LUNITEK

Atlas-F PLUS
Seismic Digitizer

32 bit DIGITIZER

USER MANUAL

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Declaration of Conformity

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Hereby declare that the equipment specified conforms to the following Directive and Standards: 2014/53/UE (RED)

Product Name: **Lunitek Atlas Plus**
Product Description: Seismic digitizer

Standards:

ETSI EN 301 489-1 V. 2.1.1
ETSI EN 301 489-17 V3.1.1
EN 61000-6-2:2005
EN 61000-3-2: 2014
EN 61000-3-3: 2013
EN 60950-1:2007+/A11:2009 +/A1:2010 +/A2:2013 +/A12:2011
ETSI EN 300 328 V2.1.1
ETSI EN 300440-2 V.1.4.1
ETSI EN 301511 V 12.5.1

Sarzana (SP) Italy
02/07/2019

CE

Giuliano Manfredini
Chief Technical Officer

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1 General Information

- The device described in this manual has been designed in order to provide excellent performance and to be compliant to the national and European directives in effect at the time. Conformity has been demonstrated; all the documentation and declarations are deposited at the producer.
- Atlas is a very sophisticated device which is also sturdy and easy to use. It requires care and knowledge to configure, install and maintain. For this reason, it is highly recommended that you read the manual with care before using the device.
- The manufacturer declines any responsibility for damage caused by misuse of the product, from non-compliance with the instructions hereafter described and from unauthorized modifications to the instrument or to the kit components.

Symbol Legend

WARNING!
..potential hazardous situation which if not avoided could cause injury or death.

INFORMATION
..useful tips and recommendation for efficient and trouble-free use of the device.

2 System Verification

2.1 Standard equipment

Atlas system kit contains the following components and accessories:

- Atlas.
- Universal AC/DC adapter with M12 connector for Atlas DC in.
- 1 Straight RJ45 LAN cable
- 1 WiFi TNC antenna
- 1 4G TNC antenna (optional)
- 1 GPS antenna
- Manufacturer's certificate
- User manual

All instruments are carefully inspected before being dispatched. However please check all the items and verify the contents correspondence with the packing list and order confirmation. In case of discrepancies, please contact Lunitek Immediately.

2.2 Warranty

Lunitek covers the device in the case of mechanical or electronic defects.
The warranty lasts for 1 year from the delivery date.
If defects are found during the warranty period, Lunitek may decide to fix the device or to replace it without further charge for the customer.

2.3 Warranty Void

The warranty does not apply in the case of:

- Incorrect use or maintenance of the instrument.
- Non-proprietary software or hardware interfacing.
- Unapproved mechanical or electrical changes.
- Operations and maintenance which are out of the stated ranges.
- The device having been tampered with or opened.

3 Brief Introduction to Atlas Plus

Atlas Plus was conceived for seismic and structural measuring and monitoring applications.
Designed in compact and efficient way, it comes with 3 or 6 fully differential external inputs plus a digital input specifically designed to interface the LTME150 digital sensor (Figure 1).

Figure 1 – Atlas Plus with LTME150 digital sensor connected

Atlas allows you to create a network of dataloggers communicating with each other and highly synchronized.
In addition to real-time processing and data logging, parameters of interest can be transferred remotely and alarms or emergencies can be managed.
Atlas is equipped with an internal backup battery that can last for 24 hours without power supply.
Batteries capacity can be increased depending on the customer needs.

Atlas is designed to be compact and sturdy, well suited for field applications.

KEY FEATURES

- True 32-bit ADC available in 3 or 6 channel configurations
- Sample rates up to 5000 sps
- Ultra-low noise floor, High Dynamic range (145dB@100sps).
- Digital channel for LTME150 (150dB mems sensor)
- Precision timing with built-in GNSS receiver or NTP protocol.
- Gigabit Ethernet
- WiFi
- 4G / 5G modem (optional)
- Removable SD card
- UPS functionality
- Rugged and waterproof enclosure IP68.

3.1 Cables and Accessories

Optional items add functionality and accessories to the digitizer.
Table 1 below is a list of available options.

Table 1 – Atlas Plus optional accessories

MODEL	DESCRIPTION
ATLAS-SUIT	Suitcase for ATLAS digitizer to housing SYSTEM and accessories
ATLAS-F-BAG	Spare part - Bag for ATLAS-F digitizer to housing SYSTEM and accessories.
ATLAS-F-MKII-BPACK	Additional or spare part - Battery pack for ATLAS-F digitizer
ATLAS-F-MKII-BRK	Pairs of brackets for permanent installation of ATLAS-F
ATLAS-PWR-US	Power supply with US power cord
ATLAS-PWR-EU	Power supply with EU power cord
ATLAS-ETH-GIGA	Gigabit ethernet cable ATLAS-TRITON
ATLAS-GPS	Standard GNSS antenna with 10 mt cable TNC connector
ATLAS-EXT-PWR	Extern DC supply cable for ATLAS and ATLAS-F digitizers
ATLAS-4G	Integrated 4G router option includes short antenna

3.1 Batteries Section

Batteries can be found at the back of the instrument (Figure 2).

Figure 2 – Position of the Atlas batteries. A) primary battery slot, B) secondary battery slot

Two battery slots are available by removing a sealed cap, using a 3 mm Allen key.

Slot A is the primary battery slot, slot B is the secondary battery slot and it is available as an option.

The batteries are standard 7.4V Li-Ion packs with a JST connector. The pack comes with a built-in BMS (battery management system) that protects the batteries from over/under charging.

Figure 3 - 7.4V Li-Ion packs

Li-Ion batteries have the highest energy density, but they suffer from low temperatures.
These batteries can work between -15C° and 70C° but they must be charged in the 0°C-45C° range.

When the temperature is outside the above-mentioned range, the charging process is suspended.

