

**INSTRUCTION MANUAL  
LASER SCANNER**

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**GLS-2000 SERIES**

# HOW TO READ THIS MANUAL

Thank you for selecting the TOPCON instrument.

- Please read this instruction manual carefully, before using this product.
- 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.
- 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

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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.



: Indicates supplementary explanation.

[OK] etc. : Indicates buttons on the display.

## Notes regarding manual style

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- All 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.

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# 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

 <b>WARNING</b>	Ignoring this indication and making an operation error could possibly result in death or serious injury to the operator.
 <b>CAUTION</b>	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.



Because this instrument is heavy, make sure to carry it carefully using both the handle and the side handle. There is a possibility that the instrument may topple and fall resulting in possible injury, and incorrect lifting posture may also result in hurting your back.



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.



When scanning the target with the flash light while the instrument is set to use the prism, please pay attention to the surroundings before doing so. When the target scanning is started with the flash light while the instrument is set to use the prism, a white spot beam will be emitted from the scanner unit to detect the position of the prism. This spot beam may decrease a driver or pedestrian's vision temporarily if it hits the eye and may cause a serious accident.



Secure handle to main unit. Failure to properly secure the handle could result in the unit falling off 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.



Do not touch the instrument while the motor is in operation. Injury could result.

-  Do not touch the scanner section during high-speed rotation. Injury could result.
-  Tighten the adjustment tribrach clamp securely. Failure to properly secure the clamp could result in the tribrach falling off while being carried, causing injury.

### Power Supply

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 **Warning**

-  Do not short circuit. Heat or ignition could result.
  -  Do not place articles such as clothing on the battery charger while charging batteries. Sparks could be induced, leading to fire.
  -  Do not use voltage other than the specified power supply voltage. Fire or electrical shock could result.
  -  Do not use batteries other than those designated. An explosion could occur, or abnormal heat generated, 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 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.
  -  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 use batteries or the battery charger if wet. Resultant shorting could lead to fire or burns.
  -  Do not connect or disconnect power supply plugs with wet hands. Electric shock could result.
-  **Caution**
-  Do not touch liquid leaking from batteries. Harmful chemicals could cause burns or blisters.

### Tripod

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 **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.

## 2. PRECAUTIONS

### Charging Battery

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

### Warranty policy for Battery

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

### Precautions concerning water and dust resistance

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The instrument conforms to IP54 specifications for waterproofing and dust resistance when battery cover, connector cap and the Wide-angle camera lens cap of the instrument and are closed.

- Be sure to correctly attach the connector caps to protect the instrument from moisture and dust particles when the connector is not in use.
- 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, 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 dealer.

### The Lithium Battery

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- The lithium battery is used to maintain the Calendar & Clock function. 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.

### The Levelling Base

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- Always use the levelling base provided.  
If the tribrach is installed incorrectly, the measuring precision could be effected. Occasionally check the adjusting screws on the tribrach. Make sure the base fixing lever is locked and the base fixing screws are tightened.

### Tripod

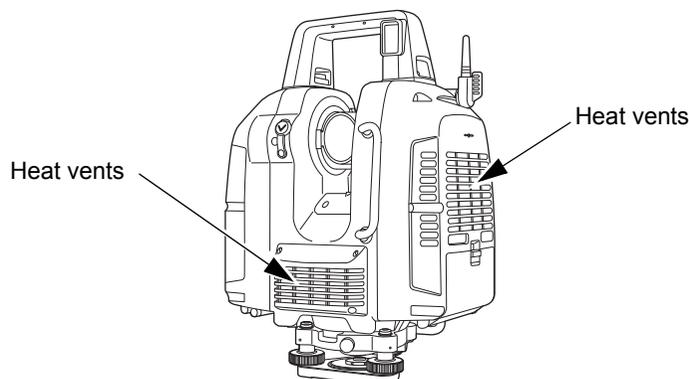
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- When mounting the instrument on a tripod, use a wooden tripod.  
Do not use a metallic tripod.

### Heat Release

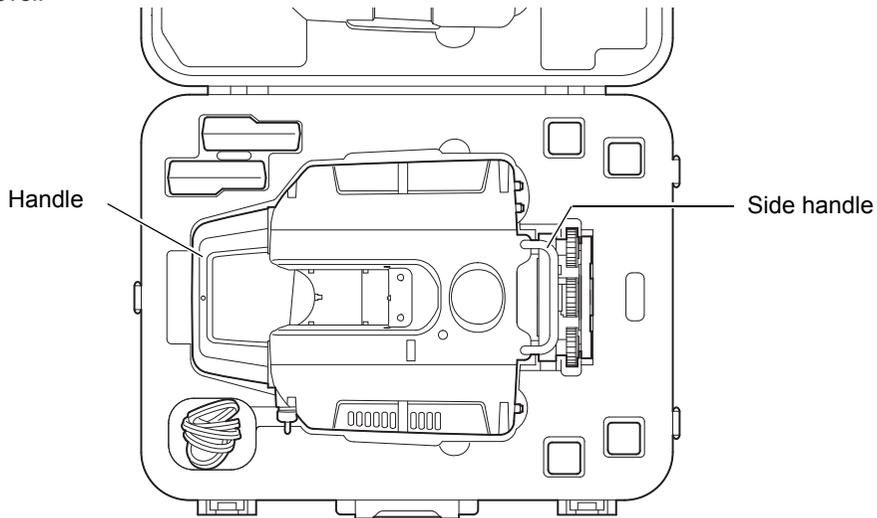
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- To prevent malfunction caused by a temperature rise inside this instrument, heat vents are provided to release heat. Do not cover the vents when in use. When installing this instrument, keep the vents away from a wall.



## Removing the instrument

- When removing the instrument from the case, hold by the handle and side handle and pick it up while keeping it level.



## Other precautions

- **Effect of water drops**  
It may not be possible to measure if there are water drops on the glass of the scanner unit. Wipe off moisture completely. A wet object may not be measured.
- **When raining or snowing**  
When it is raining, snowing or foggy outside, please do not use the instrument to measure objects. Water drops and snowflakes will be recognized as 3D data.
- **Horizontally rotating part**  
Do not turn the horizontally rotating part and the scanner unit with your hands while the power is ON. If it has been turned by force, turn the power ON again. (Except when collimating)
- **Guarding the instrument against shocks**  
When transporting the instrument, provide some protection to minimize risk of shocks. Heavy shocks may cause the measurement to be faulty.
- **Sudden changes of temperature**  
Any sudden change of temperature to the instrument may result in a reduction of measuring distance range, i.e when taking the instrument out from a heated vehicle. Let instrument acclimate itself to ambient temperature.
- **Direct sunlight**  
Do not expose the instrument to direct sunlight for extended periods of time. When left in the sun for long periods, performance may be adversely affected, or if the inner temperature of the instrument may rise to an abnormally high level, the instrument may fail to operate.  
When measurements must be made in locations exposed to the sun and require high precision, protect from direct sunlight by using a sunshade for the instrument and tripod.
- **Battery level check**  
Confirm battery level remaining before operating.
- **Battery use**  
Always use four batteries as one set, and operate the instrument with batteries that have been charged and discharged the same number of times. Do not mix old and new batteries, or batteries that have been charged and discharged a different number of times.
- **Taking the battery out**  
It is recommended not to take the battery out during the power is on. Doing so may cause loss of data. Please do your assembling or taking the battery out after the power is off. Refer to Chapter "Replacing the Batteries during the power is ON" on page 25 if you need to replace the batteries during the power is on.

**Maintenance**

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- Wipe off moisture completely if the instrument gets wet during survey work.
- Always clean the instrument before returning it to the case. The scanner unit, wide-angle camera lens and laser plummet window, etc. require 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.
- If the display is dirty, carefully wipe it with a soft, dry cloth. To clean other parts of the instrument or the carrying case, lightly moisten a soft cloth in a mild detergent solution. Wring out excess water until the cloth is slightly damp, then carefully wipe the surface of the unit. Do not use any alkaline cleaning solutions, alcohol, or any other organic solvents on the instrument or display.
- Store the instrument in a dry room where the temperature remains fairly constant.
- Check the tripod for loose fit and loose screws.
- If a foreign object is thought to be in the rotation section or the screw section of this instrument, or if a trace of water droplets or mold is found on the scanner unit, or the reflecting prism of the scanner, contact your local dealer.
- When the instrument is not used for a long time, check it at least once every 3 months.
- 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)**

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- 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 May 2013 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>

**User**

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- This product is for professional use only!  
The user is required to be a qualified surveyor or have a good knowledge of surveying, in order to understand the user and safety instructions, before operating, inspecting or adjusting.
- Wear the required protectors (safety shoes, helmet, etc.) when operating.

**Exceptions from responsibility**

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- The user of this product is expected to follow all operating instructions and make periodic checks (hardware only) of the product's performance.
- The manufacturer, or its representatives, assumes no responsibility for results of faulty or intentional usage or misuse including any direct, indirect, consequential damage, or loss of profits.
- The manufacturer, or its representatives, assumes no responsibility for consequential damage, or loss of profits due to any natural disaster, (earthquake, storms, floods etc.), fire, accident, or an act of a third party and/or usage under unusual conditions.
- The manufacturer, or its representatives, assumes no responsibility for any damage (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, and loss of profits caused by usage different to that explained in the operator's manual.
- The manufacturer, or its representatives, assumes no responsibility for damage caused by incorrect operation, or action resulting from connecting to other products.

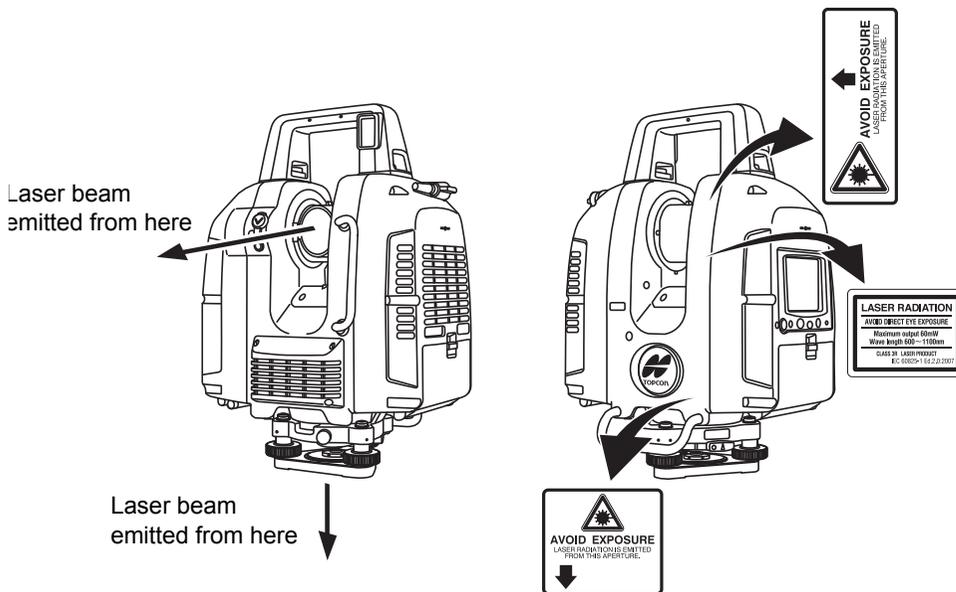
# 3. LASER SAFETY INFORMATION

This instrument emits a laser beam while scanning or using a laser plummet.

The instrument is classified as the following class of Laser Product according to IEC Standard Publication 60825-1 Ed.2.0: 2007 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.50, dated June 24, 2007.)

Laser class of each mode is as follows.

Device		Laser class
Scanner unit	Range mode ("Detail" / "High Speed" / "Standard" / "Close" is selected.)	Class 3R
	Range mode ("Low Power" is selected.)	Class 1M
	Laser pointer	Class 3R
Laser Plummet		Class 3R



## 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.

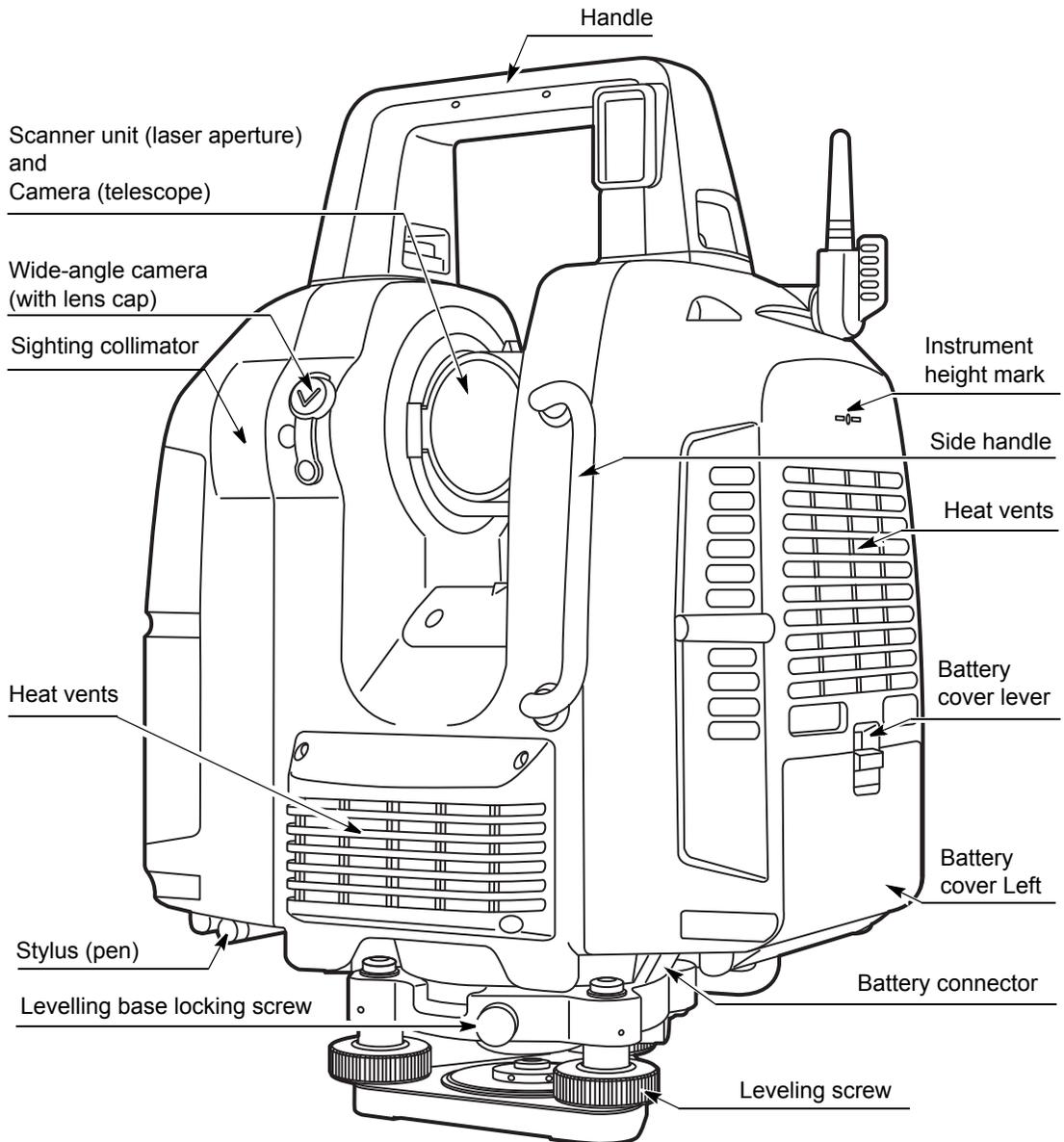
## Caution

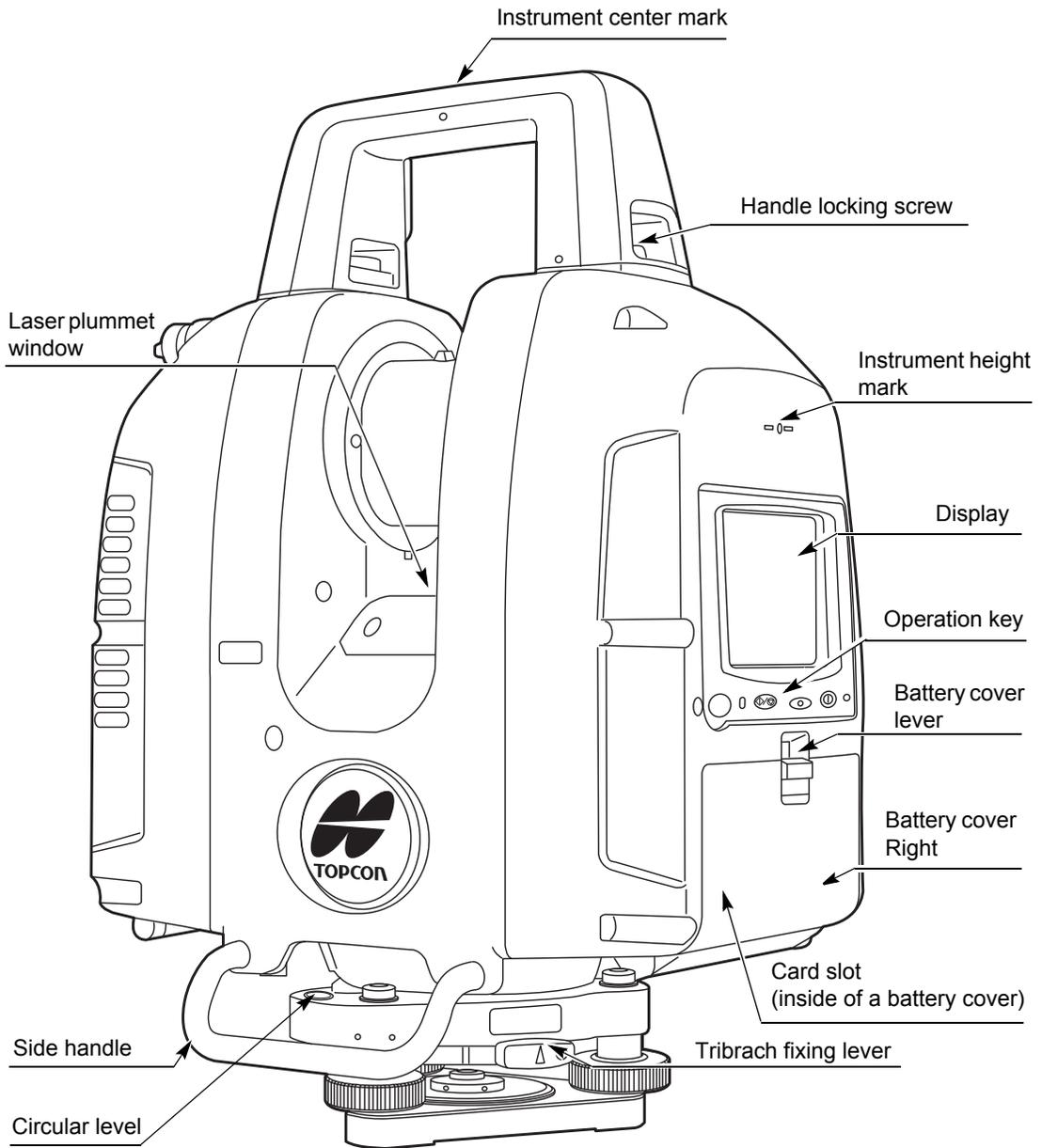
- Perform checks at start of work and periodic checks and adjustments with the laser beam emitted under normal conditions.
- When the instrument is not being used, turn off the power.
- When disposing of the instrument, destroy the battery connector so that the laser beam cannot be emitted.

- 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 visible laser beam unintentionally striking a person in the eye.
- 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.

# 4. PRODUCT OUTLINE

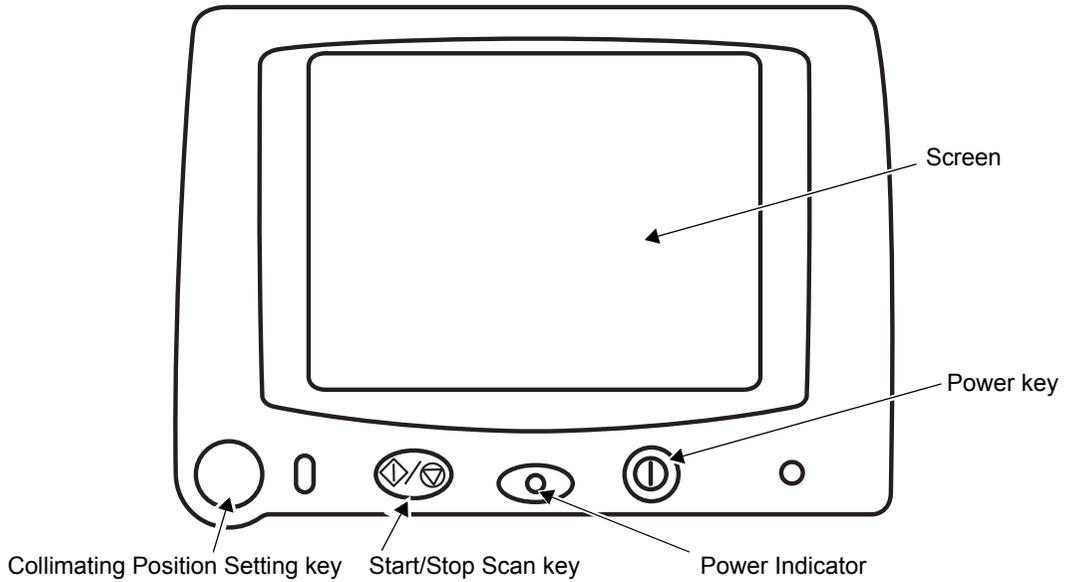
## 4.1 Parts of the Instrument





## 4.2 Operating Keys

The operating keys on the side of the instrument are as follows:



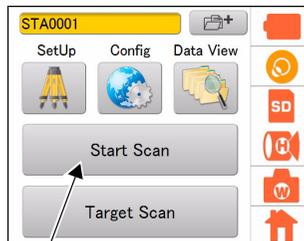
Key / Indicator name	Function
Collimating Position Setting key	Sets the collimating position.
Start/Stop Scan key	Starts or stops scanning.
Power key	Turns the power ON and OFF.
Power Indicator	Lighting up in orange when the power is turned ON.

**Note**

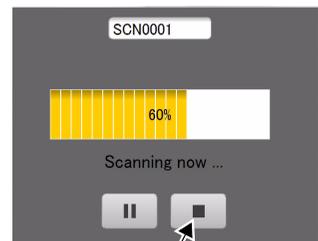
- The buttons in the screens below provide the same functions as the keys listed in the table above.



Collimating Position Setting key



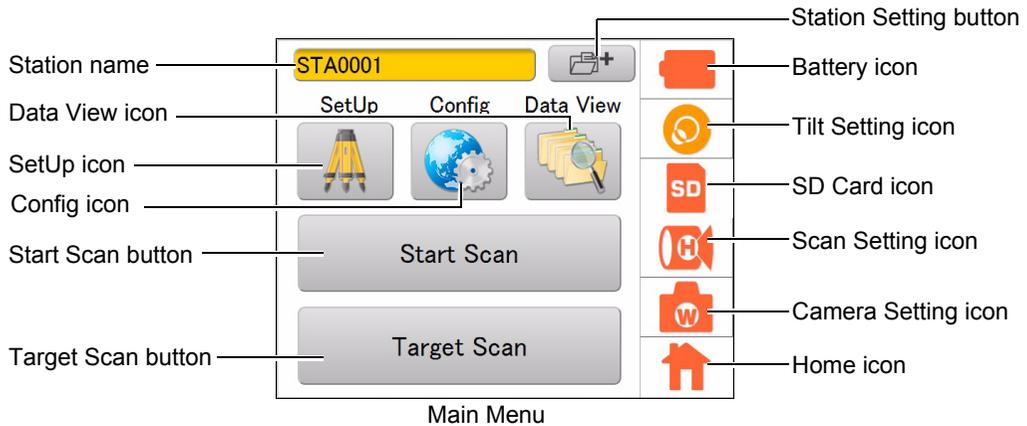
Start Scan button



Scan Stop key

## 4.3 Display and Functions of the Main Menu

Icons for frequently used functions and various setting modes are displayed on the main menu.



