EKOSync 1588

PTP / NTP TIME SERVER

Operational Manual

www.arftechnologies.com

Description

This manual is issued for reference only, at the convenience of Arf Technologies. Reasonable effort was made to verify that all contents were accurate as of the time of publication.

What This Manual Covers

This manual describes the set up and operation of the EKOSync 1588 series time servers.
The industrial time server models EKOSync 1588A and EKOSync 1588B are designated as EKOSync 1588M1 and EKOSync 1588M2, respectively, for versions that comply with MIL-STD military testing standards. While the core technology and functionality remain unchanged, this distinction ensures clear differentiation between industrial and military-certified variants, particularly in regulatory and contractual contexts.

The use of distinct model codes is necessary due to specific sales terms that govern these product lines, which impact compliance, export control, and contractual obligations. Restricting military applications to EKOSync 1588M1 and EKOSync 1588M2 helps manage licensing requirements, mitigate legal risks, and maintain alignment with OEM policies, safeguarding the company from unintended liability. Additionally, deployment of these military-compliant models requires explicit approval from the OEM, ARF Technologies, ensuring that all transactions adhere to the established terms and conditions.

Date of Issue November 14, 2024

Firmware Version This manual is applicable to the following firmware versions and later:

For EKOSync 1588A :	SYN101V4.0.0N0.0O0.0
	SYN101V4.0.0N0.0P0.0
For EKOSync 1588B :	2.9.10.010922

Contact Information

ARF TEKNOLOJİ ANONİM ŞİRKETİ
İSTİNYE MAH. RESSAM HİKMET ONAT SK. 9
SARIYER/ İSTANBUL

www.arftechnologies.com
+90 266 502 44 15
info@arftechnologies.com

Unpacking the Device

1.1 Introduction

This section will assist you with unpacking the clock from its shipping container; other parts and accessories shipped with the standard configuration device include ***(Figure 1.1):***

1. EKOSync 1588A/B Time Server
2. Standard 30m timing cable
3. Bracket for pole mounting or wall mounting
4. Timing antenna compatible with the device

Figure 1.1: Packaging of the Device and Accessories

1.2 Precautions

Mechanical Shock

Be aware that the GNSS antenna is small and smooth, making it vulnerable to damage if dropped. Handle it with care, and ensure it is stored safely before the final installation.

Static Discharge

The Model 1588A and 1588B are electronic devices with static-sensitive components. Extra caution is required to avoid static discharges while handling them. While these components are generally protected during normal use, some parts may be exposed when the cover is removed.

CAUTION - Antenna Input Connector

Only connect the antenna cable to this input (see Fig 2.2 or 2.4). The antenna input connects directly to the GNSS receiver inside the clock, which can be damaged by high voltage or static discharge. To safeguard the GNSS clock during operation, consider using an optional surge arrester (see Section 3.3 for more details).

1.3 Unpacking and Locating Accessories

The Model 1588A/B, and included accessories, are packed between two closed-cell foam shells (see Figure 1.1). The Model 1588A/B series clocks are packed between layers of molded foam pieces. Carefully pull apart the two shells to extract the clock and accessories. Some of the accessories (i.e. antenna and rack-mount ears) are located in one of these shells for protection.

1.4 Mounting the Device

The device's case has two rack mounting ears suitable for mounting to a 19-inch system rack ***(see Figure 1.2).*** Each ear has two holes, which are used to screw the device into the rack cabinet. You can easily mount and use the device with the ears located on the right and left sides of the panel.

Figure 1.2: Rack Mounting Ears

Carefully place the device into your 19-inch rack and ensure it is secured using the rack mounting ears. Make sure there is adequate airflow around the device to prevent overheating. Ensure easy access to the device's front panel, as it is important for the LED indicators and other controls to be easily reachable. Organize the ethernet and other cables properly to reduce clutter and minimize the risk of potential damage.

Front and Rear Panels

2.1 Introduction

This section identifies the connectors, controls, and displays found on the front and rear panels of the 1855A/B devices. Take care to review all of these items prior to connecting cables to and configuring these products.

Figure 2.1: Front Panel of 1588A

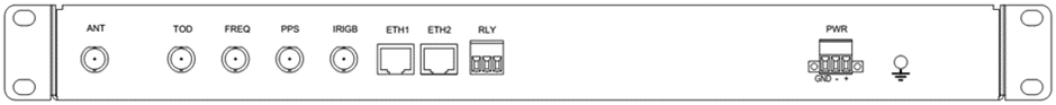


Figure 2.2: Rear Panel of 1588A

Figure 2.3: Front Panel of 1588B

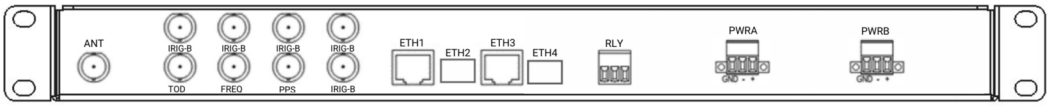


Figure 2.4: Rear Panel of 1588B

2.2 Front Panel Controls and Indicators

On the front panels of both models, there is an LCD screen, LED indicators, and an encoder ***(see Figure 2.1, Figure 2.3).***

The LCD screen displays time, date information, the device's operating mode, and time zone details. The LED indicators provide visual feedback on the device's synchronization status and ethernet connection status. Additionally, with the encoder, you can navigate through the LCD menu to retrieve information and configure the device settings ***(see Chapter 7 LCD Menu).***

2.2.1 LCD Display

The LCD screen displays time, date information, the device's operating mode, and time zone details.

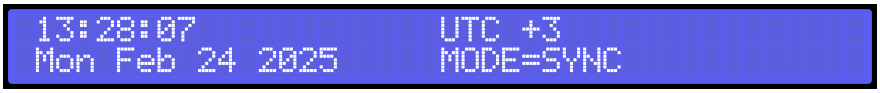


Figure 2.5 LCD display of EKOSync 1588A/B

The time information is in the Hour:Minute:Second format.

The date information is in the Month Day Year format.

The time zone is shown based on UTC (Coordinated Universal Time).

Mode shows the current operating mode of the device according to the antenna. The device has 3 modes:

1. **FREE:** The mode in which the device does not receive information from the antenna when it is first powered on.
2. **SYNC:** The device enters this mode when it successfully establishes a connection to the antenna and synchronizes with it. In Sync Mode, the device can accurately maintain time based on the information received from the antenna.
3. **HOLDOVER:** Holdover Mode is activated when the antenna connection is lost or weakened after Sync Mode. Despite this disconnection, the device continues to provide time information by relying on its internal oscillator. This ensures that timekeeping is maintained even in the absence of a valid antenna signal.

2.2.2 LED Status Indicators

The LED Status Indicators give information about device status. EKOSync 1588A and 1588B models contains different number of LEDs. Each LED status is further explained with pictures below.

2.2.2.1 EKOSync 1588A LEDs

EKOSync 1588A consists of 8 LEDs as shown in ***Figure 2.6.***

Figure 2.6 EKOSync 1588A LED Indicators

PWR

ON	OFF
	

PTP

Indicates whether the PTP protocol is activated for synchronization via the web interface, where it can be activated/deactivated.

ON	OFF
	
PTP is active.	PTP is passive.

NTP

Indicates whether the NTP protocol is activated for synchronization via the web interface, where it can be activated/deactivated.

ON	OFF
	
NTP is active.	NTP is passive.

TP – Time Pulse

This LED shows the servers synchronization status. Each blink represents the time pulse coming from the satellite or internal oscillator. Blinking TP led represents the SYNC or HOLDOVER mode.

Blinking	Solid On
	
The TP LED blinks when the device is synchronized to the antenna time or internal oscillator and is actively receiving time pulses from it, indicating Sync or Holdover modes.	The TP LED remains steadily on (without blinking) if the device is not synchronized to the antenna time. This represents the FREE mode.

ETH

State				
Meaning	No connection	Connected and communicating with 10 Mbps	Connected and communicating with 100 Mbps	Connected and communicating with 1000 Mbps

Table 2.1 EKOSync 1588A ETH LED Indicators

2.2.2.1 EKOSync 1588B LEDs

EKOSync 1588B consists of 14 LEDs as shown in ***Figure 2.7.***

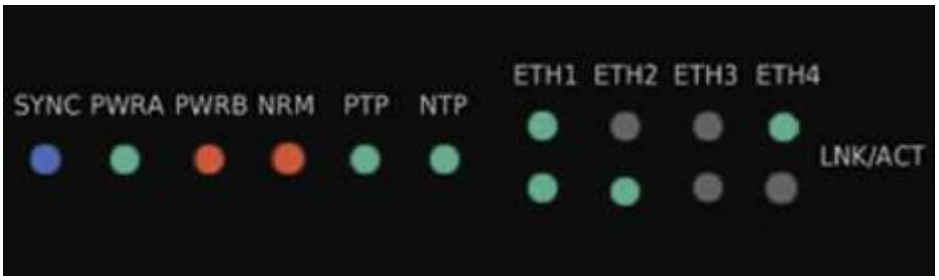


Figure 2.7 EKOSync 1588B LED Indicators

SYNC

Blinking	Solid On
	
The SYNC LED blinks when the device is synchronized to the antenna time and is actively receiving time pulses from it.	The SYNC LED remains steadily on (without blinking) if the device is not synchronized to the antenna time and is not receiving time pulses from it.

PWR

EKOSync 1588B has two hot-swappable power supplies to provide power redundancy and ensure uninterrupted operation. Each power unit has its own LEDs as indicated with PWRA and PWRB below and operates independently.

One power supply is sufficient to operate the time server; however, two power supplies are recommended for redundancy.

ON	OFF
 	 

NRM

	
ALARM The device is not functioning normally. Check if the antenna connection is lost or if one of the redundant power supplies has failed.	**NORMAL OPERATION** The device is functioning properly. The antenna connection is stable, and both redundant power supplies are operating as expected.

PTP

ON	OFF
	

NTP

ON	OFF
	

ETH

State				
Meaning	No connection	Connected and communicating with 10 Mbps	Connected and communicating with 100 Mbps	Connected and communicating with 1000 Mbps

2.2.3 Encoder

The encoder allows access to the LCD menu and selection of configuration parameters. Pressing the encoder confirms a selection; while turning it scrolls through the options.

For EKOSync 1588A, pressing the encoder for 3 seconds resets the time server to its default settings.

2.3 Rear Panel Identification and Connectors

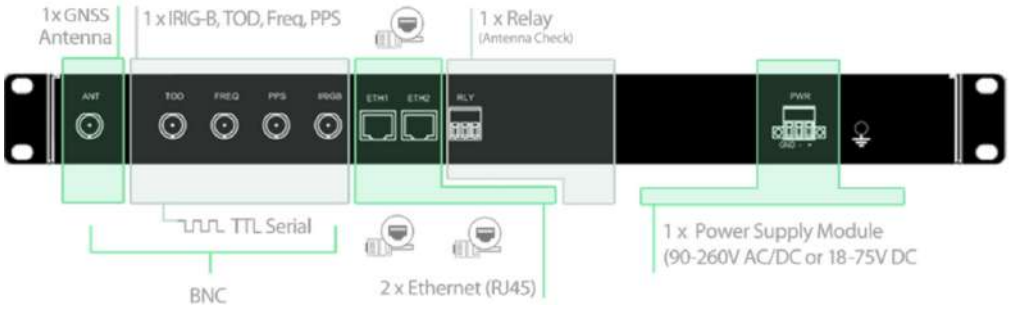


Figure 2.8 EKOSync 1588A Rear Panel

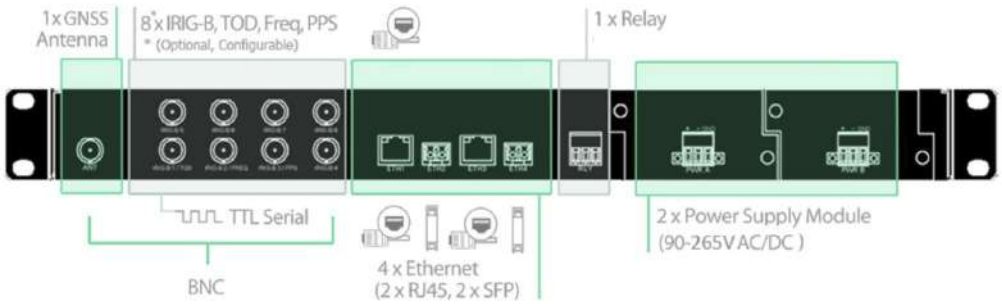


Figure 2.9 EKOSync 1588B Rear Panel

	1588A		1588B	
Antenna Connector	BNC female		BNC female	
TTL Ports	1x TOD 1x FREQ 1x PPS 1x IRIG-B		8x IRIG-B	5x IRIG-B 1x TOD 1x FEQ 1x PPS
Ethernet ports	2x RJ45 ports		2x RJ45 ports 2x SFP ports	
Alarm Relay	✓		✓	
Power Unit	18-75 V DC	90-240 V AC/DC	2x 90-265V AC/DC	

Table 2.1 EKOSync1588A/B Rear Panel Connectors

2.3.1 Power Inlet

This is the input used to connect the power supply for the operation of the device. It is important to use a proper and stable power supply or UPS (Uninterruptible Power Supply). The EKOSync 1588A device has 1 power inlet, and there are 2 options that support voltages of 18-75 V DC or 90-240 V AC/DC.

Figure 2.10 18-75 V DC Powered EKOSync 1588A Power Connection

Figure 2.11 90-240 V AC/DC Powered EKOSync 1588A Power Connection

The EKOSync 1588B device has 2 power inlets. Both inlets support voltages of 90-265V AC/DC.

It is crucial for the health of the device that the GND connection at the power input is made with a verified ground connection, and it should not be left without a ground connection.

2.3.2 Antenna Input

This is the connection point used to connect the GNSS antenna to the device. The GNSS antenna (50 Ω) receives GNSS signals to enable the device to perform precise time synchronization.

2.3.3 Standard Outputs

2.3.3.1 ToD

The ToD output provides precise "Time of Day" information for time synchronization purposes. The ToD (Time of Day) output can be used for time synchronization of other devices.

For example, in telecommunications networks or energy distribution systems, the ToD output can be utilized. An energy grid management system can use the ToD output to minimize time discrepancies between

different substations, enabling better planning and management of energy distribution. This enhances reliability and ensures more efficient use of energy resources.

2.3.3.2 FREQ

The FREQ output provides a frequency signal that can be used for synchronizing clocks or other time-sensitive equipment. The frequency options provided are 5, 10, 20, 25 MHz for the EKOSync1588 series. Frequency configuration can be performed through the LCD menu. The default frequency output is 10 MHz.

2.3.3.3 PPS

The PPS output delivers a pulse per second signal, commonly used for precise timing and synchronization in various systems. PPS has configurable parameters such as pulse period and pulse duration. Pulse period options are 1, 60, 3600 s. Pulse duration options are 100, 200, 500 ms. PPS configuration can be performed through the LCD menu.