The battery charger circuit is based on a power path concept which is the best option for products that allow simultaneous charge and data acquisition.
When the battery is deeply discharged, the power path algorithm can independently regulate the system and battery current from the external supply to provide a small current into the battery, ensuring that the system is still getting the required power to turn on, instead of waiting until the battery has reached an acceptable charge value to turn on (Figure 4).

Beside this, when there is significant demand for system current (for example 5G power peak transmission), the system combine power from the input and the battery to support the system load.

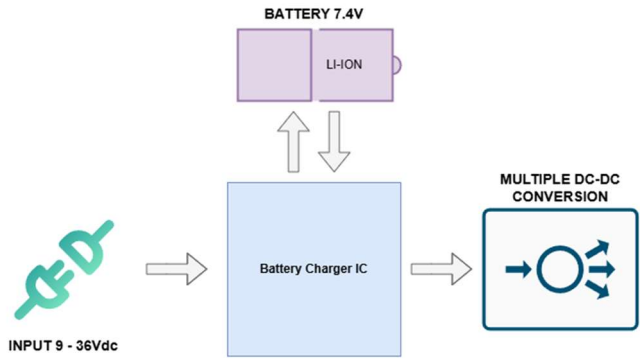


Figure 4 – Scheme of Atlas Plus batteries functioning

Atlas switches itself off with a safe procedure if the internal backup battery voltage is very low and no supply voltage from outside is applied.
This avoids dangerous situations for data integrity (sudden switch off).

If the internal battery is almost discharged, Atlas switches itself off. When an external voltage is supplied again, the device resumes the last known state before the interruption (idle or recording).

3.2 System Architecture

The system is designed around the outstanding IMX8-nano chip performance which incorporates 4 Cortex™-A53 cores at 1.5GHz as well as a real-time co-processor unit, 650MHz Cortex™-M7 and 2GB of DDR4 RAM. Atlas Plus offers advanced features and a variety of connectivity options such as gigabit ethernet, WiFi dual-band 802.11 ac/a/b/g/n and 4G/5G network.

The heart of data acquisition and data processing consists of an FPGA that also manages the timing synchronization and the PLL frequency generator from the PPS signal of the GNSS.

In the system architecture, there is a watchdog MCU to make sure that the high-level logic part does not get stuck in abnormal processes.

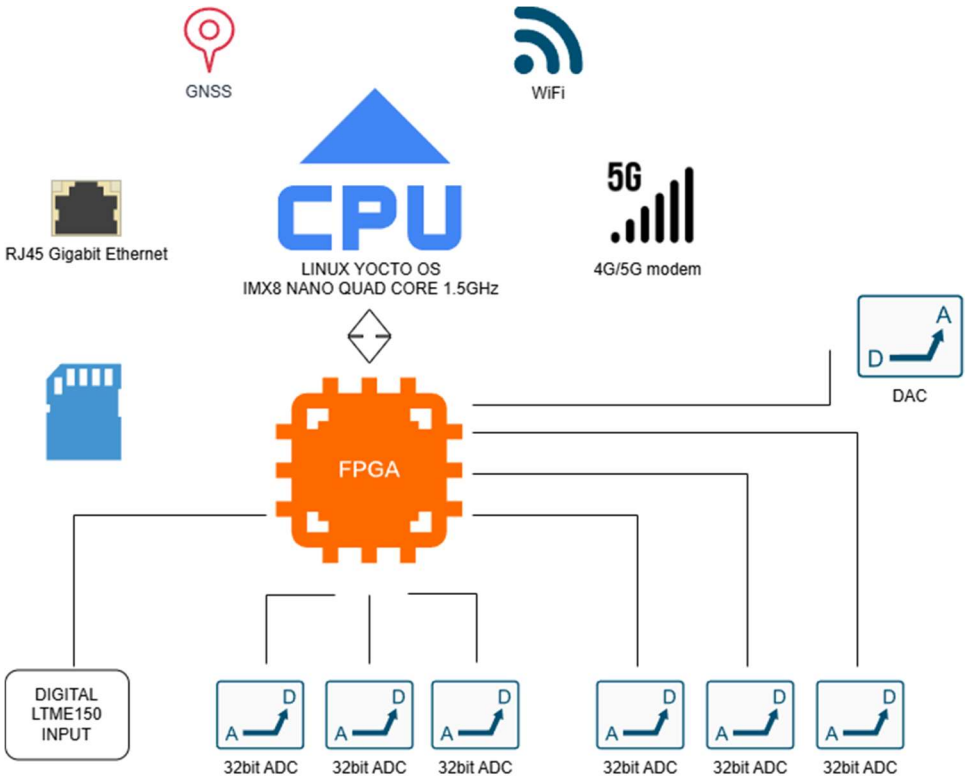


Figure 5 – Scheme of Atlas Plus architecture

Internally, at the macro-element level, Atlas Plus consists of 3 parts:

- The power module
- The baseboard
- The ADC modules

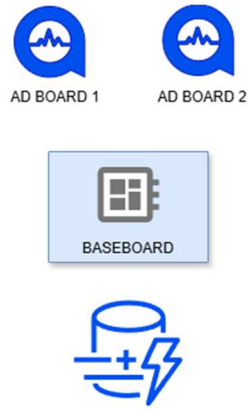


Figure 6 - Power module scheme

The power module (Figure 6) converts the variable input voltage range (9-36Vdc) to manage the battery charging process and the main power supply of the baseboard.
The power module has been designed as a separate module to ensure the least influence of temperature drift during the charging process, when a discrete amount of energy (up to 15W) is used.

The baseboard is the main module of the system and hosts:

- one or two AD modules each one capable of 6 differential channels
- IMX8-nano CPU module
- FPGA
- 4G / 5G modem module
- GNSS receiver

The baseboard is connectorized to the modules for easy maintenance and troubleshooting in the event of a problem.

The cellular modem is provided as an option and it can be 4G or 5G.
As an integrated component of the system, it benefits from the internal battery backup while utilizing the built-in IMX8 CPU. This integration eliminates the energy waste typically associated with external modems, which require a dedicated CPU running a separate operating system
The cellular modem is a standard PCIe module.

