the Actions column, confirming the deletion in the dialog prompt, and saving the changes to apply them.

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## MQTT SETTINGS PAGE – NETRA INTERFACE

The MQTT Configuration page provides comprehensive management of Message Queuing Telemetry Transport (MQTT) protocol settings for the Netra Energy device. This page enables configuration of MQTT broker connections, topic hierarchies, data publishing parameters, and security settings to facilitate real-time data streaming to IoT platforms, industrial automation systems, and cloud-based monitoring solutions. MQTT configuration is essential for lightweight, efficient communication with external systems that require low-latency data transmission and reliable messaging protocols.

### MQTT Server Configuration Tabs

The MQTT Settings page features a tabbed interface with MQTT Server 1 and MQTT Server 2 tabs, enabling configuration of two independent MQTT broker connections.

This dual-server architecture provides redundancy and failover capabilities, ensuring continuous data transmission even if one MQTT broker becomes unavailable.

Each server tab contains identical configuration options but operates independently, allowing connection to different brokers or the same broker with different settings.

MQTT Server 1 represents the primary MQTT broker connection and is typically configured for the main monitoring system or primary IoT platform.

This server configuration handles most of the data transmission and serves as the default connection for routine monitoring operations.

The primary server configuration usually connects to the most reliable broker infrastructure with optimal network connectivity and processing capabilities.

MQTT Server 2 provides secondary MQTT broker connectivity for backup operations, alternative monitoring systems, or specialized data routing requirements. This server can be configured to connect to a different broker for redundancy purposes or to a specialized broker that handles specific data types or monitoring functions.

The secondary server configuration enhances system reliability and provides flexibility for complex monitoring architectures.



### MQTT Settings

Configure MQTT broker connection and messaging settings

MQTT Server 1    MQTT Server 2

**MQTT Server 1 Status**

Disabled

**Enabled**

Enable MQTT Server 1 connection

**Port**

1882

MQTT port (default: 1883)

**Secure Connection**

**No**

Yes (TLS)

Use MQTT over TLS/SSL

**MQTT Broker URL**

mqtt.example.com

MQTT broker hostname or IP address

**Username**

Netra

MQTT broker username (leave empty if not required)

**Topic**

netra/data

MQTT topic for data publishing

**Password**

.....

MQTT broker password (leave empty if not required)

[Save Settings](#)

The MQTT Server Status section controls the activation of each MQTT server connection through radio button selection between "Disabled" and "Enabled" options. When Disabled is selected, the MQTT server connection is deactivated, and no data transmission occurs to that particular broker. When Enabled is selected, the system activates the MQTT connection and begins data transmission according to the configured parameters.

The connection control mechanism allows selective activation of MQTT servers based on operational requirements, network availability, or system maintenance schedules.

Users can enable both servers for redundancy, operate with only one server for simplified configuration, or disable both servers when MQTT communication is not required.

The status control provides flexibility for different deployment scenarios and operational modes.

### MQTT Settings

Configure MQTT broker connection and messaging settings

MQTT Server 1

MQTT Server 2

**MQTT Server 2 Status**

Disabled

**Enabled**

Enable MQTT Server 2 connection

**Port**

MQTT port (default: 1883)

**Secure Connection**

**No**

**Yes (TLS)**

Use MQTT over TLS/SSL

**MQTT Broker URL**

MQTT broker hostname or IP address

**Username**

MQTT broker username (leave empty if not required)

**Topic**

MQTT topic for data publishing

**Password**

MQTT broker password (leave empty if not required)

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings

## FTP DATA EXPORT PAGE – NETRA INTERFACE

The FTP Data Export Settings page provides comprehensive configuration for File Transfer Protocol (FTP) server connections and automated file transfer capabilities for the Netra Energy device. This interface enables configuration of FTP server parameters, authentication credentials, security settings, and transfer options to facilitate automated CSV file uploads to external servers for data archival, backup, and integration with file-based monitoring systems. The FTP export functionality supports both standard and secure FTP protocols for reliable data transmission to remote storage systems.

### FTP Server Configuration Section

The FTP Server Configuration section manages the primary connection parameters required for

establishing communication with target FTP servers. This configuration defines the destination server infrastructure that will receive uploaded data files from the Netra Energy device and enables automated file transfer operations for data archival and external system integration.

The FTP Server URL field specifies the target FTP server hostname or IP address without protocol prefixes, as indicated by the guidance text "FTP server hostname or IP address (without ftp:// prefix)". The example shows "ftp.example.com" demonstrating proper hostname format for FTP server identification.

This field supports both fully qualified domain names and direct IP addresses to accommodate various server deployment methods and network configurations. Proper server URL configuration is essential for establishing successful FTP connections and ensuring reliable file transfer operations.

The Port configuration field defines the network port for FTP communication, with the default value set to 22 as shown in the interface, accompanied by guidance text "FTP port (default: 21)". This configuration allows customization of FTP port settings to accommodate specialized server deployments or security requirements that mandate non-standard port usage.

### FTP Data Export Settings

Configure FTP server connection and file transfer settings

The screenshot displays the 'FTP Server Configuration' interface. It features a title bar with a refresh icon and the text 'FTP Server Configuration'. Below the title, there are several input fields and sections:

- FTP Server URL:** A text input field containing 'ftp.example.com'. Below it, a small text label reads 'FTP server hostname or IP address (without ftp:// prefix)'.
- Port:** A text input field containing '22'. Below it, a small text label reads 'FTP port (default: 21)'.
- Username:** A text input field containing 'test'. Below it, a small text label reads 'FTP account username'.
- Secure Connection:** A section with two radio buttons: 'No' (selected) and 'Yes (FTPS)'. Below the radio buttons, a small text label reads 'Use secure FTP over SSL/TLS'.
- Password:** A password input field with masked characters '....'. Below it, a small text label reads 'FTP account password'.
- Ignore Response:** A section with two radio buttons: 'No' (selected) and 'Yes'. Below the radio buttons, a small text label reads 'Ignore server response after file transfer'.

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## HTTP SERVER PAGE – NETRA INTERFACE

The HTTP Server Setup page lets you change basic information about the functioning of the HTTP server which is how you interact with your Netra through the browser.



## HTTP Server Setup

Configure your HTTP server settings

### ⊕ HTTP Server Configuration

Configure your HTTP server settings and logging options.

#### HTTP Access Log

Don't generate HTTP Log

Generate HTTP Log File

Optionally log every HTTP request to a log file

#### HTTP Log File Name

[View](#)

Enter full name and path for the HTTP Log file

#### HTTP Server Port

Change this from the default of 80 if required

#### Session Logged In Variable

The session variable that needs to be set non-zero for file saving to work

[Save Settings](#)

The HTTP Access log feature can be useful for troubleshooting connections, but it is not recommended to keep it active as it will create a very large amount of data.

The HTTP Log File name determines where the HTTP Access log would be saved (if enabled) If you require a custom port other than 80 you can enter it in the HTTP Server Port field.

If you are working with a completely customized setup, you could change this to whatever you like, but doing so will break the NetraOS login feature.

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings

## OTA CONFIGURATION PAGE – NETRA INTERFACE

OTA (Over-the-Air) Updates allow you to remotely update different components of the Netra system without manual intervention. You can access this feature from the Side Menu → Network

→ OTA Updates. To enable OTA, set Over-the-Air Updates to Enabled from the dropdown menu. By default, the system checks for updates once every day (86,400 seconds), though you can adjust this interval if necessary. Turning on Automatically Install Updates will allow updates to install immediately after they are downloaded. If this option is disabled, updates will only be downloaded and will require manual installation.

## OTA SETTINGS



### OTA Configuration

Configure your Over-The-Air update settings

#### Basic OTA Settings

Configure core Over-The-Air update functionality and check intervals.

##### OTA Enable

Enabled

Enable the OTA agent to allow for automatic updates

##### OTA Check Interval

Choose 86400

Choose how often the Wattmon polls the server to see if updates are available

##### Automatically Install Update

Enabled

Enable this if you want to automatically extract and install the update

##### Automatically Resync Filesystem

Enabled

Automatically Resync Filesystem when a package is installed

#### Advanced Settings

Configure email notifications and specific update types.

##### Send Email Update

Disabled

Send email updates when a package or firmware is automatically installed

##### OTA For The Firmware

Disabled

Automatically keep the firmware at the latest version

##### OTA For Package

Disabled

Automatically keep the installed packages at the latest version

##### OTA For Customer

Disabled

Automatically keep the installed custom packages at the latest version

Check Now

Save Settings

If you use Automatic Healing, enable Automatically Resync Filesystem so the system can restore

files when needed. You can also receive an email notification once updates are installed by enabling Send Email Updates — note that your SMTP settings must be configured first.

For firmware updates, set OTA for Firmware to Enabled. To automatically update extra features like FTP or PC packages, enable OTA for Packages. If you manage many Netra devices and want to update them from your own repository, turn on OTA for Custom Packages. The system will check your repository for newer versions and install them when available.

You can manually trigger a check by clicking Check Now, and the system will connect to the update server to look for new firmware or packages. Once you have adjusted your settings, click Save Settings them. If OTA was previously turned off, a restart will be needed so the scheduler can be updated.

## Basic OTA Settings

The Basic OTA Settings control the core functionality of the Over-the-Air update system. OTA Enable acts as the master switch to turn the entire OTA update feature on or off.

The OTA Check Interval specifies how often the device checks for available updates, with options such as once per day, once per week, or a custom value in seconds.

Auto Install determines whether downloaded updates are installed automatically without requiring manual action.

Auto Resync ensures that the filesystem is automatically synchronized after any package installation to maintain system consistency.

## Advanced Settings

The Advanced Settings provide additional customization for OTA updates.

Send Email Updates enables email notifications upon successful completion of automatic installations, provided the device's email settings are configured.

OTA for Firmware allows the device's core firmware to be updated automatically, keeping the system up to date.

OTA for Packages ensures that standard software packages installed on the device receive updates as needed.

OTA for Custom enables updates for specialized packages via a custom URL, allowing integration with dedicated or private update servers.

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings

## **INTERFACE SETTINGS PAGE – NETRA INTERFACE**

In the Optimization group, select Only essential files from SD Card, optimized for remote access to ensure remote access works smoothly. If you are working locally only you can set it to All files from SD Card. Some browsers allow notifications which can be enabled using the Desktop notifications option. Set the Dashboard refresh interval to a larger value if you do not need the page to refresh every 1 second. The Maximum script execution time is 20 seconds by default.

### **1. System Configuration**

The System Configuration tab provides controls to optimize how the device loads and manages its files for best performance.

File Loading Optimization allows you to choose between Remote Optimized mode, which loads only essential files from the SD Card for faster remote access, or Full Local Access, which loads all files directly from the SD Card for complete local control.

In Cloud Integration, non-essential files can be retrieved from cloud servers to improve performance when using the Remote Optimized mode.

Storage Management determines how configuration files are accessed and loaded from local storage, while Speed Enhancement further reduces load times by selectively loading critical files locally and fetching other files remotely.

You can also enable or disable Desktop Notifications to receive alerts and messages directly on your system.



### Interface Settings

Configure your Interface settings here.

---

System Configuration Performance Settings

---

#### System Optimization

Configure system performance and file loading optimization.

**File Loading Optimization**

Remote Optimized - Only essential files from SD Card

Full Local Access - All files from SD Card

Speed up page loading by choosing to only load essential files from the SD card and take the remainder from the cloud

#### Desktop Notifications

Configure desktop notification preferences for system messages and alerts.

**Notification Settings**

Disabled - Do not show desktop notifications

Enabled - Show messages using desktop notifications

Enable or disable desktop notifications for system messages and alerts

Save Settings

## 2. Performance Settings

The Performance Settings allow you to fine-tune system speed and responsiveness.

The Dashboard Refresh Interval determines how often dashboard data is updated, with options such as 1, 5, 10, or 30 seconds, enabling you to balance real-time updates with overall system performance.

Maximum Script Execution Time sets the timeout limit for running scripts (10, 20, or 60 seconds) to prevent the system from hanging during long operations.

Session Login Variable defines the specific session variable that must have a non-zero value for file-saving operations to proceed.

System Resource Management controls how long processes are allowed to run before being automatically terminated, helping to prevent resource overuse.

Performance Optimization adjusts system responsiveness based on the chosen refresh intervals and resource limits to ensure stable operation.



### Interface Settings

Configure your Interface settings here.

System Configuration
Performance Settings

#### Performance Settings

Configure system timing and performance parameters.

Dashboard Refresh Interval

The frequency of data updates on the dashboard

Session Login Variable

Session variable that must be non-zero for file saving

Maximum Script Execution Time

Maximum time a script can run before termination

[Save Settings](#)

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## SUBSCRIPTION MANAGEMENT PAGE – NETRA INTERFACE

The Subscription Management page provides centralized control over your Netra Energy device licensing, feature access, and subscription status monitoring. This interface displays comprehensive subscription information, manages feature availability based on your active plan, and provides tools for maintaining current licensing status across your energy management system.

### Subscription Holder Information

**Personal and Company Details:** View registered subscription holder information including full name, company name, and primary contact number - this information is linked to your Netra Energy account and determines licensing ownership for support and billing purposes.

**Device Identification:** The MAC address uniquely identifies your specific Netra device and links it to your subscription license - this hardware identifier ensures proper license validation and

prevents unauthorized feature access across multiple devices.

**Update Tracking:** Monitor when subscription information was last synchronized with Netra Energy servers - the "Last Updated" timestamp indicates the most recent successful communication for license validation and feature refresh operations.

**Information Accuracy:** Ensure all displayed information matches your purchase records and contact details - discrepancies may indicate licensing issues that require attention from Netra Energy support for proper subscription management and feature access.

## SUBSCRIPTION MANAGEMENT

The screenshot displays the 'Subscription Management' interface. At the top, there are two buttons: 'Reload Subscription' and 'Refresh Status'. Below this, the 'Subscription Holder Details' section is shown, containing five cards: 'Full Name' (Etherlog), 'Company Name' (Etherlog Office), 'Contact Number' (Not Set), 'Device MAC Address' (9C-95-6E-53-27-D6), and 'Last Updated' (176013957). The 'Current Subscription Status' section follows, showing 'Status' as 'Active', 'Plan Type' as 'Monitoring + Zero Export + Cloud Portal + Analytics', and 'Expires' as '280901'. A 'Plan Features' section at the bottom lists eight features, all of which are checked: Monitoring, Zero Export, DG Sync, Reactive Power Control, Multiple Cluster Management, Cloud Portal, Advanced Analytics, and Remote Control.

## Subscription Status Overview

**Active Status Monitoring:** Real-time display of subscription validity with clear visual indicators - Active status (green) confirms all licensed features are available while Inactive status (red) indicates expired or invalid licensing requiring immediate attention.

**Plan Type Display:** Comprehensive view of your current subscription level showing all included features in a readable format - plan types combine multiple features like "Monitoring + Cloud Portal + Analytics" to clearly communicate available functionality.

**Expiration Management:** Track subscription end dates to prevent service interruption - the expiry date display helps plan renewal timing and ensures continuous access to licensed features without unexpected functionality loss.

**Status Validation:** Subscription status is automatically validated every 30 seconds against Netra

Energy servers to ensure real-time accuracy - manual refresh options provide immediate status updates when needed for troubleshooting or after account changes.

## Feature Access Control

The subscription system controls access to eight core Netra Energy features through bitwise licensing:

**Monitoring (Bit 1):** Basic device monitoring and data collection capabilities including real-time energy measurements, historical data logging, system status monitoring, and fundamental dashboard access for operational visibility.

**Zero Export (Bit 2):** Advanced grid interaction control preventing excess power export to utility infrastructure - enables precise power flow management for compliance with utility requirements and optimal energy utilization.

**DG Sync (Bit 4):** Diesel generator synchronization functionality for backup power integration - provides seamless transition between grid, solar, and generator power sources with automatic load management and power quality control.

**Reactive Power Control (Bit 8):** Power factor management and reactive power compensation capabilities - optimizes electrical efficiency, reduces utility penalties, and maintains power quality standards for industrial and commercial applications.

**Multiple Cluster Management (Bit 16):** Advanced system architecture supporting multiple device clusters - enables centralized management of distributed energy resources across large installations with coordinated control strategies.

**Cloud Portal Access (Bit 32):** Integration with Netra Energy cloud services for remote monitoring, data analytics, and mobile app connectivity - provides off-site access and advanced reporting capabilities through secure web interfaces.

**Advanced Analytics (Bit 64):** Enhanced data processing, custom reporting, and predictive analytics features - delivers detailed energy insights, trend analysis, and optimization recommendations for maximum system performance.

**Remote Control (Bit 128):** Complete remote device management capabilities including configuration changes, system control, and maintenance functions - enables off-site system administration and emergency response capabilities.

## Subscription Management Actions

**Reload Subscription:** Fetches the latest subscription information directly from Netra Energy servers - use this function after purchasing upgrades, renewing subscriptions, or when feature access appears incorrect to ensure current licensing status.

**Refresh Status:** Updates the local display with currently cached subscription information - provides immediate interface refresh without server communication for troubleshooting display issues or confirming recent changes.

**Automatic Updates:** The system automatically polls for subscription changes every 30 seconds to maintain status - this background process ensures feature availability stays synchronized with your active licensing without manual intervention.

**Status Indicators:** Visual feedback system using coloured icons and messages - green

checkmarks indicate successful operations, orange warnings show unsaved changes, and red error indicators highlight communication or validation problems requiring attention.



## Subscription Validation Process

**Real-Time Verification:** Continuous subscription validation ensures licensed features remain available throughout normal operation - the system maintains secure communication with Netra Energy licensing servers for immediate status updates and feature control.

**Feature Blocking:** When subscriptions expire or features are not licensed, the system automatically disables corresponding functionality - users receive clear notification of unavailable features with options to upgrade or renew subscriptions for continued access.

**License Security:** Hardware-based device identification prevents subscription sharing between devices - each Netra unit requires individual licensing tied to its unique MAC address for proper access control and compliance with software licensing terms.

**Grace Periods:** Brief continuation of service during temporary communication issues prevents unnecessary service interruption - the system maintains feature access during short network outages while attempting to restore server communication for validation.

## Troubleshooting Subscription Issues

**Connectivity Problems:** If subscription information fails to load or appears outdated, verify network connectivity and use the "Reload Subscription" button - persistent issues may indicate firewall restrictions or DNS problems requiring network configuration review.

**Feature Access Issues:** When licensed features appear disabled despite valid subscriptions, check subscription status and expiration dates - contact Netra Energy support if valid subscriptions show inactive status or features remain inaccessible after reload operations.

**Information Discrepancies:** Mismatched subscription details or outdated information requires server synchronization - use reload functions first, then contact support if registered information doesn't match your account records or recent purchases.

**Expired Subscriptions:** Plan renewal before expiration prevents service interruption - the system provides advance warning of approaching expiration dates to ensure timely renewal and continued access to licensed functionality.

## Saving Configuration

Subscription information is automatically maintained and synchronized - no manual saving is required as the system continuously updates licensing status and feature availability based on server communication and validation processes

**Note:** Subscription changes take effect immediately upon successful validation with Netra Energy servers. Feature access is controlled in real-time, and expired subscriptions immediately restrict functionality to prevent unauthorized use of licensed capabilities.

# DATA EXPORT PAGE – NETRA INTERFACE

The Data Export Settings page provides comprehensive configuration options for automated data transmission to various platforms and services. This centralized interface manages all export destinations, enabling seamless integration with cloud services, custom servers, and third-party monitoring platforms for centralized data analytics and backup purposes.

## 1. Netra Cloud Export Tab

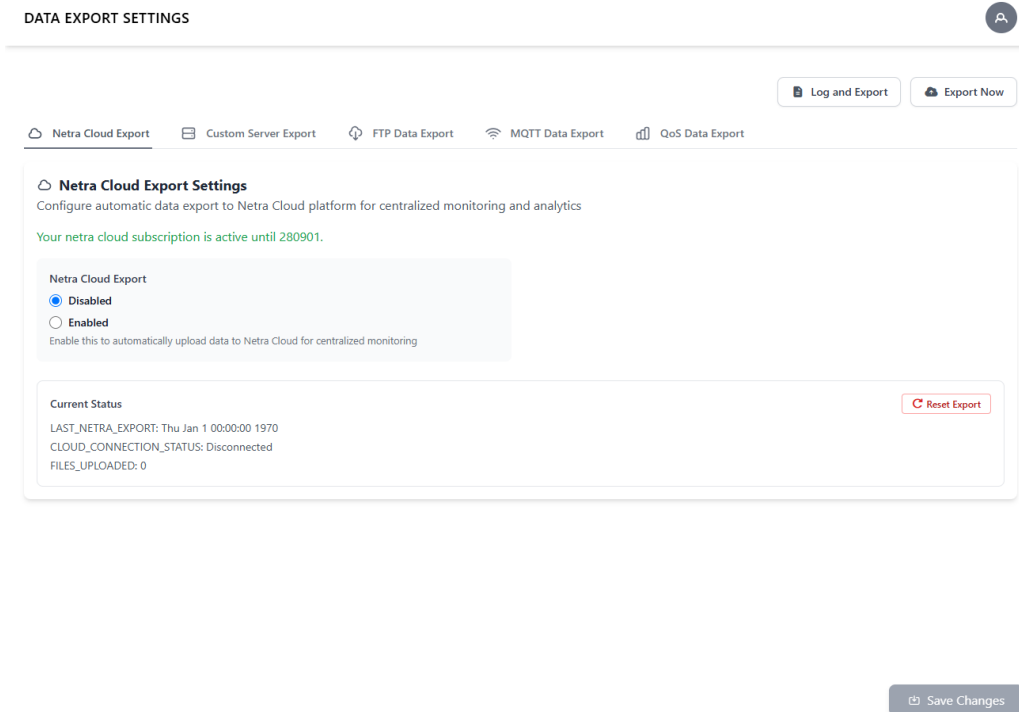
**Integrated Platform Service:** Direct integration with Netra Energy's cloud platform providing centralized monitoring, analytics, and mobile app connectivity through secure authenticated channels with automatic device registration and data synchronization.

**Device Registration:** Automatic device identification using MAC address ensures proper data attribution in multi-device environments, while maintaining security through encrypted communication channels and authenticated API access for reliable cloud connectivity.

**Data Transmission:** Configurable transmission intervals from 1 to 60 minutes allowing optimization between real-time visibility and bandwidth conservation while ensuring consistent data flow for cloud-based analytics and reporting functions.

**Connection Status:** Real-time monitoring of cloud connectivity with visual indicators showing connection health, last successful transmission timestamp, and error reporting for troubleshooting communication issues with Netra Cloud services.

**Subscription Requirement:** Requires Cloud Portal access (Subscription Bit 32) - users without this feature see disabled interface elements with upgrade prompts and clear indication of subscription requirements for cloud connectivity features.



## 2. Custom Server Export Tab

**Third-Party Integration:** Flexible HTTP endpoint configuration enabling integration with custom monitoring systems, third-party analytics platforms, building management systems, and enterprise data warehouses through standardized REST API communications.

**Endpoint Configuration:** Complete URL specification with protocol selection (HTTP/HTTPS), hostname, port, and path configuration allowing integration with virtually any web-based service that accepts HTTP POST requests with JSON data payloads.

**Authentication Support:** Configurable authentication methods including API keys, bearer tokens, and basic authentication ensuring secure data transmission to protected endpoints while maintaining compatibility with various third-party service authentication schemes.

**Data Format Control:** JSON payload structure with configurable field selection, timestamp formats, and data filtering options allowing precise control over transmitted information to match receiving system requirements and optimize bandwidth usage.

**Transmission Scheduling:** Flexible interval configuration from 1 to 60 minutes with immediate testing capabilities allowing optimization of data frequency based on receiving system requirements and network capacity constraints.

**Subscription Requirement:** Requires Advanced Analytics access (Subscription Bit 64) - displays upgrade prompts and disabled interface for users without proper licensing while clearly indicating subscription requirements for custom export functionality.

**DATA EXPORT SETTINGS**

Netra Cloud Export | **Custom Server Export** | FTP Data Export | MQTT Data Export | QoS Data Export

### Custom Server Data Export Settings

Configure custom server data export for sending data to your own endpoints

Your analytics subscription is active until 280901.

**Custom Export Status**

Disabled  
 Enabled

Enable this to push data to your custom server

**Export Interval**

5

Interval in minutes to push data to your custom server

**Custom Server URL**

0

URL to your script (i.e. [http://www.test.com/my\\_log.php](http://www.test.com/my_log.php)). Data will be sent via a POST request in CSV format. For more information on the file format refer to the website.

**Number of Lines**

5

Number of lines to export at a time

**CSV Header Row**

Include  
 Exclude

You can choose to include row headers in the CSV for server side processing if required. These will be matching the definitions in the Data Collection page

**Debug**

Disabled  
 Enabled

Add debug information into /logs/debug.txt to troubleshoot issues

**Current Status**

LAST\_EXPORTED: Thu Jan 1 00:00:00 1970  
FILE\_POSITION: 0  
FILE\_DATE:

[Reset Export](#)

[Save Changes](#)

### 3. FTP Data Export Tab

**File-Based Data Transfer:** Automated FTP upload capabilities for systems requiring file-based data exchange with support for both FTP and SFTP protocols ensuring compatibility with legacy systems and secure environments requiring encrypted file transfers.

**Server Configuration:** Complete FTP server specification including hostname, port, username, password, and directory path configuration with connection testing to ensure reliable automated file uploads without manual intervention.

**File Format Options:** Configurable CSV and JSON file formats with customizable field selection, timestamp formats, and file naming conventions allowing integration with existing data processing workflows and automated import systems.

**Upload Scheduling:** Automated file generation and upload on configurable intervals from 1 to 60 minutes with file retention policies and error handling ensuring consistent data availability without storage overflow on target systems.

**Security Features:** SFTP support for encrypted file transfers with password authentication and directory access control ensuring secure data transmission for sensitive energy information and compliance with data protection requirements.

**Subscription Requirement:** Requires Advanced Analytics access (Subscription Bit 64) - shows disabled interface and upgrade notifications for users without proper subscription level while maintaining clear feature access requirements.

Netra Cloud Export Custom Server Export **FTP Data Export** MQTT Data Export QoS Data Export

#### FTP Data Export Settings

Configure FTP server settings for automatic data export

Your analytics subscription is active until 280901.