2.3.3.4 IRIG-B

The device can provide time code signals compatible with the Inter-range Instrumentation Group IRIG 200-04 standard, enabling time synchronization with other compatible equipment. The time server supports IRIG 200-004 Standard and Extended versions. The table below shows the expected IRIG-B output properties:

Signal Type	DC level shift	
	Polarity non-inverted (RS-232 usually inverted)	
Signal Standards	IRIG 200-04	
	IEEE 1344*	
	IEEE C37.118-2005*	
Signal Properties	Amplitude	5.2V
Signal Extensions*	Local Offset	+0H
	Time Quality	0 UTC Traceable
	Time	Binary Seconds
	Parity	EVEN

Table 2.2 IRIG-B properties

* indicates extended version, which can be turned ON/OFF via LCD menu.

2.3.4 Ethernet Ports

The device features Gigabit Ethernet ports used for communication with the network. These ports can be utilized for various operations such as PTP (Precision Time Protocol) and NTP (Network Time Protocol) broadcasts, HTTP web server streaming, Telnet connections, and FTP transfers. These capabilities are enabled through the integration of the device into the network via an appropriate switch or router.

The EKOSync 1588A features two RJ45 ports, while the EKOSync 1588B includes two RJ45 ports and two SFP ports.

- In the EKOSync 1588A, both Ethernet ports support NTP, PTP, and HTTP protocols. With ETH1 and ETH2 ports on different subnets, it can broadcast on two separate subnets.
- Supported NTP/SNTP versions are NTP/SNTP v4, NTP/SNTP v3, NTP/SNTP v2.
- In the EKOSync 1588B, all four ports support NTP and PTP, with the last two ports ***(ETH3 and ETH4 as seen in Figure 2.12)*** additionally reserved for HTTP access. The B device can broadcast on four different subnets as long as they are on separate subnets.
- See Section 6.1 for details of accessing the web interface.

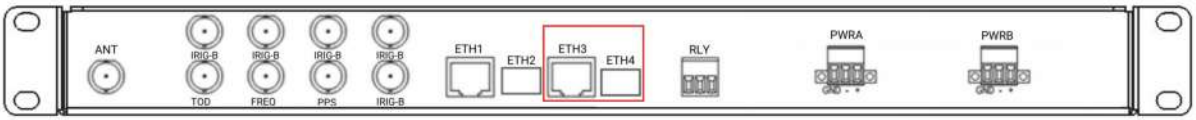


Figure 2.12 EKOSync 1588B ports that support HTTP

2.3.5 Alarm Relay

2.3.5.1 EKOSync 1588A Alarm Relay

The alarm relay output of the device is used to alert the user in the event of problems with the antenna connection. In case of synchronization loss from antenna and/or antenna disconnection, your device will automatically trigger the alarm.

Figure 2.13 Alarm Relay on EKOSync 1588A

Figure 2.14 Alarm Relay Close Up

If the device has no power, the Alarm contact is in the closed position. When the device is operational and the antenna connection is healthy, the OK contact will switch to the closed position, indicating normal operation.

(OK = Normally Open (NO), CM = Common, ALR = Normally Closed (NC))

2.3.5.2 EKOSync 1588B Alarm Relay

The alarm relay output alerts the user to issues with the antenna connection or redundant power supplies. If synchronization is lost or the antenna is disconnected, the alarm will trigger automatically. Similarly, a disconnection from either power supply (PWRA, PWRB) will also activate the alarm. When both the antenna and power supplies are functioning properly, no alarm will be triggered.

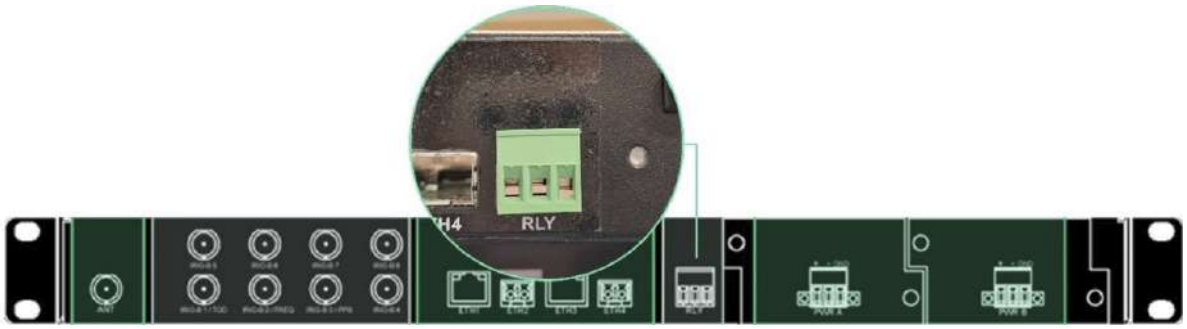


Figure 2.15 Alarm Relay on EKOSync 1588B

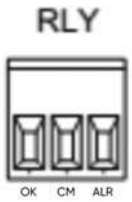


Figure 2.16 Alarm Relay Close Up

If the device has no power, the Alarm contact is in the closed position. When the device is operational, the antenna connection is healthy, and the two power supplies connected, the OK contact will switch to the closed position, indicating normal operation.

(OK = Normally Open (NO), CM = Common, ALR = Normally Closed (NC))

GNSS Antenna and Cable Information

3.1 Introduction

This chapter is designed to ensure smooth and accurate installation of the antenna, optimizing the performance of the device. The connected device receiver processes the data from the antenna to determine its position (requiring at least four satellites) and the exact time. Proper antenna installation plays a key role in achieving optimum precision. This chapter contains step-by-step instructions for installation.

Under favorable weather conditions, the standard antenna configuration can reach a standard time cable length of up to **60 meters** without a signal amplifier, and up to **160 meters with a signal amplifier.** For even longer antenna-to-server distances, please contact the manufacturer.

3.2 GNSS Antenna Installation

To properly receive GNSS signals, the GNSS antenna needs to be mounted clear of buildings and surrounding elements that may block the GNSS signals being transmitted by the satellites. For complete coverage, the antenna needs to have a clear view of the sky from 10 degrees above the horizon to directly overhead for all points of the compass. Minimal installations, where the antenna is mounted in a less favourable location, may work however reception may be somewhat limited during certain hours of the day.

3.2.1 Mounting the Antenna

TThe EKOSync 1588 Series PTP/NTP Time Server includes the following antenna accessories ***(Figure 3.1):***

- Conical radome timing GNSS antenna (No:1).
  Note: Must be fitted in open sky view area in vertical position!
- 3 kV insulated, stainless steel antenna mounting apparatus (No:2).
- 30m RWC200PE 50 Ω coaxial cable (No: 5) with BNC (No:6) and TNC (antenna side) connectors (No: 3).
  Note: Other antenna and cable options may be available depending on the desired configuration.
- GT-TFF-AL Surge Protector Gas Discharge Tube (No: 4).
  Note: Surge protection and lightning protection systems should only be installed by people with suitable electrical installation expertise.

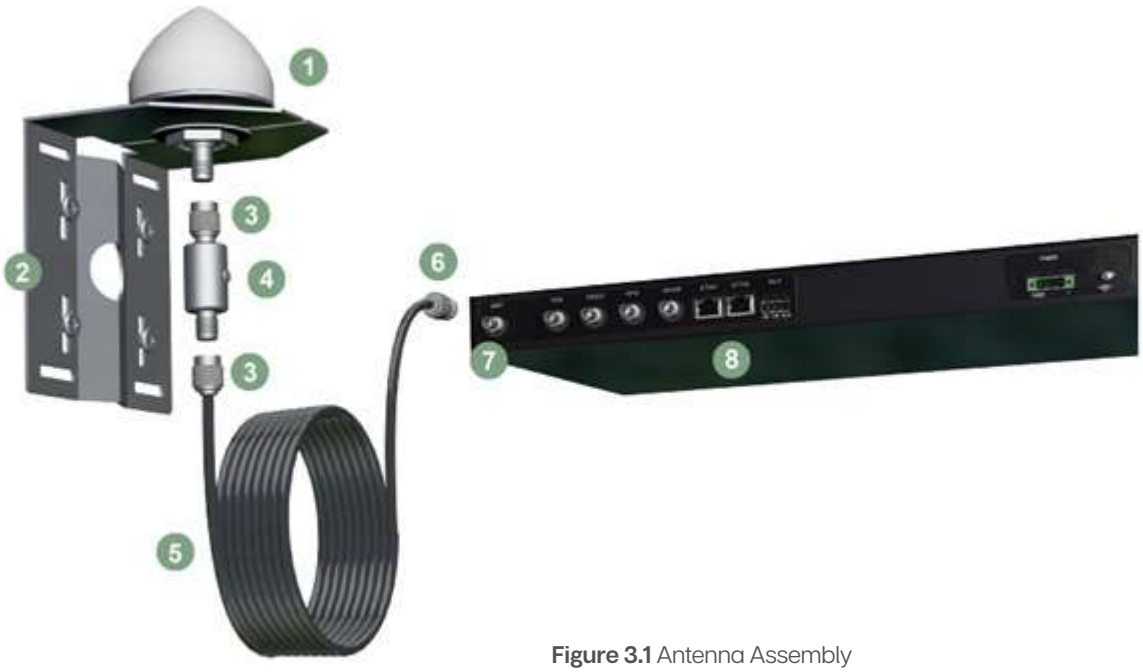


Figure 3.1 Antenna Assembly

No	Parts (Figure 3.1)
1	Timing GNSS antenna
2	3 kV insulated, stainless steel antenna mounting apparatus
3	TNC Connectors
4	GT-TFF-AL Surge Protector with connection cable (optional)
5	30m RWC200PE 50 Ω coaxial cable
6	BNC Connector
7	Device's BNC antenna port
8	EKOSync 1588 Series Device

Table 3.1 Antenna Assembly Components Information

3.2.2 Points to Consider

GNSS satellites are located about 19,312 kilometres away in space. Therefore, it's important to mount GNSS antennas in a place where they have a clear view of the sky in all directions (360°) and are spaced well apart from each other. This simple rule is often overlooked, which can lead to poor performance.

A clear 360° view is crucial. Additionally, it's important not to install antennas too close to each other. Since these antennas are outside, they face various harsh weather conditions, from extreme heat to heavy rain and snow. Proper placement is key for their effective operation and durability.

Busy Roof Space: Roof spaces that are already crowded can cause issues. This includes interference from systems like line-of-sight radio links and electrical setups, such as air conditioning units that emit strong or broadband interference. Shown at the below ***Figure 3.2.***

Figure 3.2 Busy Roof Space

Pole Sharing: It's important to regularly monitor antenna installations for unauthorized additions. Even if you've installed your antenna with a clear 360° view on a new pole, someone might add their radio equipment later. For instance, a 2.4 GHz point-to-point link without lightning protection could be a concern.

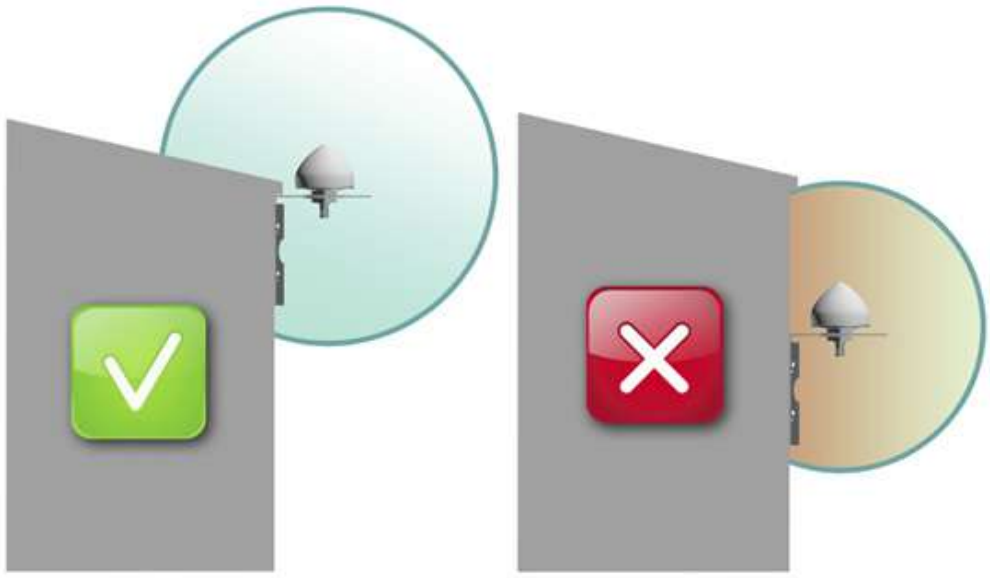


Figure 3.3 Correct and Incorrect Assembly Applications

Antenna Cable Runs: The antenna usually transmits at GNSS L1 frequency (1.575 GHz). Therefore, use suitable low-loss cables like LMR400, avoiding tight bends or crushing the cable. Keep these cables away from high voltage or 3-phase cables.

Lightning Protection: Lightning protection (surge arrester) is crucial for safety and to reduce equipment damage. Antennas should be mounted below the building's lightning conductor and connected to an approved ground. Install lightning arrestors at points where cables enter or exit the building.

3.2.3 GNSS Antenna & Antenna Apparatus Assembly

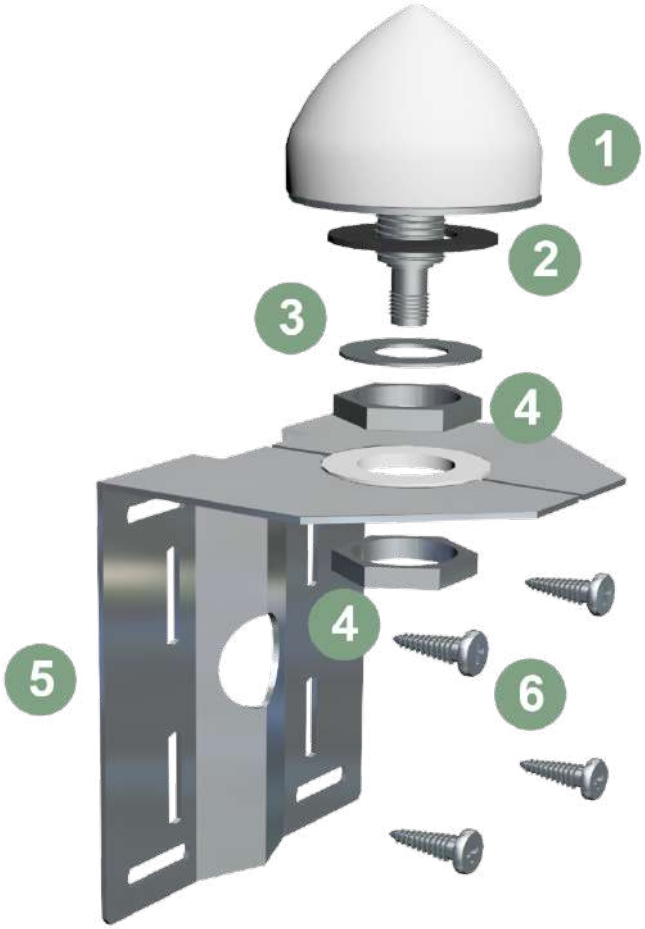


Figure 3.4 Antenna Mounting Components

No	Parts (Figure 3.4)
1	Conical radome timing GNSS antenna with TNC Male Connector
2	Black rubber seal
3	Steel Washer
4	Antenna mounting nuts
5	3 kV insulated, stainless steel antenna mounting apparatus
6	4x10 mm wall mounting screws

Table 3.2 Antenna Mounting Components Information

Note: The type of connection elements such as seals and nuts may vary depending on the antenna model.