The FPGA a handles the following task:

- Processing of the oversampled data from the 32-bit ADC by applying FIR filtering and decimation ratios.
- Data collection from the digital sensor LTME 150.
- Creation of the time synchronism starting from the PPS input from the on-board GNSS receiver.
- Management of the DAC signal output (sensor calibration)

FPGA and CPU communicate via a high-speed SPI interface.

The AD board is equipped with 32-bit ADCs connected directly to the FGPA that manages the settings and retrieves data from them.
AD converters are synchronized by the same clock source and feature a low noise PGA.
The input signal goes through several analog and digital filtering blocks (Sync + FIR/IIR) and through a decimation stage in order to remove unwanted aliasing effects.
Eventually the final dynamic range exceeds 145dB@100sps while the sampling rates are up to 5000 sps.

4 Quick Start

Figure 7 – Atlas Plus connections and lights

4.1 Preliminary Operations

Unpack the box and take out your new Atlas Plus, the device only takes a few minutes to be ready. To get started with your device you must:

1. Identify the 10m TNC **GNSS** antenna and plug it in to the Atlas Plus TNC connector (Figure 7**Errore. L'origine riferimento non è stata trovata.**(**5**)).
   The internal high-sensitivity GNSS receiver, which is specifically made for timing applications, can get a time-fix from a single satellite, and is multi-constellation. Thanks to this, it is possible to install the GNSS antenna in not-optimal positions, without a direct sky view, for example inside a building, near a window.

2. Identify the power supply cable and the AC/DC adapter, plug it in to the Atlas M12 panel connector (Figure 7 (10)). Plug the AC/DC adapter into the mains power. The battery led (Figure 7 (**14**)) will light up either cyan or white, depending on the status of the internal battery.

3. Press the ON/OFF button (Figure 7 (8)). Atlas Plus will emit a short beep and start the power up sequence. When the power up sequence is complete, the heartbeat led (Figure 7 (**11**)) will light up blue while the GNSS led (Figure 7 (**12**)) will blink according to the GNSS status.

4. If you want to use the **LAN** connection to the Atlas Plus web interface, identify the RJ45/M12 LAN cable and plug it in to the Atlas M12 panel connector (Figure 7 (10)). The M12 connection is polarized,

first find the match and then screw it clockwise. The LAN led (Figure 7 (**14**)), will blink cyan according to the network traffic. Atlas Plus is configured by default with a static IP address, 192.168.111.xxx (xxx depends on the serial number of the instrument).

5. If you want to use **WiFi** connection to the Atlas Plus web interface, identify the WiFi TNC-RP antenna and screw it in to the Atlas Plus TNC (Figure 7 (**6**)) clockwise.

4.2 WiFi Network Connection

The Atlas is easily accessible via WiFi interface.

The first step is to identify the Atlas WiFi access point and connect to it.
On your PC, open the WiFi network discovery/display, usually on the bottom right.

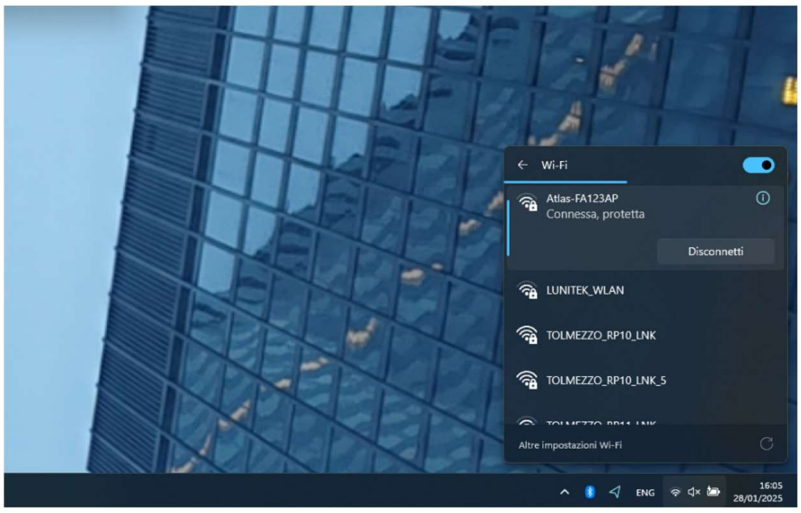


Figure 8 –Atlas Plus WIFI access

Once you have found the Atlas WiFi access point, connect to it and enter the WiFi password.
The default WiFi password is: **11223344**
The connection should be established in a few seconds.

You can then connect to the web interface: open your preferred web browser and enter in the address bar the default WiFi IP address **192.168.0.100**
When the welcome page with login is displayed (Figure 9), enter the default user/password: **lunitek / lun1t3k@@**

Please note that it is not currently possible for the user to change the web interface password, this functionality will be available in a future release.

Figure 9 – Login page of the Atlas Plus device accessed from the Atlas Plus WiFi Connection

4.3 Wired Network Connection – Static IP

The Atlas Plus is configured by default on static IP.
If you want to use the cabled network, plug the RJ45 connector in your LAN and enter the default IP address on your browser:

192.168.111.xxx (the **xxx** that depends on the serial number of your Atlas).

If the default IP address is not compatible with your network, you may want to assign a valid IP. You can do this by accessing the web interface via WiFi.

