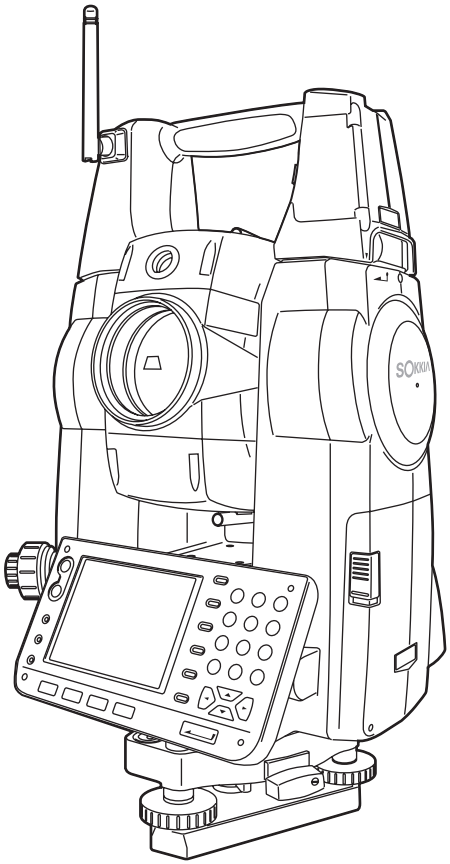
SOKKIA

Series SRX

SRX1
SRX2
SRX3
SRX5

Total Station



Class 3R Laser Product

Class 1 LED Product

OPERATOR'S MANUAL

JSIMA

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

SOKKIA

Series SRX

SRX1
SRX2
SRX3
SRX5

Total Station

Class 3R Laser Product

Class 1 LED Product

OPERATOR'S MANUAL

- Thank you for selecting the SRX1/2/3/5.
- Before using the instrument, please read this operator's manual carefully.
- Verify that all equipment is included.
  ☞"26. STANDARD EQUIPMENT"
- SRX has a function to output data saved in Program mode to a connected host computer. Command operations from a host computer can also be performed. For details, refer to "Interfacing with the SOKKIA SDR Electronic Field Book" and Command Explanations manuals and ask your Sokkia agent.
- The specifications and general appearance of the instrument may be altered at any time and may differ from those appearing in brochures and this manual.
- Some of the diagrams shown in this manual may be simplified for easier understanding.

HOW TO READ THIS MANUAL

Regarding other manuals

- Manuals 2, 3, 4, and 5 below are electronic manuals provided on a CD-ROM in PDF format (). Adobe Reader is necessary in order to view these documents. The latest version of Acrobat Reader can be downloaded from the Adobe homepage.
- The SRX comes equipped with 6 manuals for operation information:
  1. Series SRX Operator's Manual (this manual):

     Explains basic operation and functions of the SRX.

  2. SDR Software Reference Manual (Series SRX and NET05/NET1)  :

     Explains advanced measurement operations using the SRX in Program mode, and methods for managing measured data.

  3. SFX Dial-Up Program Explanations (Series SRX and NET05/NET1)  :

     Explains how to send and receive data using the SFX function

  4. Periodic Monitoring Program Explanations (Series SRX and NET05/NET1)  :

     Explains how to measure displacement using the periodic monitoring function

  5. Mesh-Scan Survey Program Explanations (Series SRX and NET05/NET1)  :

     Explains how to measure using the Mesh-Scan Survey function

  6. Quick Start Guide (Series SRX and NET05/NET1):

     Simplified explanations of operations such as Auto Tracking to allow users to get started straight away.

  For Auto Tracking measurement, read this manual in conjunction with the On-demand Remote Control System Manual.

Symbols

The following conventions are used in this manual.

 : Indicates precautions and important items which should be read before operations.

 : Indicates the chapter title to refer to for additional information.

: Indicates supplementary explanation.

 : Indicates an explanation for a particular term or operation.

[Softkey] etc. : Indicates softkeys on the display and window dialog buttons.

{Key} etc. : Indicates keys on the operation panel.

<Setting out> etc.: Indicates screen titles.

Notes regarding manual style

- Except where stated, “SRX” means SRX1/SRX2/SRX3/SRX5 in this manual.
- The SRX is available in both "Auto Tracking" and "Auto Pointing" models. Users with an "Auto Tracking" instrument should read the instructions regarding the Auto Tracking function. The "Auto Pointing" model does not support Auto Tracking.
- Screens and illustrations appearing in this manual are of SRX3 (Auto Tracking model with RC-TS3 handle).
- Location of softkeys in screens used in procedures is based on the factory setting. It is possible to change the allocation of softkeys.

☞ Softkey allocation: "21.6 Allocating Key Functions"

- Learn basic operations in "4. PRODUCT OUTLINE" and "5. BASIC OPERATION" before you read each measurement procedure. An overview of the available SRX functions is given in "4.1 Functions". For selecting options and inputting figures, see "5.1 Basic Key Operation".
- Measurement procedures are based on continuous measurement. Some information about procedures when other measurement options are selected can be found in “Note” (Note).

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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 operator's manual.
The definitions of the indications are listed below. Be sure you understand them before reading the manual's main text.

Definition of Indication

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

△ This symbol indicates items for which caution (hazard warnings inclusive) is urged. Specific details are printed in or near the symbol.

⃠ This symbol indicates items which are prohibited. Specific details are printed in or near the symbol.

● This symbol indicates items which must always be performed. Specific details are printed in or near the symbol.

General

⚠ Warning

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

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

⃠ Never look at the sun through the telescope. Loss of eyesight could result.

⃠ Do not look at reflected sunlight from a prism or other reflecting object through the telescope. Loss of eyesight could result.

⃠ Direct viewing of the sun using the telescope during sun observation will cause loss of eyesight. Use a solar filter (option), such as that in "27. OPTIONAL ACCESSORIES", for sun observation.

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

⚠ Caution

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

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

Do not wield or throw the plumb bob. A person could be injured if struck.

Keep hands and clothing away from rotating parts. Injury could result from being dragged into the part.

Do not touch the instrument or look through the telescope eyepiece while the motor drive is in operation. Hands could be caught in moving parts or an eye could be struck by the telescope and cause injury.

Secure handle to main unit with handle locks. Failure to properly secure the handle could result in the unit falling off while being carried, causing injury.

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

⚠ Warning

Do not short circuit. Heat or ignition could result.

Do not disassemble, rebuild, mutilate, incinerate, heat or short circuit the battery and charger. Fire, electric shock, burns or an explosion could result.

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

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.

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

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 heat or throw batteries into fire. An explosion could occur, resulting in injury.

Do not use the battery, charger or AC (power) cable for any other equipment or purpose. Fire or burns caused by ignition could result.

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

Caution

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

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

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

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

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

***Bluetooth* wireless technology**

Warning

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

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

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

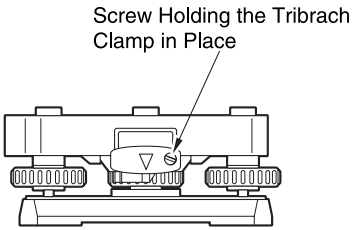
Do not use within the vicinity of automatic doors, fire alarms and other devices with automatic controls as the electromagnetic waves produced may adversely affect operation resulting in an accident.

Telescope

- Aiming the telescope at the sun will cause internal damage to the instrument. Use the solar filter when observing the sun.
  ☞ "27. OPTIONAL ACCESSORIES"

Tribrach Clamp and Handle

- When the instrument is shipped, the tribrach clamp is held firmly in place with a locking screw to prevent the instrument from shifting on the levelling base. Before using the instrument the first time, loosen this screw with a screwdriver. And before transporting it, tighten the locking screw to fasten the tribrach clamp in place so that it will not shift on the levelling base.
- The SRX handle can be removed. When operating the SRX with the handle attached, always make sure that the handle is securely fixed to the SRX body with the handle lock levers.



Precautions concerning water and dust resistance

SRX conforms to IP64 specifications for waterproofing and dust resistance when the CF card cover and battery cover are closed.

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

Charging the battery

- The battery (BDC58) was not charged at the factory. Charge the battery fully before using the SRX.

The Lithium Battery

The lithium battery is used to maintain the SRX Calendar & Clock function. It can back up data for approximately 5 years of normal use, but its lifetime may be shorter depending on circumstances.

The Levelling Base

Be sure to use levelling base WA100A.

Other precautions

- Never place the instrument directly on the ground. Sand or dust may cause damage to the screw holes or the centering screw on the base plate.
- Do not perform automatic vertical rotation of the telescope when using the lens hood, diagonal eyepiece, or solar filter. Such accessories may strike the SRX causing damage.

- Protect the instrument from heavy shocks or vibration.
- Protect the instrument from rain or drizzle with an umbrella or waterproof cover.
- When the operator leaves the instrument attached to the tripod, the vinyl cover should be placed on the instrument.
- Never carry the instrument on the tripod to another site.
- Turn the power off before removing the battery.
- Remove the battery before placing the SRX in its case.
- Make sure that the instrument and the protective lining of the carrying case are dry before closing the case. The case is hermetically sealed and if moisture is trapped inside, the instrument could rust.
- Consult your Sokkia agent before using the instrument under special conditions such as long periods of continuous use or high levels of humidity. In general, special conditions are treated as being outside the scope of the product warranty.

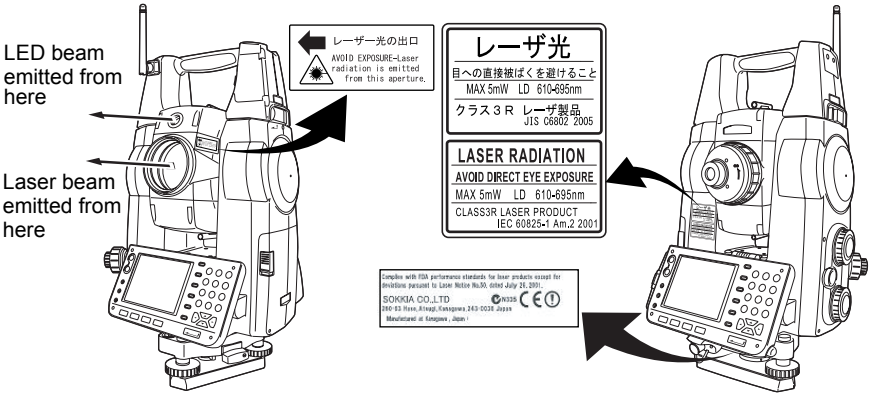
Maintenance

- Wipe off moisture completely if the instrument gets wet during survey work.
- Always clean the instrument before returning it to the case. The lens requires special care. First, dust it off with the lens brush to remove tiny particles. Then, after providing a little condensation by breathing on the lens, wipe it with the wiping cloth.
- 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 organic solvents or alkaline cleaning solutions.
- Store the instrument in a dry room where the temperature remains fairly constant.
- Check the tripod for loose fit and loose screws.
- If any trouble is found on the rotatable portion, screws or optical parts (e.g. lens), contact your Sokkia agent.
- When the instrument is not used for a long time, check it at least once every 3 months.
  ☞"23. CHECKS AND ADJUSTMENTS"
- 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.

3. LASER SAFETY INFORMATION

SRX is classified as a Class 3R Laser Product and Class 1 LED Product according to IEC Standard Publication 60825-1 Amd. 2: 2001 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 July 26, 2001.)

- EDM device in objective lens: Class 3R Laser Product
- (When using prism or reflective sheet as target or when in Auto Tracking mode) Class 1 Laser Product
- Auto pointing device in objective lens: Class 1 Laser Product
- Guide light: Class 1 LED product



- EDM device is classified as Class 3R Laser Product when reflectorless measurement is selected. When the prism or reflective sheet is selected as target, the output is equivalent to the safer class 1.
- The cumulative output during distance measurement and tracking in Auto Tracking mode is equivalent to class 1.

⚠Warning

- Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Follow the safety instructions on the labels attached to the instrument as well as in this manual to ensure safe use of this laser and LED product.
- Never point the laser beam at another person. If the laser beam strikes skin or an eye, it could cause serious injury.
- Do not look directly into the laser beam source or guide light source. Doing so could cause permanent eye damage.
- Do not stare at the laser beam. Doing so could cause permanent eye damage.
- If an eye injury is caused by exposure to the laser beam, seek immediate medical attention from a licensed ophthalmologist.
- Never look at the laser beam through a telescope, binoculars or other optical instruments. Doing so could cause permanent eye damage.
- Sight the target so that the laser beam does not stray from them.

⚠Caution

- Perform checks at start of work and periodic checks and adjustments with the laser beam emitted under normal conditions.
- When the instrument is not being used, turn off the power and replace the lens cap.
- When disposing of the instrument, destroy the battery connector so that the laser beam cannot be emitted.
- Operate the instrument with due caution to avoid injuries that may be caused by the laser beam unintentionally striking a person in the eye. Avoid setting the instrument at heights at which the path of the laser beam may strike pedestrians or drivers at head height.
- Never point the laser beam at mirrors, windows or surfaces that are highly reflective. The reflected laser beam could cause serious injury.
- When using the laser-pointer function, be sure to turn OFF the output laser after distance measurement is completed. Even if distance measurement is canceled, the laser-pointer function is still operating and the laser beam continues to be emitted. (After turning ON the Laser-pointer, the laser beam is emitted for 5 minutes, and then automatically switches OFF.)
- Only those who have been received training as per the following items shall use this product.
  - Read the Operator's manual for usage procedures for this product.
  - Hazardous protection procedures (read this chapter).
  - Requisite protective gear (read this chapter).
  - 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 lasers are used should be posted with laser warning notices.
- If Search or Track is selected in the Motor configuration "A.T. Setting", the laser beam will be emitted from the objective lens when tracking a moving prism or searching for the center of the prism.

  ☞ Tracking settings: "12.1 Auto Tracking Settings"
- The LED beam is emitted when the guide light is set to ON and the power is turned ON. Before turning ON the power check that there are no persons in the LED beam path. Alternatively, always set the guide light to OFF when you have finished measurement.

  ☞ Guide light settings for tasks other than setting-out: "14.2 Using the Guide Light"

  ☞ Guide light settings for setting-out: "14.2 Using the Guide Light"

4. PRODUCT OUTLINE

4.1 Functions

SRX has the following features to make operation more efficient.

1. Auto Tracking (Auto Tracking model only)

   The SRX will automatically follow a moving prism when the target is being moved to the next measurement point, making surveying operations such as setting out faster and smoother. Even when an obstacle causes the SRX to momentarily lose the target, the On-demand Remote Control System allows the operator at the target to move the SRX via remote control and re-acquire the target position.

   ☞"12. MEASUREMENT WITH AUTO TRACKING"

2. *Bluetooth* wireless technology (Models with handle RC-TS3 or H-BT1 only)

   Bluetooth technology removes the need for cumbersome cables and provides wireless communication functionality between the SRX and the On-demand Remote Control System, and data collectors for even greater efficiency gains in the field.

   ☞"8. CONNECTING TO EXTERNAL DEVICES"

   Bluetooth®

   Use of this technology must be authorized according to telecommunications regulations of the country where the instrument is being used.

   ☞"30. REGULATIONS"

3. High accuracy with reflectorless measurement

   Sokkia's own optics, electrical circuits, and processing algorithms combine to provide superior reflectorless accuracy at distances as short as 30cm.

   RED-tech REvolutionary Digital processing EDM technology

4. Various interface options

   Data link options for the SRX include both a CF card slot and USB ports.

5. Full colour touch panel display

   Not only does the colur screen improve usability, but the Graphic option allows the user to visualise setting out operations. In addition to the operation keys, the touch panel with stylus pen offers another user-friendly method for selecting screens and inputting characters.

   ☞"5.2 Display Functions"

6. Guide light

Setting-out measurement etc. can be carried out effectively using the guide light. The guide light is composed of a light that is divided into green and red sections. A poleman can ascertain whether to move to the right or left by checking the guide light color.

☞"14.2 Using the Guide Light"

7. Sighting the target using Auto Pointing

Once the instrument is pointed in the general direction of the target, simply pressing **[SRCH]** will automatically sight the center of the prism. When used in collaboration with the On-demand Remote Control System, the SRX will locate the RC controller and automatically sight the target allowing all measurement to be performed from target side.

☞"11.2 Auto-Pointing Function for Target Sighting" and "21.3 EDM Settings"

8. Trigger Key for Easier Operation

Each screen contains a number of softkeys. Softkeys displayed in bold type control the flow of measurement operation. Pressing the trigger key located on the side of the SRX will perform exactly the same operation as the bolded softkey in the current screen. This allows the user to continue operation without having to return to the display to press softkeys.

☞〃4.2 Parts of the Instrument Trigger key"

9. Wide range of advanced programs

One touch of the **{PROGRAM}** key allows the user to switch from Basic mode to Program mode in order to use advanced measurement programs. The position of menus and softkeys can be user-defined for greater ease-of-use.

☞Switching modes: "4.3 Mode Structure", rearranging softkeys: "21.6 Allocating Key Functions"

10. SETTINGS Mode

One-touch of the **{SETTINGS}** key allows the user to jump to and from the SETTINGS mode during operation without exiting measurement.

☞"4.3 Mode Structure", "5.4 SETTINGS Mode"

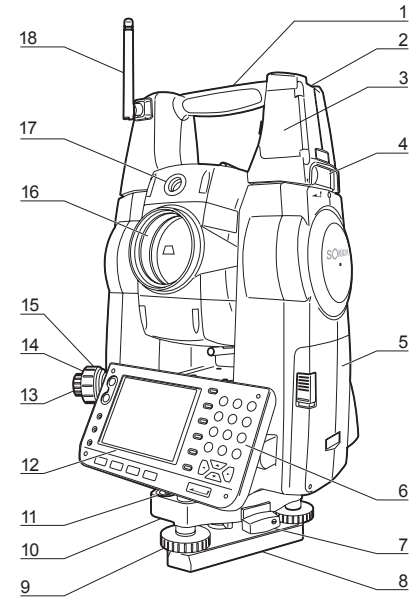
11.Sokkia's original Independent Angle Calibration System (IACS) technology

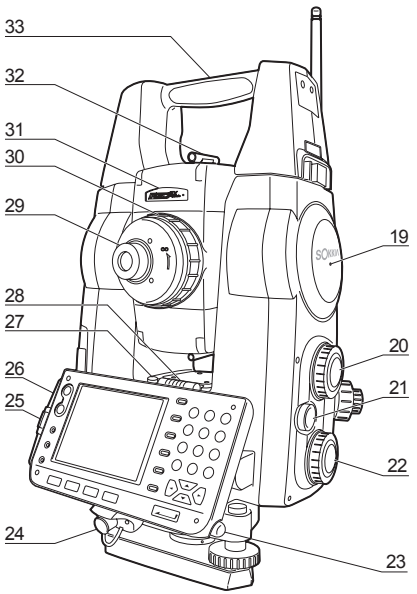
This revolutionary technology provides an even higher level of stability and reliability for angle measurement. IACS also eliminates the need for collimating with the instrument during operation as well as the need for a calibration instrument when performing checks and adjustments.

☞Independent angle calibration cannot be performed by the user. Consult your Sokkia agent.

4.2 Parts of the Instrument

Parts and functions of the instrument





1 Handle
☞"27. OPTIONAL ACCESSORIES"
2 Tubular compass slot
3 Beam detector (for On-demand Remote Control System operation)
4 Handle lock
5 Battery cover
6 Keyboard ☞ "5.1 Basic Key Operation"
7 Tribrach clamp
8 Base plate
9 Levelling foot screw
10 Circular level adjusting screws
11 Circular level
12 Display
13 Optical plummet eyepiece
14 Optical plummet reticle cover
15 Optical plummet focussing ring
16 Objective lens
(Includes "[] Laser-pointer function")
17 [] Guide light
18 *Bluetooth* antenna

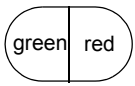
19 [] Instrument height mark
20 [] Vertical Jog dial
21 [] Trigger key
22 [] Horizontal Jog dial
23 Stylus pen holder
24 Combined communications and power supply connector
25 CF card slot
☞"6. USING THE CF CARD SLOT"
26 USB ports
☞"8. CONNECTING TO EXTERNAL DEVICES"
27 Plate level adjusting screw
28 Plate level
29 Telescope eyepiece screw
30 Telescope focussing ring
31 [] Laser radiation warning indicator
32 [] Peep sight
33 Instrument center mark

Vertical and Horizontal Jog dials

The instrument and telescope can be rotated manually by hand or, for more precise adjustments, by turning the vertical and horizontal Jog dials.
The faster the Jog dials are turned, the faster the instrument and telescope rotate.
☞"11.1 Auto Pointing Settings" step 3

Guide light

Setting-out measurement etc. can be carried out effectively using the guide light. The guide light is composed of a light that is divided into green and red sections. A poleman can ascertain the present position by checking the guide light color.



●**Guide light status**.

Light status	Meaning
Slow flashing (Red and green simultaneously)	Waiting
Fast flashing (Red and green simultaneously)	Searching in progress
	Measuring (continuous measurement)
	Returned signal checking in progress
	Auto Tracking in progress (Auto Tracking model only)
Green and red alternate flashing	Search error (error screen only)
	Distance measurement error (no signal, sighting error)
	"Prism wait"

The guide light indicator is lit or flashes depending on the status of the guide light.

Laser radiation warning indicator

Laser radiation warning indicator is red when laser beam is emitted or laser-pointer is used, allowing the status of the laser beam to be ascertained from the telescope eyepiece side.

Peep sight

Use peep sight to aim the SRX in the direction of the measurement point.
Turn the instrument until the triangle in the peep sight is aligned with the target.

Instrument height mark

The height of the SRX is 236mm (from tribrach dish to this mark). "Instrument height" is input when setting instrument station data and is the height from the measuring point (where SRX is mounted) to this mark.

Trigger key

When the Trigger key is pressed SRX carries out the operation indicated by the softkey in bold type on the screen. This allows the user to continue operation without having to return to the display to press softkeys.

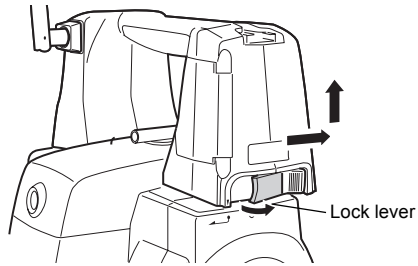
Laser-pointer function

A target can be sighted with a red laser beam in dark locations without the use of the telescope.

Removing the handle

1. Slide the handle locks in the direction as shown at right until a click is heard. The handle is now unlocked.

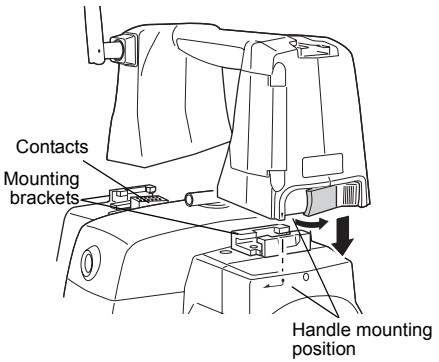
2. Pull the lock levers towards you and slide the handle back and up to remove.
   The handle lock levers, once released, will return to the original position.