3.2.4 Stainless Steel Antenna Mounting Apparatus

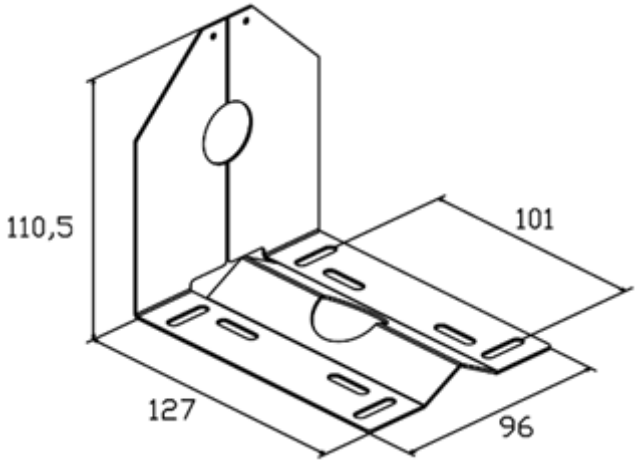


Figure 3.5 Stainless steel antenna mounting apparatus dimensions in mm

3.3 Surge Protector

Figure 3.6 shows the GT-TFF-AL GNSS Surge Arrester Kit, designed for in-line installation with the antenna cable. This surge suppressor features two female Type-N connectors, which are bidirectional, along with two grounding lugs equipped with hardware for solid grounding connections. The surge arrester allows the necessary DC power to pass through to the GNSS antenna while ensuring protection from lightning or electrical surges, without drawing power from the time server.

Figure 3.6 Surge Protector

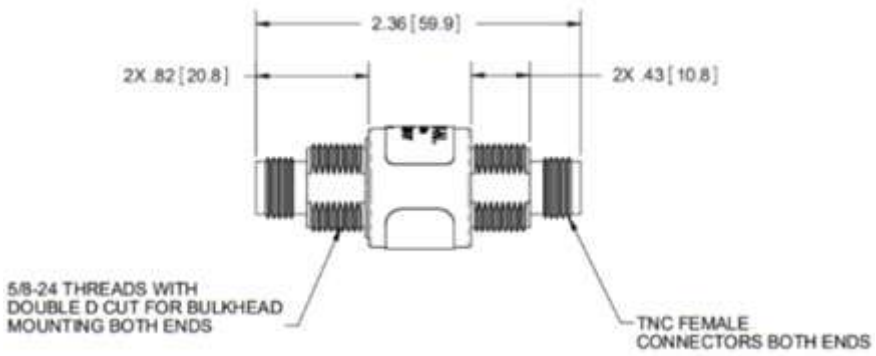


Figure 3.7 Surge Protector dimensions in inches [in mm]

Startup and Basic Operation

In this chapter, you will find the steps to set up and prepare your EKOSync 1588 series devices for initial use. Please carefully read the user manual and follow the instructions before installing the device correctly.

4.1 Device Installation

Physical Connection of the Device: You can install the device by following these steps:

a. Place the EKOSync 1588A/B device properly into a rack-type cabinet.

b. Use an appropriate rack mounting kit or bracket to install the device into your rack cabinet. Follow these steps for the installation:

- Find a suitable space in your rack cabinet and place the EKOSync 1588A/B device onto the rack.
- Use the holes located on the sides of the device to secure it with the front screws (M4 or M6) of your rack cabinet.
- Ensure that the device is securely mounted.

Power Connection: Connect the power supply of the device properly to the designated power source 18-75V DC or 90-240V AC/DC for EKOSync 1588A; 90-265 V AC/DC for EKOSync 1588B (See Section 2.3.1). The device will perform the startup process and transition to the main screen.

Network Connection: Connect the ethernet ports located on the rear panel of the device to a compatible RJ45 or SFP (in case of 1588B with SFP and RJ45 ports) network switch or router in your network. Once the ethernet cable is connected, the device will communicate with your network. You can monitor the connection status and speed through the ETH1 and ETH2 LEDs located on the front of the device.

Antenna Connection: Place the antenna in a location with a clear view of the sky and connect it properly to the EKOSync 1588A/B device via the antenna input using the included antenna cable. You can check the status of the antenna connection via the device's alarm relay output.
Connecting Clock Outputs: After configuring the EKOSync 1588A/B connections, connect your clock outputs to your devices.

Note: It is recommended to use RG58 cable to connect your devices to the output ports.

Alarm Relay Connection: Make the alarm relay connection for antenna connection check. For more information see Section 2.3.5.

4.2 Initial Startup Sequence

After connecting the device to the power source and establishing the antenna and network connections, the EKOSync 1588A/B devices will complete the startup process and display the main screen. On the main screen, you will see the basic time and date information.

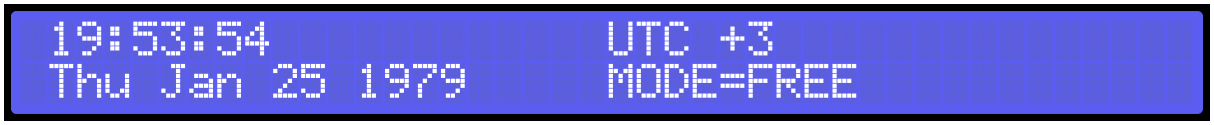


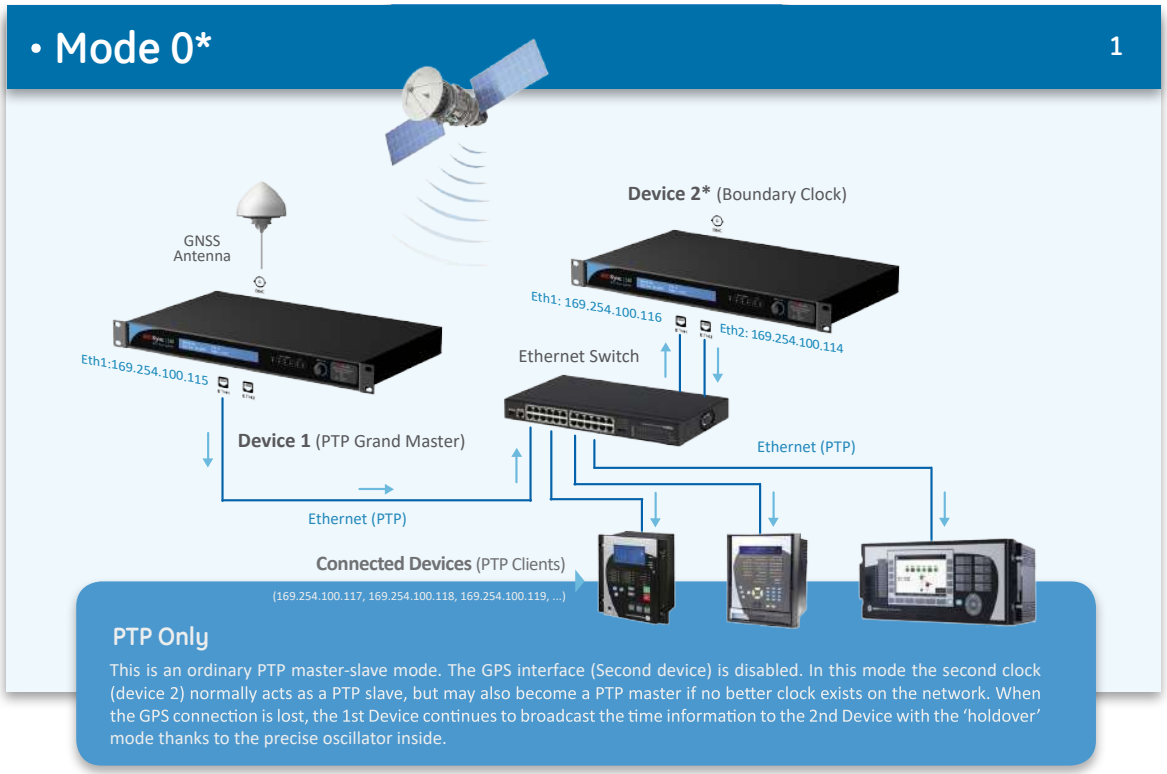
Figure 4.1 Display Screen Initial Startup

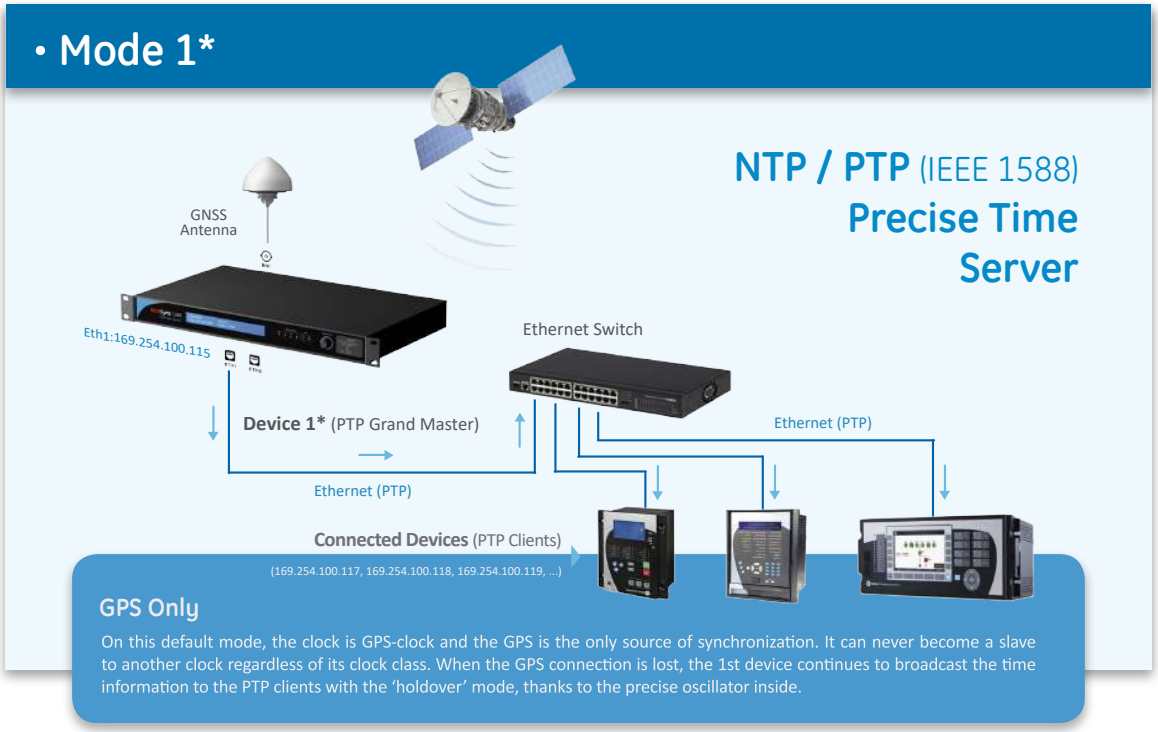
Once you have successfully installed and completed the initial startup of your EKOSync 1588A/B device, you can begin exploring the device's interface and configuring various settings. The guidance in the later chapters of the user manual will assist you with this.

For more information, refer to the "Web Interface Introduction" chapter. If you have any questions or need assistance, contact your supplier.

PTP Working Modes

The EKOSync 1588 Series comes out of the box with Mode 1 (GPS Only). Please contact the manufacturer for other mode options.





• Mode 2*

2

GPS Primary, PTP Secondary

This mode is almost the same as Mode 1, but after the holdover interval it can potentially become a PTP slave if a better clock appears on the network. It means that the clock has the GPS-signal as its primary source of synchronization and the PTP as a backup source. when no GPS-signal present.

• Mode 3*

PTP Primary, GPS Secondary

This mode is designed for unstable GPS-reception environments, where the node having a better signal reception becomes a PTP master and all others become PTP slaves, even if they have their own GPS-signal. Depend on the reception quality, that clock which has a higher priority (better GPS signal reception) becomes the PTP master on the network and all others synchronize with it.

Web Interface Introduction

The EKOSync 1588A/B can be easily configured through a user-friendly web-based interface. This feature makes it quite simple to configure the device's settings, time synchronization configurations, and monitor the device's status. Below is an introduction to the web interface and key features of the EKOSync 1588A/B devices.

6.1 Accessing the Web Interface

To access the web interface of the EKOSync 1588A/B device, first ensure that the device is connected to the network by following these steps:

- Connect your computer's ethernet port to the time server's assigned ethernet ports ***(Table 6.1).*** For visual representation of the assigned port see Fig. 2.12

For EKOSync 1588A	For EKOSync 1588B
ETH1 and ETH2	ETH3 and ETH4

Table 6.1 Ethernet ports assigned to accessing web interface

- Configure the computer's IP address within the same subnet with the time servers. For the default IP addresses and default subnet masks given in ***Table 6.2***, suitable IP address range for the computer is 169.254.0.1 - 169.254.255.254
  (Caution: the same IP address cannot be given to both the computer and the time server's connected ethernet port.)
- The current IP search of the time server can be found in LCD display screen. The default IP addresses can be found in ***Table 6.2.***

EKOSync 1588A		
ETH1	169.254.100.115	255.255.0.0
ETH2	169.254.100.112	255.255.0.0
EKOSync 1588B		
ETH1	169.254.100.114	255.255.0.0
ETH2	169.254.100.111	255.255.0.0
ETH3	169.254.100.115	255.255.0.0
ETH4	169.254.100.112	255.255.0.0

Table 6.2 EKOSync 1588A/B Default IP Addresses and Subnet Masks

- The default port number is 7070.
- Open a modern web browser and enter the device's IP address and port number into the browser's address bar. Example of a web search line: 169.254.100.115:7070 ***(as seen in Figure 6.1)***

Subnets:

- **EKOSync 1588A:** With ETH1 and ETH2 ports on different subnets, it can broadcast on two separate subnets.

- **EKOSync 1588B:** With Ethernet ports on different subnets, it can broadcast on four different subnets.