**FTP Export Status**

Disabled  
 Enabled

Enable this to upload data to your FTP server

**Upload Interval (minutes)**

61

How often to upload data files

**Partial Upload (KB)**

0

Limit upload size per run in KB (0 = no limit)

**Incremental Upload**

No  
 Yes

Upload separate files for each interval

**FTP Export Status**

LAST\_FTP\_EXPORT: Thu Jan 1 00:00:00 1970  
FTP\_FILE\_POSITION: 0  
FTP\_FILE\_DATE:

Reset Export

## 4. MQTT Data Export Tab

**Purpose:** Configure Message Queuing Telemetry Transport for real-time data streaming to IoT platforms and industrial monitoring systems.

MQTT configuration emphasizes real-time data streaming through broker address fields for specifying connection endpoints and port inputs typically configured for standard MQTT ports 1883 or 8883 for secure connections.

Client ID fields provide unique device identification ensuring proper message routing, while topic prefix configuration establishes hierarchical message organization that enables sophisticated data filtering and routing capabilities.

Optional username and password fields support secure broker authentication when required by your MQTT infrastructure.

This efficient messaging protocol delivers minimal overhead real-time data transmission ideal for IoT platforms and industrial monitoring applications, enabling immediate data availability for time-sensitive monitoring and control applications across distributed systems.

Configuration Elements:

- **Broker Settings:** Specify MQTT broker address, port, and connection parameters
- **Topic Configuration:** Define message topics and data organization structure
- **QoS Settings:** Set Quality of Service levels for message delivery reliability
- **Authentication:** Configure client certificates and security credentials

The screenshot shows the 'MQTT Data Export Settings' page. At the top, there are navigation tabs: 'Netra Cloud Export', 'Custom Server Export', 'FTP Data Export', 'MQTT Data Export' (selected), and 'QoS Data Export'. Below the tabs, the page title is 'MQTT Data Export Settings' with a subtitle 'Configure MQTT broker settings for real-time data publishing'. A green notification states 'Your analytics subscription is active until 280901.' The main configuration area is divided into several sections: 1. 'MQTT Export Status' with radio buttons for 'Disabled' (selected) and 'Enabled', and a note 'Enable this to publish data to your MQTT broker'. 2. 'Publish Interval (minutes)' with a text input field containing '5' and a label 'How often to publish data to MQTT broker'. 3. 'Topic' with a text input field containing 'netra/data' and a label 'MQTT topic for data publishing'. 4. 'Quality of Service (QoS)' with a dropdown menu set to '1 - At least once' and a label 'MQTT Quality of Service level'. At the bottom, there is a 'MQTT Export Status' section showing 'LAST\_MQTT\_PUBLISH: Thu Jan 1 00:00:00 1970', 'MQTT\_CONNECTION\_STATUS: Disconnected', and 'MESSAGES\_PUBLISHED: 0', along with a 'Reset Export' button.

## 5. QoS Data Export Tab

**Quality Monitoring Stream:** Specialized data export focused on power quality metrics, grid interaction data, and performance indicators essential for utility compliance reporting and advanced energy analysis applications requiring detailed quality measurements.

**Metrics Selection:** Configurable selection of quality parameters including voltage harmonics, frequency variations, power factor measurements, and grid stability indicators allowing precise monitoring of power quality compliance and system performance.

**Compliance Reporting:** Automated generation of utility-compliant data streams for regulatory reporting requirements with standardized formats meeting industry specifications for grid interconnection monitoring and power quality documentation.

**Real-Time Streaming:** High-frequency data transmission options for applications requiring immediate quality monitoring alerts with configurable threshold detection and alarm generation for critical power quality events requiring immediate attention.

**Data Validation:** Built-in data integrity checking and validation ensuring accurate quality measurements with error detection and automatic retry mechanisms for critical quality monitoring applications requiring high reliability.

**Subscription Requirement:** Requires Advanced Analytics access (Subscription Bit 64) - provides clear subscription status indication and upgrade pathways for users requiring quality monitoring capabilities with proper licensing validation.

Netra Cloud Export Custom Server Export FTP Data Export MQTT Data Export **QoS Data Export**

### QoS Data Export Settings

Configure QoS Format data export settings for network monitoring and analytics

Your analytics subscription is active until 280901.

**QoS Export Status**

Disabled  
 Enabled

Enable this to export QoS metrics and network performance data

**Export Interval (minutes)**

15

How often to export QoS metrics to the server

**QoS Server URL**

https://qos.example.com/api/metrics

URL endpoint for QoS data submission (HTTP/HTTPS)

**QoS Export Status**

LAST\_QOS\_EXPORT: Thu Jan 1 00:00:00 1970  
QOS\_SERVER\_STATUS: Disconnected  
METRICS\_EXPORTED: 0

Reset Export


## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## DEVICE TYPES PAGE – NETRA INTERFACE

The Device Types page lists all the device drivers currently available on the Netra. The list includes inverters, energy meters, sensors and other device drivers that have already been created. Each device has been assigned a unique Device Type Id which is visible in the first column. The Name column indicates the make and model of the device, and the Category shows which category of device it is (Inverter, Meter, Sensor, Other). You can quickly search for your driver by typing in the Filter box. To create a new device driver, click the New Device Driver button. To edit an existing one, click the Edit button.

DEVICETYPES 

Device types define the communication protocols and register mappings for different hardware devices that can be monitored by the system.

[+ New Device Driver](#)

#	DEVICE TYPE ID ▲	NAME	CATEGORY	OPTIONS
1	1	WMPRO-60	Netra Master	<a href="#">✎</a>
2	8	WM-MINI3	Netra Master	<a href="#">✎</a>
3	10	WM-MEGA	Netra Master	<a href="#">✎</a>
4	11	WM-M2	Netra Master	<a href="#">✎</a>
5	12	WM-MINI3-4G	Netra Master	<a href="#">✎</a>
6	20	WM-ULTRA	Netra Master	<a href="#">✎</a>
7	21	WM-MEGA2	Netra Master	<a href="#">✎</a>
8	21	WM-MEGA2	Netra Master	<a href="#">✎</a>
9	22	WM-MEGA2-4G	Netra Master	<a href="#">✎</a>
10	30	Netra Core	Netra Master	<a href="#">✎</a>
11	1001	Wattmon C502 50A Current Sensor Module	Sensor	<a href="#">✎</a>
12	1002	Wattmon C752 75A Current Sensor Module	Sensor	<a href="#">✎</a>

## DEVICE TYPE EDIT PAGE

The Device Type Edit page lets you create and edit device drivers. A device driver is nothing other than a mapping for a set of Modbus registers that explains the Netra polling engine how and what to read (or write) from an external device.

### Device Driver Configuration

The **Device Driver Configuration** section defines essential information for identifying and managing device drivers within the system.

**Device Type ID** is a unique numerical identifier automatically assigned by the system to new devices, following a sequential format (e.g., 10, 11, 12).

This value is read-only and cannot be changed after creation to ensure data integrity. **Device Name** is a short, descriptive label used for quick identification in device selection menus.

It should be an alphanumeric string without space, ideally using manufacturer abbreviations and model numbers.

**Device Description** provides a detailed explanation of the device's functionality, including manufacturer, model, and primary purpose, offering clear context for system users.

**Device Category** organizes devices into predefined groups such as *Inverter*, *Power Meter*, *Charge Controller*, *Sensor*, *Other*, or *Netra Master* for easier management and classification.

The **Number of Roles** field displays the total count of configured register roles for the device, automatically updating when registers are added or removed.

This value is read-only and reflects the actual configuration without manual editing.



### Device Driver Configuration

Configure your device driver settings and parameters here.

Device Type ID

Device Name

Device Description

Device Category

Number of Roles (Auto-calculated)

## Digital Input Configuration

The Digital Input Configuration section manages how digital inputs are addressed, displayed, and edited within the system.

Digital Input Base Address defines the starting memory address for digital input registers, which may be specified in either hexadecimal or decimal format (e.g., 0, 100, 0x40001).

This address maps to the device's Modbus register scheme and may vary depending on the communication protocol used. The Number of Digital Inputs displays the total configured digital input registers, automatically updating when inputs are added or removed, and is read-only to reflect the actual configuration.

### Digital Input Configuration

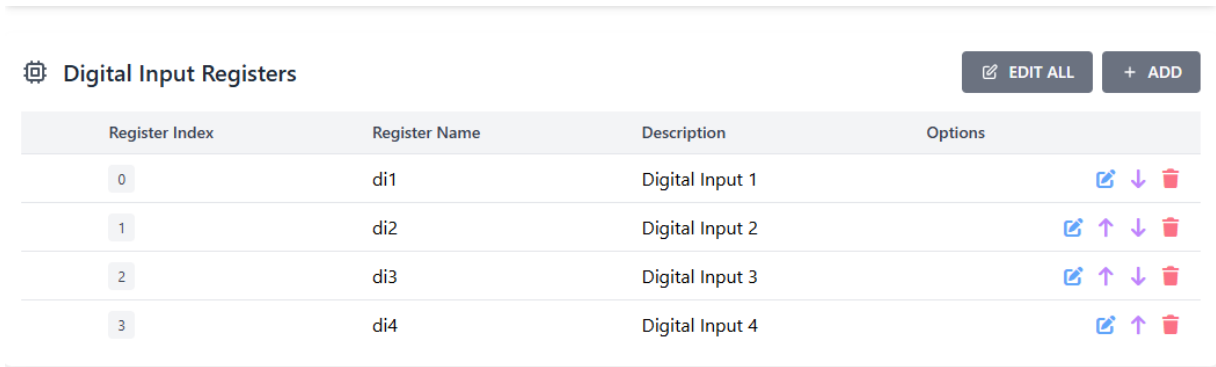
Digital Input Base Address















Number of Digital Inputs (Auto-calculated)

The Digital Input Registers Table lists all configured digital input registers, showing key details such as the Register Index (sequential position for processing), Register Name (short internal identifier, e.g., *di1*, *di2*), Description (human-readable label for the UI), and Options (action buttons for editing or deleting a register).

For management, the EDIT ALL button allows bulk editing of all registers at once, making it ideal for applying common parameters across multiple inputs.

The ADD button creates a new digital input register, automatically assigning the next sequential index. Each register row also includes an individual Edit button for making detailed changes to a specific register's configuration.



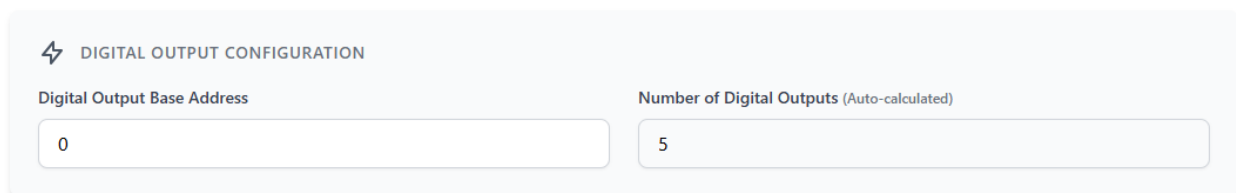
Register Index	Register Name	Description	Options
0	di1	Digital Input 1	  
1	di2	Digital Input 2	   
2	di3	Digital Input 3	   
3	di4	Digital Input 4	  

## Digital Output Configuration

The Digital Output Configuration section controls how digital outputs are mapped and managed for device control operations.

Digital Output Base Address establishes the starting memory address for digital output control registers, following the same addressing format as digital inputs and mapping to the device's Modbus control register scheme.

Number of Digital Outputs shows the total configured digital output registers, automatically calculated and maintained as read-only to reflect current configuration.



**DIGITAL OUTPUT CONFIGURATION**

Digital Output Base Address:

Number of Digital Outputs (Auto-calculated):

Digital Output Registers Table displays all configured digital output registers with Register Index (sequential control position), Register Name (internal control identifier), Description (user-friendly control label), and Options (management actions for each output).

The EDIT ALL and ADD buttons provide the same bulk editing and creation functionality as the digital input section, allowing efficient management of multiple output registers.

Digital Output Base Address defines the starting memory address for digital output control registers, following the same addressing format as digital inputs and mapping to the device's Modbus control register scheme.

⚡ DIGITAL OUTPUT REGISTERS ✎ EDIT ALL + ADD

Register Index	Register Name	Description	Options
0	do1	Digital Output 1	
1	do2	Digital Output 2	
2	do3	Digital Output 3	
3	do4	Digital Output 4	
4	do5	Digital Output 5 (Relay)	

## Read Only Registers Configuration

The **Read Only Registers Configuration** section manages registers that are used strictly for data monitoring and cannot be modified.

**Read Only Register Start Address** defines the starting memory location for the read-only register block.

**Number of Read Only Registers** is automatically calculated based on the current configuration, showing the total number of registers in the set.

**Read Function Type** allows you to select the method for retrieving register values, with options such as *Default* for standard polling behaviour.

**Read Type** determines how registers are accessed: **Single Block** reads all registers in one continuous block for efficiency, while **Multi-block Mode** allows reading from non-contiguous memory locations.

📄 READ ONLY REGISTERS CONFIGURATION

<p>Read Only Register Start Address</p> <input type="text" value="0"/>	<p>Number of Read Only Registers (Auto-calculated)</p> <input type="text" value="9"/>
<p>Read Function Type</p> <input type="text" value="Default"/>	<p>Read Type</p> <p><input checked="" type="radio"/> Single Block</p> <p><input type="radio"/> Multi-block Mode</p>

Register Index shows the sequential position of the register within the configuration.

Register Name is the system's internal identifier for the register.



































Description gives a clear label of the measurement or value stored in the register.

Persistent indicates whether the value is stored persistently in memory.

Interval displays the polling rate for the register, where applicable.

Options provide quick access to actions such as editing, reordering, or deleting registers. Additional tools include the Hex Converter for value conversion, as well as EDIT ALL and ADD buttons for efficient bulk configuration and creation of new read-only registers.

READ ONLY REGISTERS Hex Converter EDIT ALL + ADD

Register Index	Register Name	Description	Persistent	Interval	Options
0	a1	A1 (Voltage of Power pin)	false	0	  
1	a1_raw	Raw ADC reading for A1	false	0	   
2	a2	A2 (0-300V DC)	false	0	   
3	a2_raw	Raw ADC reading for A2	false	0	   
4	a3	A3 (0-5V DC)	false	0	   
5	a3_raw	Raw ADC reading for A3	false	0	   
6	counter1	DI1 Counter Value	false	0	   
7	counter2	DI2 Counter Value	false	0	   
8	counter3	DI3 Counter Value	false	0	  

## Read/Write Registers Configuration

The Read/Write Registers Configuration section handles bidirectional communication with device control and configuration registers.

Read/Write Register Start Address defines the starting memory address for read/write registers, visible when registers exist and single-block mode is active.

These registers allow both reading current values and writing new configuration parameters.

Number of Read/Write Registers shows the total configured read/write registers, automatically maintained to reflect current configuration. R/W Polling Method controls reading frequency: "Poll RW registers every polling loop" (continuous monitoring for real-time updates) and "Poll RW registers once only" (single read during initialization for configuration values).

Write Type determines register access methodology: Single Block (all registers accessed in one continuous block) and Multi-block Mode (individual register addressing for non-contiguous mapping).

READ/WRITE REGISTERS CONFIGURATION

Read/Write Register Start Address:

Number of Read/Write Registers (Auto-calculated):

R/W Polling Method:

Write Type:  Single Block  Multi-block Mode

The Read/Write Registers Table presents a complete list of all registers that support both read and write operations, enabling dynamic control and calibration of the connected device.

Register Index: Displays the sequential position of each register within the configuration list for

quick identification.

**Register Name:** The unique identifier used to reference the register in system operations and scripts.

**Description:** A clear explanation of the register's function, such as calibration offsets, multipliers, or divider settings for specific analogy inputs.

**Persistent:** Indicates whether the register's value is stored permanently in device memory or reset upon restart.

**Options:** Provides quick access tools for editing register details, rearranging the order (move up/down), duplicating configurations, and deleting registers.

**Hex Converter Tool:** Allows conversion between decimal and hexadecimal values for register entries, aiding in low-level debugging and data interpretation.

**Bulk Edit / Add:** The EDIT ALL function enables simultaneous modification of multiple registers, while the ADD button allows quick creation of new read/write register entries.

Register Index	Register Name	Description	Persistent	Options
0	a1_offset	Offset to 0 for A1	false	
1	a1_mul	Multiplier calibration for A1	false	
2	a1_div	Divider calibration for A1	false	
3	a2_offset	Offset to 0 for A2	false	
4	a2_mul	Multiplier calibration for A2	false	
5	a2_div	Divider calibration for A2	false	
6	a3_offset	Offset to 0 for A3	false	
7	a3_mul	Multiplier calibration for A3	false	
8	a3_div	Divider calibration for A3	false	
9	di1_counter_enabled	Counter 1 Status	false	
10	di2_counter_enabled	Counter 2 Status	false	
11	di3_counter_enabled	Counter 3 Status	false	

## One-time String Data Configuration

The One-time String Data Configuration section manages retrieval of device identification and configuration strings that are read once during device initialization.

**One-time String Data Table** shows configured string retrieval operations with Type (data category: Serial Number, Model Number, User Defined 1-3), Modbus Function (3 - Read Holding Register or 4 - Read Input Register), Start Address (beginning register for string data), Count (number of registers to read for complete string), and Options (management actions).

These string operations typically retrieve manufacturer information, model numbers, serial numbers, and custom identification data that help with device identification and inventory management.

Type	Modbus Function	Start Address	Count	Options
------	-----------------	---------------	-------	---------

## Roles Configuration Section

The Roles Configuration section defines how raw register data is processed, scaled, and presented to users and external systems.

Roles Table presents all configured data processing roles with Role ID (sequential processing identifier), Role Name (descriptive identifier for the processed data), Role Type (data processing method and format), Register Index (source register with dropdown selector), Role Scale (scaling factor or reference to another register), and Options (management actions).

Role Type offers extensive data processing options including various integer formats (16-bit signed/unsigned), floating-point formats (32-bit and 64-bit with different endianness), long integer formats (32-bit and 64-bit with endianness options), and digital I/O references. Read/Write roles appear with red highlighting to indicate their control capabilities.

Register Index features a hybrid input system with direct numeric entry and dropdown selection from appropriate register types based on the selected Role Type, ensuring proper data source mapping.

Role ID	Role Name	Role Type	Register Index	Role Scale	Options
0	A1	Read Only Register (16-bit)		10	
1	A2	Read Only Register (16-bit)		10	
2	A3	Read Only Register (16-bit)		100	
3	di1	Digital Input		1	
4	di2	Digital Input		1	
5	di3	Digital Input		1	
6	di4	Digital Input		1	
7	do1	Digital Output		1	
8	do2	Digital Output		1	
9	do3	Digital Output		1	
10	do4	Digital Output		1	
11	do5	Digital Output		1	
12	A1_raw	Read Only Register (16-bit)		1	
13	A2_raw	Read Only Register (16-bit)		1	
14	A3_raw	Read Only Register (16-bit)		1	
15	di1_counter	Read Only Register (16-bit)		1	
16	di2_counter	Read Only Register (16-bit)		1	

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save

button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## FIRMWARE UPDATE PAGE – NETRA INTERFACE

Firmware is the system firmware management interface that enables downloading, installing, and scheduling firmware updates for your Netra Energy device. This page provides secure access to official firmware releases, version management, and automated installation processes to keep your device updated with the latest features, bug fixes, and security improvements. Current Firmware Version shows your device's currently installed firmware version in major. Minor format (e.g., 2.1, 3.0), automatically retrieved from the system configuration. This version is used for comparison when selecting firmware updates to determine whether you are upgrading, downgrading, or reinstalling.

Firmware updates provide system improvements, bug fixes, and new features for your Netra Energy device. Always ensure proper power supply during installation to prevent device corruption.

[Upload File](#)

Your current firmware version is 4.2024. [View the change log.](#)

ID	NAME	VERSION	SIZE	DATE	OPTIONS
1	firmware_2014.tar md5 : f2dfc9b705460419dd31cc0b2f7cb24f	2014	1812967	2025-04-29 11:16:27	<a href="#">Install</a>
2	firmware_2015.tar md5 : 951c2d770961a765452e58f382e7c5dd	2015	1813267	2025-05-05 05:52:08	<a href="#">Install</a>
3	firmware_2017.tar md5 : 332455e211ba45cd07c2d44eb4c97d7f	2017	1793448	2025-07-10 08:52:46	<a href="#">Install</a>
4	firmware_2018.tar md5 : 7b15abb94ac5f18af37ddecc4964e072	2018	1793552	2025-07-25 09:36:54	<a href="#">Install</a>
5	Firmware 2019 md5 : ed0afeba847f897446eab710998dc5dd	2019	1794347	2025-08-06 08:09:53	<a href="#">Install</a>
6	firmware_2020.tar md5 : 6688874b499f4ce87401b06e5f968c8f	2020	1795054	2025-09-10 09:00:07	<a href="#">Install</a>

Change Log Access provides a direct link to view the complete firmware change log in a new window, allowing you to review all improvements, bug fixes, and new features across different firmware versions before deciding to update.

Power Supply Warning reminds users to ensure stable power supply during firmware installation to prevent device corruption, as power interruption during the update process can render the device inoperable.

The Available Firmware Updates section presents all official firmware releases available for download and installation from the Netra Energy update servers.

Firmware Updates Table displays comprehensive information about each available firmware version with sortable columns for easy navigation. The table includes ID (sequential numbering for reference), Name (firmware title with MD5 checksum for verification), Version (firmware

version number for comparison), Size (download file size), Date (release date), and Options (available actions for each firmware).

Sorting Functionality allows clicking on any column header to sort the firmware list by those criteria, with reverse sorting available by clicking the same header again. This helps locate specific versions or organize by release date, size, or version number.

MD5 Checksum Display shows the unique fingerprint for each firmware file beneath the firmware name, enabling verification of download integrity and ensuring the firmware file has not been corrupted during transmission.

#### Firmware Installation Options

##### Download and Install Process

The immediate installation process provides real-time feedback through multiple stages of firmware deployment.

Download Stage begins when selecting immediate installation, showing "Downloading firmware file..." status with a progress bar indicating download completion percentage. The system retrieves the selected firmware from Netra Energy servers using secure connections.

Upload Stage follows successful download, displaying "Uploading firmware file..." status as the downloaded firmware is transferred to the device's internal storage. The progress bar shows upload completion percentage to track transfer progress.

Verification Stage occurs after upload completion, showing "Firmware uploaded. Verifying..." status while the system performs MD5 checksum verification to ensure file integrity. This critical step prevents installation of corrupted firmware that could damage the device.

Installation Completion displays "result:1" upon successful verification, followed by automatic redirection to the installation task page where the actual firmware installation process begins. The system provides a 1.5-second delay before redirection to confirm successful verification.

##### Scheduled Installation (OTA)

The Over-The-Air (OTA) scheduling feature allows firmware updates to be queued for installation during maintenance windows or low-usage periods.

Background Processing enables firmware updates to be scheduled without immediate installation, allowing the system to download and prepare firmware while maintaining normal operations. The installation can be triggered later through system scheduling or manual activation.

Maintenance Window Planning allows administrators to schedule firmware updates during planned maintenance periods, minimizing disruption to normal device operations and ensuring proper supervision during the update process.

## Installation Confirmation Dialogs

The system provides intelligent confirmation dialogs based on the relationship between current and selected firmware versions.

Upgrade Confirmation appears when installing a newer firmware version, displaying "Upgrade from [current] to [new version]?" to confirm the forward progression and ensure intentional upgrade selection.

Downgrade Warning activates when selecting an older firmware version, showing "You are downgrading firmware. Are you sure?" to alert users about potential feature loss or compatibility issues when reverting to earlier versions.

Reinstallation Confirmation occurs when selecting the currently installed version, displaying "This version is already installed. Reinstall?" to confirm intentional reinstallation for troubleshooting or repair purposes.

Scheduled Operation Messages modify confirmation text for OTA installations, adding "scheduled in background" or "in background" to clarify that the operation will be queued rather than executed immediately.

## Status Monitoring and Progress Tracking

The system provides comprehensive feedback throughout the firmware update process with visual and textual indicators.

Status Messages appear in a prominent green notification box, providing real-time updates about current operation status including download progress, upload status, verification results, and completion notifications.

Progress Bars display percentage completion for download and upload operations, allowing users to monitor transfer progress and estimate completion time. The progress bars update in real-time based on actual data transfer rates.

Error Handling provides clear error messages for common failure scenarios including "Download failed" (network connectivity issues), "MD5 checksum mismatch" (file corruption), "Invalid response format" (server communication errors), and "Network Error" (connection problems during verification).

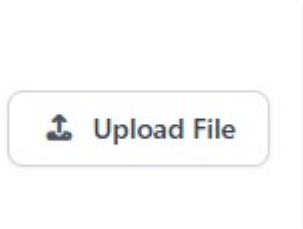
## Upload File

The Firmware File Upload section manages the manual upload process for HEX firmware files from your local computer to the device.

**File Selection Interface** provides a standard file browser input that accepts only HEX firmware files. The system automatically validates file extensions and types to ensure only compatible firmware files are selected for upload.

**File Type Validation** occurs immediately upon file selection, checking that the chosen file has a HEX extension or contains "hex" in its file type. If an incompatible file is selected, the system displays an alert message "Please select a hex file" followed by the detected file type, preventing upload of incorrect files.

**Upload Progress Indicator** activates during file transfer, displaying a red spinning icon with "Uploading, please wait..." message to indicate active file transfer. This visual feedback helps users understand the upload is in progress and prevents premature page navigation.



## Firmware Installation Process

After successful upload, the system guides users through the actual firmware installation procedure.

**Automatic Redirection** occurs after confirming the upload success alert, automatically redirecting the browser to `/os/task.cgi?action=firmware&exec=1` where the actual firmware installation process begins. This ensures proper sequencing from upload to installation.

**Device Reboot Requirement** is clearly communicated to users through the success message, emphasizing that device reboot is necessary to complete firmware installation. The reboot process applies the uploaded firmware and may take several minutes to complete.

**NVRAM Backup Process** automatically creates a backup of current device configuration to `"nvram.dat"` before beginning firmware installation. This backup allows configuration restoration if issues occur during the firmware update process.

**Installation Task Execution** begins the firmware installation procedure through the task management system, providing progress tracking and status monitoring throughout the installation process.