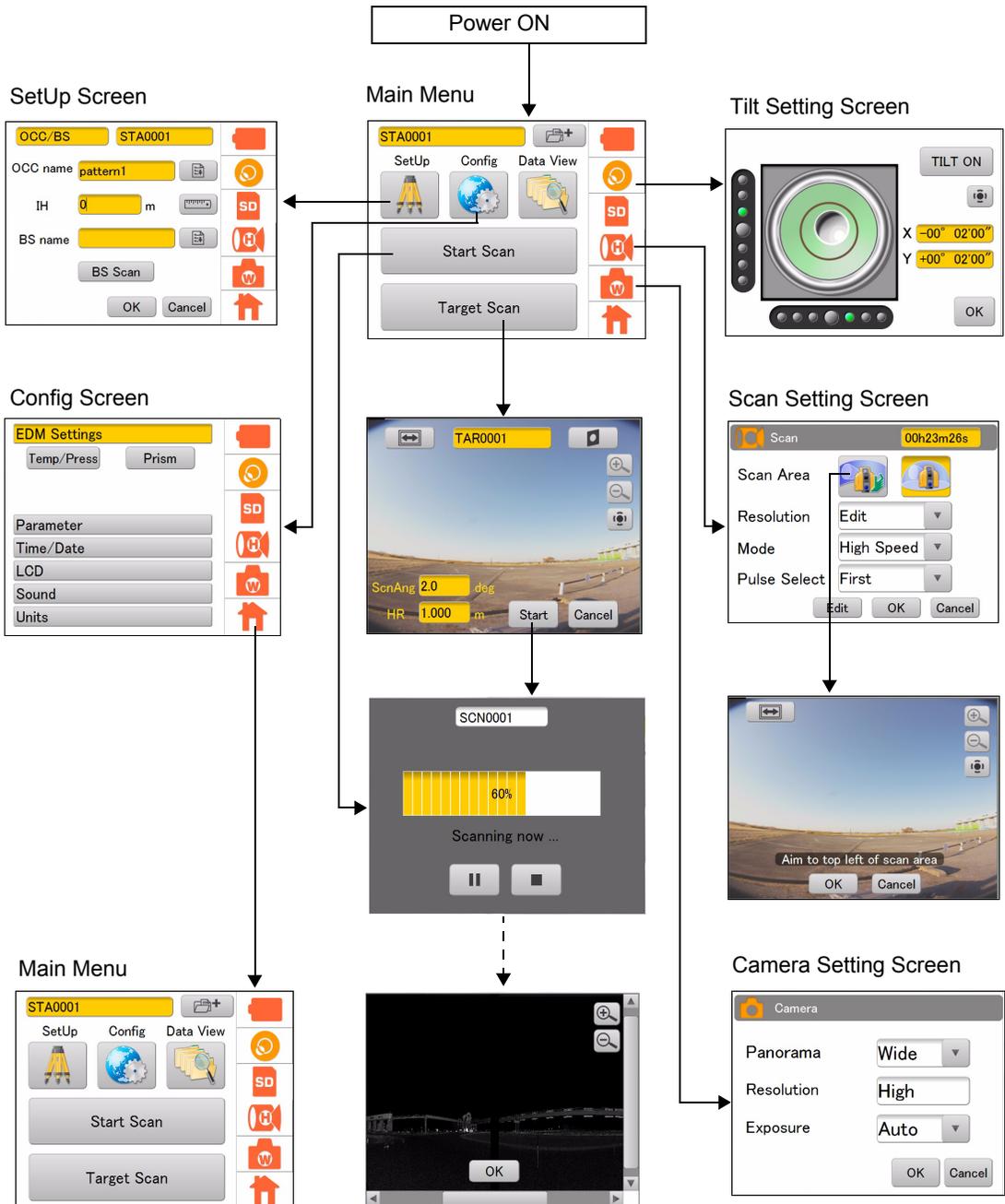
Name of the button / icon	Function(s)
Station Setting button	Sets a new station name. ☞ "9. STATION SETTINGS"
SetUp icon	Enters the SetUp mode to set the occupied point name and the backsight point name. ☞ "9.2 Setting the Point Name (Occupied point and Backsight point)"
Config icon	Enters the Config mode to configure various settings. ☞ "8. FLOW OF THE CONFIGURATION SCREEN"
Data View icon	Enters the Data View mode. ☞ "8.10 Data structure in the SD card"
Start Scan button	Starts Scanning. ☞ "10.2 3D Scanning"
Target Scan button	Scans the target. ☞ "10.1 Target Scanning"
Battery icon	Displays the remaining battery life. Also, use it to replace the batteries while scanning. ☞ "6.6 Battery Power Remaining Display" ☞ "6.7 Replacing the Batteries during the power is ON"
Tilt Setting icon	Displays the electronic circular level. Switches the tilt, ON or OFF. ☞ "7.1 Setting the Tilt Sensor ON/OFF" Adjusts the tilt sensor installation error. ☞ "11.2 Tilt Sensor Calibration"
SD Card icon	Displays the detail of the SD card usage. ☞ "6.5 Using the SD Card"
Scan Setting icon	Sets the conditions of scanning. ☞ "10.2 3D Scanning"
Camera Setting icon	Sets the built-in camera ☞ "7.2 Camera Settings (Angle of view and Resolution)"
Home icon	Displays the main menu.

## 4.4 Flow of the Screens

The following illustrates the main flow of the screens. Use a stylus pen to operate the screen.



- Do not scratch or use any sharp objects other than a stylus pen on the screen face.



## 5. PREPARATIONS BEFORE USE

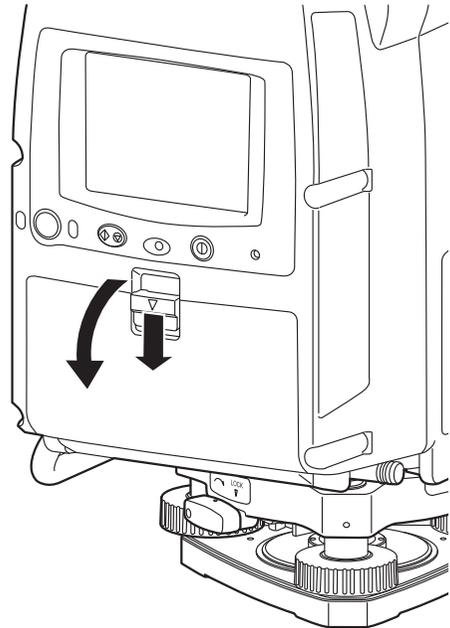
### 5.1 Inserting an SD memory card and Installing the Battery



- The station information and the measured data are stored in the SD memory card. Make sure that the SD memory card is inserted before measuring.
- When using a coordinate point that is already known, make sure that the data (coordinate point file (CSV file), etc.) is stored in the SD card.
- Use an SD card with the speed at 6MB/sec or faster, or an SDHC card of Class 6 or higher. SD cards of Class 4 or lower cannot be used.
- Use the supplied battery (BDC70) for the instrument.
- See “12. BATTERY CHARGING” on how to charge the batteries.
- Do not break the projection (Open/Close sensor) inside the battery cover. Be careful not to pinch your finger.
- Make sure that no water drop or dust gets inside the instrument when setting or removing the batteries.
- When storing the batteries, remove the batteries from the instrument or the charger.
- The batteries are chemical products that use a chemical reaction and have a limited life expectancy. Even if the batteries are not used, they deteriorate over time and the capacity decreases. If the service lives of the properly charged batteries are shortened, purchase new ones, as the batteries have come to the end of their useful service life.

#### PROCEDURE

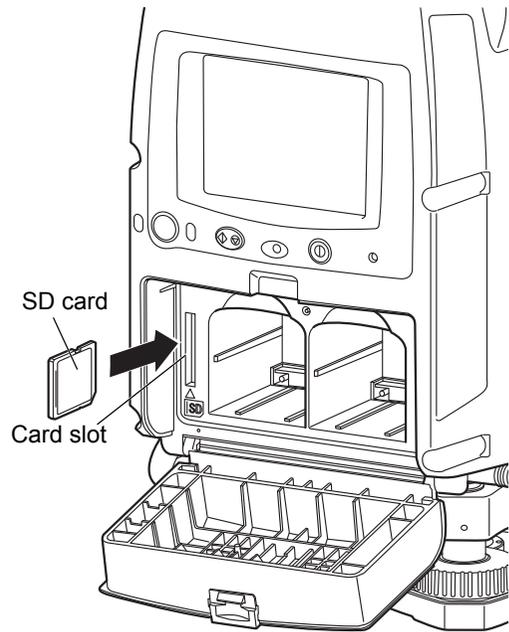
1. Slide down the lever on the battery cover (Right) to open.



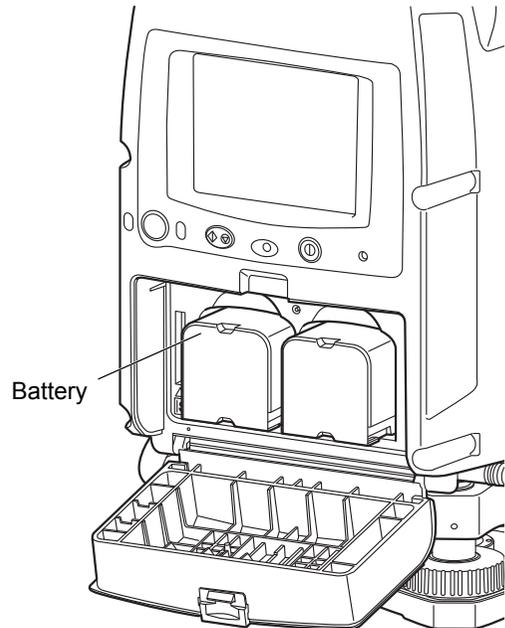
## 2. Insert a SD card to the card slot.



- Please make sure you have the front and back of the SD card facing correctly when inserting into the card slot.
- When removing the SD card, press the center of the card slowly. Pressing the edge of the card may cause the card to eject strongly.
- While a progress bar displays, do not remove the SD card. Otherwise, the data may be destroyed.



## 3. Checking the terminal side on the battery, insert two batteries as shown.

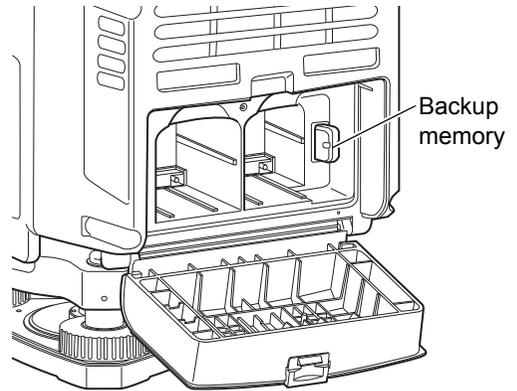
4. Close the battery cover (Right).  
Make sure it clicks.

5. Open the battery cover (left).

6. Similarly, Install two batteries.



- Never remove the backup memory in the battery cover (Left).



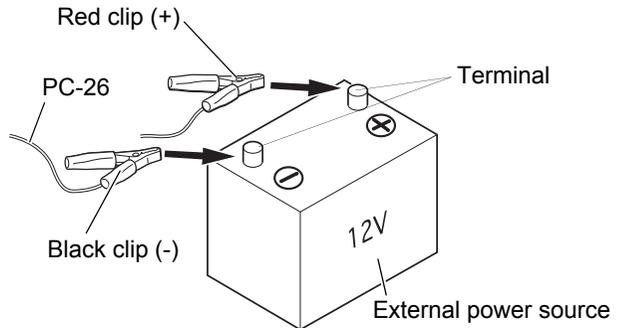
7. Close the battery cover (Left). A click is heard when the cover is secure.

## 5.2 Connecting the External Power Source

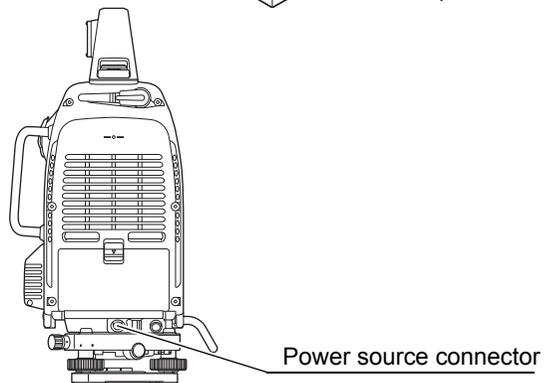
Use the external power source if necessary.

### PROCEDURE Connect the external power source

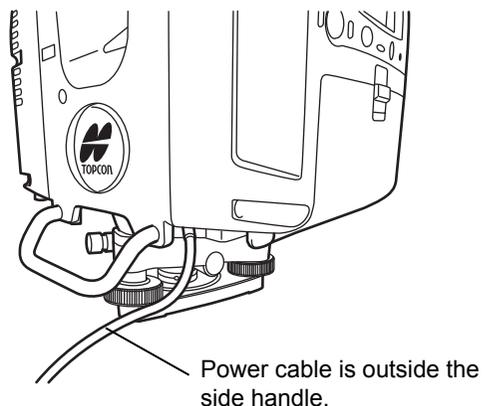
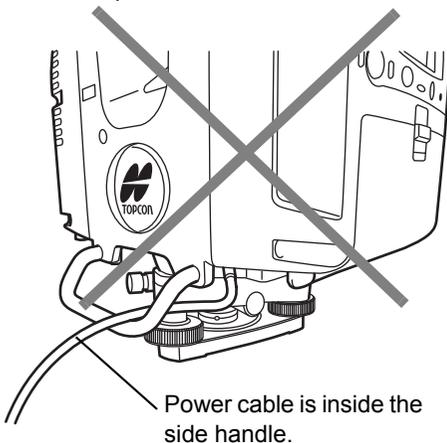
1. Connect the clip of the external power cable PC-26 (Sold separately) to a terminal of commercial external power source.



2. Connect the external power cable PC-26 to the power source connector.



- The GLS-2000 automatically starts by connecting the external power source without the batteries (BDC70) in the instrument.
- Make sure to close the connector cap of the power source connector when an external power source is not being used.
- When connecting the power cable to the power source connector, place the power cable outside the side handle as shown below. If the power cable is inside the side handle, it may be disconnected due to the instrument's rotation. Rotate the instrument before turning the power on to make sure that it does not hit the power cable.



## 5.3 Overview of Scanning Procedure

The following describes the overview of scanning procedure:

### Prepare for scanning

1. Install the instrument.  
 "6.4 Setting Up the Instrument"
2. Turn the power ON.  
 "6.3 Power ON/OFF"
3. Set up this instrument.  
 "7. INSTRUMENT SETTINGS"  
 "8.9 Handling the Coordinate Point File"

### Set the station, the occupied point and the backsight point

1. Set the station.  
 "9.1 Creating a New Station"
2. Set the occupied point name and the backsight point name, and then scan the backsight point.  
 "9.2 Setting the Point Name (Occupied point and Backsight point)"

### Scan

- 
- "10. MEASURING (SCANNING)"
1. Scan the target.  
 "10.1 Target Scanning"
  2. Perform a 3D scanning.  
 "10.2 3D Scanning"

### Turn the power OFF

1. Turn the power OFF.  
 "6.3 Power ON/OFF"

# 6. PREPARATION FOR MEASUREMENT

## 6.1 Detaching / attaching the Handle

The carrying handle can be removed from the instrument. To remove it, loosen the 2 handle rocking screws.



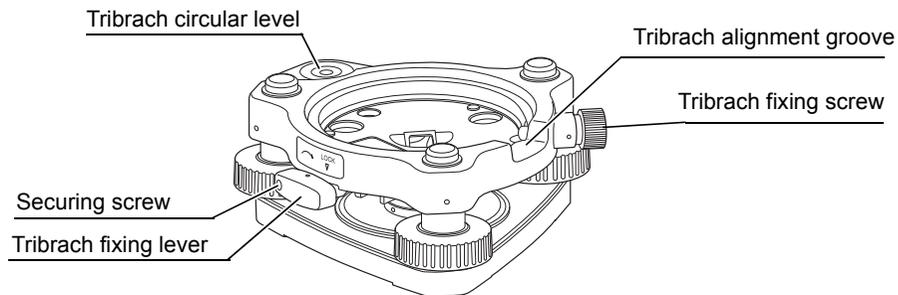
- Remove the handle when scanning around the zenith or the whole circumference.
- To remove the handle, hold both sides of the handle and lift it straight above. If you hold the handle by one hand or incline it, the terminal attached on the handle may be damaged.
- When using the instrument with the handle detached, pay careful attention that no water or dust has adhered to the terminal.



To attach the handle, position and align the handle and then tighten up the handle locking screws. (Two points need to be screwed.)

## 6.2 Detaching / attaching the Tribrach

The instrument is easily detached or attached to the tribrach.

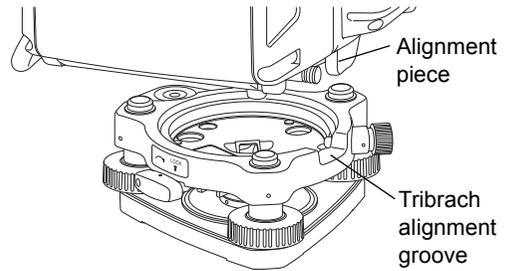


### PROCEDURE Detaching the instrument from the levelling base

1. Loosen the levelling base locking screw by turning 2 or 3 rotations in the counterclockwise direction.
2. Turn the tribrach clamp counterclockwise to loosen. (When the tribrach fixing lever securing screws are screwed in, use the driver provided in the package to loosen.)
3. Lift the instrument to detach.

**PROCEDURE Attaching the instrument to the levelling base**

1. Check that the tribrach fixing screw has been loosened.
2. Align the alignment piece and the tribrach alignment groove and lower the instrument onto the levelling base.
3. Turn the tribrach fixing lever clockwise to tighten.
4. Turn the tribrach fixing screw clockwise to tighten.

**Note**

- Locking the tribrach fixing lever

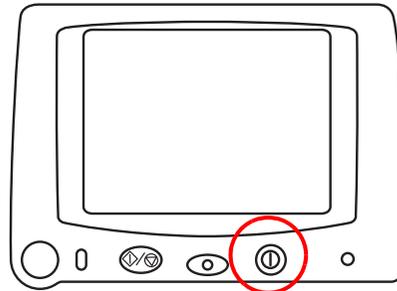
The tribrach fixing lever can be locked from being moved accidentally. This is useful if the upper instrument section is not being detached very often. Simply tighten the securing screw on the fixing lever with the accessory screw driver.

**6.3 Power ON/OFF****PROCEDURE Power ON**

1. Press the power key located on the right side of the instrument.  
After the power Indicator turned on, a startup screen will be displayed.



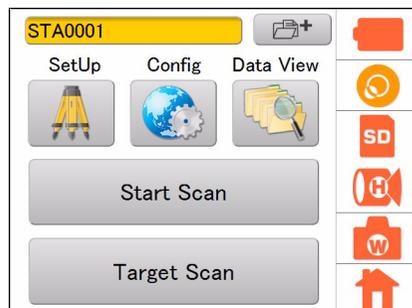
- It takes approximately 3 minutes after the power has been switched ON to initialize the instrument and warm up the laser.  
Do not turn the instrument with your hands or operate any keys while the instrument is turning.



The main menu will appear.



- If [TILT OVER] is displayed, this instrument is inclining beyond the tilt angle compensation range. Level this instrument using the tilt sensor.  
☞ “6.4 Setting Up the Instrument”

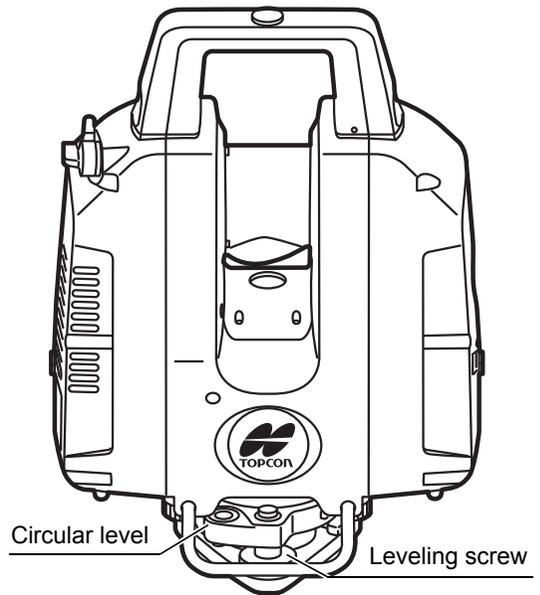
**Note**

Main menu

- Internal Calibration

In order to maintain its precision, the instrument will automatically perform internal calibration. The internal calibration will take approximately 2 minutes.

Confirm that, after the setup is finished, the positional relationship between the instrument and the tribrach will be as shown in the figure here.



- Do not turn the head or the scanner unit with your hands while the power is ON. If it has been turned by force, turn the power ON again. (Except when collimating)

**PROCEDURE Power OFF**

---

1. Press and hold (about 2 seconds) the power key located on the right side of the instrument. The power is switched off.

## 6.4 Setting Up the Instrument



- Level and center the instrument precisely. Level and center the instrument precisely to insure the best performance.
- Use tripods with a tripod screw of 5/8 in. diameter and 11 threads per inch, such as the Type E TOPCON wide-frame wooden tripod. Do not use a metallic tripod.

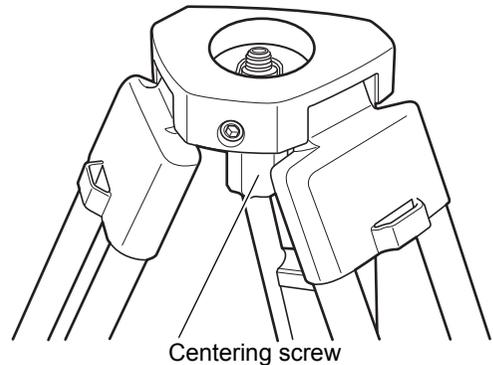
### PROCEDURE Leveling and Centering the Instrument

#### 1. Setting up the Tripod

First, extend the extension legs to suitable lengths and tighten the screws on their midsections.

#### 2. Place the instrument on the tripod head.

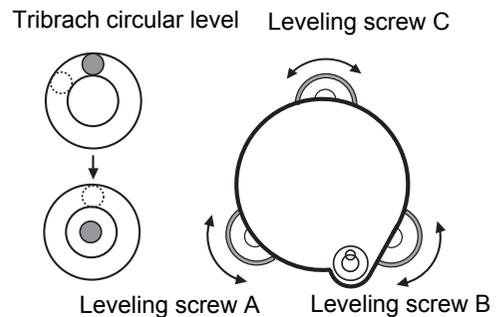
Place the instrument on the tripod head, lightly tighten the centering screw. Slide the instrument by loosening the centering screw, place the point over the survey point, and then tighten the centering screw.



#### 3. Roughly Leveling the Tribrach by Using the Tribrach circular level

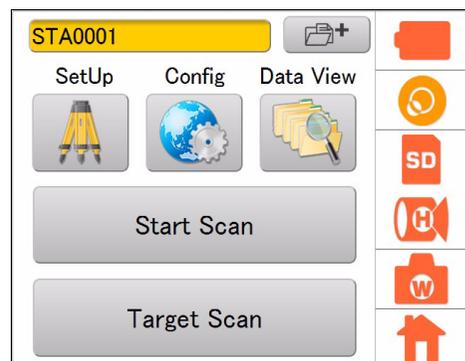
Turn the leveling screws A and B and adjust the bubble to stay at the top or bottom of the circular level.

Turn the leveling screw C to bring the bubble to the center of the tribrach circular level.



#### 4. Centering with the Laser Plummet

Turn the power of this instrument ON.  
Press the Tilt Setting icon.



The electronic circular level is displayed. Press , and then the laser plummet beam will be emitted from the bottom of the instrument. "●" indicates the bubble in circular level. The line within the electronic circular level is set at  $\pm 6'$ . The amount of dislocation will not be displayed when the bubble is beyond the line.

Center "●" in the circular level using foot screws.

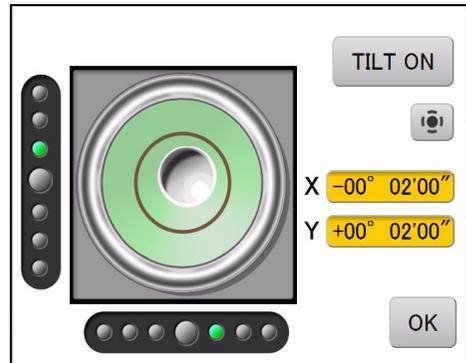
 : Laser plummet beam is lit.

 : Laser plummet beam is off.

Slide the instrument by loosening the centering screw, place the point on the survey point, and then tighten the centering screw.

Try to keep the instrument from rotating when sliding it so as to minimize the dislocation of the bubble.

Repeat step 3 and 4 if necessary.



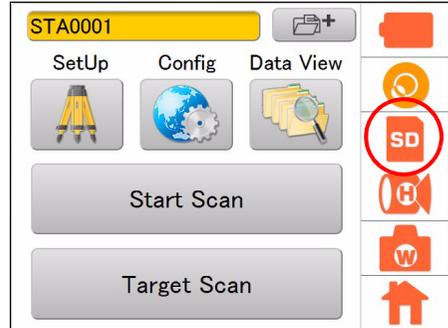
5. Press [OK] after centering.