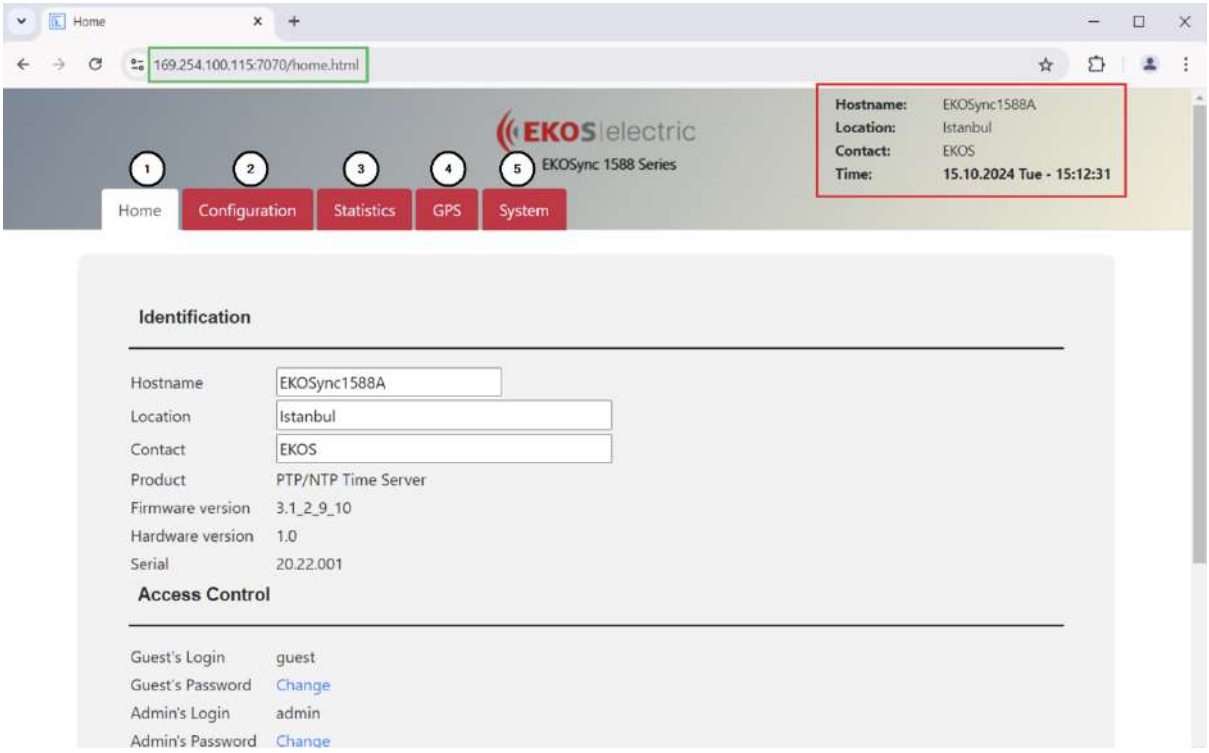


Figure 6.1 Web Interface of EKOSync 1588A

6.2 Login and User Authorization

When you access the web interface, you will need to log in with your username and password. By default, the username and password for the device are given in ***Table 6.3.*** For security reasons, it is recommended to change your password regularly.

Model	Username	Password
EKOSync 1588A	admin	admin
EKOSync 1588B	admin	nimda

Table 6.3 The default login information

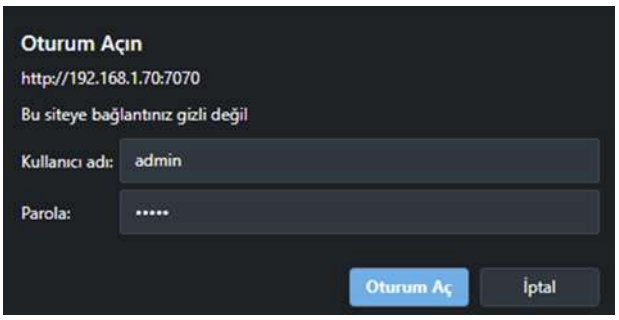


Figure 6.2 Web Interface Login

6.3 Main Screen and Time Information

Once you log in to the web interface, the main screen will display the basic time and date information of the EKOSync 1588A/B devices (see red square in Fig. 6.1). With five intuitive sections, you gain complete control over every aspect of your time server, ensuring seamless and precise synchronization at your fingertips.

6.4 Settings and Configuration Page

In the web interface, various configuration options such as time synchronization, network settings, and regional settings are available. You can access 4 menus (see in Figure 6.3) to configure the settings and make any desired changes.

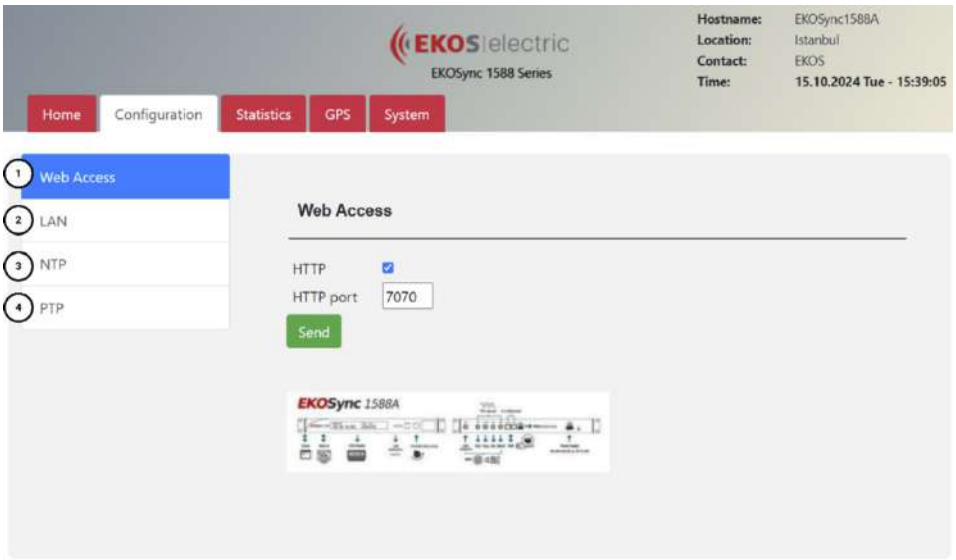


Figure 6.3 The Configurations Screen Overview for EKOSync 1588A

6.5 Alarms and Notifications

The EKOSync 1588A device can alert users about specific events and statuses through the E-Mail service. On the SMTP page, you can configure various options for email notifications (see section 7.5.2).

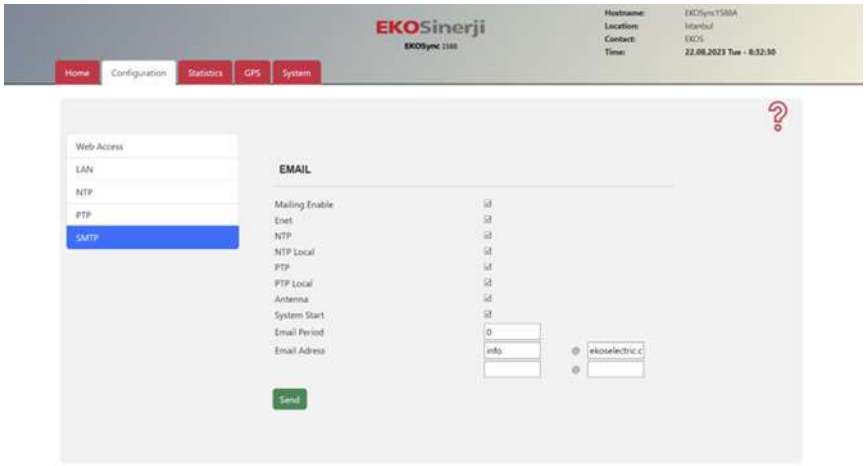


Figure 6.4 The Configurations SMTP Screen for EKOSync 1588A

Configuration via The Web Interface

The web-based interface of the EKOSync 1588A/B includes many important features, ranging from configuring the basic time and date information to adjusting network settings, monitoring device performance statistics, and observing GNSS information. Below, you can find detailed information about the pages available in the interface.

7.1 Home Page

7.1.1 Identification

- **Hostname:** Used to assign a unique name to your device, making it easier to identify on the network.
- **Location:** Allows you to enter information about the physical location of the device.
- **Contact:** You can add contact information related to the device.
- **Product:** Displays the name of the device.
- **Firmware Version:** Shows the currently installed firmware version of the device.
- **Hardware Version:** Displays the hardware version of the device.
- **Serial:** Displays the serial number of the device.

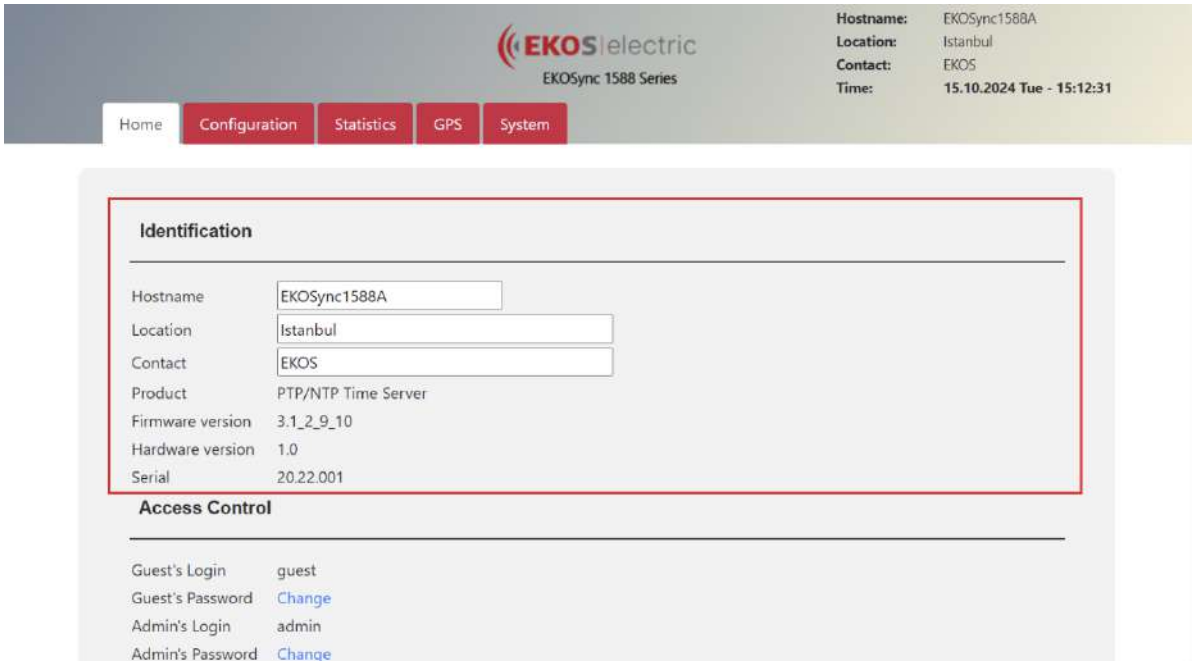


Figure 7.1 Home Page – Identification

7.1.2 Access Control

- **Guest's Login:** Displays the login information for the guest user.
- **Guest's Password:** Used to set a password for the guest user.
- **Admin's Login:** Displays the login information for the admin user.
- **Admin's Password:** Used to set a password for the admin user.

Figure 7.2 Home Page – Access Control & Time Settings & Others

7.1.3 Time Settings

- **Timezone:** Used to select the appropriate time zone for the geographical region where the device is located. The correct time zone helps the device provide accurate time and date information. This setting is set to EAT (UTC+3) by default. See Fig 8.5 for all available timezones.
- **Daylight Saving Time (DST):** Enables or disables the daylight-saving time feature. If daylight saving time is enabled, you can configure the DST setting to allow the device to automatically adjust the time zone. This setting is disabled by default.

7.1.4 Others

- **LCD Backlight:** Controls the backlight feature of the LCD screen located on the front panel.

7.2 Configuration Page

7.2.1 Web Access

- **HTTP:** Enables or disables web access.
- **HTTP Port:** Specifies the port number used for HTTP access.

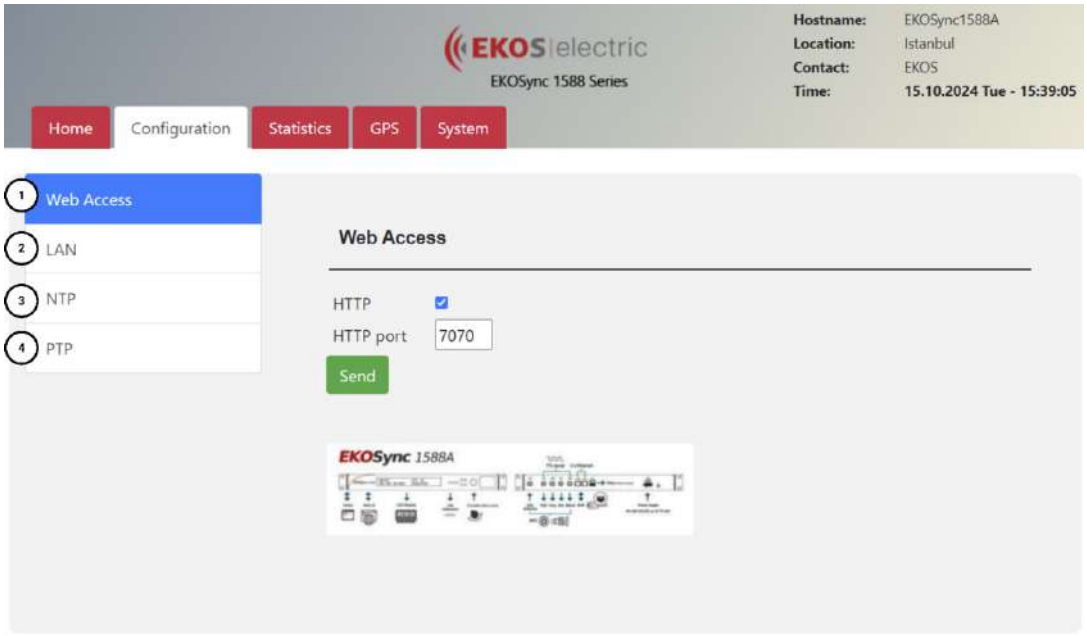


Figure 7.3 Configuration Page – Web Access

7.2.2 LAN

EKOSync 1588A has 2 ethernet ports. ETH1 and ETH2 port configurations can be made in this screen (see Fig 7.6).

EKOSync 1588B has 2 ethernet ports, 2 SFP ports. ETH1, ETH2, ETH3 and ETH4 port configurations can be made in this screen (see Fig 7.7).

- **ETHx:**
  - IP Address: Enter the IP address for ETHx.
  - Gateway: Specify the gateway address for ETHx.
  - Mask: Set the subnet mask for ETHx.
  - MAC Address: View the MAC address for ETHx.