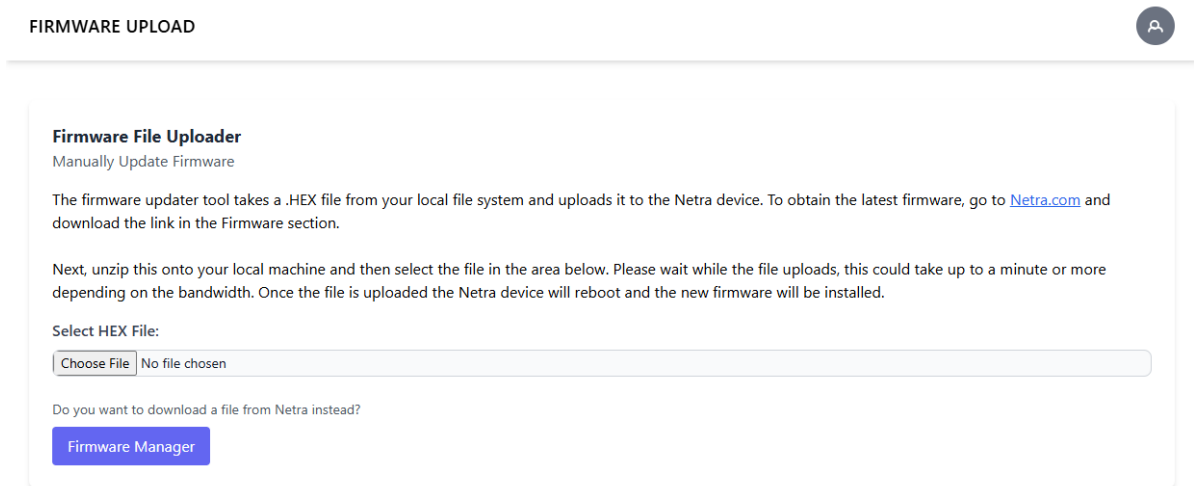
## Hardware Platform Compatibility

The system automatically adapts upload behavior based on the detected hardware platform to ensure compatibility.

**Platform Support** (HW\_PLATFORM < 8) uses the standard "/image.hex" upload path for older device generations, maintaining compatibility with established firmware update procedures.

**Modern Platform Variants** (HW\_PLATFORM >= 8) use specialized upload paths based on specific hardware configurations: Platform 11 uses "image2.hex" for dual-boot capable devices, Platform 20+ uses "imageu.hex" for enhanced security implementations, and other modern platforms use "imagez.hex" for compressed firmware formats.

**Automatic Path Selection** eliminates user configuration requirements by detecting the hardware platform and selecting the appropriate upload path automatically. This ensures firmware files are placed in the correct location for successful installation regardless of device generation.



## CSV DATA POINT PAGE – NETRA INTERFACE

The Data log interface is the CSV data collection configuration tool that manages how data points are gathered, processed, and stored in CSV log files for export and analysis. This page allows administrators to configure data collection intervals, define data points from device roles or global variables, and apply data processing functions to create comprehensive logs for monitoring and reporting purposes.

### Data Collection Configuration

Disk Write Interval defines how long data is buffered in memory before being written to the SD card storage, specified in minutes.


Data is temporarily stored in RAM during this period and then written to disk in batches to reduce SD card wear and extend storage device lifespan. A longer interval reduces storage wear but increases the risk of data loss during power failures.

Data Collection Interval determines how frequently new data entries are recorded in the CSV log file, specified in minutes with a default value of 1 minute.

This setting controls the temporal resolution of your data logging - shorter intervals provide more detailed data but consume more storage space and processing resources.

CSV File Updates occur automatically based on the configured intervals, generating time-stamped entries in the CSV log file that can be exported to external systems or analyzed locally.

The CSV format includes headers matching the configured data point names and provides standardized data exchange capabilities.

CSV DATA POINTS SETTINGS 

---

The data points in the CSV log file can be updated below and are used to generate CSV files for data export. The CSV file is updated every 1 minute by default, but can be changed in the settings.

Your data logging subscription is active until 280901.

Disk Write Interval	Data Collection Interval (Minutes)
<input type="text" value="1"/>	<input type="text" value="1"/>
<small>Data is buffered in memory for this period and written to disk to decrease the wear on the SD card</small>	<small>The number of minutes between each log entry (the default is 1)</small>

**Real-Time Checking:** When users attempt to add new data points or modify existing configurations, the system queries the current subscription status and compares the requested configuration against allowed limits. This prevents users from creating configurations that exceed their service level.

**License Key Validation:** The subscription system likely uses encrypted license keys or tokens that specify allowed features, data point limits, storage quotas, and export frequencies. The page validates these permissions before allowing configuration changes.

**Graceful Degradation:** If subscription limits are exceeded, the system provides clear feedback about limitations and offers upgrade paths rather than simply blocking functionality. This maintains user experience while encouraging service upgrades when needed.

## Data Points Configuration

The Data Points Configuration section manages the specific data values that are collected and stored in each CSV log entry.

Data Points Table displays all configured data collection points with comprehensive information for each entry. The table includes ID (sequential position in CSV output), Type (data source classification), Value (specific data source reference), Scale (multiplication factor applied to raw values), Min/Max (range validation limits), Function (data processing method), and Options (management actions).

Scale Factor Configuration applies mathematical scaling to raw data values before storage in the

CSV file. The scale value multiplies the raw data, allowing unit conversions (e.g., 0.001 to convert watts to kilowatts) or calibration adjustments. A scale of 1 preserves original values without modification.

Range Validation uses Min and Max values to define acceptable data ranges for quality control. Values outside these ranges can trigger alerts or be flagged for review, helping identify sensor malfunctions or communication errors. Setting both values to 0 disables range checking.

Adding New Data Points uses the "New Data Point" button to create additional data collection entries. New points are automatically added to the end of the table with default values and immediately enter edit mode for configuration. The system supports unlimited data points subject to processing capacity.

Editing Existing Data Points activates through the edit icon (pencil) in the Options column, enabling inline editing of all data point parameters. While in edit mode, dropdown menus and text fields become active for value modification, and the edit icon changes to a check mark for saving changes.

Deleting Data Points removes entries using the deleted icon (trash can) in the Options column. Deleted data points are immediately removed from the configuration and will no longer appear in future CSV log entries. Sequential ID numbers automatically adjust to maintain proper ordering.

Visual Status Indicators provide immediate feedback about configuration state: orange warning icon indicates unsaved changes requiring attention, green checkmark shows successful save operations, and red error icon alerts to save failures or validation problems.

## **CSV Data Export Integration**







































The data points configured in this interface directly control the content and format of CSV files generated for data export operations.

CSV Header Generation automatically creates column headers based on the data point names and types configured in the table. Headers provide meaningful labels for external systems importing CSV data and match role names or global variable identifiers.

Export Portal Compatibility ensures data points are formatted correctly for transmission to external monitoring portals or cloud services. The configuration supports various export intervals and data formats required by different external systems.

## Data Points

+ New Data Point

ID	TYPE	VALUE	SCALE	MIN	MAX	FUNCTION	OPTIONS
1	Role	inverter1_AC_Active_Power	1	0	0	AVERAGE	 
2	Role	inverter1_AC_Apparent_Power	1	0	0	AVERAGE	 
3	Role	inverter1_kWh_Total_Active	1	0	0	AVERAGE	 
4	Role	inverter1_kWh_Day_Active	1	0	0	AVERAGE	 
5	Role	inverter1_Temperature_Internal	1	0	0	AVERAGE	 
6	Role	inverter1_DC_Voltage_1	1	0	0	AVERAGE	 
7	Role	inverter1_DC_Current_1	1	0	0	AVERAGE	 
8	Role	inverter1_DC_Voltage_2	1	0	0	AVERAGE	 
9	Role	inverter1_DC_Current_2	1	0	0	AVERAGE	 
10	Role	inverter1_DC_Voltage_3	1	0	0	AVERAGE	 
11	Role	inverter1_DC_Current_3	1	0	0	AVERAGE	 
12	Role	inverter1_DC_Power	1	0	0	AVERAGE	 
13	Role	inverter1_AC_Voltage_AB	1	0	0	AVERAGE	 
14	Role	inverter1_AC_Voltage_BC	1	0	0	AVERAGE	 
15	Role	inverter1_AC_Voltage_CA	1	0	0	AVERAGE	 
16	Role	inverter1_AC_Current_A	1	0	0	AVERAGE	 
17	Role	inverter1_AC_Current_B	1	0	0	AVERAGE	 
18	Role	inverter1_AC_Current_C	1	0	0	AVERAGE	 
19	Role	inverter1_AC_PF	1	0	0	AVERAGE	 

Save Settings

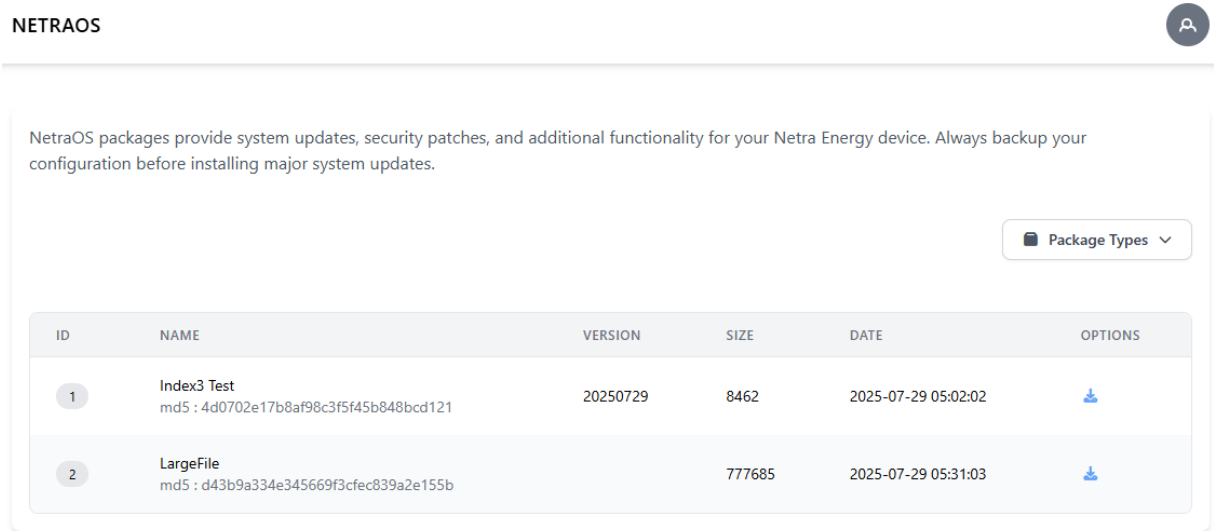
## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

# NETRAOS PAGE – NETRA INTERFACE

The NetraOS package management system provides secure installation of operating system updates, security patches, and additional functionality packages for your Netra Energy device. This interface connects to official Netra Energy repositories to download and install verified packages while maintaining system integrity and providing comprehensive installation tracking.



## Installation Process

The installation process begins with a confirmation step, where the system compares the selected package with the currently installed version and displays warnings for downgrades or reinstallation.

Once confirmed, the download phase retrieves the package from official servers with support for resuming interrupted transfers and tracking progress.

After downloading, the package is uploaded to the device's storage, where integrity checks and automatic retries ensure a complete transfer.

In the processing stage, the package is decompressed, verified, and checked for any dependency requirements.

Finally, the completion step confirms successful installation and, if necessary, prompts the user to reboot the system.

## Package Categories Section

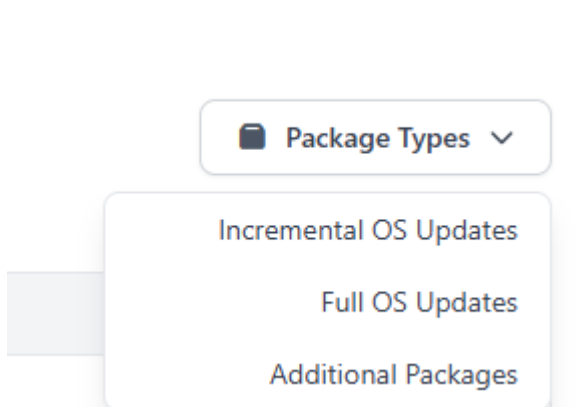
The Package Categories section organizes available packages into logical groups based on their function and impact on system operation.

Provides access to different categories of system packages with specific purposes and installation characteristics. The dropdown menu organizes packages for easy selection and includes visual icons for quick identification.

**Incremental OS Updates** contain small, focused updates that add specific features or fix targeted issues without requiring full system replacement. These updates are typically faster to install and have minimal risk of system disruption. Incremental updates are ideal for maintaining current functionality while adding minor improvements or security fixes.

**Full OS Updates** provide comprehensive system upgrades that may include major feature additions, significant architectural changes, or complete component replacements. These updates typically require more installation time and may necessitate device reboot for proper activation. Full updates offer substantial improvements but should be installed during planned maintenance windows.

**Additional Packages** offer optional functionality extensions that add new capabilities to your device beyond standard operation. These packages may include specialized protocols, additional device drivers, enhanced monitoring features, or integration modules for third-party systems. Additional packages expand device capabilities without modifying core system operation.



## Custom Repository Support

The system supports connection to custom package repositories for specialized or development packages.

**Custom Repository Configuration** allows specification of alternative package sources for organizations with private package repositories. Custom repositories enable installation of specialized packages not available in standard repositories.

**Repository URL Specification** provides manual entry of custom repository addresses for

accessing private or development package sources. The system validates repository connectivity before attempting package listing or installation.

**Package Verification** maintains security standards even when using custom repositories, ensuring packages meet integrity requirements regardless of source. All packages undergo MD5 verification and compatibility checking.

## ROLES PAGE – NETRA INTERFACE

Roles in Netra refer to variables that are linked to either a device, a global variable or a group. Roles are automatically created by Configuration Wizard but can be manually modified or added to. Any changes made manually will be overwritten by Configuration Wizard if it is run again. A role can be logged and can be modified via System Settings scripts or via Actions. Role values are dynamically updated using the modbus polling engine, i.e. if a role called inverter1\_AC\_Active\_Power is linked to inverter 1, every time the polling engine runs the role will contain the latest active power of that inverter. A role-out setting in the System Settings page will clear the role value (set it to 0 or the device's persistent value) if communication with the device has failed for longer than the timeout setting.

ROLES 👤

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Roles are used throughout Netra to interface with hardware and software parameters, and need to be linked to devices or global variables to function.

+ New Role

ID	ROLE NAME	TYPE	DEVICE	OPTIONS
1	inverter1_AC_Active_Power	Read Only Value	7094	<a href="#">🔗</a>
2	inverter1_AC_Apparent_Power	Read Only Value	7094	<a href="#">🔗</a>
3	inverter1_kWh_Total_Active	Read Only Value	7094	<a href="#">🔗</a>
4	inverter1_kWh_Day_Active	Read Only Value	7094	<a href="#">🔗</a>
5	inverter1_Temperature_Internal	Read Only Value	7094	<a href="#">🔗</a>
6	inverter1_DC_Voltage_1	Read Only Value	7094	<a href="#">🔗</a>
7	inverter1_DC_Current_1	Read Only Value	7094	<a href="#">🔗</a>
8	inverter1_DC_Voltage_2	Read Only Value	7094	<a href="#">🔗</a>
9	inverter1_DC_Current_2	Read Only Value	7094	<a href="#">🔗</a>
10	inverter1_DC_Voltage_3	Read Only Value	7094	<a href="#">🔗</a>
11	inverter1_DC_Current_3	Read Only Value	7094	<a href="#">🔗</a>

The System Roles list shows the roles defined in Netra. The Role Name is automatically generated based on the device name and the device role selected. The role type can be one of the following:

Read Only: This is linked to a modbus device's read only roles

Read Write: This is linked to a modbus device's read write roles. Changing this role value in code or via actions will result in a modbus write to the holding register in the externally connected modbus device.

Global: The role name is identical to the global variable name, and any changes will reflect both ways

Digital Input: The role is linked to a digital input type of device

Digital Output: The role is linked to a digital output of a device

1-Wire: The role contains the temperature of a 1-Wire sensor

To add a new Role, click the Add Role button. To edit an existing role, click the Edit button next to the role.

## ROLE SETTINGS PAGE

Role Settings is the individual role configuration interface that allows creation and modification of data processing roles within the Netra Energy system. This page provides detailed configuration options for defining how roles process data, connect to devices, and integrate with system functions for monitoring and control purposes.

### Configure Role settings and permissions

The Role Settings page is reached by editing or adding a role. Each role has a unique Role ID generated by Netra. This should not be changed.

The role name is automatically generated but can be modified if required in the Role Name field. Show Role determines if the roles are displayed in the dashboard Variables widget (if activated).

This can be used to display certain variables if required, when customizing your dashboard. Group lets you link a role to a group, which can be used for specific purpose such as accumulating watts as kilowatts.

Select a group from the drop-down field. Role Type determines the role type (described in the section above).

Roles of a certain type can be linked to certain devices. This is automatically generated by Configuration Wizard.

Role Definition lets you change the way Netra handles the role value, when linked to a group.

Options are Current, Voltage, Temperature, Watts, Kilowatts and a few more that have no specific function.

Not all roles are logged in the CSV file, as some roles may be used only for display purposes.

To ensure the role value is logged, set Role is logged to Yes.

If the role is linked to a group, each of these will function in a specific way:

Current roles will be multiplied by a voltage role (if found) or the Netra input voltage for devices

that support it to generate a Watt value for the group.

Voltage roles will be used with current roles to calculate watts in the group

Watts and kilowatts roles will be used by the group to generate kwh values if the group settings are defined as such.

EDIT ROLE 👤

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**Role Settings for inverter1\_Temperature\_Internal**  
Configure role settings and permissions

Role ID	Role Type
<input type="text" value="5"/>	<input style="border: none; border-bottom: 1px solid #ccc;" type="text" value="Read Only Value"/>
Role Name	Log Role
<input type="text" value="inverter1_Temperature_Internal"/>	<input type="radio"/> No <input checked="" type="radio"/> Yes

## Device Assignments

The **Device Assignments** section manages which specific devices in your system can use this role for data collection or control operations. This section establishes the connection between the role definition and actual physical devices, enabling the role to access device-specific registers and communication capabilities.

**Device Assignments**  
Choose which device types this role can be assigned to

Devices		<a href="#">+ Add Device</a>
#	DEVICE	ACTIONS
1	<input type="text" value="Sungrow PV String Inverter - 110 Scale (7094)"/>	<a href="#">Delete</a>

[Save Settings](#)

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save

button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.











## WIDGETS PAGE – NETRA INTERFACE

Widgets are customizable dashboard components that display key information and metrics on your home page. Configure the layout, visibility, and order to create your personalized dashboard experience. It allows you to edit the positions and order of the widgets and add custom widgets if required. The packages usually take care of adding or removing their corresponding widgets automatically. For example, Configuration Wizard adds the widget when you install it and removes it when you uninstall it.

WIDGETS

Widgets are customizable dashboard components that display key information and metrics on your home page. Configure the layout, visibility, and order to create your personalized dashboard experience.

+ Add Widget

ID	TITLE	TEMPLATE	ICON	WIDTH	VISIBILITY	OPTIONS
1	Live Energy Overview	/os/pkg/Insight/Insight.inc	icon-play	12	Visible	    
2	Devices	/os/pkg/Devices/Devices.inc	icon-play	4	Visible	    

The Widgets screen allows you to manage the different dashboard components that display important information and metrics on your homepage.

Each row in the table represents a widget, showing key details such as its ID, title, template path, icon, width, and visibility status.

The ID is a number that indicates the widget's position in the list, starting from 1. The title is simply the name of the widget, like "Insight," "Counters," or "Variables."

The template shows the file path that loads the content for that specific widget. The icon column indicates the type of icon being used for the widget, which in this case is the same ("icon-play") for all entries.

The width column tells how wide the widget will appear on your dashboard; here, all have a width value of 4.

If the visibility is marked as "Visible," it means that widget will be displayed; if it's marked as "Hidden," it will not appear on the dashboard.

Next to each widget, under the "Options" section, there are several icons that allow you to control how the widget behaves.

The green eye icon is used to make a widget visible, while the orange crossed-out eye icon hides it.

You can also edit a widget using the blue pencil-and-paper icon or delete it completely by clicking the red trash bin icon.

If you want to change the order of the widgets, use the pink up and down arrows to move a widget higher or lower in the list.



Adding Widgets button allows you to create a new widget by entering details such as the title, template path, icon, and width.

After adding it, you can manage the new widget just like the others, using the visibility toggle and other options.

## WIDGETS SETTINGS PAGE

The Widget Settings page is used to configure the display and behavior of an individual widget that appears on your dashboard.

When you open this page, you'll see a form with several fields that let you define how the widget should look and function.

At the top left, the Widget ID is displayed, which is automatically generated and cannot be edited.

This ID is used internally to identify each widget. Next to it on the right is the Visibility dropdown, where you can choose whether the widget should be shown or hidden on the dashboard.

Selecting "Visible" will display the widget, while choosing "Hidden" will keep it off the dashboard

but still available for future use.

WIDGET SETTINGS 👤

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### 🔧 Configure Widget Settings

Configure widget display and behavior

<b>Widget Id</b> <input type="text" value="0"/> <small>Automatically generated widget ID</small>	<b>Visibility</b> <input type="text" value="Visible"/> <small>Choose the visibility of the widget</small>
<b>Widget Title</b> <input type="text" value="Insight"/> <small>Text displayed in the widget title if an icon is specified</small>	<b>Widget Template File</b> <input type="text" value="/os/pkg/Insight/Insight.inc"/> <small>Path to widget include file</small>
<b>Widget Width</b> <input type="text" value="4"/> <small>Width in blocks (12=Full width, 6=half, etc)</small>	<b>Icon</b> <input type="text" value="icon-play"/> <small>Enter an icon css style to apply (or none for no icon)</small>

[Save Settings](#)

If you have an include file that you wish to use in the dashboard, you can click the *Add Widget* button.

Enter a title for the widget in the Title of widget box field and select a *Width*. The *Width* can be between 1 and 12, where 12 is the maximum width – this is due to the underlying bootstrap framework that netra uses.

Choose to show the widget or hide it using the *Invisibility* drop down.

### Widget Id

Automatically generated unique identifier for the widget used internally by the system

### Widget Title

Text displayed in the widget header/title bar when an icon is specified for visual identification

### **Widget Width**

Width in grid blocks where 12=full width, 6=half width, 4=one-third width for responsive layout

### **Visibility**

Controls widget display behaviour across different devices (visible, hidden, or device-specific visibility)

### **Widget Template File**

File path to the include file that defines the widget's content and functionality structure

### **Icon**

CSS class name for the icon displayed in the widget header (e.g., "icon-eye", "icon-chart")

## **Saving Configuration**

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

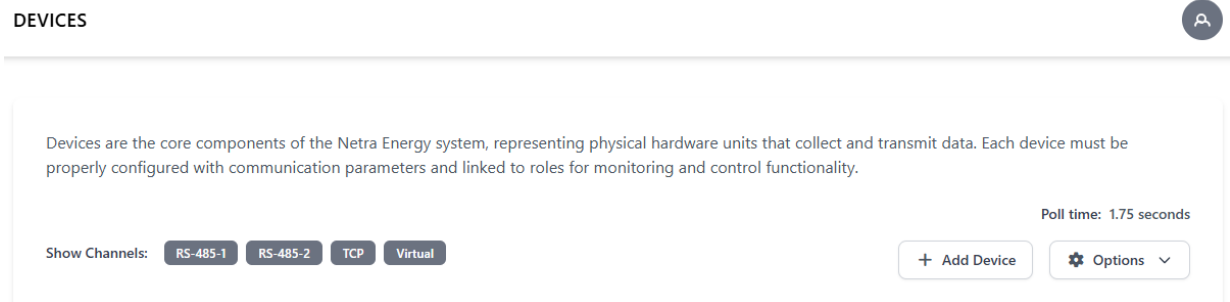
**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## **DEVICES PAGE – NETRA INTERFACE**

Devices are the core components of the Netra Energy system, representing physical hardware units that collect and transmit data. Each device must be properly configured with communication parameters and linked to roles for monitoring and control functionality. It displays all the active and inactive devices connected to Netra, and allows you to add, remove, or customize any devices. There are three options given on control bar – ADD Device, and OPTIONS. Configuration Wizard handles the creating and configuration of modbus devices, but you can manually change things here if required. Any changes you make will be overwritten if you run Configuration Wizard again. The ADD drop-down menu has the following options - The Manually Add a Device option is used when connecting a device to your Netra.

## Show Channel

Displays real-time channel data table showing all configured device registers with current values, timestamps, and status information.



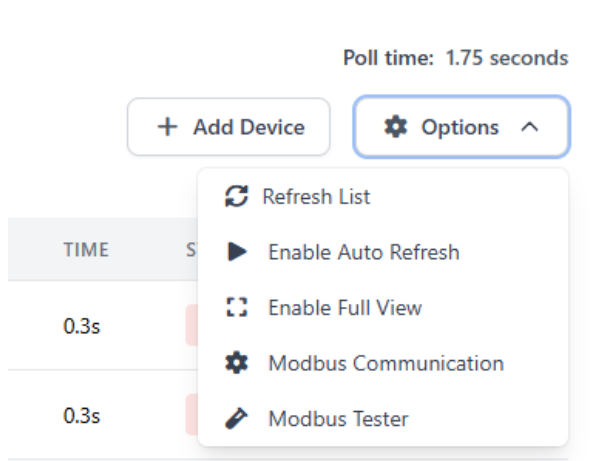
The OPTIONS drop-down offers five functions – Refresh List, Enable/Disable Automatic Refresh, Enable Full View, Edit Communication Settings and Modbus Tester.

Refresh List refreshes the list of devices displayed and notifies you of the total polling duration.

Enable Automatic Refresh and Disable Automatic Refresh allow you to select whether you wish to have the refreshing done automatically every 5 seconds or manually.

The fourth option, Edit Communication Settings take you to the Modbus Communication Settings page to modify system-wide modbus settings.

The last option, Modbus Tester can be used to test modbus communication with connected devices and is described in the Modbus Tester section.



## Poll Times

Immediately requests fresh data from the device, bypassing normal polling schedule for instant status updates.



