Magnifying discoveries

Åligner

Laser alignment kit
for station orientation

User Manual

Reference: ÅLIGNER_UM_01.1, Issue 1 Version 2

MAAGM SAS | 57, bd Demorieux | F72100, Le Mans France | tel : +33 6 64 30 39 94 | www.maagm.com
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Magnifying discoveries

Summary :

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1 CONTENT

- Mechanical Interface = 'The Åligner'
  - Precisions pins on the top
  - Fast mounting interface on tripod
  - Laser line factory aligned with precision pins on the top
- Field Battery
  - 5V USB-B output for Laser
  - 5V USB-B output for TP-link LAN-Wifi Access Point
  - 20V-3A USB-C output for Optical Gyrocompass power
  - Flashlight
  - Charge indicator
- TP-link Nano Access point
  - Wire RJ45 connection of the optical gyrocompass
  - Wi-Fi connection to the Field Tablet
- Field Tablet
  - Display of Optical Gyrocompass Orientation and Heading
  - 'GNSS transfer' MAÅGM application to automatically provide position to Optical Gyrocompass (configuration of the Optical Gyrocompass required according to this manual)
- Tripod
  - Fast-mounting and secured platform
  - Independent heading and pitch setting
  - Hook for stabilizing the tripod with the backpack
  - Adjustable feet and mast
- Waterproof Backpack
  - Fitting tripod size and hook
  - Containing all accessories (but the tripod and the Optical Gyrocompass)

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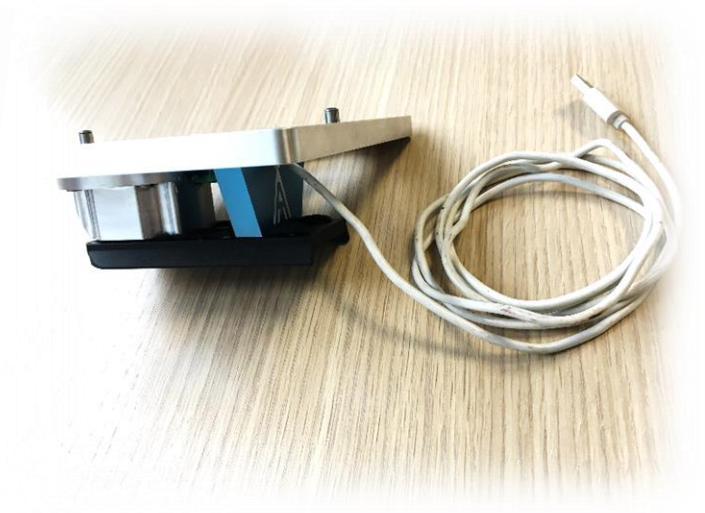

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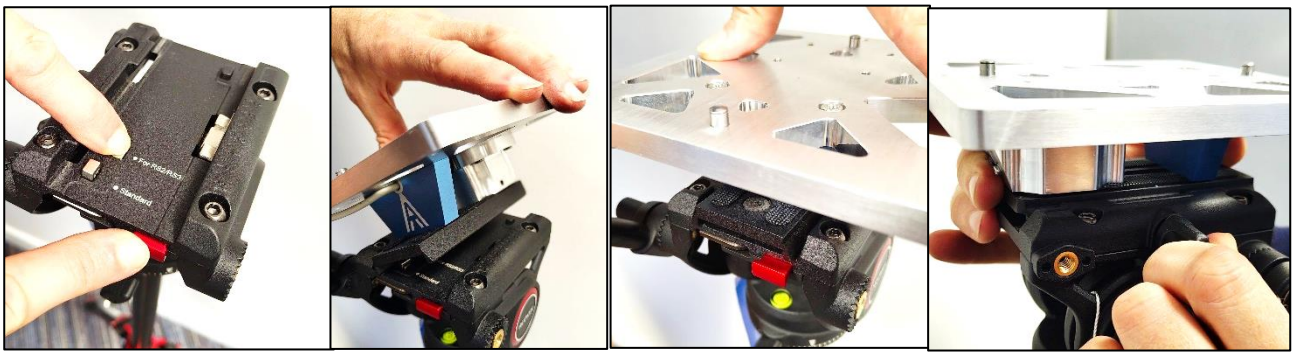
2 MOUTING AND DISMOUNTING OF THE ÅLIGNER ON THE TRIPOD

Positioning and securing the Åligner on the tripod

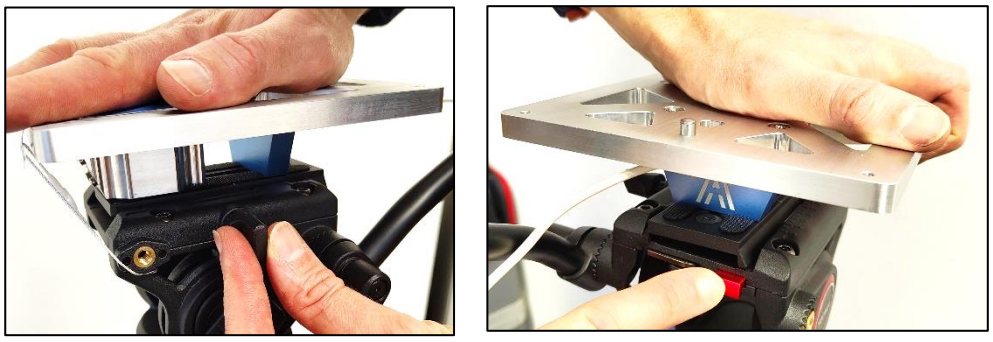
1. Press **RS2/RS3** to lift the standard stop (if not already engaged)
2. Push the **red locking button** (if not already engaged)
3. Insert the Åligner into the slots on the sides of the support
4. Clip the Åligner until the **red locking button** pops out. The plate is now secure.
5. Center the Åligner plate on the tripod.
6. Lock it by tightening the **knob** at the top of the tripod.



