TOPCON

**INSTRUCTION MANUAL
LAYOUT NAVIGATOR**

LN-150 series

LN-150 Series
Layout Navigator
Instruction Manual

Part Number 1035721-00

Revision B

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HOW TO READ THIS MANUAL

Thank you for selecting the LN-150 series.

• Please read this Instruction manual carefully, before using this product.
• LN has a function to output data to a connected host computer. Command operations from a host computer can also be performed. For details, refer to "Communication manual" and ask your local dealer.
• The specifications and general appearance of the instrument are subject to change without prior notice and without obligation by TOPCON CORPORATION and may differ from those appearing in this manual.
• The content of this manual is subject to change without notice.
• Some of the diagrams shown in this manual may be simplified for easier understanding.
• Always keep this manual in a convenient location and read it when necessary.
• This manual is protected by copyright and all rights are reserved by TOPCON CORPORATION.
• Except as permitted by Copyright law, this manual may not be copied, and no part of this manual may be reproduced in any form or by any means.
• This manual may not be modified, adapted or otherwise used for the production of derivative works.

Symbols

The following conventions are used in this manual.

✿	:	Indicates precautions and important items which should be read before operations.
☞	:	Indicates the chapter title to refer to for additional information.
Note	:	Indicates supplementary explanation.
📖	:	Indicates an explanation for a particular term or operation.

{Power switch} etc. : Indicates keys on the operation panel.

Notes regarding manual style

• Except where stated, "LN" means LN-150 series in this manual.

• *Bluetooth*® is a registered trademark of Bluetooth SIG, Inc.
• All other company and product names featured in this manual are trademarks or registered trademarks of each respective organization.

Li-ion CONTAINS Li-ion BATTERY.
MUST BE RECYCLED OR DISPOSED OF PROPERLY.

JSIMA This is the mark of the Japan Surveying Instruments Manufacturers Association.

CONTENTS

1. PRECAUTIONS FOR SAFE OPERATION

For the safe use of the product and prevention of injury to operators and other persons as well as prevention of property damage, items which should be observed are indicated by an exclamation point within a triangle used with WARNING and CAUTION statements in this instruction manual.
The definitions of the indications are listed below. Be sure you understand them before reading the manual's main text.

Definition of Indication

⚠ WARNING	Ignoring this indication and making an operation error could possibly result in death or serious injury to the operator.
⚠ CAUTION	Ignoring this indication and making an operation error could possibly result in personal injury or property damage.

⚠	This symbol indicates items for which caution (hazard warnings inclusive) is urged. Specific details are printed in or near the symbol.
🚫	This symbol indicates items which are prohibited. Specific details are printed in or near the symbol.
●	This symbol indicates items which must always be performed. Specific details are printed in or near the symbol.

General

⚠ Warning

🚫 Do not use the unit in areas exposed to high amounts of dust or ash, in areas where there is inadequate ventilation, or near combustible materials. An explosion could occur.

🚫 Do not perform disassembly or rebuilding. Fire, electric shock, burns, or hazardous radiation exposure could result.

❗ When securing the instrument in the carrying case make sure that all catches, including the side catches, are closed. Failure to do so could result in the instrument falling out while being carried, causing injury.

⚠ Caution

🚫 Do not use the carrying case as a footstool. The case is slippery and unstable so a person could slip and fall off it.

🚫 Do not place the instrument in a case with a damaged catch, belt or handle. The case or instrument could be dropped and cause injury.

🚫 This instrument automatically operates when the power is turned ON or OFF. Do not touch the instrument during operation. Doing so may cause injury.

Power Supply

⚠ Warning

🚫 Do not use batteries other than those designated. An explosion could occur, or abnormal heat generated, leading to fire.

❗ To prevent shorting of the battery in storage, apply insulating tape or equivalent to the terminals. Otherwise shorting could occur, resulting in fire or burns.

🚫 Do not place articles such as clothing on the battery charger while charging batteries. Sparks could be induced, leading to fire.

🚫 Do not use damaged power cords, plugs or loose outlets. Fire or electric shock could result.

🚫 Do not use power cords other than those designated. Fire could result.

❗ Use only the specified battery charger to recharge batteries. Other chargers may be of different voltage rating or polarity, causing sparking which could lead to fire or burns.

Do not connect or disconnect power supply plugs with wet hands. Electric shock could result.

Do not short circuit. Heat or ignition could result.

Do not use voltage other than the specified power supply voltage. Fire or electrical shock could result.

Do not use the battery or charger for any other equipment or purpose. Fire or burns caused by ignition could result.

Do not heat or throw batteries or chargers into fire. An explosion could occur, resulting in injury.

Do not use batteries or the battery charger if wet. Resultant shorting could lead to fire or burns.

⚠ Caution

Do not touch liquid leaking from batteries. Harmful chemicals could cause burns or blisters.

Tripod

⚠ Caution

When mounting the instrument to the tripod, tighten the centering screw securely. Failure to tighten the screw properly could result in the instrument falling off the tripod, causing injury.

Tighten securely the leg fixing screws of the tripod on which the instrument is mounted. Failure to tighten the screws could result in the tripod collapsing, causing injury.

Do not carry the tripod with the tripod shoes pointed at other persons. A person could be injured if struck by the tripod shoes.

Keep hands and feet away from the tripod shoes when fixing the tripod in the ground. A hand or foot stab wound could result.

Tighten the leg fixing screws securely before carrying the tripod. Failure to tighten the screws could lead to the tripod legs extending, causing injury.

Bluetooth wireless technology / Wireless LAN

⚠ Warning

Do not use within the vicinity of hospitals. Malfunction of medical equipment could result.

Use the instrument at a distance of at least 22 cm from anyone with a cardiac pacemaker. Otherwise, the pacemaker may be adversely affected by the electromagnetic waves produced and cease to operate as normal.

Do not use onboard aircraft. The aircraft instrumentation may malfunction as a result.

Do not use within the vicinity of automatic doors, fire alarms and other devices with automatic controls as the electromagnetic waves produced may adversely affect operation resulting in an accident.

2. PRECAUTIONS

Charging Battery

• Be sure to charge the battery within the charging temperature range.
    Charging temperature range: 0 to 40°C

• Use only the specified battery and the battery charger. Failures caused by using other batteries and battery chargers are out of warranty including the main unit.
    (Battery: BDC72, Charger: CDC77)

Warranty policy for Battery

• Battery is an expendable item. The decline in retained capacity depending on the repeated charging/discharging cycle is out of warranty.

About operation when the power is turned ON/OFF

This instrument operates as shown below and performs auto leveling/auto rotation when the power of the instrument is turned ON or OFF. Do not touch the instrument during operation. Doing so may cause injury.

When the power is turned ON or OFF
(Auto rotation)

When the power is turned ON
(Auto leveling)
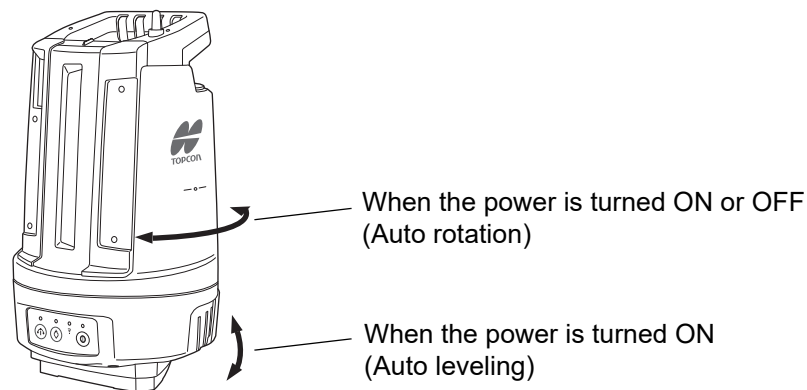
Precautions concerning water and dust resistance

Dustproof and waterproof performance of the instrument comply with IP65. Please read the following carefully before using.

• Close the battery cover tightly.

• Make sure that moisture or dust particles do not come in contact with the terminal or connectors. Operating the instrument with moisture or dust on the terminal or connectors may cause damage to the instrument.

• Make sure that the inside of the carrying case and the instrument are dry before closing the case. If moisture is trapped inside the case, it may cause the instrument to rust.

• If there is a crack or deformation in the rubber packing for the battery cover or external interface hatch, stop using and replace the packing.

• To retain the waterproof property, it is recommended that you replace the rubber packing once every two years. To replace the packing, contact your local sales representative.

The Lithium Battery

• Lithium battery is incorporated in the instrument. It can back up data for approximately 5 years of normal use and storage (Temperature = 20°, humidity = about 50%), but its lifetime may be shorter depending on circumstances. If the voltage supplied by the lithium battery declines, an error message will be displayed on the controller. Ask your local dealer to replace the battery for you.

Bluetooth Wireless Technology/Wireless LAN

* *Bluetooth*/Wireless LAN function may not be built in depending on telecommunications regulations of the country or the area where the instrument is purchased. Contact your local dealer for the details.
* Use of this technology must be authorized according to telecommunications regulations of the country where the instrument is being used. Contact your local dealer in advance.
  ☞ "11. REGULATIONS"
* TOPCON CORPORATION is not liable for the content of any transmission nor any content related thereto. When communicating important data, run tests beforehand to ascertain that communication is operating normally.
* Do not divulge the content of any transmission to any third party.

Radio interference when using *Bluetooth* technology/Wireless LAN

Bluetooth/Wireless LAN communication with the LN uses the 2.4 GHz frequency band. This is the same band used by the devices described below. As a result, using the LN within proximity to these devices may result in interference causing communication failure or reduction of transmission speed.

* Industrial, scientific, and medical (ISM) equipment such as microwaves and pacemakers.
* portable premises radio equipment (license required) used in factory production lines etc.
* portable specified low-power radio equipment (license-exempt)
* IEEE802.11b/IEEE802.11g standard wireless LAN devices (When using *Bluetooth* function)
* *Bluetooth* devices (when using Wireless LAN function)

Although a radio station license is not required for this instrument, bear in mind the following points when using *Bluetooth* technology/Wireless LAN for communication.

● Do not use the LN in proximity to microwaves.
  * Microwave ovens can cause significant interference resulting in communication failure. Perform communication at a distance of 3m or more from microwave ovens.
● Regarding portable premises radio equipment and portable specified low-power radio equipment:
  * Before starting transmission, check that operation will not take place within the vicinity of portable premises radio equipment or specified low-power radio equipment.
  * In the case that the instrument causes radio interference with portable premises radio equipment, terminate the connection immediately and take measures to prevent further interference (e.g. connect using an interface cable).
  * In the case that the instrument causes radio interference with portable specified low-power radio equipment, contact your local dealer.
● When using *Bluetooth* function in proximity to IEEE802.11b or IEEE802.11g standard wireless LAN devices, turn off all devices not being used.
  * Interference may result, causing transmission speed to slow or even disrupting the connection completely. Turn off all devices not being used.
● Refrain from using the LN in proximity to televisions and radios.
  * Televisions and radios use a different frequency band to *Bluetooth*/Wireless LAN communications. However, even if the LN is used within proximity to the above equipment with no adverse effects with regard to *Bluetooth*/Wireless LAN communication, moving a *Bluetooth*/Wireless LAN compatible device (including the LN) closer to said equipment may result in electronic noise in sound or images, adversely affecting the performance of televisions and radios.

Precautions regarding transmission

● For best results
  * The usable range becomes shorter when obstacles block the line of sight, or devices such as PDAs or computers are used. Wood, glass and plastic will not impede communication but the usable range becomes shorter. Moreover, wood, glass and plastic containing metal frames, plates, foil and other heat shielding elements as well as coatings containing metallic powders may adversely affect wireless communication and concrete, reinforced concrete, and metal will render it impossible.
  * Use a vinyl or plastic cover to protect the instrument from rain and moisture. Metallic materials should not be used.
  * The direction of the wireless antenna can have adverse effects upon usable range.