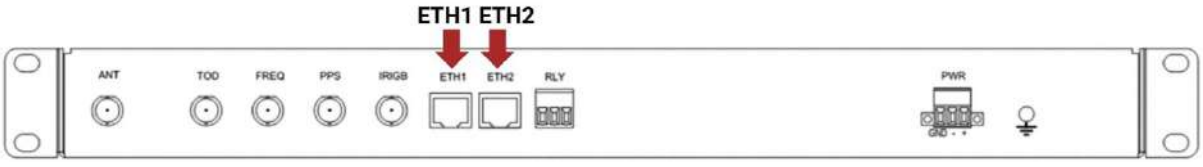


Figure 7.4 Ethernet Ports of EKOSync 1588A

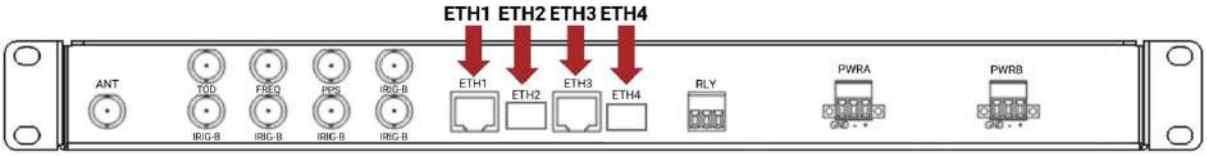


Figure 7.5 Ethernet Ports of EKOSync 1588B

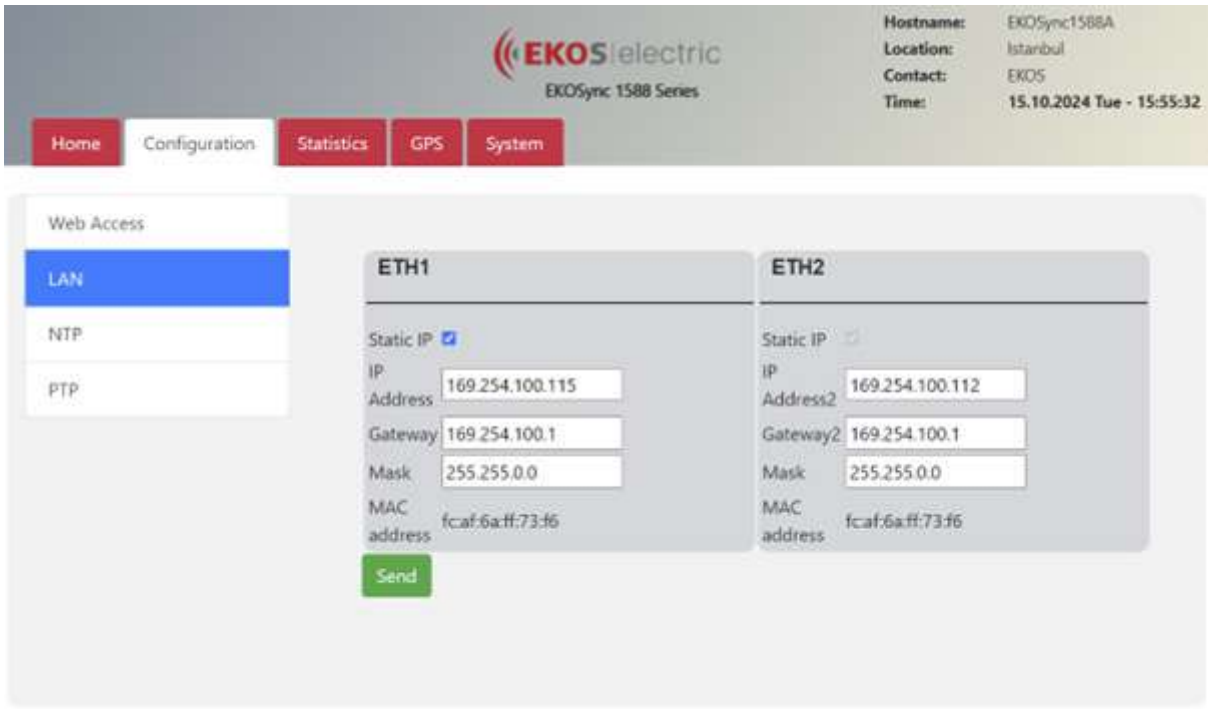


Figure 7.6 Configuration Page – LAN (EKOSync 1588A)

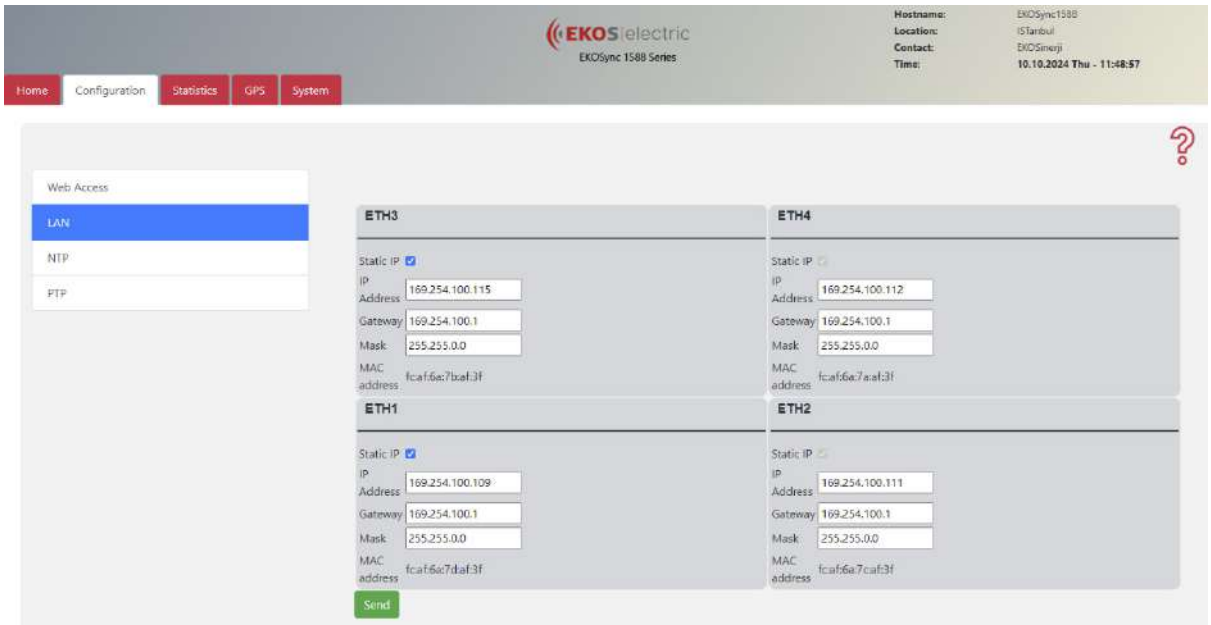


Figure 7.7 Configuration Page – LAN (EKOSync 1588B)

7.2.3 NTP

- **Enable:** Enables or disables NTP time synchronization.
- **Local Time:** Enables or disables local time settings.
- **NTP poll:** NTP packets intervals (between 3 (8 s) and 17 (36 hr))

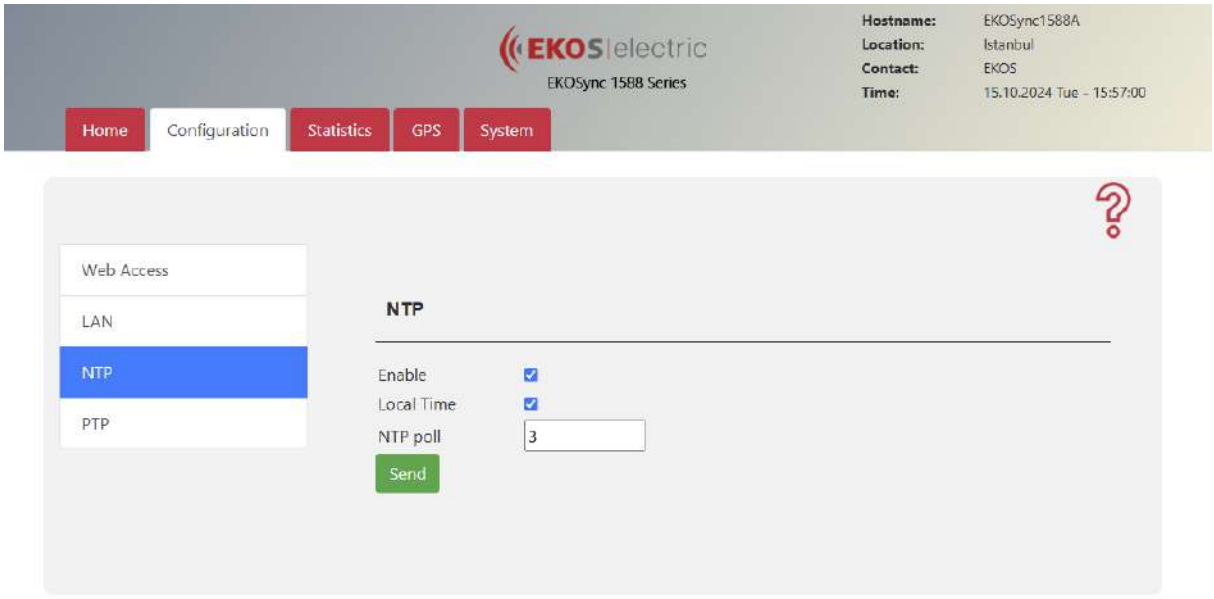


Figure 7.8 Configuration Page – NTP

7.2.4 PTP

- **Enable:** Enables or disables PTP time synchronization.
- **Local Time:** Enables or disables local time settings.
- **Domain Number:** Specifies the PTP domain number.
- **Announce Interval:** Specifies the PTP announce interval in seconds.
- **Sync Interval:** Specifies the PTP synchronization interval in seconds.
- **Min Delay Request:** Specifies the minimum delay request time for PTP in seconds.
- **Min Peer Delay Request:** Specifies the minimum peer delay request time for PTP in seconds.
- **Delay Mechanism:** Specifies the delay mechanism. Options are P2P (Peer-to-peer) and E2E (End-to-end).
- **Protocol:** Specifies the PTP protocol. Options are UDP IPv4, UDP IPv6 and Layer 2.
- **Profile:** Selects one of the PTP profiles:
    - Default
    - G8265
    - G8275.1
    - G8275.2
    - POWER

**The EKOSync 1588B model does not offer profile selection. However, you can achieve the same result by configuring the variables according to the specific profile specifications.

- **Announce Receipt Timeout:** Specifies the announce receipt timeout.
- **Clock Class:** Specifies the clock class.
- **Clock Accuracy:** Specifies the clock accuracy.
- **Priority 1:** Specifies the priority 1 value.
- **Priority 2:** Specifies the priority 2 value.

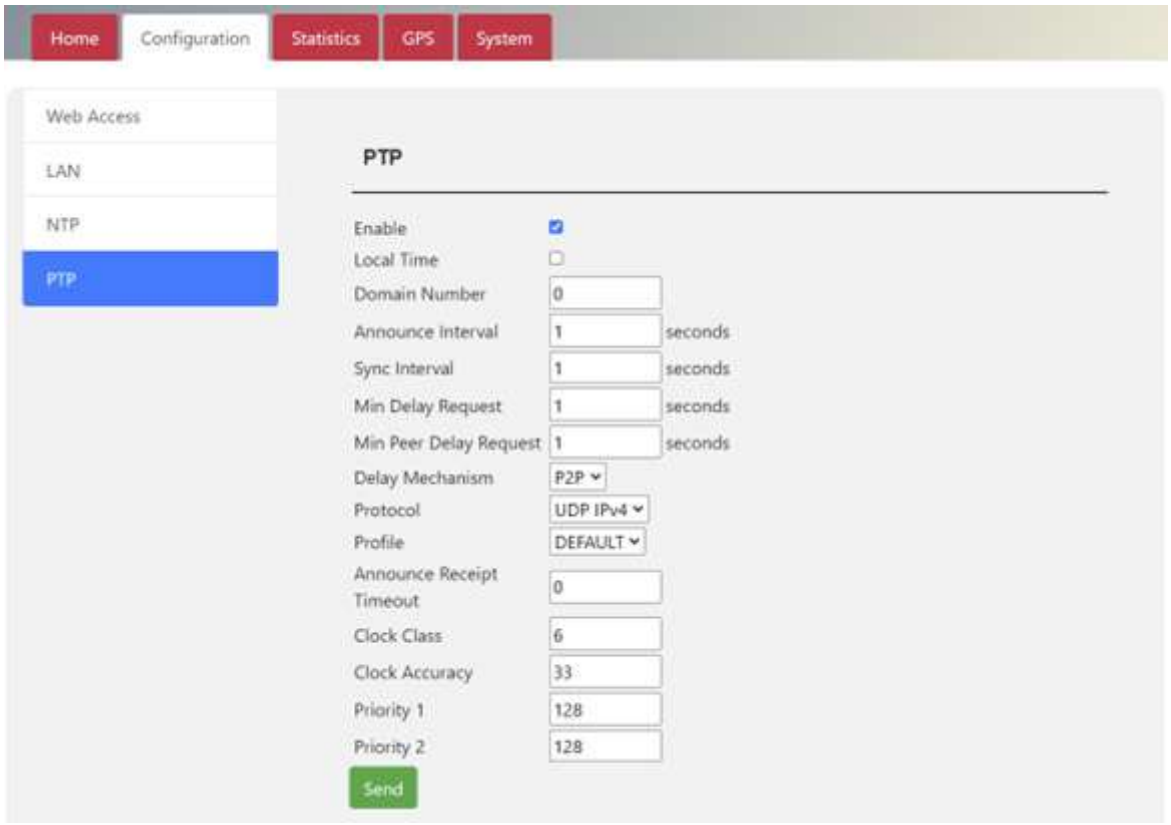


Figure 7.9 Configuration Page - PTP

7.2.5 SMTP

This page is only available in versions with the e-mail feature. If you're unsure of your product version, please contact the manufacturer.

- **SMTP Enable:** Enables or disables the SMTP service.
- **Enet:** Reports the status of Ethernet connections.
- **NTP:** Reports the status of the NTP service.
- **NTP Local:** Reports the status of the local NTP.
- **PTP:** Reports the mode information of the PTP service.
- **PTP Local:** Reports the status of the local PTP.
- **Antenna Status:** Reports the status of the antenna.
- **System Start:** Sends an email upon system startup.
- **Email Period:** Specifies the email sending period.
- **Email Address:** Enter the email addresses to which emails will be sent.