1 2 3 4 5 6

Removing the Åligner from the tripod

1. Loosen the plate by unscrewing the **knob** at the top of the tripod.
2. **While holding the Åligner firmly,** Push the **red locking button** to remove the Åligner from the tripod.



1 2

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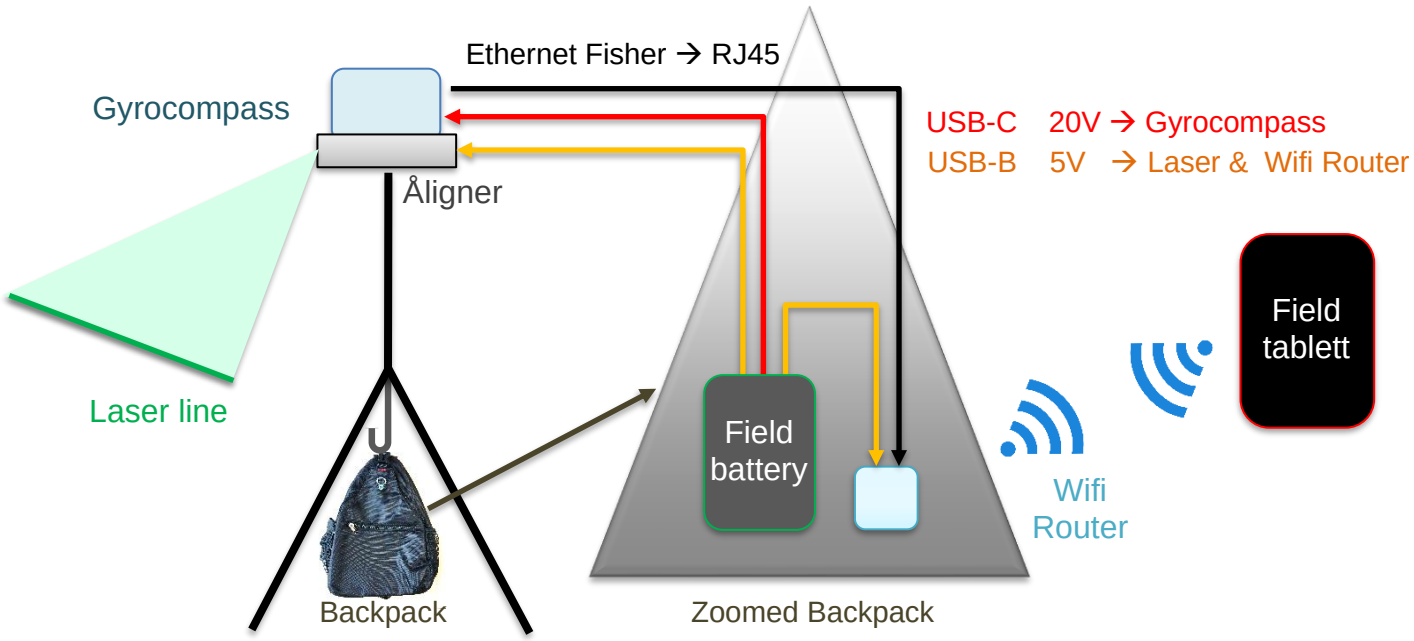
3 INSTALLATION OF THE GYROCOMPASS ONTO THE ÅLIGNER

1. Inspect the **precision hole** under the baseplate of the optical gyrocompass and the **precision pins** on the Åligner. Ensure they are free from dust or contamination before attempting installation.
2. The precision pins on top of the Åligner ensure precise alignment of the optical gyrocompass. They are designed to provide **a tight yet smooth fit when aligned correctly**.
3. When docking or undocking the gyrocompass, move it **parallel** to the Åligner. Avoid applying force if the alignment is not precise.

4 WIRING



The backpack is designed to contain the router and field battery. It can be attached under the tripod using a dedicated hook, as shown in the following image.

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5 NETWORK CONFIGURATION

Here under is the general configuration which ensure:

- Connection of the gyrocompass to the tablet (through Wifi Router) to display the attitude information (Roll, Pitch, Heading)
- Connection of the tablet to the gyrocompass (through Wifi Router) to provide GNSS information from the tablet to the gyrocompass algythm (NEEDED to ensure proper alignment of the optical gyrocompass)

Replace **AAA.BBB.CCC** with the required domain.

	Static IP	**Gateway**	**Sub-Mask**
TP-LINK router	AAA.BBB.CCC. **x**	AAA.BBB.CCC. **x**	255.255.255.0
TABLET	AAA.BBB.CCC. **y**	AAA.BBB.CCC. **x**	255.255.255.0 (length of network prefix = 24)
GYROCOMPASS	AAA.BBB.CCC. **z**	AAA.BBB.CCC. **x**	255.255.255.0
GYROCOMPASS GNSS INPUT	AAA.BBB.CCC. **y**	Port 8117	n.a.

Proposed setting corresponding to **factory setting** of article provided by MAÅGM.
The configuration of the gyrocompass is to be made by the customer when the optical gyrocompass is not provided by MAÅGM.

	Static IP	**Gateway**	**Sub-Mask**
TP-LINK	192.168.36.1	192.168.36.1	255.255.255.0
TABLETT	192.168.36.101	192.168.36.1	255.255.255.0 (length of network prefix = 24)
GYROCOMPASS	192.168.36.100	192.168.36.1	255.255.255.0
GYROCOMPASS GNSS INPUT	192.168.36.101 Port 8117	n.a.	n.a.