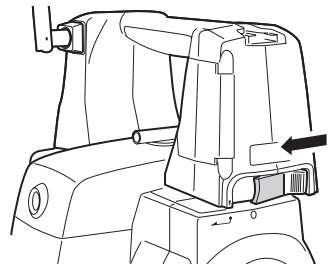
- Make sure that the handle does not fall while being removed. Removing the handle requires a certain amount of force. As a result, always hold firmly when removing.

Attaching the handle

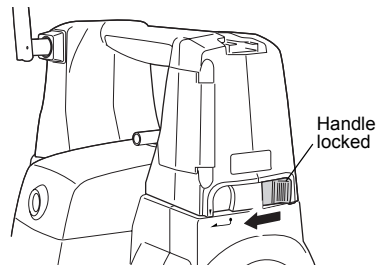
1. Align the handle with the mounting brackets.



2. Slide the handle onto the mounting position until a click is heard. Check that the handle lock levers, once released, return to the closed position.



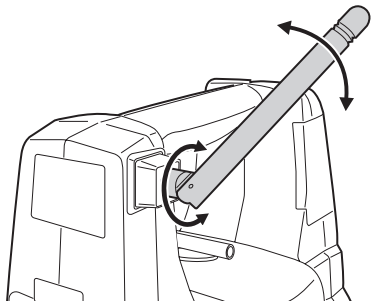
3. Slide the handle locks away from you to lock the handle. Check that the green sections of the handle locks are showing.



- Securely lock the handle in place before starting measurement.

Bluetooth antenna (RC-TS3/H-BT1 handles only)

When performing communication using *Bluetooth* wireless technology, the antenna must be directed towards the zenith.

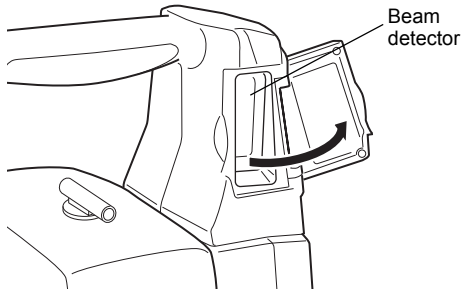


Handle the antenna with care and be aware of the following points when operating.

- An extended antenna may be damaged if struck during operation.
- The antenna may be damaged if forcibly bent in an incorrect direction. The antenna cannot be bent to angles exceeding 90°.
- Always stow the antenna in a downward direction when the instrument is not in use.

Beam detector for On-demand Remote Control System (RC-TS3/RC-TS3A handles only)

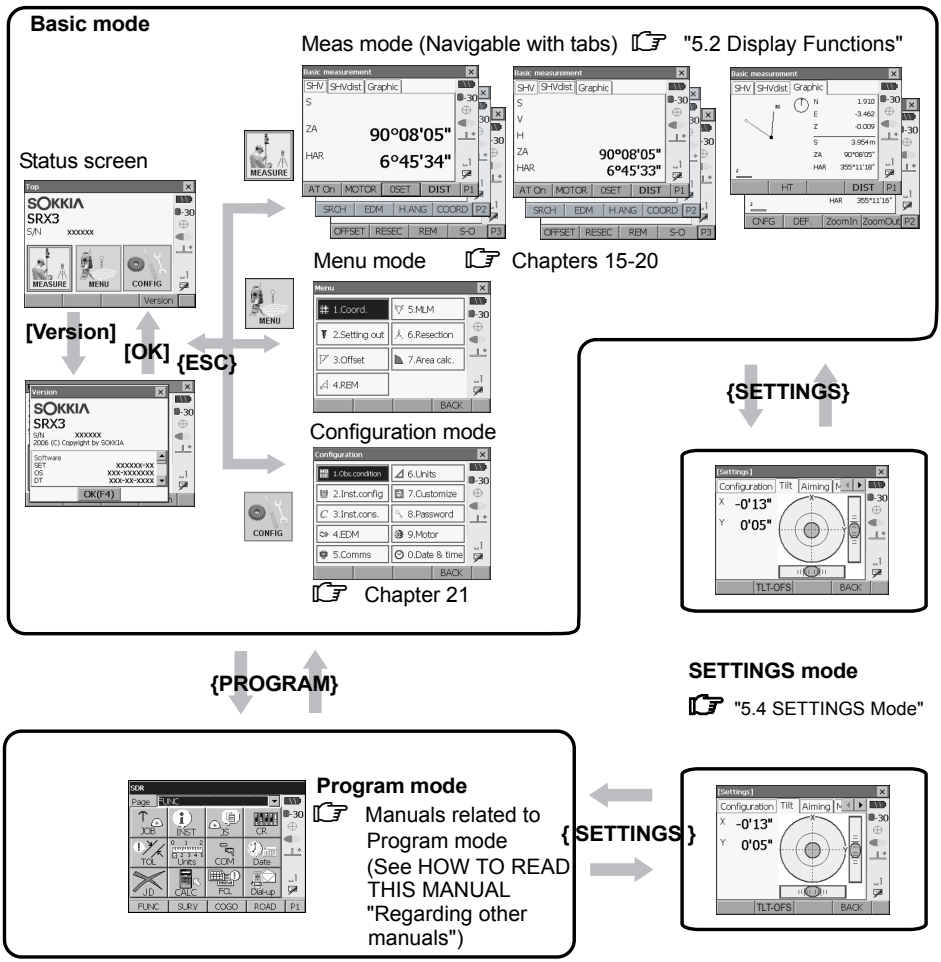
Always open the beam detector cover when using the On-demand Remote Control System.



- The beam detector cover can be damaged if forced open beyond a certain angle. Always close the beam detector cover before moving the instrument or placing it in its case.
- Never touch the beam detector. The ability of the system to perform Turning may be adversely affected.

4.3 Mode Structure

The diagram below describes the different modes of the SRX and key operations for navigating between them. Managing data functions are contained in Program mode.



- Switching between modes is not possible during distance measurement or while the motor is in operation.

4.4 *Bluetooth* Wireless Technology

- *Bluetooth* communication is only possible with instruments incorporating either the RC-TS3 or H-BT1 handle.
- Use of this technology must be authorized according to telecommunications regulations of the country where the instrument is being used. Contact your Sokkia agent in advance.
  ☞"30. REGULATIONS"
- Sokkia is not liable for the content of any transmission nor any content related thereto. When communicating important data, run tests beforehand to ascertain that communication is operating normally.
- Do not divulge the content of any transmission to any third party.

Radio interference when using *Bluetooth* technology

Bluetooth communication with the SRX uses the 2.4 GHz frequency band. This is the same band used by the devices described below.

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

The above devices use the same frequency band as *Bluetooth* communications. As a result, using the SRX within proximity to the above devices may result in interference causing communication failure or reduction of transmission speed.

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

● Regarding portable premises radio equipment and portable specified low-power radio equipment:

- Before starting transmission, check that operation will not take place within the vicinity of portable premises radio equipment or specified low-power radio equipment.
- In the case that the instrument causes radio interference with portable premises radio equipment, terminate the connection immediately and take measures to prevent further interference (e.g. connect using an interface cable).
- In the case that the instrument causes radio interference with portable specified low-power radio equipment, contact your Sokkia agent.

● When using the SRX in proximity to IEEE802.11b or IEEE802.11g standard wireless LAN devices, turn off all devices not being used.

- Interference may result, causing transmission speed to slow or even disrupting the connection completely. Turn off all devices not being used.

● Do not use the SRX in proximity to microwaves.

- Microwave ovens can cause significant interference resulting in communication failure. Perform communication at a distance of 3m or more from microwave ovens.

● Refrain from using the SRX in proximity to televisions and radios.

- Televisions and radios use a different frequency band to *Bluetooth* communications.
  However, even if the SRX is used within proximity to the above equipment with no adverse effects with regard to *Bluetooth* communication, moving a *Bluetooth* compatible device (including the SRX) closer to said equipment may result in electronic noise in sound or images, adversely affecting the performance of televisions and radios.

Precautions regarding transmission

● For best results

- When using the On-demand Remote Control System, perform communication within a line-of-sight distance of approximately 300m. The usable range becomes shorter when obstacles block the line of sight, or devices other than the On-demand Remote Control System, such as PDAs or computers, are used. Wood, glass and plastic will not impede communication but the usable range becomes shorter. Moreover, wood, glass and plastic containing metal frames, plates, foil and other heat shielding elements as well as coatings containing metallic powders may adversely affect *Bluetooth* communication and concrete, reinforced concrete, and metal will render it impossible.
- Use a vinyl or plastic cover to protect the instrument from rain and moisture. Metallic materials should not be used.
- The direction of the *Bluetooth* antenna can have adverse effects upon usable range. For best results make sure that the antennas of both the SRX and the paired device are pointing towards one another.

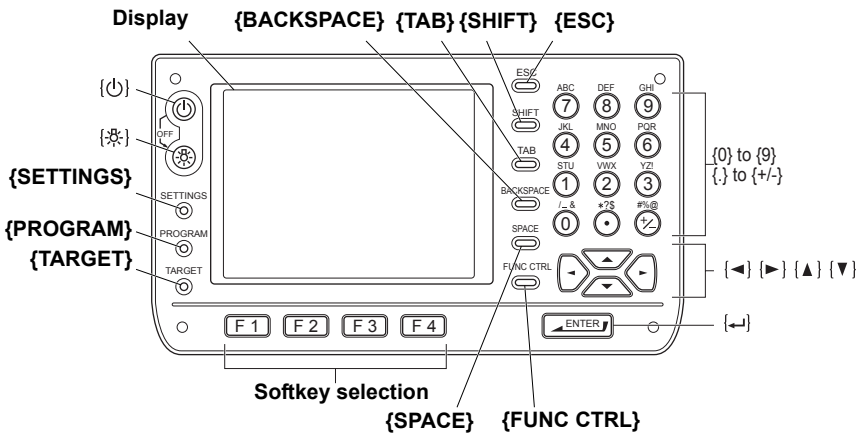
● Reduced range due to atmospheric conditions

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

5. BASIC OPERATION

Learn basic key operations here before you read each measurement procedure.

5.1 Basic Key Operation



- **Power ON/OFF**

{⏻}	Power ON
{⏻} (while pressing) + **{☼}**	Power OFF

- **Lighting up the reticle/keys and selecting screen backlight brightness**

{☼}	Switches the reticle illumination/key backlight ON/OFF
	Switches the screen backlight brightness setting

☞ "21.2 Instrument Configuration"

- **Switching to SETTINGS mode**

{SETTINGS}	Switches to screens for tilt correction, returned signal checking, motor operation, fixed velocity rotation, and general configuration
{SETTINGS}/{ESC}	Returns to the previous screen (mode)

☞ "5.4 SETTINGS Mode"

- **Switching to Program mode**

{PROGRAM}	Switches between Basic mode and Program mode

- **Switching target type**

{TARGET}	Switches between target types

☞ "21.3 EDM Settings"

Note

• Changes can also be made by tapping the status bar icon with the stylus pen.
☞ "5.2 Display Functions"

● **Switching the laser-pointer/guide light ON/OFF**

{☼} (Press and hold until a beep sounds)	Turns the laser-pointer/guide light ON/OFF

☞ Selecting laser-pointer/guide light after pressing **{☼}:** "21.3 EDM Settings"
•After turning ON the laser-pointer/guide light, the laser beam is emitted for 5 minutes, and then automatically switches OFF.
• Changes can also be made by tapping the status bar icon with the stylus pen.
☞ "5.2 Display Functions"

● **Softkey operation**

Softkeys are displayed on the bottom line of the screen.

{F1} to **{F4}**	Select the function matching the softkeys
{FUNC CTRL}	Toggle between softkey pages

● **Inputting letters/figures**

Character input method can be selected from upper case alphabetic, lower case alphabetic and numeric characters.

Note

•A selection can also be made by tapping the status bar icon with the stylus pen.

{0} to {9}	Input numeral or symbol printed above the key (during numeric input mode)
	Input alphabetic character in the order they are listed (in alphabetic input mode)
{.}	Input a decimal point (during numeric input mode)
{+/-}	Input a plus or minus sign (during numeric input mode)
{ESC}	Cancel the input data
{TAB}	Shift to the next item
{BACKSPACE}	Delete the character to the left
{SPACE}	Input a blank space (increments by 1 when setting the date and time)
{◀}/{▶}	Move the cursor left/right during character input
{ ▲ }/{ ▼ }	Move the cursor up/down during character input
{↵}	Select/accept input word/value

● Selecting options

{ ▲ }/{ ▼ }	Move the cursor/selection item up/down
{◀}/{▶}	Move the cursor/selection item left/right or select other option
{TAB}	Shift to the next item
{SPACE}	Display other options
{↵}	Select/accept the option

● Selecting tabs

{ ▲ }/{ ▼ }	Move tab/cursor in tab up/down
{◀}/{▶}	Display next tab at left/right

● Other operation

{ESC}	Return to previous screen

☞ Tabs: "5.2 Display Functions"

Example: Entering "computer" (lower case) as the name of a new device

1. Tap the input mode icon in the status bar (second from bottom) until "_a" is displayed.

2. Press **{7}** three times.
"c" is displayed.

3. Press **{5}** three times.
   "o" is displayed.

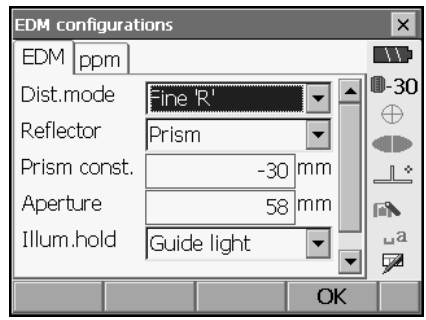
4. Press **{▶}**.
   Press **{5}** twice. "m" is displayed.

5. Continue to input letters. Press **{⏎}** to complete inputting.

Example: selecting a reflector type

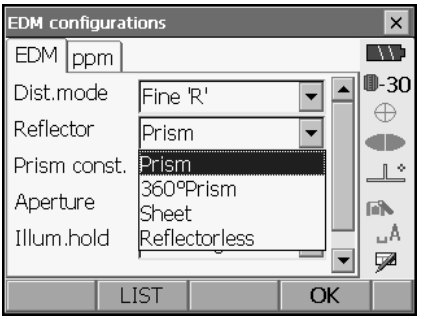
(Method 1)

1. Select **[EDM]** in the second page of Meas mode or "EDM" in SETTINGS mode/Configuration mode.



2. Move to "Reflector" using **{▲}**/**{▼}**/**{TAB}**.

3. Press **{SPACE}** to display a list of all options.



4. Select an option using **{▲}/{▼}**.

5. Press **{↵}** to confirm selection.

(Method 2)

1. Select **[EDM]** in the second page of Measure mode or "EDM" in SETTINGS mode/ Configuration mode.

2. Move to "Reflector" using **{▲}/{▼}/{TAB}**.

3. Switch between Prism, 360° Prism, Sheet, and Reflectorless using **{◀}/{▶}**.

4. Press **{↵}** to confirm selection.

.

5.2 Display Functions

Screens can be selected/operated using the keys on the keyboard or the touch panel. The touch panel can be operated using either the stylus pen provided or your fingers.

- Do not scratch the display or use any sharp implement other than the stylus pen to operate the touch panel.

Using the stylus

The stylus pen can be used to select menus and buttons on the screen and operate the scroll bar. The touch panel supports "tap", "double tap", and "drag" operations.

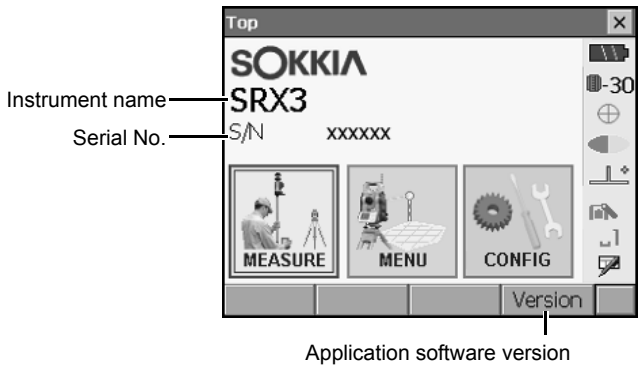
Operation	Method
Tap	Lightly tap the display once. This operation is equivalent to the clicking of a mouse button when using a computer.
Double tap	Lightly tap the display twice on the same point.This operation is equivalent to the "double-click" for a computer mouse.
Drag	Lightly apply the point of the stylus pen to the display and move in the desired direction, maintaining contact between the stylus and display all the time.

Displaying and operating screens

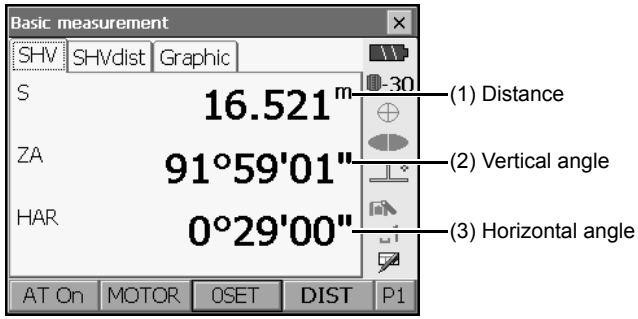
- To close a screen, tap the cross in the top right corner, or press **{ESC}**.
- Tabs, softkey allocations, displayed tab items, and character sizes can all be changed in accordance with user preferences.

☞"21. CHANGING THE SETTINGS"

● **Status screen**



● **Basic measurement screen**



(1) Distance

Press **[/SHV]** to switch between the SHV and SHVdist tabs. An SHVdist tab will be created when one does not exist.

☞ "21.1 Observation Conditions"

☞ "21.6 Allocating Key Functions"

(2) Vertical angle

The Vertical angle display can be switched between Zenith (Z=0°)/Horiz (H=0°)/Horiz (H=±90°) To switch vertical angle/slope in %, press **[ZA/%]** when allocated to the Meas mode screen. The capitalized letter in the softkey indicates the currently selected mode.

☞ "21.1 Observation Conditions"

(3) Horizontal angle

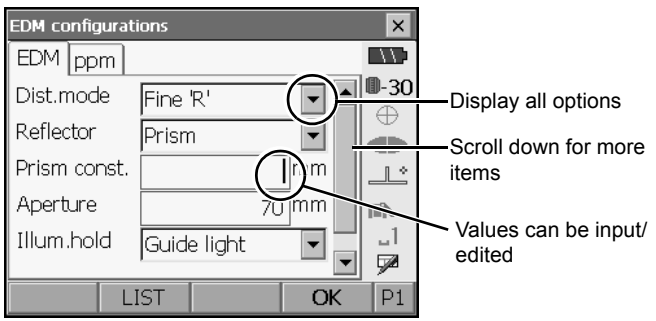
Press **[R/l]** when allocated to the Meas mode screen to switch the display status. The capitalized letter in the softkey indicates the currently selected mode.

HAR : Horizontal angle right

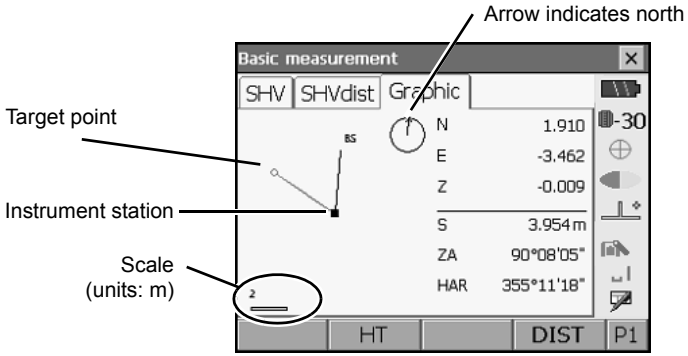
HAL : Horizontal angle left

☞ "21.6 Allocating Key Functions"

● **Input screen/configuration screen**



● **Graphic tab**



The Graphic tab display can be modified using the softkeys in the second page.

[CNFG]: In <Graphic configuration> the user can specify the orientation of the graphic tab display and which point, target or station, to set at the center of the display.

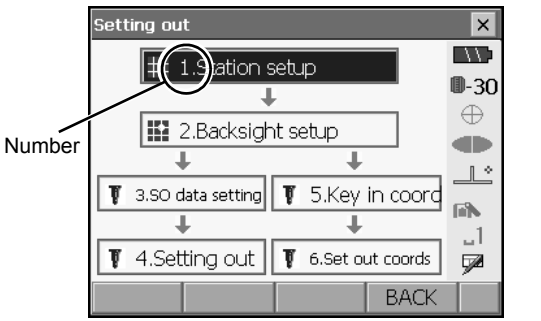
[DEF.]: Returns to the original orientation display.

[ZoomIn]: Zooms in.

[ZoomOut]:Zooms out.

● **Selecting menus**

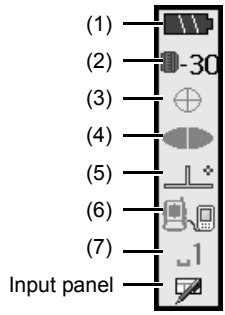
To select a menu, tap the touch panel or press the relevant number key.



● **Status bar**

Indicates the current status of the instrument. Tapping icons (1) to (7) will switch between the relevant options for that item Tapping and holding will display a list of all available options for that item and, in certain cases, a link to the configuration screen for that item.

☞ Settings: "21. CHANGING THE SETTINGS"



(1)Remaining battery power

Remaining battery power indicator and configuration of auto-power function (BDC58/external battery BDC61, Temperature = 25°, EDM on).

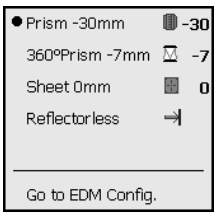
The remaining battery power displayed when distance measurement or motor operation is in progress may differ to that displayed at other times.

: Level 3	Full power
: Level 2	Plenty of power remains
: Level 1	Half or less power remains
Level 0	Little power remains. (Flashes red and black)
: No power	(Red display in the center of the screen) Stop measurement and charge the battery

☞ "7. USING THE BATTERY"

(2) Target display

Selection of target type and configuration of prism constant.



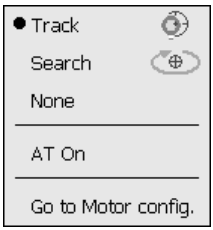
: Prism (-30mm)
: 360° Prism (-7mm)
: Sheet (0mm)
: Reflectorless

Target information can be edited/recorded in <Reflector setting>.

☞ "21.3 EDM Settings"

(3) Motor configuration

Configuration of Auto Pointing/Auto Tracking status. The display may change slightly depending on the target type selected. Auto Tracking items are only relevant to Auto Tracking models and are not available for Auto Pointing models.