## 6.5 Using the SD Card

Tap the SD Card icon to check the detail of the SD card usage.

### PROCEDURE

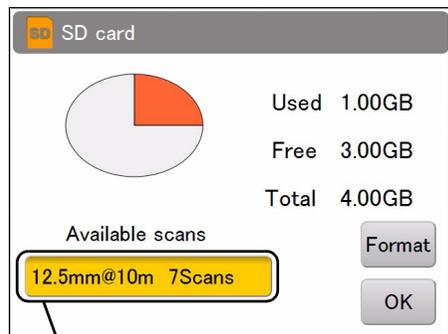
1. Press the SD Card icon.



The confirmation window will appear.

Press [Format] to format the SD card.  
Press [OK] in the confirmation message window to start the format.

The time required to format an SD card depends on the volume of the SD card.



2. Press [OK] to return to the main menu.

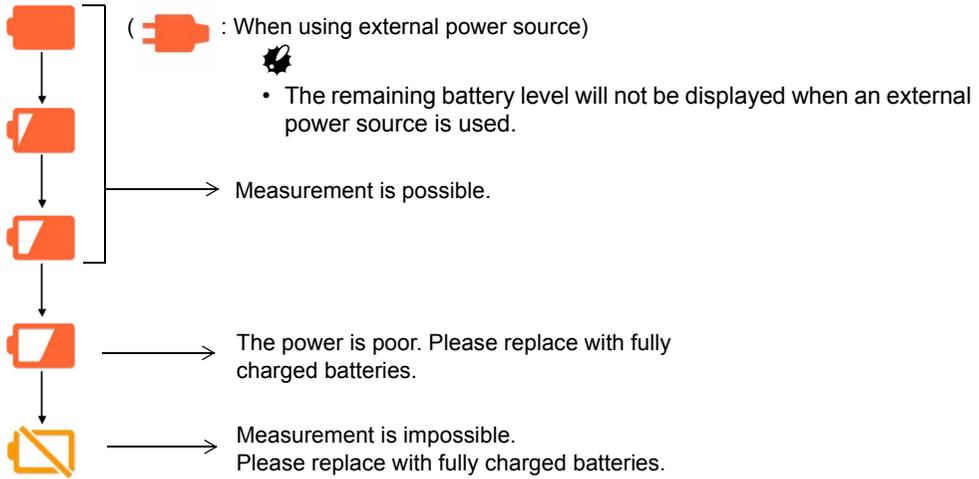
It means that there are seven scans worth of memory available when the scanning is to be done within the set scanning range at a resolution of 12.5mm@10m.



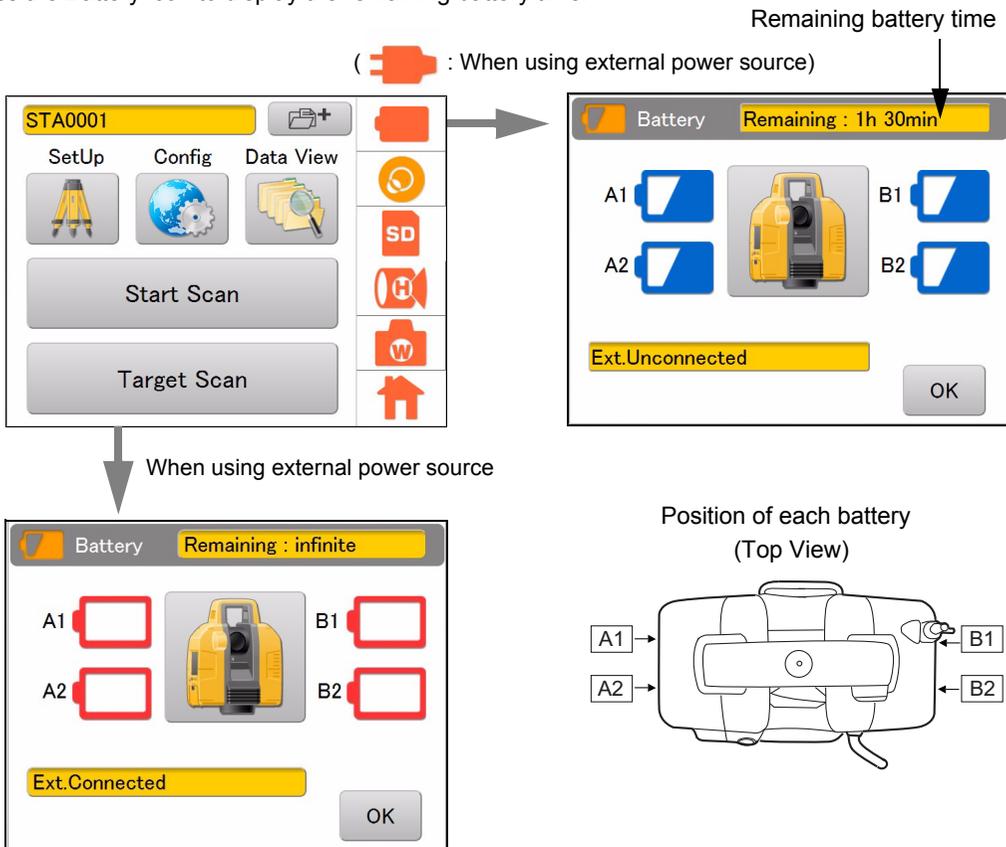
- Note that when the card is formatted, all files in the card are deleted and cannot be used.

## 6.6 Battery Power Remaining Display

Battery power remaining display indicates the power condition.



Press the Battery icon to display the remaining battery time.



- The battery operating time will vary depending on the environmental conditions such as ambient temperature, charging time, the number of times of charging and discharging etc. It is recommended for safety to charge the battery beforehand or to prepare spare full charged batteries.

 "12. BATTERY CHARGING"

## 6.7 Replacing the Batteries during the power is ON



- When replacing the built-in batteries, replace all four batteries with fully charged batteries.
- Replace two batteries at a time: Replace A1 and A2 batteries first, and then B1 and B2 batteries, all with fully charged ones.  “Position of each battery” on page 24

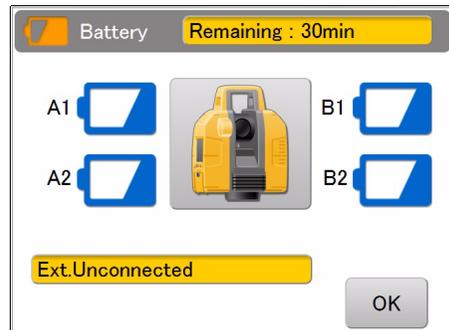
### PROCEDURE

If the battery power becomes low during the power is ON, replace the batteries by following the instruction below to continue the scanning:

1. Press the Battery icon.



The remaining battery level will be displayed.

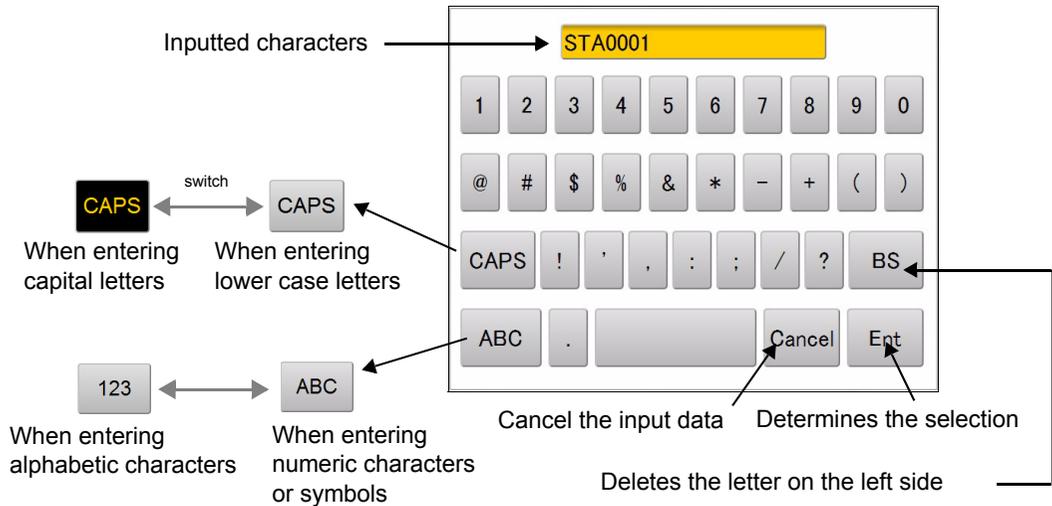


2. Open the right-side battery cover to replace two batteries.
3. Close the right-side battery cover.  
Confirm that both A1 and A2 batteries are recognized and that the battery level has increased.
4. Similarly, open the left-side battery cover to replace two batteries.
5. Close the left-side battery cover.  
Confirm that both B1 and B2 batteries are recognized and that the battery level has increased.
6. Press [OK].

## 6.8 Entering Numeric and Alphabetic Characters

Numerical, uppercase, and lowercase alphabetic characters can be entered when entering a station, an instrument height, or a backpoint.

The function of a keyboard is as follows.



Characters that can be entered

Items to enter characters	Characters that can be entered	Number of characters
<ul style="list-style-type: none"> <li>• Target name</li> <li>• Station name</li> <li>• Occupied point name</li> <li>• Backsight point name</li> </ul>	<ul style="list-style-type: none"> <li>• Alphabet : a to z, A to Z</li> <li>• Numeric characters: 0 to 9</li> <li>• Symbols ("*", ".", "/", "?") are disabled)</li> </ul>	8 characters or less

## 6.9 Preparing the Target

Use the target or (single) prism when performing "target scanning".



- Be sure to use the target sheets for the GLS-2000/1500 manufactured by TOPCON.
- Select the target sheet (large, medium, small) based on the distance to the object being scanned. (Target sheet (large / medium) is sold separately)

Distance to the scanning target (m)	Target sheet	Size (m)
50-200	Large	0.12
10-100	Middle	0.06
2-50	Small	0.03

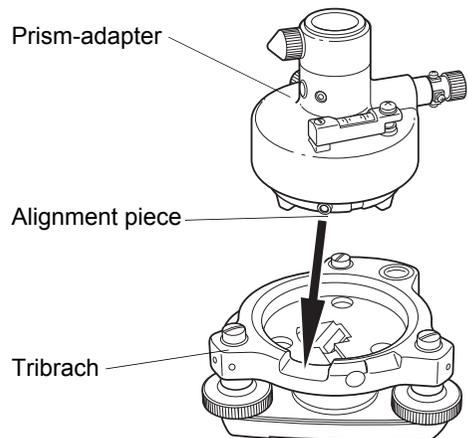
### ■ Assembling the target



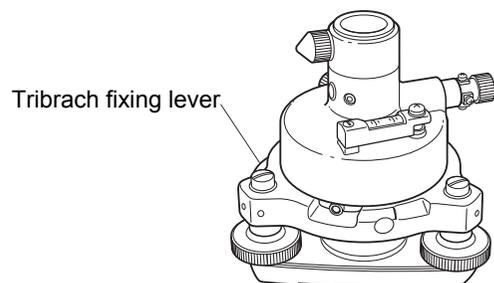
- Refer to the instruction manual of the prism in use for its assembling.

### PROCEDURE

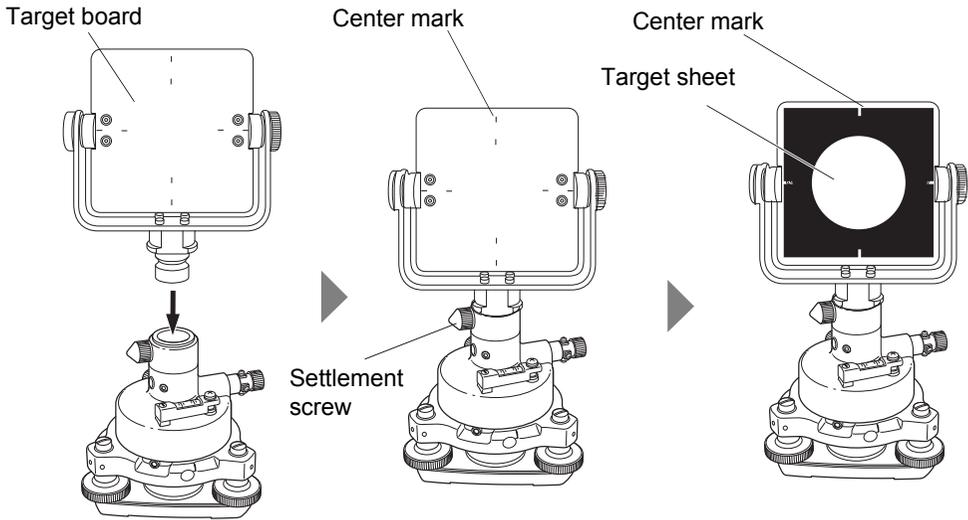
1. Attach the alignment piece of the prism adaptor (sold separately) to the tribrach (sold separately), according to the position shown in the figure here.



2. Tighten the tribrach fixing lever firmly by turning clockwise.



3. Install the target board (Sold separately) as shown in the illustration.  
Tighten the settlement screw surely.
4. Put the magnetic target sheet on the target board. At this point, adjust the center marks (4) of the target sheet and the target board exactly.



# 7. INSTRUMENT SETTINGS

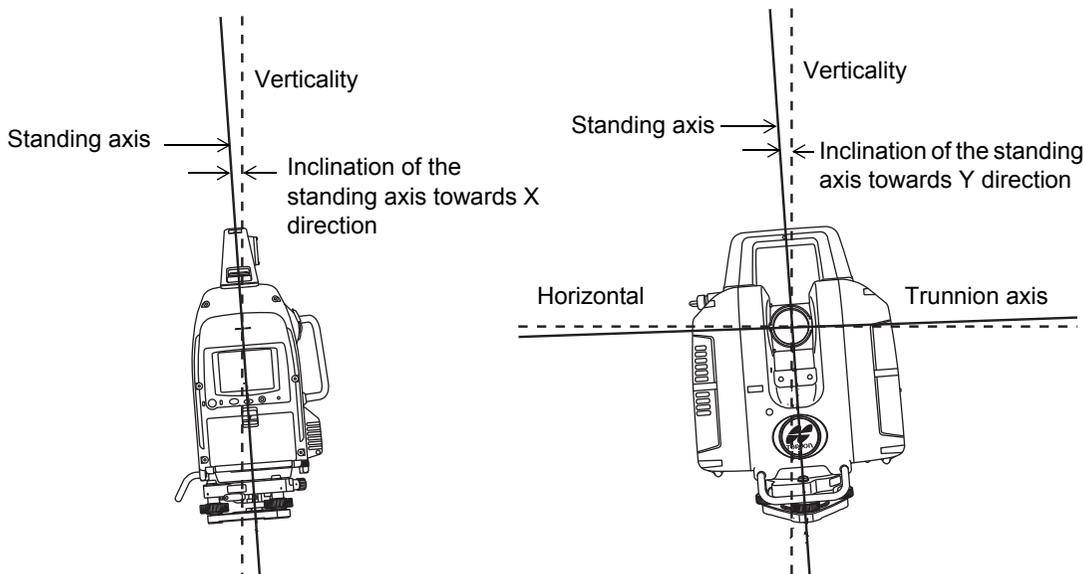
Settings for this instrument are set through main menu icons and settings mode (☞ “8. FLOW OF THE CONFIGURATION SCREEN”).

## 7.1 Setting the Tilt Sensor ON/OFF

When the auto tilt correction function for the vertical and horizontal angles is turned ON, the 2-axis tilt sensor is activated, automatically compensating errors in vertical and horizontal angles due to inclination of the standing axis.

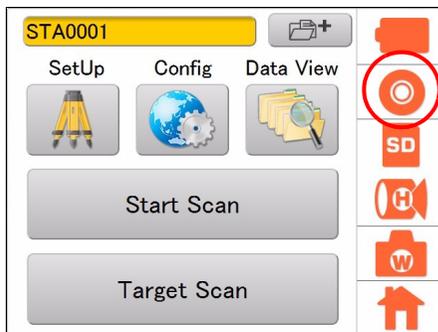
To ensure precise measurement, set the auto tilt correction [Tilt] to ON. If the error is out of the automatic compensation range, [TILT OVER] will be displayed. In such a case, level this instrument. The screen appearing before [TILT OVER] was displayed will appear again when the tilt enters the automatic compensation range after the leveling.

- This instrument automatically compensates errors in the vertical and horizontal angles by detecting the inclination of the standing axis of the instrument towards the X, Y directions.
- Indication of the inclination of the X, Y directions may not be consistent when this instrument is mounted on an unstable stand or when the wind is strong. In such a case, stop the auto tilt correction for the vertical and horizontal angles to operate.



### PROCEDURE Setting example: Tilt ON to OFF

1. Press the Tilt Setting icon.

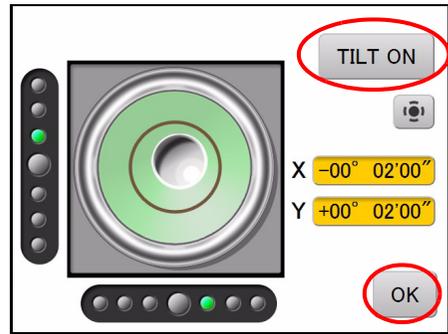


## 2. Press [TILT ON.]

The tilt is set to OFF.

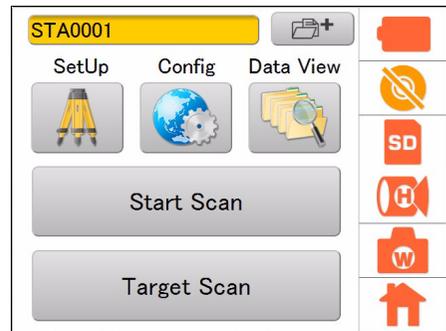
The line within the electronic circular level is set at  $\pm 6'$ . The amount of dislocation will not be displayed when the bubble is beyond the line.

## 3. Press [OK.]



The Tilt Setting icon is switched OFF (  ).

-  : OK (It is correctable by using the tilt correction function.)
-  : NG (It is not correctable by using the correction function.)
-  : OFF (The tilt correction function is turned off.)



## 7.2 Camera Settings (Angle of view and Resolution)

The built-in camera automatically takes photographs of the entire scanning range and saves the photograph data in the image file when scanning. (when selecting “Wide” or “Tele”)

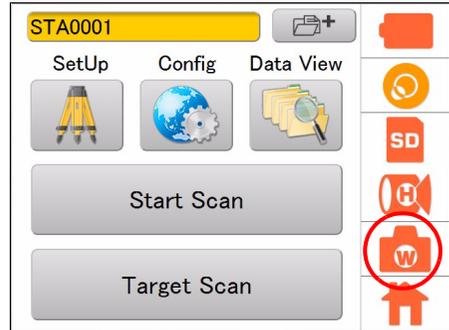
The photograph data of the entire scanning range consists of several photographs. As the scanning area becomes wider, the number of photographs taken will increase.

Also, as the resolution becomes finer, the file size will increase. Set the resolution as needed.

1. Press the Camera Setting icon.

### Note

- The Camera Setting icon displayed in the status screen shows the selective condition of the Panorama selected.



2. Select “Panorama,” “Resolution,” “Exposure,” and press [OK.]

### Setting items and each selection (\*: Factory default)

- (1) Panorama: Wide\* / Tele / OFF

Panorama	Angle of view
Wide	Diagonal 170°
Tele	8.9° (V) × 11.9° (H)
OFF	No image data



- Remove the Wide-angle camera lens cap of the instrument when selecting “Wide”.

- (2) Resolution: Low / Normal / High\*

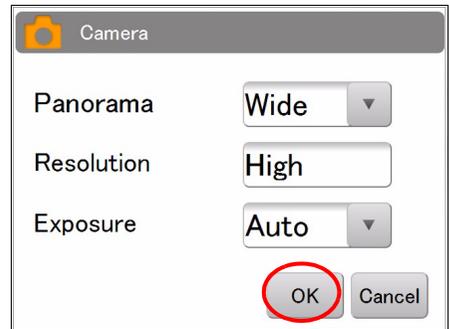
(When selecting “Wide” for the “Panorama” camera setting: “High”

only)

Resolution	Number of pixels
Low	480 (V) × 640 (H)
Normal	960 (V) × 1280 (H)
High	1920 (V) × 2560 (H)

- (3) Exposure: Auto\* / Manual

Exposure	Exposure value
Auto	The exposure value will be automatically determined by the signal level of the center of the scanning range.
Manual	The exposure value can be adjusted on the exposure adjust screen at the start of the scanning.



## 7.3 Settings for Scanning Conditions

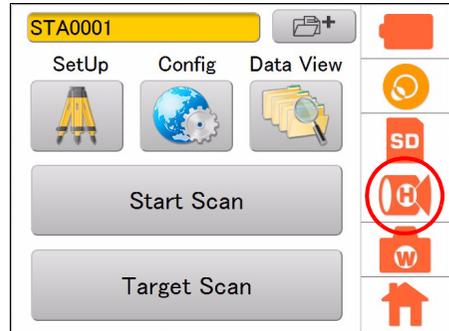
By changing the scanning settings, measurement that suits the purpose can be carried out. Resolution can be selected from the predetermined resolutions or by entering the desired resolution.

1. Press the Scan Setting icon.

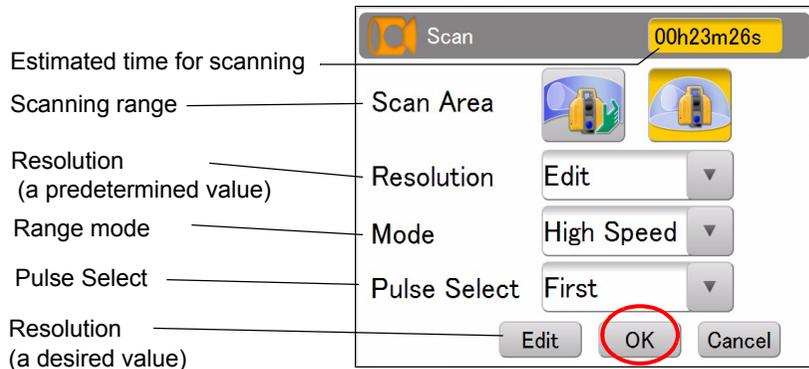
### Note

- The Scan Setting icon displayed in the status screen shows the selective condition of the range mode.

-  : Detail
-  : High Speed
-  : Low Power
-  : Standard
-  : Close



2. Select "Scan Area," "Resolution," "Mode," "Pulse Select," and press [OK.]



- (1) Scanning range

Range setting scanning or Whole circumference scanning can be selected.

 "Scanning range" on page 64

- (2) Resolution (a predetermined value)

Select a predetermined resolution listed below:

50mm@10m, 25mm@10m, 12.5mm@10m, 6.3mm@10m, 3.1mm@10m, Edit

"50mm@10 m" means "a measurement accuracy of 50mm in pitch at a position of 10 m ahead".

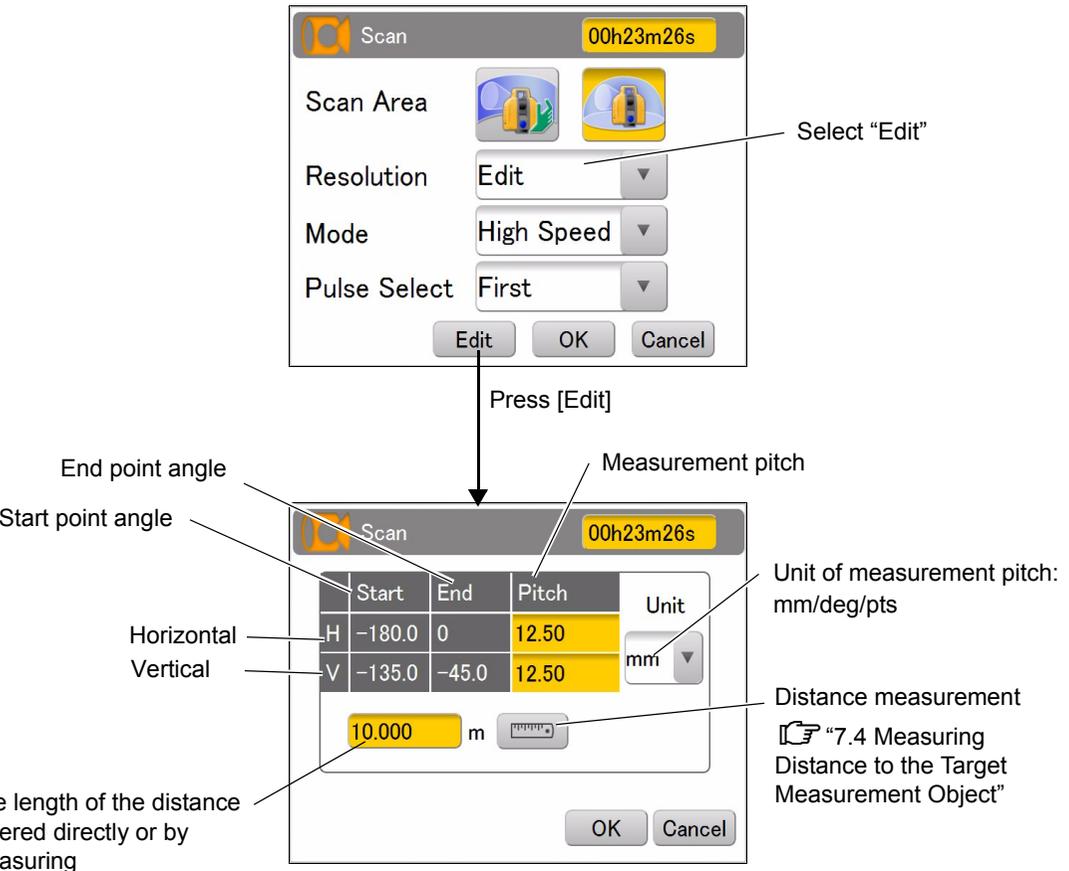
For the range of measurement distance and the accuracy of measurement, see the following table.