● Reduced range due to atmospheric conditions

- The radio waves used by the LN may be absorbed or scattered by rain, fog, and moisture from the human body with the limit of usable range becoming lower as a result. Similarly, usable range may also shorten when performing communication in wooded areas. Moreover, as wireless devices lose signal strength when close to the ground, perform communication at as high a position as possible.

- TOPCON CORPORATION cannot guarantee full compatibility with all *Bluetooth*/Wireless LAN products on the market.

Other precautions

- Do not insert a foreign object into the instrument during the auto leveling. Doing so will cause a failure.
- Never place the instrument directly on the ground. Sand or dust may cause damage to the screw holes or the centering screw on the base plate.
- Protect the instrument from heavy shocks or vibration.
- Protect the instrument from rain or drizzle with an umbrella or waterproof cover.
- Never carry the instrument on the tripod to another site.
- Turn the power off before removing the battery.
- Remove the battery before placing the instrument in its case.
- Make sure that the instrument and the protective lining of the carrying case are dry before closing the case. The case is hermetically sealed and if moisture is trapped inside, the instrument could rust.
- Consult your local dealer before using the instrument under special conditions such as long periods of continuous use or high levels of humidity. In general, special conditions are treated as being outside the scope of the product warranty.

Maintenance

- Wipe off moisture completely if the instrument gets wet during survey work.
- Always clean the instrument before returning it to the case. The lens requires special care. First, dust it off with the lens brush to remove tiny particles. Then, after providing a little condensation by breathing on the lens, wipe it with the wiping cloth.
- Store the instrument in a dry room where the temperature remains fairly constant.
- Check the tripod for loose fit and loose screws.
- If any trouble is found on the rotatable portion, screws or optical parts (e.g. lens), contact your local dealer.
- When the instrument is not used for a long time, check it at least once every 3 months.
- Every 4,000 to 5,000 hours operation in total, change grease of driving parts. Contact your local dealer for the maintenance.
- When removing the instrument from the carrying case, never pull it out by force. The empty carrying case should be closed to protect it from moisture.
- Check the instrument for proper adjustment periodically to maintain the instrument accuracy.

Exporting this product (Relating EAR)

- This product is equipped with the parts/units, and contains software/technology, which are subject to the EAR (Export Administration Regulations). Depending on countries you wish to export or bring the product to, a US export license may be required. In such a case, it is your responsibility to obtain the license. The countries requiring the license as of Mar. 2020 are shown below. Please consult the Export Administration Regulations as they are subject to change.

  North Korea

  Iran

  Syria

  Sudan

  Cuba

URL for the EAR of the US: http://www.bis.doc.gov/policiesandregulations/ear/index.htm

5

Exporting this product (Relating telecommunications regulations)

• Wireless communication module is incorporated in the instrument. Use of this technology must be compliant with telecommunications regulations of the country where the instrument is being used. Even exporting the wireless communication module may require conformity with the regulations.

Exceptions from responsibility

• The manufacturer, or its representatives, assumes no responsibility for any damage, or loss of profits (change of data, loss of data, loss of profits, an interruption of business etc.) caused by use of the product or an unusable product.

• The manufacturer, or its representatives, assumes no responsibility for any damage, or loss of profits caused by usage different to that explained in this manual.

• The manufacturer, or its representatives, assumes no responsibility for consequential damage, or loss of profits due to heavy rain, strong wind, high-temperature and humidity, or storing or use of the product under unusual conditions.

• Product failures caused by rebuilding are out of warranty.

• Cautions and warnings included in this manual do not cover all the possible events.

3. LASER SAFETY INFORMATION

The instrument is classified as the following class of Laser Product according to IEC Standard Publication 60825-1 Ed.3.0: 2014 and United States Government Code of Federal Regulation FDA CDRH 21CFR Part 1040.10 and 1040.11 (Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No.56, dated May 8, 2019.)

- EDM device   : Class 1 Laser Product
- Laser pointer   : Class 3R Laser Product
- Laser plummet   : Class 2 Laser Product

A laser beam is emitted from here

A laser beam is emitted from here
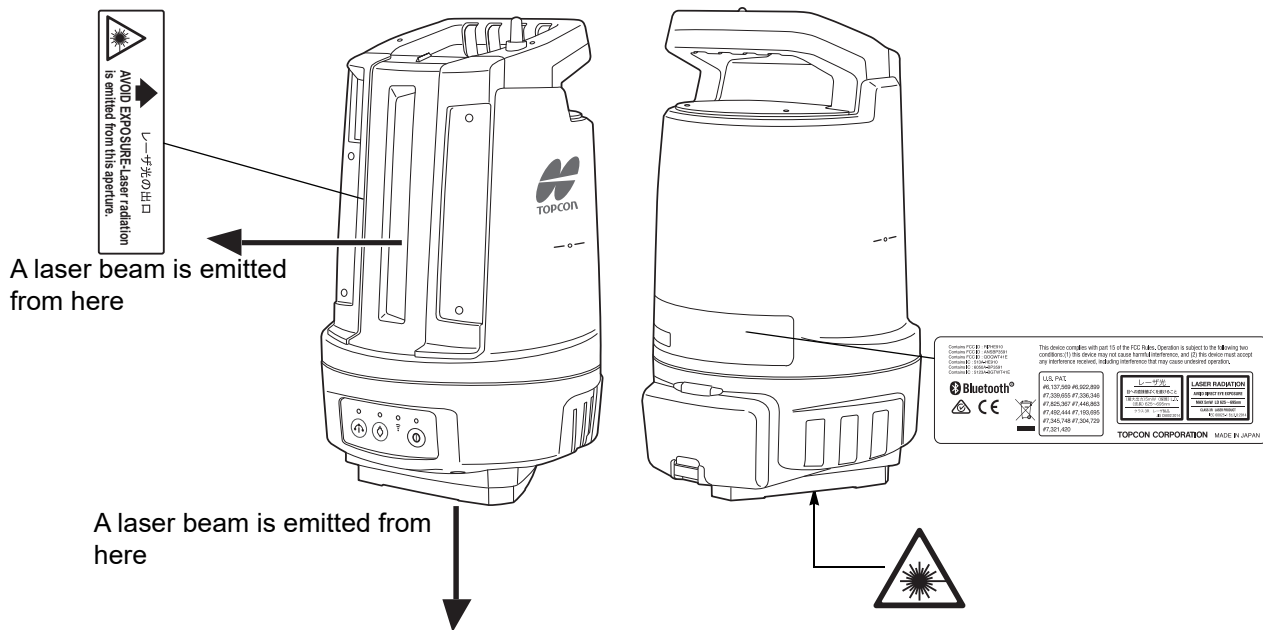
Please read the following safety instructions carefully before using the LN.

⚠Warning
- Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Never intentionally point the laser beam at another person. The laser beam is injurious to the eyes and skin. If an eye injury is caused by exposure to the laser beam, seek immediate medical attention from a licensed ophthalmologist.
- Do not look directly into the laser beam. Doing so could cause permanent eye damage.
- Do not stare at the laser beam. Doing so could cause permanent eye damage.
- Never look at the laser beam through a telescope, binoculars or other optical instruments. Doing so could cause permanent eye damage.
- Sight targets so that the laser beam does not stray from them.

⚠Caution
- Perform checks at start of work and periodic checks and adjustments with the laser beam emitted under normal conditions.
- When the instrument is not being used, turn off the power.
- When disposing of the instrument, destroy the battery connector so that the laser beam cannot be emitted.
- Avoid setting the instrument at heights at which the path of the laser may strike pedestrians or drivers at head height. Operate the instrument with due caution to avoid injuries that may be caused by the laser beam unintentionally striking a person in the eye.
- Never point the laser beam at mirrors, windows or surfaces that are highly reflective. The reflected laser beam could cause serious injury
- Only those who have received training as per the following items shall use this product.

- Read this manual for usage procedures for this product.
- Hazardous protection procedures (read "LASER SAFETY INFORMATION")
- Requisite protective gear (read "LASER SAFETY INFORMATION")
- Accident reporting procedures (stipulate procedures beforehand for transporting the injured and contacting physicians in case there are laser-induced injuries).

- Persons working within the range of the laser beam are advised to wear eye protection which corresponds to the laser wavelength of the instrument being used.

- Areas in which the laser is used should be posted with a standard laser warning sign.

- When using the laser-pointer function, be sure to turn OFF the output laser after distance measurement is completed. Even if distance measurement is canceled, the laser-pointer function is still operating and the laser beam continues to be emitted.

4. PRODUCT OUTLINE

4.1 Parts and functions of the Instrument

Wireless antenna

Handle

Guide light

Window

Instrument
height mark

Operation
panel

Position where the
serial number is
printed

LN-150

Battery cover

Wireless communication
method selector switch

Reset switch

Wireless LAN mode selector switch
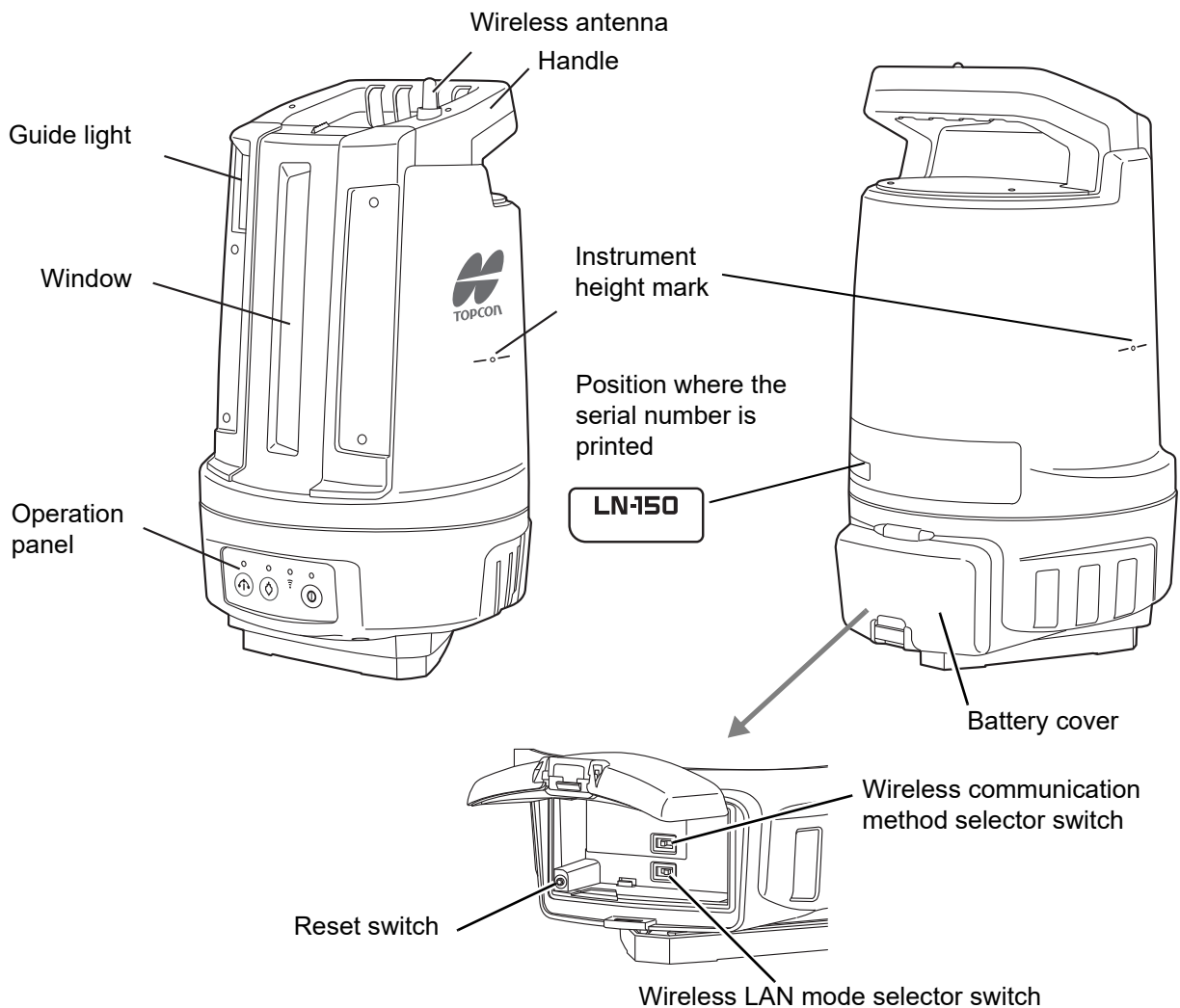
📖 **Wireless communication method selector switch**
Select a method between "WLAN" or "*Bluetooth*" for wireless communication with the controller.