: Auto Tracking ON
: Auto Pointing ON
: Both Auto Tracking and Auto Pointing OFF
: Start Auto Tracking."AT Off" is displayed when performing Auto Tracking or when in "Prism wait" status. Tap to quit Auto Tracking.

One of the following icons will be displayed while the motor is in operation to indicate the current status of the SRX.

: Rotating
: Rotating at fixed velocity
: Searching
: Auto Tracking in progress (when Auto Tracking set)
: Target "lost" (when Auto Tracking set)
: (Flashes red) Waiting for prism (when Auto Tracking set)

☞ Motor settings: "11.1 Auto Pointing Settings", "12.1 Auto Tracking Settings"

Note

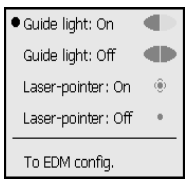
- Auto Tracking and Auto Pointing cannot be performed when "Reflectorless" has been selected as the target type. will be displayed. Auto Tracking cannot be performed when "Sheet" has been selected as the target type. will be displayed
- An arrow indicating turn direction will be displayed when the SRX is rotating at a fixed velocity.

☞ Fixed velocity rotation: "5.4 SETTINGS Mode ● Fixed velocity rotation"

(4) Laser-pointer/guide light

Configuration of laser-pointer/guide light status.

☞ Switching the laser-pointer/guide light ON/OFF: "5.1 Basic Key Operation"



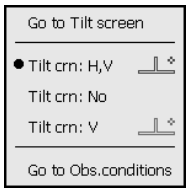
: Guide light ON
: Guide light OFF
: Laser-pointer ON
: Laser-pointer OFF

Note

- The laser-pointer will be automatically switched OFF during distance measurement.

(5) Tilt angle compensation

The vertical and horizontal angles are automatically compensated for small tilt errors usng the SRX's dual-axis tilt sensor. This icon displays the status of this function.



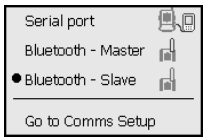
: Horizontal and vertical tilt angles compensated (blue)
: No compensation
: Only horizontal tilt angle compensated (green)

Note

- is displayed when the instrument is out of level.

(6) Communication status

Selection and configuration of communication status with external devices. This icon is not displayed in Program mode. *Bluetooth* settings can only be selected when using instruments incorporating either the RC-TS3 or H-BT1 handle.



: Connection via RS232C cable
: Connection via *Bluetooth* (SRX set as "Master" device) (blue antenna)
: Connection via *Bluetooth* (SRX set as "Slave" device) (green antenna)

Note

- When *Bluetooth* is selected (SRX set as "Master" device) a connection can be initiated/canceled by tapping / .
- This icon is not displayed in Program mode.

Connection status to external devices is displayed as follows.

i) Connection via *Bluetooth* wireless technology

When SRX is set as the "Master" device the antenna mark is blue. When the SRX is set as the "Slave" device the antenna mark is green.

: Connecting

: Canceling connection

: (Antenna is purple - moving)

SRX set to "Master": Inquiring about other *Bluetooth* devices

: (Antenna is purple - stationary)

Communication settings in progress/Preparing for communication (Instrument just powered ON or just switched to "Slave")

: Connection error (icon flashes green and red)

ii) : Connection via RS232C cable

Note

- An arrow (e.g. /) is displayed to indicate that data transmission is in progress. A red arrow indicates that data transmission has failed and data needs to be sent again.
- If a connection cannot be established or a connection error occurs, there may be dust particles on the contacts between the SRX and handle. Wrap a dry cloth around your fingertip and wipe the contacts clean.
  ☞ Contacts: " 4.2 Parts of the Instrument Removing the handle/Attaching the handle"

(7) Input mode
Selection of input mode

_1	Inputting numbers and symbols
_A	Inputting upper case alphabetic characters
_a	Inputting lower case alphabetic characters

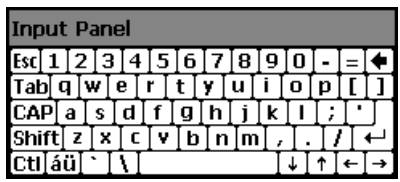
5.3 Inputting Characters using the Input Panel

Tap to display <Input Panel>. This keyboard can be used to input numeric and alphabetic characters as well as symbols. Tap the icon again to close.

Note

- When <Input Panel> is covering the icon of the status bar, use the stylus pen to drag the input panel to another part of the screen so that you can access the icon.

Input panel

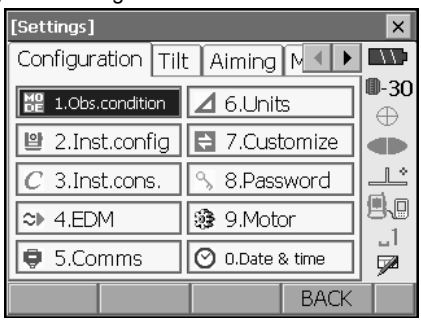


Esc	: Deletes all input characters
Tab	: Moves the cursor to the next text box
CAP	: Alternates between upper and lower case alphabetic characters and numbers/ symbols
Shift	: Alternates between upper and lower case alphabetic characters and numbers/ symbols. Is canceled after inputting a single character.
Ctl	: No function
Del/⇦	: Delete the character to the left/right or deletes the entire text in the active section
←→	: Move the cursor left/right

↵ : Accept input characters
Space : Input a blank space
áü : Accesses further Latin/Germanic characters/symbols

5.4 SETTINGS Mode

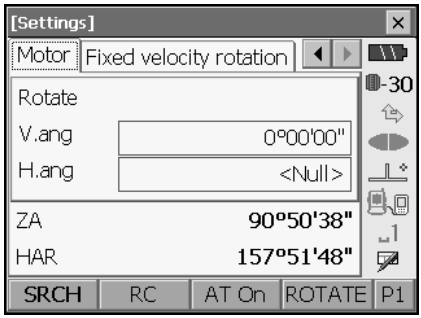
Press **{SETTINGS}** to switch to screens for tilt correction, returned signal checking, motor operation, fixed velocity rotation, and general configuration



☞ Performing settings: "21. CHANGING THE SETTINGS", Tilt settings: "9.2 Levelling", Returned signal checking: "14.1 Returned Signal Checking"

● Motor settings

The instrument can be automatically rotated to a desired vertical and/or horizontal angle by specifying the angle in the "Motor" tab and selecting **[ROTATE]**.

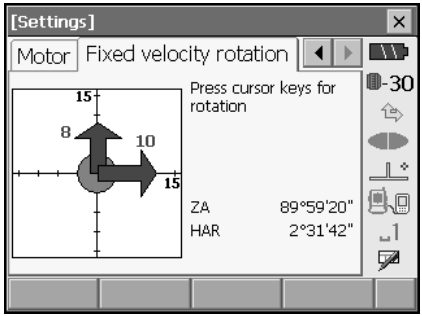


Note

- The following operations can be performed using the softkeys in the second page.
  [READ] : Read in coordinates from Program mode and set as the desired angle.
  [COORD] : Specify rotation angle by inputting coordinates in <Key in coord>.
  [TURN] : Rotate the SRX 180°.
  [CNFG] : Perform Motor configuration settings. ☞ "12.1 Auto Tracking Settings"

● Fixed velocity rotation

The SRX horizontal angle and telescope can be rotated using the controls in the Fixed velocity rotation tab. Speed settings are from 1 to 16.



Tap the touch panel in the desired rotation direction.
Press **{ESC}** or tap the red center circle to stop rotation.

6. USING THE CF CARD SLOT

CF (Compact Flash) cards, for saving surveying and other data, are supported by the SRX. Management of JOB and survey data is done in Program mode.
☞ SDR Software Reference Manual (Series SRX and NET05/NET1)

Note

- Contact your Sokkia agent for details regarding communication formats for CF card input/output.
- Data can also be transferred to an external device with memory capabilities for storage and/or editing using the SRX's USB ports.

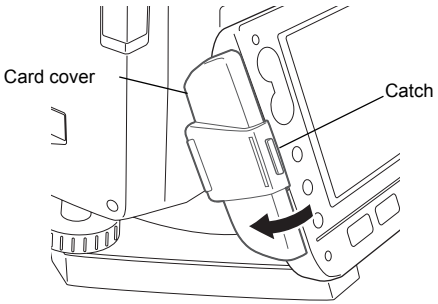
☞ "8. CONNECTING TO EXTERNAL DEVICES"

6.1 Inserting/Removing the CF Card

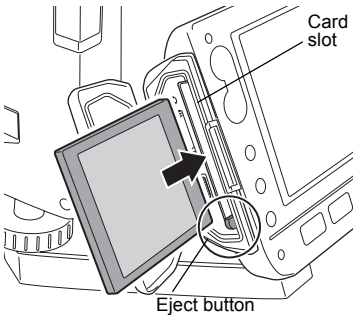
- Do not remove the CF card during data read/write.
- Make sure the eject button is fully depressed when a CF card is inserted. A protruding eject button will be depressed when the card cover is closed causing the card to be ejected.
- Always close the card cover before moving the instrument. The card cover can be damaged if forced open beyond a certain angle.

PROCEDURE Inserting the CF card

1. Push the catch on the card cover away from the display to open.

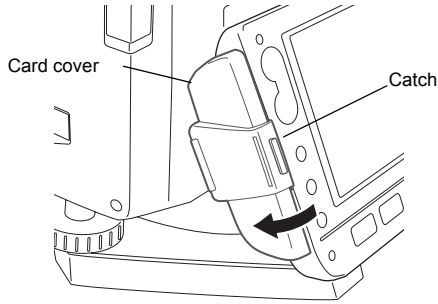


2. Insert the CF card.
3. Close the card cover.

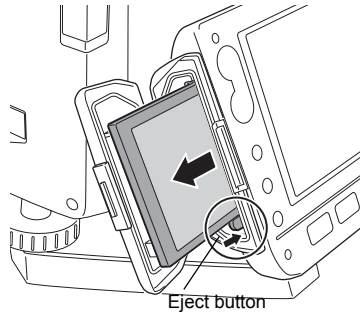


PROCEDURE Removing the CF card

1. Push the catch on the card cover away from the display to open.



2. Press the eject button once to release. Once the eject button is fully protruded, press once more to remove the card from the card slot.



3. Check that the eject button is not protruding, then close the card cover. Make sure the cover is properly closed.

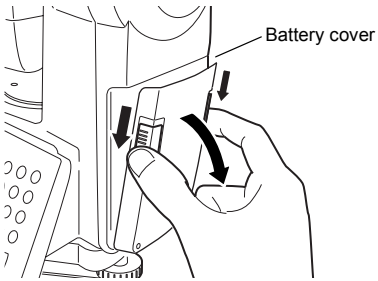
7. USING THE BATTERY

Mount the charged battery (BDC58).
☞ Types of power source: "24. POWER SUPPLY SYSTEM"

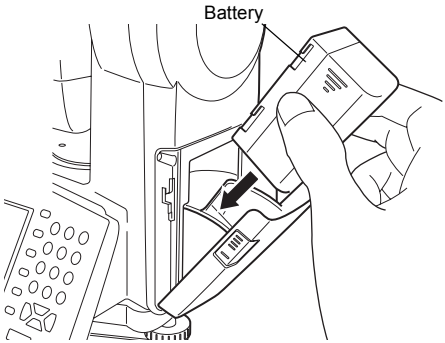
- Remove the battery when the instrument is not being used.
- Before removing the battery, turn off the power to the instrument. If the battery is removed while the power is switched on, a warm boot occurs. File and folder data may be lost as a result.
- When installing/removing the battery, make sure that moisture or dust particles do not come in contact with the inside of the instrument.

PROCEDURE Mounting the battery

1. Slide down the catches on the battery cover to open.



2. Insert the battery in the direction of the arrow printed on the side.
3. Close the battery cover. A click is heard when the cover is secure.



PROCEDURE Removing the battery

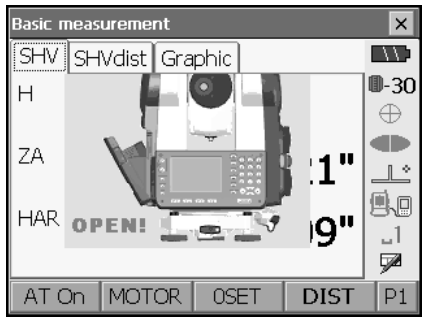
1. Slide down the catches on the battery cover to open.

2. Grip the battery by the arrow symbols printed on the side and slide out.

3. Close the battery cover. A click is heard when the cover is secure.

Note

- Battery cover
  If the battery cover is open during power ON, SRX notifies you by displaying the screen below and beeping.
- When the battery cover is closed, the previous screen is restored.



8. CONNECTING TO EXTERNAL DEVICES

The SRX supports both USB and *Bluetooth* wireless technology for communication with data collectors, the On-demand Remote Control System etc.
Read this manual in conjunction with the operator's manual for the relevant external device.

☞ *Bluetooth* communication: "4.4 Bluetooth Wireless Technology"
Transferring data using the SFX function: SFX Dial-Up Program Explanations (Series SRX and NET05/NET1), Output format and command operations: Interfacing with the SOKKIA SDR Electronic Field Book and Command Explanations manuals

•*Bluetooth* communication is only possible with instruments incorporating either the RC-TS3 or H-BT1 handle.

8.1 Wireless Communication using *Bluetooth* Technology

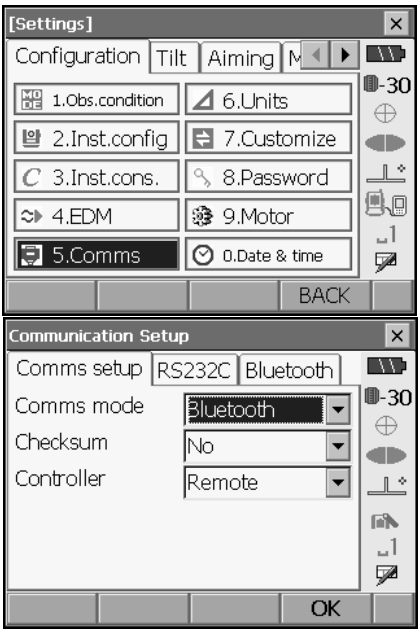
The *Bluetooth* module incorporated in the SRX can be used for communication with Bluetooth devices such as the On-demand Remote Control System RC controller and data collectors.

***Bluetooth* connections**
Communication between a pair of *Bluetooth* devices requires one device to be set as the "Master" and the other as the "Slave". To initiate connections from the SRX side, set the SRX as the "Master" device. To initiate connections from the paired device side, set the SRX as the "Slave" device. The factory setting is "Slave".

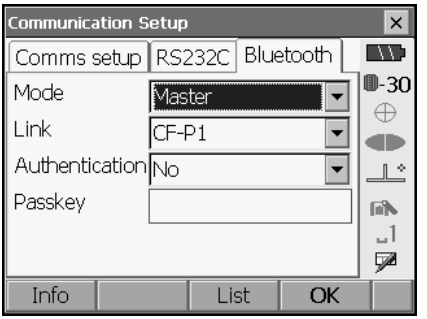
PROCEDURE Necessary settings for *Bluetooth* communication

1. Select "Comms" in SETTINGS mode. Set Comms mode in the Comms setup tab to "*Bluetooth*".

   • Changing communication settings during *Bluetooth* communication will cancel the connection.
   • The status bar icon cannot be tapped in <Communication Setup>.



2. Select a mode for the SRX in the *Bluetooth* tab. The factory setting is "Slave".
   Register companion devices.
   •"Master" cannot be selected when no companion devices have been registered.
   ☞ "Master"/"Slave": "*Bluetooth* connections"



3. Select, in "Link", a companion device from among the *Bluetooth* devices already registered in the SRX.
   ☞ Registering devices: "PROCEDURE Registering *Bluetooth* companion devices"

   •Companion devices cannot be selected when the SRX is set as "Slave".

4. Set "Authentication" to "Yes" or "No".
   If "Authentication" is set to "Yes" for the SRX the passkey will also need to be input on the companion device.

5. When "Authentication" is set to "Yes", input the same passkey as that for the intended companion device. Even if "Authentication" is set to "No", a passkey is requested when authentication is set on the companion device being used.
   • Up to 16 numeral characters can be input. Input characters will be displayed as asterisks (e.g. "******"). The passkey was set to "0123" at the factory.

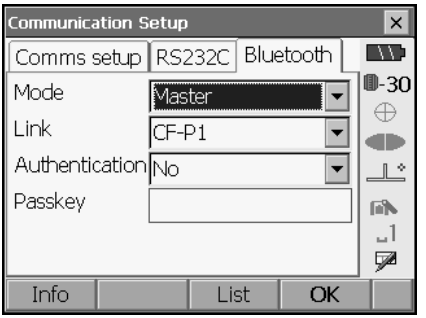
6. Press **[OK]** to finish settings.

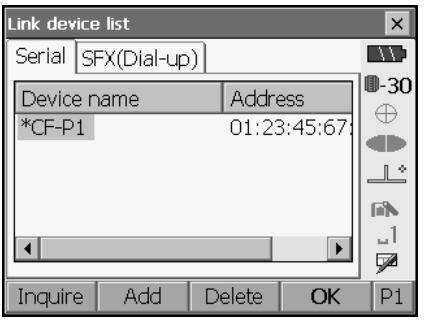
PROCEDURE Registering *Bluetooth* companion devices

1. Power on the companion device.

2. Select ""*Bluetooth*" in "Comms mode" in the Comms setup tab.

3. Press **[LIST]** to display a list of all registered devices.
   Data collector devices can be set in the Serial tab and devices for use with the SFX Dial-Up Program in the SFX (Dial-Up) tab.





4. Register your *Bluetooth* device(s).

   Press **[Add]** to display <Add device>. Input the device name and *Bluetooth* address and press **[OK]**. Up to 12 characters (numbers 0 to 9 and letters from A to F) can be input.

Press **[Inquire]** to inquire about *Bluetooth* devices in the immediate vicinity of the SRX and display their device name and address in a list. Select a device from this list and press **[OK]** to add to the Link device list in step 3.

Press **[Delete]** to delete the selected device name. Deleted device names cannot be retrieved.

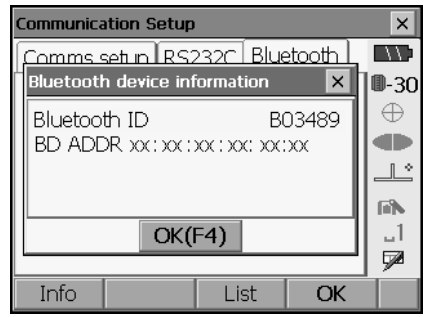
- Select a device and press **[Edit]** in the second page to update the device name and/or device address.

5. Press **[OK]** to complete registration and return to the screen in step 2.

PROCEDURE Displaying *Bluetooth* information for the SRX

1. Select "Comms" in SETTINGS mode.

2. Press **[Info]** in the *Bluetooth* tab to display information for the SRX. Register the *Bluetooth* address (BD ADDR) displayed here in the paired device set as "Master".



***Bluetooth* device address**

This is a number unique to one particular *Bluetooth* device used to identify devices during communication. This number consists of 12 characters (numbers 0 to 9 and letters from A to F). Some devices may be referred to by their *Bluetooth* device address.

8.2 Communication between the SRX and Companion Device

- *Bluetooth* communication causes SRX battery power to be depleted at a rate higher than that for normal operation.
- Check that the companion device (data collector, computer, cellular phone, or On-demand Remote Control System etc.) is turned on and the relevant *Bluetooth* settings are complete.

• All communication settings will be changed to factory settings when a cold boot is performed. Comms setup will need to be performed again.
☞ "8.1 Wireless Communication using Bluetooth Technology"

1. Complete the necessary SRX settings for *Bluetooth* communication.
☞ "8.1 Wireless Communication using Bluetooth Technology"

2. Start communication
When SRX is set as the "Master" device, the **[Connect]** softkey is allocated to the fourth page of Meas mode. When **[Connect]** is pressed the SRX searches for the device selected in "Link" and a connection starts. When a connection has been successfully established  is displayed in the status bar.
The establishing of a connection can also be initiated by tapping  in the status bar.
☞ Status bar, communication status: "5.2 Display Functions"

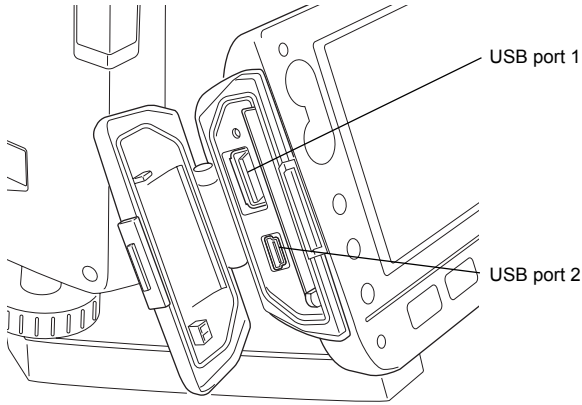
Note

•When SRX is set as the "Slave" device, the establishing of a connection can only be initiated/ canceled by the companion device set as "Master".

3. Press **[Cancel]** in the fourth page of Meas mode to terminate the connection.
A connection can also be terminated by tapping  in the status bar.

8.3 Connecting to USB devices

SRX has two different USB ports. Sokkia cannot guarantee that all USB devices are compatible with the SRX USB ports.



Each port is used for connection to different types of devices.

Port name	Device type
USB port 1	USB memory devices etc.
USB port 2	computers etc.

Connecting the SRX to a computer to transfer data from Program mode

1. Power OFF the SRX. Connect the SRX and computer using the USB cable.
   ☞ "10. POWER ON/OFF"

Note

•The computer does not need to be turned off before connection.

2. Press **{** ⏻ **}** while pressing **{**⏎**}**. "USB Mode" will be displayed on the screen of the SRX. After a short period (approx. 1 minute) <Removable disk> will be displayed on the computer screen.

3. The JOB data and observation data displayed in <Removable disk> can be copied and/or transferred to the computer.

Note

•The computer display may vary depending on Windows settings.

Follow the instructions below to ensure that the SRX continues to operate normally during USB transfer.

- Do not change the folder hierarchy or folder names in <Removable Disk>.
- Do not format the removable disk.

4. Double-click  in the computer task bar.
"Safely Remove Hardware" is displayed. Select "USB Mass Storage Device" and press "Stop". After confirming the subsequent prompt, disconnect the USB cable from the computer and SRX.

5. Press **{** ⏻ **}** while pressing **{**☼**}**. The next time the SRX is powered ON, the Meas mode screen will be displayed.

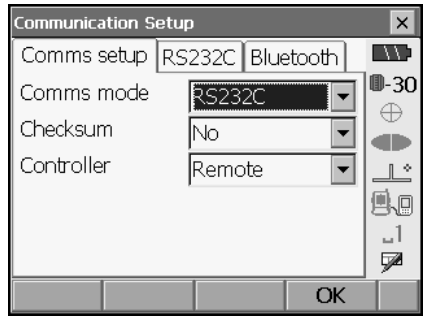
•Do not disconnect the USB cable or turn off the SRX or computer while files are being copied/ transferred.