Range of measurement *1)	Reflectivity	Range mode				
		Detail	High Speed	Low Power	Standard	Close
	9% reflection	-	-	-	-	40m
	18% reflection	40m	90m	90m	150m	-
	90% reflection	100m	210m	210m	350m	-

\*1) Range varies depending on weather conditions or stability of the atmosphere.

## (3) Resolution (a desired value)

The horizontal and vertical start point angle, end point angle and measurement pitch can be set to a desired value. (Set the start point angle and end point angle in the scan range setting screen (  P. 65).)



Scan Area 

Resolution Edit 

Mode High Speed 

Pulse Select First 

Edit OK Cancel

Press [Edit]

End point angle

Start point angle

Horizontal

Vertical

Measurement pitch

Unit of measurement pitch: mm/deg/pts

Distance measurement  "7.4 Measuring Distance to the Target Measurement Object"

The length of the distance entered directly or by measuring

	Start	End	Pitch	Unit
H	-180.0	0	12.50	mm 
V	-135.0	-45.0	12.50	

10.000 m 

OK Cancel

## Setting the measurement pitch

Enter the vertical or horizontal measurement pitch settings within the scanning range by using one of the following three methods. Each value is linked.

- mm : Enter the pitch between scanning points
- pts : Enter the total number of scanning points
- deg : Enter the angle between scanning points

When entering the space between the two measurement points in millimeters, enter or measure the distance to the target beforehand.

## About the angle of the starting point and the end point

The angle which is set within the scanning range will be displayed.

The angle will be H : -180~0, V : -135~45 when whole circumference scanning is to be done.

## (4) Range mode

Range mode settings are as follows.

Detail / High Speed / Low Power / Standard / Close

Please refer to the following for details.

Range mode	Cycle of light emission	Laser class	Distance
Detail	120 KHz	Laser class 3R	Up to 100 m
High Speed	120 KHz	Laser class 3R	Up to 210 m
Low Power	48 KHz	Laser class 1M	Up to 210 m
Standard	60 KHz	Laser class 3R	Up to 350 m
Close	120KHz	Laser class 3R	Up to 40 m

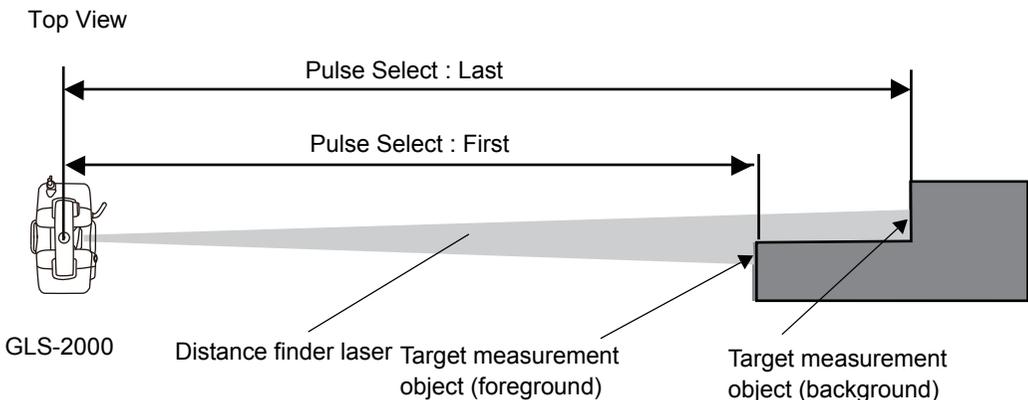


The number of measured data may vary depending on the measurement distance or the selected range mode in the circumstances noted below.

- In the case where the incident angle of the distance measurement laser toward the target measurement object was narrow.
- In the case where the target was measured by using objects that have a multiple reflection effect such as a mirror.
- In the case where a highly reflective object located close and facing toward the instrument is measured.

## (5) Pulse select

When the target measurement objects are in the foreground and background as shown below, the distance of either object can be measured by changing the pulse selection.



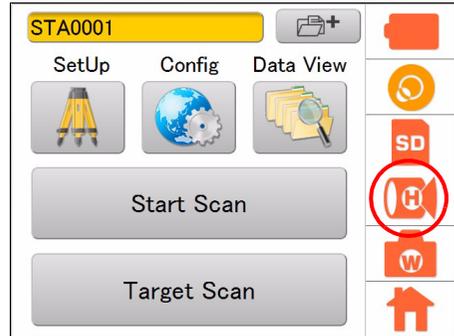
- Depending on the reflection ratio of or the distance between the target measurement objects, it might not be possible to measure the target even by switching from first to last or vice versa.

## 7.4 Measuring Distance to the Target Measurement Object

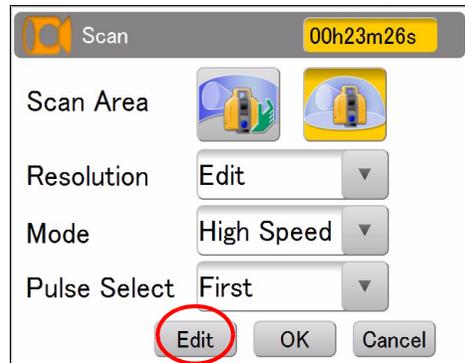
An overall distance to the target measurement object that is required when setting the resolution (a desired value) of the scanning parameter in millimeters will be measured as indicated below. (The distance is not required when using the unit of points or degrees.)

### PROCEDURE

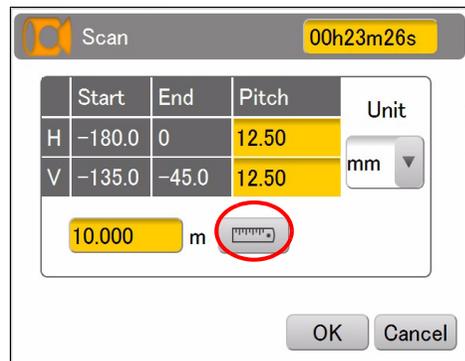
1. Press the Scan Setting icon.



2. Select "Edit" in "Resolution", and then press [Edit].



3. Press  .

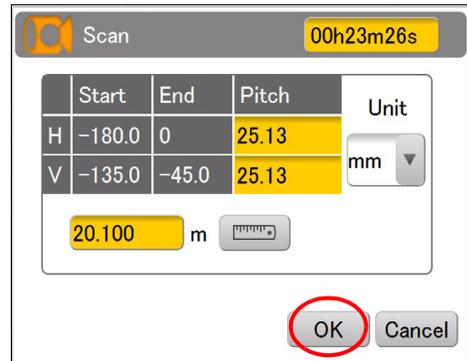


4. Press  to switch the camera to "Tele" and tap the target measurement object.  
 "Explanation of the buttons" on page 61

The instrument will automatically turn to the target measurement object which will be displayed around the middle of the screen. While doing this, the horizontally rotating part and the turn of the scanner unit will be locked. To unlock, turn the horizontally rotating part or the scanner unit manually.



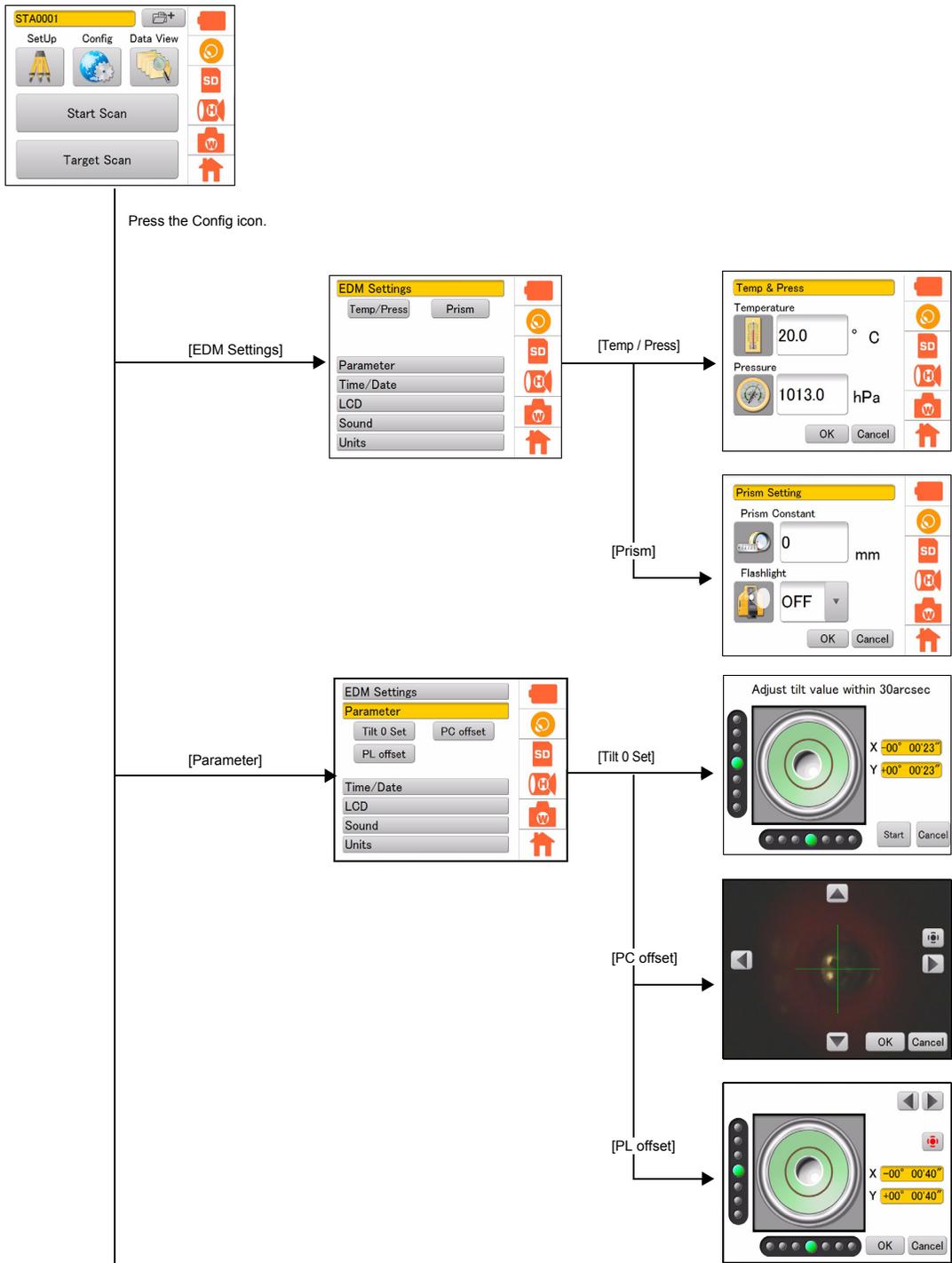
5. Press [Meas].  
 6. The scanning distance is displayed. (20.1m)  
 Press [OK].

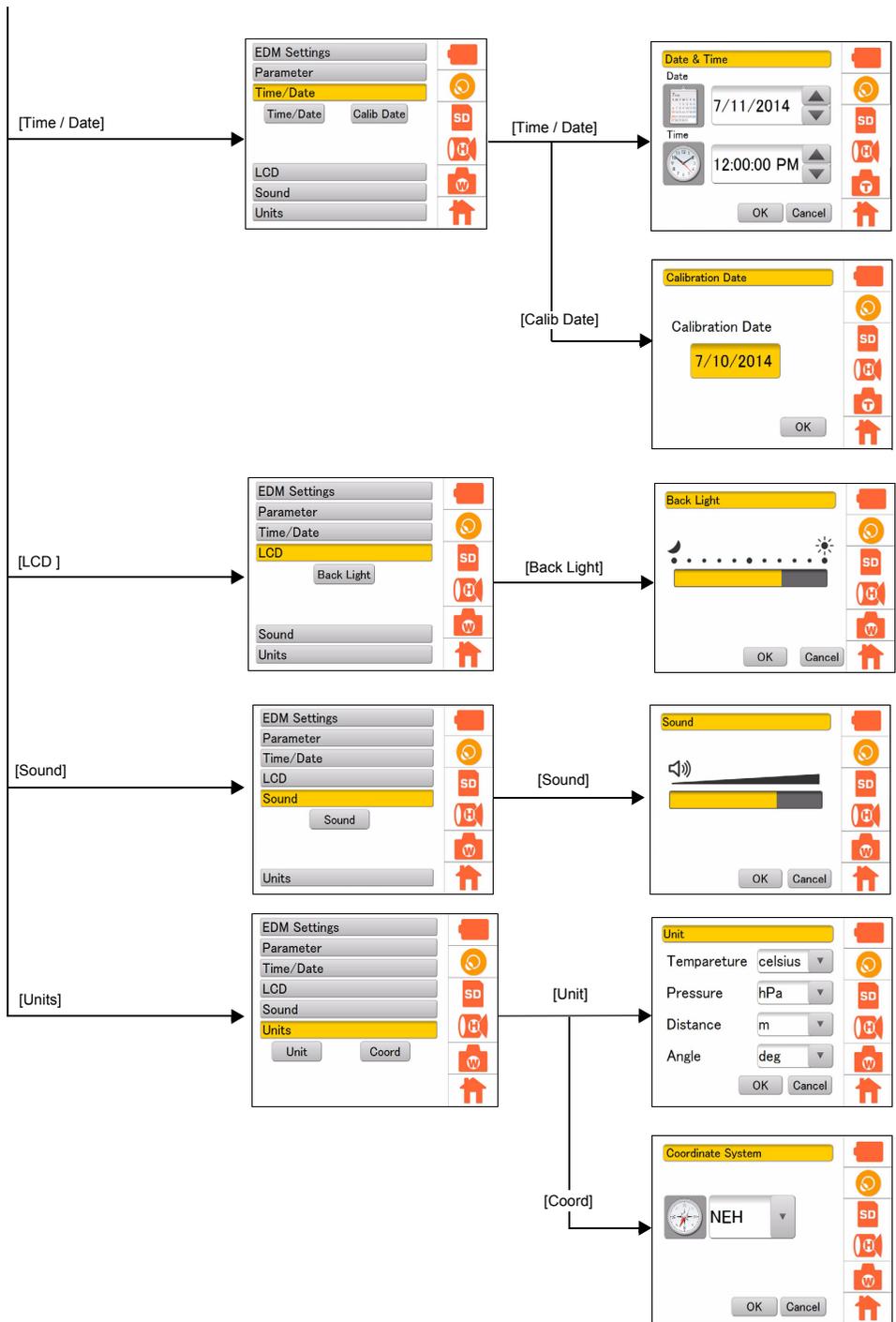


- This function confirms rough distance and is not for measuring accurate distance to the target.
- Do not use a prism or a target sheet in this measurement.

# 8. FLOW OF THE CONFIGURATION SCREEN

Press the Config icon to enter the Config mode.  
The following illustrates the flow of the configuration screen.



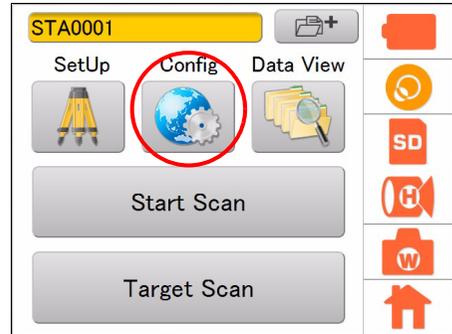


## 8.1 Setting Temperature and Atmospheric Pressure

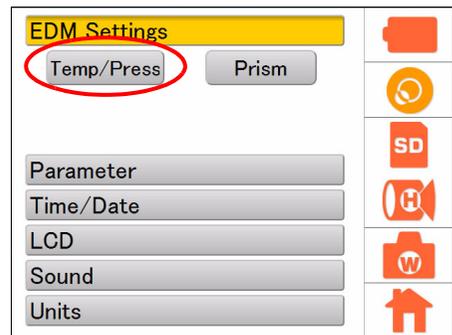
To compensate the measured data, enter the temperature and atmospheric pressure during the measurement.

### PROCEDURE

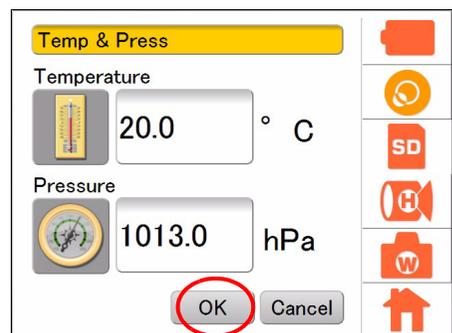
1. Press the Config icon.



2. Press [EDM Settings].



3. Press [Temp/Press].



4. Enter the temperature and atmospheric pressure, and then press [OK].

Temperature:

-10 °C to +50 °C (increments of 0.1 °C)  
(Default setting: +20 °C)

Atmospheric pressure:

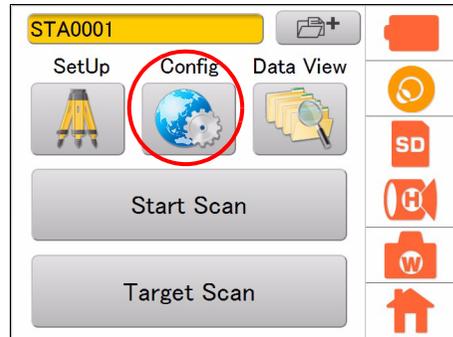
560 hPa to 1066.0 hPa (increments of 0.1 hPa)  
(Default setting: 1013.0 hPa)

## 8.2 Setting the Prism Constant and Flash Light

Set the prism constant to be used and the flash light.

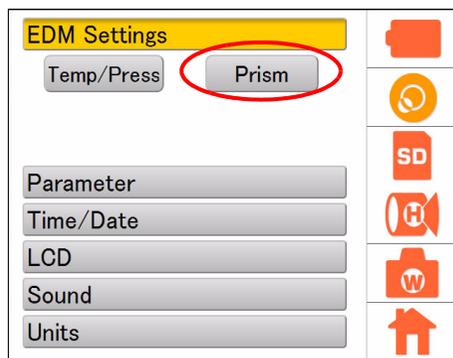
### PROCEDURE

1. Press the Config icon.



2. Press [EDM Settings].

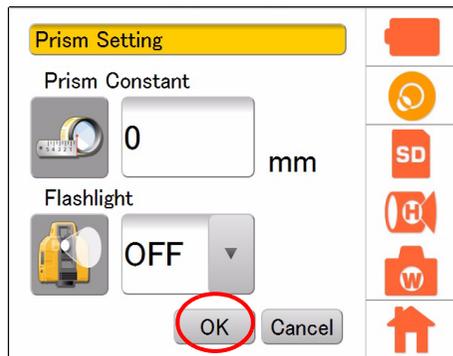
3. Press [Prism].



4. Enter the prism constant, choose ON/OFF of the flash light, and then press [OK].

When the target scanning is started after the flash light is set to "ON" and the instrument is set to use the prism, a white spot beam will be emitted from the scanner unit to detect the position of the prism.

Prism Constant : -99 mm to + 99 mm  
(Default setting: 0 mm)  
Flashlight : ON/OFF  
(Default setting: OFF)



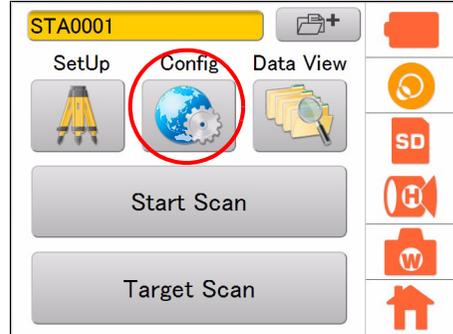
## 8.3 Setting the Date and Time

Set the date and time to record the date in the measurement data.

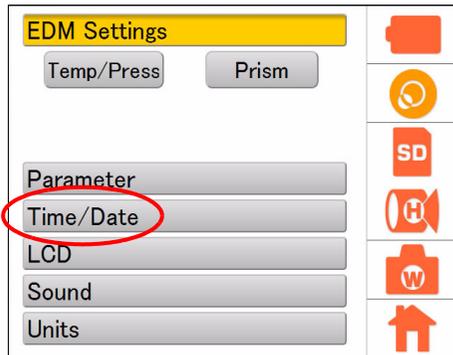
[Setting example] Date: July 11, 2014 Time: 12:00

### PROCEDURE

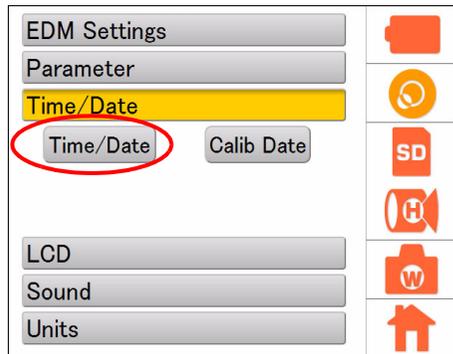
1. Press the Config icon.



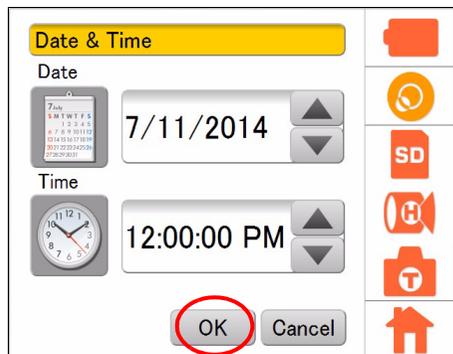
2. Press [Time/Date].



3. Press [Time/Date].



4. Tap the value that you want to change, and use the up and down arrows to set the date and time, and press [OK].



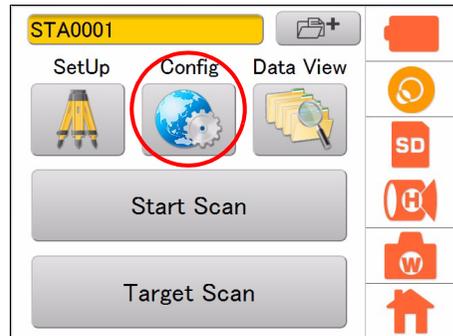
## 8.4 Displaying the Last Calibration Date

The date of the last calibration (precision calibration of measurement distance and angle) can be displayed.

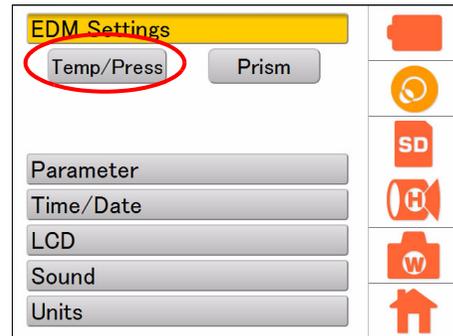
We recommend performing the precision calibration again within one year from the last calibration date.

### PROCEDURE

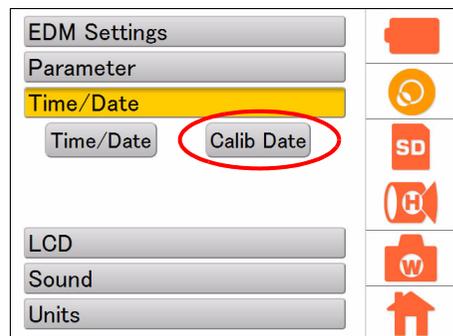
1. Press the Config icon.



2. Select [Time/Date].

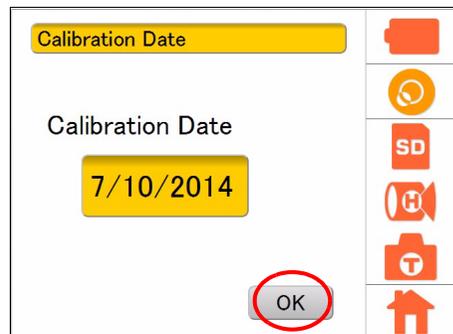


3. Select [Calib Date].



4. Press [OK].

The last calibration date will be displayed.