📖 **Instrument height mark**
The height of the instrument is as follows:
176 mm (from the position where a tripod is mounted to the instrument height mark)
☞"About the instrument height when setting the instrument point" on page 20

📖 **Reset switch**
This function resets the Wireless LAN setting to the default factory setting.
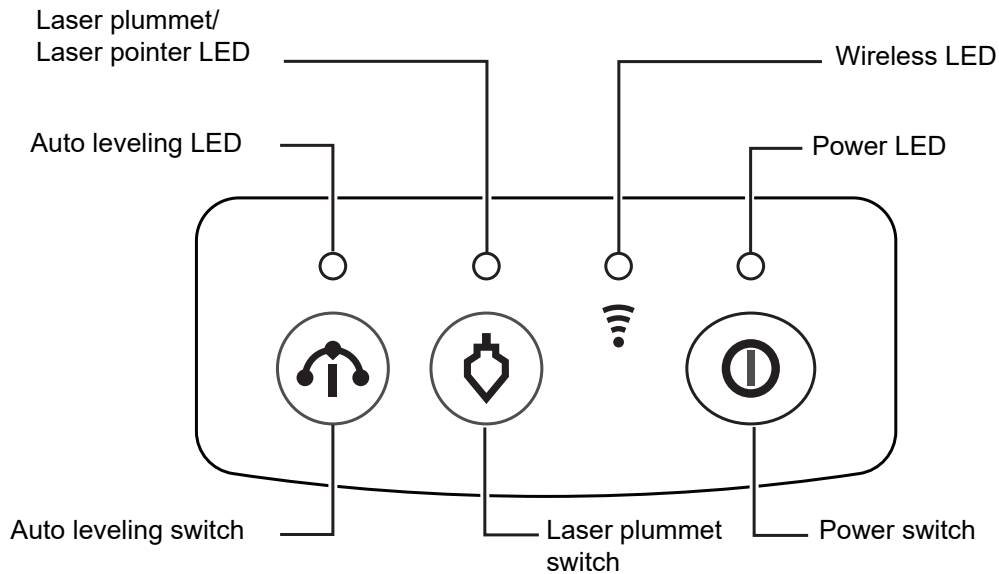☞"9.2 What to Do When"
Do not use this switch under normal circumstances.

Wireless antenna

✍

• This antenna may be damaged depending on how it is handled. Be careful not to hit the antenna while working, as it sticks out from the instrument.

4.2 Control Panel

Laser plummet/
Laser pointer LED

Wireless LED

Auto leveling LED

Power LED

Auto leveling switch

Laser plummet
switch

Power switch

■ Explanation of the operation panel

Name	Function details
Power switch	Power ON: Press it for a short time Power OFF: Hold down the switch for more than 1 second
Power LED	Off: Power OFF Lighting up in green: Power is ON Blinking in green: During Power-OFF-process Blinking in red: Battery voltage dropped
Wireless LAN mode selector switch (inside the battery cover)	Mode A: Flip the switch to the right Mode B: Flip the switch to the left
Wireless communication method selector switch (inside the battery cover)	WLAN: Flip the switch to the right *Bluetooth*: Flip the switch to the left
Wireless LED	Wireless LAN communication When it is Mode A Connection waiting state:Blinking in green every 1 second (repeating a cycle in which the LED is on for 1 second and then off for 1 second) Connecting:Lighting up in green When it is Mode B Connection waiting state:Blinking in green quickly (repeating a cycle of quick on twice, followed by 2 seconds off) Connecting:Lighting up in green When an error is detected in the Wireless LAN setting item: Lighting up in red
	Bluetooth wireless communication Connection waiting state:Blinking in green 4 times every second Connecting:Lighting up in green
Laser plummet switch ☞"Laser plummet ON/OFF and brightness adjustment" on page 11	Laser plummet ON: Press it Laser plummet OFF: Press and hold (More than 1 second).
Laser plummet/ Laser pointer LED	Off: Laser plummet or laser pointer is OFF Blinking in green: Laser plummet or laser pointer ON

Auto leveling switch ☞"Auto leveling" on page 19	Starts auto leveling:Press it while auto leveling is stopped. Stops auto leveling:Press it again while auto leveling is being performed. Extends the leveling screw: Hold it down.
Auto leveling LED	Blinking in green:In auto leveling Lighting up in green:Within the range of inclination compensation (±6 minutes) Lighting up in red:Outside the range of inclination compensation (±6 minutes or over) Blinking in red:Outside the range of auto leveling

■ Displaying battery life

The battery life is low when the power LED is blinking in red and a beep sound (repeating beeps) is heard. Exchange the battery. The battery life of the instrument is displayed on the controller.
☞Refer to the instruction manual of the controller.

■ Laser plummet ON/OFF and brightness adjustment

The operation method of the laser plummet is as follows:

Function	Description
Turn ON the laser plummet	Press the {laser plummet switch} for a short time. The laser plummet lights up with the stored brightness.
Turn OFF the laser plummet	Hold down the {laser plummet switch} for at least 1 second or it turns OFF automatically about five minutes after the laser plummet is turned ON. The brightness used when the laser plummet turned OFF is stored.
Turn up the brightness	Pressing the {laser plummet switch} for a short time while the laser plummet is turned ON turns up the brightness by one level, up to level 5. After reaching level 5, it goes back to level 1.

5. PREPARATION

5.1   Using the Battery

■ Battery charging

Be sure to charge the battery fully before using it for the first time or after not using it for long periods.

❗

• The charger will become rather hot during use. This is normal.
• Do not use or charge batteries other than those designated.
  (Battery: BDC72   Charger: CDC77)
• Do not charge the battery just after charging is completed. Battery performance may decline.
• The charger is for indoor use only. Do not use outdoors.
• Batteries cannot be charged when the temperature is outside the charging temperature range. Be sure to charge the battery within the charging temperature range.
• Remove batteries from the charger before putting into storage.
• When not in use, disconnect the power cable plug from the wall outlet.
• Store the battery in a dry room where the temperature is within the following ranges. For long-term storage, the battery should be charged at least once every six months.

Storage period	Temperature range
1 month or less	-20 to 50°C
1 month to 3 months	-20 to 40°C
3 months to 1 year	-20 to 20°C

• Batteries generate power using a chemical reaction and as a result have a limited lifetime. Even when in storage and not used for long periods, battery capacity deteriorates with the passage of time. This may result in the operating time of the battery shortening despite having been charged correctly. In this event, a new battery is required.

PROCEDURE

1. Connect the power cable to the charger and plug the charger into the wall outlet.

2. Mount the battery in the charger by matching the grooves on the battery with the guides on the charger.

    When charging starts, the lamp starts flashing in green. The lamp lights up in green when charging is finished.

Grooves

Guides

Slot 1

Charging lamp

Slot 2
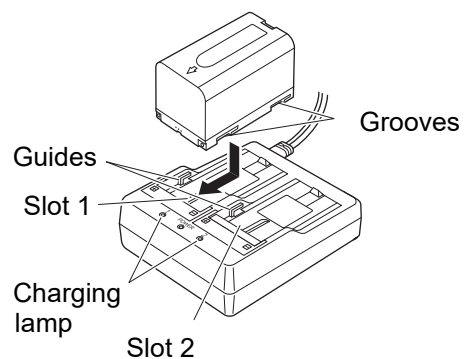
3. Remove the battery and unplug the charger.

Note
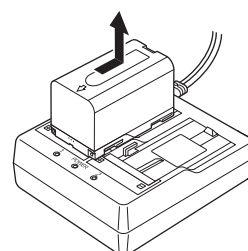
- Slots 1 and 2:
  The battery charger can hold and charge up to two batteries at the same time.
- Charging time per battery:
  BDC72: about 8 hours (at 25°C)
  (Charging can take longer than the times stated above when temperatures are either especially high or low.)
- Charging lamp:

| LED	Description
Green lamp flashing	On charge
Green lamp lit	Fully charged
Yellow lamp flashing	Battery temperature is out of charging temperature range. Charge the battery again within the charging temperature range. If the yellow lamp still does not stop flashing, contact your local dealer.
Off	The battery is not correctly mounted. Mount it again correctly. If the lamp is still off, contact your local dealer.
Red lamp lit	Charging is not being normally performed. There may be trouble with the charger or battery. Contact your local dealer.

■ Installing the battery

Mount the charged battery.

✦

• Use the specified battery (BDC72).
• When installing/removing the battery, make sure that moisture or dust particles do not come in contact with the inside of the instrument.
• Be careful not to shut the battery cover on your fingers.
• Before removing the battery, turn off the power to the instrument. If the battery is removed while the power is switched on, a warm boot may occur. File and folder data may be lost as a result.
• Do not open the battery cover while the power is on.
• Remove batteries from the surveying instrument or charger before putting into storage.

PROCEDURE

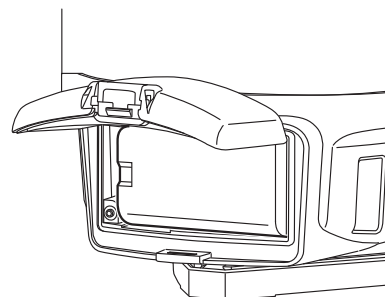1. Push the catch on the battery cover upwards to open the cover.
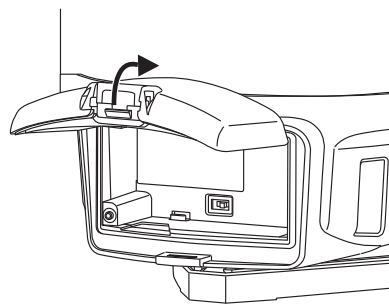
2. Check the orientation of the terminal of the battery, and then insert the battery by sliding it to the right and pressing against the main unit.

   ✦

   • Do not insert the battery diagonally, as this may damage the main unit or the battery terminal.

3. Close the battery cover.
   Make sure it clicks.

■ Removing the battery

PROCEDURE

1. Push the catch on the battery cover upwards to open the cover.

2. Remove the battery by sliding it to the left.
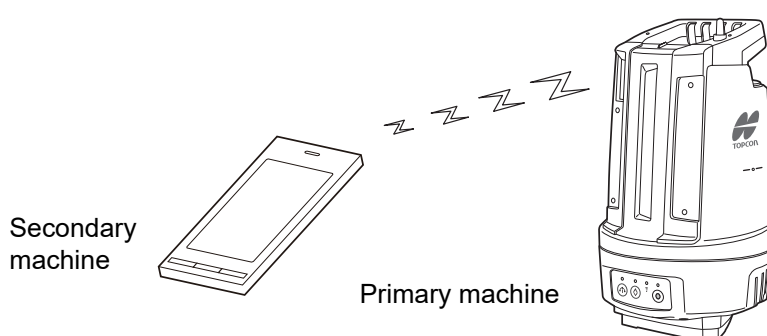
5.2 Wireless LAN Connection with the Controller

❌

• Be sure to select the wireless communication method correctly. Check that the selector switch inside the battery cover is set to "WLAN".

There are two methods to set up a Wireless LAN connection between the instrument and the controller:

■ Mode A connection

This is a one-to-one connection using the instrument as a primary machine and the controller as a secondary machine for Wireless LAN connection. When using the Mode A connection, the instrument performs as a DHCP server.