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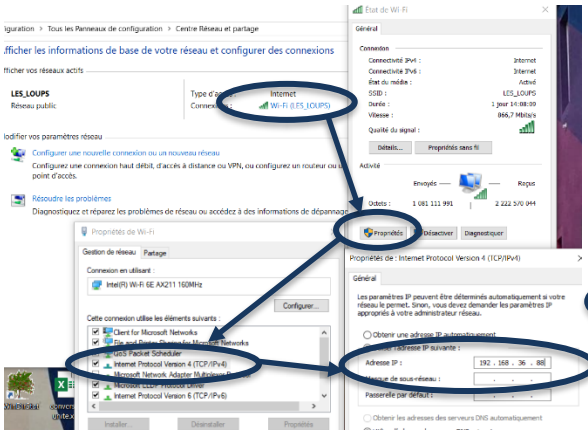
5.1 TP-LINK network configuration

This section explains how to configure the TP-Link router to establish communication between the gyrocompass and the tablet.

5.1.1 Accessing the configuration interface

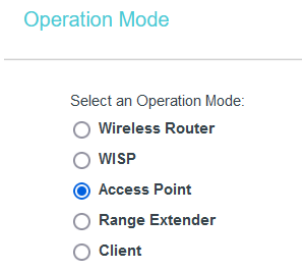
1. **Set up your computer or tablet** on the same domain (AAA.BBB.CCC) as the router's IP address. Avoid ending with "1" or "100" to prevent conflicts with the router or gyrocompass IP adresses.
    1. **MAAGM factory setting domain**: 192.168.36
    2. **TP-Link factory setting domain**: 192.168.0
2. **Connect to the TP-Link network** using the name (SSID) written on the back of the router.
3. **Enter the Wi-Fi password**, also located on the back of the router.
4. **Open a web browser** (e.g., Firefox, Chrome) and enter the router's IP address or http://tplinkwifi.net (double-check "http", and not "https")
    - **MAAGM factory setting IP**: 192.168.36.1
    - **TP-Link factory setting IP**: 192.168.0.1
5. **Log in** using the default credentials:
    - Username: admin
    - Password: admin



1 (for Windows)

2 3

5.1.2 MAÅGM factory parameters



DHCP Settings

DHCP Server:	○ Disable ◉ Enable
Start IP Address:	192.168.36.102
End IP Address:	192.168.36.199
Address Lease Time:	1 minutes (1~2880 minutes, the default value is 1)
Default Gateway:	192.168.36.1 (optional)
Default Domain:	(optional)
DNS Server:	192.168.36.1 (optional)
Secondary DNS Server:	0.0.0.0 (optional)

LAN Settings

LAN Type: Static IP

Note: The IP parameters cannot be configured if you have chosen Smart IP(DHCP)

(In this situation the device will help you configure the IP parameters automatically as you need).

MAC Address:	CC:32:E5:D4:2F:70
IP Address:	192.168.36.1
Subnet Mask:	255.255.255.0
Gateway:	192.168.36.1 (optional)

Wireless Settings

Wireless:	◉ Enable ○ Disable
Wireless Network Name:	TP-Link_2F70 (Also called SSID)
Mode:	11bgn mixed
Channel Width:	Auto
Channel:	Auto

☑ Enable SSID Broadcast

Status

Firmware Version:	0.9.1 3.17 v0001.0 Build 190428 Rel.63523n
Hardware Version:	TL-WR802N v4 00000004

LAN

MAC Address:	CC:32:E5:D4:2F:70
IP Address:	192.168.36.1
Subnet Mask:	255.255.255.0

Wireless 2.4GHz

Operation Mode:	**Access Point**
Wireless Radio:	Enabled
Name(SSID):	TP-Link_2F70
Mode:	11bgn mixed
Channel:	Auto(Channel 4)
Channel Width:	Auto
MAC Address:	CC:32:E5:D4:2F:70

5.1.3 *Modifying the router 's IP adress*

Changing the router's IP address should only be done when necessary, following the IP consistency rules described in Section 5. Any change in the domain will require corresponding updates to the tablet and optical gyrocompass configurations. Similarly, modifying the IP address within the same domain (the last section of the IP address, labeled 'x' in Section 5) will require updating the tablet and optical gyrocompass settings.

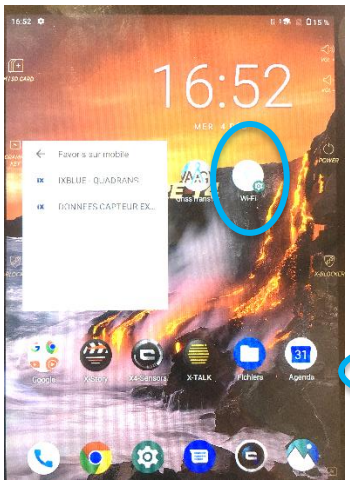
1. Modify the **LAN settings** to set the IP format to **AAA.BBB.CCC.x**, ensuring the IP address matches the gateway.
2. Update the **DHCP settings** as follows:
   - Start IP address: AAA.BBB.CCC.102
   - End IP address: AAA.BBB.CCC.199
   - Default Gateway: AAA.BBB.CCC.x
   - DNS Server: AAA.BBB.CCC.x