Devices are the core components of the Netra Energy system, representing physical hardware units that collect and transmit data. Each device must be properly configured with communication parameters and linked to roles for monitoring and control functionality.

Poll time: 1.75 seconds

Show Channels: RS-485-1 RS-485-2 TCP Virtual + Add Device Options

INDEX	ID	CHANNEL	NAME	TYPE	ROLE	TIME	STATUS	OPTIONS
1	1	RS-485	inverter1	Sungrow PV String Inverter - 110 Scale		0.3s	Error	
2	2	RS-485	inverter2	SolarEdge Inverter		0.3s	Error	
3	3	RS-485	inverter3	KACO new energy Tx1 and Tx3 Series		0.3s	Error	
4	10	RS-485	meter1	Secure Elite 440-446		0.3s	Error	
5	11	RS-485	meter2	Secure Elite 440-445		0.0s	Error	
6	0	Virtual	NETRACORE	0		0.0s	Active	
7	200	Virtual	Pyrano	Pyranometer (Virtual)		0.0s	Error	

The device list displays relevant data in columns, such as device ID, Channel, Name, Type, Role, Status and Options. ID represents the Modbus ID; The ID of Netra is always 0 on a virtual channel.

Channel shows the Modbus channel used for communication. When a device is connected, the Channel is RS-485 or RS-485 2; if a device is connected using Modbus TCP, it is displayed as per TCP Channel used.

A virtual channel also exists for virtual devices that are handled in code. The Name column displays the name of the device as entered in Configuration Wizard, which can be set by you.

For certain third-party devices, such as inverters and energy meters, which allow for the model number and serial number to be polled using Modbus registers, the relevant details are displayed below the device Name.

The Type column displays the selected Modbus Device Type which is the driver selected in Configuration Wizard. If Enable Full View is enabled, Role lists each of the variables that are polled or logged from a particular device, divided into two parts.

The first list displays the values that are logged by name, such as the voltage input on the Netra called A1 (Voltage of Power Pin), or the Lifetime Generation from an inverter.

The second list is shaded and features the actual names of the variables as they are logged on the Netra; the voltage input on the Netra is logged as A1 Voltage, or the total generation from an inverter is logged as inverter1\_kWh\_Total\_Active.

The Time column shows the poll time of a device – this can be used to determine if devices are properly functioning or giving issues.

The Status column shows Active if the device is online and connected, and if not detected, then Error will appear.

The Option drop-down has the following options: Configure, which allows you to edit the name, channel and choose the logged variables of a particular device; Enable/Disable, which lets you set the state; Delete, which permanently removes the device from the Netra; and Calibrate, which is for recalibrating or resetting a Netra Module.

## CONFIGURE DEVICE PAGE

The Configure Device page lets you update important settings for a modbus device, such as the ID, name and bus.


The Device Bus lets you choose which bus the device is physically (or virtually) connected to. The Device ID is the modbus ID assigned to the device

The Device Name is the name assigned (usually this is automatically assigned in Configuration Wizard). Ensure the name is unique to avoid conflicts.

The Poll Interval determines the frequency at which the data is to be polled. You can enable or disable the device status in the Device Status field.

CONFIGURE DEVICE 👤

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 **Configure Device**

Configure your Configure Device settings here.

Device ID	Device Name
<input type="text" value="1"/>	<input type="text" value="inverter1"/>
Device Status	Poll Interval
<input type="radio"/> Disabled <input checked="" type="radio"/> Enabled	<input type="text" value="1000"/> <input type="button" value="Choose"/> <input type="button" value="v"/>

Polling interval in milliseconds. Example: 1000 = 1 second

In the second part of the page, the logged roles are shown.



### Configure Roles

**Total AC Active Power**

Assigned Role: inverter1\_AC\_Active\_Power [logged] Scale: 1

Type: Read Only Unsigned INT32 (Little Endian)

[Edit](#)

**Total AC Reactive Power**

Assigned Role: Undefined Scale: 1

Type: Read Only Signed INT32 (Little Endian)

**Total AC Apparent Power**

Assigned Role: inverter1\_AC\_Apparent\_Power [logged] Scale: 1

Type: Read Only Unsigned INT32 (Little Endian)

[Edit](#)

**Lifetime Generation**

Assigned Role: inverter1\_kWh\_Total\_Active [logged] Scale: 1

Type: Read Only Unsigned INT32 (Little Endian)

[Edit](#)

**Daily Generation**

Assigned Role: inverter1\_kWh\_Day\_Active [logged] Scale: 10

Type: Read Only Register

Calibrate
Save Changes

The roles that are currently linked are shown. Undefined values indicate that the role is not being logged. You can select Create New Logged Role which will add a role to the data logging engine. Click the Edit Role to edit an individual role – this is described in the Roles section. Clicking the Calibrate button takes you to the device calibration page.

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## CALIBRATE DEVICE PAGE

The default calibration page lets you edit any read/write registers that are defined in the driver and shows the raw register values in the section below.

For most devices (other than Netra branded) the Read/Write section will be blank. Use the read only Registers list to quickly determine if the device is properly reading values from the modbus device.

Please note that the values are the raw registers and will not properly show the role values – many roles are composed of more than 1 register (I.e. 32-bit float) so the values won't be displayed correctly here.

The screenshot shows the 'DEVICE CALIBRATION' page for a 'Sungrow PV Grid-Connected String Inverters with 110 Percent Scaling (7094)'. The page has a search icon in the top right corner. Below the title, there are three tabs: 'Read only Registers', 'Roles', and 'Read/write Registers'. The 'Read only Registers' tab is active. The main content area displays a list of registers with their names and values. All values are currently '0'. At the bottom right, there are two buttons: 'Edit Device' and 'Save Settings'.

Register Name	Value
Daily Generation	0
Lifetime Generation	0
2	0
Internal Temperature	0
Total AC Apparent Power	0
4	0
DC Voltage PV 1	0
DC Current PV 1	0
DC Voltage PV 2	0

Edit Device button navigates to the device-specific configuration page where all device parameters can be modified.

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## FLASH DRIVE PAGE – NETRA INTERFACE

Flash drive management interface that controls internal flash storage operations, boot configuration, and flash drive maintenance for your Netra Energy device. Certain hardware versions come with 64MB of external Flash memory that can be used for the NetraOS file system. To see if your Netra has it, open the Flash Settings page in Side Menu. Under the Flash Information area, you will see information about the flash chip. The flash ID and size will show if the flash chip is detected and otherwise you will see a 0 there. You can choose to boot your Netra from SD card or from Internal Flash by choosing the Boot drive. By booting from flash, you will ensure that your filesystem and config settings will not get corrupt even if the SD card fails. The SD card is always used to log data and store temporary config files.

### Boot Configuration Section

Boot Drive Selection determines the primary storage device used for system operation through a dropdown menu with two options: SD Card (external removable storage) and Internal Flash (built-in permanent storage).

SD Card Boot Option uses external SD card storage for system operation, providing easy backup and replacement capabilities. SD card boot is ideal for development, testing, or when frequent system updates are required since the SD card can be easily removed and backed up externally.

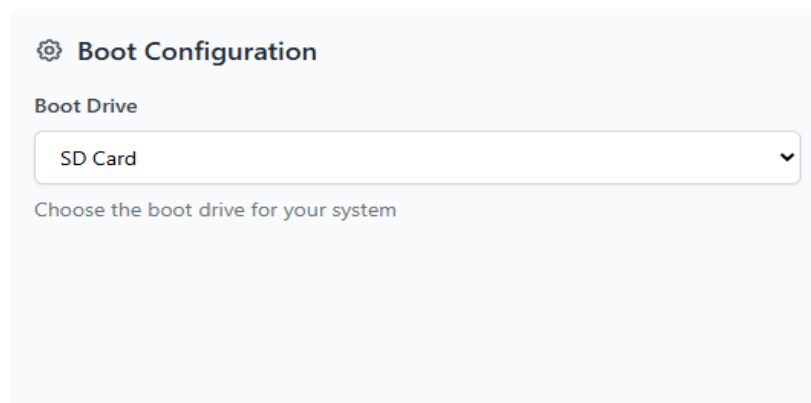
Internal Flash Boot Option uses built-in flash memory for system operation, providing faster performance and better reliability for production environments.

Flash boot eliminates dependency on external storage and reduces risk of accidental removal or corruption.

### Flash Drive Settings

Manage your flash storage configuration and operations

#### Flash Operations



The screenshot shows a settings panel titled "Flash Operations" with a sub-section "Boot Configuration". Under "Boot Configuration", there is a "Boot Drive" label above a dropdown menu. The dropdown menu currently displays "SD Card" and has a downward arrow on the right. Below the dropdown, there is a descriptive text: "Choose the boot drive for your system".

### Flash Information Section

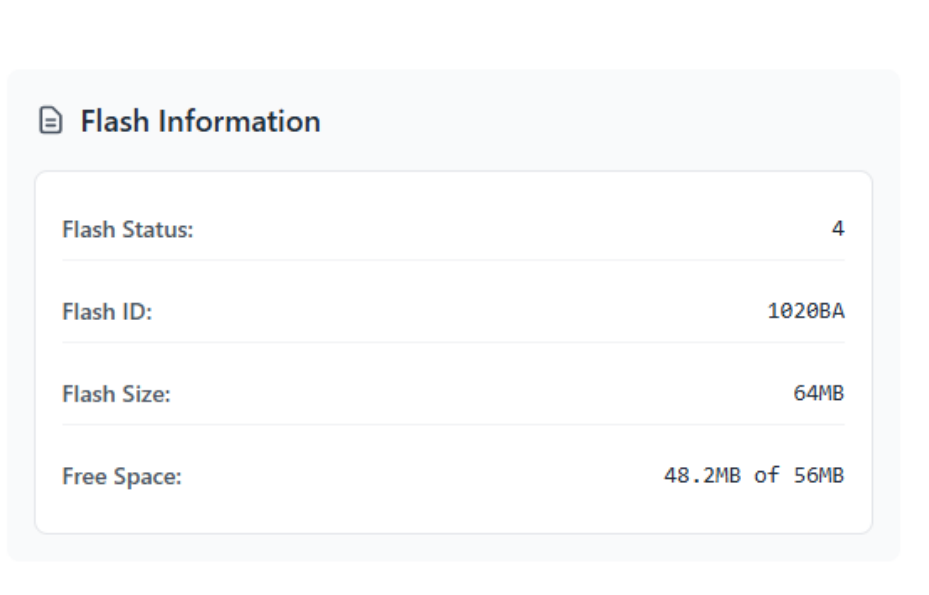
**Flash Status Display** shows current operational state of the flash memory including availability, health status, and any detected issues. Status indicators help identify flash problems before they cause system failures.

**Flash ID Information** presents the unique identifier of the flash memory chip in hexadecimal format, useful for technical support and hardware verification. The Flash ID helps confirm compatible flash memory and assists with troubleshooting hardware issues.

**Flash Size Details** indicates total storage capacity of the internal flash memory in bytes, showing the available space for system files and data storage. Size information helps plan system configuration and data storage requirements.

**Free Space Monitoring** displays current available storage space versus total capacity, showing both free space and total space in an easy-to-read format (e.g., "45.2MB of 64MB"). Free space monitoring helps prevent storage overflow and system instability.

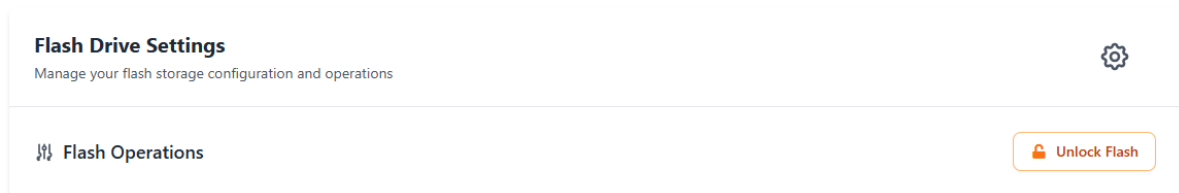
**Real-time Updates** refresh flash information automatically to reflect current system status, ensuring displayed information remains accurate during flash operations.



The image shows a 'Flash Information' panel with a list of four items:

Flash Status:	4
Flash ID:	1020BA
Flash Size:	64MB
Free Space:	48.2MB of 56MB

**Unlock Process** removes write protection temporarily to allow authorized flash operations including formatting, erasing, restoring from backup, and system file modifications. Unlocking is required before any flash modification can proceed.



The image shows a 'Flash Drive Settings' interface. At the top, it says 'Flash Drive Settings' and 'Manage your flash storage configuration and operations'. Below this, there is a section for 'Flash Operations' and a prominent orange button labeled 'Unlock Flash'.

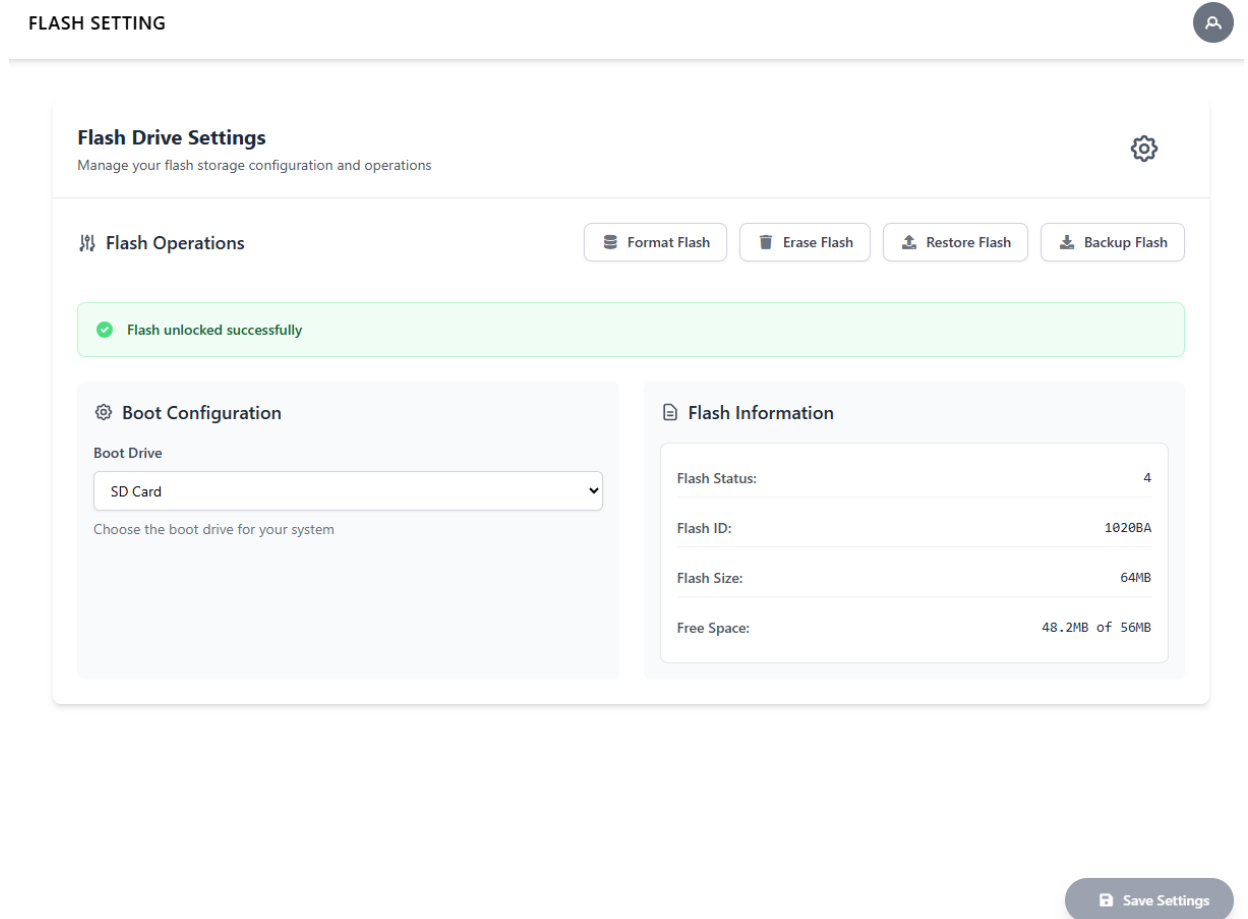
**Erase Flash** to wipe the entire flash chip and reset the internal values to their defaults – this

process takes about 2 minutes.

**Format Flash** should be run on a blank (or erased) flash, to create the FAT filesystem. This needs to be done before any files can be copied across.

Backup Flash will create an ISO image of the flash chip as a backup.

Restore Flash will restore a previously saved ISO image from the root of the SD card (this was saved as flash.iso)



## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## PACKAGE MANAGER PAGE – NETRA INTERFACE

Packages extend the Netra Energy system’s functionality by providing additional features, drivers, and applications. Each package can be installed, configured, enabled, or disabled to customize your system capabilities. The Update and Manage Packages setting consists of configurations for various add-in packages, such as PC (Power control), Insight, MQTT and more optional features of the NetraOS, that need to be installed to be used.

### PACKAGE MANAGER



Packages extend the Netra Energy system functionality by providing additional features, drivers, and applications. Each package can be installed, configured, enabled, or disabled to customize your system capabilities.

[Rescan Folder](#)

INDEX	ID	NAME	AUTHOR	VERSION	STATUS	OPTIONS
1	<b>Insight</b>	EZDisplay Visualisation <i>Installed manually</i>	SJ E7 IT Services Pvt Ltd	20230926	Enabled	
2	<b>Devices</b>	Devices Widget <i>Installed manually</i>	Akash Heimlich	1.0	Enabled	
3	<b>PC</b>	Power Control System <i>Installed manually</i>	SJ E7 IT Services Pvt Ltd	20250505	Enabled	
4	<b>PF</b>	Inverter PF Control <i>Installed manually</i>	Akash Heimlich	20230406	Enabled	
5	<b>InError</b>	Inverter Error Codes <i>Installed manually</i>	Akash Heimlich	20200921	Uninstalled	
6	<b>MQTT</b>	MQTT Configuration <i>Installed manually</i>	Akash Heimlich	20220504	Uninstalled	

Upon first opening, the Available Package List will display no items. Click on RESCAN FOLDER to reveal all the optional packages available on your device.

The Package Manager provides comprehensive installation capabilities for adding new software components to the Netra Energy device. Installation operations include dependency resolution, version compatibility checking, and system requirement validation to ensure successful package deployment.

Package removal functionality allows administrators to uninstall unnecessary or outdated components while protecting critical system packages from accidental deletion.

The removal process includes dependency checking to prevent system instability and provides warnings when removing packages that other components depend on. Bulk operations enable simultaneous installation or removal of multiple packages for efficient system management.

Update management keeps installed packages current with the latest versions and security patches. The system displays available updates with version information, change logs, and update priorities. Automatic update scheduling options allow administrators to configure maintenance windows for system updates while minimizing operational disruption.

**Note:** When flash memory is locked (write-protected), the Save Settings button will display "Flash Locked" and become disabled. Flash lock prevents any configuration changes, installations, or modifications to protect system integrity. You must unlock the flash memory before saving any settings or making system changes.

## CONFIGURATION WIZARD START PAGE – NETRA INTERFACE

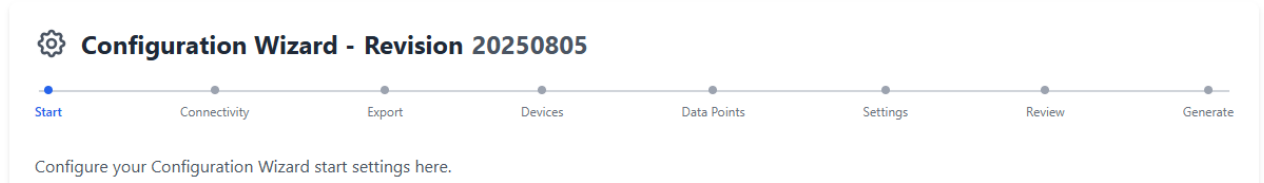
Configuration Wizard is the initial configuration wizard interface that provides step-by-step guidance for setting up your Netra Energy device from scratch. This page serves as the starting point for system configuration, offering a structured approach to device setup including connectivity settings, data export configuration, device assignments, data points, and system settings through an intuitive multi-stage process.

### Configuration Wizard Progress Stages

Stage Progress Indicator displays a visual progress bar showing all configuration stages with the current stage highlighted in blue and completed stages marked accordingly.

The progress indicator helps users understand their position in the setup process and remaining steps.

- ✓ **Start:** Initial wizards launch and preparation
- ✓ **Connectivity:** Network and communication settings
- ✓ **Export:** Data export and external service configuration
- ✓ **Devices:** Hardware device detection and setup
- ✓ **Data Points:** Data collection parameter configuration
- ✓ **Settings:** System preferences and advanced options
- ✓ **Review:** Configuration summary and validation
- ✓ **Generate:** Final configuration creation and deployment



The About Section explains the wizard's purpose and provides essential information about the configuration process.

Wizard Purpose enables quick device setup through guided configuration steps, automatically adjusting the number of stages based on selected options and system requirements. The wizard streamlines complex configuration tasks into manageable sequential steps.

Dynamic Stage Adjustment modifies the configuration process based on user selections, showing only relevant stages for the chosen setup options. This adaptive approach reduces complexity and focuses on applicable configuration areas.

Configuration Scope covers all essential system settings including network connectivity, device communications, data collection parameters, export settings, and system preferences through a structured sequential process



### Configuration Wizard - Revision 20250805

Start   Connectivity   Export   Devices   Data Points   Settings   Review   Generate

Configure your Configuration Wizard start settings here.

#### About

The configuration wizard lets you quickly set up your device. Depending on the options selected, the wizard will adjust the number of stages to accommodate all required settings.

It is suggested to re-generate the driver list by clicking the button below:

Changelog

**GENERATE Button** initiates the device detection process, scanning system files and building the device database. The generation process creates /config/devicetypes.ini with organized device information for wizard use.

Regenerate files to update devices and packages in case you manually added any.

### Start Button

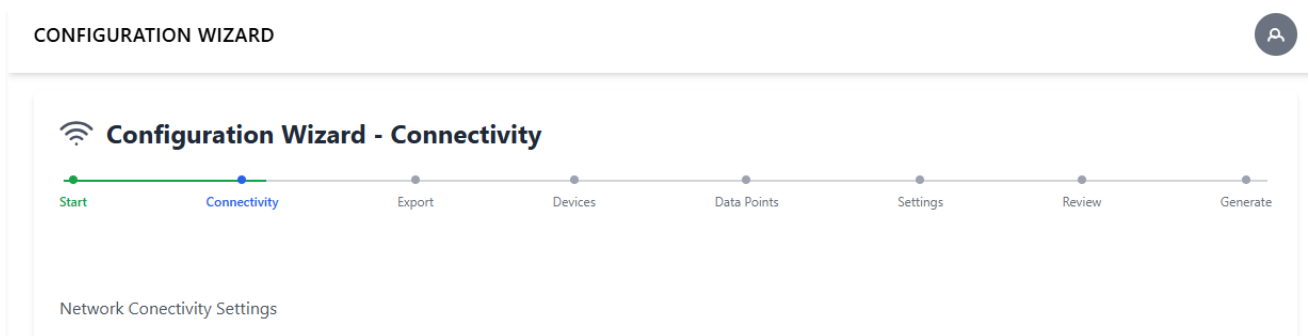
Launches the configuration wizard and proceeds to the first configuration stage Begins guided setup process for complete system configuration.

# INTERFACE

The Configuration Wizard Connectivity page is the second stage of the setup wizard that manages network settings for your Netra Energy device. This stage focuses on establishing internet connectivity through wired Ethernet and cellular connections, enabling the device to communicate with external services and monitoring systems. Connectivity configuration is essential for proper device operation and data transmission to remote monitoring platforms

## Progress Indicator Section

- ✓ Stage Progress Visualization shows a horizontal progress line with circular indicators for each stage.
- ✓ Completed stages appear with green dots, the current stage (Connectivity) displays a blue dot, and remaining stages show gray dots for pending completion.



## Wired Network Configuration Section

The Wired Network Configuration section manages Ethernet connection parameters for establishing primary internet connectivity. This section provides comprehensive control over network settings including IP address assignment, subnet configuration, gateway routing, and DNS resolution services.

The configuration interface uses intuitive input fields with built-in validation to ensure proper network parameter entry and prevent configuration errors that could disrupt connectivity.

The IP Address configuration consists of four numeric input boxes with a valid range of 0-255, connected by dots to form a complete IP address. Manual entry allows direct specification of the device IP address with real-time validation feedback.

The default configuration typically displays values like 192.168.0.50 for local network integration but can be customized based on specific network infrastructure requirements. Input validation restricts each field to numbers between 0-255, providing immediate validation feedback and preventing invalid IP address configuration.

Network Mask configuration defines network boundaries using four numeric inputs with dot separation, typically configured as 255.255.255.0 for standard local networks.

The subnet mask determines network segmentation and defines which devices can communicate directly without routing, affecting both network security and performance characteristics.

Proper subnet mask configuration ensures optimal network performance and appropriate security boundaries for device communication.

Gateway Address configuration specifies the router IP address required for internet connectivity, usually configured as the first address in the network range such as 192.168.0.1.

The gateway serves a critical routing function by enabling internet access and communication with external services by defining the network path to external networks and remote monitoring systems.

DNS Server configuration defines the Domain Name System server address for converting domain names to IP addresses, which is essential for internet connectivity and domain resolution services.

Standard DNS options commonly include public DNS servers like 8.8.8.8 provided by Google, or organizational DNS servers specific to the network infrastructure. Proper DNS configuration ensures reliable domain name resolution for external service communication and system updates.

## **LTE/3G Connection Settings Section**

The LTE/3G Connection Settings section provides comprehensive cellular connectivity management for backup internet access or primary connectivity in remote locations.

The cellular module control features an enable/disable toggle implemented through a dropdown menu with "Disabled" and "Enabled" options for managing cellular connectivity activation.

The module status setting determines whether the device attempts cellular connections and manages cellular hardware power states to optimize power consumption and connection reliability.

Access Point Name Entry specifies carrier-specific connection parameters required for cellular data access, varies by mobile carrier and plan type.