8.4 Connection via RS232C cable

PROCEDURE Basic cable settings

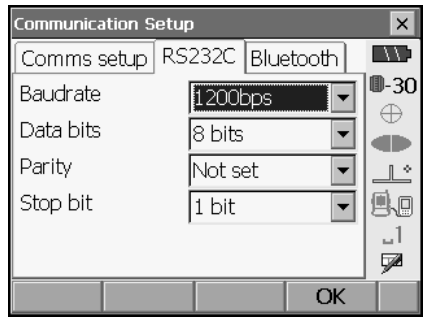
1. Connect the cable.
   ☞ Cables: "27. OPTIONAL ACCESSORIES"

2. Select "Comms" in SETTINGS mode.
   Set communication conditions in the Comms setup tab. Set "Comms mode" to "RS232C".



3. Set options in the RS232C tab according to the selection made in the Comms setup tab.
   *: factory settings

   Baud rate:
   1200*/2400/4800/9600/19200/38400bps
   Data bits: 7/8* bits
   Parity: Not set*/Odd/Even
   Stop bit: 1*/ 2



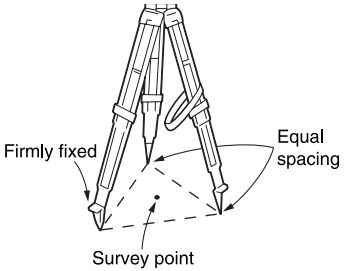
9. SETTING UP THE INSTRUMENT

- Mount the battery in the instrument before performing this operation because the instrument will tilt slightly if the battery is mounted after levelling.

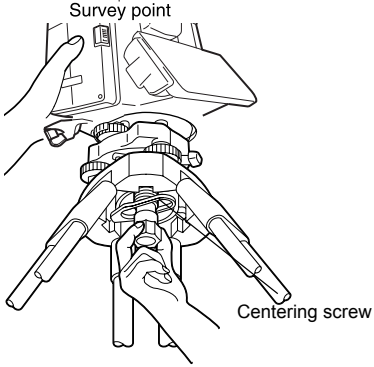
9.1 Centering

PROCEDURE

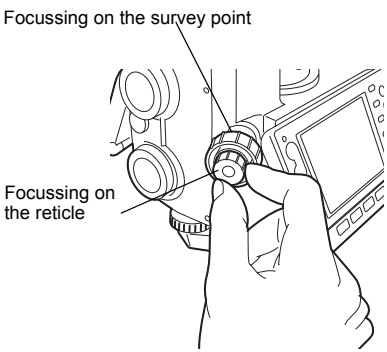
1. Make sure the legs are spaced at equal intervals and the head is approximately level. Set the tripod so that the head is positioned over the surveying point.
   Make sure the tripod shoes are firmly fixed in the ground.



2. Place the instrument on the tripod head. Supporting it with one hand, tighten the centering screw on the bottom of the unit to make sure it is secured to the tripod.



3. Looking through the optical plummet eyepiece, turn the optical plummet eyepiece to focus on the reticle.
   Turn the optical plummet focusing ring to focus on the surveying point.

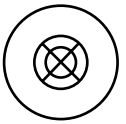


9.2 Levelling

Instrument can be levelled using the screen.
☞ "Note Levelling on the screen"

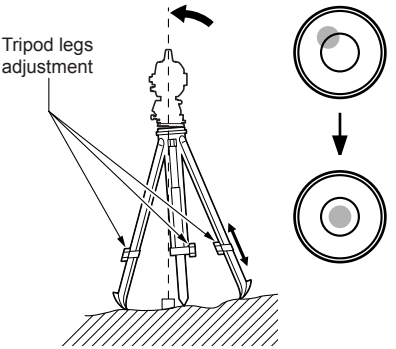
PROCEDURE

1. Adjust the levelling foot screws to center the surveying point in the optical plummet reticle.

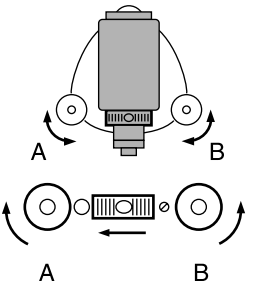


2. Center the bubble in the circular level by either shortening the tripod leg closest to the offcenter direction of the bubble or by lengthening the tripod leg farthest from the offcenter direction of the bubble. Adjust one more tripod leg to center the bubble.

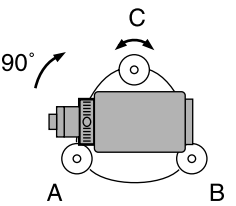
   Turn the levelling foot screws while checking the circular level until the bubble is centered in the center circle.



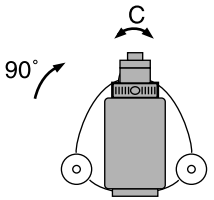
3. Turn the upper part of the instrument until the plate level is parallel to a line between levelling foot screws A and B.
   Center the air bubble using levelling foot screws A and B simultaneously.
   The bubble moves towards a clockwise rotated levelling foot screw.



4. Turn the upper part of the instrument though 90°.
   The plate level is now perpendicular to a line between levelling foot screws A and B.
   Center the air bubble using levelling foot screw C.



5. Turn another 90° and check bubble position
   Turn the upper part of the instrument a further 90° and check to see if the bubble is still in the center of the plate level. If the bubble is off-center, perform the following:
   a. Turn levelling foot screws A and B equally in opposite directions to remove half of the bubble displacement.
   b. Turn the upper part a further 90°, and use levelling foot screw C to remove half of the displacement in this direction.
   Or adjust the plate level.
   . ☞ "23.1 Plate Level"



6. Turn the instrument and check to see if the air bubble is in the center position in all directions. If it is not, repeat the levelling procedure.

7. Loosen the centering screw slightly.
   Looking through the optical plummet eyepiece, slide the instrument over the tripod head until the surveying point is exactly centered in the reticle. Retighten the centering screw securely.

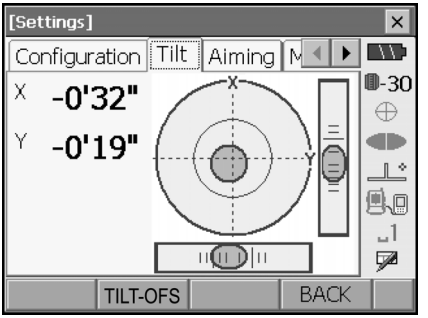
8. Check again to make sure the bubble in the plate level is centered
   If not, repeat the procedure starting from step 3.

PROCEDURE Levelling on the screen

1. Press **{ ⏻ }** to power on.
   ☞ "10. POWER ON/OFF"

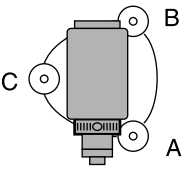
2. Press **{SETTINGS}** to enter SETTINGS mode.

3. Select the Tilt tab to display the circular level on the screen.
"●" indicates the bubble in circular level. The range of the inside circle is ±3' and the range of the outside circle is ±4.5'.



4. Center "●" in the circular level.
☞"9.2 Levelling" steps 1 to 2

5. Turn the instrument until the telescope is parallel to a line between levelling foot screws A and B.



6. Set the tilt angle to 0° using foot screws A and B for the X direction and levelling screw C for the Y direction.

7. Press **{ESC}** to return to Meas mode.

Note

•Press **[TLT-OFS]** to enter <Tilt offset/Meas.>.
☞"23.3 Tilt Sensor"

10.POWER ON/OFF

PROCEDURE Power ON

1. Press **{** ⏻ **}**.
   When the power is switched on, a self-check is run.
   The Meas mode screen is displayed.

   If "Out of range" is displayed, the instrument tilt sensor is indicating that the instrument is out of level. Level the instrument once again and the horizontal and vertical angles will be displayed.

Note

- "Tilt crn." in "Obs. condition" should be set to "No" if the display is unsteady due to vibration or strong wind.

☞ "21.1 Observation Conditions"

Resume function
The Resume function redisplays the screen appearing before the instrument was powered OFF when the instrument is powered back ON. All parameter settings are also saved. Even if remaining battery power is completely depleted, this function will remain active for 1 minute, after which it is canceled. Replace a depleted battery as soon as possible.

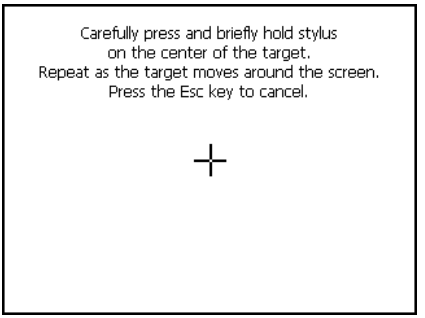
PROCEDURE Power OFF

Press **{** ⏻ **}** while pressing **{**☼**}**.

- When there is almost no battery power remaining, the battery mark in the status bar will start to blink.In this event, stop measurement, switch off the power and charge the battery or replace with a fully charged battery.
- To save power, power to the SRX is automatically cut off if it is not operated for a fixed period of time. This time period can be set in "Power off" in <Inst.config.>.
  ☞ "21.2 Instrument Configuration"

10.1 Configuring the Touch Panel

When using for the first time, or after performing a cold boot, the screen for configuring the touch panel will be displayed.



Follow the instructions on the screen. Tap the cross-hairs at the center of the display with the stylus pen. Tap 5 times. Press **{↵}** to complete touch panel configuration. Press **{ESC}** to retain previous settings.
For units with a display on both the F1 and F2 faces:

After tapping 5 times the display backlight will dim and the display on the reverse face will illuminate. Tap the cross-hairs on the reverse face display a further 5 times.

Note

- Touch panel configuration can be performed at any time during normal operation by pressing **[PNL CAL]** in <Inst.config.>.

☞"21.2 Instrument Configuration"

10.2 Resolving Software Issues

If you are experiencing problems with the SRX and suspect a fault in the program, you should try a warm boot. If the problem is not resolved with a warm boot the next step is to perform a cold boot. A warm boot will not erase surveying data in Program mode but will cancel the resume function. Whenever possible transmit the data to a personal computer before rebooting.

PROCEDURE

1. Power OFF the instrument.

2. Press **{ ⏻ }** while pressing **{↵}**.
   The instrument is reset and powers ON as normal.

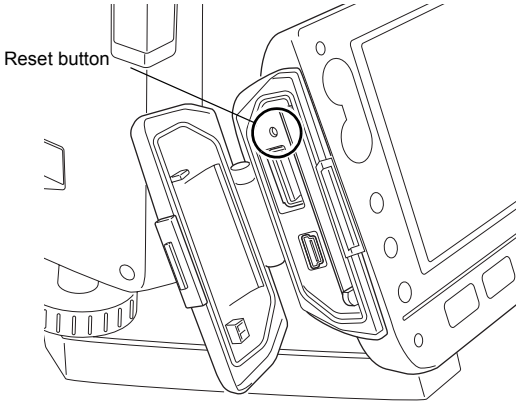
Cold boot

If the problem is not resolved with a warm boot the next step is to perform a cold boot. A cold boot will not erase surveying data in Program mode but all the parameters will be changed to the factory settings. If the data in the memory is necessary, **BE SURE TO TRANSFER IT TO A PERSONAL COMPUTER BEFORE PERFORMING A COLD BOOT.**
To perform a cold boot, while holding **{F3}, {F1},** and **{BACKSPACE}**, press **{ ⏻ }** .
The instrument is reset and powers ON as normal.
☞"21.10 Restoring Default Settings"

Problems Powering OFF

When the instrument cannot be powered OFF as normal, depress the reset button with the tip of the stylus pen. Then, power ON as normal.

•Pressing the Reset button may result in file and folder data being lost.



10.3 Powering the SRX ON/OFF from an External Instrument

The SRX can be powered ON/OFF from an external device such as a computer or data collector. Powering OFF from the paired *Bluetooth* device during *Bluetooth* communication is only possible when the SRX is set as the "Slave" device.

When the SRX is powered OFF from a paired *Bluetooth* device during *Bluetooth* communication, the screen shown at right will be displayed.

Powering ON the SRX from the paired *Bluetooth* device or by pressing **{** ⏻ **}** on the SRX itself redisplays the screen appearing before the instrument was powered OFF.

Powering OFF the SRX during *Bluetooth* communication will cancel the *Bluetooth* connection. If this screen is displayed continuously for 30 minutes, power to the SRX is automatically cut off.

•The password must be input after powering ON the SRX from an external device when a password has been set.

☞ Remote PWR-On function: "21.2 Instrument Configuration"
Setting a password: "21.8 Changing Password"

11.TARGET SIGHTING

A target can be automatically sighted using the Auto Pointing function or manually sighted by the operator using the peep sight and telescope. When Auto Pointing is performed, the SRX determines the direction in which the light beam reflected from the target (prism or reflective sheet target) has returned and automatically rotates the telescope to align the collimation axis of the total station with the center of this target.

⚠ Caution

- The instrument emits a laser beam until the center of the prism is sighted.

- Auto Pointing can only be performed when a prism or sheet is used as the target. For reflectorless measurement, the target must be sighted manually.
- Use reflective prisms/reflective sheets from Sokkia for higher precision measurement.
- Auto Pointing cannot be performed if the prism is located at the zenith. In this case, manually sight the target.

☞"11.3 Manually Sighting the Target"

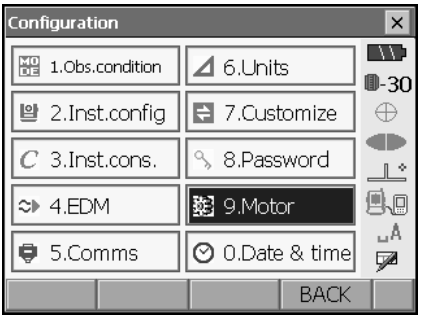
- If more than one prism is located in the field of sight during Auto Pointing, an operation error will occur and the SRX will not be able to find the target.
- A prism beyond glass cannot be searched because a measurement error occurs.
- If an obstacle blocks the laser beam path between the SRX and the prism, SRX cannot find the target correctly.
- When there is sunlight or extremely strong light entering the telescope from the sighting direction or being reflected directly from the objective lens, the SRX will evade such light to protect the CCD sensor. When evasion is not possible, search, sighting, and Auto Tracking operations may be automatically canceled. Avoid sunlight and extremely strong light when operating the SRX.
- If strong light shines directly into the objective lens, measurement cannot be performed correctly.
- Position the prism in alignment with the objective lens. A prism with a prism constant of -40mm can eliminate the error caused by tilted prism.

  ☞"29.1 High Accuracy with the 360° Prism"
- The following table suggests what size target to use for different distances when performing Auto Pointing with a reflective sheet target.

Distance	Target size
5 to 15m	RS10 (10mm)
5 to 30m	RS30 (30mm)
5 to 40m	RS50 (50mm)
5 to 50m	RS90 (90mm)

11.1 Auto Pointing Settings

1. Select "Motor" in <Configuration>.
   Set Auto Pointing functions in the Configuration tab.
   Set "A.T. Setting" to "Search".



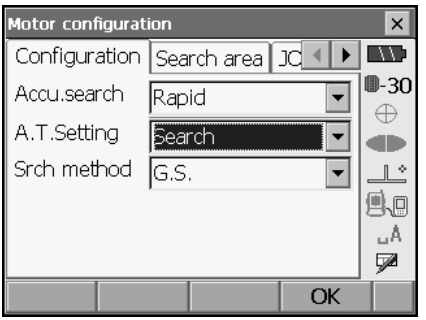
Settings and Options

(*: factory settings)

(1) Accu. search
Fine/Rapid*

(2) A.T. Setting
Auto Pointing model: None/Search*
Auto Tracking model: None/Search/Track*

(3) Srch method
G.S.*/R.C.



Accu. search

Set to "Fine" for greater accuracy during Auto Pointing. Make sure that the prism is securely mounted on a tripod etc.
Set to "Rapid" when supporting the pole by hand.
When "Fine" is set the SRX checks that the prism position is stable, then searches for the prism direction. Once the SRX confirms that the prism is sighted at the approximate center of the field-of-view, Auto Pointing is complete. Although this setting provides greater accuracy, when supporting the pole by hand, hand movements will result in Auto Pointing taking too long to complete and a "Time out" error will occur.
When "Rapid" is set however, Auto Pointing can be performed even with slight instability of prism position or minor shifts of target position in the field-of-view. The SRX will use the data obtained to determine the direction of the target.
Auto Pointing performed using the "Rapid" setting can be completed in a much quicker time than the "Fine" setting.
"Fine" is recommended when a high level of measurement accuracy is needed. The range for the offset between the target and reticle after Auto Pointing completed changes as shown below depending on the Srch. accuracy setting.

"Fine": ± 5" (approx.)
"Rapid": ± 30" to ± 10' (depending on distance)

Srch method

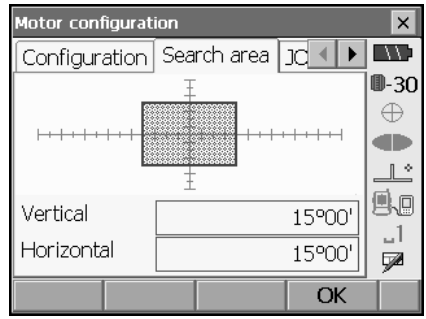
Selects search before distance measurement option.
When set to "G.S." the SRX will search for the target in the area specified in the Search area tab. When set to "R.C.", the SRX will wait for a Turning command to be issued from the RC Controller before starting Auto Pointing. Such commands can only be received when using instruments incorporating either the RC-TS3 or RC-TS3A handle.

Search operation during Auto Pointing

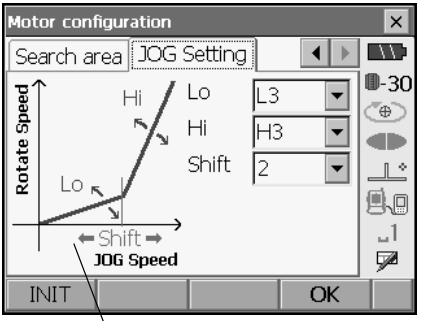
When the target enters the field-of-view within the set time limit for Auto Pointing completion, the SRX stops moving and the offset between the target and telescope reticle is added to the angle measurement value obtained from the encoder and compensated using image processing calculation. Although this compensation reduces measurement time and increases search accuracy, there is a possibility that the target and telescope reticle appear to be misaligned. Compensated values are displayed in blue.
If the SRX is rotated (manually or using the jog dials) more than 10", compensation will be canceled, the angle reverts to that obtained from the encoder, and the angle values are once again displayed in black. Compensation is automatically performed when performing Auto Tracking. Terminating Auto Tracking or powering OFF the SRX will cancel the compensation function.

2. Set the area in which to perform target sighting in the Search area tab. Drag the box to specify the desired area or input vertical and horizontal angle values.
   Angle values can only be specified in 1°30’ steps (e.g. 15°00’, 16°30’, 18°00’ etc.). Input values not conforming to this format will be automatically rounded up.

3. Press **[OK]**.



4. Set the Jog dial turning speed for vertical and horizontal rotation of the telescope. The "Shift" point signifies the dial turning speed at which telescope rotation switches from the Lo speed setting to the Hi speed setting.This Shift point, along with the Lo and Hi speed settings can be configured according to user preference.



The larger the number set in (3) the further to the right the Shift point is set

Settings and Options

(*: factory settings)

(1) Lo
1 to 4 (3*) (steps. 4 is fastest)

(2) Hi
1 to 4 (3*) (steps. 4 is fastest)

(3) Shift point
1 to 4 (2*) (steps)

Press **[INIT]** to return JOG Setting tab settings only to their factory settings.

11.2 Auto-Pointing Function for Target Sighting

PROCEDURE

1. Use the peep sight to aim the objective lens in the general direction of the target. The vertical and horizontal Jog dials can be used for precise adjustments of the instrument and telescope
   ☞ JOG Setting tab: "11.1 Auto Pointing Settings" step 3.

2. Press **[SRCH]** in any Meas mode screen. The telescope and top half of the instrument rotate and target auto-search begins. When the target is found, the instrument sights the center of the prism and stops.
   ☞ Allocating the **[SRCH]** softkey: "21.6 Allocating Key Functions"

Note

• When "A.T. Setting" in <Motor configuration> is set to "Search" the function of the following softkeys will change depending on the option selected in "Srch. method".
☞ Motor settings: "11.1 Auto Pointing Settings"
•"Turning" operation: The SRX locates the On-demand Remote Control System RC controller by detecting the laser beam output by the RC controller, then starts Auto Pointing.

"Motor" setting / Softkey	When "Search" set in "A.T. Setting"		When "None" set in "A.T. Setting"
	"Srch method" is R.C.	"Srch method" is G.S. (Global Search)	
[SRCH]	Performs Auto Pointing		
[DIST]	Performs Turning operation then angle/ distance measurement	Performs Auto Pointing then angle/distance measurement	Performs angle and distance measurement
[RC]	Rotates directly in the direction of the RC controller then performs Auto Pointing		
[<-RC]	Rotates in a counterclockwise direction (from the point of view of the RC controller) then performs Auto Pointing		
[RC->]	Rotates in a clockwise direction (from the point of view of the RC controller) then performs Auto Pointing		
[RC Cont]	Nullifies the current measurement position then continues Turning operation		
[AT On] (Auto Tracking model only)	Performs Turning operation then Auto Tracking	Performs Auto Pointing then Auto Tracking	Performs Auto Tracking *1

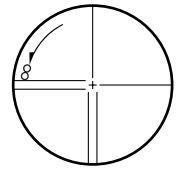
*1: Pressing **[AT On]** when A.T. Setting is set to "None" will result in one of the following operations being performed.
When "R.C." selected: Performs Turning operation then Auto Tracking
When G.S." selected: Performs Auto Pointing then Auto Tracking

11.3 Manually Sighting the Target

- When sighting the target, strong light shining directly into the objective lens may cause the instrument to malfunction. Protect the objective lens from direct light by attaching the lens hood.

▶PROCEDURE

1. Look through the telescope eyepiece at a bright and featureless background.
   Turn the eyepiece clockwise, then counterclockwise little by little until just before the reticle image becomes focussed.
   Using these procedures, frequent reticle refocussing is not necessary, since your eye is focussed at infinity.



2. Use the peep sight to bring the target into the field of view. Turn the vertical and horizontal Jog dials for fine sighting adjustments.

3. Turn the telescope focussing ring to focus on the target.
   Turn the vertical and horizontal fine motion screws to align the target with the reticle.
   The last adjustment of each fine motion screw should be in the clockwise direction.

4. Readjust the focus until there is no parallax
   Readjust the focus with the focussing ring until there is no parallax between the target image and the reticle.

Eliminating parallax

This is the relative displacement of the target image with respect to the reticle when the observer's head is moved slightly before the eyepiece.
Parallax will introduce reading errors and must be removed before observations are taken.
Parallax can be removed by refocussing the reticle.