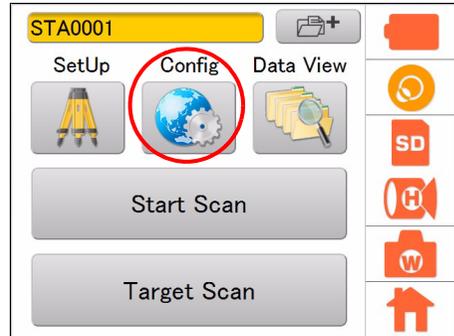


## 8.5 Adjusting the Brightness of the Display Section

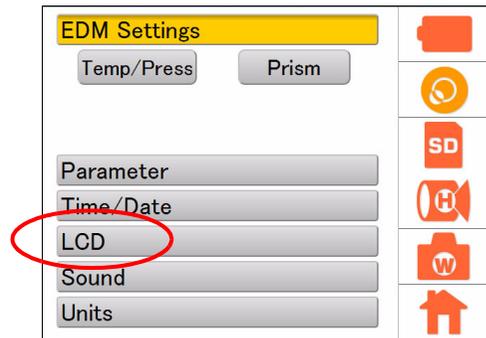
Use the backlight if it is hard to look at the display section in the evening or in a tunnel.  
The level of backlight brightness can be adjusted from OFF to 10.

### PROCEDURE

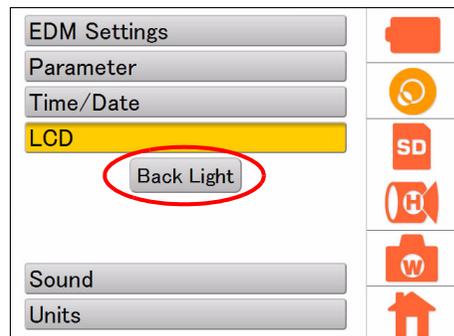
1. Press the Config icon.



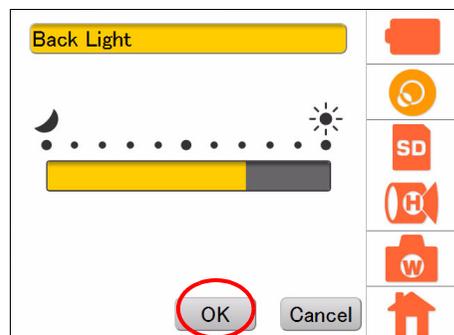
2. Press [LCD].



3. Press [Back Light].



4. Adjust the brightness using the slider, and then press [OK].

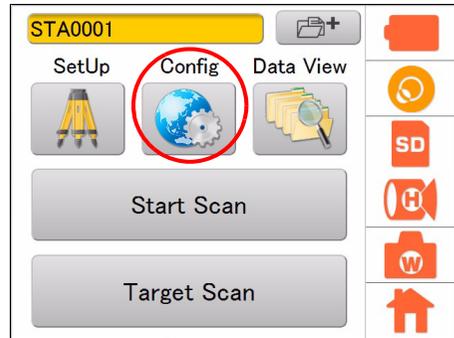


## 8.6 Setting the Volume

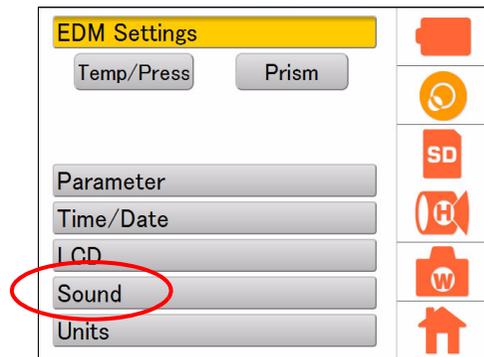
The volume of the sound which can be heard from this instrument can be adjusted as follows.

### PROCEDURE

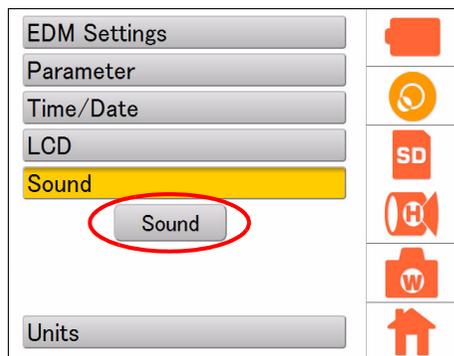
1. Press the Config icon.



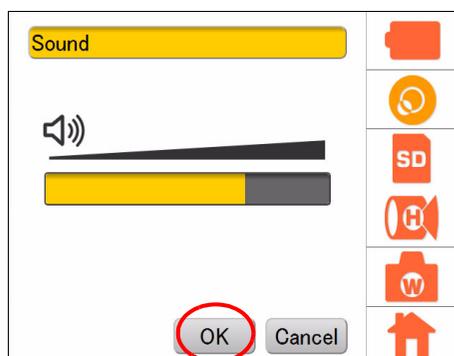
2. Press [Sound].



3. Press [Sound].



4. Adjust the volume with a slider, and then press [OK].

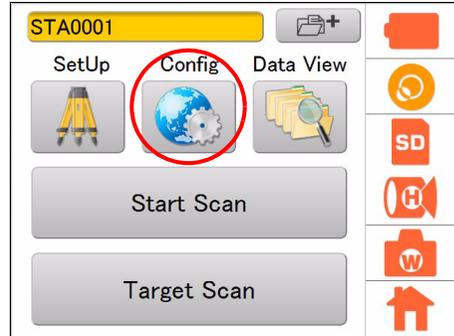


## 8.7 Selecting the Unit

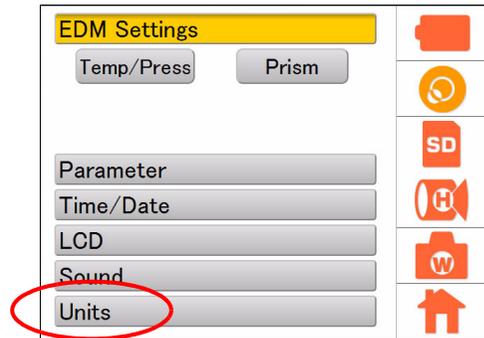
Select the units as follows.

### PROCEDURE

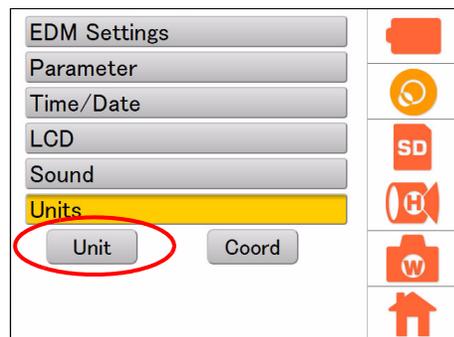
1. Press the Config icon.



2. Press [Units].



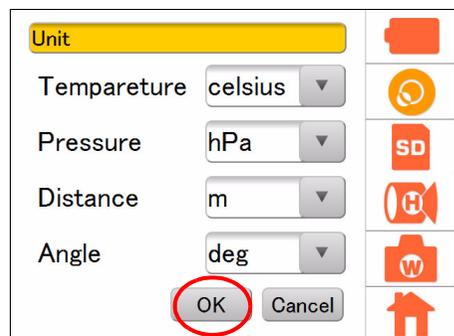
3. Press [Unit].



4. Select the units for "Temperature," "Pressure," "Distance," and "Angle."

#### Items set and options (\* : Factory setting)

Temperature: celsius\* / fahrenheit  
 Pressure : hPa\* / mmHg / inHg  
 Distance : m\* / ft (us) / ft (NT)  
 Angle : deg\* / gon

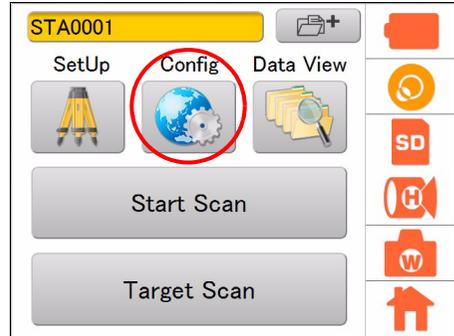


## 8.8 Selecting the Coordinate System

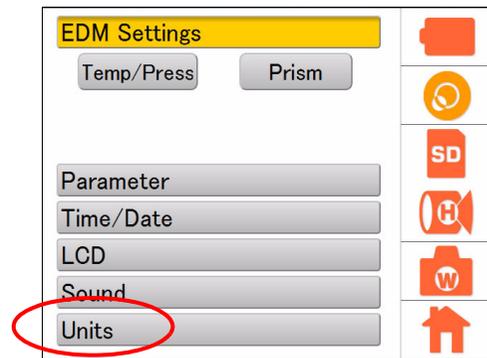
Select the coordinate system (ENH or NEH) as follows.

### PROCEDURE

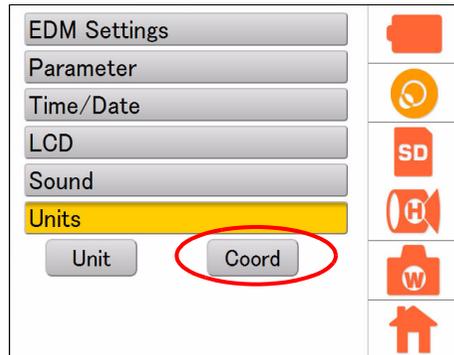
1. Press the Config icon.



2. Press [Units].

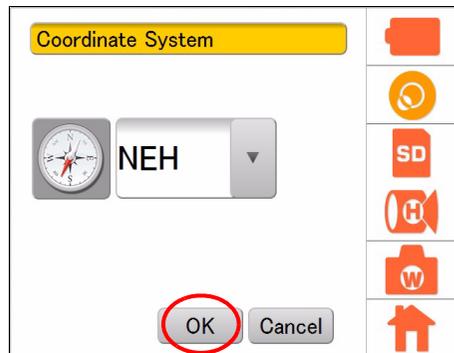


3. Press [Coord].



4. Select the coordinate system (ENH\* or NEH), and then press [OK].

\* Factory setting



## 8.9 Handling the Coordinate Point File

### ■ Import the coordinate point file

The coordinate point name and the coordinate value described in CSV file format can be imported into the instrument via the SD card. The occupied point name and the occupied point coordinate or the backsight point name and the backsight point coordinate can be selected from the imported coordinate list.

The imported coordinate list is retained even after turning OFF the instrument.

### ■ Conditions to create the CSV file (coordinate point file)

Create the CSV file in accordance with the following conditions.

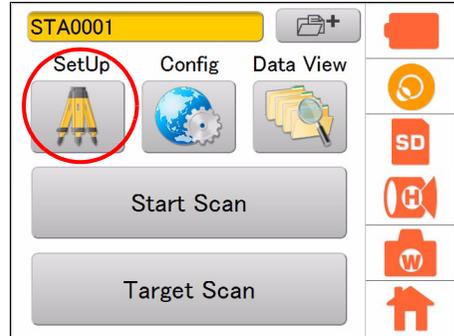
Items	Conditions for creation
<b>CSV file</b>	A CSV file is comma delimited, and records fields in the following order: coordinate point name, E, N, H (X, Y, Z). Example pt-01,1105.494,1069.231,6.6, pt-02,1110.989,1088.461,7.2, pt-03,1116.483,1107.691,7.8,
	Save the CSV file in the highest hierarchy in the SD card. If the file is saved in any lower hierarchy, it cannot be imported.
	Up to 250 coordinate points can be imported. (Up to 250 coordinate points are registered.) They are read with the coordinate system.
	Always use "****.csv" for the file extension. (Case insensitive)
<b>Point name</b>	Use up to eight characters for the coordinate point name. (For a long string, up to eight characters are automatically imported, and the ninth and subsequent characters cannot be imported. As a consequence, multiple identical coordinate point names may exist.)
<b>Coordinate value</b>	Express the coordinate value within the range of $\pm 99999999.999$ m. (A coordinate value that exceeds the range cannot be imported.)

### Example of creating a CSV file

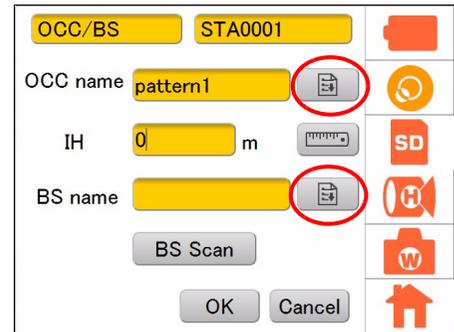
1. Enter the name of the coordinate point and E, N, and H (X, Y, and Z) in a text file.
2. Change the extension to CSV or enter the name of the coordinate point and E, N, and H (X, Y, and Z) in a file such as Microsoft Excel's.
3. Change the format of the file to CSV when saving it.

**PROCEDURE How to import a CSV file (coordinate file) in the SD card**

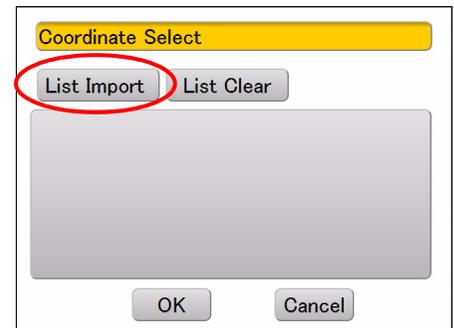
1. Press the SetUp icon.



2. Press  of the "OCC name" or "BS name" window.



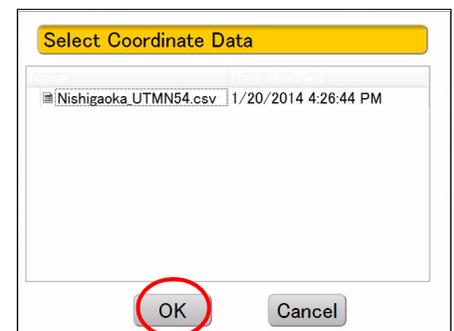
3. Press [List Import].



4. Select the CSV file you wish to import, and then press [OK].  
The CSV file has been imported.

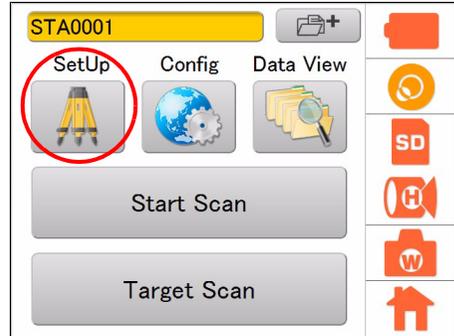


- The data of the coordinate point that is already imported into the instrument will be erased when the data of the coordinate point in another CSV file is added.

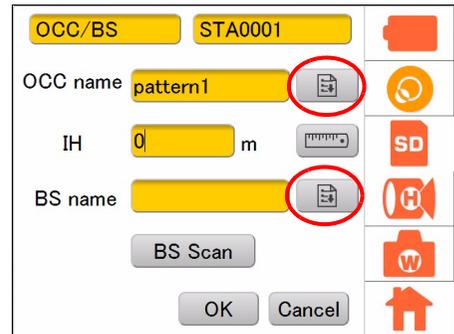


**PROCEDURE How to delete the coordinate list**

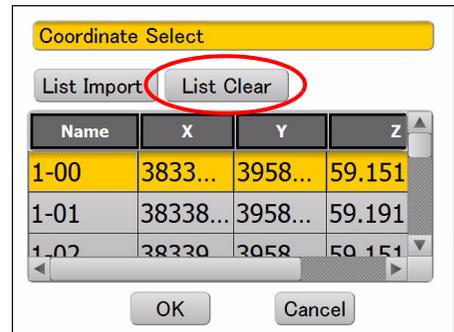
1. Press the SetUp icon.



2. Press  of the "OCC name" or "BS name" window.



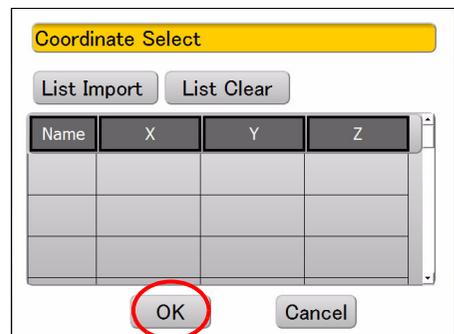
3. Press [List Clear] to delete the coordinate list.



The coordinate list will be deleted.



- The coordinate list stored in the instrument will be erased. However, the coordinate list stored on an SD card will not be affected. Thus, it is possible to read the coordinate list again from the SD card.

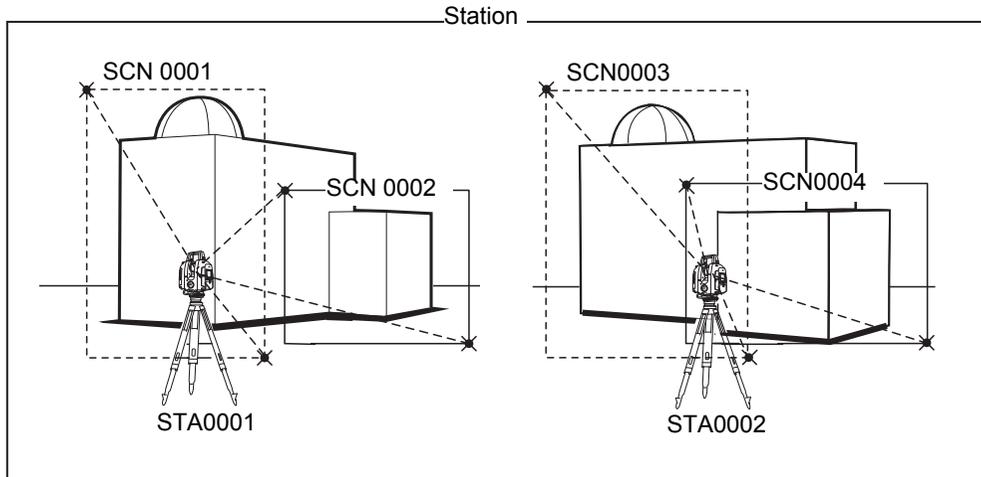


## 8.10 Data structure in the SD card

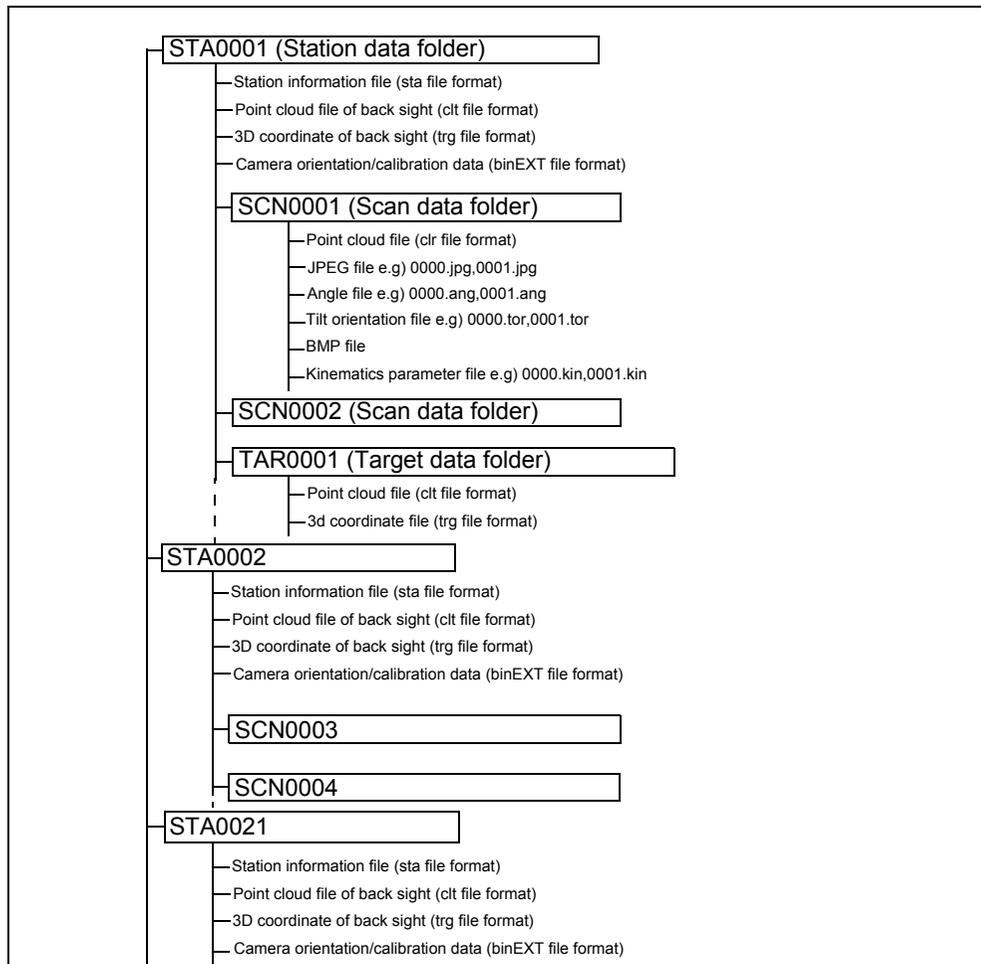
Save data in the SD card with the following hierarchy structure.

Within the area where the instrument is set, it is possible to extract and measure a certain target.

Select the measurement range to measure the target.



Data configuration example

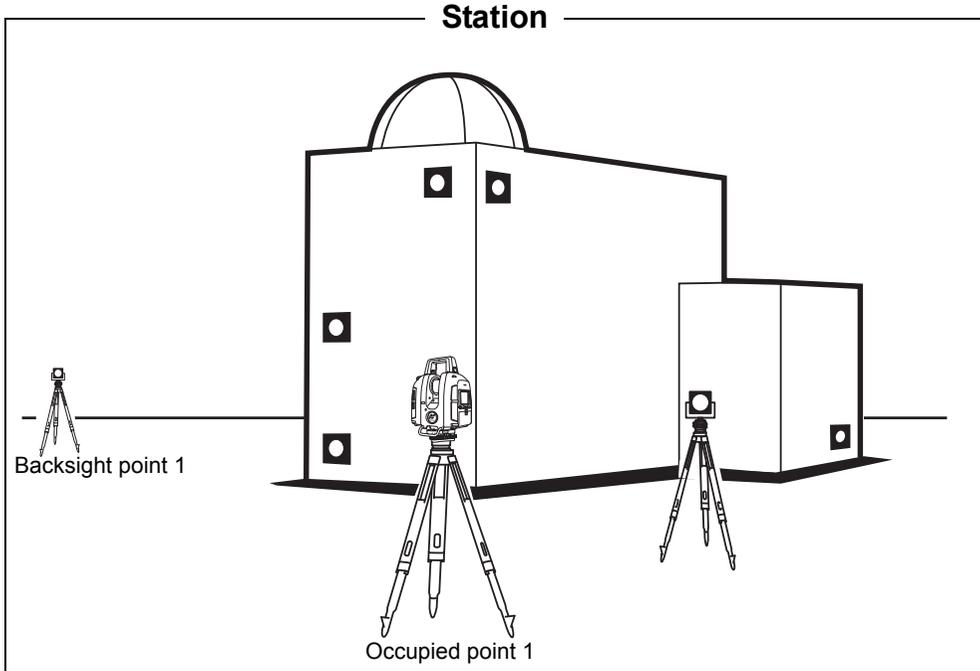


# 9. STATION SETTINGS

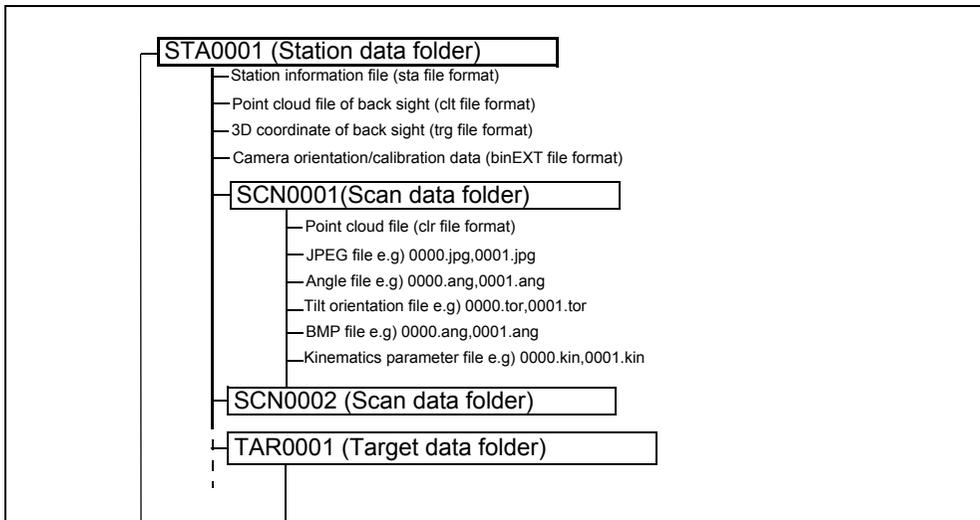
Data related to measurement, such as an occupied point name, a backsight point name, target data, and 3D data, are stored in the station.