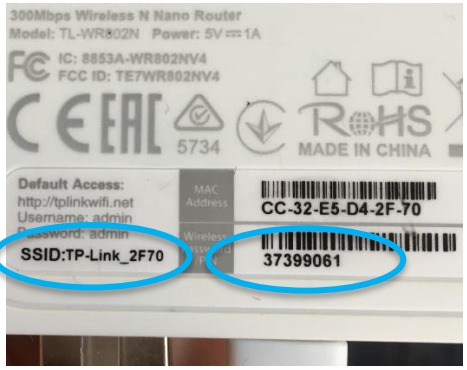
5.2 Tablet network configuration

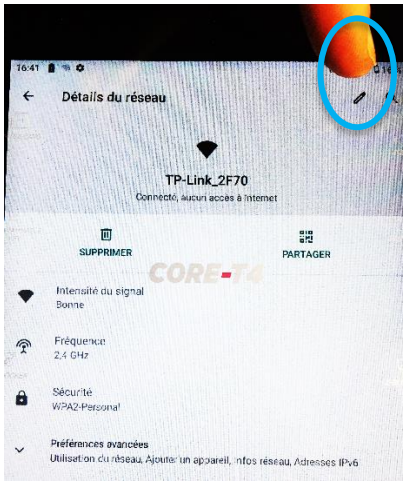
Changing the tablet's IP address should only be done when necessary, following the IP consistency rules described in Section 5.

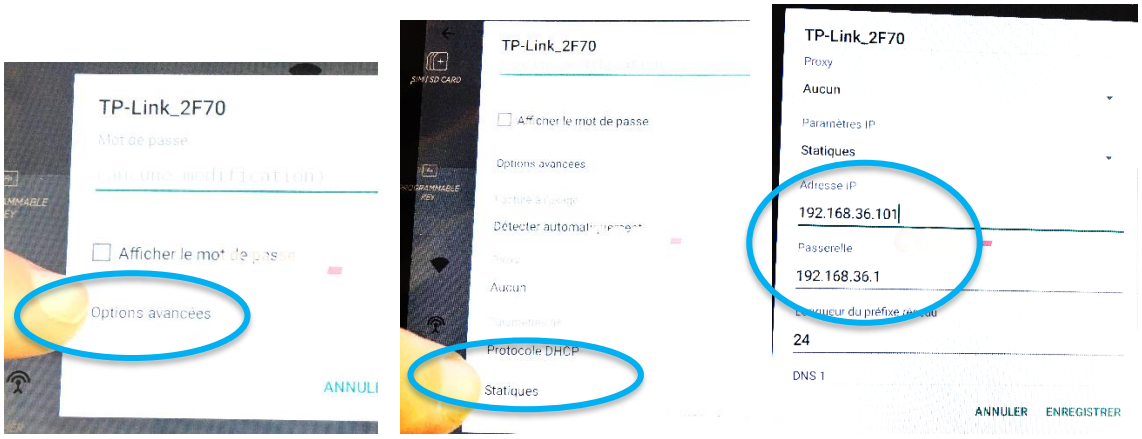
The IP configuration on Android depends on the network. This requires setting the network parameters in the Wi-Fi settings for the TP-Link network.

1. Tap the **Wi-Fi settings icon**.
2. Connect to the TP-Link network using the name (SSID) written on the back of the router.
3. Enter the Wi-Fi password, also found on the back of the router.
4. Tap the **pencil icon** to edit the TP-Link connection.
5. Select **'Advanced options'**.
6. Choose **'Static'** as the IP configuration type.
7. Define the IP Address: **AAA.BBB.CCC.y**. Make sure to modify the GNSS input IP on the gyrocompass as described in **§5.3.3**.
8. Set the Gateway IP Address: **AAA.BBB.CCC.x** (the TP-Link router's IP address).





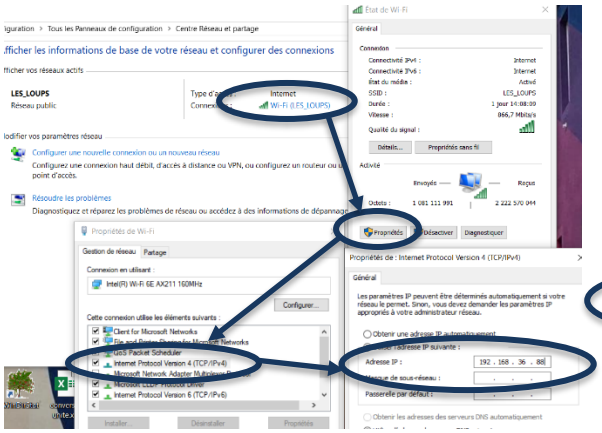




5.3 Gyrocompass network configuration

5.3.1 Connection to the Web interface

1. **Set up your computer or tablet** on the same domain (AAA.BBB.CCC) as the router's IP address. Avoid ending with "1" and "100" as this would conflict with the router's IP address or Gyrocompass IP address.
   - **MAAGM factory setting domain**: 192.168.36
   - **TP-Link factory setting domain**: 192.168.0
2. **Connect to the TP-LINK network** using the name (SSID) written on the back of the router.
3. **Enter the Wi-Fi password**, also located on the back of the router.
4. **Open a web browser** (e.g., Firefox, Chrome) and enter the Gyrocompass's IP address (double-check "http", and <u>not</u> "https")
   - **exail factory setting gyrocompass 's IP**: 192.168.36.1kk
     'kk' being the last digit of the gyrocompass serial number