Greater accuracy when sighting manually

For greater accuracy when sighting manually, set A.T. Setting to "None" then automatically rotate the telescope to a specified angle. When the target is in the field-of-view, use the Jog dials to make fine adjustments and accurately sight the center of the prism.
☞ "11.3 Manually Sighting the Target"

It is recommended that a slow Jog dial turning speed is used for greater stability when performing fine adjustments.

12. MEASUREMENT WITH AUTO TRACKING

With the Auto Tracking function, the SRX searches for and sights the target. The SRX will then following that target as it is moved from measurement point to measurement point. The On-demand Remote Control System is recommended for high performance Auto Tracking measurement.

⚠ Caution

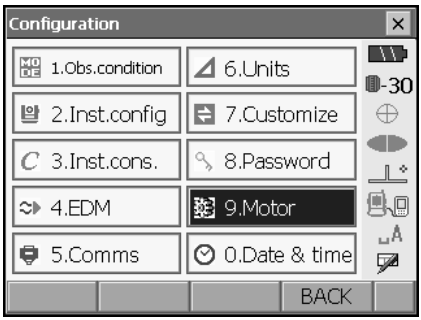
- The instrument emits a laser beam during Auto Pointing and Auto Tracking operation.

- Auto Pointing model does not support Auto Tracking.
- Auto Tracking can only be performed when a prism is used as the target. Auto Tracking is not possible with reflective sheet and reflectorless measurement.
- Use reflective prisms from Sokkia for higher precision measurement.
- If more than one prism is located in the field of sight during Auto Tracking, an operation error will occur and the SRX will not be able to find the target.
- The SRX cannot perform Auto Pointing/Auto Tracking when there is glass between the SRX and the prism. A measurement error will occur.
- If an obstacle blocks the laser beam path between the SRX and the prism, SRX cannot find the target correctly.
- When there is sunlight or extremely strong light entering the telescope from the sighting direction or being reflected directly from the objective lens, the SRX will evade such light to protect the CCD sensor. When evasion is not possible, search, sighting, and Auto Tracking operations may be automatically canceled. Avoid sunlight and extremely strong light when operating the SRX.

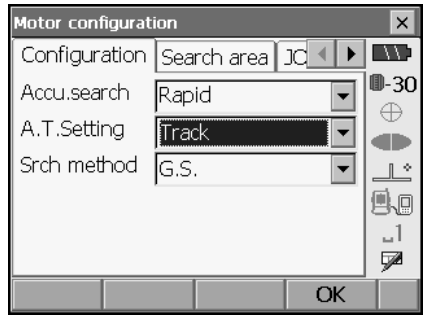
12.1 Auto Tracking Settings

PROCEDURE

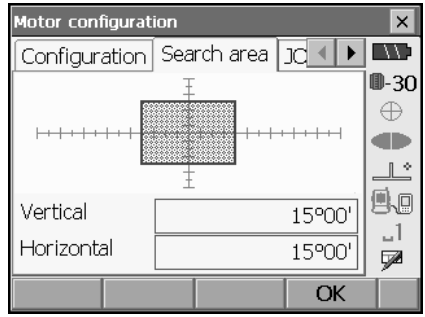
1. Select "Motor" in <Configuration>.
   Set Auto Tracking functions in the Configuration tab.
   Set "A.T. Setting" to "Track".



☞ Configuration tab: "11.1 Auto Pointing Settings"



2. Set the area in which to perform target sighting in the Search area tab. Drag the box to specify the desired area or input vertical and horizontal angle values.
   Angle values can only be specified in 1°30' steps (e.g. 15°00', 16°30', 18°00' etc.). Input values not conforming to this format will be automatically rounded up.

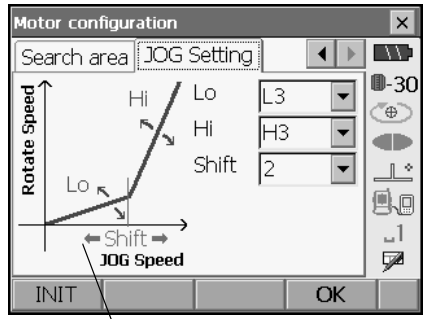


3. When neccessary, set the Jog dial turning speed for vertical and horizontal rotation of the telescope.

   ☞ JOG Setting tab: "11.1 Auto Pointing Settings" step 3

   Press **[INIT]** to return JOG Setting tab settings only to their factory settings.

4. Press **[OK]**.



The larger the number set in (3) the further to the right the Shift point is set

12.2 Measurement with Auto Tracking

PROCEDURE

1. Use the peep sight to aim the objective lens in the general direction of the target. (The vertical and horizontal Jog dials can be used for precise adjustments of the instrument and telescope.)
   ☞ JOG Setting tab: "11.1 Auto Pointing Settings" step 3

2. Select **[DIST]**, **[RC Cont]**, or **[SRCH]** in any Meas mode screen. The telescope and top half of the instrument rotate and target auto-search begins. When the target is found, the target is aligned in the field-of-view and Auto Tracking starts.
   ☞ Allocating softkeys: "21.6 Allocating Key Functions"

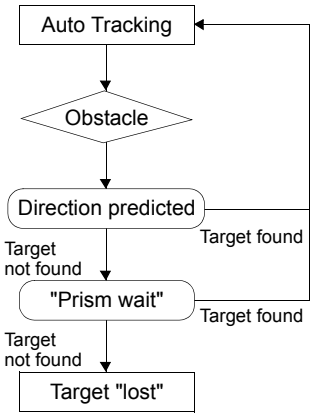
3. Press **[AT Off]** in a Meas mode screen to stop Auto Tracking.

Note

- When **[STOP]** is pressed, distance measurement will stop but Auto Tracking will remain active.

Lost Prism

In the event that an obstacle prevents the SRX sighting the target during Auto Tracking, the instrument will predict the direction in which the target will travel and continue Auto Tracking based on this prediction. If the SRX re-acquires the target in this predicted direction, Auto Tracking continues without change. If the target is not re-acquired however, Auto Tracking will stop and the SRX will enter "prism wait" status for a period of 60 seconds. If the target enters the field of view or a Turning command is received from the RC controller during "prism wait", the SRX will search for the target, then resume Auto Tracking. If the target is not re-acquired during the "prism wait" period, the target is considered "lost" and sighting terminates.
Start Auto Tracking procedure again from step 1.



Note

• When "A.T. Setting" in <Motor configuration> is set to "Track" the function of the following softkeys will change depending on the option selected in "Srch. method" and Auto Tracking will be added.

☞ Motor settings: "11.1 Auto Pointing Settings"

Turning operation

The SRX locates the On-demand Remote Control System RC controller by detecting the laser beam output by the RC controller, then starts Auto Pointing.

"Motor" setting / Softkey	When "Track" set in "A.T. Setting"		When "None" set in "A.T. Setting"
	"Srch method" is R.C.	"Srch method" is G.S. (Global Search)	
[SRCH]	Performs Auto Pointing then Auto Tracking		Performs Auto Pointing
[DIST]	Performs Turning operation then distance measurement/Auto Tracking	Performs Auto Pointing then distance measurement/Auto Tracking	Performs angle and distance measurement
[RC]	Rotates directly in the direction of the RC controller then performs Auto Pointing		Rotates in the direction specified by the RC controller then performs Auto Pointing
[<-RC]	Rotates in a counterclockwise direction (from the point of view of the RC controller) then performs Auto Pointing/Auto Tracking		Rotates in a counterclockwise direction (from the point of view of the RC controller) then performs Auto Pointing

[RC->]	Rotates in a clockwise direction (from the point of view of the RC controller) then performs Auto Pointing/Auto Tracking		Rotates in a clockwise direction (from the point of view of the RC controller) then performs Auto Pointing
[RC Cont]	Nullifies the current measurement position then continues Turning operation/Auto Tracking		Nullifies the current measurement position then continues Turning operation
[AT On]	Performs Turning operation then Auto Tracking	Performs Auto Pointing then Auto Tracking	Performs Auto Tracking *1

*1: Pressing **[AT On]** when A.T. Setting is set to "None" will result in one of the following operations being performed.
When "R.C." selected: Performs Turning operation then Auto Tracking
When "G.S." selected: Performs Auto Pointing then Auto Tracking

13.ANGLE MEASUREMENT

This section explains the procedures for basic angle measurement in Basic mode.

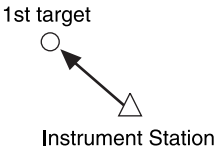
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.
  ☞"21.6 Allocating Key Functions"

13.1 Measuring the Horizontal Angle between Two Points (Horizontal Angle 0°)

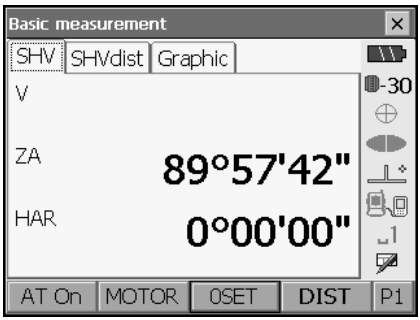
Use the “0SET” function to measure the included angle between two points. The horizontal angle can be set to 0 at any direction.

PROCEDURE

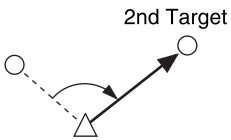
1. Sight the first target as at right.
   ☞"11. TARGET SIGHTING"



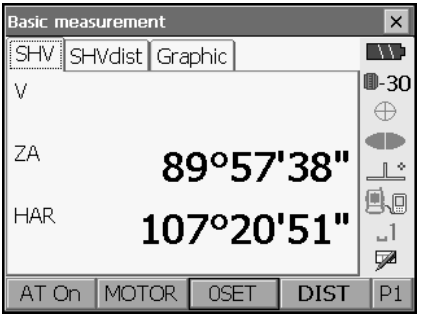
2. In the first page of the Meas mode screen, press **[0SET]**.
   [0SET] will flash, so press **[0SET]** again.
   The horizontal angle at the first target becomes 0°.



3. Sight the second target.



The displayed horizontal angle (HAR) is the included angle between two points.



13.2 Setting the Horizontal Angle to a Required Value (Horizontal Angle Hold)

You can reset the horizontal angle to a required value and use this value to find the horizontal angle of a new target.

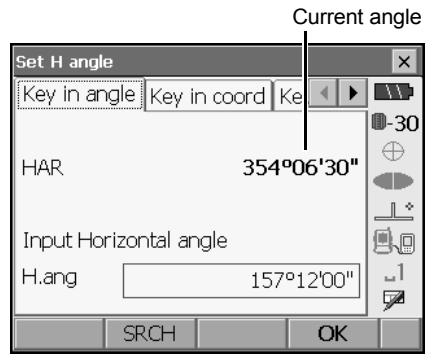
PROCEDURE

1. Sight the first target.

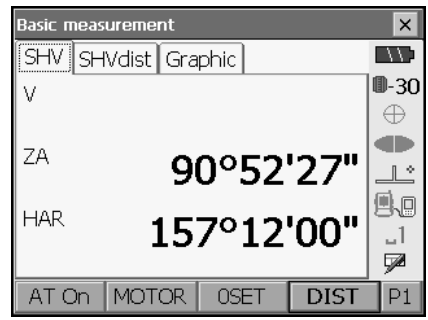
2. In the second page of Basic mode, press **[H.ANG]**. <Set H angle> is displayed.

3. Enter the angle you wish to set, then press **[OK]**. The value that is input as the horizontal angle is displayed.

   - Press **[SRCH]** to rotate the SRX in the direction of the desired angle.
   - The same setting can also be performed with coordinate and azimuth input.
     ☞ "15.2 Azimuth Angle Setting"



4. Press **[OK]** to confirm the input value and display the new horizontal angle.



5. Sight the second target.
   The horizontal angle from the second target to the value set as the horizontal angle is displayed.

Note

- Pressing **[HOLD]** performs the same function as above.
- Press **[HOLD]** to set the displayed horizontal angle. Then, set the angle that is in hold status to the direction you require.

☞ Allocating **[HOLD]**: "21.6 Allocating Key Functions"

13.3 Turning the Instrument from the Reference Angle to a Specified Angle

The SRX automatically turns from the reference direction to the specified angle (target).

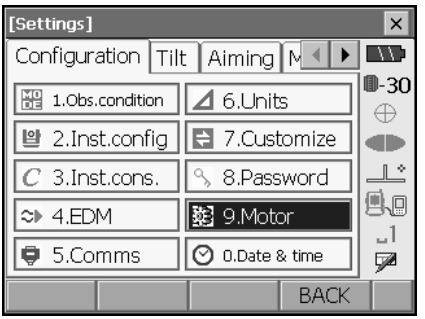
- SRX also turns to the target coordinates when reference angle is omitted.

- Rotation may not be completed correctly when specifiying an angle near the zenith or nadir if "Tilt crn." or "Coll. crn" is set to "Yes" in "Obs.condition".

PROCEDURE

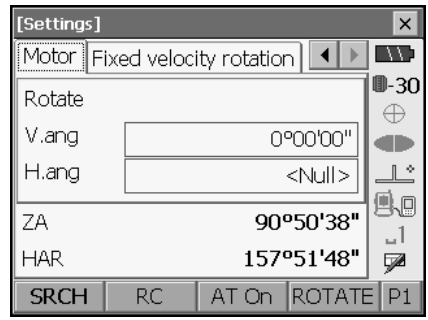
1. Sight the point you will use as the reference angle and set it as the reference angle.
   Sight the reference point and press **[0SET]**, or input the reference point angle.
   ☞"13.1 Measuring the Horizontal Angle between Two Points (Horizontal Angle 0°)"/ "13.2 Setting the Horizontal Angle to a Required Value (Horizontal Angle Hold)"

2. Press **{SETTINGS}** to switch to SETTINGS mode.
   Select "Motor" in the Configuration tab.



3. Enter the vertical and horizontal angles in the Motor tab.

   - Pressing **[READ]** in the second page displays the coordinates data recorded in Program mode. This data can be recalled and used for settings.
     ☞"15.4 Reading in registered coordinate data from Program mode"
   - The target angle can be obtained from the entered instrument station and target coordinates. Instrument station data is entered on the second page. Press **[OK]** to calculate both the horizontal and vertical angle from the coordinates.



4. After confirming the coordinates, press **[ROTATE]**. The SRX moves to the point (target) entered in step 3.

13.4 Angle measurement and Outputting the Data

The following explains angle measurement and the features used to output measurement results to a computer or other external devices.
☞"6.1 CONNECTING TO EXTERNAL DEVICES", Cables: "27. OPTIONAL ACCESSORIES", Output format and command operations: Interfacing with the SOKKIA SDR Electronic Field Book and Command Explanations manuals

PROCEDURE

1. Connect SRX and external device.
2. Sight the target point.
3. Press **[HV out]** in Meas mode to output target measurement results to the external device.

14.DISTANCE MEASUREMENT

Perform the following settings as preparation for distance measurement in Basic mode.

- Distance measurement mode
- Target type
- Prism constant correction value
- Search area
- Auto Pointing/Auto Tracking
  ☞"11.1 Auto Pointing Settings", "12.1 Auto Tracking Settings", "21.3 EDM Settings"
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.
  ☞"21.6 Allocating Key Functions"

⚠ Caution

- When using the laser-pointer function, be sure to turn OFF the output laser after distance measurement is completed. Even if distance measurement is canceled, the laser-pointer function is still operating and the laser beam continues to be emitted. (After turning ON the laser-pointer, the laser beam is emitted for 5 minutes, and then automatically switches OFF.)

- Make sure that the target setting on the instrument matches the type of target used. SRX automatically adjusts the intensity of the laser beam and switches the distance measurement display range to match the type of target used. If the target does not correspond to the target settings, accurate measurement results cannot be obtained.
- Accurate measurement results cannot be obtained if the objective lens is dirty. Dust it off with the lens brush first, to remove minute particles. Then, after providing a little condensation by breathing on the lens, wipe it off with the wiping cloth.
- During reflectorless measurement, if an object with a high reflective factor (metal or white surface) is positioned between the SRX and the target, accurate measurement results may not be received.
- Scintillation may affect the accuracy of distance measurement results. Should this occur, repeat measurement several times and use the averaged value of the obtained results.

14.1 Returned Signal Checking

Check to make sure that sufficient reflected light is returned by the target sighted by the telescope. Checking the returned signal is particularly useful when performing long distance measurements.

⚠ Caution

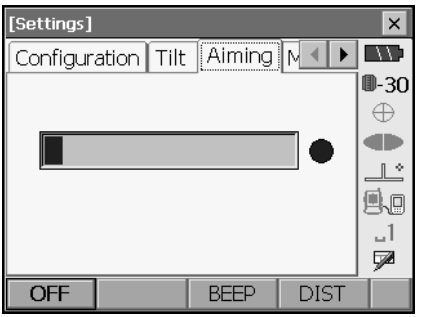
- The laser beam is emitted during returned signal checking.

- Manually sight the target when checking the returned signal.
- When the light intensity is sufficient even though the center of the reflective prism and the reticle are slightly misaligned (short distance etc.), "●" will be displayed in some cases, but in fact, accurate measurement is impossible. Therefore make sure that the target center is sighted correctly.

PROCEDURE

1. Accurately sight the target manually.
   ☞ "11.3 Manually Sighting the Target"

2. Press **{SETTINGS}** to switch to SETTINGS mode and select the Aiming tab or press **[AIM]** in Meas mode.
   ☞ Allocating **[AIM]**: "21.6 Allocating Key Functions"



   When **[AIM]** is pressed, a gauge indicating light intensity is displayed.

   - The more ▬▬ displayed, the greater the quantity of reflected light.
   - If "●" is displayed, only enough light for the measurement is returned.
   - When "●" is not displayed, accurately resight the target.

     [BEEP]/[OFF]: Sets a buzzer sound when measurement is possible. Press to switch on and off.
     [DIST]: Returns to Meas mode and starts angle and distance measurement regardless of "A.T. Setting" setting. This softkey is not displayed when the returned signal checking function is accessed from Program mode.

3. Press **[OFF]** to finish signal checking.
   Press **{ESC}** or tap the cross in the top-right corner to return to the previous screen.

Note

- When ▬▬ is displayed persistently, but "●" is not, contact your Sokkia agent.
- If no key operations are performed for two minutes, the display automatically returns to the previous screen.

14.2 Using the Guide Light

The color and flashing speed of the guide light indicates the status of the SRX and can be known when the user is located at a distance from the instrument.
☞ Switching the guide light ON/OFF "5.1 Basic Key Operation"

• The pattern of the guide light can be changed.
☞ "21.2 Instrument Configuration"

• The guide light will turn off, even when set to ON, during distance measurement and returned signal checking.

Light status	Meaning
Slow flashing (Red and green simultaneously)	Waiting
Fast flashing (Red and green simultaneously)	Searching in progress
	Measuring (continuous measurement)
	Returned signal checking in progress
	Auto Tracking in progress (Auto Tracking model only)
Green and red alternate flashing	Search error (error screen only)
	Distance measurement error (no signal, sighting error)
	"Prism wait"

14.3 Distance and Angle Measurement

An angle can be measured at the same time as distance.

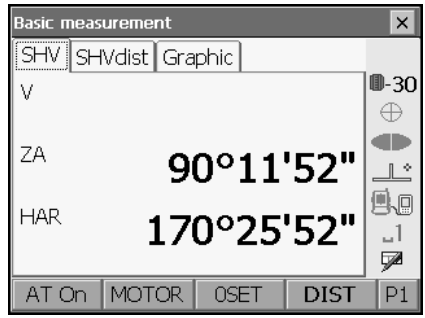
• The search range can be set.
☞ "11.1 Auto Pointing Settings"

⚠Caution
• The laser beam is emitted during Auto Pointing and Auto Tracking.

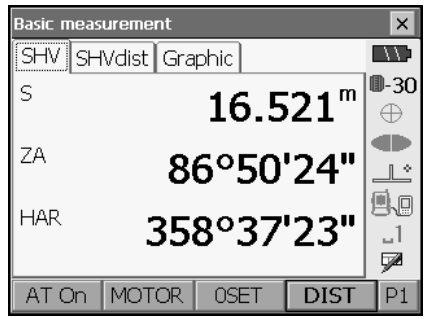
PROCEDURE

1. Face the SRX in the direction of the target
   Use the peep sight to aim the SRX and telescope toward the target.
   ☞ "11. TARGET SIGHTING"

2. Start measurement.
   Press **[DIST]** in the first page of Meas mode to start measurement.



   The measured distance data (S), vertical angle (ZA), and horizontal angle (HAR) are displayed.



3. Press **[STOP]** to quit distance measurement.

Note

- If the single measurement mode is selected, measurement automatically stops after a single measurement.
- During fine average measurement, the distance data is displayed as S1, S2,... to S9. When the designated number of measurements has been completed, the average value of the distance is displayed in the "SA" line.
- The distance and angle that are most recently measured remain stored in the memory until the power is off and can be displayed at any time by pressing **[RCL]**.

☞ Allocating **[RCL]**: "21.6 Allocating Key Functions"

14.4 Distance Measurement and Outputting the Data

The following explains distance measurement and the features used to output measurement data to a computer or external devices.

☞"8. CONNECTING TO EXTERNAL DEVICES", Communication cables: "27. OPTIONAL ACCESSORIES". Output format and command operations: Interfacing with the SOKKIA SDR Electronic Field Book and Command Explanations manuals

PROCEDURE

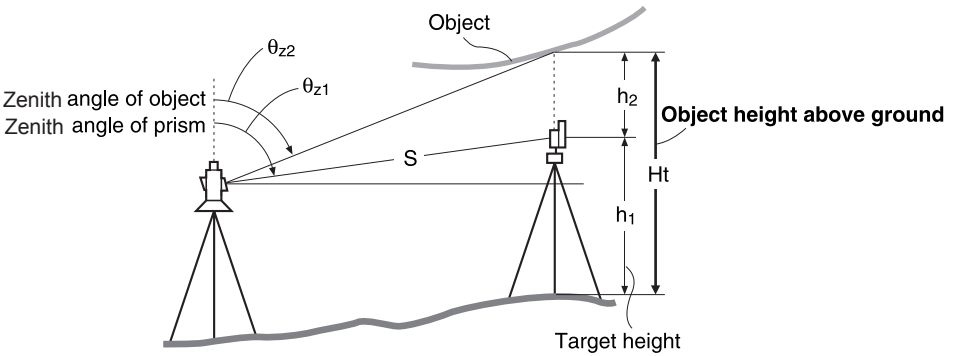
1. Connect SRX and external device.
2. Sight the target point.
3. Press **[HVD out]** in Meas mode to start distance measurement. Target measurement results are output to the external device.
   ☞ Output type: "21.6 Allocating Key Functions", "21.1 Observation Conditions"
4. Press **[STOP]** to finish data output and return to the Meas mode.