- When setting (moving) the instrument, create a new station.



Station data are stored in the SD card.



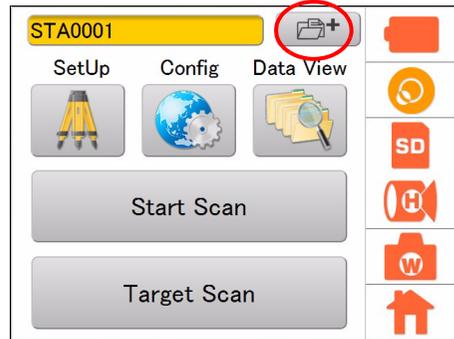
## 9.1 Creating a New Station

[Configuration example] Set the station name as [STA0002].

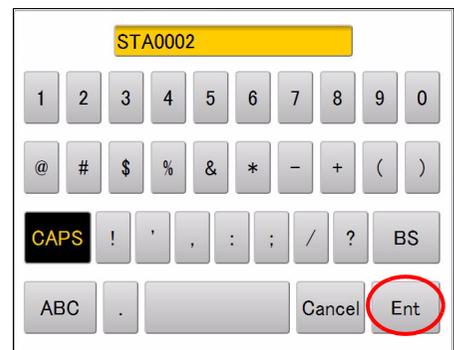
 "6.8 Entering Numeric and Alphabetic Characters"

### PROCEDURE

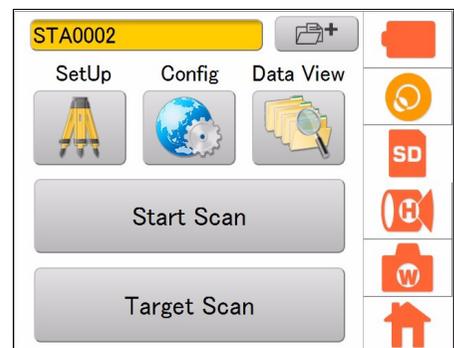
1. Press  .



2. Enter the station name (Example: "STA0002"), and then press [Ent] to create the station.



"Station0002" is set.



## 9.2 Setting the Point Name (Occupied point and Backsight point)

The setting of the occupied point name and the backsight point name is required in order to correlate the known point promptly when the coordinates of the measurement target is transformed during a post-processing.

### ■ When using the known point

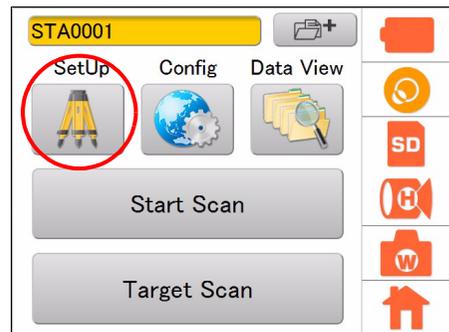
By selecting the occupied point name and the backsight point name from the imported coordinated list, the data of the occupied point name, backsight point name and the coordination can be stored to be used in a post-processing. Perform target scanning on the backsight point after selecting the occupied point name and the backsight point name from the coordinate list.

For the import method of coordinate lists, “8.9 Handling the Coordinate Point File”

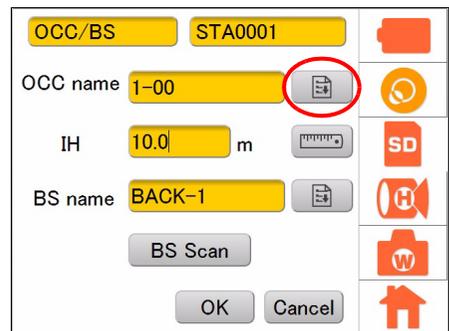
For target scanning, “10.1 Target Scanning”

### PROCEDURE Setting the occupied point name

1. Press the SetUp icon.



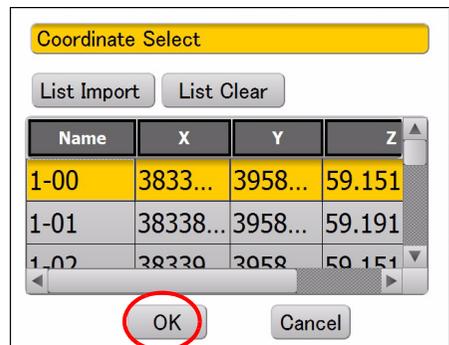
2. Press of the “OCC name” window to display the coordinate list.



3. Select a coordinate point that you want to set as the occupied point from the coordinate points list, and then press [OK].

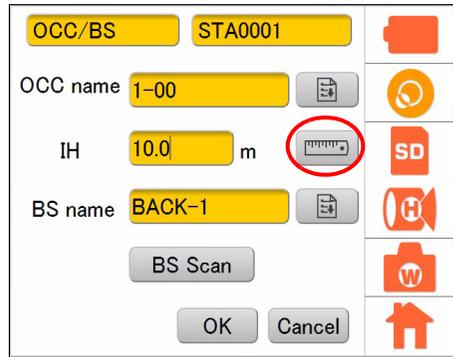
The occupied point name and its coordinate will be stored.

At this point, if you want to change the occupied point name read from the coordinate file, tap on the input-editor of the occupied point name and enter a different occupied point name.

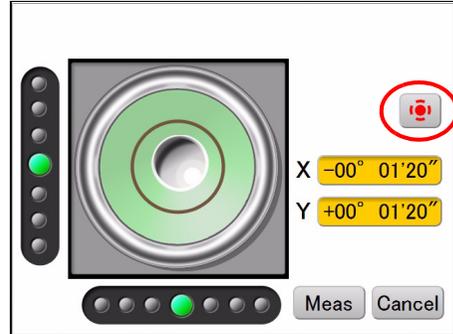


4. Press .

(Instrument height (IH) can also be entered directly.)



5. Press  to display an image of the survey point.



**Note**

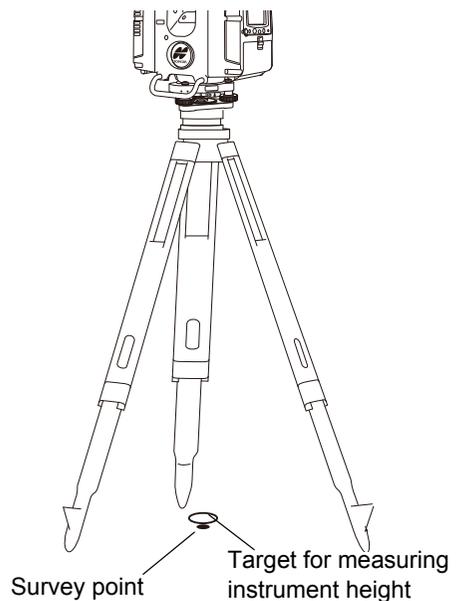
- In this case, the laser plummet does not turn on.



6. As shown in the image to the right, place the target for instrument height on the survey point.
7. Press [Meas].  
The instrument height will be entered automatically.

**Note**

- If [Meas] is pressed in step 5, the instrument height will be measured without displaying the survey point. (The screen shown in step 8)



- Press  next to the backsight point (BS) name, and then select the backsight point name and the coordinate in the same manner as the occupied point.

At this point, if you want to change the backsight point name read from the coordinate file, tap the input-editor of the backsight point name and enter a different backsight point name.

- Press [BS Scan].

The image will be displayed.

- Enter the backsight point name (BS0002) in the input-editor on top of the screen.

For details of setting “ScnAng” and “HR”,  
 “10.1 Target Scanning”

- Press  to switch the camera to "Tele" and tap the target at the backsight point.

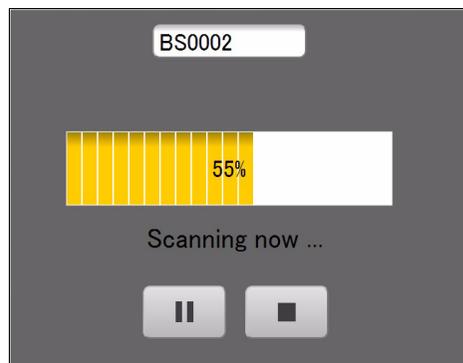
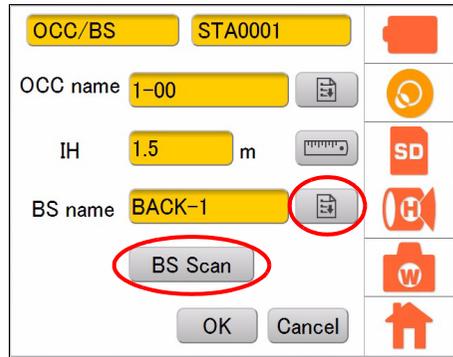
 “Explanation of the buttons” on page 61

The instrument will automatically turn to the object which will be displayed around the middle of the screen. While doing this, the horizontally rotating part and the turn of the scanner unit will be locked. To unlock, turn the horizontally rotating part or the scanner unit manually.

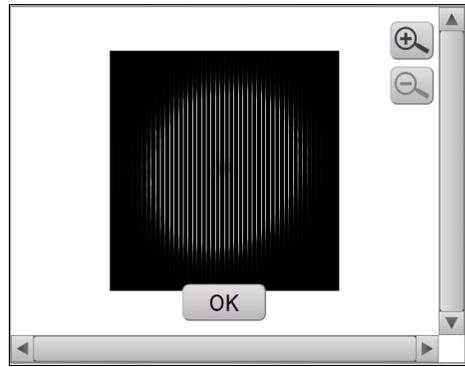
- Press [Start], Start/Stop scan key or collimating position setting key.

**Note**

- Sometimes “Internal calibration Please wait ...” is displayed.
- When  is pressed, it will take a while to stop.



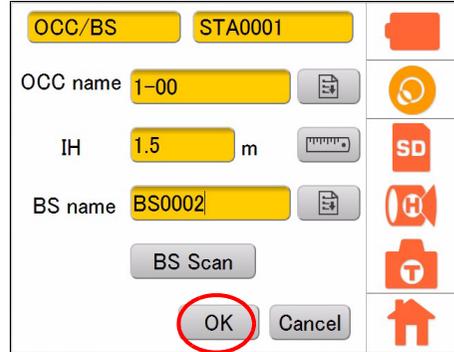
Scanning results will be displayed.



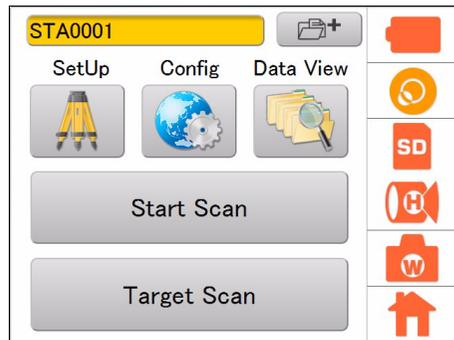
13. Press [OK].

The instrument height, the backsight point name, and the backsight coordinate will be stored.

Press [OK] in the confirmation message window.



- Only the prism or the target sheet for Topcon's GLS-2000/1500 can be used as the target.
- The target sheet used varies depending on the scanning distance. (Refer to "6.9 Preparing the Target")



## ■ Importing the point name (Occupied point or Backsight point)

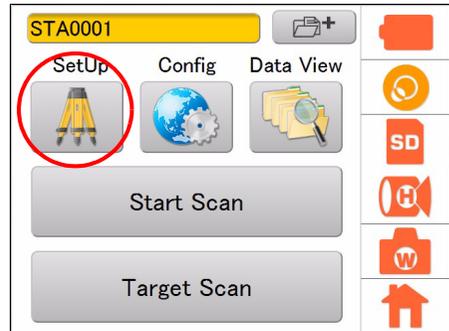
After entering the occupied point name and the backsight point name, perform target scanning on the backsight point. When calculating with a PC after measuring, it is possible to set the coordinates of the occupied point and the backsight point.

[Configuration example] Configure the settings as follows:

Occupied point name : OCC-1  
 Instrument height : 1.5m (depending on the measurement result)  
 Backsight point name : BACK-1

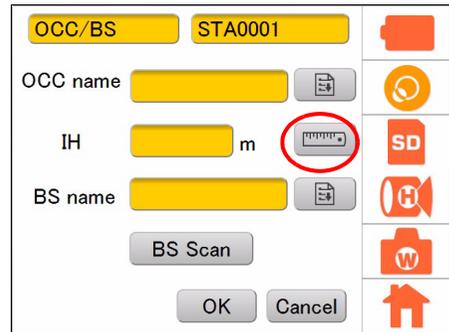
### PROCEDURE

1. Press the SetUp icon.



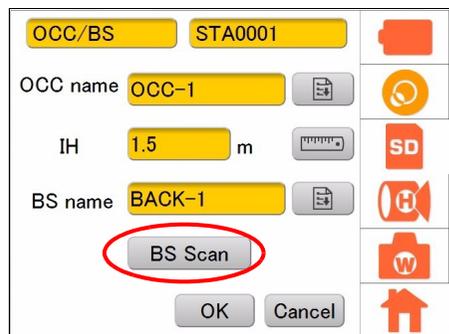
2. Tap on the occupied point name input-editor, and then enter the occupied point name.

3. Press , and then press [Meas] to measure the instrument height.  
 (Instrument height (IH) can also be entered directly.)



4. Enter the backsight point in the same manner as the occupied point name.

5. Press [BS Scan].  
 The image will be displayed.



- Press  to switch the camera to "Tele" and tap the target at the backsight point.  
 "Explanation of the buttons" on page 61

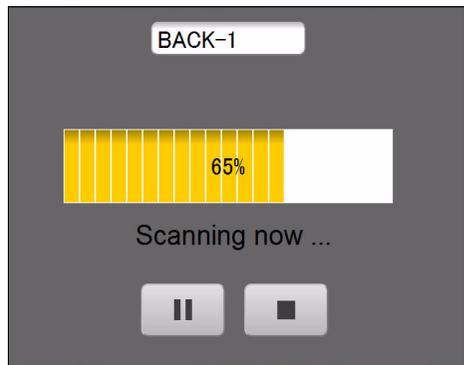
The instrument will automatically turn to the object which will be displayed around the middle of the screen. While doing this, the horizontally rotating part and the turn of the scanner unit will be locked. To unlock, turn the horizontally rotating part or the scanner unit manually.



- Press [Start], Start/Stop scan key or collimating position setting key.

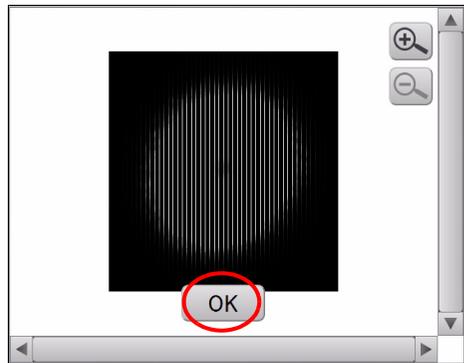
**Note**

- Sometimes "Internal calibration Please wait ..." is displayed.
- When  is pressed, it will take a while to stop.

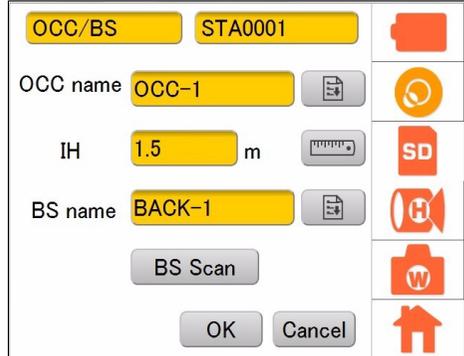


Scanning results will be displayed.

- Press [OK].



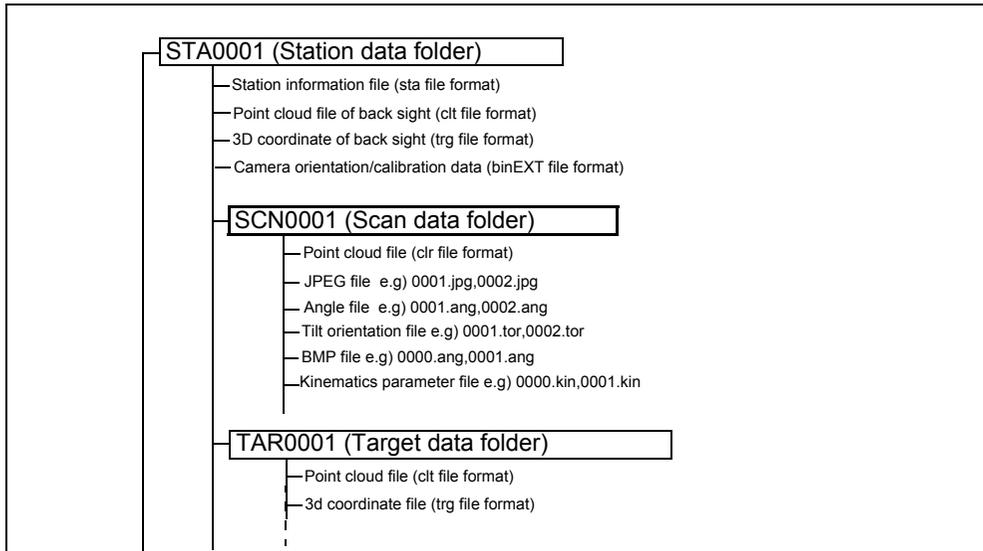
The instrument height, the backsight point name, and the backsight point coordinate will be stored.



# 10. MEASURING (SCANNING)

There are two types of scanning: target scanning that only measures the target, and 3D scanning that obtains 3D data.

Scanned data will be saved in the Station folder in the SD card.



## Target scanning

Perform target scanning to measure the target placed within the range of 3D scanning. This target scanning data is used to align 3D scanning data from multiple instrument points by post-processing.

Target scanning provides the coordinate data on which the target is centered.

## 3D scanning

Perform 3D scanning to obtain the 3D data.

First, determine the scanning range, and then set parameters for the resolution of scanning.



- The name of the folder will be the same as that of the station which has been set.

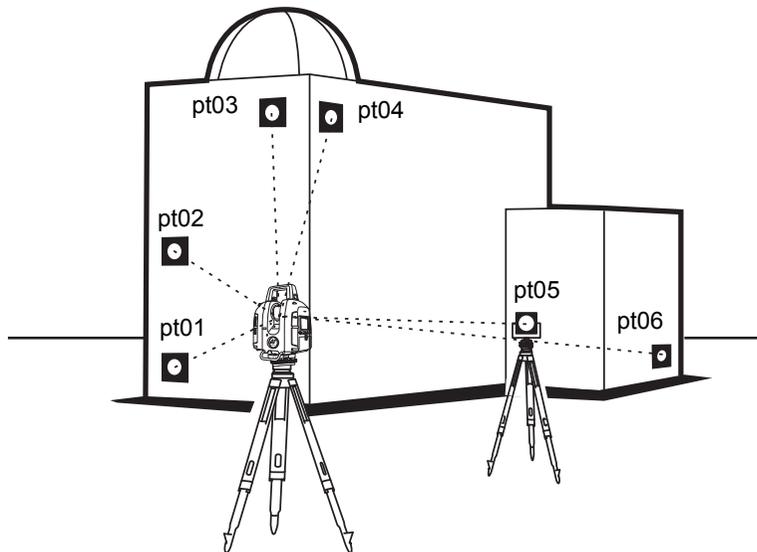
## 10.1 Target Scanning

Target scanning must be performed to align the positional information of multiple 3D scanning data to perform post-processing of data.

Thus, the target must be placed in a position that can be seen from the position of the next station. To measure the object, place the target near the scanning target or stick the target directly on the scanning target.



- Only the prism or the target sheet for Topcon's GLS-2000/1500 can be used as the target.
- To align the positional information of the data, at least three sets of common target scanned data are required. Place the target on three or more positions that can be collimated from each station.
- 3D data cannot be obtained from the positions where the target sheet is stuck. Avoid sticking the sheet on an important scanning position.
- Do not stick the target sheet in a straight line. Secure a wide range for 3D scanning to stick target sheets evenly.
- The target sheet used varies depending on the scanning distance. (☞ “6.9 Preparing the Target”)

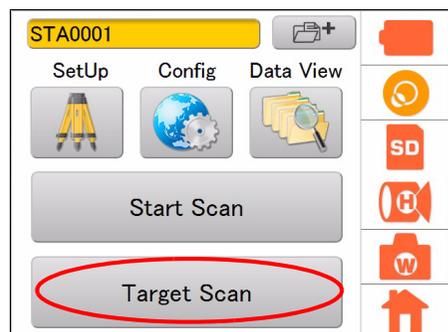


[Configuration example] Scan from target pt01 to pt06

Target height of pt01: 1 m (Input range: -999.999m~999.999m)

### PROCEDURE

1. Press the Target Scan button.

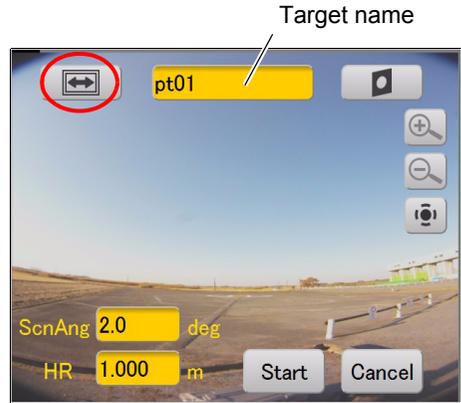


- Press  to switch the camera to "Tele" and tap the target (pt01).

 "Explanation of the buttons" on page 61

The instrument will automatically turn to the object which will be displayed around the middle of the screen. While doing this, the horizontally rotating part and the turn of the scanner unit will be locked. To unlock, turn the horizontally rotating part or the scanner unit manually.

- Enter "Target name", "ScnAng", and "HR", and then press [Start], Start/Stop scan key or collimating position setting key.

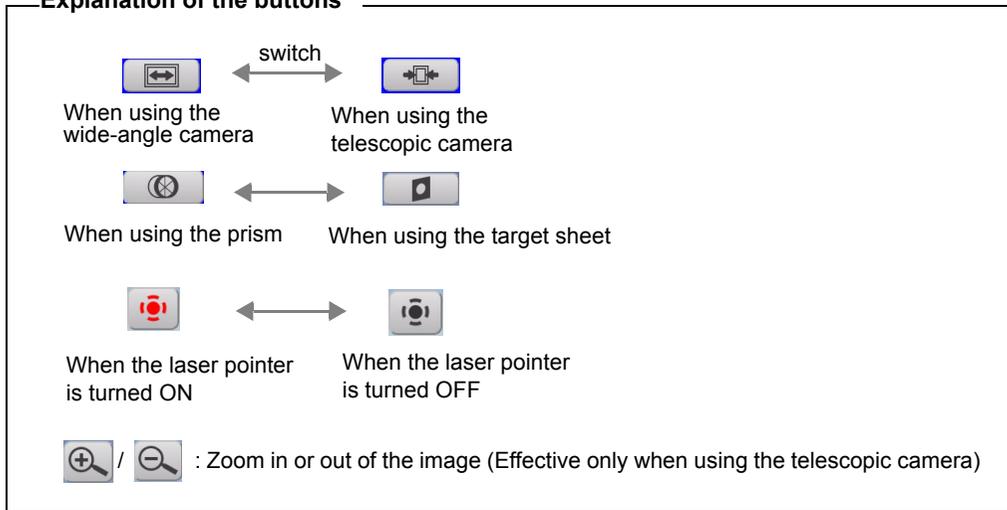


Example: Target name : pt01  
 ScanAng : 2°  
 HR : 1 m

 "Recommended search width setting" on page 63

 "Setting the target height" on page 63

### Explanation of the buttons

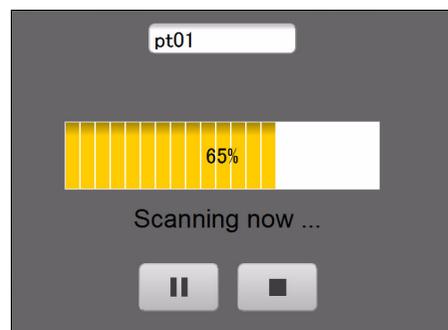


- Make sure to select the target ( /  ) according to the target object.

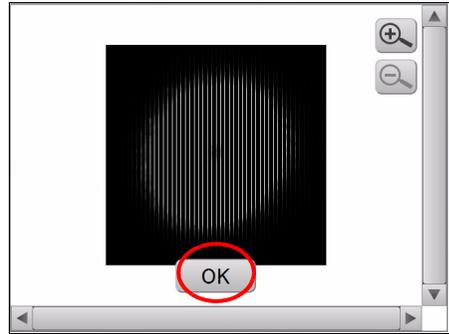
Target scanning is in progress.