Preset Options provide quick selection for common Indian carriers:

- ✓ Airtel: airtelgprs.com - Popular Indian carrier APN
- ✓ BSNL: bsnlnet- Government carrier configuration
- ✓ JIO: jionet - Major Indian 4G carrier setting
- ✓ Vodafone: www - International carrier APN

The dropdown menu implementation enables easy selection from preset carrier options while maintaining flexibility for manual entry when needed. Custom APN entry allows configuration for carriers not included in the preset list or for special enterprise account configurations.

This flexibility ensures compatibility with various cellular carriers while providing convenient preset options for common configurations.



### Configuration Wizard - Connectivity

Start Connectivity Export Devices Data Points Settings Review Generate

Network Connectivity Settings

#### Wired Network Configuration

IP Address

192 . 168 . 0 . 50

Network Mask

255 . 255 . 255 . 0

Gateway

192 . 168 . 0 . 1

DNS Server

8 . 8 . 8 . 8

#### LTE/3G Connection Settings

Cellular Data Module

Enabled

APN (Access Point Name)

bsnlnet Presets

&lt; Back

Save

Save &amp; Next &gt;

## Navigation Buttons

**Back Buttons** - returns to the initial Configuration Wizard start page.

**Save Button** - Saves current network configuration without proceeding to next stage

**Save & Next Button** - Saves network settings and automatically advances to Export configuration stage.

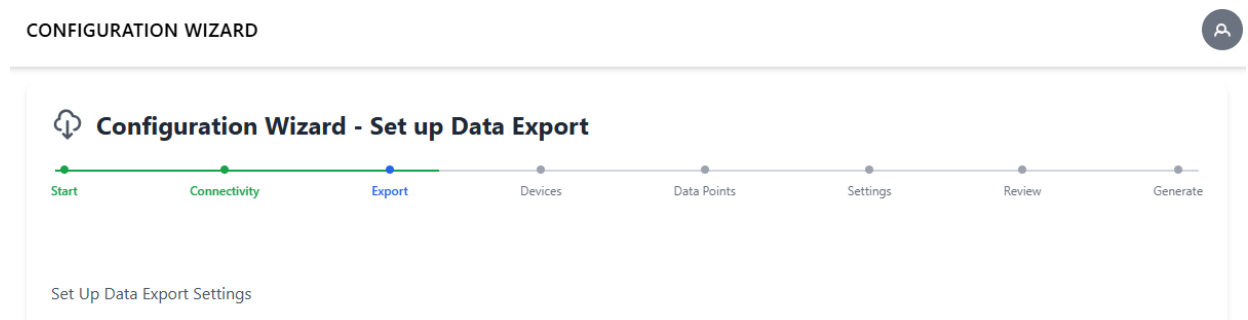
**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## CONFIGURATION WIZARD DATA EXPORT PAGE – NETRA INTERFACE

**Configuration Wizard Set up Data Export** is the data export configuration stage of the setup wizard that manages how your Netra Energy device exports data to external systems and monitoring platforms. This stage configures HTTP endpoints, FTP servers, and QOS (Quality of Service) systems for automated data transmission and integration with external monitoring services.

### Progress Indicator Section

- ✓ **Stage Progress Visualization** shows a horizontal progress line with circular indicators for each stage.
- ✓ Completed stages (Start and Connectivity) appear with green dots, the current stage (Export) displays a blue dot, and remaining stages show gray dots for pending completion.



### HTTP Data Export Settings Section

The HTTP Data Export Settings section configures web-based data transmission to third-party servers and monitoring platforms.

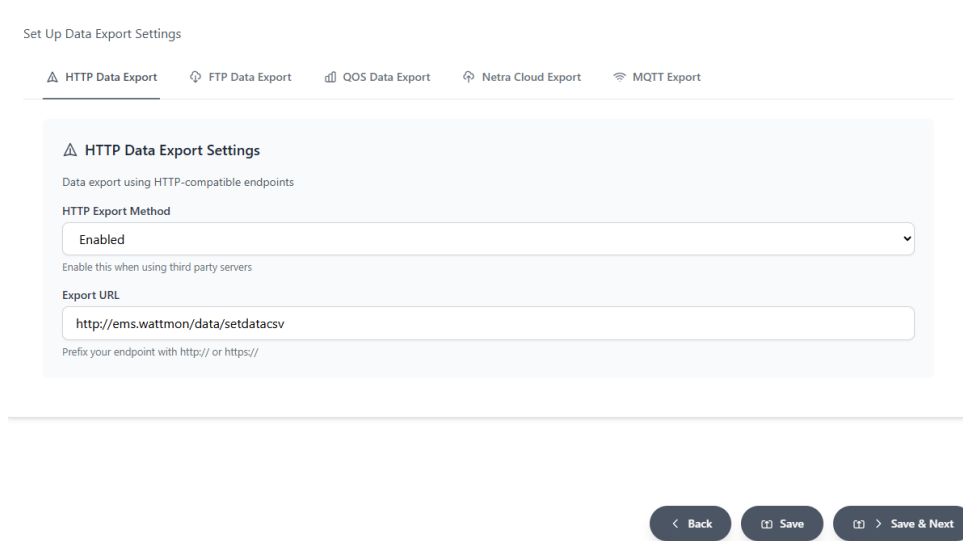
Export Method Dropdown provides enable/disable control for HTTP data transmission through a dropdown menu with "Disabled" and "Enabled" options for HTTP export activation.

Purpose and Usage enable HTTP export when integrating with third-party servers, web-based monitoring platforms, or custom data collection systems that accept HTTP POST requests.

Default State typically starts as "Disabled" until specific HTTP endpoints are configured for data transmission.

Export URL Field specifies the complete web endpoint where data will be transmitted, including protocol prefix (http:// or https://) for secure or standard connections.

Security Considerations recommends HTTPS endpoints for encrypted data transmission when dealing with sensitive operational data or when transmitting over public networks.



## FTP Data Export Settings Section

The FTP Data Export Settings section manages CSV file uploads to FTP servers for automated data archival and external system integration.

**FTP Export Dropdown** controls FTP data transmission through "Disabled" and "Enabled" options, typically used when exporting data to QOS systems or file-based data collection platforms.

Usage Scenarios include automated data archival, integration with systems requiring file-based data transfer, and QOS system data provision.

**FTP Username** provides authentication credentials for FTP server access, enabling automated login for data upload operations.

**Server Name** identifies the FTP server hostname or IP address for connection establishment (e.g., "ftp.example.com" or "192.168.1.50").

**Server Port** defines the FTP connection port, typically 21 for standard FTP or custom ports for secure FTP implementations.

**Server Path** specifies the directory path on the FTP server where CSV files will be uploaded, defining the storage location for exported data files.

**FTP Password** supplies secure authentication for FTP access, stored encrypted and used for automated file upload processes.

### FTP Data Export Settings

Export CSV Data to an FTP server

**FTP Export**

Enable this when exporting data to FTP (cannot be enabled simultaneously with QOS Export)

<b>Server Name</b> <input type="text" value="ftp.myserver.com"/> <small>Enter the FTP Server name</small>	<b>Server Port</b> <input type="text" value="22"/> <small>Enter the FTP Server Port</small>
<b>Server Path</b> <input type="text" value="/myftp"/> <small>Enter the path on the FTP Server</small>	
<b>FTP Username</b> <input type="text" value="ftp1"/> <small>Enter the FTP Username</small>	<b>FTP Password</b> <input type="password" value="....."/> <small>Enter the FTP Password</small>

## QOS Data Export Settings Section

The QOS Data Export Settings section configures specialized data transmission to Quality-of-Service monitoring systems for advanced analytics and reporting.

**QOS Export Dropdown** enables or disables QOS system integration through "Disabled" and "Enabled" options for specialized quality monitoring platforms.

**QOS System Purpose** provides advanced data analytics, quality monitoring, performance tracking, and specialized reporting for operational optimization.

**Server Path** specifies the directory location on the QOS server for data file storage and processing.

**Server Name** identifies the QOS server hostname or IP address for connection establishment and data transmission.

**Server Port** defines the connection port for QOS server communication, may differ from standard FTP ports for specialized protocols.

**FTP Username** provides authentication credentials for QOS server access using FTP-based file transfer protocols.

**FTP Password** supplies secure authentication for QOS server access with encrypted storage and automated usage.

**QOS Prefix** defines filename prefix for QOS data files (e.g., "QOS\_"), enabling easy identification and automated processing of transmitted files.

Set Up Data Export Settings

HTTP Data Export FTP Data Export **QOS Data Export** Netra Cloud Export MQTT Export

### QOS Data Export Settings

Export Data to QOS server

QOS Export  
Disabled

Enable this when exporting data to QOS (cannot be enabled simultaneously with FTP Export)

Server Name  Server Port   
Enter the QOS Server name Enter the QOS Server Port

Server Path   
Enter the path on the QOS Server

QOS Username  QOS Password   
Enter the QOS Username Enter the QOS Password

QOS Prefix   
QOS File Prefix i.e. QOS\_

< Back Save > Save & Next

## Netra Cloud Export Settings Section

The Netra Cloud Export Settings section configures native integration with the Netra Cloud platform for centralized data management and advanced analytics capabilities.

This configuration enables seamless data synchronization with Netra's proprietary cloud services, providing enhanced monitoring, analytics, and remote management capabilities through the official Netra Cloud ecosystem.

The Netra Cloud Export Method dropdown provides comprehensive enable/disable control for cloud data transmission through a dropdown menu featuring "Disabled" and "Enabled" options for Netra Cloud export activation.

The purpose and usage of Netra Cloud export centres on leveraging Netra's advanced analytics platform, centralized device management, and enhanced monitoring capabilities that provide deeper insights into energy system performance and optimization opportunities.

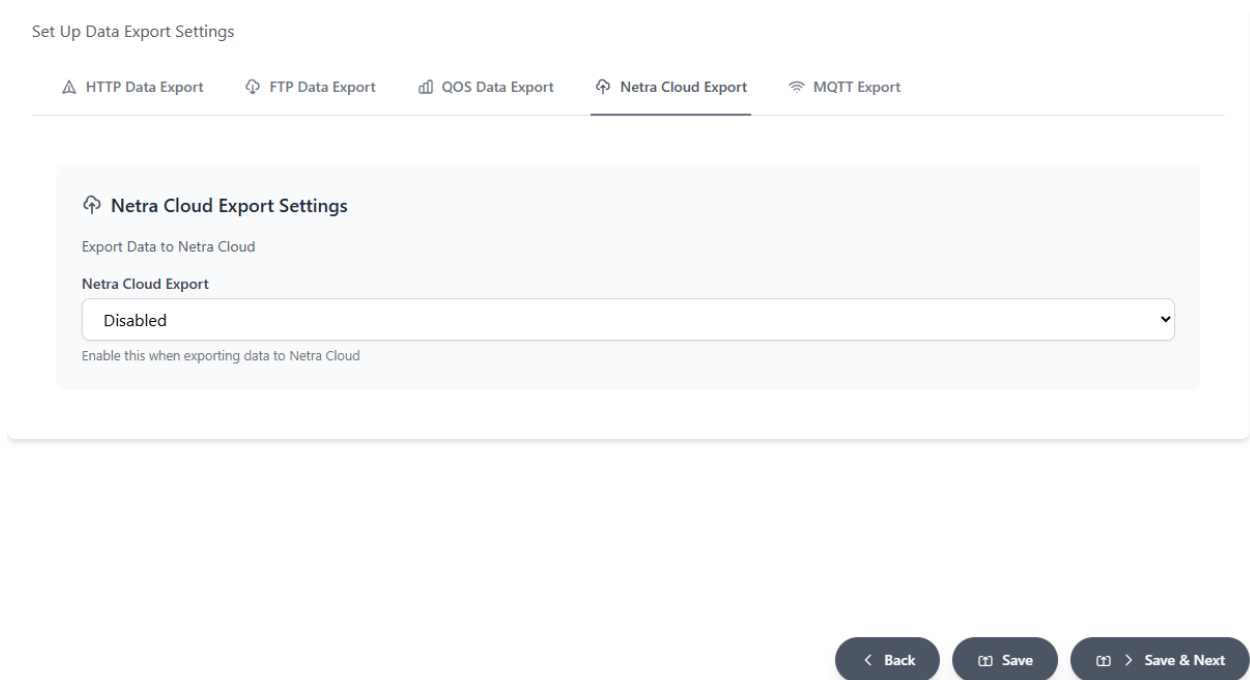
Native Netra Cloud platform integration utilizes optimized data protocols specifically designed for Netra devices, ensuring efficient data transmission and reduced bandwidth usage compared to generic export

methods.

Cloud authentication and endpoints are automatically configured based on device registration, utilizing secure authentication tokens and encrypted communication channels to protect sensitive operational data during transmission to Netra Cloud services.

Data synchronization settings include real-time data streaming options, historical data upload configurations, and selective data point transmission that allows users to choose which measurements and metrics are synchronized with the Netra Cloud platform.

Advanced synchronization features include data compression, retry mechanisms, and offline data buffering that ensures reliable data delivery even with intermittent internet connectivity.



## MQTT Export Settings Section

The MQTT Export Settings section configures Message Queuing Telemetry Transport protocol for IoT data streaming to MQTT brokers and IoT platforms.

This configuration enables lightweight, efficient data transmission to IoT ecosystems, industrial automation systems, and real-time monitoring platforms that utilize MQTT messaging protocols for device communication and data collection.

The MQTT Export Method dropdown provides comprehensive enable/disable control for MQTT data transmission through a dropdown menu featuring "Disabled" and "Enabled" options for MQTT export activation.

The purpose and usage of MQTT export focuses on integration with IoT platforms, industrial automation

systems, and real-time monitoring solutions that require low-latency, efficient messaging protocols for device communication and data streaming.

MQTT broker configuration requires detailed connection parameters including broker hostname or IP address, port configuration typically utilizing port 1883 for standard MQTT or port 8883 for secure MQTT over SSL/TLS connections.

Broker authentication settings include username and password credentials, client certificate configurations, and security token specifications required for secure MQTT broker access and message publishing.

Set Up Data Export Settings

HTTP Data Export FTP Data Export QOS Data Export Netra Cloud Export **MQTT Export**

### MQTT Export Settings

Export Data via MQTT

MQTT Export  
Disabled

Enable this when exporting data via MQTT

MQTT Broker URL  
mqtt://broker.example.com

MQTT Port  
1883  
Default: 1883 (non-secure), 8883 (secure)

Secure Connection  
No

MQTT Topic  
netra/data

MQTT Username  
Optional

MQTT Password  
Optional

< Back Save > Save & Next

## Navigation Buttons

**Back Buttons** - Returns to the Export configuration stage (configwizard1.cgi).

**Save Button** - Saves current network configuration without proceeding to next stage

**Save & Next Button** - Saves network settings and automatically advances to Export configuration stage.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## CONFIGURATION WIZARD DEVICES PAGE – NETRA INTERFACE

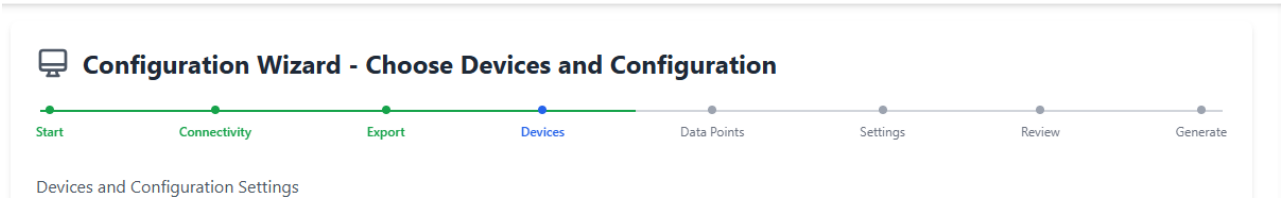
**Configuration Wizard Devices and configuration** is the device configuration stage of the setup wizard that manages hardware device detection, selection, and configuration for your Netra Energy system. This stage focuses on identifying connected devices, configuring communication

parameters, and establishing device relationships for data collection and monitoring operations.

## Progress Indicator Section

- ✓ Stage Progress Visualization shows a horizontal progress line with circular indicators for each stage.
- ✓ Completed stages (Start, Connectivity, Export) appear with green dots, the current stage (Devices) displays a blue dot, and remaining stages show gray dots for pending completion.

CONFIGURATION WIZARD



## Modbus RTU Configuration

The Modbus RTU Configuration section lists the Baud Rate, Parity and Polling Interval settings, which should be identical for all the Modbus RTU devices connected to the Netra.

- ✓ The Baud Rate determines the speed of communication and can be set to anything
- ✓ between 1200 and 115200 bits per second. The default is set to 9600.
- ✓ For Parity, select any one of the three available options, which are No Parity, Even Parity and Odd Parity.
- ✓ Inter-packet delay is the interval in milliseconds between packets – increase this if your devices are not responding properly. The default is 10 but you can set it up to 50 or more if required.
- ✓ Short Timeout is the interval that Netra waits before receiving a single byte back from a device before deciding it is inactive.
- ✓ Reply timeout is the maximum time to wait for a packet before skipping to the next packet.

Modbus RTU Configuration	
Baud	<input type="text" value="9600"/>
Parity	<input type="text" value="No Parity"/>
Inter-packet delay	<input type="text" value="10"/>
Short Timeout	<input type="text" value="30"/>
Reply Timeout	<input type="text" value="300"/>
Retry	<input type="text" value="1"/>

## Modbus RTU 2 Configuration

This option is available on supported devices. It has identical options as like Modbus RTU channel 1, with an additional bridge mode.

### Modbus RTU 2 Configuration ^

Modbus Engine  
Enable ▼

Baud  
9600

Parity  
No Parity ▼

Inter-packet delay  
10

Reply Timeout  
300

Retries  
1

Retry Interval  
15

## TCP Setting Configuration

The TCP Settings Configuration lets you configure Modbus TCP/IP settings, specifically the IP address of the devices you wish to interface with the Netra over Modbus TCP. The number of TCP channels depends on the hardware platform and firmware version. Some devices support up to 10 channels, while newer platforms support up to 30 channels.

## TCP Setting Configuration

Modbus Enabled

Enable

Inter-packet delay

10

Reply Timeout

300

Retries

1

Retry Interval

15

The Enabled, Inter-packet delay, Timeout, Retires and Retry interval are all like the Modbus RTU section described above. The TCP Channel sections as shown below let you enter an IP Address to connect to when in client mode. Enter the TCP Port number which is 502 for Modbus TCP by default. If you plan on having external devices connect to the Netra to read registers, check the TCP Server Mode and enter the port number to listen on. You may choose multiple channels that listen on the same port as well.

Modbus TCP Channel1

TCP Server Mode

Select this to turn this channel into a Modbus TCP Listener server

IP Address

0

Enter a valid IP address

Port

0

Enter a port number for the connection. The default Modbus TCP port is 502

Modbus TCP Channel2

TCP Server Mode

Select this to turn this channel into a Modbus TCP Listener server

IP Address

0

Enter a valid IP address

Port

0

Enter a port number for the connection. The default Modbus TCP port is 502

## Power Meters

The **Power Meters** section lets you add and configure the power meters that will be used in the system. A Power Meter refers to any third party modbus device that can provide an active power value that is used

by Netra Power Control algorithm – most brands are supported as of now, but the Netra support team can be contacted to add a new driver for you if required. The meters connect to the Netra via Modbus RTU or Modbus TCP.

ID	DEVICE	ADDRESS	BUS	NAME	TYPE	RATING (KVA)	ACTIONS
1	Secure Elite 440-445 (6455)	10	Virtual	meter1	INCOMER	100	<a href="#">Edit</a> <a href="#">Delete</a>

After clicking Add a new blank row will appear, letting you select the Device from a drop down. This list will contain every driver in the Netra /dev/ folder that is defined as a power meter – this list is generated from the first page of Configuration Wizard before entering Stage.

1 and can be regenerated if required (for example if you have uploaded a new driver or added one).

The Address needs to match the Modbus ID set on the meter.

It is suggested to keep the default naming convention of meter1-meterX, but the name can be set to anything else if each device has a unique name.

Select the Location of the meter – this will show the meter at the appropriate place in Insight and update power control accordingly.

accordingly.

Location could be: At Genset (output of the generator), At Incomer (between the grid and the building), At Inverter (between the inverter and the building, also referred to as a check meter), At Load (between main AC panel and the load), and ESS (at the output of an energy storage system). If you select At Genset, you will be prompted to enter the kVA rating of the generator which will help Power Control select an appropriate set point.

## Inverters

Grid-Tie (or hybrid) inverters need to be defined in the Inverters section. Clicking the Add button will bring up a blank row that needs to be configured.

ID	MAKE	MODEL	ADDRESS	BUS	NAME	RATING (KW)	ACTIONS
1	Sungrow	SGxxCX PV String Inverter	1	Virtual	inverter1	50	<a href="#">Edit</a> <a href="#">Delete</a>
2	Sungrow	SGxxCX PV String Inverter	2	Virtual	inverter2	50	<a href="#">Edit</a> <a href="#">Delete</a>

The Make drop down contains the inverter brand name – select the inverter make and the choose the model number from the Model drop down.

If you do not find your make and model, contact support to get a suitable driver made for your inverter.

Ensure the Modbus ID of the inverter matches the Address you enter. Select the Bus, which can be any of the physical buses, TCP channels or the virtual bus.

Choose a unique name for the inverter – it is recommended to follow the default naming convention of inverter1-inverterX.

Enter the AC rating of the inverter in kW.

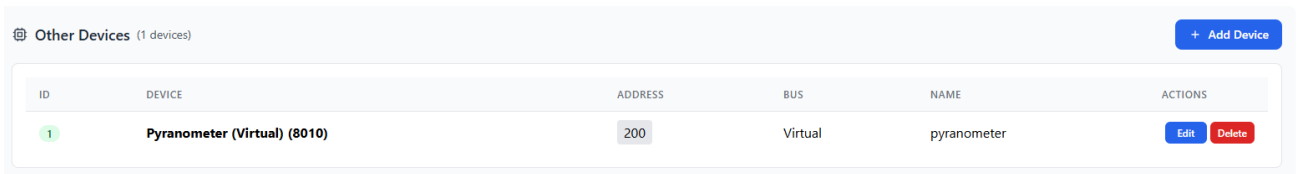
## Other Devices

The Other Devices section is where you define any other sensors or modbus devices.

If your device is not in the drop-down list, contact support. Enter the Modbus address, choose the bus and enter a unique device name.

you have a physical Pyranometer, you should select it from the list of devices here. If you choose to use the Pyranometer package below, a virtual device called Pyranometer will automatically get added to the Other Devices list, in addition to the physical device you add.

Ensure the name of your physical device is unique to avoid conflicts.



The screenshot shows a web interface for configuring 'Other Devices'. At the top left, it says 'Other Devices (1 devices)'. At the top right, there is a blue button labeled '+ Add Device'. Below this is a table with the following columns: ID, DEVICE, ADDRESS, BUS, NAME, and ACTIONS. The table contains one row with the following data: ID: 1, DEVICE: Pyranometer (Virtual) (8010), ADDRESS: 200, BUS: Virtual, NAME: pyranometer. The ACTIONS column for this row contains two buttons: 'Edit' (blue) and 'Delete' (red).

ID	DEVICE	ADDRESS	BUS	NAME	ACTIONS
1	Pyranometer (Virtual) (8010)	200	Virtual	pyranometer	Edit Delete

## Navigation Buttons

**Back Buttons** - Returns to the Export configuration stage (configwizard2.cgi).

**Save Button** - Saves current network configuration without proceeding to next stage

**Save & Next Button** - Saves device settings and automatically advances to Data Points configuration stage.

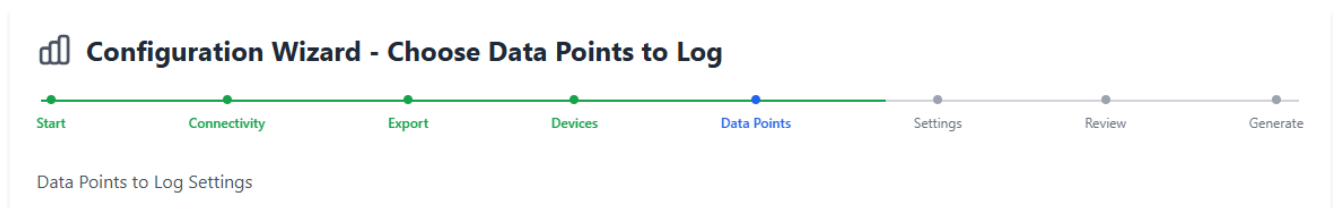
**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## CONFIGURATION WIZARD DATA POINT PAGE – NETRA INTERFACE

**Configuration Wizard Data Point** is the data points configuration stage of the setup wizard that manages which device parameters and measurements will be collected and logged to CSV files. This stage enables administrators to select specific data points from configured devices, set data processing functions, and configure QOS signal mappings for comprehensive system monitoring and data export.

### Progress Indicator Section

- ✓ Stage Progress Visualization shows a horizontal progress line with circular indicators for each stage.
- ✓ Completed stages (Start, Connectivity, Export, Devices) appear with green dots, the current stage (Data Points) displays a blue dot, and remaining stages show gray dots for pending completion.



**Total Logged Roles: 121** displays the real-time count of all selected data points across all device categories that will be included in CSV logging and data export operations.

Select the data points or variables you wish to log for each of your selected Power Meters, Inverters and Other Devices. Each of the device types are listed along with the respective parameters that can be logged by the Netra. If you define several power meters or inverters using the same device type or model, the roles/data points will be applied to each of them. The page displays the devices separated into the Power Meters, Inverters and Other Devices sections like in the previous step. The available roles for the device type and logging options for the role are listed, grouped by device type.

## Power Meters

Total Logged Roles: 156

### 1 Secure Elite 440-445 (6455)

<input type="checkbox"/>	FUNCTION (INSTANTANEOUS - AVERAGE)	VARIABLE	DESCRIPTION
<input checked="" type="checkbox"/>	AVERAGE	AC_Active_Power	Total AC Active Power
<input checked="" type="checkbox"/>	AVERAGE	AC_Reactive_Power	Total AC Reactive Power
<input checked="" type="checkbox"/>	AVERAGE	AC_Apparent_Power	Total AC Apparent Power
<input checked="" type="checkbox"/>	AVERAGE	kWh_Total_Export	Total Export Energy
<input checked="" type="checkbox"/>	AVERAGE	kWh_Total_Import	Total Import Energy
<input checked="" type="checkbox"/>	AVERAGE	AC_Voltage_AN	AC Voltage Phase A to Neutral
<input checked="" type="checkbox"/>	AVERAGE	AC_Voltage_BN	AC Voltage Phase B to Neutral
<input checked="" type="checkbox"/>	AVERAGE	AC_Voltage_CN	AC Voltage Phase C to Neutral

The Checkbox column needs to be ticked if the parameter is to be logged. The Function column defines how a value is calculated. While the Netra polls each of data points of the devices based on the Polling Interval set in the previous step, the value for each data point is written to the Netra at the CSV Logging Interval which is usually 1 minute (also set in the previous step).