14.5 REM Measurement

An REM measurement is a function used to measure the height to a point where a target cannot be directly installed such as power lines, overhead cables and bridges, etc.
The height of the target is calculated using the following formula.

$Ht = h_1 + h_2$

$h2 = S \sin\theta_{z1} \times \cot\theta_{z2} - S \cos\theta_{z1}$



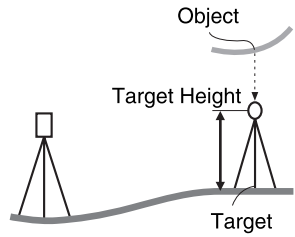
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.

☞"21.6 Allocating Key Functions"

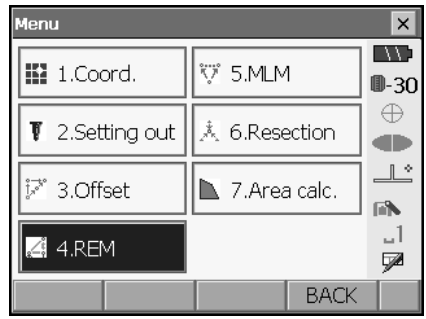
PROCEDURE

1. Set the target directly under or directly over the object and measure the target height with a tape measure etc.

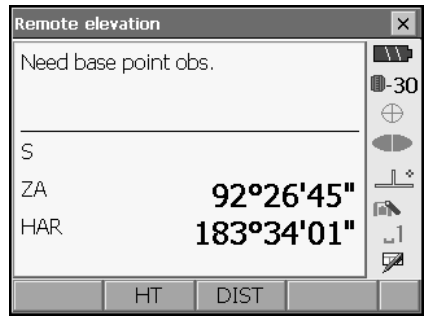
   Press **[HT]** and enter the target height.



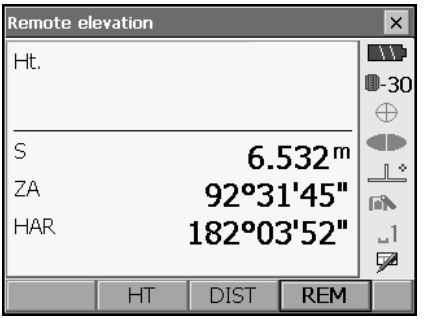
2. Select "REM" in <Menu>.



3. Sight the target and press **[DIST]** to start measurement. Press **[STOP]** to stop the measurement.

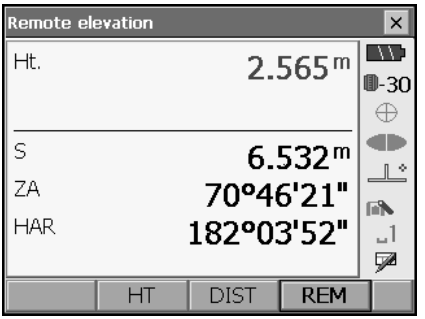


The measured distance data, vertical angle and horizontal angle are displayed.



4. Sight the object, then press **[REM]** to start REM measurement. The height from the ground to the object is displayed in "Ht.". Press **[STOP]** to stop the measurement.

   - To re-observe the target, sight the target then press **[DIST]**.
   - To continue REM measurement, press **[REM]**.

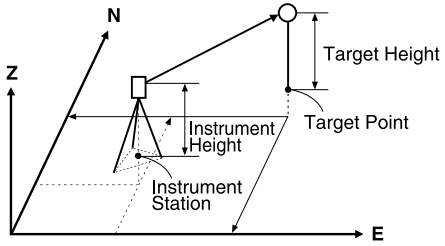


Note

- When measurement data already exists, select **[REM]** in <Menu> as in step 2 to proceed to step 4 and start REM measurement. Press **[STOP]** to stop the measurement.

15.COORDINATE MEASUREMENT

By performing coordinate measurements it is possible to find the 3-dimensional coordinates of the target based on station point coordinates, instrument height, target height, and azimuth angles of the backsight station which are entered in advance.



- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.
  ☞"21.6 Allocating Key Functions"

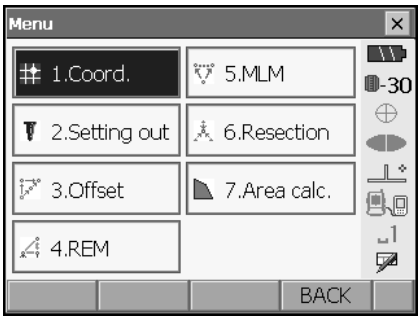
15.1 Entering Instrument Station Data

Before performing coordinate measurement, enter instrument station coordinates, instrument height and target height.

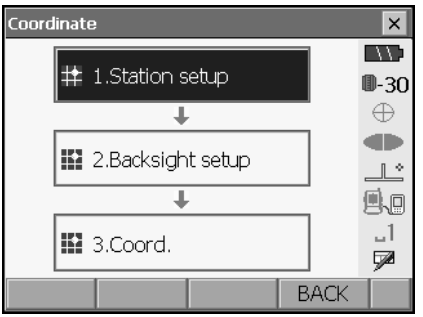
PROCEDURE

1. First measure the target height and instrument height with a tape measure, etc.

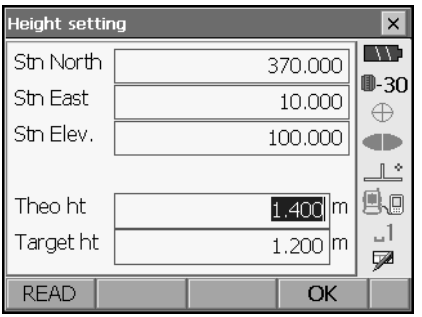
2. Select "Coord." in <Menu>.



3. Select "Station setup" and enter instrument station coordinates, instrument height and target height.



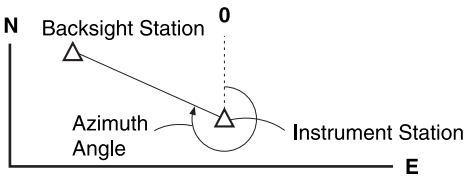
- Press **[READ]** to read in coordinate data registered in Program mode.
  ☞ "15.4 Reading in registered coordinate data from Program mode"



4. Press **[OK]** to set the input values. <Set H angle> is displayed again.

15.2 Azimuth Angle Setting

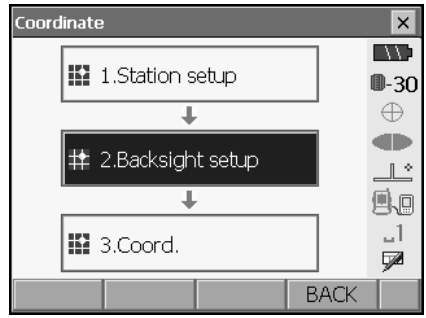
Based on the instrument station coordinates and backsight station coordinates which have already been set, the azimuth angle of the backsight station is calculated.



PROCEDURE Entering coordinates

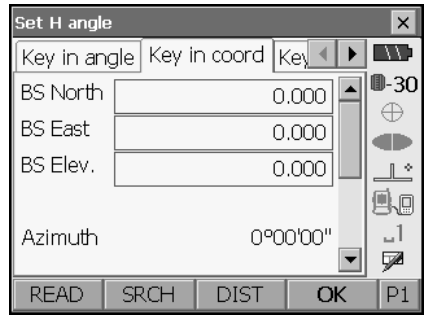
1. Select "Backsight setup" in <Coordinate>. <Set H angle> is displayed.

   • <Set H angle> can also be displayed from the screen in step 4 of "15.1 Entering Instrument Station Data".

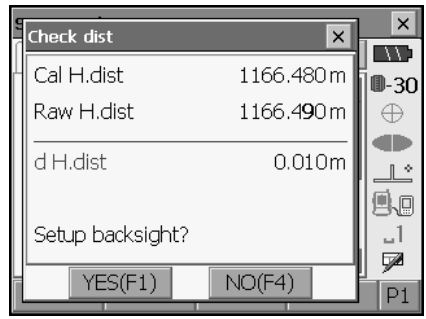


2. Select the Key in coord tab and enter the backsight station coordinates.

   • **[READ]**: Reads in coordinate data registered in Program mode.
   ☞"15.4 Reading in registered coordinate data from Program mode"
   • **[SRCH]**: Performs Auto Pointing. Rotates the SRX in the direction of the backsight.



   • Sight the backsight station and press **[DIST]**. Press **[STOP]** to display the distance calculated from coordinates, the measured distance, and the difference between the two. Press **[YES]** to set the azimuth angle and display <Coord. measurement>.
   • **[None]**: Switches horizontal angle setting method.
   ☞ Horizontal angle settings



3. Press **[OK]** to set the input values. <Coord. measurement> is displayed.

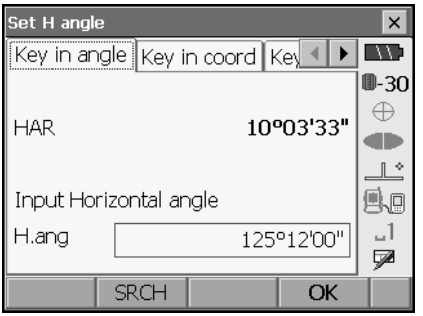
PROCEDURE Entering angle

1. Select "Backsight setup" in <Coordinate>. <Set H angle> is displayed.

. <Set H angle> can also be displayed from the screen in step 4 of "15.1 Entering Instrument Station Data".

2. Select the Key in angle tab and enter the desired angle in "H.ang".

   • **[SRCH]**: Performs Auto Pointing. Rotates the SRX in the direction of the backsight.



3. Press **[OK]** to set the input values. <Coord. measurement> is displayed.

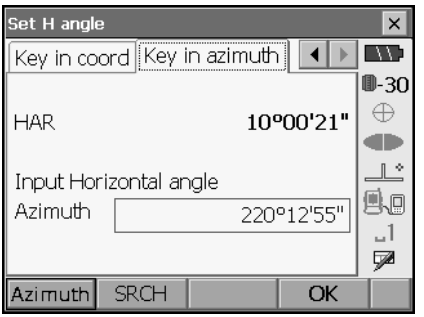
PROCEDURE Entering azimuth

1. Select "Backsight setup" in <Coordinate>. <Set H angle> is displayed.

. <Set H angle> can also be displayed from the screen in step 4 of "15.1 Entering Instrument Station Data".

2. Select the Key in azimuth tab and enter the desired angle in "Azimuth".

   • **[SRCH]**: Performs Auto Pointing. Rotates the SRX in the direction of the backsight.
   • **[None]**: Switches horizontal angle setting method.
   ☞ "Horizontal angle settings"



3. Press **[OK]** to set the input values. <Coord. measurement> is displayed.

Horizontal angle settings

Azimuth (set both horizontal and azimuth angles to the same value)/H.ANG (input both horizontal and azimuth angles)/None (input azimuth angle only)/0 SET (horizontal angle set to 0°)

15.3 3-D Coordinate Measurement

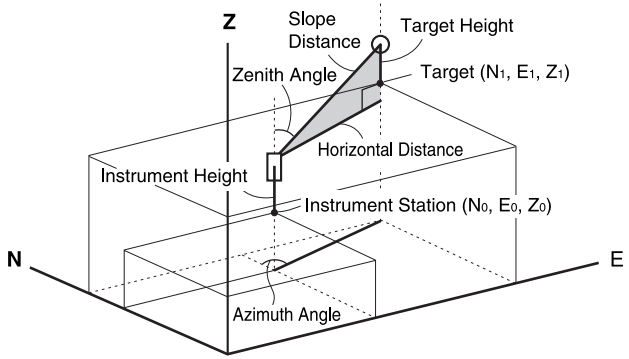
The coordinate values of the target can be found by measuring the target based on the settings of the instrument station and backsight station.

The coordinate values of the target are calculated using the following formulae.

N1 Coordinate = N0 + S x sinZ x cosAz
E1 Coordinate = E0 + S x sinZ x sinAz
Z1 Coordinate = Z0 + S x cosZ + ih - fh

N0: Station point N coordinate	S: Slope distance	ih: Instrument height
E0: Station point E coordinate	Z: Zenith angle	fh: Target height
Z0: Station point Z coordinate	Az: Direction angle	

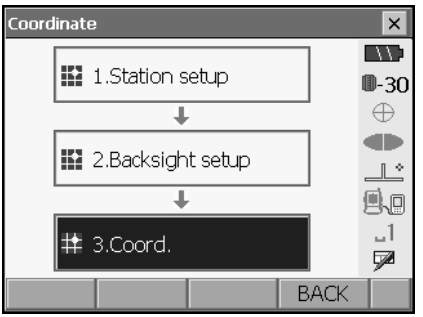
"Null" coordinates will not be included in calculations. "Null" is not the same as zero.



PROCEDURE

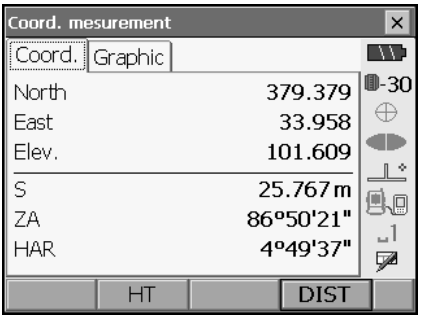
1. Sight the target at the target point.
   ☞ "11. TARGET SIGHTING"

2. Select "Coord." in <Coordinate>.



   Press **[DIST]** to start measurement. Press **[STOP]** to stop the measurement. The coordinates of the target point are displayed. Select the Graphic tab to display coordinates on a graph.

   • By pressing **[HT]**, the instrument station data can be reset. When the target height of the next target is different, reenter the target height before beginning the observation.



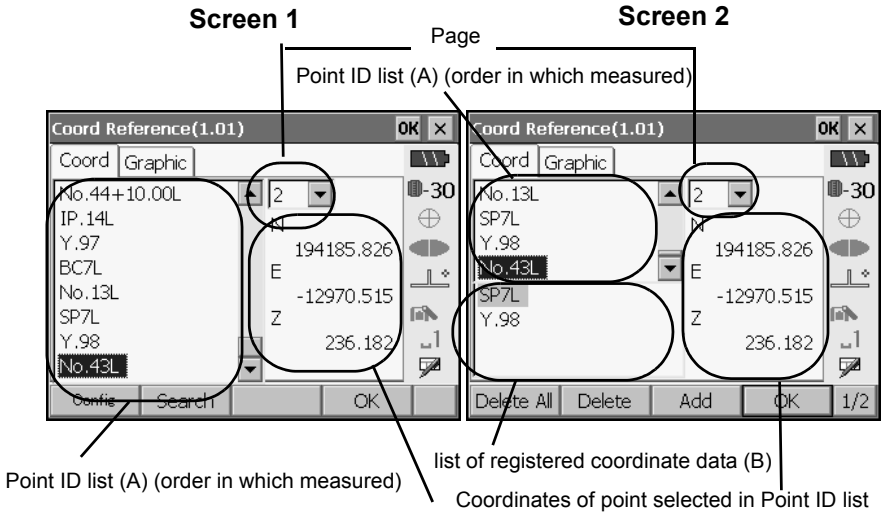
3. Sight the next target and press **[DIST]** to begin measurement. Continue until all targets have been measured.

4. When coordinate measurement is completed, press **{ESC}** or tap the cross in the top-right corner to return to <Coordinate>.

15.4 Reading in registered coordinate data from Program mode

15.4.1 Selecting points from registered coordinates

When **[READ]** is pressed, coordinate data stored in Program mode is recalled and displayed in <Coord Reference>. The points thus displayed can then be selected as points for the current operation. The Coord and Graphic tabs are linked so that when a particular point is selected in one tab, the same point is automatically selected in the other tab.



One page can display up to 1000 points. When this limit is exceeded, subsequent data will be displayed in a new page. A maximum of 20,000 points can be registered.

It is possible to re-sort the list of registered points or search for a particular point ID.

Screen 2 contains the following softkeys:

[Add]: Adds the point currently selected in the Coord or Graphic tab to the list of registered coordinate data (B). Points can also be added by double-tapping the desired point in the point ID list (A) or selecting the point in the Graphic tab.

[Delete]: Removes the currently selected point from the list of registered points (B).

[Delete All]: Clears the list of registered points (B).

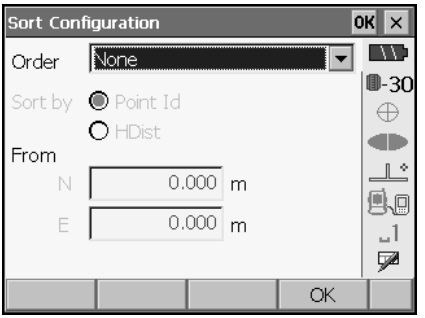
[Range]: Adds all points within the specified coordinate and distance range to the list of registered points (B).
For details, see “15.4.4 Setting range”

[All Screen]: Adds all points displayed in the Graphic tab to the list of registered points (B).

- Re-sorting point IDs

1. Press **[Config]** in page 2 of <Coord Reference> to display <Sort Configuration>.

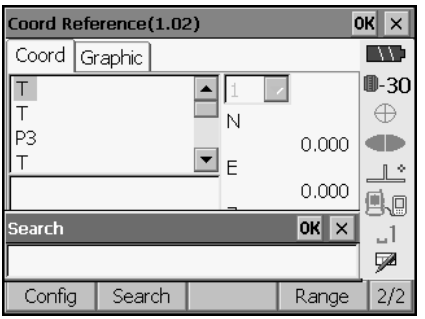
2. Select the desired order and press **[OK]** to re-sort the list.



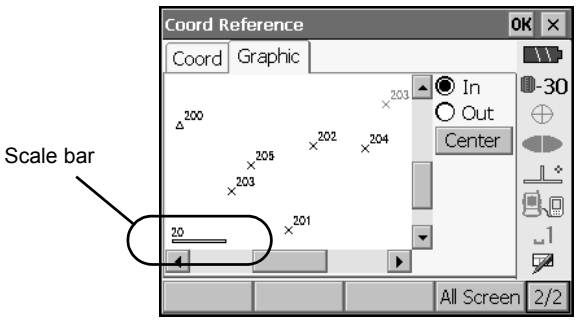
- Searching for a point

1. Press **[Search]** to display the <Search> box.

2. Enter a point ID and press **[OK]**, **{↵}**, or the **{READ}** key to start the search. Any existing point with a matching ID will be displayed at the top of the point ID list.



15.4.2 The graphic display



"In": Select the "In" radio button and draw a box on the touch screen with the stylus pen to zoom in on the selected area.

"Out": Select the "Out" radio button and draw a box on the touch screen with the stylus pen to zoom out with the screen centered on the selected area.

[To Fit]: Returns the graph to the original orientation whereby all points in the graph are dis played on the screen.

[Center]: Centers the graphic view on the currently selected point when the graph has been enlarged.

[Zoom in]: Zooms in on the center of the graph (x 2).

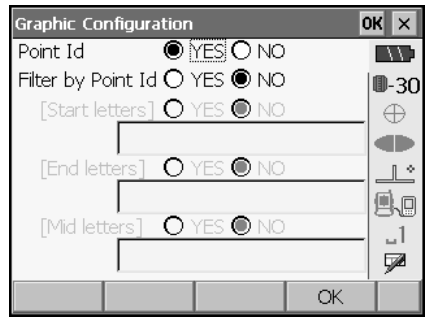
[Zoom out]: Zooms out while centered on the center of the graph (x 0.5).

[All Screen] Records all points currently displayed in the screen.

15.4.3 Graphic configuration

1. Press **[Config]** in the Graphic tab to display <Graphic Configuration>.

2. Settings made in this screen will be reflected in the Graphic tab. Press **[OK]** to complete settings.



"Point Id": Select "Yes" to display all point IDs.

"Filter by Point Id": Set one of the following options to "Yes" to display only those point IDs that meet the relevant requirements.

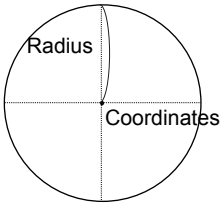
"Start letters": Point IDs starting with the letter(s) in the box below.

"End letters": Point IDs ending with the letter(s) in the box below.

"Mid letters": Point IDs including the letter(s) in the box below.

15.4.4 Setting range

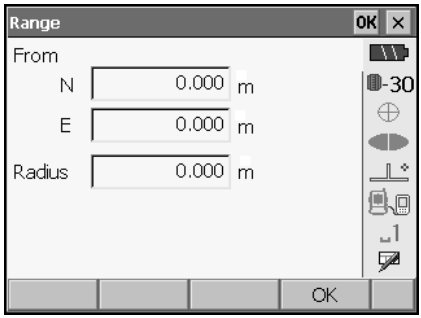
Multiple points in the Graphic tab can be added to the list of registered points (B) by specifying a circular selection range. This range is defined according to input N/E coordinates and the circle's radius.



1. Press **[Range]** in the second page of <Coord Reference> to display <Range>.

2. Input the N/E coordinates of the center point of the circle and the circle's radius.If a point had been selected in the Coord or Graphic tab when <Range> was displayed, the northing and easting coordinates of that point will be displayed in "N" and "E".

3. Press **[OK]** to register all coordinate points within the set circular selection range in the list of recorded points (B).
   Press **{ESC}** or the cross in the top right corner to return to <Coord Reference> without registering any points.



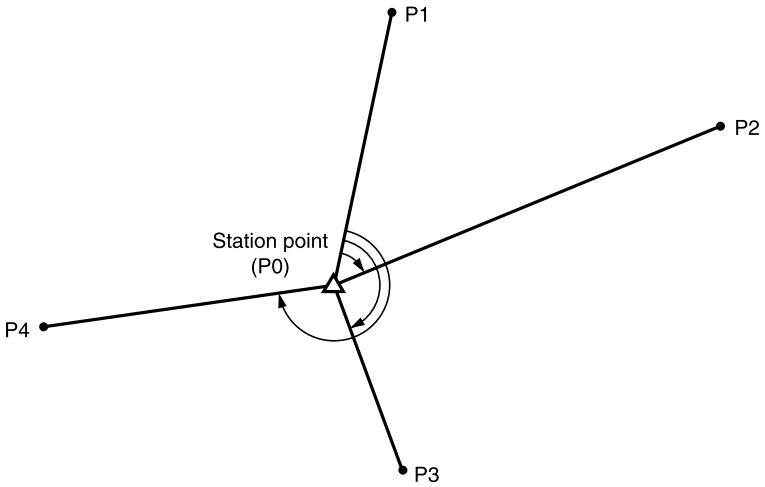
Items set and input range (*: Factory setting)

Northing:	-999999.999 to 999999.999 (0.000*)
Easting:	-999999.999 to 999999.999 (0.000*)
Radius:	0.000 to 9999.999 (0.000*)

16.RESECTION MEASUREMENT

Resection is used to determine the coordinates of an instrument station by performing multiple measurements of points whose coordinate values are known. Registered coordinate data can be recalled and set as known point data. Residual of each point can be checked, if necessary

Entry			Output		
Coordinates of known point	:	(Ni, Ei, Zi)	Station point coordinates	:	(N0,E0, Z0)
Observed horizontal angle	:	Hi			
Observed vertical angle	:	Vi			
Observed distance	:	Di			



- Between 2 and 10 known points can be measured by distance measurement, and between 3 and 10 known points by angle measurement.
- The more known points there are and the more points there are whose distance can be measured, the higher the precision of the coordinate value calculation.
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.