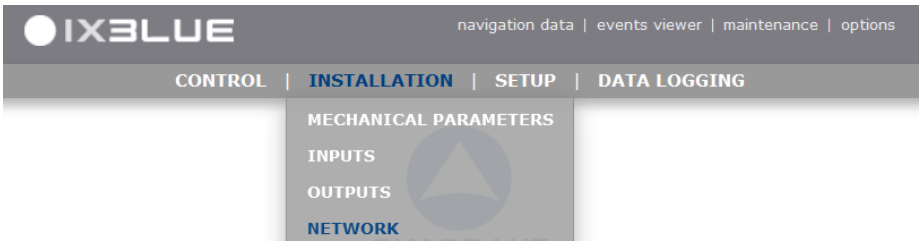
1 (for Windows)

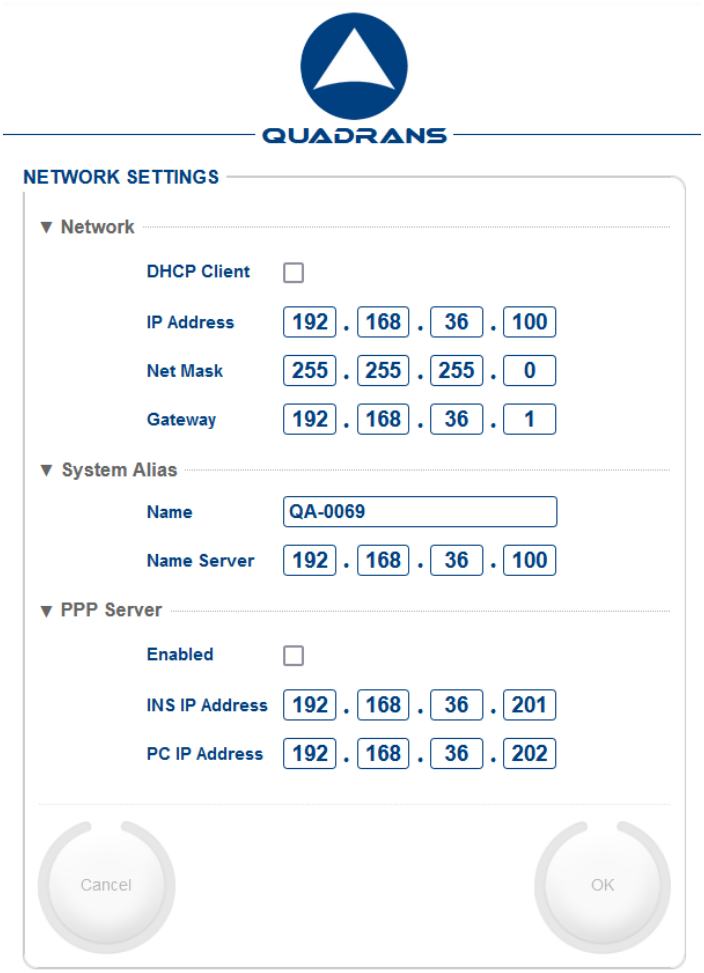
2 3

5.3.2 Configuring of the gyrocompass 'IP' address

Changing the gyrcompasss's IP address should only be done when necessary, following the IP consistency rules described in Section 5.

1. Click on '**Parameters / Network**' in the gyrocompass interface.
2. Set the gyrocompass IP to **AAA.BBB.CCC.z**, ensuring:
   - The domain (AAA.BBB.CCC) matches the router and tablet.
   - z does not conflict with other IPs in the network (e.g., router or tablet).
3. Set the **Gateway IP Address** to **AAA.BBB.CCC.x** (the TP-Link router's IP)





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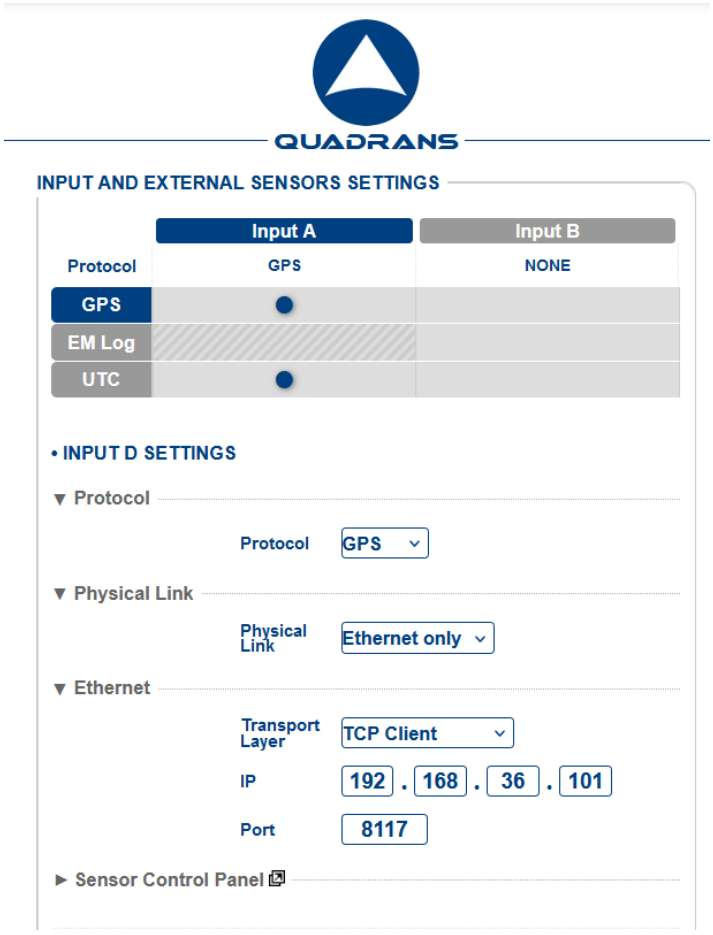
5.3.3 *Configuration of the TCP/IP GNSS input*

These settings allow the gyrocompass to receive GNSS information from the tablet using the **'GNSS Transfer'** application. To ensure that the tablet is effectively broadcasting GNSS information, launch the GNSS transfer application onto the tablet (cf §6).