☞ For details of the connection method, refer to the instruction manual of WLAN Config for LN-150.

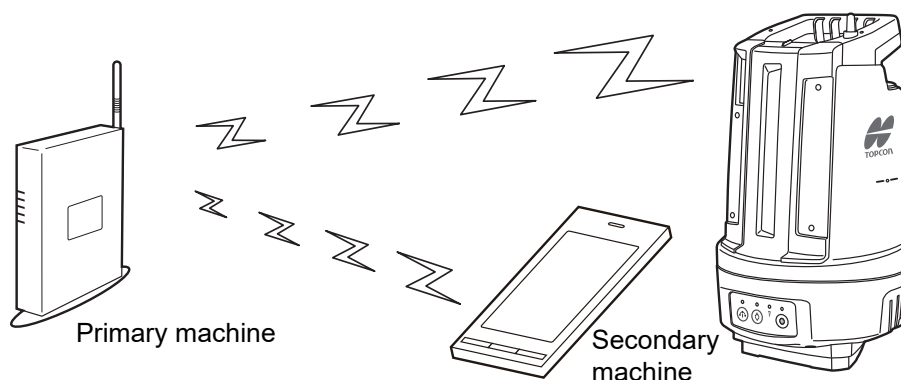Secondary machine

Primary machine

■ Mode B connection

Connect via other access point (as the primary machine) using the instrument and the controller as secondary machines for Wireless LAN connection.

☞ For details of the connection method, refer to the instruction manual of WLAN Config for LN-150.

❌

• The network settings of Mode A and Mode B are saved one each.

Primary machine

Secondary machine

■ **Connection setting items**

	Item	Selection item	Default factory setting
Mode A	SSID	Fixed	Model name _ serial number (e.g. LN-150_AB123456)
	Security	None/WEP/WPA/WPA2	WPA2
	Password (Security key)	WEP64: String of 5 characters (e.g. RIVER) or 10 hexadecimal characters (e.g. 12345678AF) WEP128: String of 13 characters or 26 hexadecimal characters WPA/WPA2: String of 8 to 63 characters or 64 hexadecimal characters	00serial number (e.g. 00AB123456)
	Channel	1 to 11	11
	IP address	Fixed	192.168.0.1
	Subnet mask	Fixed	255.255.255.0
	DHCP function	Fixed	DHCP server enabled
	DHCP lease address	Fixed	192.168.0.10 to 192.168.0.25
Mode B	SSID	Up to 32 bytes	No setting
	Security	None/WEP/WPA/WPA2	None
	Password (Security key)	WEP64: String of 5 characters or 10 hexadecimal characters WEP128: String of 13 characters or 26 hexadecimal characters WPA/WPA2: String of 8 to 63 characters or 64 hexadecimal characters	No setting
	IP address	xxx.xxx.xxx.xxx format	No setting
	Subnet mask	xxx.xxx.xxx.xxx format	No setting
	DHCP function	DHCP client / static IP	DHCP client

• After purchasing the instrument, change the password for Mode A to other than the serial number.

• If you forget the password, refer to "9.2 What to Do When".

5.3 *Bluetooth* Connection with the Controller

The LN-150 supports wireless connection with the controller using *Bluetooth* technology.

☞ For details of the *Bluetooth* connection, refer to the instruction manual of the *Bluetooth* enabled application software you use.

• Be sure to select the wireless communication method correctly. Check that the selector switch inside the battery cover is set to "*Bluetooth*".

5.4   Setting Up the Instrument

■ Centering

PROCEDURE

1. Make sure the legs are spaced at equal intervals and the head is approximately level.
   Set the tripod so that the head is positioned over the survey point.
   Make sure the tripod shoes are firmly fixed in the ground.
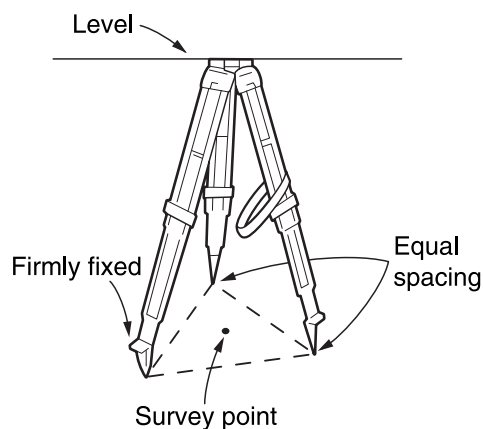
2. Place the instrument on the tripod head.
   Supporting it with one hand, tighten the centering screw on the bottom of the unit to make sure it is secured to the tripod.
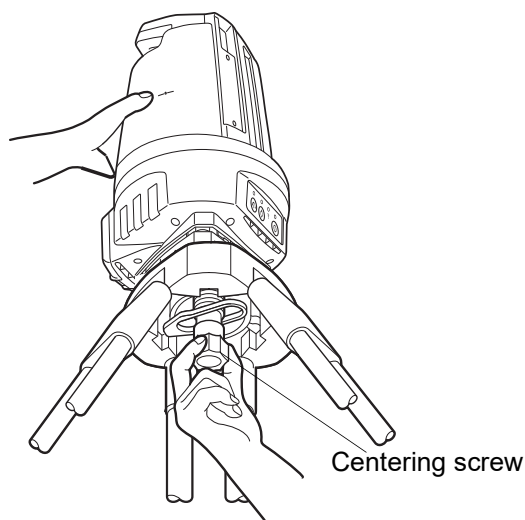
3. Perform auto leveling.
   As referring to the following section, perform auto leveling.
   ☞"Power ON/OFF" on page 18
   or
   ☞"Auto leveling" on page 19

4. Check the survey point and laser beam.
   Turn on the {Laser Plummet Switch} on the operation panel. Check if the laser beam is aligned with the survey point. ☞"Laser plummet ON/OFF and brightness adjustment" on page 11
   If it is done so, centering is completed. If it is not done so, carry out the following process.
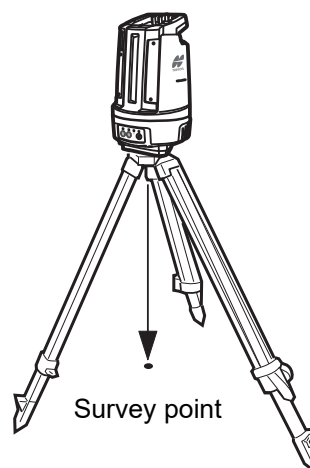
5. Aim a laser beam at the survey point.
   Loosen the centering screw.
   Slide the instrument to align the laser beam with the survey point. Tighten the centering screw.

6. Repeat the steps of "PROCEDURE".
   Repeat Step 3 to Step 5.

Note

• The laser light blinks when the instrument is performing auto leveling.

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■ **Power ON/OFF**

⚠	**Caution**
🚫	This instrument automatically operates when the power is turned ON or OFF. Do not touch the instrument during operation. Doing so may cause injury.

PROCEDURE: Power ON

1. Turn the power ON.

   Press the {Power switch} on the operation panel to turn the power ON.

   When the power is turned ON, the power LED turns on. After the leveling automatically has started, the instrument rotates automatically.

🕮

• Avoid a wireless connection during auto leveling when setting up the instrument.

• After the rotation starts, do not touch the instrument until it stops at the original position.
  ☞Refer to "Auto leveling" on page 19 for information on auto leveling.

• Auto Power OFF function:
  If no key operation or no data communication has been performed for about 30 minutes, the power turns OFF automatically.

• If the power cannot be turned ON even when the battery is mounted or if the power turns OFF as soon as the power turns ON, the battery is either discharged or defective. Exchange it for a fully charged battery.
  ☞"Displaying battery life" on page 11

Procedure: Power OFF

1. Hold down the {Power switch} for about 1 second.

■ Auto leveling

⚠	**Caution**
🚫	Do not touch the instrument during auto leveling. Doing so may cause injury.

🔧

- By performing auto leveling, the center of the instrument is automatically leveled within the range of ±30". After that, if the inclination of the main unit exceeds the range of inclination compensation (±6'), the red LED will light up. In this case, auto leveling will not automatically start. Perform auto leveling again.

PROCEDURE

1. Press {Auto leveling switch} while auto leveling is stopped.
   The auto leveling LED starts blinking in green and auto leveling starts. After completing auto leveling, the LED lights up in green.

🔧

- If a foreign object gets caught in the auto leveling section, hold down {Auto leveling switch}.
  If the leveling screw is extended, remove the foreign object, and restart auto leveling.
  The following describes how to press {Auto leveling switch} and its relationship with the operation of the instrument:

Auto leveling switch	Beep sound *1)	While auto leveling is stopped	While auto leveling is being performed
Short press	One beep	After the beep sound is heard, auto leveling starts when you release the switch.	After the beep sound is heard, auto leveling stops when you release the switch.
Long press (1 second)	Two beeps	After the beep sound is heard, auto leveling starts when you release the switch. At this time, the instrument rotates 180°.*2)	
Hold down	Two beeps	After the beep sound is heard, the leveling screw starts extending. It stops when you release the switch.	

*1)
If a sound other than these beep sound patterns is heard, refer to the instruction manual of TSshield®.

*2)
When auto leveling is performed by pressing {Auto leveling switch} for a long time (1 second), the same auto leveling operation as that performed when {Power switch} is turned ON is performed. Measurement by rotating the instrument 180° calibrates the inclination sensor.

■ About the instrument height when setting the instrument point

The instrument height entered for setting the instrument point is the height from the survey point to the instrument height mark.

☞ Refer to the instruction manual of the controller for the settings.

Instrument height

Survey point
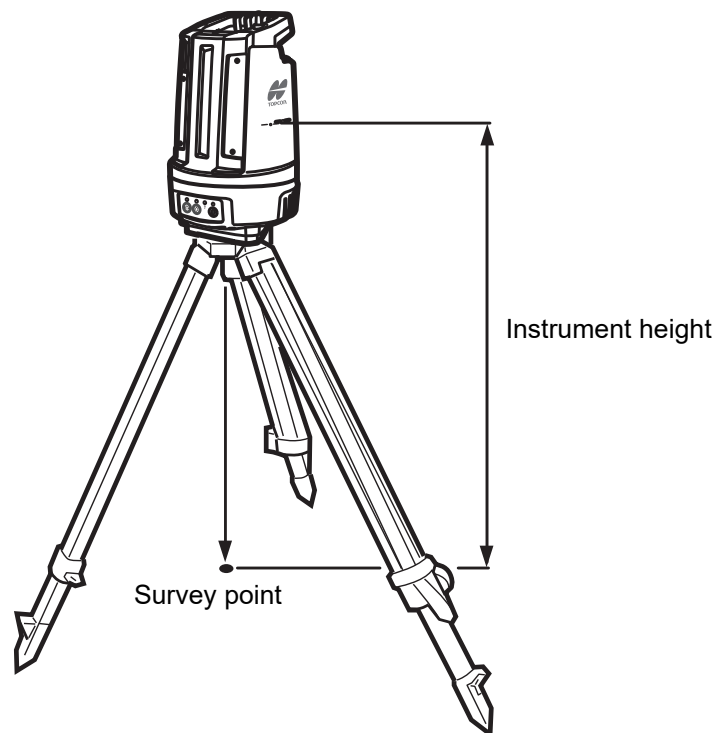
6. OUTLINE OF SURVEY

The instrument can perform a stakeout survey and a side shot method.

Use the controller for measurement.