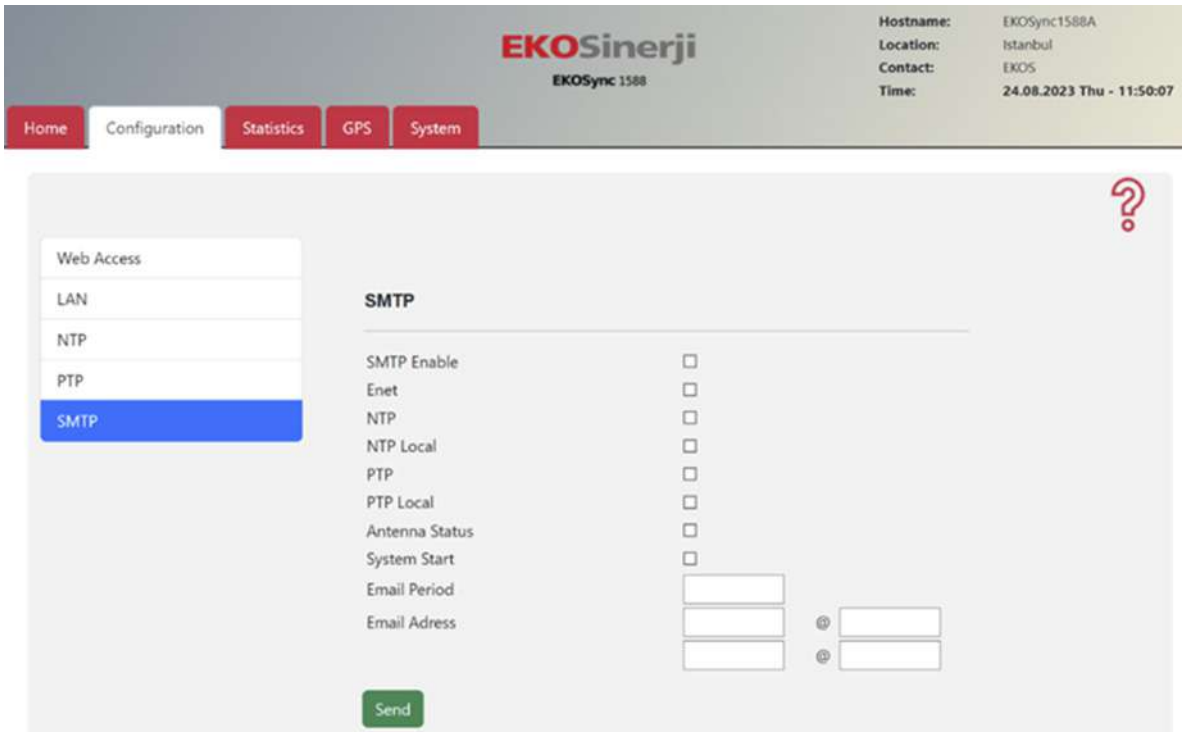


Figure 7.10 Configuration Page – SMTP

7.3 Statistics Page

General Statistics

- **Uptime (seconds):** Displays the device's operational time in seconds.
- **Time (UTC):** Shows the device's Coordinated Universal Time (UTC).
- **Time (Local):** Displays the device's local time.
- **PTP Service:** Indicates the status of the PTP service.
- **Current UTC-PTP Offset:** Shows the current UTC-PTP offset.
- **NTP:** Displays the status of the NTP service.
- **Alarm:** Indicates the alarm status of the device.

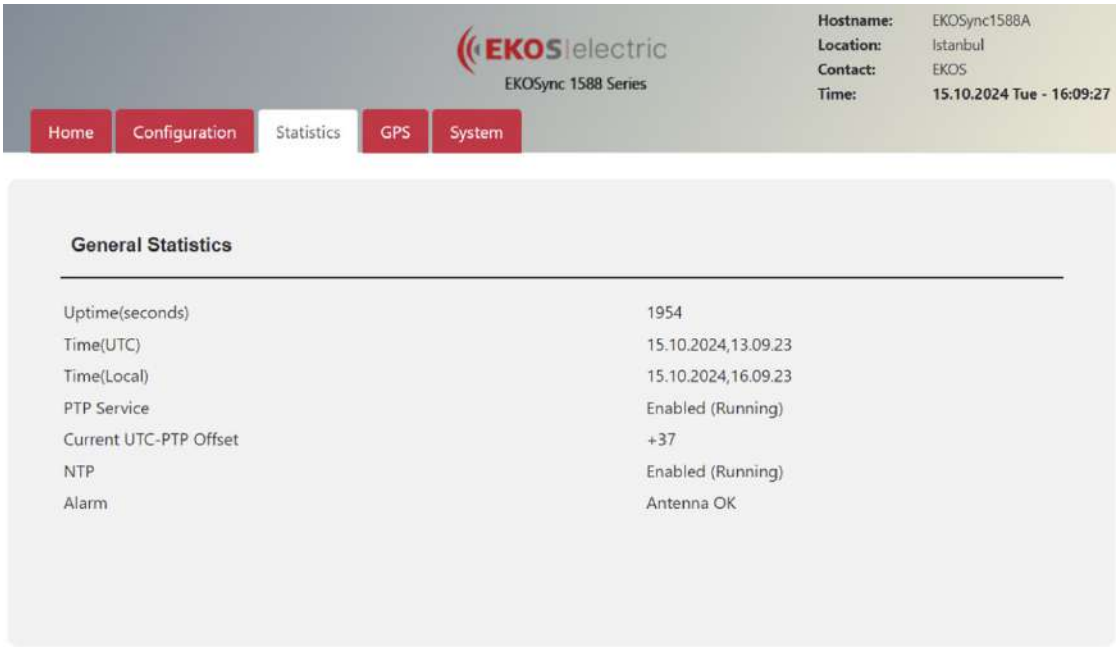


Figure 7.11 Statistics Page

7.4 GPS Page

Satellite Signal Reception: Here, the list of satellites you are connected to, and their signal strength is displayed.

Location: Here, the device's coordinates are shown.

Status: Indicates the status of the device.

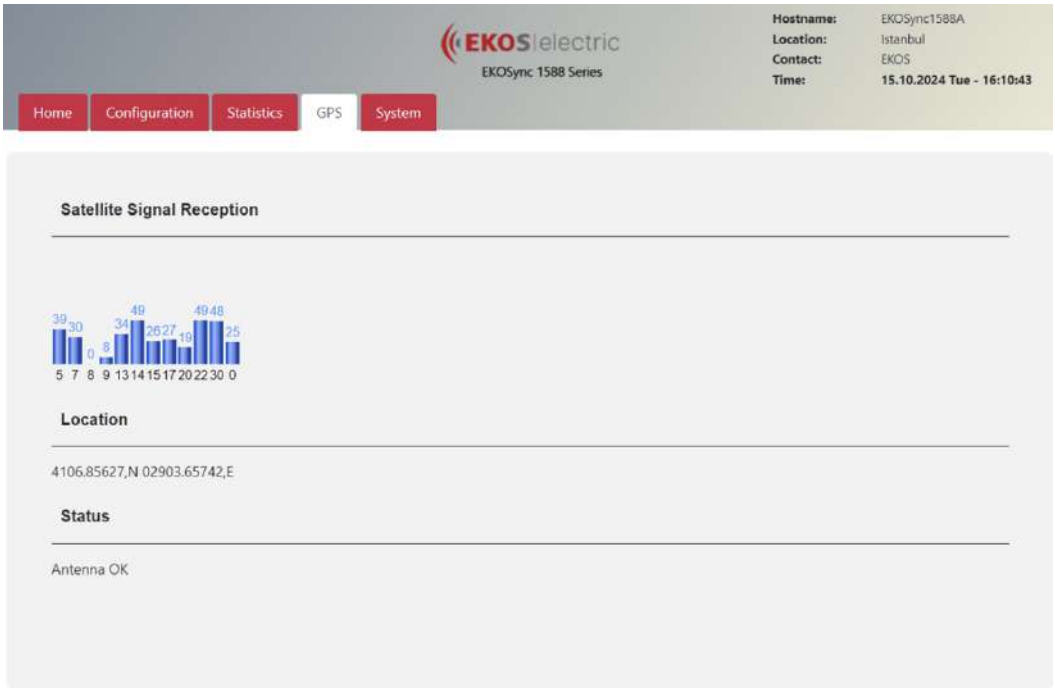


Figure 7.12 GPS Page

7.5 System Page

7.5.1 EKOSync 1588A System Page

- **Reconfig:** This section allows you to reload the device's configuration settings. To reload the settings, you enter this tab.

- **Reboot:** This section allows you to reboot the device. The reboot operation is performed within this tab.

- **Clear Statistics:** This section allows you to reset the statistics. The operation to reset the statistics is performed within this tab.

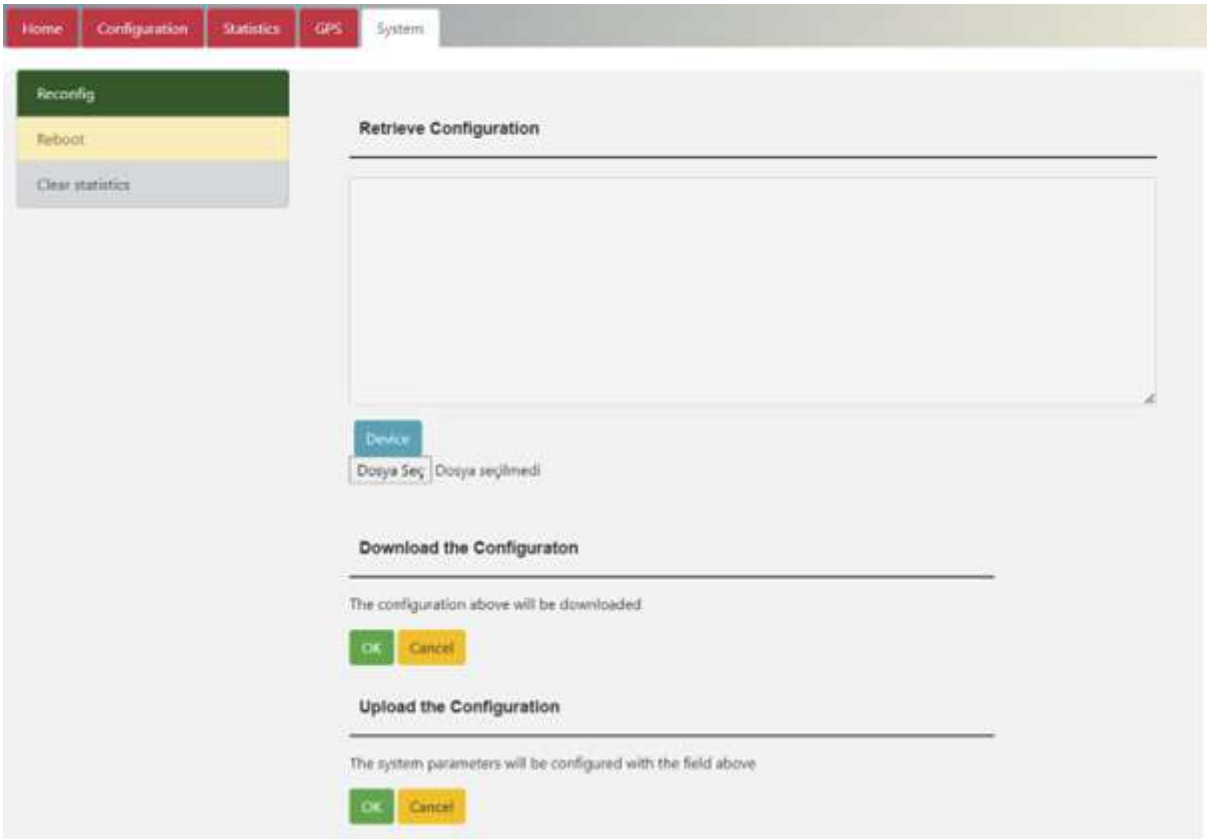


Figure 7.13 System Page in EKOSync 1588A

7.5.2 EKOSync 1588B System Page

- **Save:** The old configuration will be overwritten by the new one.
- **Reboot:** The system will reboot with the last saved configuration.
- **Clear statistics:** The statistics will be cleared.
- **Reflash:** The chosen firmware update will be uploaded.

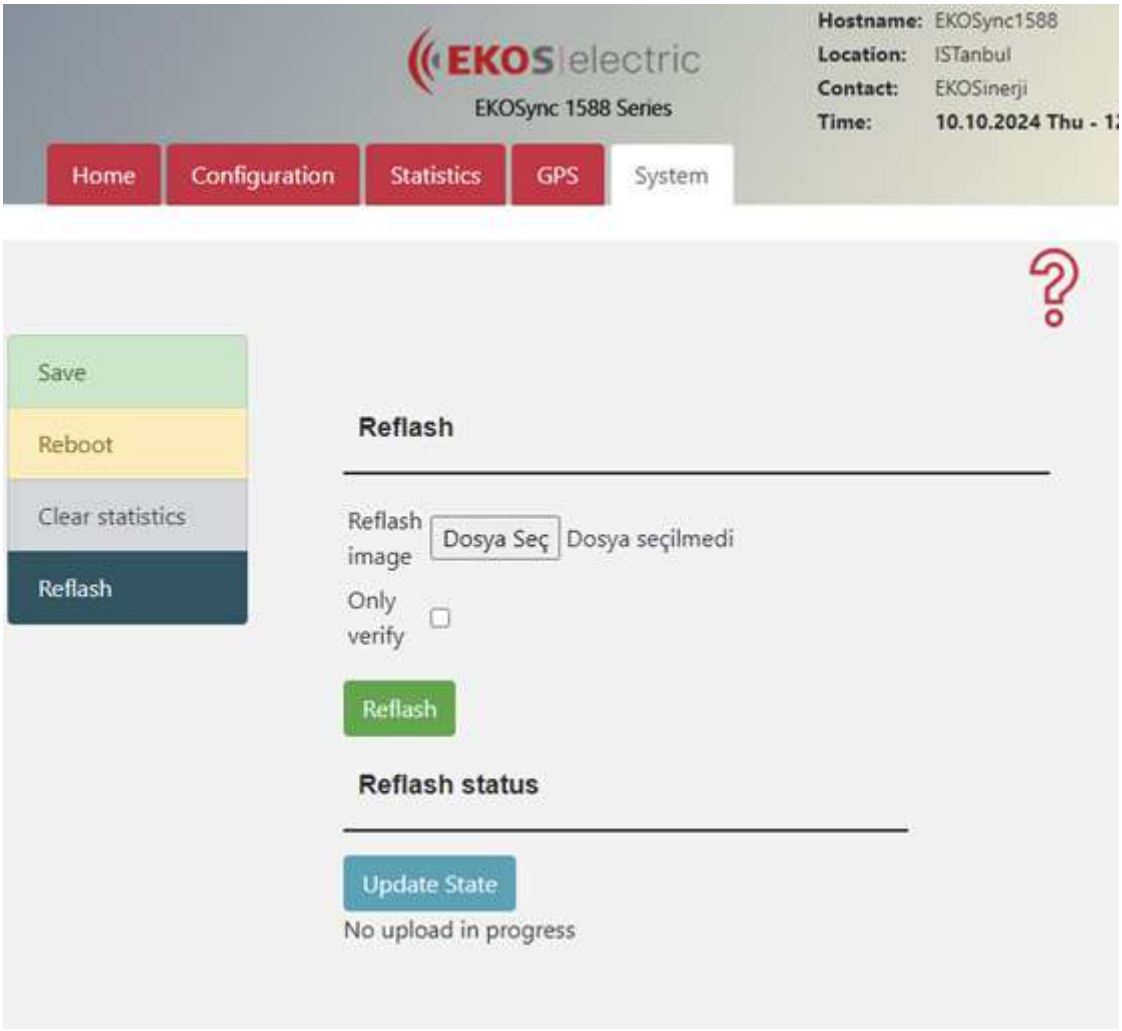


Figure 7.14 System Page in EKOSync 1588B

LCD Menu

8.1 EKOSync 1588A LCD Menu

LCD menu offers device status information and configuration options. The main menu is shown in ***Figure 8.1.***