1. Click on **'Parameters / Input'** in the gyrocompass interface.
2. Click the **dark blue circle** under the GNSS column to access the settings.
   Note: The dark blue circle disappears when clicked. Click again to make it reappear.
3. Set **Transport/Link** to **'TCP client'**.
4. Set the **Port** to **8117**, matching the GNSS Transfer application on the tablet.
5. Set the **IP Address** to **AAA.BBB.CCC.y** (the tablet's IP).
6. Click **'OK'** at the bottom of the page to save the configuration



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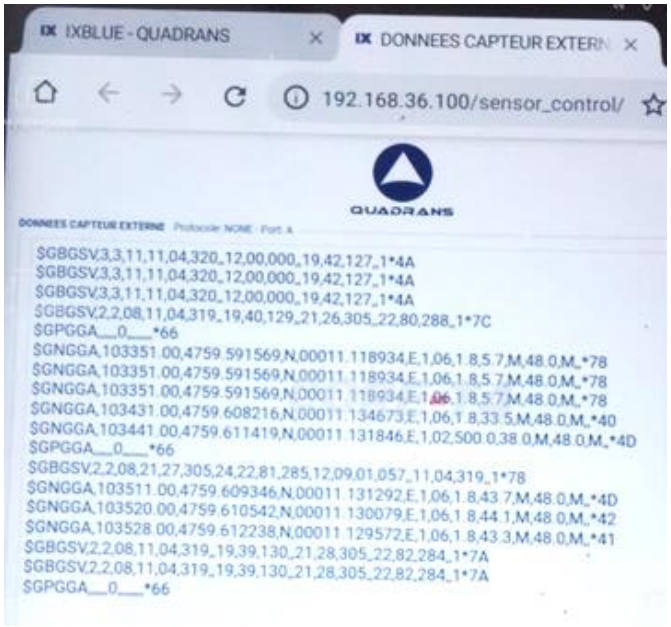
5.3.4 *Checking the GNSS signal received*

Click on the small arrow icon in the gyrocompass interface to monitor the **NMEA frames** sent by the tablet.

Note that the tablet will only start broadcasting NMEA frames once they are valid, meaning they provide readable latitude and longitude data, and not several empty fields between commas.



6 PROVIDE POSITION TO THE OPTICAL GYROCOMPASS

To ensure proper alignment of the optical gyrocompass with True North, its position must be set. This information can be provided manually or automatically using the tablet.

6.1 Manual setting of the initial position

This method is used when a GNSS signal is unavailable at the alignment location. Note that a manually set position will be treated as the starting point by the gyrocompass, meaning the algorithms may assume movement during alignment.

During alignment (see §7), it is recommended to update the position multiple times by following this process:

1. Optionally, click on **'Option'** in the gyrocompass interface.
2. Optionally, set the position unit to latitude and longitude in **decimal degrees**.
3. Click on **'Parameters / Manual Position'**.
4. Enter the position coordinates.
5. Click **'OK'** at the bottom of the page to save the configuration.

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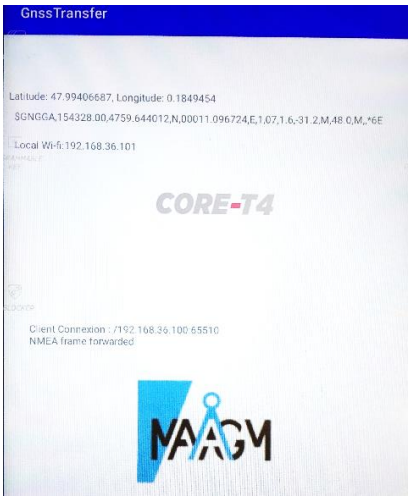
6.2 Automatic setting of the dynamic position with open sky

This method is used when a GNSS signal is available at the alignment location. The **'GNSS Transfer'** application installed on the tablet facilitates this process.

1. On the tablet, open the **'GNSS Transfer'** application.
2. Allow the application to run without closing it.
3. To switch to the gyrocompass web interface without closing the GNSS Transfer application:
    - Swipe from the bottom to the middle of the screen to view open applications.
    - Select your web browser from the list.

1



2

The application will display:

- The measured **latitude and longitude** once reliable NMEA frames have been received from the GNSS chip.
- The corresponding NMEA frames.
    - Initially, incomplete NMEA frames are common while the GNSS chip initializes. These frames may have empty fields between commas, such as $GNGCA,,,,,,,,,3J.

Refer to §5.3.4 for instructions on verifying NMEA frames are correctly received by the optical gyrocompass.

7 OPTICAL GYROCOMPASS ALIGNEMENT

Follow these steps to align the optical gyrocompass accurately:

1. **Connect the gyrocompass** according to the wiring instructions in **§4**.
2. **Access the web interface** on the tablet.
3. Depending on GNSS availability:
    - Use the **'GNSS Transfer'** application on the tablet to provide position information.
    - Or manually configure the position as described in **§6.1**.
4. Wait for **5 minutes** (the standard alignment duration).

