LeoNTP Time Server 1200

instruction manual

Welcome to **LeoNTP Time Server 1200**.

The **LeoNTP 1200** provides precise NTP time received from navigation satellites orbiting our planet and carrying one of the most accurate Rubidium and Caesium clocks ever made.

We've made the **LeoNTP 1200** as simple as possible so you can be up and running as fast as possible.

Very Quick Start Guide

Connect GPS antenna

Connect ethernet cable

Use USB or PoE for power

Use DHCP or manual IP address.

Wait until time display turns white

Serve time to all your NTP clients!

Product Information

Manufacturer	Leo Bodnar Electronics Ltd Units 7-8 New Rookery Farm, Little London, Silverstone, Northamptonshire NN12 8UP United Kingdom
Product Name	LeoNTP
Model Number(s)	1200
Description	LeoNT P 1200 is a GPS Masterclock for providing accurate synchronised time across your network.

Region	Marking	Legislation
EU	CE	2014/53/EU (Radio Equipment) 2011/65/EU (RoHS)
UK	UKCA	SI 2017/1206 (The Radio Equipment Regulations 2017) SI 2019/492 (The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (Amendment) Regulations 2019)
EU / UK		WEEE
USA	FC	CFR 47 Part 15 B
Canada	CAN ICES-003 (B) / NMB-003 (B)	ICES-003 (EMC)
Australia		Radiocommunications Labelling (Electromagnetic Compatibility) Notice 2017 (EMC)
New Zealand		Radiocommunications (EMC Standards) Notice 2019 (EMC)

System Specifications

Network	10/100Mb RJ45 Autosensing
	IPV4 DHCP/Static IP
	IPV6 Not Supported
Time Protocols	NTP V2, V3, V4, SNTP V3, V4
NTP Requests/Sec	>100K (Wire speed)
	> 1million concurrent clients typical
GPS	72 Channel
	-167dBm Sensitivity
	Power for active antenna supplied via bias tee.
Timing Performance	
GPS Accuracy	30ns RMS, 60ns 99%
	Cold start acquisition < 30s
NTP Accuracy (Typical)	< 1µS
Holdover Performance	Typically 1-4ms over 24 hours
Power	USB / 48V PoE (802.3af) only.
	1.25W.
Mechanical Dimensions	140mm x 150mm (165mm rear to button) x 42mm
BNC Output	PPS/1Mhz/10Mhz
	Accuracy 30ns RMS, 60ns 99%
Warranty	1 year return to base.
	Lifetime Firmware updates and support.
In the box	1 x LeoNTP 1200 Device
	1 x GPS Puck antenna with 3 meter cable
	1 x USB Cable
	1 x 2 meter RJ45 Patch cable.
	4 x Rubber feet
Options	Rack Mount Chassis for up to 3 units
	External Base antenna
	DIN Rail mounting clip

Quick Start

Connect the GPS antenna to the SMA connector on the rear of the unit.

Connect the unit to your switch with the supplied RJ45 Cable

To power the unit either connect the RJ45 to 802.3af compatible PoE switch or injector (not supplied). Alternatively connect the supplied USB cable to any 5V supply

When the time goes white the unit is locked and ready to serve time.

General Operation

All operations on the unit are performed by rotating the front panel button and pressing it to select an option.

The screens are in rotation as follows:

Time / Status > NTP Clients > GPS Information > Network > System > Info > Back to Time Status

You can rotate clockwise or anticlockwise to get to the menu you wish.

Time / Status Screen

This is the default screen and shows the current UTC time (default) and status indicators.

The icons on the status bar from left to right are:

PPS Indicator > GPS Signal > Network > TIME > Load Graph

The circle top left is the PPS indicator colours as follows:

green = PPS Locked to GPS (Unit is Stratum 1)
brown = unit is in holdover mode (Unit is Stratum 1 – see Hold Over Mode Operation section)
red   = no GPS signal (Unit is Stratum 16).

The GPS signal indicator indicates the current GPS strength.

green = GPS locked
red   = GPS not locked.

Network indicator displays the current status of the LAN connector. If the indicator is red the unit has no network connection. Green and blinking indicates activity.

The load graph is an indicator of the current number of NTP requests a second the unit is serving. Green is 0-1000, Yellow 1000 – 4000, Red = 4000+. Note the units can service 109,000 NTP req/sec but as few people will get near this we have scaled the load graph down.