✍

• It is recommended to use optional accessories ATP2 (360° prism) or ATP2SII (360° slide prism) as targets for measurements.
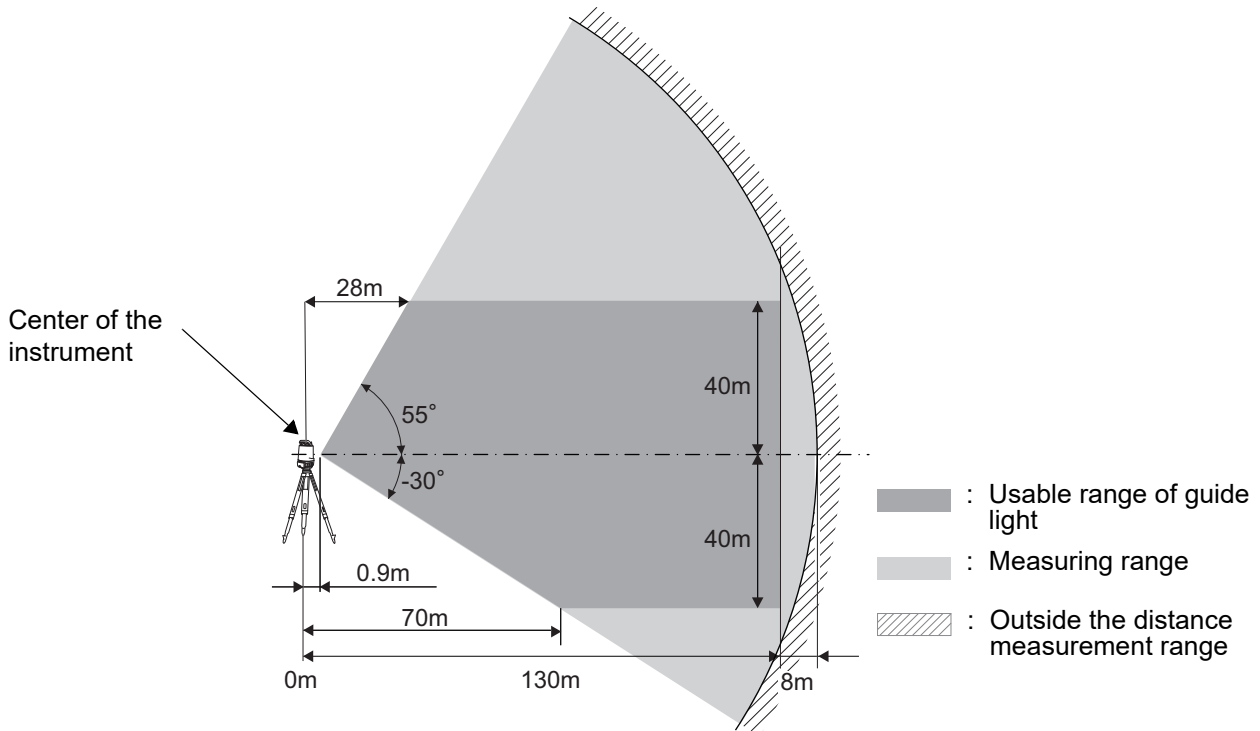
6.1 Functions of Guide Light

By setting the guide light to "ON," you can tell from a distance about the state of the instrument and the direction to move the pole, by reference to the color of the light and the blinking pattern.

The left of the guide light is green and the right is red.

Guide light
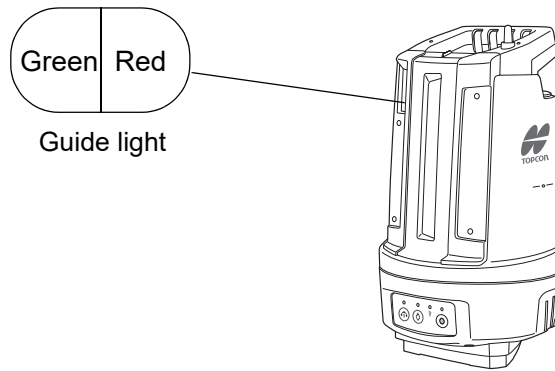
6.2 Usable Range

The following shows the usable range of the instrument.

✍

• Moving the target at the limit of the distance measurement range may result in the target being located outside the range within which measurement is possible.

7. CHECK

LN is a precision instrument. It must be inspected before use so that it always performs accurate measurements.
In addition, the instrument should be inspected with special care after it has been stored a long time, transported, or when it may have been damaged by a strong shock.

■ Setting Up the Instrument

Perform a setup operation under an environment where the sunlight is weak and not fluctuating as well as LN and the targets can be set as illustrated below.
To perform checking efficiently, mark the four points described below using setting-out function in advance.
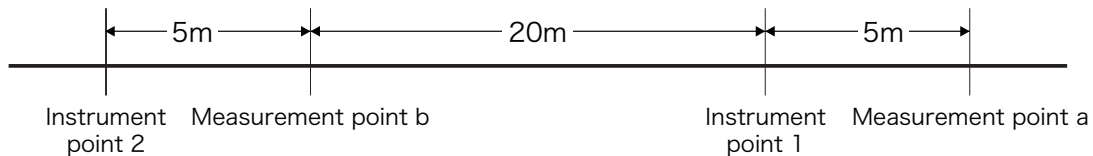

- Place the instrument and targets in a straight line when looking from directly above.
- Acceptable range of each point position is ±5cm in all directions.
- Set LN and the targets on a substantially horizontal place (such as a floor, level ground, tripods of the same height). (The guideline for difference in height at 30 m is about 30 cm)
- Use ATP2 (360° prism) or ATP2SII (360° slide prism) for the target.
- To set ATP2SII, lower the height of the prism to reduce the setting error.

■ Measurement

- Sighting can be more accurately performed by facing the ATP2/ATP2SII toward the instrument.

ATP2:The 360° Prism should be set up so that a pair of diametrically-opposed hexagonal points on its rubber flanges are aligned with the sighting direction of the instrument (see the diagram below).


↑ : Hexagonal points
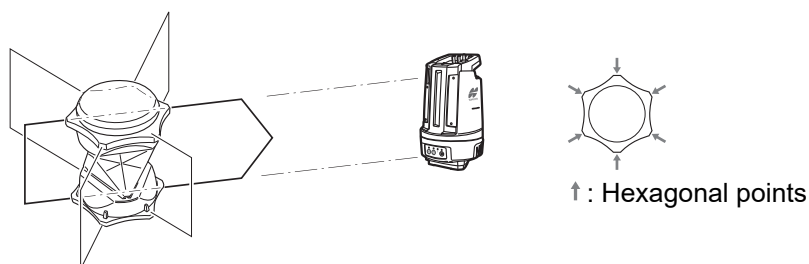
ATP2SII:The 360° Prism should be set up so that a pair of diametrically-opposed marks on top of the prism are aligned with the sighting direction of the instrument.


↑: Prism sighting direction
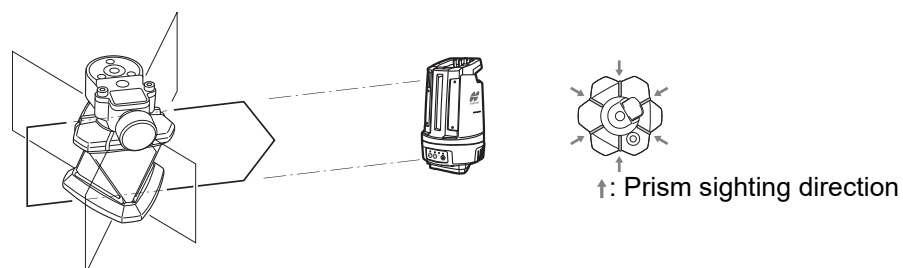
1. Set the instrument at instrument point 1.

2. Measure the target set at measurement point a to record the coordinates.
   Because the target is re-measured at measurement point a after shifting to measurement point b, the position should be marked (positioning accuracy is approximately ±1mm).


5m	20m	5m
Instrument point 2	Measurement point b	Instrument point 1	Measurement point a
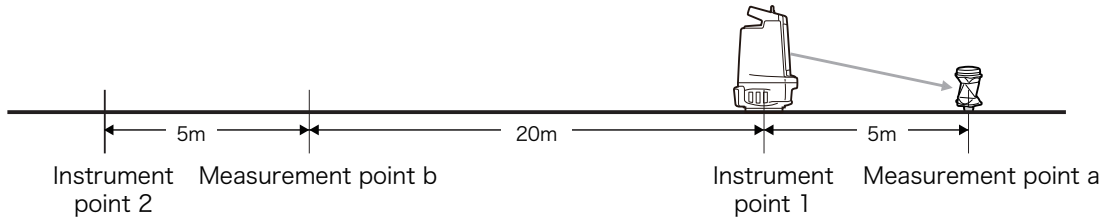
3. Set the target at measurement point b.

4. Measure the target set at measurement point b to record the coordinates.

5m	20m	5m
Instrument point 2	Measurement point b	Instrument point 1	Measurement point a
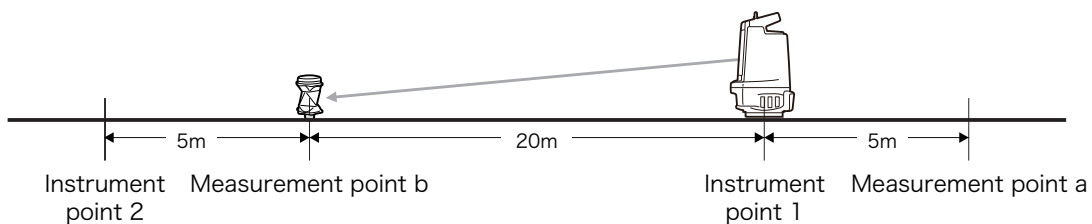
5. Set the instrument at instrument point 2.

6. Measure the target set at measurement point b to record the coordinates.

5m	20m	5m
Instrument point 2	Measurement point b	Instrument point 1	Measurement point a
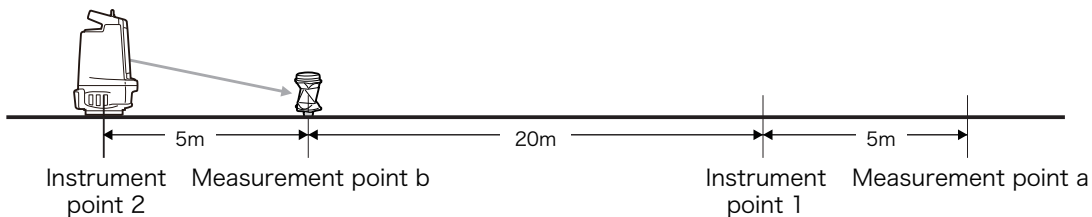
7. Set the target at measurement point a.
   Return to the measurement position shown in step 2. above.

8. Measure the target set at measurement point a to record the coordinates.

5m	20m	5m
Instrument point 2	Measurement point b	Instrument point 1	Measurement point a
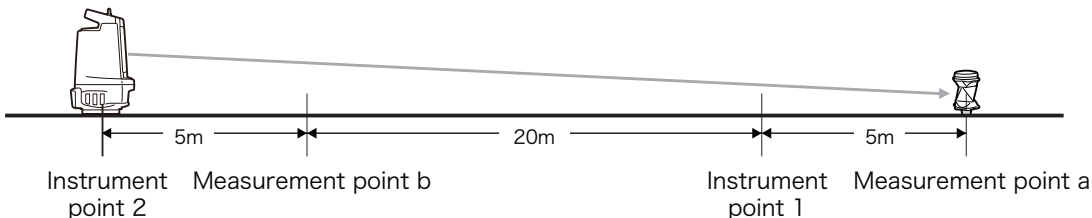
Measurement results recording table:

Instrument point	Target	X [m]	Y [m]	Z [m]
1	a	$X_{1,a}$:	$Y_{1,a}$:	$Z_{1,a}$:
	b	$X_{1,b}$:	$Y_{1,b}$:	$Z_{1,b}$:
2	a	$X_{2,a}$:	$Y_{2,a}$:	$Z_{2,a}$:
	b	$X_{2,b}$:	$Y_{2,b}$:	$Z_{2,b}$:

■ **Assessment**

Obtain the vertical error (EZ) and the distance error (ED) from the following formulas:

• **Vertical error**

$$Z_1 = Z_{1,a} - Z_{1,b}$$

$$Z_2 = Z_{2,a} - Z_{2,b}$$

$$EZ[mm] = (Z_2 - Z_1) \times 1000$$

Confirm that the vertical error (EZ) falls within the following range:

-11.6 (mm) < EZ < +11.6 (mm)

• **Distance error**

$$D_1 = \sqrt{(X_{1,a} - X_{1,b})^2 + (Y_{1,a} - Y_{1,b})^2}$$

$$D_2 = \sqrt{(X_{2,a} - X_{2,b})^2 + (Y_{2,a} - Y_{2,b})^2}$$

$$ED[mm] = \frac{(D_1 - D_2)}{2} \times 1000$$

Confirm that the distance error (ED) falls within the following range:

-6 (mm) < ED < +6 (mm)

Note

• If the error falls out of the range, contact your local dealer.