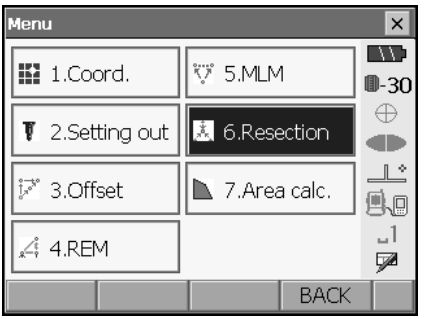
☞"21.6 Allocating Key Functions"

16.1 Coordinate Resection Measurement

N, E, Z of an instrument station is determined by the measurement.

PROCEDURE

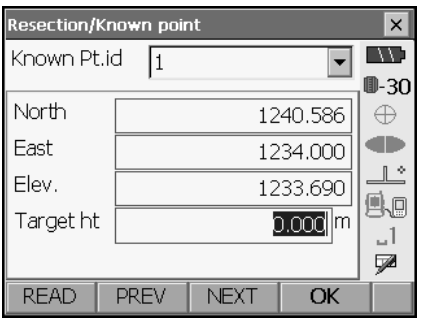
1. Select "Resection" in <Menu>.



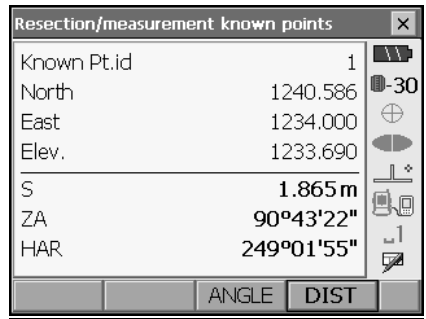
2. Select "NEZ" to display <Resection/Known point>.

3. Input the known point.
   After setting the coordinates and target height for for the first known point press **[NEXT]** to move to the second point.
   - Press **[READ]** to read in coordinate data registered in Program mode.
     ☞"15.4 Reading in registered coordinate data from Program mode"
   - Press **[PREV]** to return to settings for the previous point.

   When all required known points have been set, press **[OK]**.

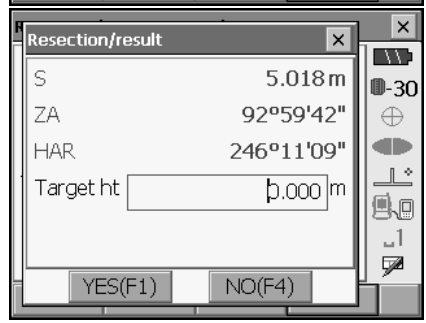


4. Sight the first known point and press **[DIST]** to begin measurement.
   The measurement results are displayed on the screen.
   • When **[ANGLE]** has been selected, the distance cannot be displayed.

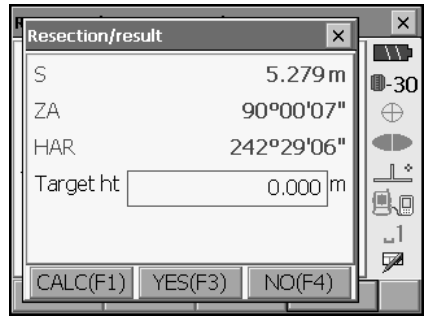


5. Press **[YES]** to use the measurement results of the first known point.

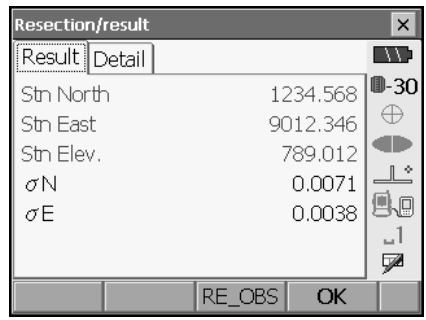
   • You can also input target height here.
   • Press **[NO]** to return to the screen in step 3 and perform measurement again.



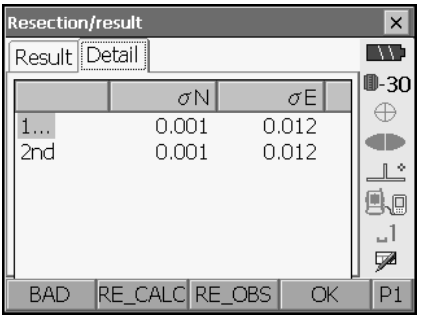
6. Repeat procedures 3 to 4 in the same way from subsequent points.
   When the minimum quantity of observation data required for the calculation is present, **[CALC]** is displayed.



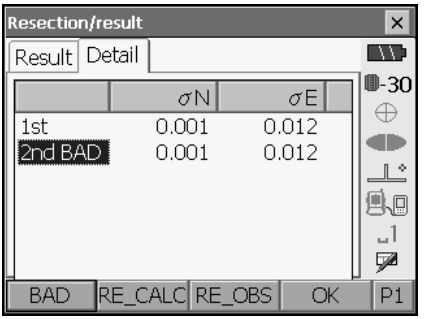
7. Press **[CALC]** or **[YES]** to automatically start calculations after observations of all known points are completed.
   • Instrument station coordinates, station elevation, and standard deviation, which describes the measurement accuracy, are displayed.



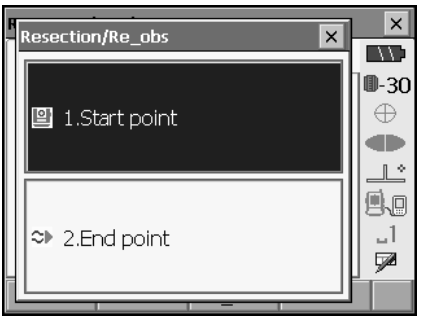
Standard deviation for the northing and easting coordinates of each point are displayed in the Detail tab.



8. If there are problems with the results of a point, align the cursor with that point and press **[BAD]**. "BAD" is displayed to the right of the point. Repeat for all results that include problems.



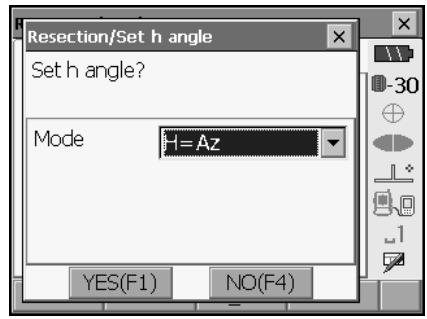
9. Press **[RE CALC]** to perform calculation again without the point designated in step 8. The result is displayed.
   If there are no problems with the result, go to step 10.
   If problems with the result occur again, perform the resection measurement from step 3.
   - Press **[RE OBS]** to measure the point designated in step 8.
     If no points are designated in step 8, all the points or only the final point can be observed again.
   - Press **[ADD]** when there is a known point that has not been measured or when a new known point is added.



10. Press **[OK]** in <Resection/result> to display <Resection/Set h angle>.

11. Select an angle mode and press **[YES]** to set the azimuth angle of the first known point as the backsight point and return to <Resection/Menu>.

12. Press **[NO]** to return to <Resection/Menu> without setting the azimuth angle.



Horizontal angle settings

H=Az (set horizontal angle to the same value as azimuth angle)/Az (set azimuth angle only)/H (set horizontal angle to measured value)

Note

- It is also possible to perform resection measurement by pressing **[RESEC]** when allocated to the Meas mode screen.
  ☞ Allocating **[RESEC]**: "21.6 Allocating Key Functions"

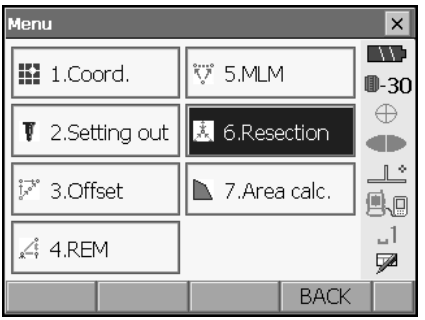
16.2 Height Resection Measurement

Only Z (height) of an instrument station is determined by the measurement.

- Known points must be measured by distance measurement only.
- Between 1 and 10 known points can be measured.

PROCEDURE

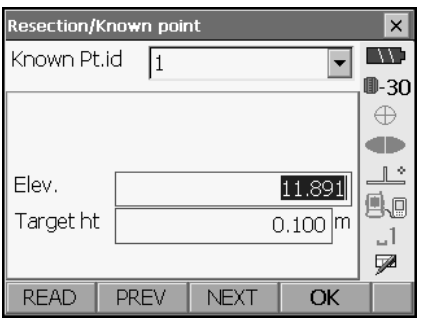
1. Select "Resection" in <Menu>.



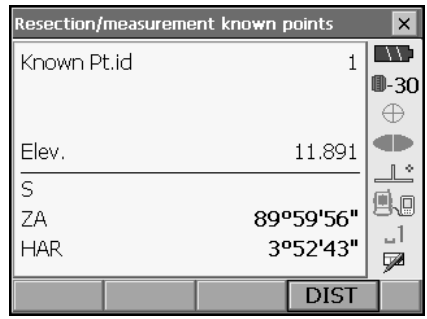
2. Select "Elevation" to display <Resection/Known point>.

3. Input the known point.
   After setting the elevation and target height for the first known point press **[NEXT]** to move to the second point.
   - Press **[READ]** to read in data registered in Program mode.
   - Press **[PREV]** to return to settings for the previous point.

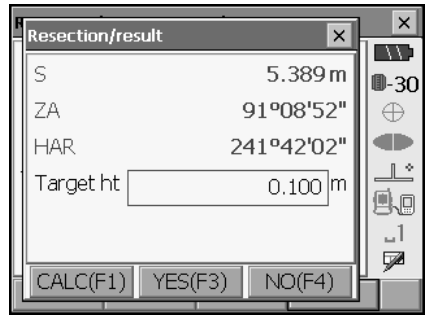
   When all required known points have been set, press **[OK]**.



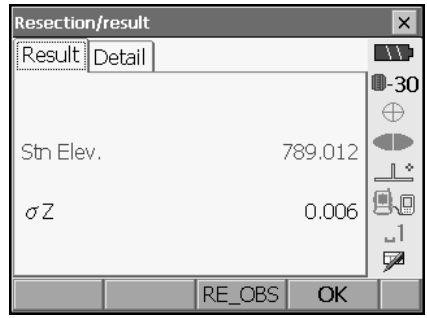
4. Sight the first known point and press **[DIST]** to begin measurement.
   The measurement results are displayed on the screen.
   • When **[ANGLE]** has been selected, the distance cannot be displayed.



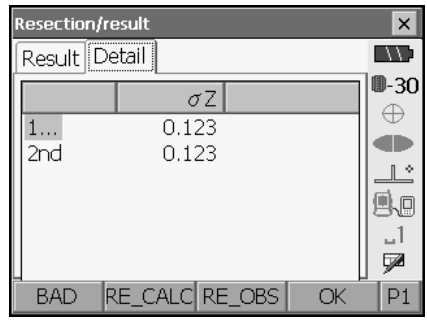
5. If measuring two or more known points, repeat procedures 3 to 4 in the same way from the second point.
   When the minimum quantity of observation data required for the calculation is present, **[CALC]** is displayed



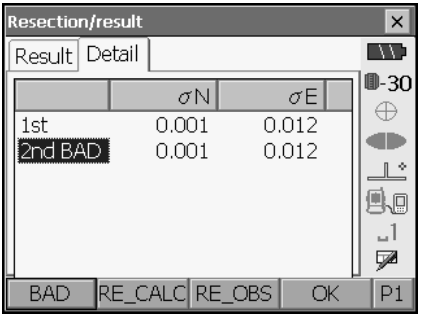
6. Press **[CALC]** or **[YES]** to automatically start calculations after observations of all known points are completed.
   • Instrument station elevation and standard deviation, which describes the measurement accuracy, are displayed in the Result tab.



   Standard deviation values for each point are displayed in the Detail tab.

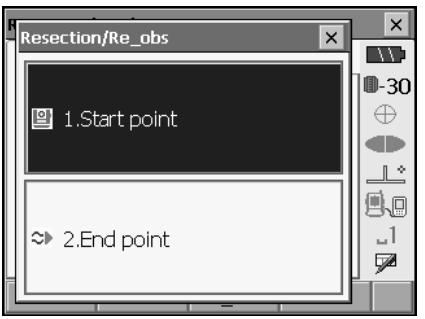


7. If there are problems with the results of a point, align the cursor with that point and press **[BAD]**. “BAD” is displayed to the right of the point. Repeat for all results that include problems.



8. Press **[RE CALC]** to perform calculation again without the point designated in step 8. The result is displayed.
   If there are no problems with the result, go to step 10.
   If problems with the result occur again, perform the resection measurement from step 3.
   • Press **[RE OBS]** to measure the point designated in step 8.

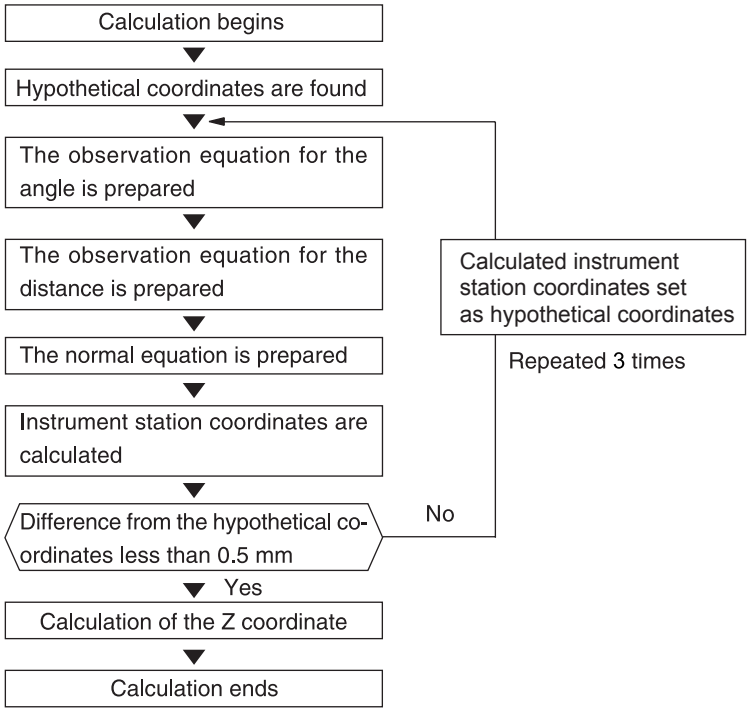
   If no points are designated in step 8, all the points or only the final point can be observed again.
   • Press **[ADD]** when there is a known point that has not been measured or when a new known point is added.



9. Press **[OK]** to finish resection measurement and return to Meas mode. Only Z (elevation) of the instrument station coordinate is set. N and E values are not overwritten.

Resection calculation process

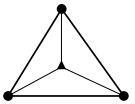
The NE coordinates are found using angle and distance observation equations, and the instrument station coordinates are found using the method of least squares. The Z coordinate is found by treating the average value as the instrument station coordinates.



Precaution when performing resection

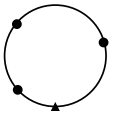
In some cases it is impossible to calculate the coordinates of an unknown point (instrument station) if the unknown point and three or more known points are arranged on the edge of a single circle.

An arrangement such as that shown below is desirable.



△▲ : Unknown point
○● : Known point

It is sometimes impossible to perform a correct calculation in a case such as the one below.

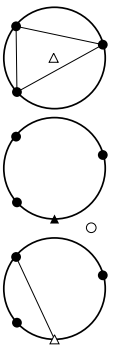


When they are on the edge of a single circle, take one of the following measures.

(1) Move the instrument station as close as possible to the center of the triangle.

(2) Observe one more known point which is not on the circle.

(3) Perform a distance measurement on at least one of the three points.



- In some cases it is impossible to calculate the coordinates of the instrument station if the included angle between the known points is too small. It is difficult to imagine that the longer the distance between the instrument station and the known points, the narrower the included angle between the known points. Be careful because the points can easily be aligned on the edge of a single circle.

17.SETTING-OUT MEASUREMENT

Setting-out measurement is used to set out the required point.
The difference between the previously input data to the instrument (the setting-out data) and the measured value can be displayed by measuring the horizontal angle, distance or coordinates of the sighted point.

The horizontal angle difference distance difference, and coordinate difference are calculated and displayed using the following formulae.
Horizontal difference
Displayed value (angle) = Horizontal angle of setting-out data - measured horizontal angle
Displayed value (distance) = measured horizontal distance x tan (horizontal angle of setting out data - measured horizontal angle)

Slope distance difference
Displayed value (slope distance)* = measured slope distance - slope distance setting-out data
*Horizontal distance or height difference can be input in the above formula.

Coordinate difference
Displayed value (coordinates)* = measured N setting-out coordinates - N coordinates of setting-out data
*E or Z coordinates can be input in the above formula

Height difference (REM setting out measurement)
Displayed value (height) = measured REM data - REM data of setting out data

- Setting out data can be input in various modes: slope distance, horizontal distance, height difference, coordinates and REM measurement.
- It is possible to allocate softkeys in the Setting-out measurement menu to suit various applications and the ways that different operators handle the instrument.

☞ "21.6 Allocating Key Functions"

- **[AT On]** can only be selected on the Auto Tracking model.

17.1 Using the Guide Light

When the guide light is set to ON, the flashing speed of the light indicates the status of the SRX and can be known when the user is located at a distance from the instrument. Also, the flashing colors relative to the target indicate the direction of the instrument and allow the user to reposition the target.
☞ Turning the Guide light ON/OFF: "5.1 Basic Key Operation"

- The pattern of the guide light can be changed.

☞ "21.2 Instrument Configuration"

- The Guide light will turn off, even when set to ON, during distance measurement and returned signal checking.

● Guide light status and meaning

Status of SRX

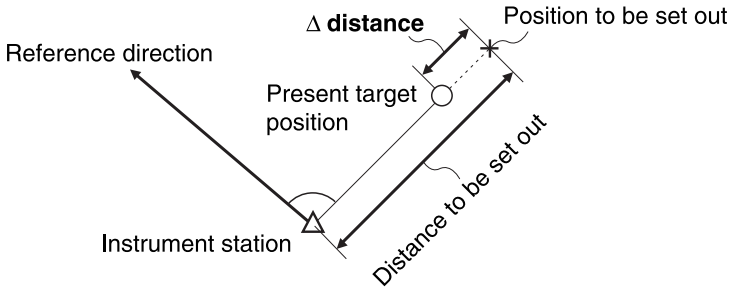
Light status	Meaning
Slow flashing (Red and green simultaneously)	Waiting
Fast flashing (Red and green simultaneously)	Searching in progress
	Measuring (continuous measurement)
	Returned signal checking in progress
	Auto Tracking in progress (Auto Tracking model only)
Green and red alternate flashing	Search error (error screen only)
	Distance measurement error (no signal, sighting error)
	"Prism wait"

Indication for positioning target during setting-out measurement

Light status	Meaning
Increased flashing speed	(From position of poleman) Move target toward SRX
Decreased flashing speed	(From position of poleman) Move target away from SRX
Fast flashing	Target is at correct distance
Red	(From position of poleman) Move target left
Green	(From position of poleman) Move target right
Red and Green	Target is at correct horizontal position

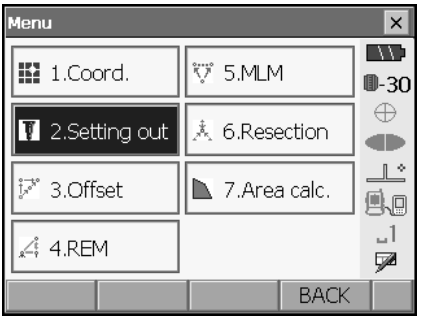
17.2 Distance Setting-out Measurement

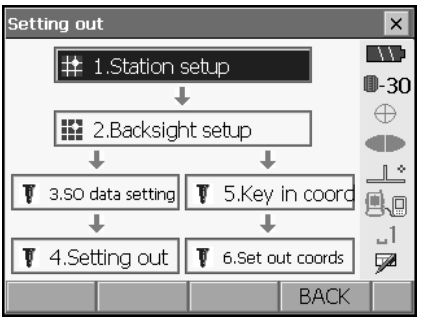
The point is to be found based on the horizontal angle from the reference direction and the distance from the instrument station.



PROCEDURE

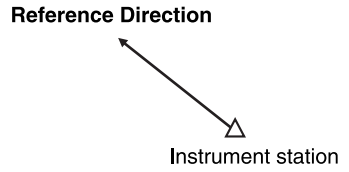
1. Select "Setting out" in <Menu> to display <Setting out>.





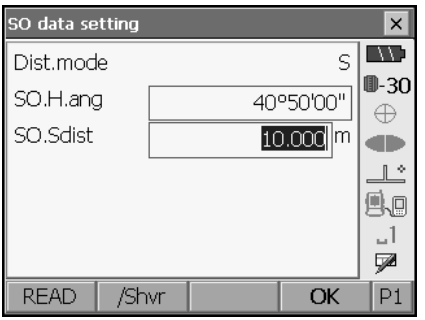
2. Select "Station setup" to display <Height setting>. Enter data for the instrument station and press **[OK]** to move to Backsight setup.
   ☞ "15.1 Entering Instrument Station Data"

   • Press **[READ]** to read in coordinate data registered in Program mode.
   ☞ "15.4 Reading in registered coordinate data from Program mode"



3. Set the azimuth angle for the backsight station. Press **[OK]** to return to <Setting out>.
   ☞ "15.2 Azimuth Angle Setting"

4. Select "SO data setting" In <Setting out> to display <SO data setting>. In the distance mode that conforms to your measurement requirements, enter the included angle between the reference point and the setting-out point in "SO.H.ang", and the distance (slope distance, horizontal distance or height difference) from the instrument station to the position to be set out in "SO.Sdist".

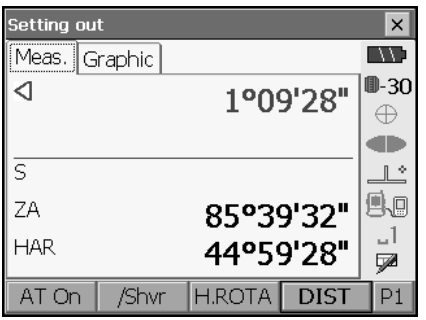


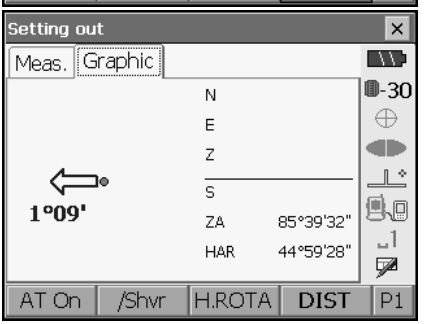
   - Each time **[/Shvr]** is pressed, the distance mode changes from "S" (slope distance), "H" (horizontal distance), "V" (height difference), and "Ht." (REM).
   - When **[READ]** is pressed, coordinates registered in Program mode can be recalled and used. The distance selected according to the selected distance input mode is calculated using these coordinate values.