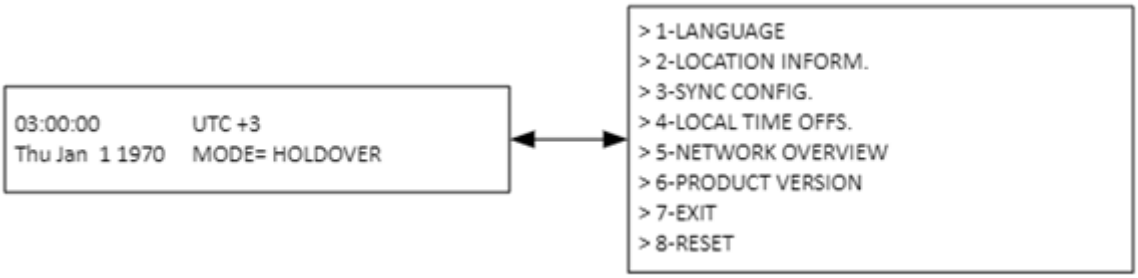


Figure 8.1 1588A LCD Menu - The Main Menu

8.1.1 Language

With the Language menu, you can choose the device language as shown in Figure 8.2. The default languge is Turkish.

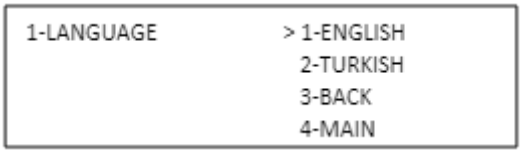


Figure 8.2 1588A LCD Menu - Language

8.1.2 Location Information

This page displays the device location information based on data provided by the GNSS.

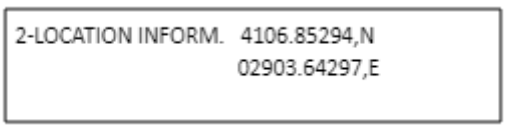


Figure 8.3 1588A LCD Menu - Location Information

8.1.3 Sync Configuration

This menu contains PPS, FREQ, TOD and IRIG-B configuration ***(See Figure 8.4)***

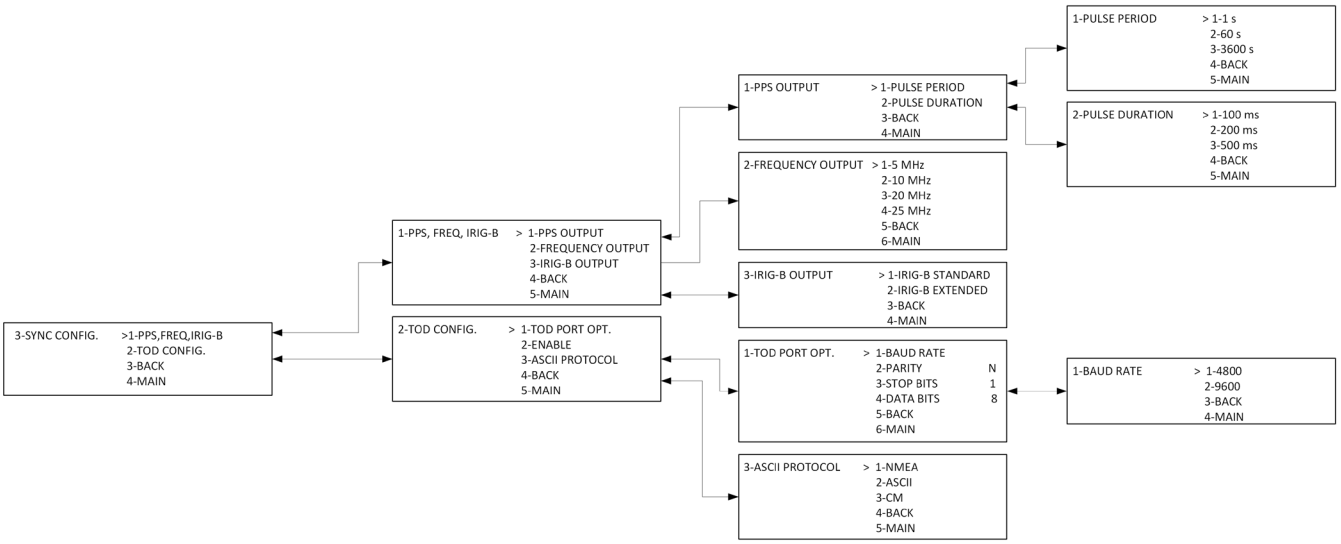


Figure 8.4 1588A LCD Menu - Sync Configuration

- In PPS (Pulse-per-second), there are two configurable elements: pulse period and pulse duration. Default PPS configuration is 1 s pulse period, and 100 ms pulse duration.

- Frequency output also can be changed on the LCD menu, frequency options are: 5, 10, 20, 25 MHz. The default frequency setting is 10 MHz.

- In the need of extended version of IRIG-B output, the menu allows to change from standard to extended version. The default setting is Standard. For details see section 2.3.3.4.

- In ToD (Time of Day), baud rate and ASCII protocol can be changed. Also, LCD menu displays Parity, Stop Bits and Data Bits (read only). For details see section 2.3.3.1. The default protocol is NMEA. The default baud rate is 4800.

8.1.4 Local Time Offset

This menu allows you to choose the appropriate time zone to your location. The default time zone is EAT (UTC +3). If you don't wish to use the EAT time zone, you can select 2-LOCAL option and reach the time zones provided as seen in ***Figure 8.5.***

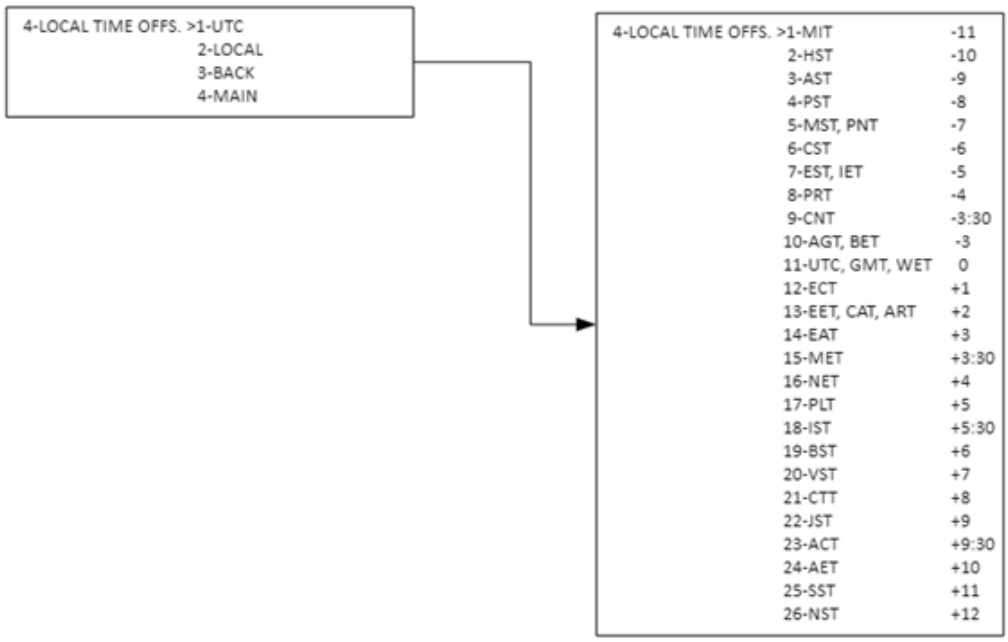


Figure 8.5 1588A LCD Menu - Local Time Offset

8.1.5 Network Overview

This page provides IP addresses of ethernet ports. Figure 8.6 shows Network Overview page of EKOSync 1588A. The two ethernet IP addresses are displayed in the screen.

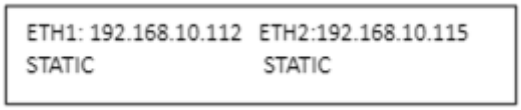


Figure 8.6 1588A LCD Menu - Network Overview

8.1.6 Product Version

This page displays the product version information.

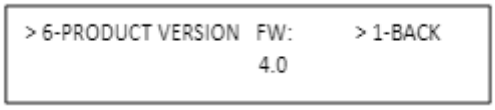


Figure 8.7 1588A LCD Menu - Product Version

8.1.7 Reset

Resetting the device will erase all settings and restore it to factory defaults.

Figure 8.8 1588A LCD Menu - Reset

8.2 EKOSync 1588B LCD Menu

LCD menu offers device status information and configuration options. The main menu is shown in ***Figure 8.9.***

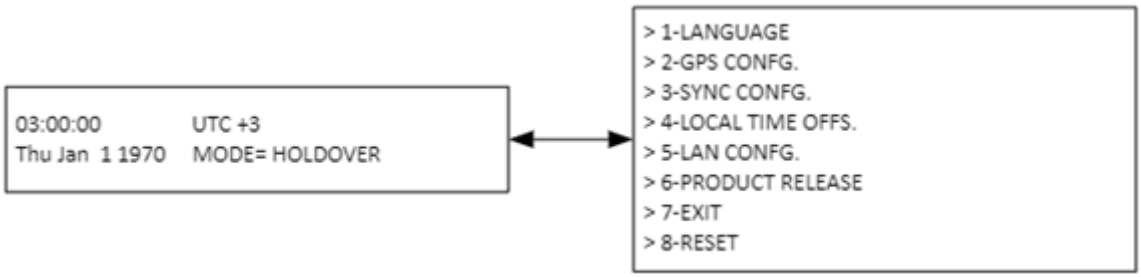


Figure 8.9 1588B LCD Main Menu

8.2.1 Language

With the Language menu, you can choose the device language as shown in ***Figure 8.10.***

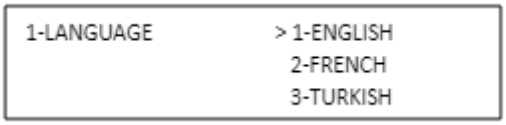


Figure 8.10 1588B LCD Menu - Language

8.2.2 GPS Configuration

This page displays the device location information based on data provided by the GNSS.

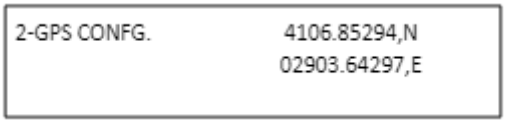


Figure 8.11 1588B LCD Menu – GPS Configuration

8.2.3 Sync Configuration

This menu contains PPS, FREQ, TOD and IRIG-B configuration ***(See Figure 8.12)***

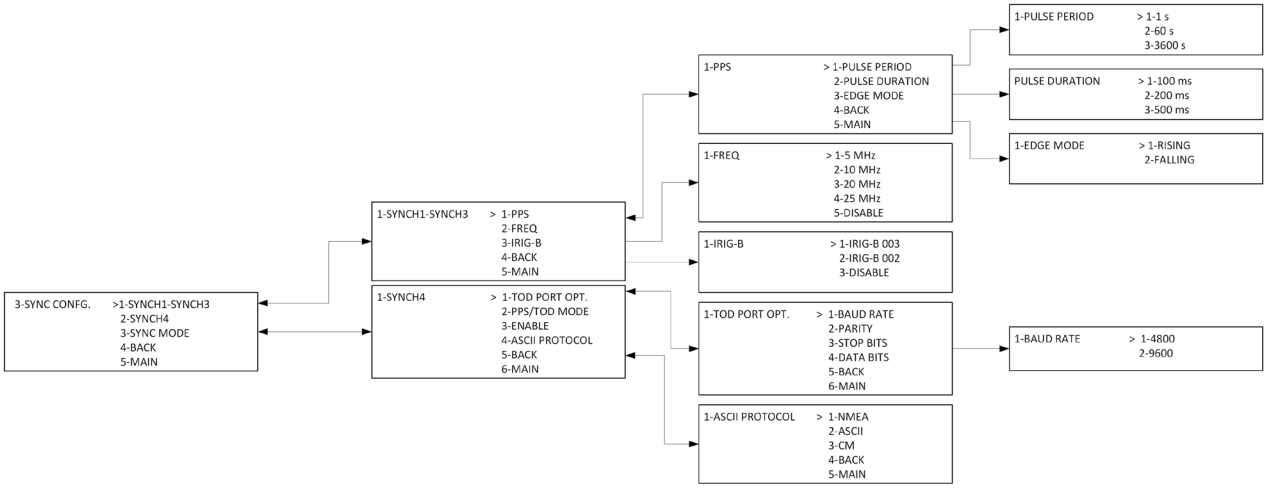


Figure 8.12 1588B LCD Menu - Sync Configuration

- SYNCH1-SYNCH3 page contains PPS, FREQ and IRIG-B configurations.
    - In PPS (Pulse-per-second), there are three configurable elements: pulse period, pulse duration and edge mode. Default PPS configuration is 1 s pulse period, and 100 ms pulse duration.
    - Frequency output also can be changed on the LCD menu, frequency options are: 5, 10, 20, 25 MHz. The default frequency setting is 10 MHz.
    - IRIG-B output options are IRIG-B 002 and IRIG-B 003
- SYNCH4 page contains ToD configurations. In ToD (Time of Day), baud rate and ASCII protocol can be changed. Also, LCD menu displays Parity, Stop Bits and Data Bits.