- Sometimes "Internal calibration Please wait ..." is displayed.
- When  is pressed, it will take a while to stop.

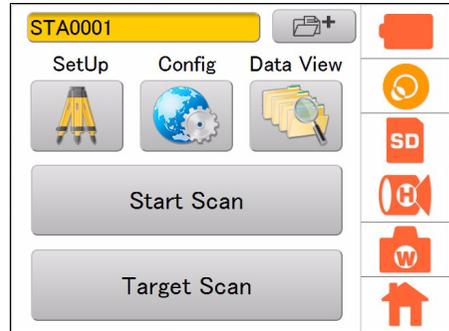


- The scanning results will be displayed. Check the scanning range, and then press [OK].



You will return to the main menu.

- Similarly, perform steps 1 to 4 until the completion of target scanning the target "pt06."



### ■ Recommended search width setting

Distance to the scanning target (m)	Search width (degrees)	Target sheet
2-5	2.5	Small
5-10	1.0	Small
10-20	1.0	Small, medium
20-50	0.5	Small, medium, large
50-100	0.5	Medium, large
100-200	0.5	Large

- Select the search width that meets your usage condition.

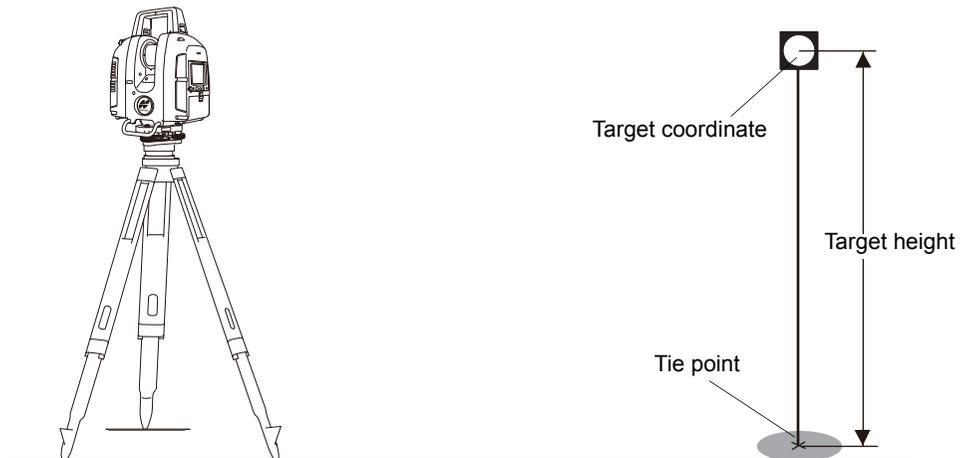
### • Type of target

Target	Distance to the scanning target (m)	Size (m)
Target sheet (Large)	50-200	0.12
Target sheet (Medium)	10-100	0.06
Target sheet (Small)	2-50	0.03
Prism	10-100	Prism-2 Prism-5

### ■ Setting the target height

Coordinate points on the ground can be registered (combining multiple sets of scanned data) as the tie point (the connecting point) by entering the target height.

Set the target height as follows:



## 10.2 3D Scanning

3D scanning provides 3D data of the scanning target.

To start 3D scanning, determine the scanning range, and then configure various settings related to the scanning.

When using the data of target scanning, scan the range that includes the common targets that are placed.



- Sometimes the instrument resonates when the scanner unit rotates at a high speed. Shorten the extension leg of the tripod in such a case.

### ■ Scanning range

There are two types of 3D scanning: range setting scanning and whole circumference scanning.



- Remove the handle when scanning around the zenith or the whole circumference.

#### Range setting scanning

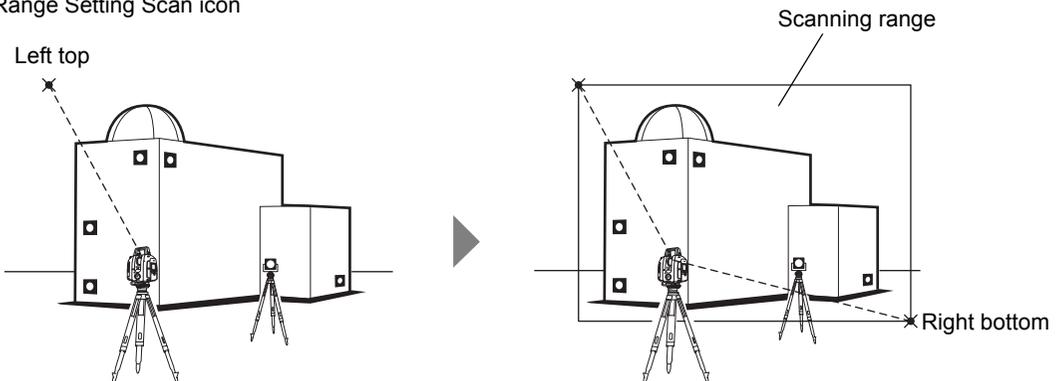
Scan the target by setting the range as illustrated below.

To set the range, determine the left top and right bottom of the range that you want to scan by collimating.

The built-in camera takes photographs of this range.



Range Setting Scan icon

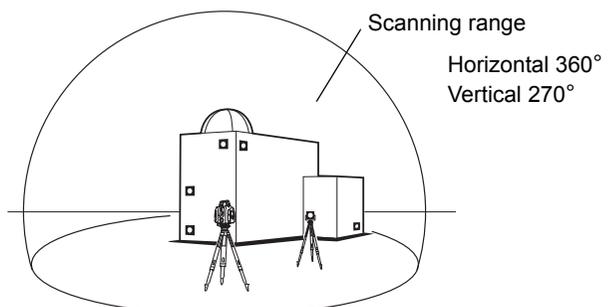


#### Whole circumference scanning

Scan the whole circumference as illustrated below:



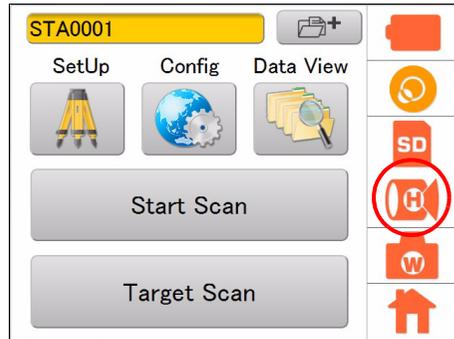
Whole circumference scanning icon



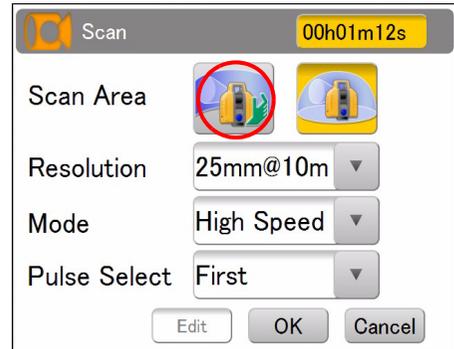
## ■ Performing 3D range setting scanning

### PROCEDURE Perform scanning by setting the scanning range

1. Press the Scan Setting icon.



2. Press .



3. Press  to switch the camera to “Tele”.  
 ☞ “Explanation of the buttons” on page 61

4. Rotate the instrument, tap the top left of the scanning range on the center of the screen.

While doing this, the horizontally rotating part and the turn of the scanner unit will be locked. To unlock, turn the horizontally rotating part or the scanner unit manually.

5. Confirm the position, and then press [OK].

#### Note

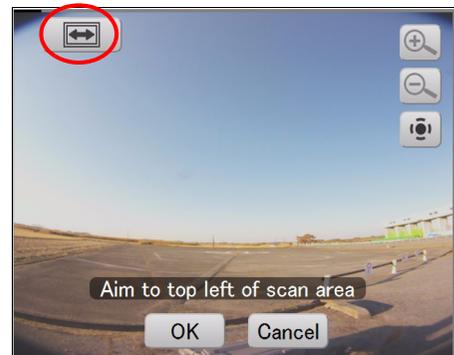
- When performing scanning indoors or in a dark place, the collimating position can be confirmed precisely by turning the laser pointer ON.

6. Rotate the instrument, tap the right bottom of the scanning range on the center of the screen.

While doing this, the horizontally rotating part and the turn of the scanner unit will be locked. To unlock, turn the horizontally rotating part or the scanner unit manually.

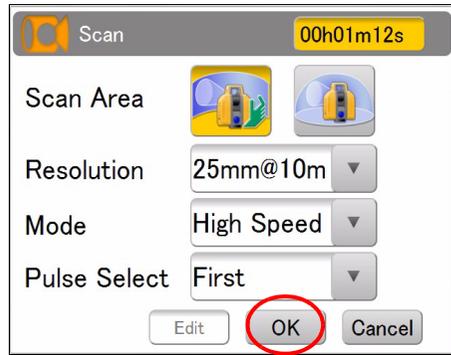
7. Confirm the position, and then press [OK].

The scanning range is determined.



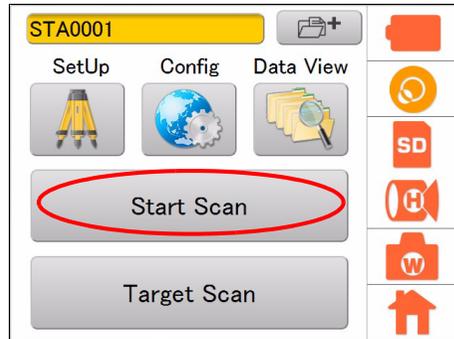
Scan range setting screen

8. Set the density of scanning  
For details of the setting items and the procedure,  
☞ “7.3 Settings for Scanning Conditions”



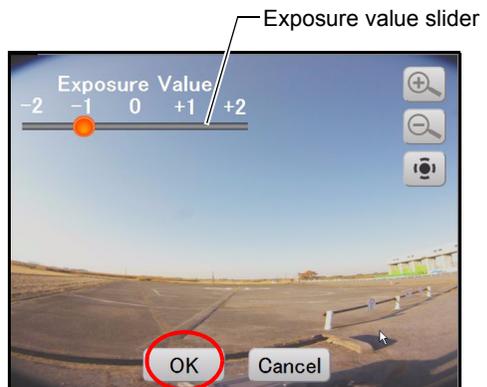
9. Press [OK].

10. Press the Start Scan button.



When “Manual” is chosen for “Exposure” of camera settings, move the exposure value slider and adjust the brightness.  
☞ “7.2 Camera Settings (Angle of view and Resolution)”

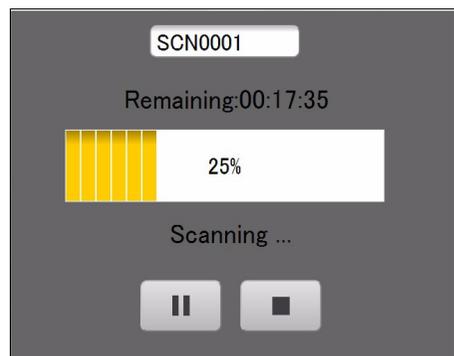
11. Press [OK].



The status is indicated by the progress bar.

**Note**

- Sometimes “Internal calibration Please wait ...” is displayed.
- When  is pressed, it will take a while to stop.



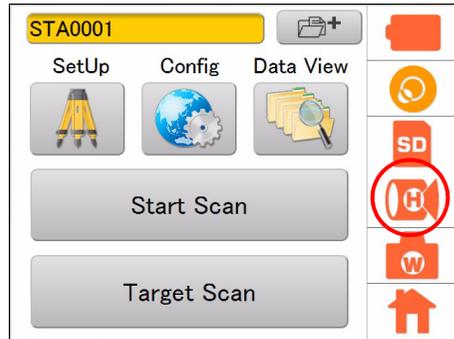
12. The scanning results will be displayed. Check the scanning range, and then press [OK].



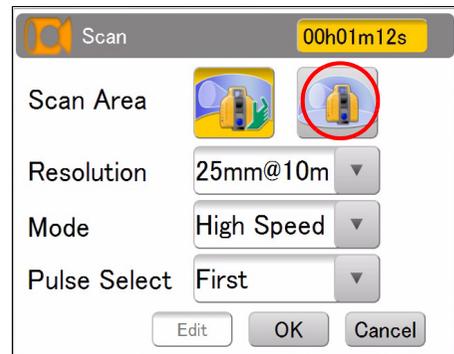
## ■ Performing 3D whole circumference scanning

### PROCEDURE

1. Press the Scan Setting icon.

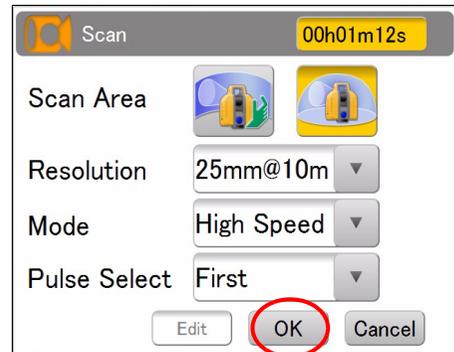


2. Press .

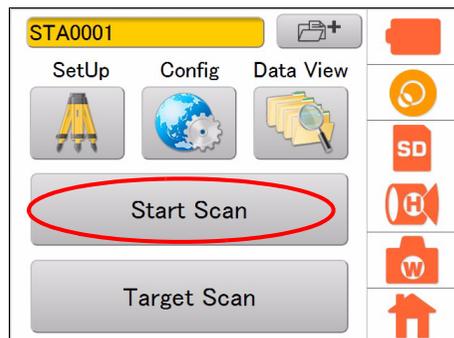


3. Perform the scan setting.  
For details of the setting items and the procedure,  
 "7.3 Settings for Scanning Conditions"

4. Press [OK].



5. Press the Start Scan button.



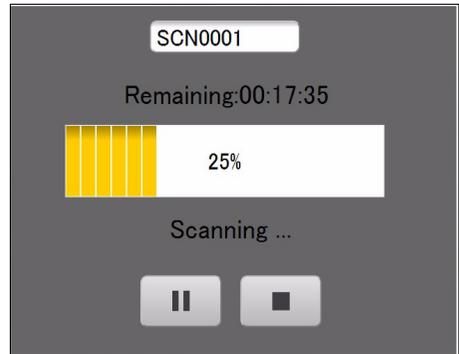
When "Manual" is chosen for "Exposure" of camera settings, move the exposure value slider and adjust the brightness.

6. Press [OK].

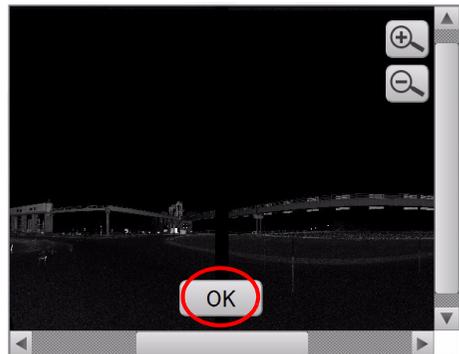


**Note**

- Sometimes "Internal calibration Please wait ..." is displayed.
- When  is pressed, it will take a while to stop.



7. The scanning results will be displayed. Check the scanning range, and then press [OK].

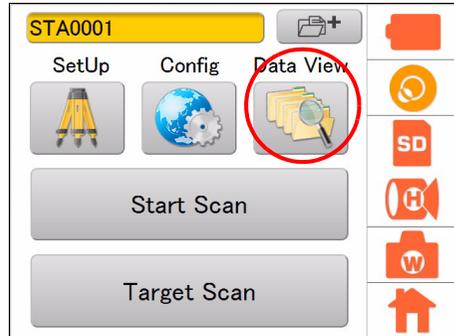


## 10.3 View the Data on the SD Card

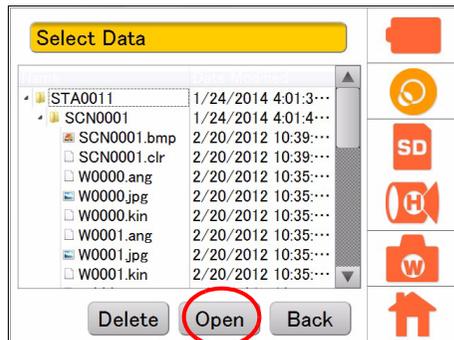
The following describes how to view data saved on the SD card.

### PROCEDURE

1. Press the Data View icon.



2. Select the data you want to view and press [Open].  
Bitmap and JPEG data can be displayed.



# 11. CHECKS AND ADJUSTMENTS

GLS-2000 is a precision instrument that requires fine adjustments. It must be inspected and adjusted before use so that it always performs accurate measurements.

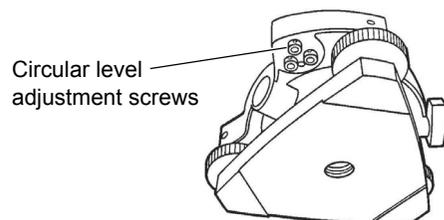
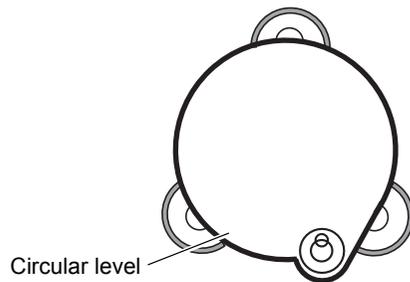
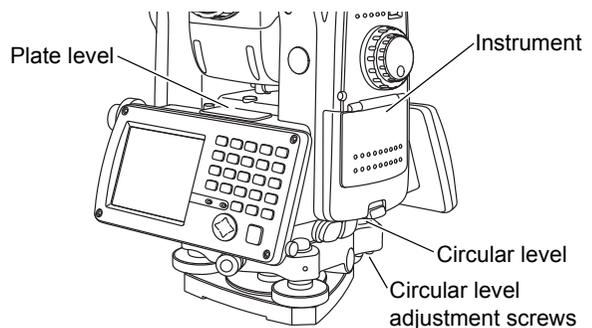
- After long-term storage or transporting the instrument over a long period of time, or if it is thought that a strong impact has been applied to this instrument during the operation, perform inspection and adjustment with extra care.
- Inspect and adjust this instrument in an environment where this instrument is securely placed. To perform an accurate measurement, inspect and adjust this instrument regularly.

## 11.1 Circular Level Adjustment

If the bubble in the circular level is deviated during the leveling, follow the below steps to adjust.

### PROCEDURE Checking and adjusting

1. Remove the tribrach from the instrument.
2. Install the adjusted instrument, such as a total station, and a theodolite, to the tribrach.
3. Level the instrument while looking at the plate level. If the bubble in the circular level of the tribrach is not deviated from the center of the circular level, no leveling is required.
4. If the bubble is deviated from the center of the circular level, rotate three circular level adjustment screws using the adjustment pin and shift the bubble to the center.



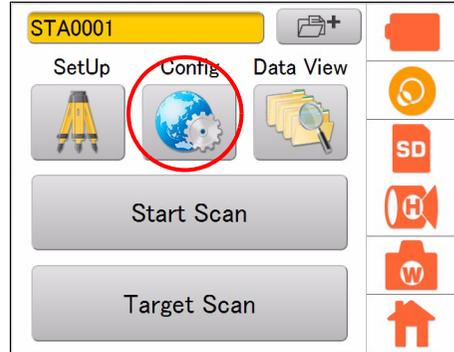
## 11.2 Tilt Sensor Calibration

Calibrate tilt sensor 0 datum.

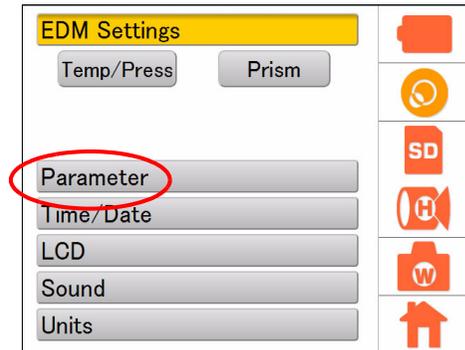
This adjustment is performed to set the standard position of the tilt sensor. Firmly set the instrument on the stable board before adjusting.

### PROCEDURE Adjustment

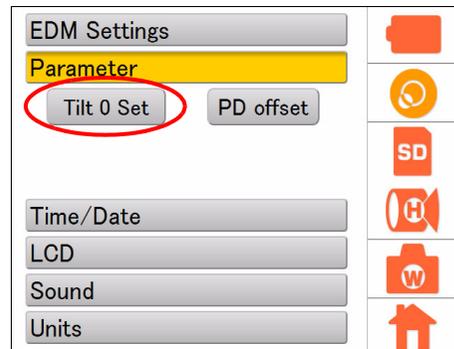
1. Press the Config icon.



2. Press [Parameter].



3. Press [Tilt 0 set].



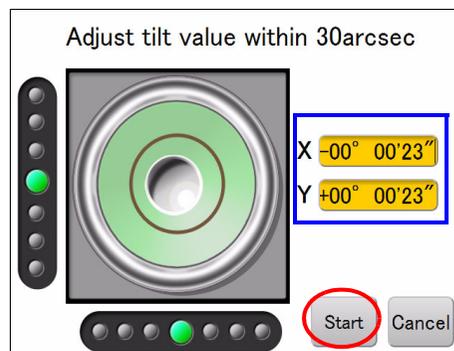
4. Level the instrument to within 30 arcseconds.

5. Press [Start].

The instrument will be automatically inverted.

6. Press [OK].

Adjusting the tilt sensor is complete.

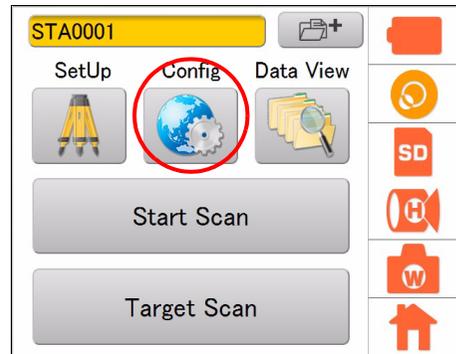


## 11.3 Aligning the Laser Plummet Beam with the Instrument Center

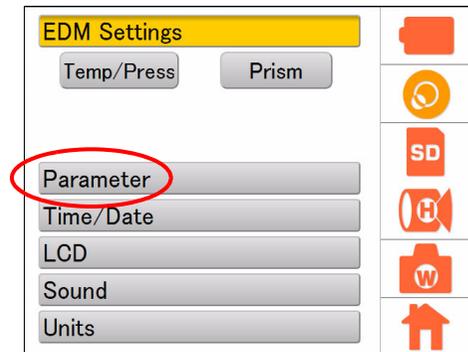
Adjust the position of the scanner unit when using the laser plummet function to center the instrument. This adjusts the alignment of the laser plummet beam and the center position of the instrument.

### PROCEDURE Checking and adjusting

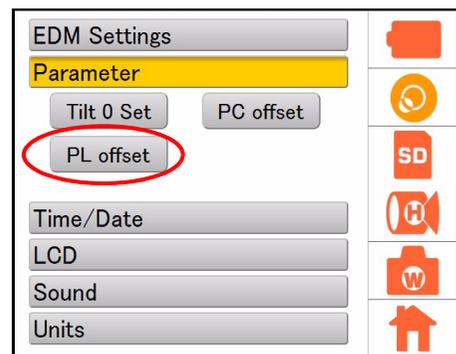
1. Carefully level the instrument.
2. Press the Config icon.



3. Press [Parameter].

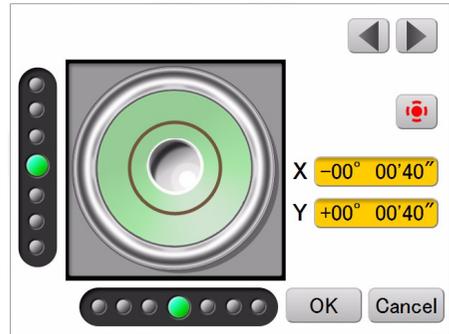


4. Press [PL offset].



## 5. Rotate the instrument horizontally.

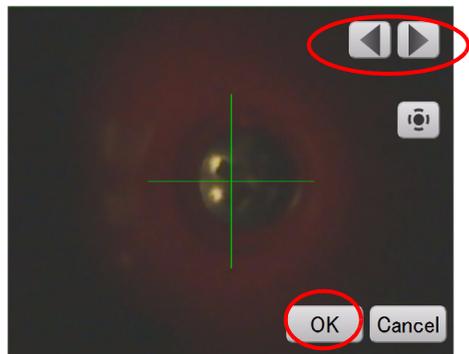
- Laser beam does not draw a circle - No adjustment necessary
- Laser beam draws a circle - The following adjustment necessary



## 6. Turn the scanner unit manually and carry out the rough alignment so that the laser beam does not draw a circle.

7. Use   to adjust the beam precisely.

While doing this, the turn of the scanner unit will be locked. To unlock, turn the scanner unit manually.