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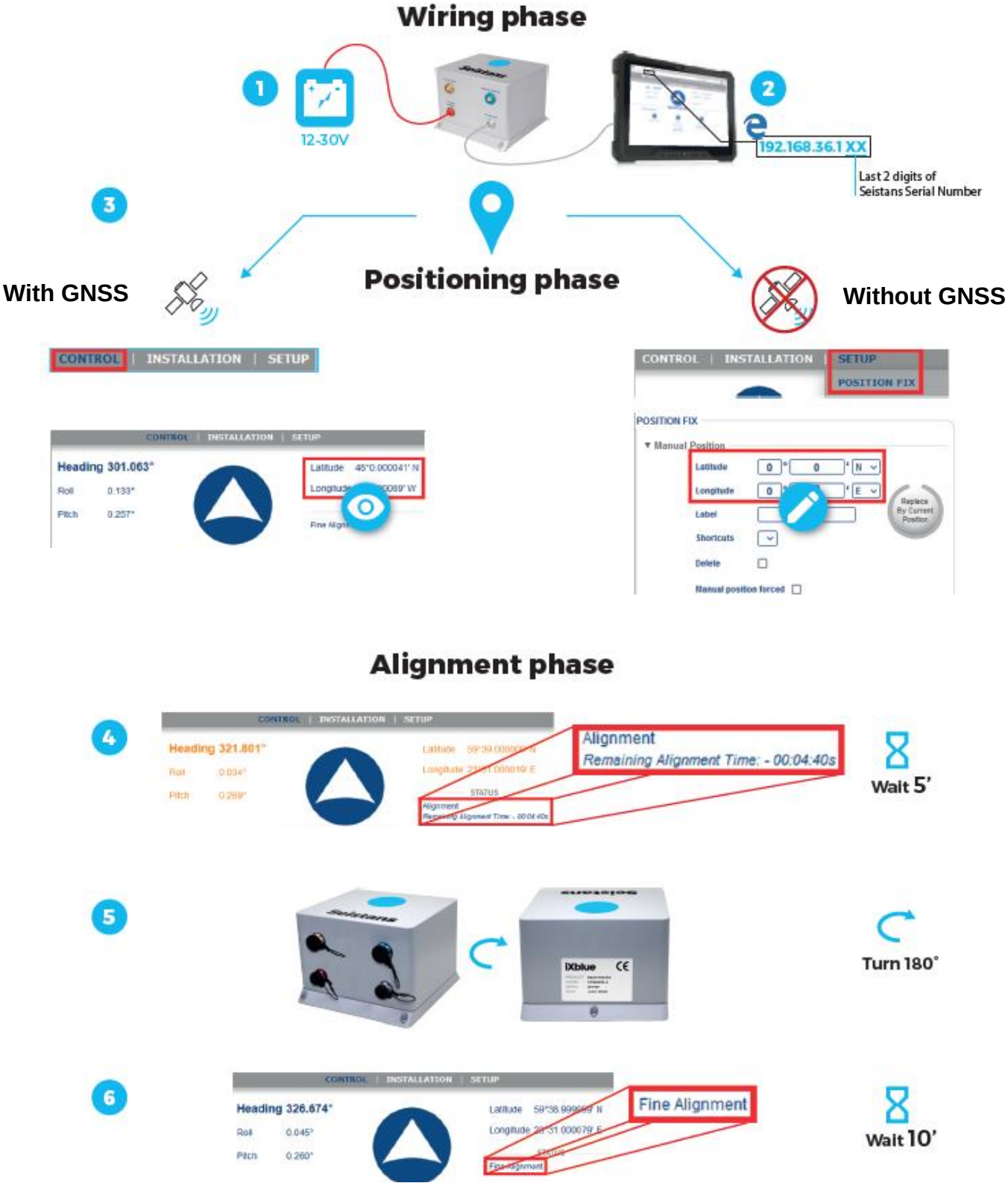
5. Rotate the gyrocompass **~180° ± 20°** along the vertical axis.
6. Wait for an additional **5 minutes** to achieve maximum alignment accuracy.



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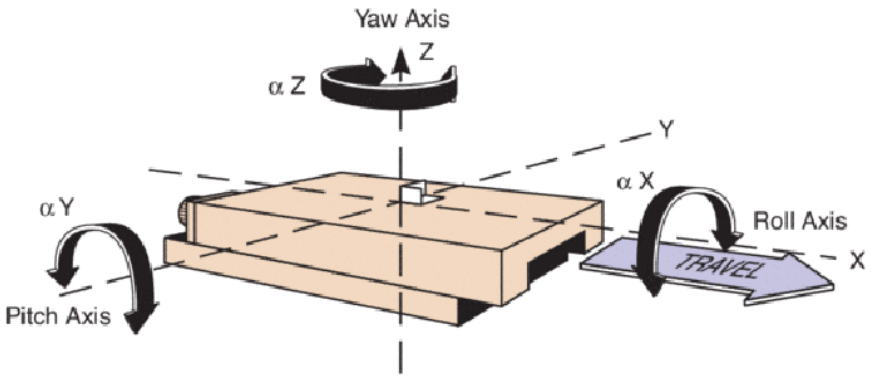
	Step	Logo color in web-HMI	Performance
Power ON = 0 to 15 seconds	initialization	Grey	Na
15 seconds to 5 minutes	coarse alignment	Orange	Under specification
5 min to 20 min	Fine alignment with 180° rotation at ~10 minutes	Blue	At specification
After 20 minutes	Converged navigation algorithm sustaining performance		Best performance

8 TRIPOD ADJUSTMENT

To ensure the laser line is aligned with the heading measurement provided by the optical gyrocompass, the tripod must be properly adjusted. Accurate adjustments depend on achieving a precise **Roll** value (typically 0.0x°) provided by the gyrocompass, visible on the tablet interface.
This is why the tripod adjustment is performed only at this stage, once reliable Roll data is provided by the gyrocompass and displayed on the tablet.
Once again, the readings provided by the gyrocompass should only be used when they are displayed in blue (alignment complete) and not in orange (alignment in progress). Additionally, for accurate results, it is crucial to have provided the gyrocompass with its current position (see §6)



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8.1 Adjusting the height

1. Ensure the tripod feet are extended enough to allow the backpack to be attached using the hook underneath (for stability and ergonomics). Fully extend the largest feet first for better stability.
2. Lock the feet securely. Check that each foot is properly in contact with its locking stop by attempting to extend it further.
3. Verify that the main vertical bar is firmly secured by rotating the **red locking ring**.
4. Use the bubble level on the top of the tripod to roughly level the platform. Adjust the feet length as necessary.