8. CLOUD OAF

The LN has a function to update option authorization file (OAF) using the Cloud OAF system. The system allows you to customize and configure the instrument according to your purpose. To update Cloud OAF, you need to purchase a specific optional package in advance. Contact your local dealer for the details of the available options and purchasing process.

Use the "TSshield Utility" to update Cloud OAF.

8.1   Installing the TSshield Utility

Note

• A Windows PC with a built-in wireless LAN or *Bluetooth* function is required.
• Close all programs before starting the installation.

1. Install the "TSshield Utility" on the PC. The program file for installation can be downloaded from the TOPCON website.
   https://positioning.topcon.co.jp/en/application/utility/

2. Extract the downloaded update file.
   Double-click setup.exe in the "Installer" folder to initiate installation.
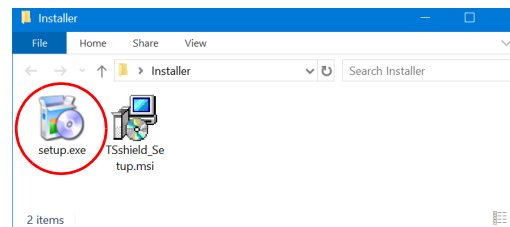
Note

- Supported Operating Systems: Windows 7/Windows 10
- The installation of required programs may start automatically, depending on your PC environment.
- The license agreement screen will appear. Click **[Accept]** if you agree to the terms and wish to continue with the installation.
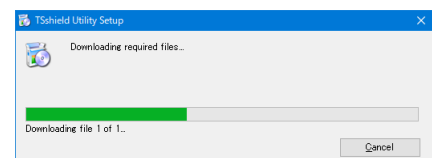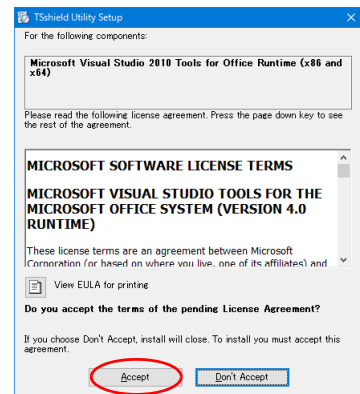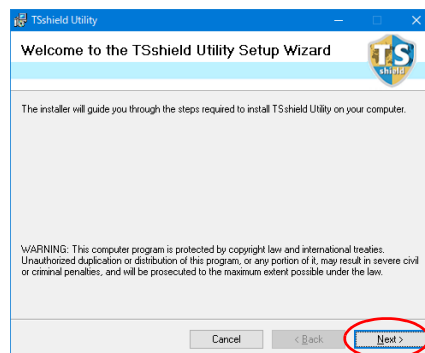

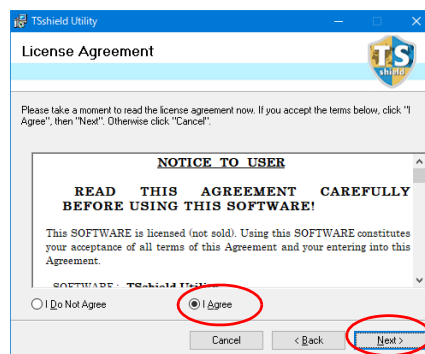- When the screen shown at the right appears, click **[Yes]**.

  The PC may be rebooted during the installation. After rebooting, the installation will continue automatically.
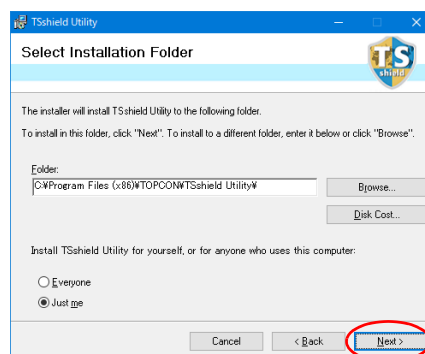

<div align="center">25</div>
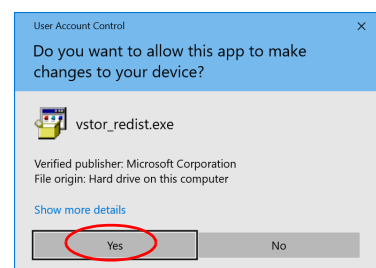
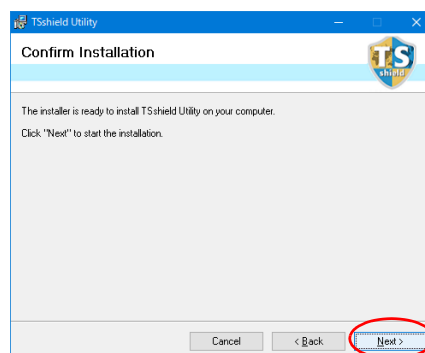3. When the screen shown at the right appears, click **[Next]**.

4. Click **I Agree** to accept the license agreement, and then click **[Next]**.

5. Select the installation destination; then click your choice, either **Everyone** or **Just me**, and then click **[Next]**.
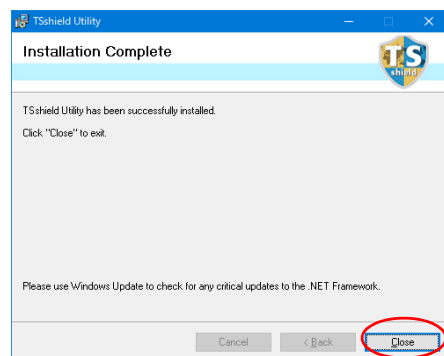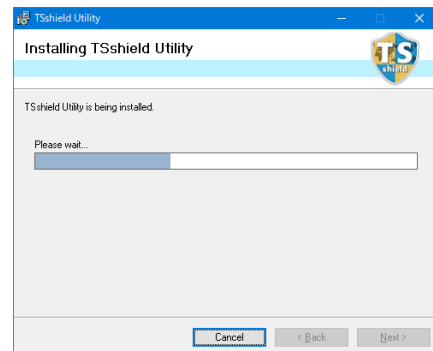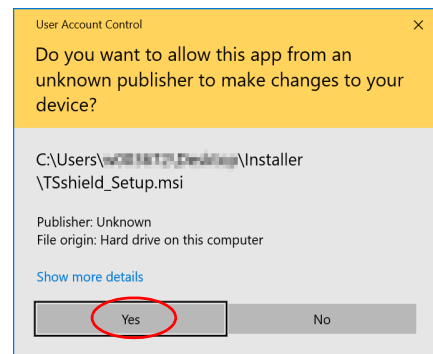
6. Click **[Next]** to start the installation.

Note

- When the screen shown at the right appears, click **[Yes]**.

7. After the files are copied, click **[Close]** to exit the installation.

   A shortcut icon of the TSshield Utility is created on the desktop.

Installation of the TSshield Utility is now complete.
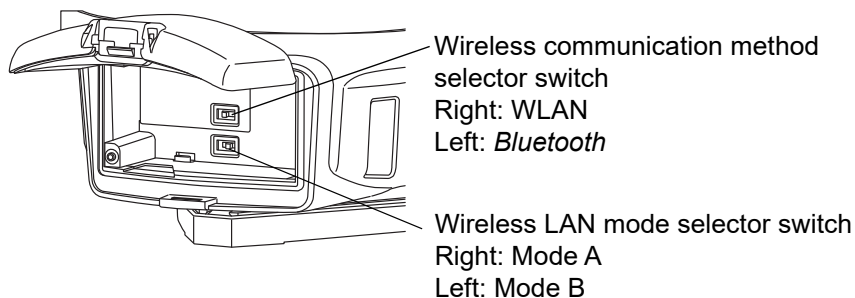
8.2　Wireless communication settings

■ Wireless LAN communication

Note

• Before proceeding, set the selector switches inside the battery box as follows.
　　Wireless communication method : WLAN
　　Wireless LAN mode: Mode A

Wireless communication method selector switch
Right: WLAN
Left: *Bluetooth*

Wireless LAN mode selector switch
Right: Mode A
Left: Mode B

• Ensure that you have a SSID and password for LN-150 to connect.
　The default security settings for Mode A are as follows:
　　　SSID　　　　　：Model name_serial number (E.g., LN-150_AB123456)
　　　Security　　　：WPA2
　　　Password　　　：00 serial number (E.g., 00AB123456)

Perform the following operations on the PC with LN-150 (main unit) powered ON.
(The screen examples are based on Windows 10)

1. Click 📶 (Wireless network connection) in the task tray.

2. The SSID (network name) of a network available for connection is displayed. Click **[Connect]** of the SSID of the LN-150 to be connected.
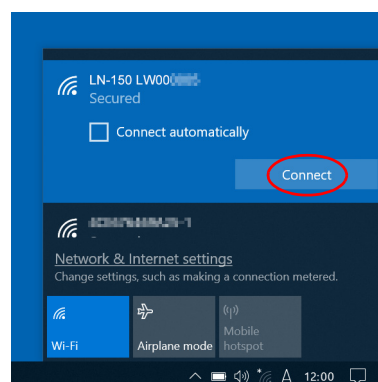

3. If security settings have been made in the LN-150 wireless LAN settings, enter the network security key and click **[Next]**.

   Disappearance of connecting display indicates that wireless LAN settings have been completed.

   ☞ For details of wireless LAN settings, see documents such as the PC instruction manual.
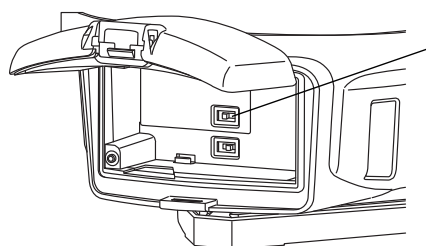
   Continue to the Cloud OAF Update.
   ☞"8.3 Cloud OAF Update"

■ *Bluetooth* **wireless communication**

Note
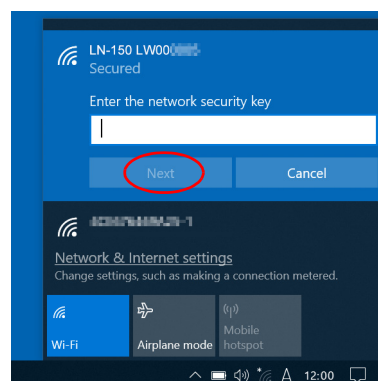
• Before proceeding, set the selector switch inside the battery box as follows.
  Wireless communication method: *Bluetooth*

Wireless communication method
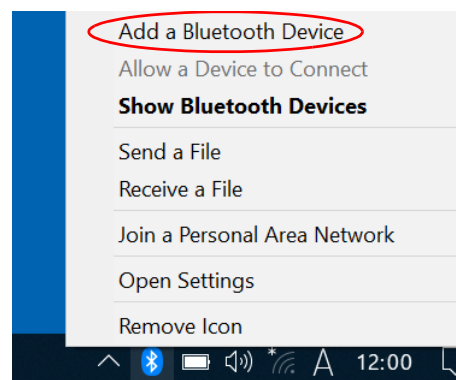selector switch
Right: WLAN
Left: *Bluetooth*

• Displayed *Bluetooth* device registration menu or the procedure of selecting devices may differ depending on the PCs or *Bluetooth* adaptors brands.