Go to **Settings** – **Network**

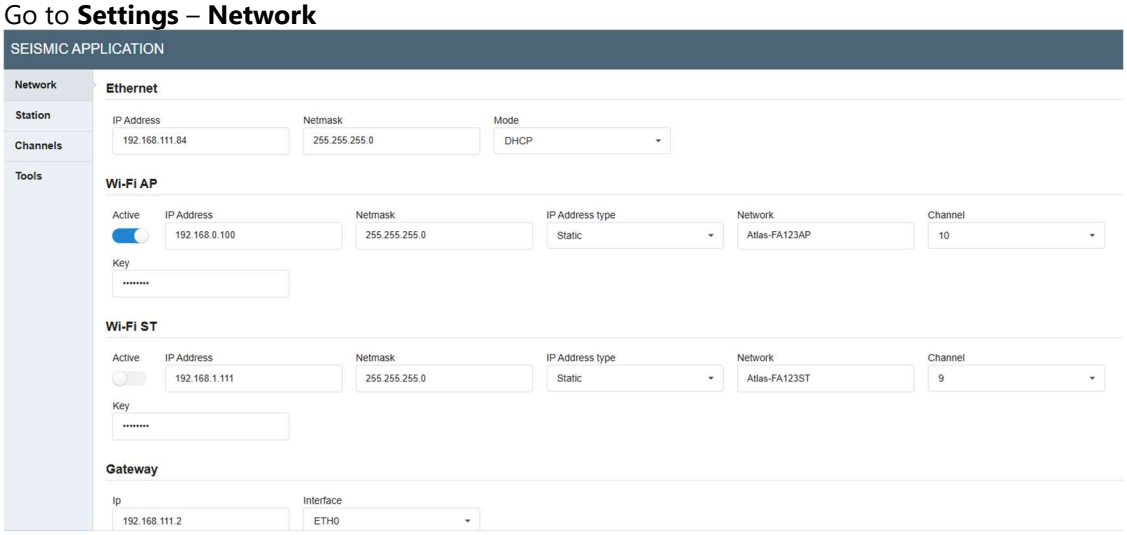


Figure 10 – The Settings – Network web page

Here it is possible to edit the following parameters:

Mode – Static or DHCP, set to Static if you want to set a static IP
IP Address – The IP address you want to assign to the device
Netmask – The netmask of your network
Gateway – The gateway address of your router

Click Save Configuration to save the changes and reboot to apply changes.

4.4 Wired Network Connection - DHCP mode

The Atlas Plus can be configured for DHCP. If your network uses DHCP to assign network addresses, simply connect the Atlas Plus to the LAN and wait a few minutes for the network address to be assigned.
You should be able to discover the assigned network address in one of the following ways:

- Asking the network administrator
- Network Scan (free programs like angry IP scanner)
- From the Atlas web interface (using WiFi)

Once you have discovered the IP address, open your preferred web browser and enter the assigned IP address, for example 192.168.111.192
Once the login page is displayed, enter the default user/password: **lunitek/lun1t3k@@** to continue to the main page.

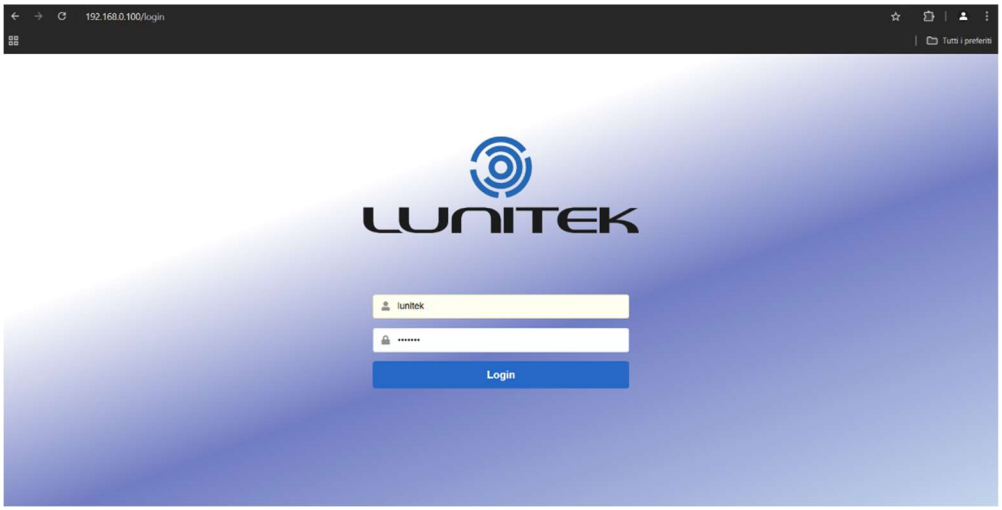


Figure 11 – The Atlas Plus login web page accessed from Wired Network Connection

In order to avoid potential unexpected IP address changes on every LAN cable connection-disconnection, the network administrator should allocate a fixed IP address to the Atlas, based on the MAC address.

4.5 IP discovery using the WiFi and the Web Interface

If you successfully access the Atlas Plus device through a WiFi connection, you can discover the IP address assigned by the DHCP server in the LAN network.