The Function for each role can be one of the following: Average, Min, Max, Instantaneous. Select Average To get the average value (sum of all entries in the logged period divided by number of polls). Select Min to log the smallest polled value for the period or Max for the highest polled value. Use Instantaneous where the latest polled value is required. The column name Function is followed by (INSTANTANEOUS - AVERAGE) which allows you to set the function for all the values within a section to either of those types by clicking on

We recommend that most values be set to instantaneous, especially any Operating State and Event or Error codes.

## ⚡ Inverters

### 1 Sungrow SGxxCX PV String Inverter (7092)

<input type="checkbox"/>	FUNCTION (INSTANTANEOUS - AVERAGE)	VARIABLE	DESCRIPTION
<input checked="" type="checkbox"/>	INSTANTANEOUS	AC_Active_Power	Total AC Active Power
<input checked="" type="checkbox"/>	INSTANTANEOUS	AC_Reactive_Power	Total AC Reactive Power
<input checked="" type="checkbox"/>	INSTANTANEOUS	AC_Apparent_Power	Total AC Apparent Power
<input checked="" type="checkbox"/>	INSTANTANEOUS	kWh_Total_Active	Lifetime Generation
<input checked="" type="checkbox"/>	INSTANTANEOUS	kWh_Day_Active	Daily Generation
<input checked="" type="checkbox"/>	INSTANTANEOUS	Temperature_Internal	Internal Temperature
<input checked="" type="checkbox"/>	INSTANTANEOUS	DC_Voltage_1	DC Voltage PV 1
<input checked="" type="checkbox"/>	INSTANTANEOUS	DC_Current_1	DC Current PV 1
<input checked="" type="checkbox"/>	INSTANTANEOUS	DC_Voltage_2	DC Voltage PV 2

The Variable column lists the name of the role as logged in the Netra. This is what the variable is called. However, as mentioned in the previous step, the final logged role is named by combining these role names with each device's name as a prefix, which is set in Step 1.

The last column is Description provides a human-readable description of the role.

The above holds true for both the Power Meters and the Inverters sections.

The Other Devices list lets you modify the variable name if required. It is not recommended to change this for the Pyranometer module but any other devices that you add can be customized if required.

If Track Curtailment was selected in step 1, you can choose to log the global curtailment values from the Global Variables list as show below.

To remove a global from the CSV log, simply clear the variable name and proceed to the next step.

**Global Variables**

Global variables can be logged here - some of the variables are used by custom packages. Make sure you enable the packages in *Stage 1* so the variables appear here. You can also choose to log custom variables at this stage if you plan to have custom scripts running.

[+ ADD](#)

<input type="checkbox"/>	FUNCTION	VARIABLE	DESCRIPTION
<input checked="" type="checkbox"/>	INSTANTANEOUS	AC_Active_Power	Global Variable
<input checked="" type="checkbox"/>	INSTANTANEOUS	AC_Reactive_Power	Global Variable
<input checked="" type="checkbox"/>	INSTANTANEOUS	AC_Apparent_Power	Global Variable
<input checked="" type="checkbox"/>	INSTANTANEOUS	kWh_Total_Export	Global Variable
<input checked="" type="checkbox"/>	INSTANTANEOUS	kWh_Total_Import	Global Variable
<input checked="" type="checkbox"/>	INSTANTANEOUS	AC_Voltage_AN	Global Variable
<input checked="" type="checkbox"/>	INSTANTANEOUS	AC_Voltage_BN	Global Variable
<input checked="" type="checkbox"/>	INSTANTANEOUS	AC_Voltage_CN	Global Variable

## Navigation Buttons

**Back Buttons** - Returns to the Export configuration stage (configwizard3.cgi).

**Save Button** - Saves current network configuration without proceeding to next stage

**Save & Next Button** - Saves device settings and automatically advances to Data Points configuration stage.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

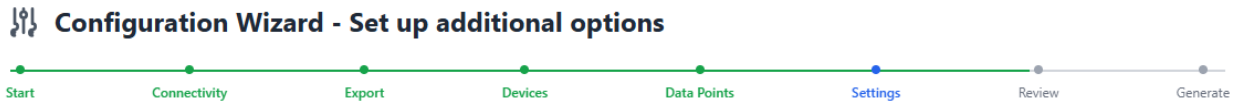
## CONFIGURATION WIZARD ADDITIONAL OPTIONS PAGE – NETRA INTERFACE

**Configuration Wizard Additional Options** is the system settings configuration stage of the

setup wizard that manages additional packages, system preferences, and advanced operational parameters for your Netra Energy device. This stage focuses on selecting optional software packages, configuring logging intervals, power control settings, automatic update preferences, and specialized monitoring features to customize system functionality and performance.

### Progress Indicator Section

- ✓ Stage Progress Visualization shows a horizontal progress line with circular indicators for each stage.
- ✓ Completed stages (Start, Connectivity, Export, Devices, Data Points) appear with green dots, the current stage (Settings) displays a blue dot, and remaining stages show gray dots for pending completion.



### Additional Packages Section

The Additional Packages section manages optional software package installation for extended system functionality.

Each package in the list is presented with a **sequential number** shown as a circular badge (1, 2, 3...) for easy reference.

An **installation checkbox** is provided to allow users to select the packages they wish to include during system generation. The package details include the **name**, which identifies the software component, along with a **description** that explains its functionality and features.

Additionally, the **version** indicates the current release available for installation, ensuring users can track and install the correct package.

Additional Settings

#### Additional Packages ^

Select the packages you wish to install

	Install	Name	Description	Version
1	<input checked="" type="checkbox"/>	Insight	Energy Visualisation	20250923
2	<input checked="" type="checkbox"/>	Devices	Devices Widget	1.0
3	<input checked="" type="checkbox"/>	pc	Power Control System	20250505
4	<input checked="" type="checkbox"/>	PMKusum	PM Kusum Portal Integration	20250218
5	<input type="checkbox"/>	InError	Inverter Error Codes	20200921
6	<input type="checkbox"/>	MQTT	MQTT Configuration	20220504
7	<input type="checkbox"/>	PF	Inverter PF Control	20230406
8	<input type="checkbox"/>	WS102	WS102 Wind Speed Sensor	20231124
9	<input type="checkbox"/>	Saved	Pulse Counting Inputs Package	20231124
10	<input type="checkbox"/>	Widget	Variable widget for the front page	1.0
11	<input checked="" type="checkbox"/>	Pyrano	Pyranometer and Irradiation	20231124

## Additional Options

The Pyranometer Module option allows you to add either a Modbus or an analog irradiation sensor to monitor both active and total solar irradiance values, while also providing you with the option to calculate performance ratios and track curtailment. After clicking Yes, a virtual Pyranometer device is added to the Other Devices list with address 200 on a virtual bus as explained above. Enter the DC Plant Size in kWp to ensure that proper potential generation values can be calculated. Enter a Fixed PR (performance ratio) which will be used by the potential generation calculation algorithm. A default of 0.8 is usually a good place to start and you may need to adjust it up or down to match the output of the plant with the potential generation value. You can read more about this in the Pyranometer Package section. CSV Log Interval – keep at 1 minute for most sites unless you require less data to be logged. CSV Log Write Interval – the interval at which log files are written to. You can keep this at 1 minute or increase it on higher end devices with more memory to reduce the wear of the SD card. Keep in mind that if a power cut occurs data in memory will be lost so keep the write interval at a reasonable interval between 1 and 5 minutes.

### Additional Options

Pyranometer

No

CSV Log Interval

1 Minute

Choose the log interval in minutes (Only 1 entry in the CSV file every X minutes)

CSV Log Write Interval

1 Minute

To optimize SD card life, you can choose to log to disk at a lower rate than the CSV log interval. This will mean data will be in memory and could potentially be lost if the device reboots before it is written.

DC Plant Size

0.000000

DC Plant size in kWp

Fixed PR

0.000000

Fixed PR for Potential kW calculation. Set to 0.8 as starting point.

Power Control

Yes

Power Control – choose yes to automatically install the Power Control (PC) package. License Key – enter your license key for power control if available. You can do this in the PC package later too.

Track Curtailment – Select yes to use the curtailment tracking algorithm in power control which will provide information about potential energy lost due to curtailment Update Power Control Settings – select yes for Netra to automatically update the power control package set points based on the Configuration Wizard data.

It is recommended to double check power control after running Configuration Wizard to ensure that everything is properly updated, including the set points for zero-export and DG protection.

Anemometer – select this to install the corresponding package if you have a wind speed sensor  
Create Automatic Snapshot – select yes to generate a backup of the /config folder and have it sent to the cloud CSV logging location – select SD card or Internal flash.

It is not recommended to use internal flash as it will fill up quickly. Automatically Update Packages – select this if you want the Over-the-air (OTA) system to automatically update your packages (i.e. FTP and Power Control) to the latest version on the website.

Automatically Update Firmware – select this to periodically check for firmware updates and install them automatically.

The screenshot displays a configuration wizard interface with the following elements:

- License Key:** A text input field containing the key `2HsQr81WBzD liz5Xmly cpqJ9YxMBm5lj GHLDrJsH ZPUF1ytJaMN3m8X7Vgy0`. Below it is the instruction: "Enter a license key supplied by Wattmon to activate power control".
- Track Curtailment:** A dropdown menu set to "No". Below it is the instruction: "Keep track of generation loss due to curtailment".
- Update Power Control Settings Automatically:** A dropdown menu set to "No". Below it is the instruction: "Automatically update the power control settings with calculated values based on your settings."
- ws102:** A dropdown menu set to "No".
- Create automatic snapshot after generating:** A dropdown menu set to "Yes".
- Automatically Update Packages:** A dropdown menu set to "No". Below it is the instruction: "When a new package that is installed (i.e. PC) is available online, automatically download and install it".
- Automatically Update Firmware:** A dropdown menu set to "No". Below it is the instruction: "When a new firmware is available online, automatically download and install it".
- Automatic Healing:** A dropdown menu set to "No".
- Navigation Buttons:** Three buttons at the bottom right: "< Back", "Save", and "Save & Next >".
- Device Info:** A label at the bottom left of the form area.

## Navigation Buttons

**Back Buttons** - Returns to the Export configuration stage (configwizard4.cgi).

**Save Button** - Saves current network configuration without proceeding to next stage

**Save & Next Button** - Saves device settings and automatically advances to Data Points configuration stage.

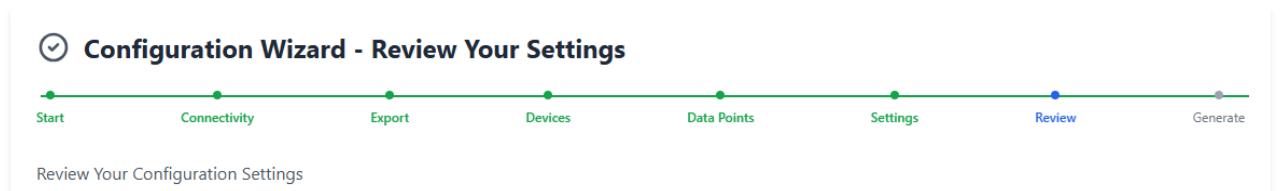
**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## CONFIGURATION WIZARD REVIEW SETTINGS PAGE – NETRA INTERFACE

**Configuration Wizard Review Your Settings** is the configuration review stage of the setup wizard that provides a comprehensive summary of all configured settings before final system generation. This stage allows administrators to review connectivity settings, data export configuration, device assignments, data points selection, and system preferences to ensure everything is correctly configured before creating the final system configuration files.


### Progress Indicator Section

- ✓ Stage Progress Visualization shows a horizontal progress line with circular indicators for each stage.
- ✓ Completed stages (Start, Connectivity, Export, Devices, Data Points, Settings) appear with green dots, the current stage (Review) displays a blue dot, and the final stage (Generate) shows gray dot for pending completion.



**BACKUP\_NOW Button** appears prominently in a red warning box with an exclamation triangle icon, strongly recommending users create a system backup before proceeding with configuration generation. This safety feature allows users to preserve their current working configuration before applying new settings that will completely replace the existing system setup.

Please go through the following table and verify that you have chosen the right options for your new configuration.

 The data points you wish to log for each device type should be selected here by checking the respective boxes. If you have defined several inverters or power meters using the same

BACKUP\_NOW

Review your configuration

The devices are listed under their respective section, Power Meters, Inverters or Other Devices,

with their Address or Modbus ID encircled in orange for energy meters, green for inverters and blue green for other devices.

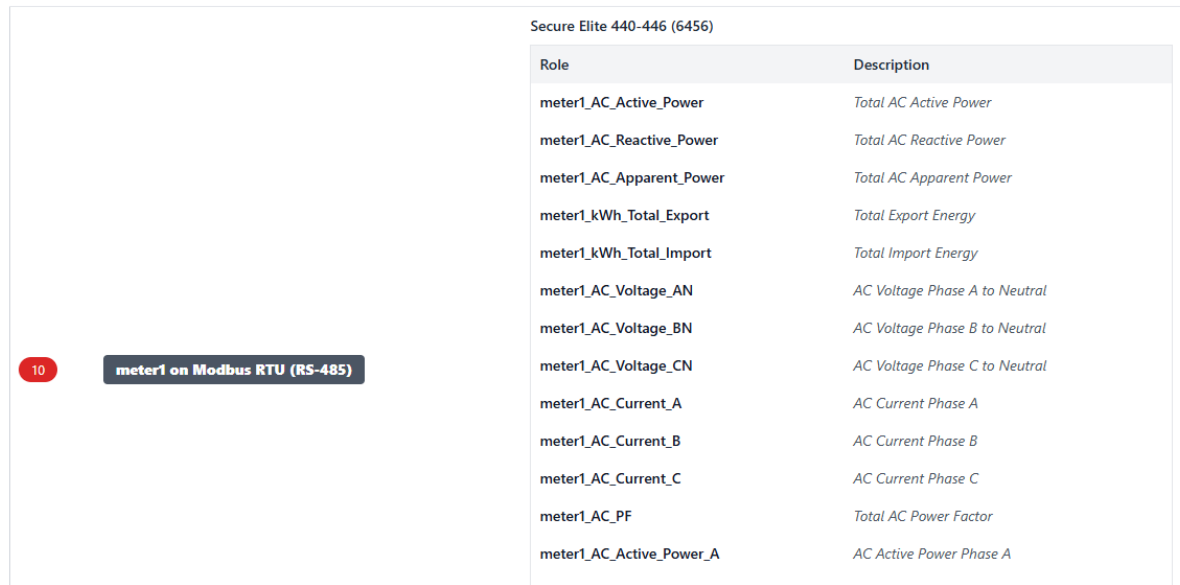
Next to the ID number is the device Name, as set in Step 1.

Next to that is the Device Type name, followed by a table with the final Role name, a combination of the device and variable names, and the Description of that role.

### Power Control

Power control settings will not be modified. This will mean that you need to manually check the Power Control configuration after completing the EZConfig to ensure that settings are properly done.

### Power Meters



Role	Description
meter1_AC_Active_Power	Total AC Active Power
meter1_AC_Reactive_Power	Total AC Reactive Power
meter1_AC_Apparent_Power	Total AC Apparent Power
meter1_kWh_Total_Export	Total Export Energy
meter1_kWh_Total_Import	Total Import Energy
meter1_AC_Voltage_AN	AC Voltage Phase A to Neutral
meter1_AC_Voltage_BN	AC Voltage Phase B to Neutral
meter1_AC_Voltage_CN	AC Voltage Phase C to Neutral
meter1_AC_Current_A	AC Current Phase A
meter1_AC_Current_B	AC Current Phase B
meter1_AC_Current_C	AC Current Phase C
meter1_AC_PF	Total AC Power Factor
meter1_AC_Active_Power_A	AC Active Power Phase A

**Note:** Since this is the final step before the generation of the configuration for your Netra, it is imperative that you review the settings presented on this page. The Modbus Address should not be conflicting between any of the Modbus RTU devices, and while the ID may be identical in the case of Modbus TCP devices, the IDs cannot be the same between Modbus RTU and Modbus TCP devices. The device Name will also be shown in all the Roles, which should be verified to be correct. If the inverters or meters have been renamed, make sure that the Roles are accordingly set.

## Inverters

Sungrow PV String Inverter - 110 Scale (7094)

Role	Description
inverter1_AC_Active_Power	Total AC Active Power
inverter1_AC_Apparent_Power	Total AC Apparent Power
inverter1_kWh_Total_Active	Lifetime Generation
inverter1_kWh_Day_Active	Daily Generation
inverter1_Temperature_Internal	Internal Temperature
inverter1_DC_Voltage_1	DC Voltage PV 1
inverter1_DC_Current_1	DC Current PV 1
inverter1_DC_Voltage_2	DC Voltage PV 2
inverter1_DC_Current_2	DC Current PV 2
inverter1_DC_Voltage_3	DC Voltage PV 3
inverter1_DC_Current_3	DC Current PV 3
inverter1_DC_Power	Total DC Power
inverter1_AC_Voltage_AB	AC Voltage Phase A to Phase B
inverter1_AC_Voltage_BC	AC Voltage Phase B to Phase C

< Back Generate

If all the allocated Roles are correct (as shown in the images above), then click on GENERATE CONFIGURATION to proceed to the final step of the Configuration Wizard.

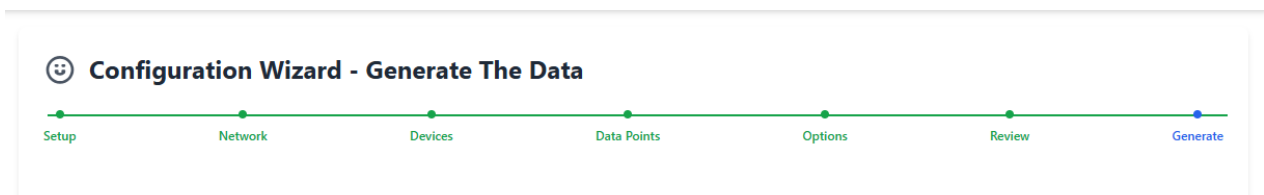
**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## CONFIGURATION WIZARD GENERATE DATA PAGE – NETRA INTERFACE

**Configuration Wizard Generate Data** is the final configuration generation stage of the setup wizard that creates all system configuration files and deploys the complete monitoring system based on all previous wizard selections. This stage processes device configurations, data points, communication settings, and system preferences to generate a fully operational Netra Energy monitoring system with automatic file creation, package installation, and system integration.

### Progress Indicator Section

- ✓ Stage Progress Visualization shows a horizontal progress line with circular indicators for all stages.
- ✓ All previous stages (Setup, Network, Devices, Data Points, Options, Review) appear with green dots indicating completion, and the current stage (Generate) displays a blue dot showing active generation process.



The Current Subscription Status section displays comprehensive information about the active Analytics subscription plan for the Netra Energy device.

The system shows an active subscription status with a green checkmark indicator, confirming that the subscription is valid and operational for continued use of the configuration wizard and

analytics features. The subscription type is identified as "Analytics" which provides access to multiple feature tiers including Basic Features, Standard Features, Cloud Access, and Analytics capabilities as indicated by the feature tags displayed below the plan information.

The subscription validity extends until the expiration date "280901" with an active confirmation message stating "Your configuration wizard subscription is active until 280901."

This ensures users understand the duration of their current subscription and can plan for renewal if necessary. The Analytics subscription enables full access to advanced monitoring capabilities, data analytics functions, and cloud integration features that enhance the device's monitoring and reporting capabilities.

The configuration generation process involves comprehensive system file creation and deployment based on all wizard selections made throughout the setup process.

The system automatically processes device configurations, communication parameters, data point definitions, and system preferences to create a complete operational environment.

Device configuration processing transforms wizard selections into active device drivers, communication protocols, and data collection parameters.

The generation system creates device-specific configuration files, establishes communication channels, and configures data polling schedules based on user selections from previous wizard stages.

Data point configuration generates measurement parameter definitions, scaling factors, alarm thresholds, and data storage specifications that enable comprehensive monitoring capabilities.

Communication settings generation creates network interface configurations, export endpoint definitions, and protocol-specific parameters for external system integration.

The process establishes HTTP endpoints, FTP connections, MQTT broker configurations, and cloud service integrations based on export settings configured in previous stages.

System preferences generation applies time zone settings, user account configurations, security parameters, and operational preferences throughout the monitoring system.

If the Power Control solution has not been installed, and instead the Device Info Widget was selected, the success message will then omit the Power Control was installed...

message and will instead display Device Info Widget was installed... Since this is the final point of the setup and marks the completion of the Configuration Wizard, there is no way to go back to the previous step as in the other pages.

Click the Configure below power control to open the power control package in case you selected the Power Control option and verify that all settings are correct.

If the summary of the settings appears to be as per your selection, then you need to restart the Netra for the settings to be applied, and the configuration put into action.

**Automatic Snapshot Generation** creates compressed backup of entire configuration when snapshot option is enabled, providing disaster recovery capability.

**Backup File Creation** generates timestamped backup files in /backup/ directory for system restoration and configuration cloning.

CONFIGURATION WIZARD

### Configuration Wizard - Generate The Data

**Current Subscription Status**

Status: <b>Active</b>	Plan Type: <b>Enterprise</b>	Expires: <b>280901</b>
-----------------------	------------------------------	------------------------

Subscription Features:

Basic Features Standard Features Premium Features Enterprise

✔ Your configuration wizard subscription is active until 280901.

Setup Network Devices Data Points Options Review Generate

Configuring Inverters...  
Configuring other devices...Done in 1705ms free=10929496  
Generating power meter data...Done in 1920ms free=10929992  
Generating snapshot of configuration...  
Generated snapshot file. You can find this here: /backup/snapshot\_1767711195.tar.

**Success**  
Your configuration has been successfully built! Please click the reboot button for it to take effect.

**4 devices** were created.  
**160 roles** were created.  
**Pyranometer Module** was installed.  
**Device Info widget** was installed.

Close Reboot

In the Configuration Wizard, click on Reboot, which will restart your Netra and apply all the new configuration changes.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## SIMULATION CONTROL PAGE – NETRA INTERFACE

The Simulation Control Page is a powerful testing and demonstration interface within the Netra Energy Management System. It allows users to simulate real-world energy conditions without relying on physical hardware, making it ideal for system validation, operator training, troubleshooting, and live demonstrations. Simulation mode provides full control over device behavior while clearly separating simulated data from real operational data. The Simulation Control Page features a modern, intuitive layout with a blue gradient header that houses the primary simulation controls. The main content area is organized into clearly defined sections for inverters and power meters, displayed in responsive grid layouts for optimal viewing across desktop, tablet, and mobile devices. Action buttons at the bottom of the page provide quick access to system-wide controls. A master

Simulation Mode toggle located in the header enables or disables simulation across the entire Netra system. When enabled, all simulated values override real device readings throughout dashboards, reports, historical data logs, alarms, and external monitoring interfaces. The toggle provides clear visual feedback, displaying green when active and gray when disabled, ensuring operators are always aware of the system state.



The Simulation Control Page allows users to simulate key environmental and device parameters that influence overall system behavior. Solar irradiance can be adjusted from 0 to 1000 W/m<sup>2</sup> to represent different weather and daylight conditions, directly affecting potential solar generation calculations, while load demand can be configured from 0 to 10,000 kW to simulate various facility consumption scenarios such as peak demand, low-load periods, and gradual transitions. Each configured solar inverter is displayed as an individual control card showing the device name, ID, rated capacity, and simulation status, allowing users to enable or disable simulation per inverter and set precise power output values within rated limits. The page also supports simulation of solar, grid, load, and generator power meters, where solar meters represent generation, grid meters simulate bidirectional import and export, load meters reflect facility consumption, and generator meters simulate backup power sources. All meter's support power values from –1000 to +1000 kW following industry-standard conventions, with individual enable and disable controls enabling advanced and selective testing scenarios

## NETRAOS PACKAGES – NETRA INTERFACE

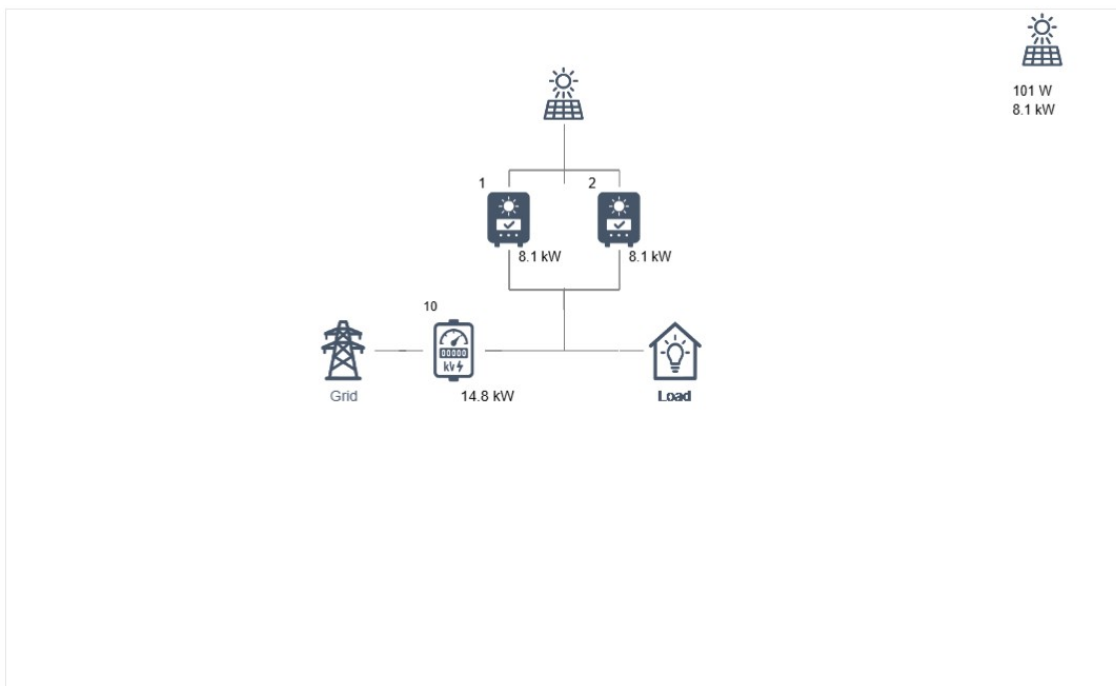
The following sections describe the Netra packages available and their function. Some of the packages are pre-installed in Netra but if they are not present, they can always be installed using

NetraOS Updater. Refer to the section above on how to install them. Packages are distributed in the form of a compressed.tar.gz file and can also be manually uploaded and extracted if you have been provided with a file by the Netra team. Package scripts reside in the /package folder. If you have your own custom packages, they will not be available through the NetraOS updater unless you add the repository URL.