In the following part, the procedure is explained using screen examples of the Microsoft standard *Bluetooth* driver.
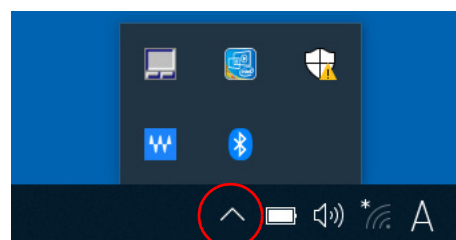☞ For the details of connection, refer to manual of your PC or devices.

Perform the following operations on the PC with LN-150 (main unit) powered ON.
(The screen examples are based on Windows 10)

1. Click 🚺 (*Bluetooth* connection) in the task tray and select "ADD a *Bluetooth* Device".

Add a Bluetooth Device
Allow a Device to Connect
Show Bluetooth Devices
Send a File
Receive a File
Join a Personal Area Network
Open Settings
Remove Icon

Note
• Click ⌃ to view a hidden icon.

2. Click ➕ to add the *Bluetooth* device.

Bluetooth & other devices
Add Bluetooth or other device
Bluetooth
On
Now discoverable as "PCDM4B"
Mouse, keyboard, & pen
USB Optical Mouse
Show notifications to connect using Swift Pair
When selected, you can connect to supported Bluetooth devices quickly when they're close by and in pairing mode.
Download over metered connections
To help prevent extra charges, keep this off so device software (drivers, info, and apps) for new devices won't download while you're

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3. Select a "*Bluetooth*" from the kind of device you want to add.
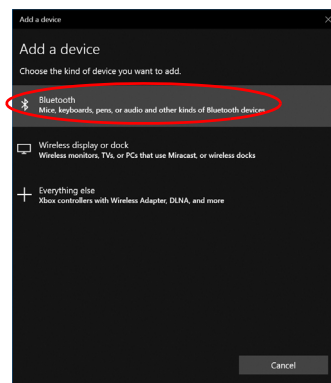
4. Select a LN-150 to connect from among the searched devices to initiate the connection.

   Model name is displayed as follows.
   Model name_serial number (E.g.,LN-150_XX123456)

   Your serial number is printed in the label attached on the LN-150 as shown below.

   Label
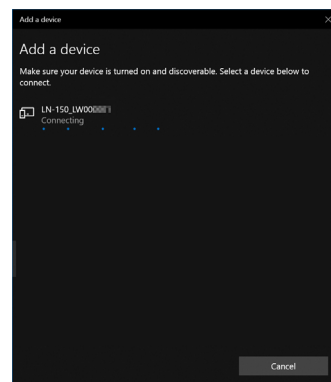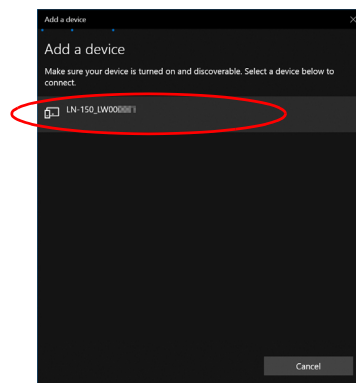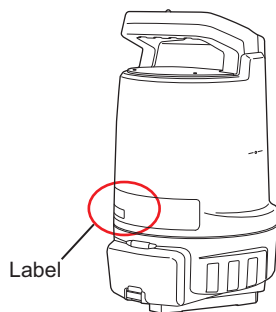
5. When a connection is established, click **[Done]**.

30
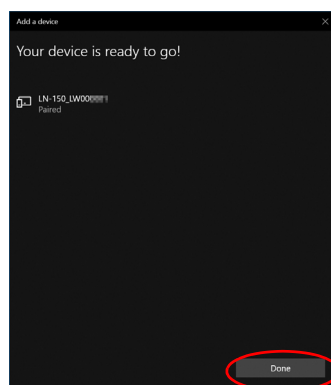
6. Select "More *Bluetooth* options".
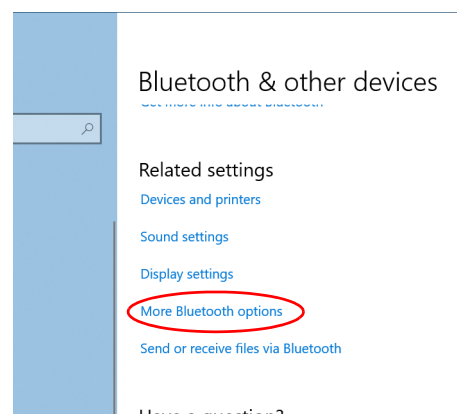
7. Write down the serial port number (Outgoing) of the LN-150 to be connected displayed on the "COM Ports" tab.
Click **[OK]** to close the window.
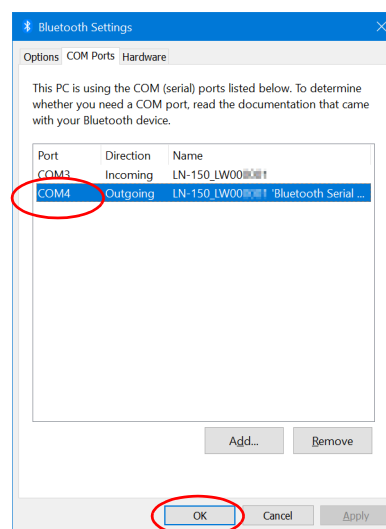
Click ⊠ in the right screen to finish the settings.

☞ For details of *Bluetooth* settings, see documents such as the PC instruction manual.

Continue to the Cloud OAF Update.
☞ "8.3 Cloud OAF Update"
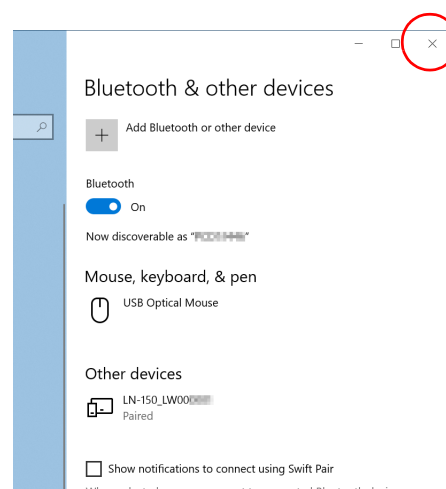
8.3   Cloud OAF Update

🐞

• When updating the firmware, mount a fully charged battery to the LN.
• A warning message may appear in step 2 depending on the browser in use or the settings of the PC; however, the downloaded file does not have a problem.

　　Reference: On Internet Explorer

　　Click the **[x]** button to exit the message.
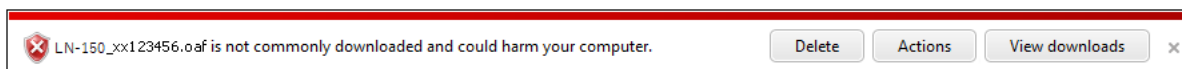
This section explains the procedures of Cloud OAF update.

PROCEDURE

1. Access TSshield web site from your PC.
   Display an instrument of which firmware is to be updated on the list. Click [⋮] to select **[Other]**.
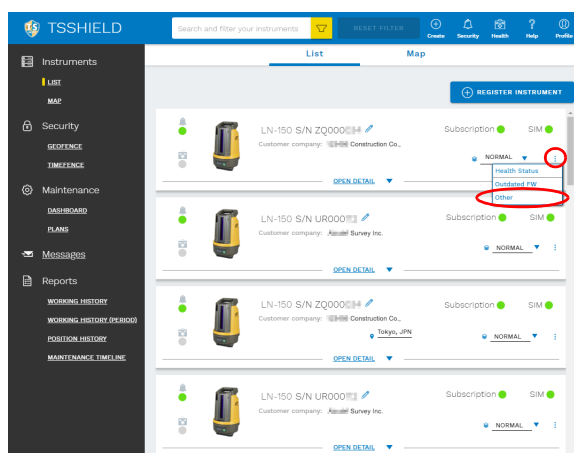
2. Click **[DOWNLOAD]** in the program file for update to download according to the screen.

   Note

   • If the destination to save downloaded files is not changed, the downloaded file is saved in "Download" folder.
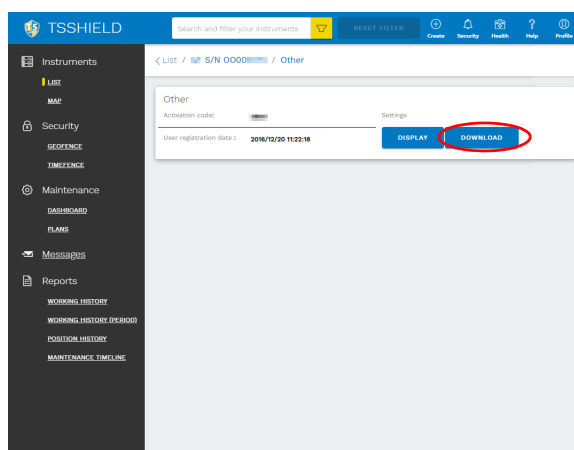
3. Power ON the instrument.

4. Start up the "TSshield Utility".

   Double-click the "TSshield Utility" shortcut icon 🛡 on the desktop.

5. Select a display language and click **[OK]**.
   English or Japanese is selectable.

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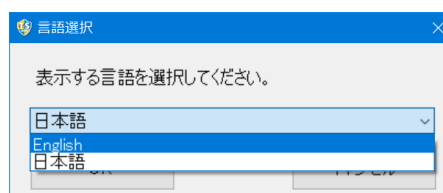
6. Click **[OAF update]**.
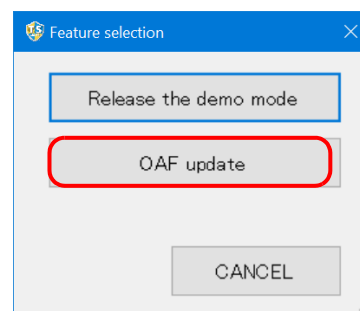
7. Select the update file (LN-150_xxxxxxxx.oaf) and click **[Open]**.
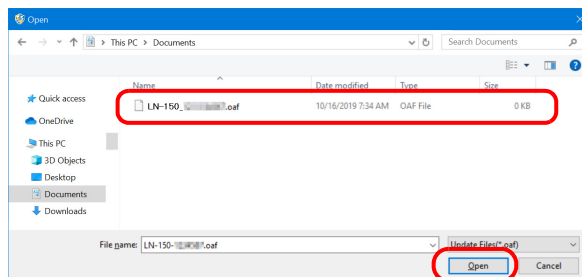
8. Select the communication method.
When selecting "WLAN" and click **[OK]**.
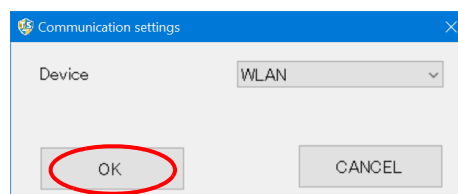
When selecting "*Bluetooth*", select the written down port number.

After setting, click **[OK]** and wait until the update starts.
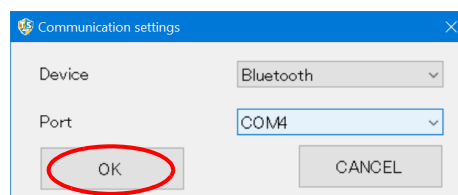
The right screen is displayed during update.

9. When the update is completed, the window dialog on the right is displayed. Click **[OK]** to exit TSshield Utility.

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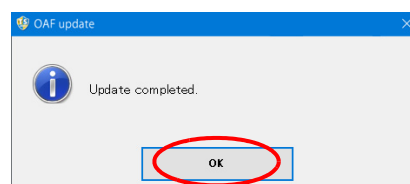
9. TROUBLESHOOTING

If there is a problem, check the table below and follow the suggestions.