Go to **Home – SOH Tab**

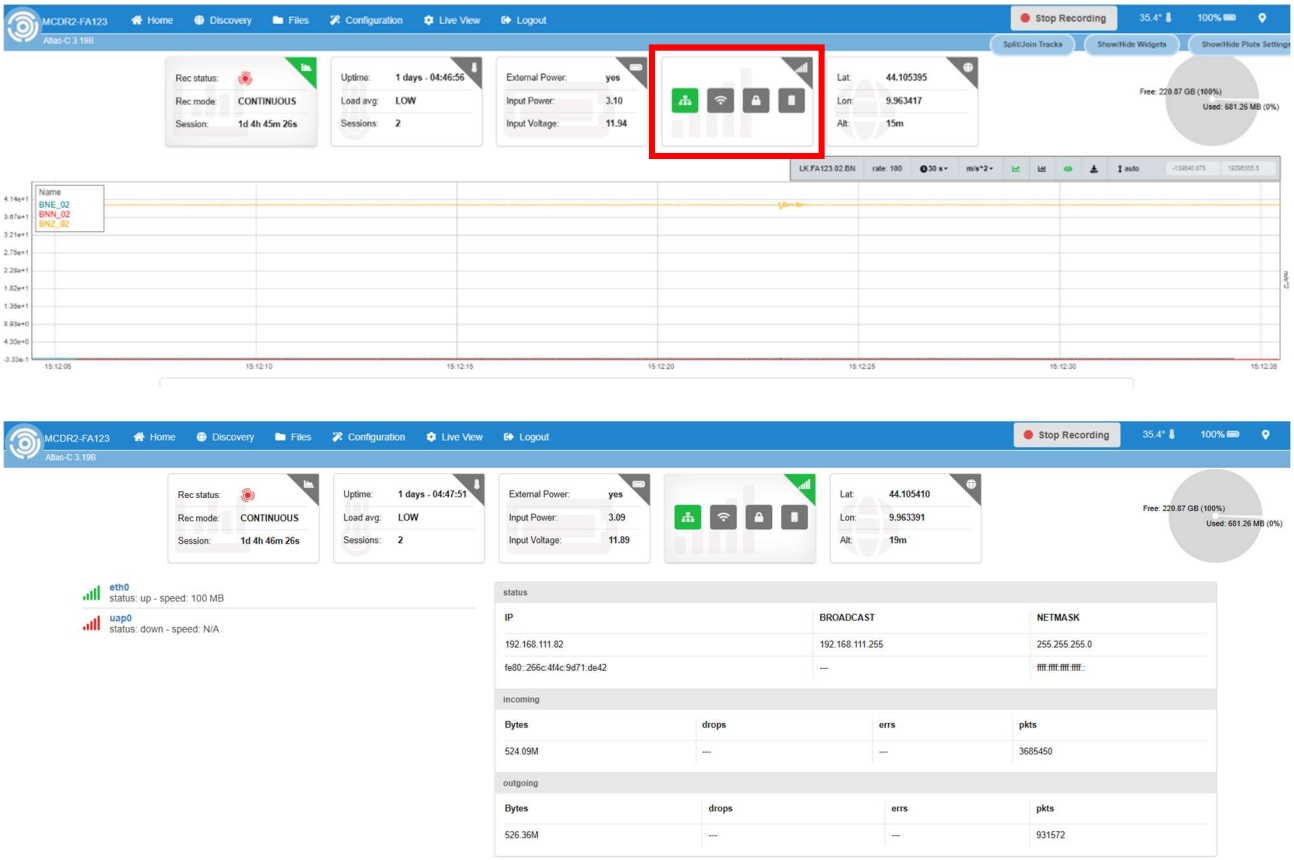


Figure 12 – Home page (at the top), and SOH page (at the bottom, accessed by mouse-click on the SOH tab within the red rectangle)

Look for the **eth0 interface** on the Network Status page.
All network parameters are listed for this interface.

4.6 Connection using SSH

SSH, or secure shell, is the most common way of connecting to Linux hosts for remote administration. Although the basics of connecting to a single host are often rather straightforward, this can become difficult when you work with a large number of remote systems.

SSH represents a flexible way to control your Atlas Plus device and an efficient tool for downloading files from the unit.

SSH is a standard protocol in Linux based systems and it is available as a free terminal emulator on Windows (for example TeraTerm or PuTTY).

The first step is to retrieve the Atlas IP address as described in the previous sections. Once you obtained the IP address, suppose it is 192.168.111.192 and that you are using a ***Linux*** machine, open your terminal and enter:

ssh root@192.168.111.192

You will be asked to enter the password; the default password is: **lun1t3k@@**

No character echo is displayed when you enter the password.

If you are using a ***Windows*** machine and TeraTerm as terminal emulator, open the emulator and enter the Atlas Plus IP address on the Host line and set TCP port to 22 and Service to SSH.

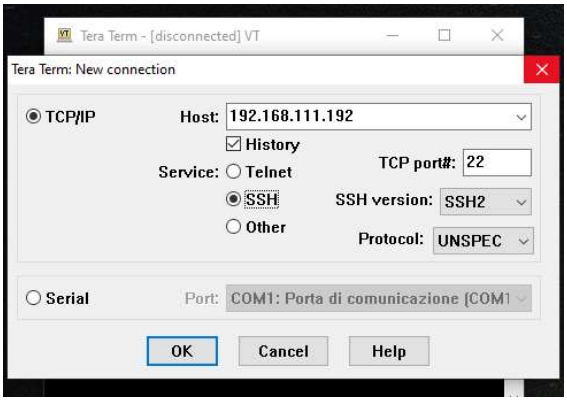


Figure 13 / SSH connection to Atlas device on Windows (TeraTerm)

Click OK.

You will be asked to enter the login information, user/password: **root/lun1t3k@@**

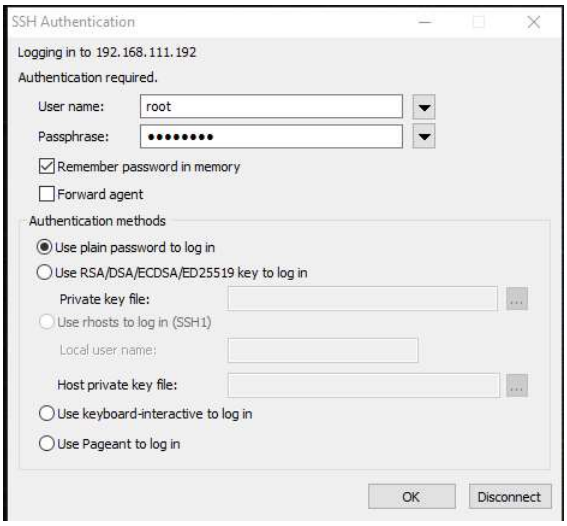


Figure 14 – Login information to connect via SSH using TeraTerm (Windows)

If you are successfully connected to the system, this will display a shell prompt.

Figure 15 – Shell prompt that appears after successful SSH connection

5 Operating Basics

Figure 16 – Atlas Plus connections

5.1 Power Supply

Atlas Plus can be powered by an external DC power source in the range of 9 to 36 Vdc.