## Insight Package

The Insight package generates a widget that shows on the main dashboard. It has a large canvas that dynamically adapts to the configuration set in Configuration Wizard and PC. Inverters appear in a single row, displaying their Modbus Address or IDs, and the AC Active Power in kilowatts. Meters will appear in their respective places (grid, solar output, or genset) and the flow of energy will indicate import or export power. If a pyranometer is installed, the solar irradiance and potential generation is shown at the top right as seen in the image below.

Live Energy Overview



This package gets automatically installed after running Configuration Wizard.

## Devices Package

If you chose the Device Info Widget during the Configuration Wizard setup, the Dashboard displays a widget showing the inverters along with their Serial Number, Model Number, Active Power, kWh Total and Status Code for each of the inverters connected to your Netra. Energy meters are displayed with their Serial Number, Active Power, kWh Total Import and kWh Total Export values. Each of the devices are listed with a small dynamic icon right before their name, which is color-coded to display the communication status of the inverter or power meter. If the icon is red in colour, then the device is inactive or has not communicated with the Netra in over two minutes. If the device is active and communicating with the Netra, then the icon is green in colour.

## Devices

### Inverters (PC Controlled)

Inverter 1 PC Group 0



Inverter 2 PC Group 0



### Power Meters (PC Controlled)

Meter 1 Grid Meter



#### PC Configuration

Device ID: 10

Type: Grid

Group: 0

Priority: 10

#### Device Details

Bus: 100

Type: 0

Model: 0

## Power Control (PC) Package

The PC package handles the Netra proprietary power control algorithm that can be used for zero feed in (ZFI) also known as zero export, for genset protection (running your solar plan along with your diesel or gas generator), and for other applications that require dynamic power limiting of inverter power.

Power control requires a license key that needs to be purchased from Netra which will activate various features in the PC package. License key types are: ZFI Only, ZFI+DG (running both zero feed in and genset protection), ZFI+DG+PF which also performs reactive power compensation to improve the power factor on the source meter, and finally ZFI+DG+PF+Cluster which activates multi-cluster mode, allowing independent power control pools with multiple meters. Scroll down to the User Settings section and click on the red-coded Power Control Settings option. Upon entering the Configure Power Control page, you will notice that to access and modify the General Settings, you must first read and accept the terms and conditions. This basically outlines the functionality and sheds some light on the capabilities and the shortcomings of the software-based power control solution offered with the Netra. To proceed further, you must click on AGREE. If you accept the terms and conditions as shown on the previous page, the complete Configure Power Control page will load, displaying three distinct sections – General Settings, Power Meters and Inverters.

## General Settings

The General Settings section lets you enable and disable power control and configure the way power control works.

**General Settings**

Configure basic power control settings and parameters. You have already accepted the terms and conditions.

<b>Power Control Status</b> <input type="radio"/> Disabled <input checked="" type="radio"/> <b>Enabled</b> <small>Keep this enabled for active power control</small>	<b>Reactive Control Method</b> <input type="radio"/> Average power of all phases (default) <input type="radio"/> Minimum power on any phase
<b>Debug Status</b> <input checked="" type="radio"/> <b>Disabled</b> <input type="radio"/> Enabled	<b>Debug Log Status</b> <input type="radio"/> Disabled <input checked="" type="radio"/> <b>Enabled</b>
<b>Update Interval</b> <input type="text" value="15"/> <small>Time interval between power control updates</small>	<b>Meter Timeout</b> <input type="text" value="10"/> <small>Timeout duration for meter communication</small>
<b>Inverter Timeout</b> <input type="text" value="30"/> <small>Timeout duration for inverter communication</small>	<b>Modbus Retries</b> <input type="text" value="3"/> <small>Number of retry attempts for failed Modbus communications</small>
<b>Reactive Offset (W)</b> <input type="text" value="0"/> <small>Reactive power offset adjustment in watts</small>	<b>Power Control Mode</b> <input type="radio"/> Average power for all phases (default) <input checked="" type="radio"/> <b>Minimum power on any one phase</b>

The Status option allows to enable or disable power control as required..

**Note: The Netra Power Control license key is a 64-character alpha-numeric that is unique to each Netra and is provided by us upon purchase. No two licenses are identical and therefore cannot be used interchangeably.**

The Debug option if set to Enabled allows you to view the real-time percentages for active power set on each inverter, on the Main Dashboard of your Netra. The Debug to Log File option is a continuation of the previous option, which lets you log the active power percentages data in a dedicated log file when set to Enabled.

The screenshot displays a configuration panel with the following settings:

- Reactive Control Method:** Radio buttons for "Average power of all phases (default)" and "Minimum power on any phase".
- Status:** Radio buttons for "Disabled" and "Enabled" (selected).
- Meter TimeOut:** Input field containing the value "10".
- Modbus retries:** Input field containing the value "3".
- Percentage Control Method:** (Label visible at the bottom left).
- Debug Status:** Radio buttons for "Disabled" (selected) and "Enabled".
- Update Interval:** Input field containing the value "15".
- Inverter Timeout:** Input field containing the value "30".
- Power Control Mode:** Radio buttons for "Average power for all phases (default)" and "Minimum power on any one phase" (selected).
- Set percent to 100%:** (Label visible at the bottom right).

The Update Interval is the response time taken in seconds by the Netra to set or change the percentages set on an inverter. This option is currently locked down to 5 seconds and cannot be changed.

The Meter Timeout value is the amount of time given for a response from a power meter. The default is set at 20 seconds. If the meters do not reply with the polled value in this set time, the Netra falls back on default fail-safe set in the next sections. The Inverter Timeout value, like the Meter Timeout, is the amount of time given for a response from an inverter. The default is set at 60 seconds. If the inverters do not reply within this set time, the Netra falls back on default fail-safe set in the next sections.

The Modbus Retries option lets you set the number of packets to be resent to the Modbus devices in case of transmission errors. The default is set to 1, which means the Netra polls each device in succession and does not poll any erroneous device more than once continuously, instead returning to it in the next polling cycle. If your license key supports PF control, a Reactive Offset field lets you enter an offset to compensate for reactive losses. This could be a positive or negative value – leave it at 0 if you are unsure what to put.

<p>Modbus retries</p> <input type="text" value="3"/> <p>Percentage Control Method</p> <p><input type="radio"/> All inverters at the same percent</p> <p><input checked="" type="radio"/> Individual percent calculated per inverter</p> <p>Shared meter for EB/DG</p> <p><input checked="" type="radio"/> Disabled</p> <p><input type="radio"/> Enabled</p> <p>Shared energy meter for EB/DG.Netra Mega DI1 is used to indicate grid availability (input on = grid available)</p> <p>CURTAILMENT</p> <p><input type="radio"/> Disabled</p> <p><input checked="" type="radio"/> Enabled</p> <p>Track curtailment losses on both Grid and DG sources. This requires the Pyranometer package to be installed and configured.</p>	<p>Power Control Mode</p> <p><input type="radio"/> Average power for all phases (default)</p> <p><input checked="" type="radio"/> Minimum power on any one phase</p> <p>Set percent to 100%</p> <p><input checked="" type="radio"/> Use calculated percent</p> <p><input type="radio"/> Set all inverters to 100% when irradiance is less</p> <p>Use Digital Inputs as bus coupler</p> <p><input checked="" type="radio"/> Disabled</p> <p><input type="radio"/> Enabled</p> <p>Digital inputs will modify the group IDs dynamically in multi cluster mode</p> <p>Fallback when TCP meter connection fails</p> <p><input checked="" type="radio"/> Disabled</p> <p><input type="radio"/> Enabled</p> <p>If a remote Modbus TCP energy meter of a higher priority meter fails, you can choose to override the inverter percent until the TCP connection is restored</p>
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The Power Control Mode option allows you to control the active power output from your inverters either at the average level or at phase level, thus ensuring that no energy is exported even if there is an imbalance in the active power on each phase. The default is set to Average power for all phases.

To enforce power control at the phase level set this to Minimum power on any one phase. When selecting this ensure the meter you have installed supports this.

The Reactive Power Control Mode option lets you choose whether to use average or phase-wise reactive power. This only applies to licenses that support it. The Percentage Control Method determines the algorithm used for power control. Selecting All inverters at the same percent will ensure that generation is uniform (in relation to inverter capacity) but on larger plants with partial shading could lead to potential losses in while curtailing as the set points assume uniform generation.

To solve this, choose Individual percent calculated per inverter. This will lead to non-uniform generation which could potentially lead to a large mismatch between inverter percentages (i.e. one at 100% and another at 0%).

The Shared meter for EB/DG option can be Enabled to use a common meter for both the grid incomer (Electricity Board) and the Generator (DG) for a more cost-effective setup. The digital input 1 (DI1) determines which source is active.

**Note: This feature is supported on devices where DI1 is configured to indicate grid availability, thereby differentiating the grid input from the genset output.**

Use Digital inputs as bus coupler only works when multi-cluster mode is enabled and allows dynamic joining of control groups depending on that status of the digital input – read more in the Advanced Power Control guide. The Track Curtailment feature can display the curtailment loss against the actual generation on a site with Zero Feed-In and/or DG Protection, by tracking the actual generation and logging against the potential generation based on the quality of sunlight

**Note: This feature requires a pyranometer to be interfaced with the Netra and the Pyranometer package enabled from the Additional Options in the Configuration Wizard.**

Fallback when TCP meter connection fails allows you to fall back to a default percentage if a critical TCP meter link fails ensuring, i.e. if a genset meter is running over LAN and it becomes unreachable, you may want to ramp down solar to ensure that the genset does not trip due to back feeding.

Enter the timeout in Duration that TCP link fails in seconds before which it falls back to the Interval override percent field.

## Power Meter

The Power Meters section allows you to add and configure the energy meters as selected in the Configuration Wizard. To add a meter, select the ADD button and a row will be displayed with all columns editable. Each row has several columns – Device, Device Model, Connected To, Min kW, Max kW, Priority, Group, PF, Plant Size and Options. The Device Model column displays the make and model of the meter selected in the Device column.

The screenshot shows the 'CONFIGURE PACKAGE POWER CONTROL' interface. At the top, there's a header 'POWER METERS' with a sub-header 'Total Power Meter: 2'. Below this is a table with columns: ID, DEVICE, DEVICE\_MODEL, CONNECTED, MIN, MAX, PRIORITY, EXTRA, PLANT SIZE, STATUS, and OPTIONS. An 'Add' button is located to the right of the table. Below the table is an 'Edit Power Meter' form. The form has two columns of fields:

- Select Meter:** A dropdown menu showing 'meter1 (ID: 10) - Secure Elite 440-446'.
- Connected To:** A dropdown menu showing 'Main Incomer'.
- Min Power (kW):** A text input field with the value '5'.
- Max Power (kW):** A text input field with the value '7'.
- Priority:** A text input field with the value '0'.
- PF Control:** A dropdown menu showing 'Active'.
- Reactive Threshold (kW):** A text input field with the value '0.00'.
- Plant Size (AC kW):** A text input field with the value '110'.
- Group:** A dropdown menu showing 'No group'.
- Status:** A dropdown menu showing 'Disabled'.

At the bottom right of the form is a blue 'Save Settings' button.

The Connected To drop-down allows you to select the installed location of your meter from five options – Undefined, Genset, Zero Feed-In, Inverter Output and Building Load. Essentially, this is a repeat of the settings as entered in the Configuration Wizard which utilizes it for the Insight, while the locations selected here notify their role in the power control solution. To ensure a smooth operation, both entries must be identical. The Min Power kW column sets the minimum threshold for the AC Active Power value in kilowatts. This is used by the Netra when enforcing Zero Feed-In or DG Protection, ensuring the Active Power value from the meter never drops below this value. In other words, the Netra ramps the inverters down once the meter output values reach this set value.

**Note: The function of this value differs based on the setting in the Connected To column. If configured for Inverter Output or Building Load, the value should always be 0. In the case of Main Incomer, the value should be set to a percentage of the site rating, to allow for a buffer in the case of a rapid ramping of power. For Genset, the Min kW should be set to the industry standard of 30% of the diesel generator rating.**

The Priority column is used when more than a single meter is interfaced in the power control solution, setting a value based on the importance of the meter in that location, with 1 being the lowest value and the greater number signifying a higher priority. The Netra follows this order when controlling the inverters. The Max kWh for Month field lets you enter several kWh that you wish to export (without any throttling) after which the power control limits (Min and Max) will apply. Leave this at 0 to disable. The Group option appears when you have a multi-cluster license. Select a group for the meter. Valid groups are 1,2,4,8,16,32,64 (groups are defined as a bitmask in inverters, and hence a unique bit position is required per group id) The PF Control option lets you enable reactive power control. If selected, the Reactive Threshold box appears allowing you to enter a reactive set point in kW.





## Inverters

The Inverters section lets you add and configure the inverters selected in the Configuration Wizard. To add an inverter, select the ADD button and a row will be displayed with all columns editable. Each row has several columns – Device, Device Model, Rating, Default Percent, Group, PF Control and Options.

The Device drop-down list contains the inverters already defined in Configuration Wizard the Device Model column displays the make and model of the inverter selected in the Device column. The Rating column should be set to the actual rating of the inverter. For example, a 100kW rated inverter with 110% max power is a 110kW inverter – which needs to be entered as 110 accordingly.

### INVERTERS

Total Inverters: 2

ID	DEVICE	DEVICE_MODEL	RATING	DEFAULT_PERCENT	GROUP	PF CONTROL	OPTIONS
1	inverter1 (ID: 1)	Sungrow PV String Inverter - 110 Scale	110	100	0	Yes	 
2	inverter2 (ID: 2)	SolarEdge Inverter	111	101	0	Yes	 

**Note: It is particularly important to set the correct rating of each inverter to ensure optimal performance from the system. Entering an incorrect rating value, for example entering 30 for 50 kW inverter, will cause the Netra to treat the inverter as 30 kW unit, setting the 100% power output at 30 kW.**

The Default Percent column is fail-safe built into the Netra power control solution. When no active power sources are found, Netra sets the active power output percentage of the inverters to this value. The Group field lets you set a group mask. This can be a single group (i.e. 2 or 4), or it could be a combination of multiple groups (i.e. 6) which will impact how the inverters behave depending on the energy sources active and their priorities. This explained in the Advanced Power Control guide. PF Control can be enabled or disabled (if your key supports reactive power control) to enable reactive power generation on the inverter. The edit button allows you to either Edit or Stop Editing a particular device and delete an added device.

**Note: Power control will still control inverters and set them to the Default Percent when power control is disabled. To not send commands to the inverters, you need to uninstall the package.**

Upon completion of all sections, you may click on the Save Settings button on the top of the page and then refresh the page to verify all the settings have been saved. To set the Netra to follow these settings, Clear Cache and Reboot the device

**Edit Inverter**

Select Inverter: inverter2 (ID: 2) - SolarEdge Inverter

Rating (kW): 111

Default Percent: 101

Control Group: 0

Power Factor Control

Enable PF Control

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## PM Kusum Package

The PM Kusum package enables your Netra device to seamlessly integrate with the PM Kusum portal, India's solar rooftop program platform. This package automatically exports solar energy data, device status information, and performance metrics to the government portal for monitoring and compliance purposes.

### PM Kusum Portal Integration Settings

Configure MQTT settings for PM Kusum portal data export

<p><b>IMEI Number</b></p> <input type="text" value="9C-95-6E-53-27-D6"/> <p><small>Enter IMEI or MAC address for device identification</small></p> <p><b>MQTT Client ID</b></p> <input type="text" value="PMKusum_Device_001"/> <p><small>Unique client identifier for MQTT connection</small></p> <p><b>MQTT Username</b></p> <input type="text" value="Netra"/> <p><small>Username for MQTT authentication</small></p> <p><b>MQTT Password</b></p> <input type="password" value="....."/> <p><small>Password for MQTT authentication</small></p>	<p><b>Export Interval (Minutes)</b></p> <input type="text" value="5"/> <p><small>How often to export data to PM Kusum portal</small></p> <p><b>Heartbeat Interval (Minutes)</b></p> <input type="text" value="15"/> <p><small>Heartbeat signal interval</small></p> <p><b>Inverter Start ID</b></p> <input type="text" value="1"/> <p><small>Starting ID for inverter numbering</small></p> <p><b>Meter Start ID</b></p> <input type="text" value="7"/> <p><small>Starting ID for meter numbering</small></p> <p><b>RTC Offset (Seconds)</b></p> <input type="text" value="19800"/> <p><small>Real-time clock offset adjustment</small></p>
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**i PM Kusum Registration Instructions**

1. Register your device on the PM Kusum portal using the IMEI number
2. Obtain MQTT credentials from the PM Kusum portal
3. Configure the settings above with the provided credentials
4. Data will be automatically exported at the configured interval

## Configuration Options Section

The PM Kusum Portal Integration Settings serves as the central configuration hub for establishing secure communication with the PM Kusum government portal. This section contains all essential parameters required to register your device and enable automatic data transmission for solar energy monitoring and compliance reporting.

The **IMEI Number** field is the unique identifier that links your Netra device to your registered solar installation in the PM Kusum portal. This field accepts either the device's IMEI number or MAC address and serves as the primary key for device identification. The IMEI must exactly match the identifier registered in the PM Kusum portal during the initial device registration process. Without a correct IMEI, the portal will reject all data transmissions from your device.

The **MQTT Client ID** field provides a unique identifier for the MQTT connection to the PM Kusum servers. This ID should be descriptive and unique across all devices connecting to the portal, typically following a format like "PMKusum\_Device\_001" or incorporating your site name and device number. The client ID helps the portal distinguish between different devices and maintain separate communication channels for each installation.

The **MQTT Username** and **MQTT Password** fields contain the secure credentials provided by the PM Kusum portal after successful device registration. These credentials are unique to your installation and must be kept confidential to maintain security. The username typically follows a standardized format provided by the portal, while the password is a secure string generated during registration. Both fields are mandatory for establishing authenticated connections to the PM Kusum servers.

## Data Export Configuration Section

The **Export Interval (Minutes)** field determines how frequently your device transmits solar energy data to the PM Kusum portal. The default setting of 15 minutes provides regular updates while minimizing network bandwidth usage. Shorter intervals provide more granular data but increase network traffic, while longer intervals reduce bandwidth usage but may provide less detailed monitoring. The portal expects regular data updates for accurate performance tracking and compliance reporting.

The **Heartbeat Interval (Minutes)** field controls how often your device sends status signals to confirm it remains online and operational. This heartbeat mechanism allows the portal to distinguish between device outages and actual performance issues. The default 15-minute interval ensures timely detection of communication problems while avoiding unnecessary network overhead. Heartbeat signals are crucial for maintaining system reliability monitoring and fault detection.

### Device Numbering Configuration

The **Inverter Start ID** and **Meter Start ID** fields define the starting identification numbers for multiple devices in larger installations. When your solar installation includes multiple inverters or meters, these fields ensure each device receives a unique identifier in the data stream. For single-device installations, the default value of "1" is appropriate. For multi-device systems, sequential numbering helps the portal distinguish between different equipment units and track individual device performance.

### System Timing Configuration

The **RTC Offset (Seconds)** field allows fine-tuning of the device's real-time clock to ensure accurate timestamp synchronization with the PM Kusum portal. This offset compensates for any timing drift in the device's internal clock and ensures data timestamps align with portal expectations. Accurate timing is crucial for proper data correlation and compliance reporting, as the portal uses timestamps to validate data integrity and sequence.

### Registration Instructions Section

The PM Kusum Registration Instructions provide step-by-step guidance for successfully connecting your device to the government portal:

1. **Register your device on the PM Kusum portal using the IMEI number** - Visit the official PM Kusum portal and complete the device registration process using your device's IMEI or MAC address. This registration creates your device profile and generates the necessary credentials.
2. **Obtain MQTT credentials from the PM Kusum portal** - After successful registration, the portal will provide secure MQTT username and password credentials specific to your installation. These credentials are essential for authenticated communication.
3. **Configure the settings above with the provided credentials** - Enter all portal-provided credentials and configure the data export intervals according to your monitoring requirements and portal guidelines.
4. **Data will be automatically exported at the configured interval** - Once configured, your device will automatically transmit solar energy data, device status, and performance metrics to the portal without manual intervention.

### Automatic Data Transmission

The PM Kusum package automatically handles all aspects of data transmission to the government portal. The system continuously monitors your solar installation's performance and transmits the following information:

- **Solar Energy Production Data:** Real-time and historical energy generation metrics
- **Device Status Information:** Inverter status, meter readings, and system health indicators
- **Performance Analytics:** Efficiency calculations, fault detection, and trend analysis
- **Compliance Reporting:** Automated generation of required government compliance reports

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## PMKusum Inverter Mapping

The PMKusum site requires roles to be mapped in a specific way. The following are the PMKusum fields:

PMKusum Field	Field	Scale	Description
IRPHV	AC_Voltage_AB or AC_Voltage_AN	1	R Phase Voltage
IYPHV	AC_Voltage_BC or AC_Voltage_BN	1	Y Phase Voltage
IBPHV	AC_Voltage_CA or AC_Voltage_CN	1	B Phase Voltage
IRPHI	AC_Current_A	1	R Phase Current
IYPHI	AC_Current_B	1	Y Phase Current
IBPHI	AC_Current_C	1	B Phase Current
IPF	AC_PF	1	Power Factor
IKW	AC_Active_Power	0.001	Active Power in KW
IKVAR	AC_Reactive_Power	0.001	Reactive Power in KW
IKVA	AC_Apparent_Power	0.001	Apparent Power in KW
IFREQ	AC_Frequency	1	Frequency in Hz
ILKWH	kWh_Total_Active	1	Lifetime Generation in kWh
ITKWH	kWh_Day_Active	1	Daily Generation in kWh
ILON	Total_Running_Time	1	Lifetime run time
ITON	Daily_Running_Time	1	Daily Run Time

	ime		
IDCV	DC_Voltage	1	DC Voltage
IDCKW	DC_Power	0.001	DC Power in kW
IST	Status_Code	1	Status
IFT1	Event_Code	1	Fault 1
IFT2	Event_Code2	1	Fault 2
IFT3	Event_Code3	1	Fault 3
IFT4	Event_Code4	1	Fault 4
IFT5	Event_Code5	1	Fault 5
ITMP	Temperature_Int ernal	1	Internal Temperature
IDC1I	DC_Current_1	1	MPPT 1 Current
IDC2I	DC_Current_2	1	MPPT 2 Current
IDC3I	DC_Current_3	1	MPPT 3 Current
IDC4I	DC_Current_4	1	MPPT 4 Current
IDC5I	DC_Current_5	1	MPPT 5 Current
IDC6I	DC_Current_6	1	MPPT 6 Current
IDC7I	DC_Current_7	1	MPPT 7 Current
IDC8I	DC_Current_8	1	MPPT 8 Current
IDC9I	DC_Current_9	1	MPPT 9 Current
IDC10I	DC_Current_10	1	MPPT 10 Current
IDC11I	DC_Current_11	1	MPPT 11 Current
IDC12I	DC_Current_12	1	MPPT 12 Current
IDC1V	DC_Voltage_1	1	MPPT 1 Voltage
IDC2V	DC_Voltage_2	1	MPPT 2 Voltage
IDC3V	DC_Voltage_3	1	MPPT 3 Voltage
IDC4V	DC_Voltage_4	1	MPPT 4 Voltage
IDC5V	DC_Voltage_5	1	MPPT 5 Voltage
IDC6V	DC_Voltage_6	1	MPPT 6 Voltage
IDC7V	DC_Voltage_7	1	MPPT 7 Voltage
IDC8V	DC_Voltage_8	1	MPPT 8 Voltage
IDC9V	DC_Voltage_9	1	MPPT 9 Voltage
IDC10V	DC_Voltage_10	1	MPPT 10 Voltage
IDC11V	DC_Voltage_11	1	MPPT 11 Voltage
IDC12V	DC_Voltage_12	1	MPPT 12 Voltage

If you have a custom mapping that does not use the standard field names in your device driver, you will need to create a custom ini file in the os/pkg/PMkusum/dev folder called devXXXX.ini where XXXX is your device type ID. An example file is shown below: [config] num\_roles=2 role\_name0=20 ks0=IFREQ scale0=0.01 role\_name1=19 ks1=IPF scale1=0.001 role\_name2=5 ks2=IDC1V scale2=0.1 In this example, roles would be created such as inverter1\_20 which would represent Frequency as a number between 0 and 5000. We need to scale it down to 0-50 hence the scale factor of 0.01 and the mapping of IFREQ as the Kusum field name. Similarly, inverter1\_19 is the power factor, so it's mapped to IPF and scaled by 1000 since the value is 0-1000 in raw form and it needs to be 0-1 Follow this naming convention and all role names for all your custom kusum fields.