1


2


2bis


3


4

8.2 Adjusting the Roll

1. Display the **Roll** information from the optical gyrocompass on the tablet by opening the **Control page**.
2. Make fine adjustments to the tripod feet to achieve a **Roll value of 0.0x°**.
   - Tip: Adjusting the spread of the feet can be more effective than changing their height.

8.3 Adjusting the Heading (Yaw)

1. Unlock the rotation along the vertical axis by loosening the corresponding screw (see image below).
2. Display the **Heading** information from the optical gyrocompass on the tablet by opening the **Control page**.
3. Rotate the platform using the removable arm for precision until the average heading displayed reaches **0.0x°.**
4. Lock the rotation by tightening the screw.
5. Verify that locking the screw hasn't shifted the platform's position. Adjust again if needed.

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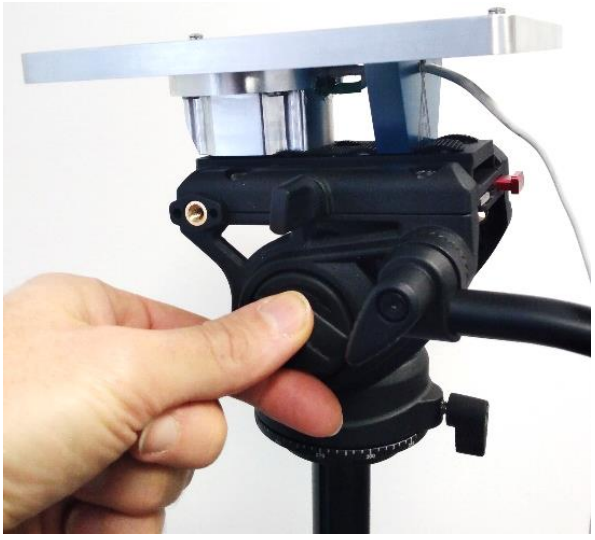
8.4 Adjusting the Pitch

1. Unlock the rotation along the horizontal axis by loosening the corresponding **red screw**.
2. Rotate the platform using the removable arm until the laser line aligns with the desired reference point.
3. Be cautious:
   - Small pitch angles have negligible effects on alignment.
   - Larger angles (e.g., >20°) can significantly affect the accuracy between the gyrocompass heading and the laser line.



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9 TIPS

☐ **Laser alignment**: It is easier to align a drawn line with the laser line by checking their parallelism rather than attempting to place the laser directly on the drawn line.

☐ **Using the field battery as a flashlight**: Press and hold the power button on the field battery for **3 seconds** to activate its flashlight function.

☐ **Gyrocompass runtime**: To check how long the optical gyrocompass has been running, navigate to the **'Navigation Data'** menu in the web interface and look for the **'Run Time'** field.

☐ **Protecting the backpack in bad weather**: When it is raining or snowing, prevent water from entering the backpack by ensuring cables are routed downward, below the bag's entrance, before looping upward into the bag.

☐ **Gyrocompass accuracy**: Do not turn off the optical gyrocompass between measurements or installations. Its accuracy improves with longer runtime.

☐ **Avoiding shocks during transport**: When transporting the gyrocompass, take care to avoid shocks or impacts to protect the system.

☐ **Improving accuracy through reorientation**: Reorienting the gyrocompass (e.g., pointing it South after completing a North-oriented measurement) can enhance its accuracy.

☐ **Manual position updates without GNSS**: If GNSS data is unavailable, periodically update the gyrocompass position manually to keep the system aligned with the actual location.

☐ **Latitude definition**: In the northern hemisphere, latitudes are positive (0° to +90°). In the southern hemisphere, latitudes are negative (-90° to 0°).

☐ **Day/Night mode**: Switch between day and night modes on the gyrocompass web interface by adjusting the settings in the **'Options'** menu.

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10 TROUBLESHOOTING

- **Problem: Unable to access the gyrocompass on your browser**
  - Double-check that you entered **http** (not https) before the IP address.
  - Ensure your device is connected to the **TP-Link network**.
  - Verify that your device is on the same domain (**AAA.BBB.CCC**) as the gyrocompass.
  - Make sure your device's IP address does not conflict with the gyrocompass or router.
  - Check that the Ethernet cable from the gyrocompass is properly connected to the TP-Link router.
  - Confirm that the gyrocompass is powered:
  - Verify the cable is connected to the field battery.
  - Ensure the blue LED on the field battery is illuminated, indicating sufficient charge.

- **Problem: Unable to access the router on your browser**
  - Double-check that you entered **http** (not https) before the IP address.
  - Ensure your device is connected to the **TP-Link network**.
  - Verify that your device is on the same domain (**AAA.BBB.CCC**) as the router.
  - Make sure your device's IP address does not conflict with the router.
  - Confirm that the router is powered:
  - Verify the cable is connected to the field battery.
  - Ensure the blue LED on the field battery is illuminated, indicating sufficient charge.

- **Problem: No laser line**
  - Confirm that the laser is powered:
  - Verify the cable is connected to the field battery.
  - Ensure the blue LED on the field battery is illuminated, indicating sufficient charge.