Atlas comes with an AC/DC for mains power.
Power cords with different types of plugs are available and must be specified when ordering.

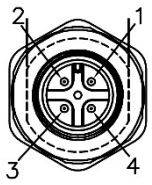
The AC/DC delivers 3.5A at 12V, however Atlas Plus absorbs max 15W when the internal battery is completely discharged. When the internal battery pack is fully charged the average power consumption drops down under 2W.

The open-ended DC cable is an optional part that might be useful when the device is power up from an external DC power source, such as solar panels.

The power supply input circuit is protected against polarity inversions, voltage excess and power surges.
A Li-Ion battery pack is installed inside the housing.
The battery is self-protected against overcurrent and over voltage, for safety reasons.

Do not dispose of the battery in household waste, batteries must be collected and recycled separately.

The input connector of the power is M12 male type (**10**).
Connector pin-out is as follows:



PIN	SIGNAL
1	GND
2	VDC (9-36)
3	VDC (9-36)
4	GND

Figure 17 - Input connector of the power

Suitable mating connectors are:

Phoenix Contact SACC-M12MS-4SC
Binder 99-0429-14-04 Series 713

The Atlas power supply circuit is equipped with GDT and TVS to protect the system from power surges, but if your installation is permanent, a supplementary external protection may ensure a longer life to the instrument. In Figure 18 is displayed a typical lightning arrester for DC voltage.

Figure 18 - Lightning arrester for DC voltage

The surge arrester must be grounded to ensure its operation.

It is strongly recommended for the Atlas housing to be connected to the earthing system via the grounding point on the enclosure.

Figure 19 - Earthing system

5.2 Power ON-OFF button

The power ON-OFF button is on the front panel of Atlas Plus (Figure 16 (**8)**).

Press the button to power on the instrument and wait for 1 minute for the boot to complete.

To turn off the Atlas press the power button and wait for the power down sequence.
Just before the complete shut down the system beeps for some seconds.

The Atlas is continuously monitoring both the external power supply and battery charge.

If the external power supply is disconnected the system runs using the internal battery.

If the battery charge drops below a predefined threshold value, the Atlas automatically starts the shut-down procedure to avoid any risk of data integrity loss (sudden switch off).

If the internal battery is almost discharged, the Atlas Plus switches off. When an external power is supplied again, the device resumes the last known state before the interruption (idle or recording).

5.3 GNSS receiver

The Atlas Plus is equipped with ultra-high sensitivity GNSS receiver specifically designed for timing applications that can get the timing fix from a single satellite. The receiver supports GPS along with BeiDou, GLONASS and Gallileo constellations which allows the device to be compliant with almost national requirements. Enhanced sensitivity and concurrent constellation reception extend coverage and integrity in challenging signal environments.

Thanks to the high-quality receiver the system achieves a time-fix even in suboptimal scenarios, for example inside buildings near windows or sky obstructions.
It is highly recommended to place the GNSS antenna where the view of the sky is optimal, but it is surprising how well it works even in hostile situations.

When the Atlas gets the time fix the led (**4**) on the lid will flash quickly once every 5 seconds.

In this situation the system is hardly synchronized, multiple units get the synchronization with less than 1µs accuracy between them.

The connector is TNC.

The central pole of the connector carries the phantom power required by the antenna, accidental short circuits are prevented by the internal electronics and the maximum supply current is 30 mA .

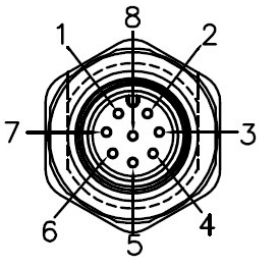
If your GNSS antenna is installed outside, it is good practice to protect the system from lightning strikes and surges with an in-line TNC coaxial surge arrester, see Figure 20.

Figure 20 - In-line TNC coaxial surge arrester

The surge arrester must be grounded to system earth to ensure protection.

5.4 Ethernet

Atlas Plus is features a gigabit ethernet network accessible via an 8 pin M12 female connector (Figure 16 (**9**) and Figure 21).



PIN	SIGNAL
1	DA+
2	DA-
3	DB+
4	DB-
5	DC+
6	DC-
7	DD+
8	DD-

Figure 21 - 8 pin M12 female connector

When a valid ethernet communication is running, the led (Figure 16 (**6**)) blinks cyan according to the traffic generated.
Atlas Plus ethernet transceiver supports the Auto-MDIX feature thus straight-through or cross Ethernet cables can be used indifferently.
Below the RJ45 to M12 cable LT21-010-CAB-00-R5 (Figure 22).

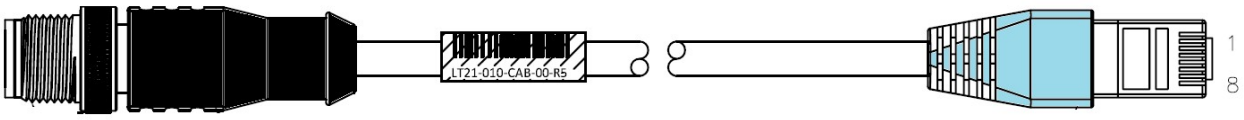


Figure 22 - RJ45 to M12 cable LT21-010-CAB-00-R5

J1		Signal	J2
1	TWISTED PAIR 1	DA-	1
2		DA+	2
3	TWISTED PAIR 2	DB-	3
4		DB+	4
5	TWISTED PAIR 3	DC+	5
6		DC-	6
7	TWISTED PAIR 4	DD+	7
8		DD-	8

Table 2

If you plan to install the instrument with permanent connection to the ethernet, it is a good practice to insert an in-line ethernet surge protector as shown in Figure 23.
This will help to protect the equipment from lightning and surges.

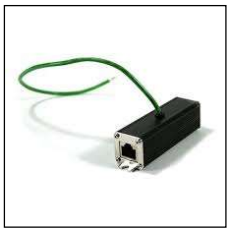


Figure 23 - In-line ethernet surge protector

The surge arrester must be grounded to the system earth to ensure protection.