8. Press [OK].  
Adjusting the laser plummet is complete.**Note**

- Press  to turn the laser plummet off, and then the image captured by the camera will be displayed.



- Adjust the instrument carefully since this adjustment might cause an error while measuring the instrument height.
- When the laser beam keeps drawing a circle even if adjustments are performed many times, a problem can exist in the instrument. Contact your local dealer.

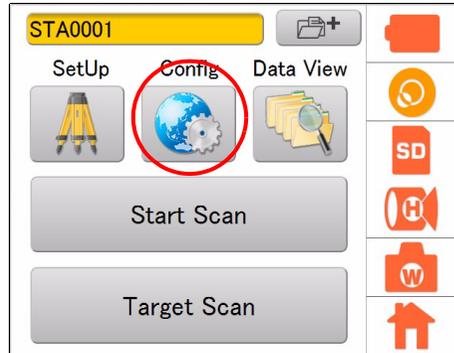
## 11.4 Aligning the Center of the Instrument and that of the Image

Align the center position of the instrument and that of the displayed image.

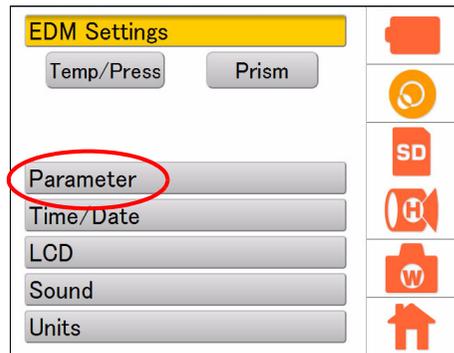
This enables to align the survey point and the center of the displayed image after aligning the center position of the instrument and the survey point.

### PROCEDURE Adjustment

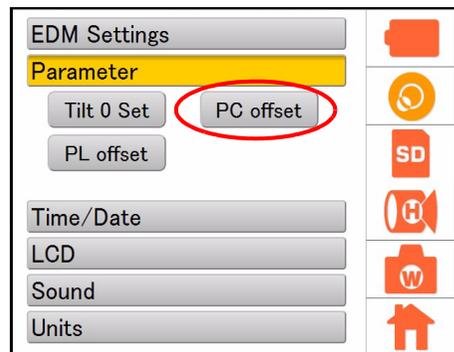
1. Carefully level the instrument.
2. Press the Config icon.



3. Press [Parameter].



4. Press [PC offset].

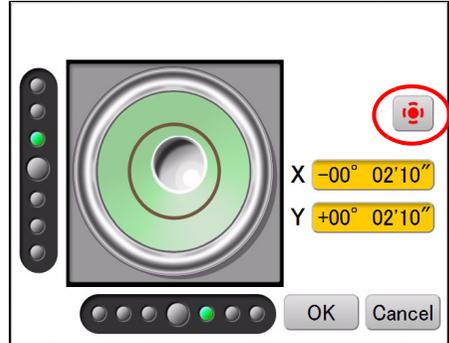


5. Tap on the screen and move the cross- hairs near the survey point.
6. Use the directional buttons at the left, right, top and bottom to align the cross- hairs with the survey point precisely.

Press [OK] after the adjustment is complete.



7. Press  to turn the laser plummet on and display the leveling screen.



# 12. BATTERY CHARGING

## 12.1 Battery Charging



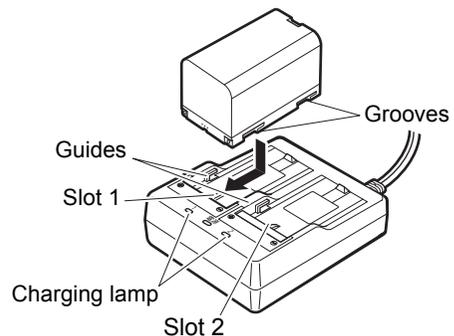
- The battery was not charged at the factory. Charge the battery fully before using the instrument.
- The charger will become rather hot during use. This is normal.
- Do not use to charge batteries other than those specified.
- The charger is for indoor use only. Do not use outdoors.
- Batteries cannot be charged, even when the charging lamp is flashing, when the temperature is outside 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.
- 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.

Storage period	Temperature range
1 week or less	-20 to 50 °C
1 week to 1 month	-20 to 45 °C
1 month to 6 months	-20 to 40 °C
6 months to 1 year	-20 to 35 °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.

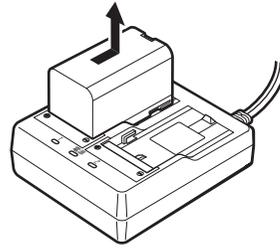
### PROCEDURE

1. Connect the power cable to the charger (CDC68A) and plug the charger into the wall outlet.
2. Mount the battery (BDC70) in the charger by matching the grooves on the battery with the guides on the charger.



3. When charging starts, the lamp starts blinking.
4. The lamp lights when charging is finished.

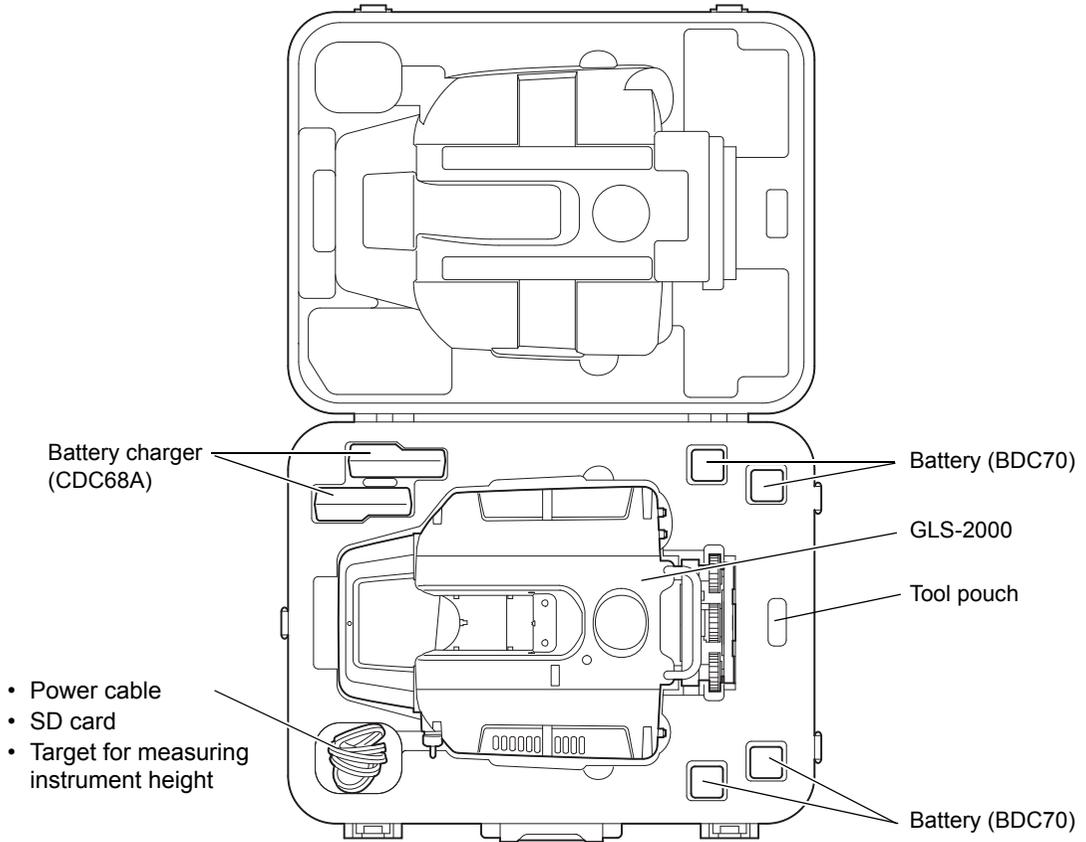
5. Remove the battery and unplug the charger.

**Note**

- Slots 1 and 2:  
The charger starts charging the battery mounted first. If you place two batteries in the charger, the battery in slot 1 is charged first, and then the battery in slot 2. (☞ step 2)
- Charging lamp:  
The charging lamp is off when the charger is outside the charging temperature range or when the battery is mounted incorrectly. If the lamp is still off after the charger falls within its charging temperature range and the battery is mounted again, contact your local dealer. (☞ steps 2 and 3)
- Charging time per battery (at 25 °C):  
BDC70: about 5.5 hours  
(At a low or high temperature, it may take longer than stated.)
- This instrument can be used abroad by using the separately sold power cable. Contact your local dealer for details.

# 13. HOW TO STORE

After using the instrument, store it as shown below.

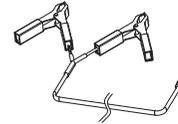


# 14. OPTIONAL ACCESSORIES

The following are optional accessories which are sold separately from the instrument.

- **Power cable PC-26**

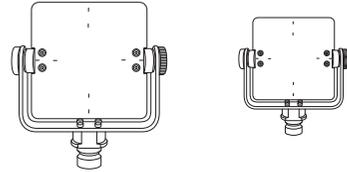
Connect with a commercial external power source.



Power cable PC-26

- **Target board (Large, Small)**

Place the target sheet (magnet type) and attach to the prism holder.



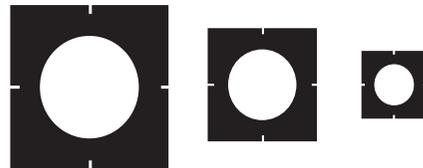
Target board (Large)

Target board (Small)

- **Target sheet [Large, Middle, Small]**

Target sheets for GLS-2000

Select the target sheet based on the scanning distance.



Target sheet (Large)

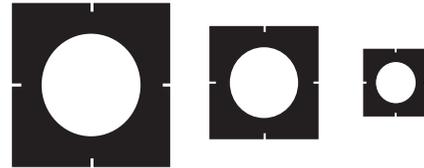
Target sheet (Middle)

Target sheet (Small)

- **Target sheet (Magnet type) [Large, Middle, Small]**

Target sheets for GLS-2000

Select the target sheet based on the scanning distance.

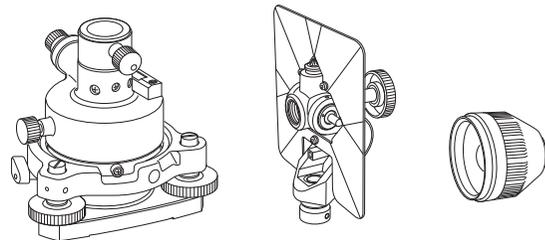


Target sheet (Large)  
(Magnet type)

Target sheet (Middle)  
(Magnet type)

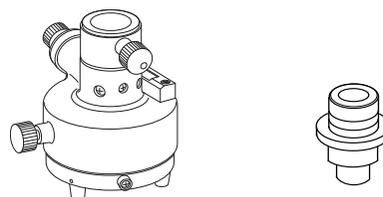
Target sheet (Small)  
(Magnet type)

- **Tilting 1P unit W8**



Tilting 1P unit W8

- **Prism adapter Plug**



Prism Adapter Type 3WP

GLS-2000 plug

# 15. WARNING AND ERROR MESSAGES

The following is a list of the error and warning messages displayed by the instrument and the countermeasures of each message. If the same message is repeated, the instrument has malfunctioned. Contact your local dealer.

## 15.1 Error

Message	Typical error number displayed	Description	Countermeasures
Communication Error code:XXXX	7000's 8000's 9000's	An error occurred during internal data transfer.	Turn the power off and restart. If the error persists, have the instrument repaired.
Ranging unit Error code:XXXX	2000's 3000's	An error occurred in the laser beam emitting system.	
Tilt unit Error code:XXXX	6000's	Failed to communicate with the tilt controller.	
Servo unit Error code:XXXX	4000's	An error occurred in the mirror or drive.	
Ranging initialize Error code:XXXX	9000's	Failed internal calibration required at initialization. Unable to scan.	

## 15.2 Warning

Type	Message	Description	Countermeasures
SD Card	Format failed.	An error occurred during SD card formatting.	<p>Check that the SD card is inserted correctly. If the error persists, format the card using a PC with the SD format tool provided by the SD Association on the web. (Download from: <a href="https://www.sdcard.org/jp/downloads/formatter_4/">https://www.sdcard.org/jp/downloads/formatter_4/</a>)</p> <p>If the SD card cannot be formatted using this tool, the SD card may be broken. Use another SD card. If the second SD card cannot be formatted, have the instrument repaired.</p>
	SD card is not seated Please re-seat	An SD card was not recognized.	
	SD card lacks space! Change SD card	The remaining capacity of an SD card is lower than required for the data to be scanned.	
Data selection	Failed to delete this file/ folder.	The file or the directory was not deleted.	<p>Check that the SD card is inserted correctly. If the error persists, format the card using a PC with the SD format tool provided by the SD Association on the web. (Download from: <a href="https://www.sdcard.org/jp/downloads/formatter_4/">https://www.sdcard.org/jp/downloads/formatter_4/</a>)</p> <p>If the SD card cannot be formatted using this tool, the SD card may be broken. Use another SD card. If the second SD card cannot be formatted, have the instrument repaired.</p>
	This file can't open!	A file other than BMP or JPEG is selected.	
Tilt	Tilt Over	When the tilt sensor is set to on, the instrument is tilted at $\pm 6'$ or more. At the [TILT 0 ADJUST] setting, the screen will display the tilt angle of $\pm 30''$ or more.	Accurately level the instrument.
	Paused by vibration!	When the tilt sensor is set to on, if vibration is detected during scan or photograph, those operations are going to pause. And if tilt value is stable again, those operations restart automatically. This message is also displayed when the instrument is tilted significantly.	<p>If the operation does not resume, it may be because that the vibration is still continuing or the instrument is being tilted significantly.</p> <p>Set the tilt setting off and start those operation.</p>

Type	Message	Description	Countermeasures
Scan Setting	H Interval too small. Please set again	The starting point and end point of the designated scan range are too close together.	Designate a wider range.
	V Interval too small. Please set again		
	Scanning Error	An error occurred while scanning.	Cannot scan the target. Long press the power key and restart the instrument. If it does not work, remove both the internal and external batteries and restart the instrument.
	Window is dirty Wipe clean.	Displayed when the instrument detects that foreign matter is attached on the window and stops the task temporarily.	Check and remove the attached matter on the window before resuming or stop operations.
Target Scan	Cannot find target	The target center cannot be found.	The target may not be correctly collimated or may have been blocked during scanning. Or, there may be a reflecting object around the target. Reconfirm the position and scan again. If the error persists, restart the instrument and scan once again. If correction is still not seen, adjustment will be required.
	Deviation seems to be large Distance Dev: ** mm Angle Dev : ** arcsec	The deviation can be increased in bad weather conditions or when the task is interrupted for some reason while scanning.	
	Mesurment failed	An error occurred during target center measurement.	
Battery	Battery Low!	The battery is low. Or the battery may become depleted while scanning.	Replace with fully-charged batteries.
Coordinate point import	Can not find data. Please start over.	Displayed when there is no usable data stored in the selected CSV file.	Confirm the content of the selected CSV file.
	No coordinates are selected. Please import csv file.	Displayed when you attempt to import a coordinate point name or a coordinate point from a coordinate point list which does not exist in the instrument.	To import a coordinate point name or a coordinate, import a CSV file to the instrument by pressing [List Import] in advance.
	This is not csv file. Reading file failed.	Displayed when you have selected a file which does not have CSV extension on the coordinate list registration screen.	Select CSV file for coordinate list.
	Exceeded the number of registration.	Displayed if there are more than 250 coordinate points in the selected CSV file, which is displayed on the coordinate list registration screen.	From the first list to the 250th list registered in the CSV file will be imported into the instrument as the coordinate lists.
	List does not exist. Please start over.	Displayed when you attempt to delete a list while there is no coordinate point list in the instrument.	Import the coordinate point list from a CSV file before deleting.
Camera	Can not determine exposure value. Scan is cancelled.	Displayed when an auto exposure adjustment is not complete.	Retake photographs of the range or determine the exposure value manually.

# 16. SPECIFICATIONS

## Methods

Distance measurement : Pulse method  
 Angle measurement : Incremental method

## General

Size : 293 (W) × 152 (D) × 411.5 (H) mm  
 Weight : 10 kg (with battery, tribrach)  
 Instrument height : 226 mm (from the attaching surface of the tribrach to the center of the rotating mirror)  
 Operation temperature range : -5 °C to 45 °C  
 Storage temperature range : -20 °C to 60 °C  
 Protection against water and dust : IP54 (Based on the standard IEC60529) Dust-proof category 2

## Scanning Unit

Range of measurement *1)	Reflectivity	Range mode				
		Detail	High Speed	Low Power	Standard	Close
Range of measurement *1)	9% reflection	-	-	-	-	40m
	18% reflection	40m	90m	90m	150m	-
	90% reflection	100m	210m	210m	350m	-
Measurement accuracy*1), *2) (90% Reflected surface)	Distance accuracy	3.5 mm (σ)	3.5 mm (σ)	4.0 mm (σ)	3.5 mm (σ)	3.5 mm (σ)
		(When measuring 1 - 90 m)	(When measuring 1 - 110 m)	(When measuring 1 - 110 m)	(When measuring 1 - 150 m)	(When measuring 1 - 40 m)
	Surface accuracy	2.0 mm (σ)	2.0 mm (σ)	2.0 mm (σ)	2.0 mm (σ)	2.0 mm (σ)
		(When measuring 1 - 90 m)	(When measuring 1 - 110 m)	(When measuring 1 - 110 m)	(When measuring 1 - 150 m)	(When measuring 1 - 40 m)

Angle (vertical) : 6"  
 Angle (horizontal) : 6"  
 Scanning data rate : Maximum of 120,000 points per second \*3)  
 Scanning density (resolving power)  
 Spot Size  
 Detail : ø7 mm or less in diameter (at 1 to 20 m) (1/e<sup>2</sup>)  
           ø4.1 mm or less in diameter (at 1 to 20 m) (FWHM)  
 High Speed / Low Power / Standard / Close : ø19 mm or less in diameter (at 1 to 150 m) (1/e<sup>2</sup>)  
           ø11.2 mm or less in diameter (at 1 to 150 m) (FWHM)  
 Point increment : Minimum of 3.1 mm (at 10 m)  
 Maximum point number : V : 15,202 points / Line H: 20,268 points  
 Field-of-view (Per scan)  
 Horizontal : 360° (maximum)  
 Vertical : 270° (maximum)  
 Laser  
 Laser class : Class3R (IEC EN60825-1)  
 Distance measurement laser : 50 mW or less for measuring the range of 1064 nm (invisible)  
 Laser pointer : 1 mW or less for measuring the range of 639 nm  
 Target scan  
 Target sheet  
 Size : 0.03m  
 Distance to the scanning target: 2-50m  
 Detection accuracy : 3" (σ) (at 50 m)

Prism (Single prism)  
 Detection accuracy : 6" ( $\sigma$ ) (at 50 m)

\*1) Differs depending on weather condition and atmospheric stability.

\*2) Differs depending on the reflectivity and surface condition of the scanning target.

\*3) Differs depending on range mode.

### Camera Unit

Telescopic camera  
 Number of effective pixels : 5M pixels (2,592 × 1,944)  
 Field angle : 8.9° (V) × 11.9° (H)  
 Wide angle camera  
 Number of effective pixels : 5M pixels (2,592 × 1,944)  
 Field angle : Diagonal 170°

### Tilt Unit

Type : Liquid 2-axis tilt sensor  
 Correction unit : 1"  
 Range of compensation :  $\pm 6'$   
 Automatic compensator : ON (H/V)/OFF (selectable)  
 Tilt offset : Can be changed

### Display

Type : TFT-LCD 3.5 VGA  
 with a touch panel

### Card slot

Type : SD card  
 Standard : Supporting SD/SDHC memory card (SD 6MB/sec, SDHC Class 6 or greater is required)  
 Number of slots : 1

### Sensitivity of levels

Circular level : 10'/2 mm  
 Electronic Circular levels : Graphic display range: 6' (inner circle)  
 Digital display range:  $\pm 6'$  30"

### Plummet

Laser  
 Laser class : Class3R (IEC EN60825-1)  
 Laser plummet : 1 mW or less for measuring the range of 639 nm  
 Image : Field of view 1° (Focus 1m)

### Power Supply

Power source : Rechargeable Li-ion battery BDC70 (4 batteries)  
 Working duration at 20 °C  
 BDC70 : about 2.5 hours / 4 batteries (continuous scanning)  
 External power source : 14 $\pm$ 1V (commercially available 12-volt lead car battery is enabled.)

### Battery (BDC70)

Nominal voltage : 7.2 V  
 Capacity : 5,240 mAh  
 Dimensions : 40 (W) × 70 (D) × 40 (H) mm  
 Weight : about 197 g

## Charger (CDC68A)

Input voltage : AC100 to 240 V

Charging time per battery (at 25°C)

BDC70 : about 5.5 hours (Charging can take longer than the times stated above when temperatures are either especially high or low.)

Charging temperature range : 0 to 40 °C

Storage temperature range : -20 to 65 °C

Size : 94 (W) × 102 (D) × 36 (H) mm

Weight : about 170 g

# 17. REGULATIONS

Region/ Country	Directives/ Regulations	Labels/Declarations
California, U.S.A	Proposition 65	<div style="border: 1px solid black; padding: 5px;"> <p><b>WARNING</b> : Handling the cord on this product or cords associated with accessories sold with this product, will expose you to lead, a chemical known to the State of California to cause birth defects or other reproductive harm. <b><i>Wash hands after handling.</i></b></p> </div>
California, U.S.A	Perchlorate Material (CR Lithium Battery)	<div style="border: 1px solid black; padding: 5px;"> <p>This product contains a CR Lithium Battery which contains Perchlorate Material-special handling may apply. See <a href="http://www.dtsc.ca.gov/hazardouswaste/perchlorate/">http://www.dtsc.ca.gov/hazardouswaste/perchlorate/</a> Note ; This is applicable to California, U.S.A. only</p> </div>
California and NY, U.S.A.	Recycling Batteries	<div style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;"><u><b>DON'T THROW AWAY RECHARGEABLE BATTERIES, RECYCLE THEM.</b></u></p> <p style="text-align: center;"><b><u>Topcon Positioning Systems Inc., United States Return Process for Used Rechargeable Nickel Metal Hydride, Nickel Cadmium, Small Sealed Lead Acid, and Lithium Ion, Batteries</u></b></p> <p>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.</p> <p>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 disassembled prior to return.</p> <p>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. <b><u>Under no circumstance should used/recyclable batteries be shipped by air.</u></b></p> <p>Failure to comply with the above requirements will result in the rejection of the package at the shipper's expense.</p> <p>Please remit packages to: Topcon Positioning Systems, Inc. C/O Battery Return Dept. 150 7400 National Dr. Livermore, CA 94551</p> <p style="text-align: center;"><b><u>DON'T THROW AWAY RECHARGEABLE BATTERIES, RECYCLE THEM.</u></b></p> </div>

Region/ Country	Directives/ Regulations	Labels/Declarations
Canada	ICES-Class A	<p>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.</p> <p>This class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conforme a la norme NMB-003 du Canada.</p> <p>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.</p> <p>This equipment complies with IC radiation exposure limits set forth for uncontrolled equipment and meets RSS-102 of the IC radio frequency (RF) Exposure rules. This equipment should be installed and operated with at least 20cm and more between the radiator and person's body (excluding extremities: hands, wrists, feet and ankles).</p>
EU	EMC-Class B	<div style="border: 1px solid black; padding: 10px; text-align: center;">  <p><b>EMC NOTICE</b> 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.</p> </div>
EU	R&TTE-Class 1	<p>R&amp;TTE Directive</p> <p>GLS-2000</p> <p>Hereby, TOPCON CORP., declares that the above-mentioned equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.</p> <p>Please inquire below if you wish to receive a copy of Topcon's Declaration of Conformity.</p> <p>Topcon Europe Positioning B.V. Essebaan 11, 2908 LJ Capelle a/d IJssel, The Netherlands Tel:+31-10-4585077 Fax:+31-10-2844949 <a href="http://www.topcon-positioning.eu/">http://www.topcon-positioning.eu/</a></p>
EU	WEEE Directive	<div style="border: 1px solid black; padding: 10px;">  <p><b>WEEE Directive</b> This symbol is applicable to EU members states only.</p> <p>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.</p> <p style="text-align: right;"><b>TOPCON CORPORATION</b></p> </div>

Region/ Country	Directives/ Regulations	Labels/Declarations
EU	EU Battery Directive	<div data-bbox="509 243 1201 394" style="border: 1px solid black; padding: 5px;"><b>EU Battery Directive</b> This symbol is applicable to EU members states only. Battery users must not dispose of batteries as unsorted general waste, but treat properly.</div>

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