8.2.4 Local Time Offset

This menu allows you to choose the appropriate time zone to your location. The default time zone is EAT (UTC +3). If you don't wish to use the EAT time zone, you can select 2-LOCAL option and reach the time zones provided as seen in ***Figure 8.13.***

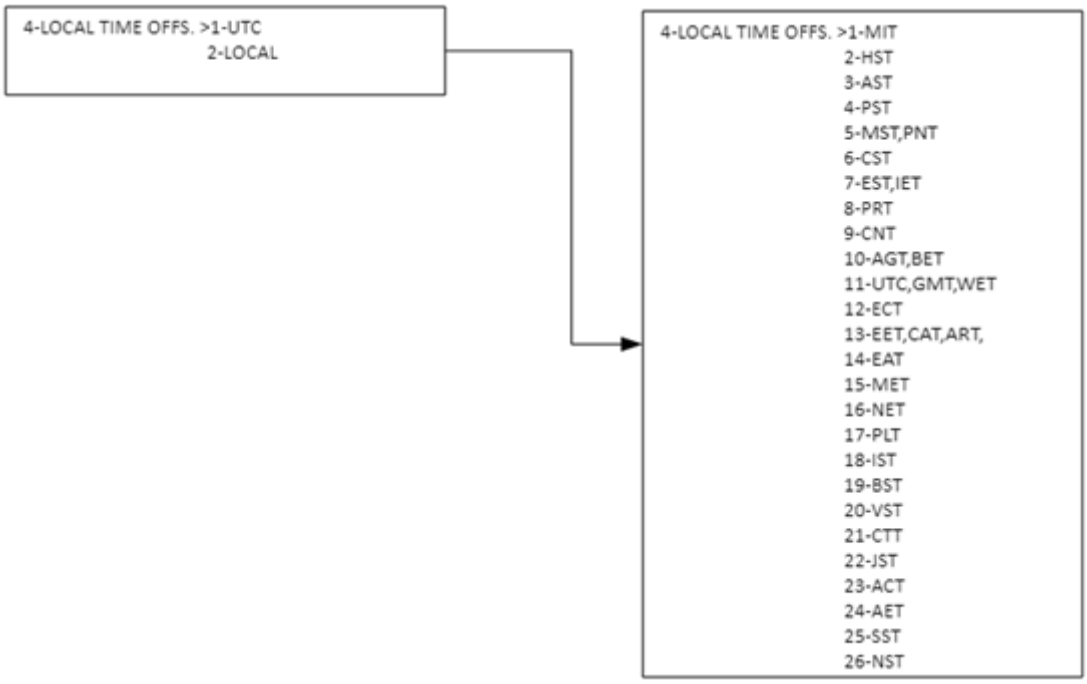


Figure 8.13 1588B LCD Menu - Local Time Offset

8.2.5 LAN Configuration

This page provides IP address of ethernet port 3 (ETH3). Figure 8.14 shows Network Overview page of EKOSync 1588B.

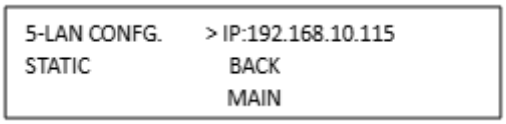


Figure 8.14 1588B LCD Menu - LAN Configuration

8.2.6 Product Release

This page displays the product version information

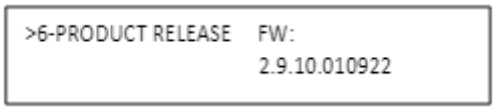


Figure 8.15 1588B LCD Menu - Product Release

8.2.7 Reset

Resetting the device will erase all settings and restore it to factory defaults.

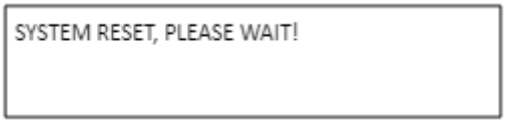


Figure 8.16 1588B LCD Menu – Reset

Technical Specifications and Operating Parameters

In this section you will find information relating to the functional and operational characteristics of the EKOSync 1588A/B Time Server.

NOTE: Specifications are subject to change without notice

APPROVAL AND CERTIFICATION

CE compliance Low voltage directive	IEC 62368-1
EMC directive	IEC 61000-6-2 IEC 61000-6-4
Radiated & Conducted	EN55032 (CISPR32) Class A

SAFETY TESTS

EN 60950-1 CE Certificate	Safety Requirements
IEC 60255-5	Dielectric Strength 2kV HV Impulse 5kV

TYPE TESTS

EMC tests were performed according to IEC 61000-6-2:2005 referring to the following standards		
IEC 61000-4-2	ESD	±8 kV contact / ±15 kV air
IEC 61000-4-3	RF Immunity	80MHz-3000 MHz, 80% AM (1kHz) 10V/m, 20V/m, 35V/m
IEC 61000-4-4	Burst (Fast Transient)	±4 kV Data ports, ±4kV DC Power ports
IEC 61000-4-5	Surge Immunity	±0.5 kV DC ±1 kV Data
IEC 61000-4-6	Conducted RF Immunity	150kHz-80Mhz, 10V rms, 80% AM (1kHz)
IEC 61000-4-8	Magnetic Field	3 A/m, 100 A/m 50Hz Continuous 1000 A/m 50Hz for 1s
IEC 61000-4-11	Voltage Dip & Interruption	30% 1 per, 60% 50 per Dips 100% 5 per, 100% 50 per Interruptions
IEC 61000-4-16	Mains Frequency Voltage	10V Continuous, 100V for 1s (DC) 30V Continuous, 300V for 1s (Data)
IEC 61000-4-17	Ripple on DC Power	10% of VDC, DC ports
IEC 61000-4-18	Damped Oscillatory Waves	1-2.5 kV common, 0.5-1 kV differential mode, 1MHz
IEC 61000-4-29	Voltage Dip & Interruption	0% 10ms, %40 200ms, 70% 500ms dips 0% 5s interruptions

ENVIRONMENTAL TESTS

IEC 60068-2-1	Cold Temperature	-40°C, 24 hours
IEC 60068-2-2	Dry Heat	+80°C, 24 hours
IEC 60068-2-14	Changes of temperature	-30°C to +65°C / 24 hours / 3 cycles
IEC 60068-2-30	Damp Heat, cyclic	95% no condensing
IEC 60068-2-78	Damp Heat, steady state	93%, 10 days, +40°C
IEC 60255-21-1	Vibration	10m/s2 @10-500Hz
IEC 60255-21-2	Shock	15g @11ms

IEEE 1613 (C37.90.X) RELAY TYPE TESTS

IEEE 37.90.3	ESD Enclosure Contact Enclosure Air	+/-2kV, +/-4kV, +/-8kV +/-4kV, +/-8kV, +/-15kV
IEEE 37.90.2	Radiated RFI Enclosure Ports	35 V/m
IEEE 37.90.1	Fast Transient Signal Ports DC Power Ports	+/-4kV @ 2.5kHz +/-4kV
IEEE 37.90.1	Oscillatory Signal Ports DC Power Ports	2.5kV common mode@1MHz 2.5kV com. 1kV diff.@1MHz
IEEE 37.90	HV Impulse Signal Ports DC Power Ports	5kV (fail-safe relay output) 5kV
IEEE 37.90	Dielectric Str. Signal Ports DC Power Ports	2kVAC 2kVAC

SURGE ARRESTER

Surge current	20 kA
Sparkover impulse voltage	500 V
Bandwidth	< 7 GHz
Insertion Loss	< 0.5dB
Impedance	50 Ω
Connector	TNC

ANTENNA CABLE

Length*	30 m (standard)
Attenuation @1500MHz	0.424 dB/m
Delay	4.02 ns/m
Velocity of propagation	83%
Impedance	50 ohms
Capacitance	80.3 pF/m

**For custom lengthsor properties, please contact the manufacturer.*

OUTPUTS

TTL Level Electrical Outputs	
Number of Outputs	4 or 8
TTL Voltage Level	5 Vdc
High Level	> 4.8 Vdc
Low Level	< 0.2 Vdc
Maximum Current	200 mA
Connectors	BNC

DIMENSIONS

	1588A	1588B
Height	44 mm	44 mm
Width (body)	439 mm	436 mm
Depth	247.5 mm	279 mm
Weight	1.70 kg	2.80 kg

ZOSCILLATORS

	Frequency Stability	Operating Temperature
VCTCXO	±0.5 ppm	-40°C to +85°C
OCXO	±1 ppm	-40°C to +85°C
Rubidium	±0.2 ppm	+20°C to +40°C
	±0.8 ppm	-5°C to +60°C

ETHERNET PORTS

Number of Ports	2,4
Transmission Rates	10/100/1000 Mbps
Connector	RJ45, SFP
Protocols Supported	NTP/SNTP v4 IEEE 1588v2:2008 FTP HTTP TCP/IP UDP Telnet DHCP (IPv4, IPv6)

GNSS ANTENNA

GNSS Antenna Receiver	
Constellations	GPS+GLONASS+BeiDou+SBAS
Sensitivity	-165 dBm (Tracking, Navigation) -160 dBm (Reacquisition) -148 dBm (Cold Start)
Sync time	30s (cold start) 4s (warm start)
Antenna type	Active
Antenna's supply	3.3 V, max 100mA

GNSS Antenna Type	
Type	2.5-12 VDC GNSS Antenna
Frequency	1588 to 1606 MHz
VSWR	2.0 Max
Impedance	50 Ω
Gain	40dB ± 3dB
Noise	2.5 dB max
Operating Temperature	-40°C to +85°C
IP rating	IP67
Connector	TNC(J)

*Under favourable weather conditions, the standard antenna configuration can reach a standard time cable length of up to **60 meters** without a signal amplifier, and up to **160 meters with a signal amplifier.** For even longer antenna-to-server distances, please contact the manufacturer.*

PRECISION TIME PROTOCOL (PTP)

Time Accuracy	±100 ns (max) ±25 ns (typical)
Protocols	UDP/IPv4 (Layer 3) IEEE 802.3 (Layer 2)
Delay Compensation	End-to-End (E2E) Peer-to-Peer (P2P)
Profiles	-Default -Telecommunication (ITU-T G8265.1, G8275.1, G8275.2) -Power (IEEE C37.238)

Security Warnings and Precautions

When using the EKOSync 1588A/B device, several important warnings and precautions must be taken to ensure the safety of users and the device. Please read these security warnings carefully and take the following precautions to use the device safely

10.1 Electrical Safety

- Use an appropriate and stable power source while operating the device.
- Ensure the power cable is properly connected and that the power connections are not loose.
- Take care to prevent water from leaking onto electrical sources and outlets in the environment where the device operates.

10.2 Heaters and Magnetic Fields

- Place the device away from potential magnetic fields, such as heaters, microwave ovens, and other large electromagnetic devices.
- Magnetic fields can affect the device's operation and cause incorrect time synchronization.

10.3 Water and Humid Environments

- Avoid exposing the device to water or humid environments. Water or liquid substances entering the device may cause damage.
- Ensure that the area where the device is installed is properly ventilated.

10.4 Unauthorized Access

- Regularly change the administrator passwords for the device and allow access only to authorized personnel.
- Use strong passwords for accessing the device's web interface and keep them secure.

10.5 Maintenance and Cleaning

Regular maintenance and cleaning of the EKOSync 1588 devices are essential for its efficient operation and longevity. This section provides some basic instructions for maintaining and cleaning your device. Please carefully follow the steps below:

10.5.1 Disconnecting Power

- It is important to disconnect the power source during maintenance and cleaning operations. Therefore, turn off the device before unplugging the power cable from the outlet.

10.5.2 Removing Dust and Dirt

- Dust and dirt accumulation on the outer surfaces of the device can negatively affect its performance over time. Regularly clean the outer surfaces of the device using a soft, dry cloth or a slightly damp cloth.
- Ensure that no liquid substances or cleaning chemicals enter the device during cleaning.

10.5.3 Maintenance by Authorized Services

- Maintenance and repair of the device should only be performed by authorized service centers or qualified technicians designated by the manufacturer.
- Do not attempt any user intervention inside the device, and do not have unauthorized individuals perform repairs or modifications.

By regularly performing the above maintenance and cleaning operations, you can ensure that your EKOSync 1588A device operates efficiently and has a long lifespan. Careful and regular maintenance can help minimize any potential negative impacts on the device's performance and ensure safe usage.

If you encounter any issues during or after any maintenance operation, please contact the manufacturer's support line or consult an authorized service center.

10.6 Unauthorized Repairs and Modifications

- Do not interfere with the inside of the device or have unauthorized individuals perform repairs or modifications.
- Only use service centers authorized by the manufacturer for repairs and maintenance of the device.

10.7 Firewalls and Authorized Access

- Protect the device behind firewalls on your network and take necessary measures to prevent unauthorized access.
- Allow access to the configuration and management of the device only to authorized users.

These security warnings and precautions are important for ensuring the safe and efficient operation of the device. Please pay attention to these warnings and precautions while using your device.

CE Mark Certification

CE

Date of Issue:	October 23, 2024
Directives:	Electromagnetic Compatibility 2014 / 30 / EU Low Voltage Safety 2014 / 35 / EU
Model Numbers:	EKOSync 1588A Time Server EKOSync 1588B Time Server
Manufacturer:	EKOS TEKNOLOJİ VE ELEKTRİK A.Ş. Organize Sanayi Bölgesi 7. Cadde No:17-19 Altıeylül/Balıkesir/Turkey
Trademark:	EKOS electric

Harmonized Standard Referenced:

EN 61000-6-4	IEC 61850-3 2nd Ed.
EN 61000-6-2	IEC 60068-2-1
EN 61000-4-6	IEC 60068-2-30
EN 61000-4-2	IEC 60068-2-2
EN 61000-4-4	IEC 60255-21-1
EN 61000-4-3	IEC 60255-21-2
EN 61000-4-5	IEC 60255-5
EN 61000-4-11	
EN 61000-4-16	
EN 61000-4-18	
EN 61000-4-17	
EN 61000-4-29	

Signatory: Sinan UNAN

This certificate declares that the described equipment conforms to the applicable requirements of the directives on Electromagnetic Compatibility 2014 / 30 / EU, and 2014 / 35 / EU adopted by the European Union.

Statement of Compliance

The following page is a statement of compliance that includes EKOSync Model 1588A, and 1588B.

GNNS Time Server Statement of Compliance

October 15, 2024
TO WHOM IT MAY CONCERN:

All EKOSync 1588 Time Servers are designed to meet the highest standards of time synchronization and performance. These devices provide traceable accuracy to UTC, ensuring reliable timekeeping anywhere in the world.

EKOSync 1588A and 1588B has successfully passed all relevant tests to ensure compliance with our group's stringent standards for material quality and manufacturing processes. Additionally, our calibration products come with certificates ensuring traceability to national standards.

Arf Technologies and EKOS Electric reserves the right to modify product specifications at any time without prior notice. All trademarks referenced are the property of their respective owners.

Regards,
Sinan UNAN
Arf Technologies

ARF Technologies ™

Headquarters:
İstinye Mah. Hikmet Onat Sk. No:9 Sarıyer/İstanbul
arftechnologies.com | info@arftechnologies.com

Manufacturing & Testing Center:
Balıkesir Teknokent No: 4-5, Balıkesir Üniversitesi Çağış Yerleşkesi, Altıeylül/Balıkesir
+90 266 281 12 95
arftechnologies.com | support@arftechnologies.com

arftechnologies

www.arftechnologies.com

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