5.5 WiFi

WiFi connection is a dual mode: it can be set as WiFi host or access point and connect to existing WiFi networks. It is Certified dual-band 802.11 ac/a/b/g/n.

The connector is an TNC-RP and it is on the front of the instrument (Figure 16 (**6**)).

A whip antenna is supplied with the kit.

5.6 Cellular Modem

Cellular modem comes as an option.
The cellular communication modules available are 4G or new generation 5G.

The mini-SIM card is accessible on the left side of the Atlas Plus, the ejection system is push/pull.
The user can seal the instrument by installing the protective lid.

The antenna connector is an FME (Figure 16 (**4**)) and it is on the front of the instrument.

A whip antenna is supplied with the system.

5.8 Analog Inputs

The Atlas Plus can be equipped with one or two external inputs for sensors.

Analog sensor input is a standard 19 pole military spec plug (Figure 16 (**2** e **3**) and Figure 24).
A typical matching part number is PT06E-14-19P(SR).

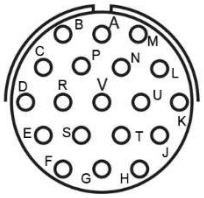


Figure 24 - Analog sensor input

Below the signals position on the connector (**Table 3**).

Pin number	Signal	Type	
A	CAL_EN	*Calibration Enable Signal*	*BB version*
B	CENTER	*Mass Centering Signal*	*BB version*
C	CAL	*Analog Calibration Signal*	*BB version*
D	AGND	*Analog Ground*	*Standard*
E	CH1+	*40V peak to peak differential*	*Standard*
F	CH1-		*Standard*
G	CH2+		*Standard*
H	CH2-		*Standard*
J	CH3+		*Standard*
K	CH3-		*Standard*
L	MASS_LOCK	*Mass Lock Signal*	*BB version*
M	PWR+	*Power Supply for sensors*	*Standard*
N	PWR-		*Standard*
P	RS232-TX	*RS232 TX Signal*	*BB version*
R	SP/LP	*Slow Period/ Long Period*	*BB version*
S	RS232-RX	*RS232 RX Signal*	*BB version*
T	U mass position	*Analog Input CH1 12 bit*	*BB version*
U	W mass position	*Analog Input CH2 12 bit*	*BB version*
V	Z mass position	*Analog Input Ch3 12 bit*	*BB version*

Table 3 - Signals position on the connector of Figure 24

Atlas Plus BB version also includes signals for full control of broadband sensors.

A typical matching part number is PT06E-14-19P(SR).

5.8 Digital Sensor

The Atlas Plus comes with an input for a digital sensor LTME-150.

D-sensor input (Figure 16 (**1**)) is a standard 10 poles military spec plug (Figure 25).

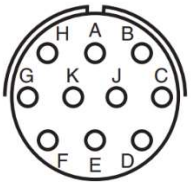


Figure 25 - D-sensor input

Below the signals position on the connector (**Table 4**).

Pin number	Signal	Type
A	CLK +	*Sync Clock Positive*
B	CLK -	*Sync Clock Negative*
C	DRDY -	*Data Ready Signal Negative*
D	DRDY +	*Data Ready Signal Positive*
E	TX -	*TX Signal Negative*
F	TX +	*TX Signal Positive*
G	VCC	*Positive Power Supply for LTFB-150 sensor*
H	RX +	*RX Signal Positive*
J	RX -	*RX Signal Negative*
K	GND	*Power Return for LTFB-150 sensor*

Table 4 - Signals position on the connector of Figure 25

A typical matching part number is PT06A-12-10S(SR).

5.8 USB console

The Atlas Plus runs a special tailored version of Linux Yocto.
Sometimes it happens that specialized user needs access to the system console.

An M8 connector is available on the instrument for this purpose to gain full control of the system console (Figure 16 (**7**)).

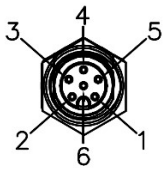


Figure 26 - M8 connector

Table 5 - Signals position on the connector of Figure 26

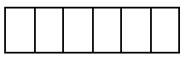
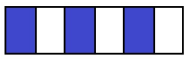
Pin number	Signal	Type
1	VCC	*+5V*
2	DATA -	*USB data minus*
3	DATA +	*USB data plus*
4	GROUND	*Ground*
5	NC	*Not connected*
6	NC	*Not connected*

CH340 driver installation could be requested to connect to the USB console.

5.9 LEDs behavior

The Atlas communicates its status to the user through a set of LEDs on the lid.

External Power/Battery

Behaviour	LED (t)	Meaning
OFF		External power supply disconnected
Cyan Steady		External power supply connected, battery charged
Orange Steady		External power supply connected, Battery charging
Blu Blinking		External power supply disconnected, flashes according the charging status

LAN

Behaviour	LED (t)	Meaning
Blu Steady		LAN chip activated
Cyan Steady		Gigabit connected link

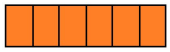
GPS

Behaviour	LED (t)	Meaning
OFF		No fix
Red Steady		Satellite Fix
Green Steady		PLL Lock
Orange Steady		Satellite Fix+PLL Lock

WiFi

Behaviour	LED (t)	Meaning
OFF		WiFi disabled
Red Steady		WiFi enabled **Access Point mode**

4G/5G

Behaviour	LED (t)	Meaning
OFF		4G disabled
Green/Orange blinking		Not registered
Orange Steady		Registered

CPU status

Behaviour	LED (t)	Meaning
Led Off		System off
Blinking green		Heartbeat CPU Activity on boot
Blinking blue/cyan		Recording

8 Accessing SD card and SIM card

Accessing SD and SIM on Atlas Plus is very easy. To fully access to the card holder section, the user must remove the sealed cap on the left side of the instrument (Figure 27).