### PMKusum Meter Mapping

The following are the PMKusum fields for meters:

PMKusum Field	Standard Field	Scale	Description
MTBLDATE		1	Billing Date for meter
VRY	AC_Voltage_AB	1	RY Phase Voltage
VYB	AC_Voltage_BC	1	YB Phase Voltage
VBR	AC_Voltage_CA	1	BR Phase Voltage
VRN	AC_Voltage_AN	1	R Phase to Neutral Voltage in Volts
VYN	AC_Voltage_BN	1	Y Phase to Neutral Voltage in Volts
VBN	AC_Voltage_CN	1	B Phase to Neutral Voltage in Volts
PFR	AC_PF_A	1	R Phase Power Factor

PFY	AC_PF_B	1	Y Phase Power Factor
PFB	AC_PF_C	1	B Phase Power Factor
POW	AC_Active_Power	1	Active Power in KW
POWR	AC_Active_Power_A	1	R Phase Active Power in KW

POWY	AC_Active_Power_B	1	Y Phase Active Power in KW
POWB	AC_Active_Power_C	1	B Phase Active Power in KW
RPOW	AC_Reactive_Power	1	Reactive Power in KVAR
RPOWR	AC_Reactive_Power_A	1	R Phase Reactive Power in KVAR
RPOWY	AC_Reactive_Power_B	1	Y Phase Reactive Power in KVAR
RPOWB	AC_Reactive_Power_C	1	B Phase Reactive Power in KVAR
APOW	AC_Apparent_Power	1	Apparent Power in KVA
APOWR	AC_Apparent_Power_A	1	R Phase Apparent Power in KVA
APOWY	AC_Apparent_Power_B	1	Y Phase Apparent Power in KVA
APOWB	AC_Apparent_Power_C	1	B Phase Apparent Power in KVA
KWHNET		1	Cumulative Net Energy in KWH
KWHIMP	kWh_Total_Import	1	Cumulative Import Energy in KWH
KWHEXP	kWh_Total_Export	1	Cumulative Export Energy in KWH
POFF		1	Grid Power Failure in Minutes

## Debugging

Run `/os/pkg/PMkusum/data_pub.cgi` from the browser to see what data is sent.

See the `{"VD":1,"TIMESTAMP":"2024-12-12`

`11:55:40","MAXINDEX":288,"STINTERVAL":5,"INDEX":142,"LOAD":0,"MSGI`

`D":"","DATE":241212,..` line at the bottom. To verify that JSON is correct, past it into JSONLINT and verify the JSON code.

In order to see what data was sent you can tail the Pmkusum log (pmkusum.txt) as follows:  
`/scripts/taillog.cgi?fn=0:/logs/pmkusum.txt`

To see the status of connectivity to the PMKusum server, run  
`/scripts/tests/mqttstat.cgi`

## MQTT Package

The MQTT package enables your Netra device to communicate with other systems and devices using the lightweight MQTT messaging protocol. This is perfect for IoT applications, remote monitoring, and data integration.

## Configuration Options Section

The Configuration Options tab serves as the foundation for establishing your MQTT connection and configuring essential security settings. This tab contains all the fundamental parameters required to connect your Netra device to an MQTT broker and establish secure communication channels.

The screenshot displays the 'MQTT Configuration' web interface. At the top, there is a header with the title 'MQTT Configuration' and a subtitle 'Configure MQTT messaging and communication settings'. Below the header, there are three navigation tabs: 'Configuration Options' (which is active and highlighted in blue), 'Message Publishing', and 'Message Reception'. The main content area is titled 'Server Configuration' and contains several configuration fields:

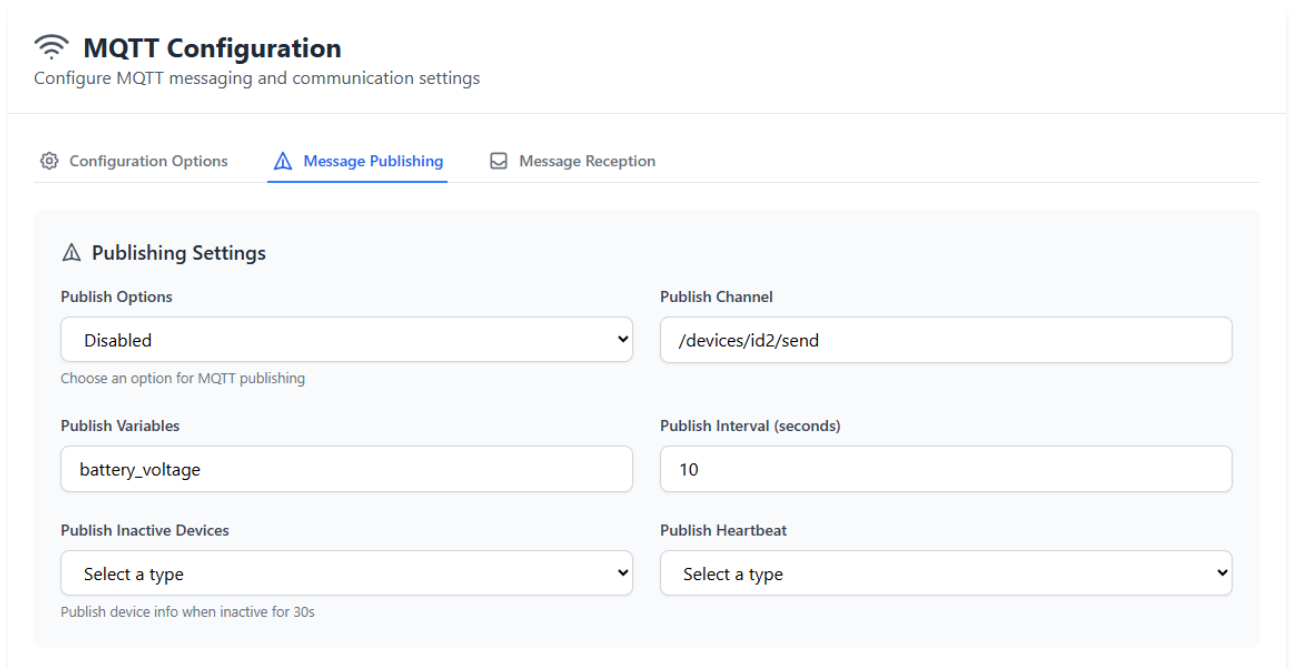
- MQTT Support:** A dropdown menu set to 'Enabled'.
- MQTT Server:** A text input field containing 'mqtt.wattmon.com'.
- Use Encryption:** A dropdown menu set to 'Select a type'.
- TLS Private Key File Path:** A text input field containing '/cert/Sdev98.key'.
- MQTT Password:** A text input field with masked characters (dots).
- Debug Mode:** A dropdown menu set to 'Select a type'.
- MQTT Port:** A text input field containing '1883'.
- TLS Custom Cert File Path:** A text input field containing '/cert/Sdev98.crt'.
- MQTT Username:** A text input field containing 'wattmon'.

The Server Configuration section is where you define the core connection parameters for your MQTT broker. The **MQTT Support** field is the master switch that enables or disables the entire MQTT functionality on your device. When disabled, no MQTT operations will occur regardless of other settings. This field should be set to "Enabled" for any MQTT functionality to work. The **Debug Mode** setting controls the level of logging detail for MQTT operations. When enabled, it provides comprehensive logging information that is invaluable for troubleshooting connection issues, message transmission problems, or configuration errors. Debug mode should typically be disabled in production environments to reduce log file size and system resource usage.

The **TLS Custom Cert File Path** and **TLS Private Key File Path** fields are used when your MQTT broker requires custom SSL certificates for authentication. These paths typically point to certificate files stored in your device's file system, such as "/cert/Sdev98.crt" and "/cert/Sdev98.key". These fields are only necessary when using custom SSL certificates rather than standard certificate authority (CA) signed certificates.

## Message Publishing Section

The Message Publishing tab controls how your Netra device sends data to external systems via MQTT. This tab determines what information is transmitted, how frequently it is sent, and which devices are included in the data publishing process. Publishing Options and Behaviour the Publish Options dropdown is the primary control for determining your device's publishing behaviour. The "Disabled" option completely stops all data publishing, which is useful for receive-only configurations or during maintenance periods. The "Publish Device data" option automatically transmits readings from all connected devices at regular intervals, providing a comprehensive data stream that includes all monitored parameters from your selected devices. This option is ideal for general monitoring applications where you want complete visibility into your system's performance.



**MQTT Configuration**  
Configure MQTT messaging and communication settings

Configuration Options **Message Publishing** Message Reception

**Publishing Settings**

<b>Publish Options</b> Disabled <small>Choose an option for MQTT publishing</small>	<b>Publish Channel</b> /devices/id2/send
<b>Publish Variables</b> battery_voltage	<b>Publish Interval (seconds)</b> 10
<b>Publish Inactive Devices</b> Select a type <small>Publish device info when inactive for 30s</small>	<b>Publish Heartbeat</b> Select a type

The "Publish variables on change" option only transmits data when monitored values actually change, which can significantly reduce network traffic and is particularly useful for systems with intermittent changes or low-bandwidth connections. The "Publish variables at interval" option sends data at predetermined time intervals regardless of whether values have changed, ensuring consistent data delivery for systems that require regular updates even when values remain constant.

The **Publish Channel** field defines the MQTT topic where your device will send its data. This topic acts as an address or mailbox that subscribing systems can monitor to receive your data. Topic naming conventions typically follow a hierarchical structure like "solar/site123/data" or "Netra/building1/telemetry". Well-structured topic names make it easier to organize and filter data in receiving systems.

The **Publish Variables** field allows you to specify exactly which data points should be included in your MQTT messages when using variable-based publishing options. Variables should be entered as a comma-separated list, such as "AC\_Power,DC\_Voltage>Total\_Energy". This granular control enables you to transmit only the data that receiving systems need, reducing bandwidth usage and simplifying data processing on the receiving end.

## Message Reception Section

The Message Reception tab configures how your Netra device processes incoming MQTT messages, enabling remote control capabilities and data integration from external systems. The **Receive Options** dropdown determines how your device responds to incoming MQTT messages. The "Disabled" option prevents processing of any incoming messages, effectively making your device publish-only. The "Update virtual driver(s)" option allows incoming messages to modify virtual device values within your system, enabling remote control of device parameters or setpoints. This option is particularly useful for remote control applications where external systems need to adjust operational parameters.

**MQTT Configuration**  
Configure MQTT messaging and communication settings

Configuration Options Message Publishing **Message Reception**

**Reception Settings**

**Receive Options**  
Execute a script  
Choose action upon message receipt

**Subscribe Channel**  
/devices/id2/commands  
MQTT Channel (use # wildcard for multiple messages)

**Script Path**  
/os/cron/tests/zoho\_rx.cgi  
Path to script for message processing

**Subscribe Heartbeat**  
Disabled  
Expect heartbeat signal

**Heartbeat Timeout**  
60  
Timeout interval in seconds

**Force Inverter Percent**  
100  
Force percent when no heartbeat received

Save Settings

The "Add received variables to global (sync)" option stores received data in global system variables that can be accessed by other system components, facilitating data integration between MQTT and other system functions. The enhanced version "Add received variables to global (sync) and send ACK" performs the same function but also sends an acknowledgment message back to the sender, confirming successful message receipt and processing.

The **Device to Update** dropdown appears for certain receive options and specifies which device within your system should be updated with incoming message data. This mapping ensures that incoming data is applied to the correct device and prevents data from being misrouted or applied incorrectly. When

wildcard channels are used in the Subscribe Channel field (indicated by the presence of "#"), the system automatically extracts device names from the incoming message topics. For example, if you subscribe to "/test/#" and receive a message on "/test/meter1", the system will automatically attempt to update a device named "meter1" with the message content. This automatic mapping simplifies configuration for systems with multiple devices but requires careful topic naming conventions to ensure proper device identification

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash write protection is enabled, you may need to temporarily disable it before saving system settings.

## Pyranometer Package

To use the Netra to automatically calculate performance and potential generation values using an irradiation sensor the Pyranometer package is required. This is installed automatically when Configuration Wizard is run with the appropriate options, but you may need to manually link the irradiance role and set the plant size or PR.

### CONFIGURE PACKAGE PYRANO



#### Pyranometer / Irradiation Sensor

Configure irradiation sensor settings and measurement parameters

##### Sensor Configuration

Scale Factor

The measured voltage will be multiplied by this to obtain the watt value

Role

Select an optional role to use as a voltage source or leave as undefined to use the default A3 input

Plant Size

Enter the plant size in kW

Static PR Ratio

Enter the performance ratio as a fraction (i.e. 0.8)

The Scale Factor should be left at 1 unless you are using an analog input of a device. The Role has a drop down of all the data points that are logged – select the device data point that has the solar irradiance value (directly from the actual pyranometer).

Enter the Plant Size as per the actual DC installed capacity. The Static PR ratio is used to calculate the potential generation and curtailment losses. The default value is 0.8 but you will need to adjust this

manually if you see a mismatch between the actual generation and the potential generation – this can be seen on the main Dashboard in Insight.

## Saving Configuration

To save the settings, click Save Settings and wait for a confirmation message - the floating save button in the bottom-right corner becomes active when changes are detected.

**Note:** When the device is running from flash memory with write protection enabled, the button displays "Flash Locked" and becomes disabled to prevent configuration changes. If flash writing protection is enabled, you may need to temporarily disable it before saving system settings.

## APPENDIX 1: NETRA NAMING CONVENTIONS

To use the Netra to automatically calculate performance and potential generation values using an irradiation sensor the Pyranometer package is required. This is installed automatically when Configuration Wizard is run with the appropriate options, but you may need to manually link the irradiance role and set the plant size or PR.

Parameter Name	Units	Description
ModelNumber	N/A	Device Model Number
SerialNumber	N/A	Device Serial Number
AC_Current	Amps	Total AC Current
AC_Current_A	Amps	AC Current Phase A
AC_Current_B	Amps	AC Current Phase B
AC_Current_C	Amps	AC Current Phase C
AC_Current_THD	%	Total AC Current - Total Harmonic Distortion
AC_Current_A_THD	%	AC Current Phase A - Total Harmonic Distortion
AC_Current_B_THD	%	AC Current Phase B - Total Harmonic Distortion
AC_Current_C_THD	%	AC Current Phase C - Total Harmonic Distortion
AC_Voltage	Volts	Total AC Voltage
AC_Voltage_AB	Volts	AC Voltage Phase A to Phase B
AC_Voltage_BC	Volts	AC Voltage Phase B to Phase C
AC_Voltage_CA	Volts	AC Voltage Phase C to Phase A
AC_Voltage_AN	Volts	AC Voltage Phase A to Neutral
AC_Voltage_BN	Volts	AC Voltage Phase B to Neutral
AC_Voltage_CN	Volts	AC Voltage Phase C to Neutral
AC_Voltage_THD	%	Total AC Voltage - Total Harmonic Distortion
AC_Voltage_AN_THD	%	AC Voltage Phase A to Neutral - Total Harmonic Distortion
AC_Voltage_BN_THD	%	AC Voltage Phase B to Neutral - Total Harmonic Distortion

AC_Voltage_CN_THD	%	AC Voltage Phase C to Neutral - Total Harmonic Distortion
AC_Active_Power	Watts	Total AC Active Power
AC_Active_Power_A	Watts	AC Active Power Phase A
AC_Active_Power_B	Watts	AC Active Power Phase B
AC_Active_Power_C	Watts	AC Active Power Phase C
AC_Active_Power_A_THD	%	AC Active Power Phase A - Total Harmonic Distortion
AC_Active_Power_B_THD	%	AC Active Power Phase B - Total Harmonic Distortion
AC_Active_Power_C_THD	%	AC Active Power Phase C - Total Harmonic Distortion
AC_Frequency	Hertz	Total AC Frequency
AC_Frequency_A	Hertz	AC Frequency Phase A
AC_Frequency_B	Hertz	AC Frequency Phase B
AC_Frequency_C	Hertz	AC Frequency Phase C
AC_Reactive_Power	VAR	Total AC Reactive Power
AC_Reactive_Power_A	VAR	AC Reactive Power Phase A
AC_Reactive_Power_B	VAR	AC Reactive Power Phase B
AC_Reactive_Power_C	VAR	AC Reactive Power Phase C
AC_Apparent_Power	Volt-Amps	Total AC Apparent Power
AC_Apparent_Power_A	Volt-Amps	AC Apparent Power Phase A
AC_Apparent_Power_B	Volt-Amps	AC Apparent Power Phase B
AC_Apparent_Power_C	Volt-Amps	AC Apparent Power Phase C
AC_PF	%	Total AC Power Factor
AC_PF_A	%	AC Power Factor Phase A
AC_PF_B	%	AC Power Factor Phase B
AC_PF_C	%	AC Power Factor Phase C
kWh_Total_Active	kWh	Lifetime Generation / Total Active Energy
kWh_Day_Active	kWh	Daily Generation
kVAh_Total_Active	kVAh	Total Apparent Energy
kVARh_Total_Active	kVARh	Total Reactive Energy
DC_Current	Amps	Total DC Current
DC_Current_1	Amps	DC Current PV 1
DC_Current_2	Amps	DC Current PV 2
DC_Current_3	Amps	DC Current PV 3
DC_Current_4	Amps	DC Current PV 4
DC_Current_5	Amps	DC Current PV 5
DC_Current_6	Amps	DC Current PV 6
DC_Current_7	Amps	DC Current PV 7
DC_Current_8	Amps	DC Current PV 8
DC_Current_9	Amps	DC Current PV 9
DC_Current_10	Amps	DC Current PV 10
DC_Current_11	Amps	DC Current PV 11
DC_Current_12	Amps	DC Current PV 12
DC_Voltage	Volts	Total DC Voltage
DC_Voltage_1	Volts	DC Voltage PV 1

DC_Voltage_2	Volts	DC Voltage PV 2
DC_Voltage_3	Volts	DC Voltage PV 3
DC_Voltage_4	Volts	DC Voltage PV 4
DC_Voltage_5	Volts	DC Voltage PV 5
DC_Voltage_6	Volts	DC Voltage PV 6
DC_Voltage_7	Volts	DC Voltage PV 7
DC_Voltage_8	Volts	DC Voltage PV 8
DC_Voltage_9	Volts	DC Voltage PV 9
DC_Voltage_10	Volts	DC Voltage PV 10
DC_Voltage_11	Volts	DC Voltage PV 11
DC_Voltage_12	Volts	DC Voltage PV 12
DC_Power	Watts	Total DC Power
DC_Power_1	Watts	DC Power PV 1
DC_Power_2	Watts	DC Power PV 2
DC_Power_3	Watts	DC Power PV 3
DC_Power_4	Watts	DC Power PV 4
DC_Power_5	Watts	DC Power PV 5
DC_Power_6	Watts	DC Power PV 6
DC_Power_7	Watts	DC Power PV 7
DC_Power_8	Watts	DC Power PV 8
Temperature_Internal	°C	Inverter Temperature
Current_String_1	Amps	String 1 Current
Current_String_2	Amps	String 2 Current
Current_String_3	Amps	String 3 Current
Current_String_4	Amps	String 4 Current
Current_String_5	Amps	String 5 Current
Current_String_6	Amps	String 6 Current
Current_String_7	Amps	String 7 Current
Current_String_8	Amps	String 8 Current
Current_String_9	Amps	String 9 Current
Current_String_10	Amps	String 10 Current
Current_String_11	Amps	String 11 Current
Current_String_12	Amps	String 12 Current
Current_String_13	Amps	String 13 Current
Current_String_14	Amps	String 14 Current
Current_String_15	Amps	String 15 Current
Current_String_16	Amps	String 16 Current
Current_String_17	Amps	String 17 Current
Current_String_18	Amps	String 18 Current
Current_String_19	Amps	String 19 Current
Current_String_20	Amps	String 20 Current
Current_String_21	Amps	String 21 Current
Current_String_22	Amps	String 22 Current
Current_String_23	Amps	String 23 Current
Current_String_24	Amps	String 24 Current
percent	%	Active Power Output Percent
Status_Code	N/A	Vendor-defined Operating State
Event_Code	N/A	Vendor-defined Events and Errors
AC_Input_Current	Amps	Total AC Input Current

AC_Input_Current_A	Amps	AC Input Current Phase A
AC_Input_Current_B	Amps	AC Input Current Phase B
AC_Input_Current_C	Amps	AC Input Current Phase C
AC_Output_Current	Amps	Total AC Output Current
AC_Output_Current_A	Amps	AC Output Current Phase A
AC_Output_Current_B	Amps	AC Output Current Phase B
AC_Output_Current_C	Amps	AC Output Current Phase C
AC_Input_Voltage	Volts	Total AC Input Voltage
AC_Input_Voltage_AN	Volts	AC Input Voltage Phase A to Neutral
AC_Input_Voltage_BN	Volts	AC Input Voltage Phase B to Neutral
AC_Input_Voltage_CN	Volts	AC Input Voltage Phase C to Neutral
AC_Output_Voltage	Volts	Total AC Output Voltage
AC_Output_Voltage_AN	Volts	AC Output Voltage Phase A to Neutral
AC_Output_Voltage_BN	Volts	AC Output Voltage Phase B to Neutral
AC_Output_Voltage_CN	Volts	AC Output Voltage Phase C to Neutral
AC_Input_Active_Power	Watts	Total AC Input Active Power
AC_Input_Active_Power_A	Watts	AC Input Active Power Phase A
AC_Input_Active_Power_B	Watts	AC Input Active Power Phase B
AC_Input_Active_Power_C	Watts	AC Input Active Power Phase C
AC_Output_Active_Power	Watts	Total AC Output Active Power
AC_Output_Active_Power_A	Watts	AC Output Active Power Phase A
AC_Output_Active_Power_B	Watts	AC Output Active Power Phase B
AC_Output_Active_Power_C	Watts	AC Output Active Power Phase C
AC_Input_Frequency	Hertz	Total AC Input Frequency
AC_Input_Frequency_A	Hertz	AC Input Frequency Phase A
AC_Input_Frequency_B	Hertz	AC Input Frequency Phase B
AC_Input_Frequency_C	Hertz	AC Input Frequency Phase C
AC_Output_Frequency	Hertz	Total AC Output Frequency
AC_Output_Frequency_A	Hertz	AC Output Frequency Phase A
AC_Output_Frequency_B	Hertz	AC Output Frequency Phase B
AC_Output_Frequency_C	Hertz	AC Output Frequency Phase C
Battery_Voltage	Volts	Battery Voltage
Battery_Current	Amps	Battery Current
Battery_Power	N/A	Battery Power
Battery_Temperature	°C	Battery Temperature
SoC	N/A	State of Charge
Charge_State	%	Charge State
Charge_Power_Day	Watts	Daily Maximum Charge Power
Charge_State	N/A	Charge State
kWh_Total_Input	kWh	Total Input Energy
kWh_Day_Input	kWh	Daily Input Energy
kWh_Total_Output	kWh	Total Output Energy
kWh_Day_Output	kWh	Daily Output Energy
kWh_Battery_Charge	kWh	Total Battery Charge Energy

kWh_Battery_Discharge	kWh	Total Battery Discharge Energy
kWh_Total_Export	kWh	Total Export Energy
kWh_Total_Import	kWh	Total Import Energy
kWh_Day_Export	kWh	Daily Export Energy
kWh_Day_Import	kWh	Daily Import Energy
kVAh_Total_Export	kVAh	Total Export Apparent Energy
kVAh_Total_Import	kVAh	Total Import Apparent Energy
kVARh_Total_Export	kVARh	Total Export Reactive Energy
kVARh_Total_Import	kVARh	Total Import Reactive Energy
kVARh_Lag	kVARh	Total Reactive Energy – Lag
kVARh_Lead	kVARh	Total Reactive Energy – Lead
kWh_Total_Utility	kWh	Total Utility Energy
kWh_Total_Genset	kWh	Total Generator Energy
AC_Current_MaxDemand	Amps	Total AC Current - Maximum Demand
W_Max_Demand	Watts	Total AC Active Power - Maximum Demand
VAR_Max_Demand	VAR	Total AC Reactive Power - Maximum Demand
VA_Max_Demand	Volt-Amps	Total AC Apparent Power - Maximum Demand
VA_Max_Demand	Volt-Amps	Total AC Apparent Power - Maximum Demand
VA_Max_Demand	Volt-Amps	Total AC Apparent Power - Maximum Demand
Output_Current	Amps	Output Current
Output_Voltage	Volts	Output Voltage
Output_Power	Watts	Output Power
Output_Frequency	Hertz	Output Frequency
Motor_Speed	RPM	Motor / Pump Running Speed
Flow_Rate	l/hr	Flow Rate of Pum
Day_Flow	Litres	Day Flow
Power_On_Time	Hours	Current Power-Up Time
Running_Time	Hours	Current Running Time
Total_Power_On_Time	Hours	Total Power-Up Time
Total_Running_Time	Hours	Total Running Time
Active_Irradiance	w/m2	Solar Irradiance
Active_Irradiance_Uncor- rected	w/m2	Solar Irradiance without Temperature Correction
kWh_Day_Irradiance	Kilowatts	Daily Irradiance
Cell_Temperature	°C / °K	Solar Irradiance Cell Temperature
Wind_Speed	km/h	Wind Speed
Wind_Direction	°	Wind Direction
Ambient_Temperature	°C	Ambient Temperature
Module_Temperature	°C	Module Temperature
Relative_Humidity	%	Relative Humidity
Rainfall	mm	Daily Rainfall
Atmospheric_Pressure	mbar	Atmospheric Pressure
kW_Potential_Active	Kilowatts	Potential Generation
kWh_Curtailment_Lifetime	kWh	Total kWh Lost Due to Curtailment
kWh_Curtailment_Day	kWh	Total kWh Lost Due to Curtailment
kWh_Curtailment_DG_Day	kWh	Total kWh Lost Due To DG Curtailment

kWh_Curtailment_Grid_Day	kWh	Total kWh Lost Due To DG Curtailment
kW_Active_Generation	Kilowatts	Total kWh Lost Due To DG Curtailment
Live_PR	%	Live Performance Ratio Value
Daily_PR	%	Daily Performance Ratio Value

The following table lists the preferred role ordering when creating device drivers.

<b>Role Index</b>	<b>Role Name 0</b>	<b>Alt. Role Name</b>
	<b>AC_Active_Power</b>	
<b>1</b>	<b>AC_Reactive_Power</b>	<b>DC_Power</b>
<b>2</b>	<b>AC_Apparent_Power</b>	<b>AC_PF</b>
<b>3</b>	<b>kWh_Total_Active</b>	<b>kWh_Total_Export</b>
<b>4</b>	<b>kWh_Day_Active</b>	<b>kWh_Total_Import</b>
<b>5</b>	<b>As per Register Address Order</b>	<b>As per Register Address Order</b>
<b>6</b>	<b>As per Register Address Order</b>	<b>As per Register Address Order</b>
<b>7</b>	<b>As per Register Address Order</b>	<b>As per Register Address Order</b>



**NETRA**