9.1   LED Display

LED display	What is happening	How to resolve
Auto leveling LED is blinking in red.	Because the instrument is inclined excessively, auto leveling cannot be performed.	Perform auto leveling again after leveling the surface, such as the flat top surface of the tripod, where the instrument is installed.
Wireless LED is blinking in red	An error occurred in the hardware.	A repair is necessary. Contact your local dealer.
Wireless LED is off	Wireless communication method is not recognized.	Check the status of the selector switches inside the battery cover.

9.2   What to Do When

Conditions	Causes	How to resolve
Forgot the password for a wireless connection.	---	Press the reset switch*) to reset to the factory default settings. Configure the communication settings again.
Wireless connection to the controller is disabled.	Signal is weak.	Use the instrument in a good signal environment.
	Incorrect security settings	Configure the security setting to the same as that of LN.
	Incorrect password	Enter the correct password.
	Another controller is already communicating.	A wireless connection can be established with one controller only. Disconnect the communication with the already connected controller first.
	It takes too long for WPA2 authentication.	Wait until the authentication completes.
When the Wireless LAN mode is set to Mode B		
Wireless connection to the controller is disabled.	Access point cannot be found.	The channel of the access point may be set to 12 or greater (out of the search range of LN). Change the channel.
	Attempting to connect with an access point that cannot be connected unless the MAC address is registered in advance.	MAC address for LN needs to be registered in advance.

*) How to press the reset switch
Set the selector switch inside the battery cover to "WLAN" in advance.
Set the Wireless LAN mode to Mode A, and then turn the power ON.
Before being connected to the wireless (while the Wireless LAN LED is blinking), hold down the reset switch until it beeps twice.

At this time, the Wireless LAN is configured as follows:
Security: WPA2
Password: 00 serial number

10.SPECIFICATIONS

Angle measurement

Method	Absolute rotary encoder method
Measuring range	
Vertical angle	+55°
	-30°
Horizontal angle	360°
☞ "6.2 Usable Range"	
Accuracy	5" (Standard deviation)

Inclination compensation

Method	Hydraulic dual-axis inclination sensors
Compensation range	±6' 00"

Distance measurement

Measuring range	0.9 to 130 m [*1, *2]
Accuracy	(3.0 + 2ppm X D) mm[*1, *3] (D: measurement distance; Unit: mm)
	(ISO 17123-4: 2001)
Update rate of distance data	20 Hz
Light source	Laser diode
Wavelength	690 nm
Laser class	Class 1
Atmospheric correction	Entry of the temperature and atmospheric pressure
	(Depending on the application)
	(Default factory setting: 15°C, 1013hPa)
	Atmospheric correction factor (ppm)[*4]
Prism constant correction	Yes

*1: When using ATP2/ATP2SII

*2: Weather conditions for measurement: Other than bad weather, such as rain, dense fog, and strong heat haze

*3: Figures will change depending on the weather conditions and location conditions.
Figures when both the elevation and depression angles of the laser beam are within 15° and the instrument is facing the 360° Prism.

*4: Atmospheric correction factor (ppm)
The atmospheric correction value is calculated using the following formula and set into the memory.

$$\text{Atmospheric Correction Factor (ppm)} = 282.324 - \frac{0.294362 \times p}{1 + 0.003661 \times t} + \frac{0.04127 \times e}{1 + 0.003661 \times t}$$

t : Air temperature (°C)

p : Pressure (hPa)

e : Water vapor pressure (hPa)

h : Relative humidity (%)

E : Saturated water vapor pressure

• e (water vapor pressure) can be calculated using the following formula.

$$e = h \times \frac{E}{100} \qquad E = 6.11 \times 10^{\frac{(7.5 \times t)}{(t + 237.3)}}$$

Laser pointer (Availability of the function depends on the application to be used.)

Light source	Laser diode
Wavelength	690 nm
Laser class	Class 3R

Spot size   Width: 7 mm / Length: 8 mm (at a distance of 20 m)

Width 16.9 mm / Length: 19.3 mm (at a distance of 50 m)

Auto Tracking

Method	Image sensor method using a coaxial optical system for beam emission and reception
Auto trackable range	0.9 to 130 m[*5]
Light source	Laser diode
Wavelength	793 nm
Laser class	Class 1

[*5]: When using ATP2/ATP2SII
Weather conditions for measurement: Other than bad weather, such as rain, dense fog, and strong heat haze

Ranging tracking optical system

Structure	Coaxial optical system for tracking a measurement of distance
Objective aperture	Ø16.5 mm
Focus distance	50 mm

Motor

Motion range	360° (Horizontal)
Maximum rotation speed	60°/second (10 rpm)
	(The time required for 180° rotation: 3.0 seconds)
Minimum feed angle (operated from the external application)	
	15" (±3.75 mm equivalent at a distance of 50 m)

Auto leveling

Method	Main unit integral type
Auto leveling mechanism	Dual-axis
Leveling range	±3°

Guide Light

Light source	Light-emitting diode (LED) (Red 626 nm / Green 524 nm)
Visible angle range[*6]	Horizontal : greater than 8° (full length: 7 m at a distance of 50 m)
	Vertical : ☞ "6.2 Usable Range"

[*6]: Brightness level is less than 80,000 lx.
Clear and sunny, the sun is positioned at 50° or more, sighting the target from the instrument.

Laser plummet

Light source	Laser diode
Wavelength	635 nm
Laser class	Class 2
Beam accuracy	1.0 mm or less (At the height of the head of a tripod of 1.3 m)
Spot diameter	Ø3 mm or less (At the height of the head of a tripod of 1.3 m)

Communication

Wireless LAN	Supports 802.11 n/b/g
Antenna for Wireless LAN	External
Security (Selection item)	None/WEP/WPA/WPA2 (Default factory setting: WPA2)
Communication distance	100 m (Depending on the controller to be used)
Bluetooth wireless communication	
Transmission method	FHSS

Modulation	GFSK
Frequency band	2.402 to 2.48GHz
Bluetooth profile	SPP, DUN
Power class	Class 1
Usable range	to 130 m[7, 8] (While in communication with designated controllers)

*7: No obstacles, few vehicles or sources of radio emissions/interference in the near vicinity of the instrument, no rain

*8: Usage range could be shorter depending on specifications of *Bluetooth* device to communicate.

Power Supply

Standard battery	BDC72 lithium-ion battery
Continuous service hour (at 20°C)	
	About 5 hours
Battery (BDC72)	
Nominal voltage	7.2 V
Capacity	5,986 mAh
Dimensions	40 (W) X 70 (D) X 40 (H) mm
Weight	About 220 g
Charger (CDC77)	
Input voltage	100 to 240 V AC
Charging time (at 25°C per battery)	
BDC72	About 8 hours (Charging may take longer than this at low or high temperature.)
Range of charging temperature	0 to 40°C
Range of storage temperature	-20 to 65°C
Dimensions	94 (W) X 102 (D) X 36 (H) mm
Weight	About 250 g
Power off function	Yes (30 minutes)

General

Panel section	
Number of keys (types)	3 types (Power source, laser plummet, auto leveling)
Number of LEDs (types)	4 types (Power source, laser plummet, auto leveling, Wireless LAN)
Wireless LAN mode switching	Mode A/B switching (Inside the battery box)
Wireless communication method switching	
	Wireless LAN/*Bluetooth* switching (Inside the battery box)
Self-diagnosis function	Yes
Buzzer	Beep only
Dimensions	185 (W) X 198 (D) X 322 (H) mm
Instrument height	176 mm
Weight	About 4 kg (Including the battery)
Environmental resistance	
Operating temperature	-20 to 50°C (No condensation)
Storage temperature	-30 to 60°C (No condensation)
Dustproof / Waterproof	IP65

11.REGULATIONS

Region/ Country	Directives/ Regulations	Labels/Declarations
U.S.A.	FCC-Class A	**FCC Compliance** **WARNING:** Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. **NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the operator's manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. **Means of conformity** This device complies with part 15 of the FCC Rules, Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter. This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that is deemed to comply without maximum permissive exposure evaluation (MPE). But it is desirable that it should be installed and operated keeping the radiator at least 20cm or more away from person's body.
California, U.S.A	Proposition 65	⚠ **WARNING:** This product can expose you to chemicals including Lead, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.
California, U.S.A	Perchlorate Material (CR Lithium Battery)	This product contains a CR Lithium Battery which contains Perchlorate Material-special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/ Note ; This is applicable to California, U.S.A. only

Region/ Country	Directives/ Regulations	Labels/Declarations
California and NY, U.S.A.	Recycling Batteries	**DON'T THROW AWAY RECHARGEABLE BATTERIES, RECYCLE THEM.** **Topcon Positioning Systems Inc., United States Return Process for UsedRechargeable Nickel Metal Hydride, Nickel Cadmium, Small Sealed Lead Acid, and Lithium Ion, Batteries** In the United States Topcon Positioning Systems Inc., has established a process by which Topcon customers may return used rechargeable Nickel Metal Hydride(Ni-MH), Nickel Cadmium(Ni-Cd), Small Sealed Lead Acid(Pb), and Lithium Ion(Li-ion) batteries to Topcon for proper recycling and disposal. Only Topcon batteries will be accepted in this process. Proper shipping requires that batteries or battery packs must be intact and show no signs of leaking. The metal terminals on the individual batteries must be covered with tape to prevent short circuiting and heat buildup or batteries can be placed in individual plastic bag. Battery packs should not be dissembled prior to return. Topcon customers are responsible for complying with all federal, state, and local regulations pertaining to packing, labeling, and shipping of batteries. Packages must include a completed return address, be prepaid by the shipper, and travel by surface mode. **Under no circumstance should used/recyclable batteries by shipped by air.** Failure to comply with the above requirements will result in the rejection of the package at the shipper's expense. Please remit packages to: Topcon Positioning Systems, Inc. C/O Battery Return Dept. 150 7400 National Dr. Livermore, CA 94551 **DON'T THROW AWAY RECHARGEABLE BATTERIES, RECYCLE THEM.**
Canada	ICES-Class A	This Class A digital apparatus meets all requirements of Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la Class A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada. This class A digital apparatus complies with Canadian ICES-003. Cet appareil numerique de la classe A est conforme a la norme NMB-003 du Canada. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device. This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment and meets the RSS-102 of the IC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that it deemed to comply without maximum permissive exposure evaluation (MPE). But it is desirable that it should be installed and operated keeping the radiator at least 20cm or more away from person's body.

Region/Country	Directives/Regulations	Labels/Declarations
EU	EMC-Class A RE	**EMC NOTICE** In industrial locations or in proximity to industrial power installations, this instrument might be affected by electromagnetic noise. Under such conditions, please test the instrument performance before use. This is a CLASS A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. This product complies with the electromagnetic environmental testing of industrial locations. Hereby, TOPCON CORPORATION declares that the radio equipment type of this product is in compliance with Directive 2014/53/EU. EU declaration of conformity is available depending on your request. Contact your local dealer. **Manufacturer** Name:TOPCON CORPORATION Address:75-1, Hasunuma-cho, Itabashi-ku, Tokyo, 174-8580 JAPAN **Europe Representative and Importer** Name:Topcon Europe Positioning B.V. Address:Essebaan 11, 2908 LJ Capelle a/d IJssel, The Netherlands
EU	WEEE Directive	**WEEE Directive** This symbol is applicable to EU members states only. Following information is only for EU-member states: The use of the symbol indicates that this product may not be treated as household waste. By ensuring this product is disposed of correctly, you will help prevent potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling of this product. For more detailed information about the take-back and recycling of this product, please contact your supplier where you purchased the product or consult.
EU	EU Battery Directive	**EU Battery Directive** This symbol is applicable to EU members states only. Battery users must not dispose of batteries as unsorted general waste, but treat properly. If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows: Hg: mercury(0.0005%), Cd: cadmium(0.002%), Pb: lead(0.004%) These ingredients may be seriously hazardous to human and the global environment. This product contains a coin cell. You cannot replace batteries by yourself. When you need to replace and/or dispose batteries, contact your local dealer.