Figure 27 – Position of the Atlas Plus SD card and SIM

To do this, you need a 3 mm Allen-key 3.0.

Figure 28 shows the content behind the sealed cap once it is removed.

Figure 28 - SD and SIM cards positions

Both cards should be inserted with the contacts on the top.

On the left the full-size SD card for the data logging storing space.
On the right the mini-SIM card for the 4G/5G connection.

Turn off the instrument before performing any operation on the cards.

Check the position of the o-ring on the cap before refitting it to the housing.

8 Identification & Maintenance

8.1 Instrument Identification

The Atlas nameplate is displayed on Figure 29 below:

Figure 29 – Atlas nameplate

The nameplate specifies the following information:

- REF: Manufacturer internal reference number
- P/N: Instrument Part Number
- S/N: Instrument Serial Number
- IP ETH: Wired LAN IP address.
- IP WiFi: Wireless LAN IP address (optional).
- Batch: Production line batch.
- S/N: Instrument Serial Number

8.2 Maintenance

Internal backup battery

The instrument is equipped with an internal lithium polymer battery. Battery life depends directly on the use of the instrument. Performance degradation is due to a deterioration of the battery. Please contact the manufacturer for a replacement battery.

Internal timekeeping battery

The instrument is equipped with a timekeeping system for when the instrument is disconnected from external power source. The battery is a coin cell type. The life expectancy is about 10 years. The loss of date/time is due to a flat battery.

Do not try to replace the battery yourself. Please contact the manufacturer for battery replacement.

Instrument cleaning

We recommend cleaning the instrument with a slightly damp cloth or a cloth soaked in alcohol.

8.3 Instrument Disposal

Do not throw away the device with household waste!
In accordance with the European Directive 2002/96/CE on electric and electronic equipment waste and its implementation as national law, electrical/electronic equipment must be collected separately and recycled ecologically.

You can return the used device to your dealer or alternatively look for an authorized collecting and recycling facility in your area.

Ignoring this EU Directive may have adverse effects on the environment and human health!

8.4 Marking

This equipment has been tested in accordance with the applicable regulations, using the most accurate measurement standards possible.
Measures have been taken to ensure that the units produced on the same equipment will keep on being compliant with the requirements.

8.5 Copyright

Technical Specifications

Analog to Digital Conversion

Resolution:	32bit
Full scale range:	±40Vpp, ±20Vpp, ±10Vpp, ±5Vpp, ±2.5Vpp, ±1.25Vpp
Dynamic:	>145dB@100SPS
Sample rate:	25, 50, 100, 200, 250, 500, 1000, 2000, 5000 sps
Digital Antialiasing Filter:	Three stages: fixed 5th-order sinc filter FIR low pass filter 140db at Nyquist
Analog LPF:	2 poles.
Additional Filter Engines:	IIR 4th-order low-pass (software selectable) IIR 1th-order high-pass (software selectable)

On Board Storage

OS storage:	e-MMC 8GB
SD card:	32GB default (up to 512 optionally)
Recording time 3 axes @ 500Hz:	2 months
Recording Format:	Proprietary or Mini-seed

Trigger

Algorithms	STA/LTA, Threshold exceeding, manual
Threshold:	Independent for each channel
Start/Stop:	manual or threshold exceeded

CPU

Processor:	4 x IMX8-nano@1.5GHz
RAM:	2GB DDR4
Operating System:	Linux Yocto Mickledore (kernel 6.1.36)

Power Supply

VDC Input:	9-36 VDC
Backup Battery:	Lithium Polymer 8,4VDC 10Ah/h
Time operation with backup battery:	20 hours (WiFi on)
Maximum power consumption:	max 15 watt with flat battery
Typical power consumption:	1.5 W, no LAN cable plugged, WiFi inactive
Battery charger:	Protected against overcharging
Power supply management:	Managed by microcontroller
Power monitoring:	Voltage/Current input, Power Input

GNSS

Receiver	72 channel
Satellites	GPS/QZSS, GLONASS, BeiDou, Gallileo (3 Concurrent)
Update rate	4Hz
Position accuracy	2.5m
Timing accuracy	<20ns
Sensibility	-167 dBm

WiFi

Type:	single or dual band
Standard:	dual-band 802.11 ac/a/b/g/n
Maximum TX PWR:	20dBm
Sensibility:	-94dBm@54Mps Rx
Data rate:	up to 150Mbps

Cellular Modem (optional)

Data Transmission 4G model:

LTE: LTE-FDD: Max. 10 Mbps (DL)/Max. 5 Mbps (UL)
LTE-TDD: Max. 8.96 Mbps (DL)/ Max. 3.1 Mbps (UL)
UMTS: HSDPA: Max. 42 Mbps (DL) HSUPA: Max. 5.76 Mbps (UL)
WCDMA: Max. 384 kbps (DL)/Max. 384 kbps (UL)
GSM: EDGE: Max. 296 kbps (DL)/Max. 236.8 kbps (UL)
GPRS: Max. 107 kbps (DL)/Max. 85.6 kbps (UL)

Data Transmission 5G model:

5G SA: n1/2/3/5/7/8/12/13/14/18/20/25/26/28/30/38/
40/41/48/66/70/71/77/78/79;
LTE-FDD: B1/2/3/4/5/7/8/12/13/14/17/18/19/20/25/26/28/30/66/71;
LTE-TDD: B34/38/39/40/41/42/43/48

SIM:	nano-SIM
Antenna:	Whip Antenna FME

Environment

Instrument operating temperature	-40C° to 85C°
Batteries operating temperature:	-10C° to +70°C (discharging)
Charging temperature:	0C° +45C°
Storage temperature:	-40 +85 °C
Humidity:	0 to 100% RH (non condensing)

Housing

Type:	Aluminum housing
Size:	234x137x63 mm (234x152x63 with connectors)
Weight:	3Kg
Protection:	IP67
Installation:	By mounting