If the time is amber the unit hasn't achieved an accurate time, you may need to reposition your GPS antenna to get a more optimal sky view. Once the GPS is locked the time will go white and PPS will blink green.

By default the unit shows UTC time. You can amend the display to do time zone offset by pressing the button and rotating the button left and right until you see your desired time zone. Press the button once more to select it.

Notes: Time zone is display only, internally the unit uses UTC. When a time zone other than UTC is selected the date is no longer displayed.

NTP Clients Screen

This screen shows the current NTP clients that are currently connecting to your device. Red means more than one connection a second. There is nothing to configure under this screen and is for information only.

GPS Signal Screen
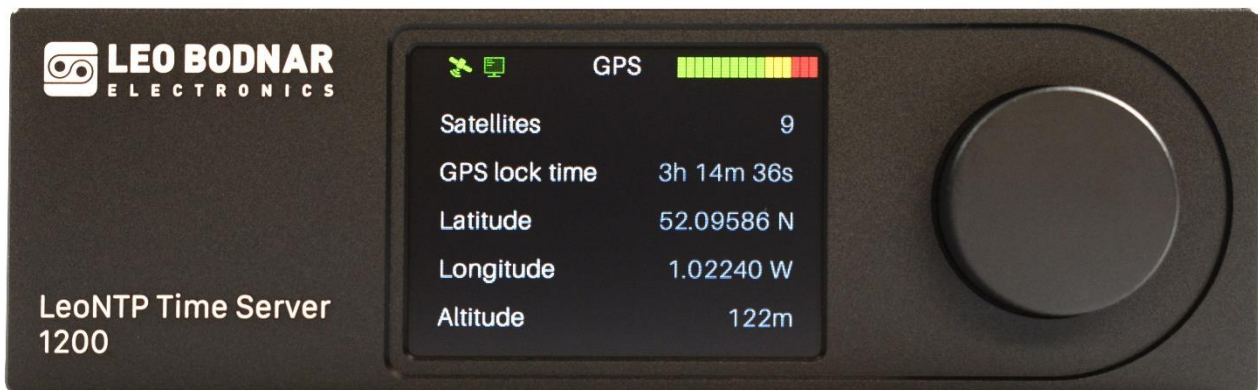
This screen shows the current time the unit has been locked, the satellites and current location. There is nothing to configure under this screen and is for information only.

Network Screen

This screen lets you view or amend the IP address assigned to the unit.

Pressing the button will high light the Configure IP in red, you can rotate left or right to select manually (Static) or Using DHCP. Press again to confirm and the selection will move to the IP Address if Manual was selected.
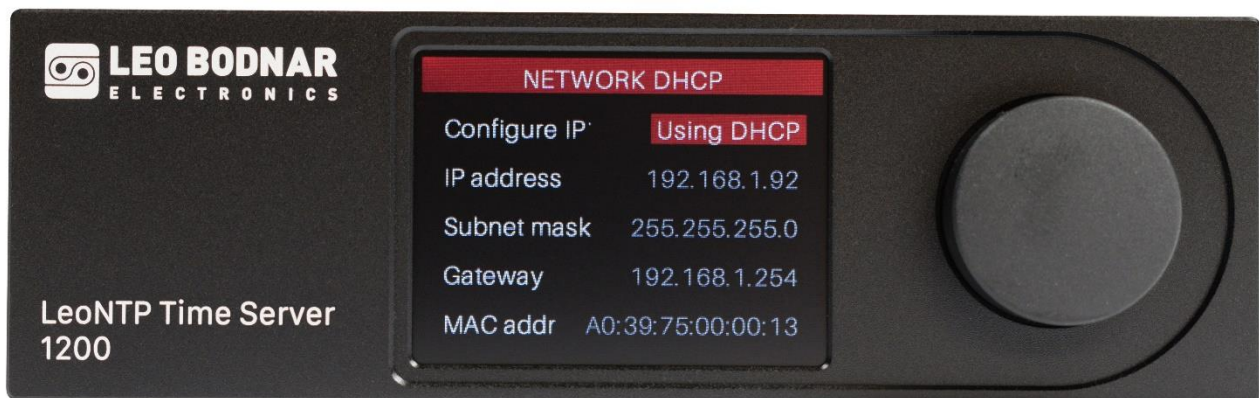
The IP address settings in manual mode can be set by rotating left and right to select the value of each octet. Press the button to move to the next field. Subnet mask and gateway are set in the same manner. Settings are immediate and the unit doesn't need a reboot.

To exit the settings press the button until you get to the end. For information the MAC address of the unit is displayed (MAC Address is also on a label on the underside of the unit)

The default IP for the unit is 192.168.1.99

Currently IPv6 is not supported.

System Screen

This screen lets you view or select the BNC output, the behaviour of the clicker, screen brightness, factory reset and Firmware Upgrade options.

Pressing the button selects BNC Out. You can rotate left and right to select the frequency of the output:

OFF > 1PPS (1Hz) > 1Mhz > 10Mhz

Pressing the button sets the value and moves to the Clicker:

OFF > NTP Req > 1PPS > Alarm

Off	= No clicker
NTP Req	= Click when a request is made
1PPS	= Click on PPS pulse
Alarm	= Click on alarm event (loss of GPS Signal/Network)

Pressing the button sets the value and moves to the Brightness, this can be changed from 0-100%.

Pressing the button sets the value and moves to the Factory Reset. The default on this is Skip Reset. Press the button to move to the next setting. Alternatively rotate to RESET ALL NOW and press the button. This will factory reset the unit and lose any configuration.

The default on FW Upgrade is Skip Upgrade. Press the button to confirm this setting. Alternatively rotate, select UPGRADE NOW and press the button (See firmware upgrade later).

Info Screen

The info screen shows:

NTP Requests (An incrementing counter since last power on – lost on reboot)
Uptime
Leap Second (Count down to the next leap second insertion)
Power Source
Firmware Version

There is nothing to configure under this screen and is for information only.

Firmware Upgrade

To update the firmware you need either a Windows PC or a Mac. The update file is a standalone program and doesn't need installing.

All settings are saved on update. The latest update files are available here: https://www.leontp.com/1200/manuals/

Extract the files from the zip file / dmg file.

Plug the LeoNTP unit into the PC/Mac with the USB cable. Rotate the button to the system screen. Press the button five times until *off* is highlighted. Rotate the button right until the unit says *update*. Press the button. The screen will now report "Bootloader mode. Connect USB and start firmware app"

From the extracted files run LeoNTP-1200-firmware.exe. The serial number of the unit should be reported. Press Update Firmware. The unit will reboot after a short period.

To exit Bootloader Mode without upgrading just power cycle the unit.

Recovery Mode

Should an update fail and the unit not reboot you can enter recovery mode by removing power, press and hold the button then reconnect the power. The unit will go into Boot Loader mode. Follow the instructions above to supply firmware.

Hold Over Mode Operation

If the unit is in holdover mode due to lack of GPS signal the unit will internally compensate typically within 1-4ms over 24 hours. Note: this is software compensation not a hardware solution.

When the PPS indicator is blinking yellow this indicates the unit is in hold over mode. After 24 hours without a GPS signal the unit will drop off to stratum 16 as it can no longer guarantee its accuracy as a time source.

As soon as the GPS signal is re-established the unit will revert to stratum 1.

Client Configuration

For all examples replace 192.168.1.99 with the IP address of your unit.

Windows

Open a command prompt as administrator.

w32tm /config /manualpeerlist:192.168.1.99 /syncfromflags:manual /reliable:yes /update
w32tm /resync /rediscover

You may need to do:

net stop w32tm
net start w32tm

You can check settings with:

w32tm /query /configuration
w32tm /query /status

You can show the difference between your PC/Server time and that of the time server by typing:

w32tm /stripchart /computer:192.168.1.99 /samples:9999 /dataonly

NOTE: On Windows when the time server is set, Windows Time will not immediately correct, it will slowly slew the time back towards that of the master clock.

Linux

If using NTPd just add the following config line to /etc/ntpd.conf

server 192.168.1.99 iburst prefer

Then restart using sudo systemctl restart ntpd.service

If using Chrony just add the following config line to /etc/chrony.conf

server 192.168.1.99 iburst

Then restart using sudo systemctl restart chronyd.service

Remote Monitoring

We offer a Python script to remotely monitor the unit see Python Stats Program on the firmware page here: http://www.leontp.com/firmware/

Getting Support/Assistance

If you have any queries with the LeoNTP please don't hesitate to mail us on orders@uputronics.com or call on +44 (0)1274 550919.