     ☞ "15.4 Reading in registered coordinate data from Program mode"

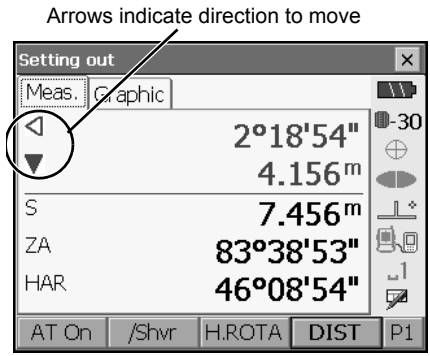
   - Press **[COORD]** in the second page and input coordinates in <Key in coord>. The angle and distance from these coordinates to the position to be set out will be calculated.

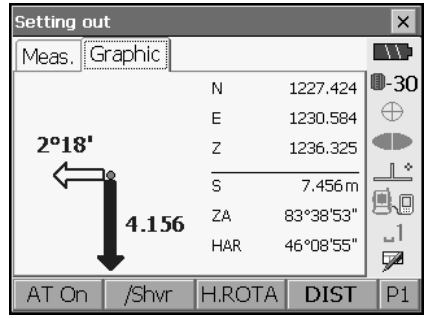
5. Enter values and press **[OK]** to display the screen at right.
   Press **[H.ROTA]** to automatically rotate the SRX until the difference in horizontal angle to the setting out point reads 0°.





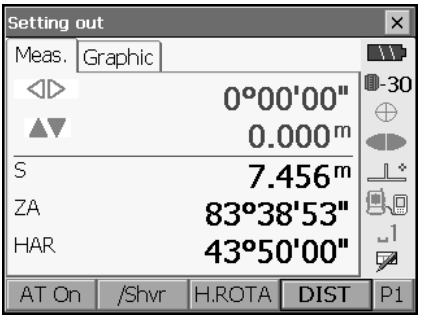
6. Position the target on the line of sight and press **[DIST]** to begin distance measurement.
   The distance and direction to move the target until the setting out point is located is displayed on the SRX. The sighting point measurement results (currently installed position of the target) are displayed.

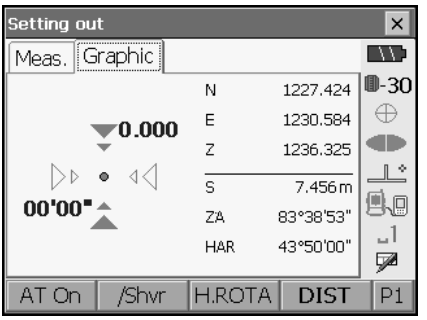




- Movement indicator (Red indicates that target position is correct)
  Arrows indicating horizontal direction will point in the opposite direction when viewing the display in Face 2.
  - ◁ : (Viewed from SRX) Move target to the left
  - ▷ : (Viewed from SRX) Move target to the right
  - ◁▷ : Target position is correct
  - ▼ : (Viewed from SRX) Move target closer
  - ▲ : (Viewed from SRX) Move target away
  - ▲▼ : (Viewed from SRX) Target position is correct
  - ⏫ : Move target upward
  - ⏬ : Move target downward
  - ⏫⏬ : Target position is correct
- Each time **[/Shvr]** is pressed, the distance input mode changes from "H" (horizontal distance), "V" (height difference), "R" (slope distance), and "S" (slope distance).
- Press **[CNFG]** to set setting out accuracy. When the position of the target is within this range both arrows will be displayed to indicate that the target position is correct.

7. Move the target until the distance to the setting-out point reads 0m. When the target is moved within the allowed range, all distance and position arrows are displayed.

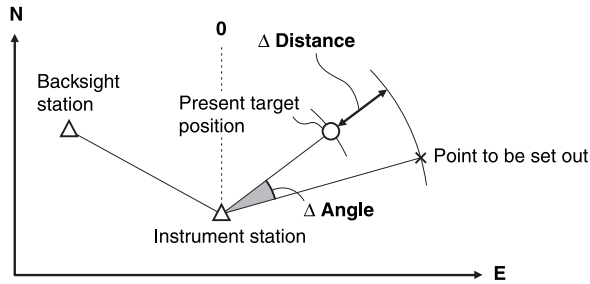




8. Press **[OK]** to return to <Setting out>. Set the next setting out point to continue setting out measurement.

17.3 Coordinates Setting-out Measurement

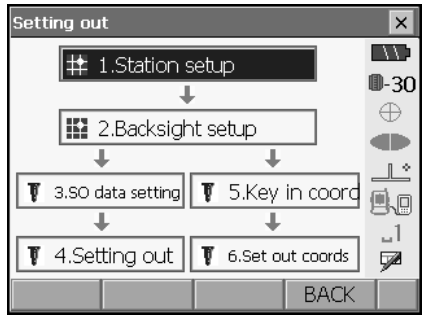
After setting the coordinates for the point to be set out, the SRX calculates the setting-out horizontal angle and horizontal distance. By selecting the horizontal angle and then the horizontal distance setting-out functions, the required coordinate location can be set out.



- Previously recorded setting-out points can be placed in order. Up to 30 points can be recorded.
- To find the Z coordinate, attach the target to a pole etc. with the same target height.

PROCEDURE

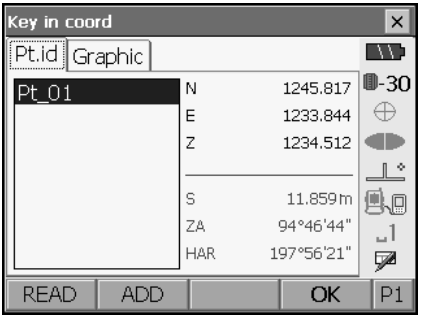
1. Select "Setting out" in <Menu> to display <Setting out>.

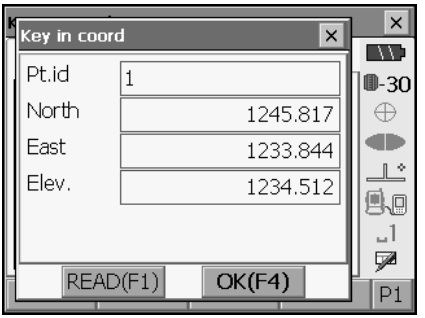


2. Select "Station setup" to display <Height setting>.
   If necessary, enter data for Backsight setup.
   ☞"17.2 Distance Setting-out Measurement" steps 2 to 3

3. Select "Key in coord" in <Setting out>. Record all the setting-out points (includes setting-out points you will measure from now).
   Press **[READ]** to display recorded angle data or press **[ADD]** to record new data.
   ☞ "15.4 Reading in registered coordinate data from Program mode"

   - Press **[DEL]** in the second page to delete the selected setting out point.
   - Press **[DELALL]** in the second page to delete all setting out points.

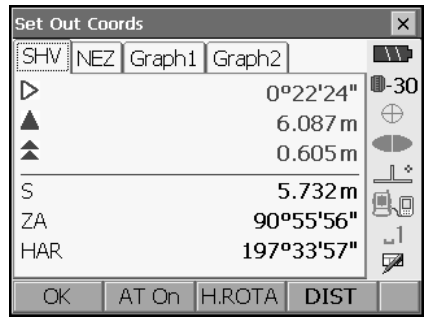




4. Select a setting-out point in the first screen of step 3 and press **[OK]** to display <Set out Coords>**.**
   Press **[H.ROTA]** to automatically rotate the SRX until the angle of the setting out point reads 0°.

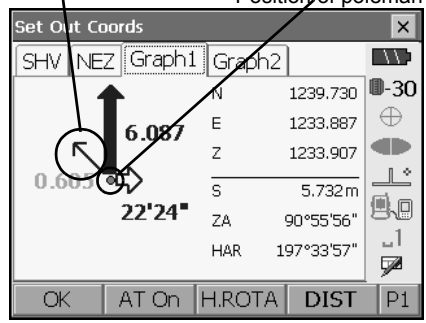
5. Position the target on the line of sight and press **[DIST]** to begin distance measurement.
   The distance and direction from the target to the setting out point is displayed on the SRX. The sighting point measurement results (currently installed position of the target) are displayed.

   • Switch between the tabs to display different sets of information.
   The Graph 1 tab shows the current position of the mirror and the direction to the setting out point from this position.
   The Graph 2 tab shows the position of the setting out point (square) and the current location of the mirror (circle).

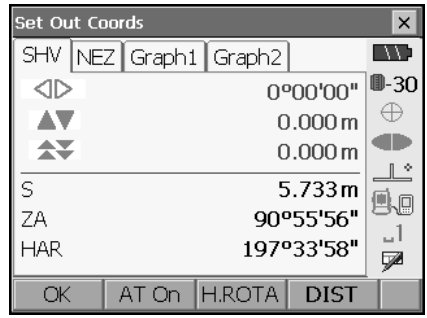


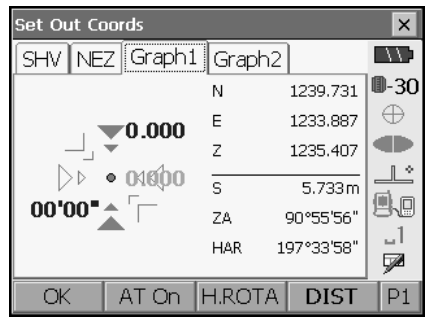
Height difference direction

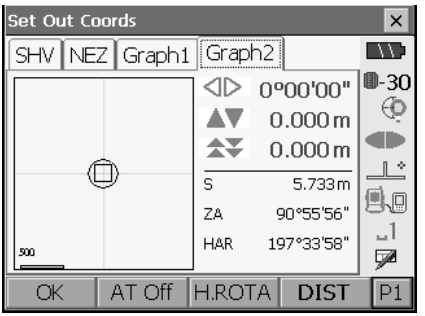
Position of poleman



   Move the target to find the correct distance (0 is displayed) to the setting out point.
   ☞ Movement indicators: "17.2 Distance Setting-out Measurement" step 5







6. Press **{ESC}** to return to <Key in coord>. Set the next setting out point to continue setting out measurement.

17.4 REM Setting-out Measurement

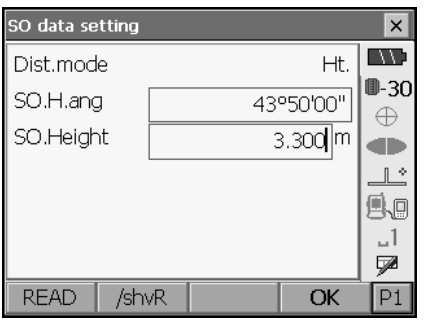
To find a point where a target cannot be directly installed, perform REM setting-out measurement.
☞"14.5 REM Measurement"

PROCEDURE

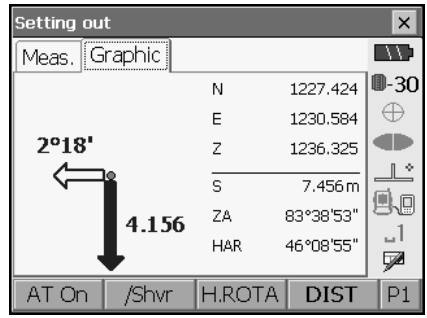
1. Install a target directly below or directly above the point to be found. Then use a measuring tape etc. to measure the target height (height from the surveying point to the target).

2. Select "Station setup" in <Setting out> to display <Height setting>. If necessary, enter data for Backsight setup.
   ☞"17.2 Distance Setting-out Measurement" steps 2 to 3

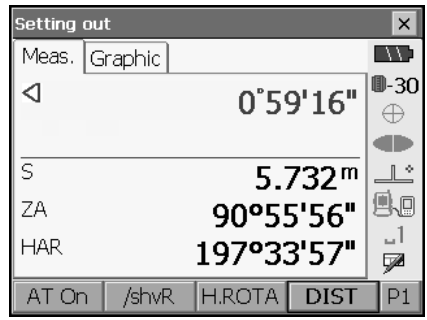
3. Select "SO data setting" In <Setting out> to display <SO data setting>. Press **[/Shvr]** until the distance input mode is "Ht.". Input height from the surveying point to the position to be set out in "SO.Height". If necessary, input the angle to the point to be set out.



4. Enter values and press **[OK]** in step 3 to display the screen at right.
   Press **[H.ROTA]** to automatically rotate the SRX toward the horizontal angle set in step 3 and set the angle to the setting out point to 0°.



5. Sight the target and press **[DIST]**. Measurement begins and the measurement results are displayed.



6. Press **[REM]** in the second page to start REM measurement.
   The distance (height difference) and direction to the sighting point and setting out point is displayed on the SRX.

   Press **[STOP]** to stop measuring.

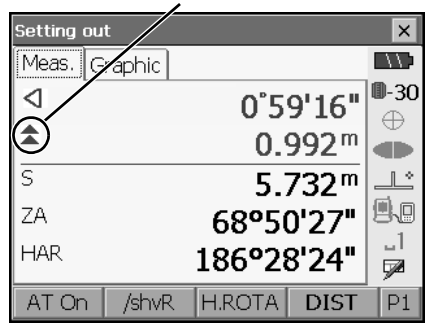
   Find the setting-out point by moving the telescope until the distance to the setting-out point reads 0m.

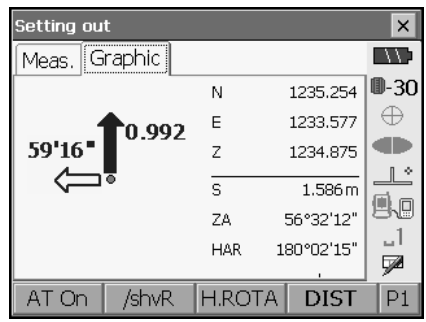
   - Movement indicator (Red indicates that target position is correct)

     ▲▲: : Move the telescope near the zenith
     ▼▼ : Move the telescope near the nadir
     ▼▼▲▲ : Telescope direction is correct

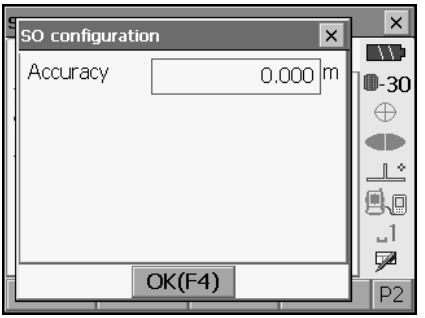
     ☞ For details of other movement indicators: "17.2 Distance Setting-out Measurement" step 5

Arrows indicate direction to move





- Press **[CNFG]** to set setting out accuracy. When the position of the target is within this range both arrows will be displayed to indicate that the target position is correct.



7. Press **{ESC}** to return to <SO data setting>.

18.OFFSET MEASUREMENT

Offset measurements are performed in order to find a point where a target cannot be installed directly or to find the distance and angle to a point which cannot be sighted.

- It is possible to find the distance and angle to a point you wish to measure (target point) by installing the target at a location (offset point) a little distance from the target point and measuring the distance and angle from the surveying point to the offset point.
- The target point can be found in the three ways explained in this chapter.
- The instrument station and backsight must be set before the coordinates of an offset point can be found. Station and backsight setup can be performed in the Offset menu.

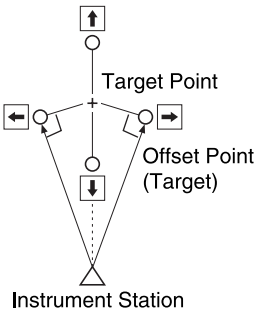
☞ Station setup: "15.1 Entering Instrument Station Data", Backsight setup: "15.2 Azimuth Angle Setting" .

- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.

☞ "21.6 Allocating Key Functions"

18.1 Single-distance Offset Measurement

Finding it by entering the horizontal distance from the target point to the offset point.

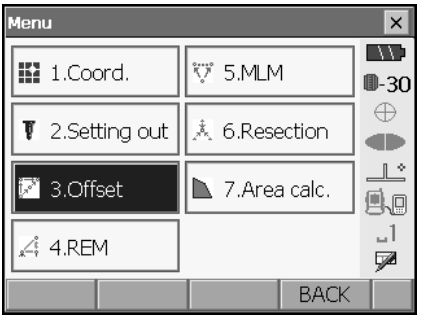


- When the offset point is positioned to the left or right of the target point, make sure the angle formed by lines connecting the offset point to the target point and to the instrument station is almost 90°.
- When the offset point is positioned in front of or behind the target point, install the offset point on a line linking the instrument station with the target point.

PROCEDURE

1. Set the offset point close to the target point and measure the distance between them, then set up a prism on the offset point.

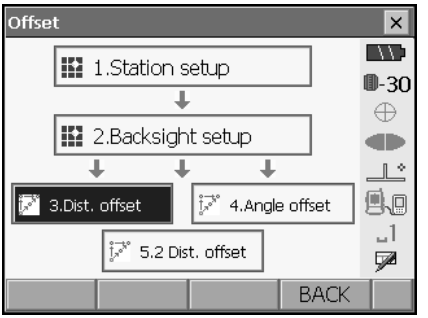
2. Select "Offset" in <Menu> to display <Offset>.

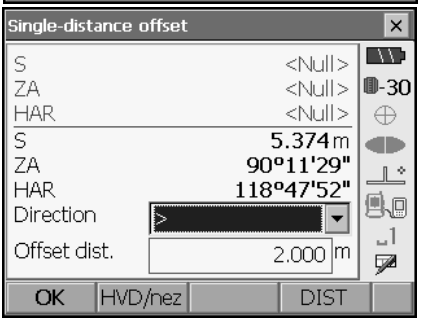


3. Select “Dist. offset”.
   Input the following items.
   (1) Direction of the offset point.
   (2) Horizontal distance from the target point to the offset point.

   • Direction of offset point

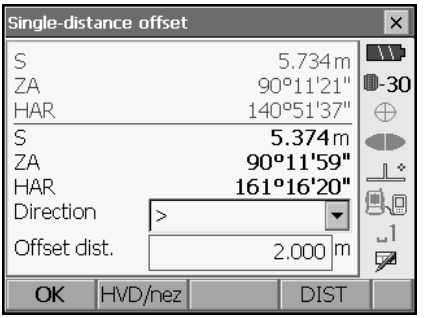
   ← : On the left of the target point.
   → : On the right of the target point.
   ↓ : Closer than the target point.
   ↑ : Beyond the target point.





4. Sight the offset point and press **[DIST]** in the screen of step 3 to start measurement.
   Press **[STOP]** to stop the measurement.
   The measurement results are displayed.

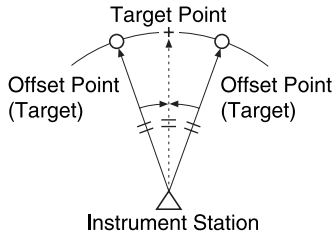
   • Press **[HVD/nez]** to switch results for the target point between distance/angle values and coordinate/elevation values.



5. Press **[OK]** in the screen in step 4 to return to <Offset>.

18.2 Angle Offset Measurement

Sighting the direction of the target point to find it from the included angle.
Install offset points for the target point on the right and left sides of and as close as possible to the target point and measure the distance to the offset points and the horizontal angle of the target point.

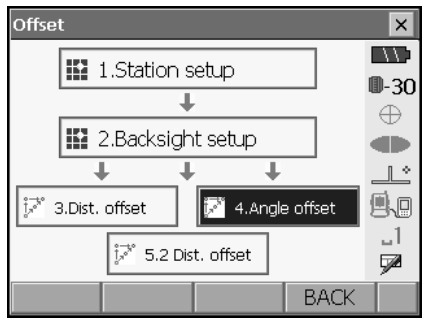


PROCEDURE

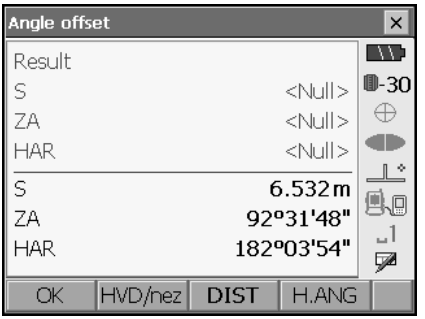
1. Set the offset points close to the target point (making sure the distance from the instrument station to the target point and the height of the offset points and the target point are the same), then use the offset points as the target.

2. Select "Offset" in <Menu> to display <Offset>.

   Select "Angle offset".



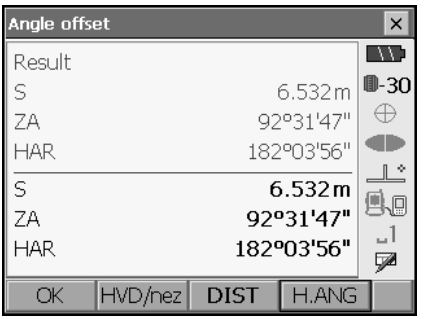
3. Sight the offset point and press **[DIST]** to start measurement.
   Press **[STOP]** to stop the measurement.



4. Sight the target point and press **[H.ANG]**.

   • Press **[HVD/nez]** to switch results for the target point between distance/angle values and coordinate/elevation values.

Results for offset point



Results for target point

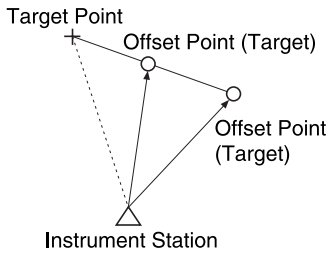
5. Press **[OK]** in the screen in step 4 to return to <Offset>.

18.3 Two-distance Offset Measurement

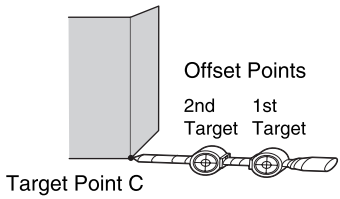
By measuring the distances between the target point and the two offset points.
Install two offset points (1st target and 2nd target) on a straight line from the target point, observe the 1st target and 2nd target, then enter the distance between the 2nd target and the target point to find the target point.

- It is possible to make this measurement easily using the optional equipment: the 2-point target (2RT500-K). When using this 2-point target, be sure to set prism constant to 0.

☞"25. TARGET SYSTEM"



How to use 2-point target (2RT500-K)



- Install the 2-point target with its tip at the target point.
- Face the targets toward the instrument.
- Measure the distance from the target point to the 2nd target.
- Set the prism constant to 0mm.

Note

- The target should be sighted manually when performing two-distance offset measurement. Multiple prisms in the field will mean that Auto Pointing may not operate correctly, or the SRX may not be able to judge which is the desired target.

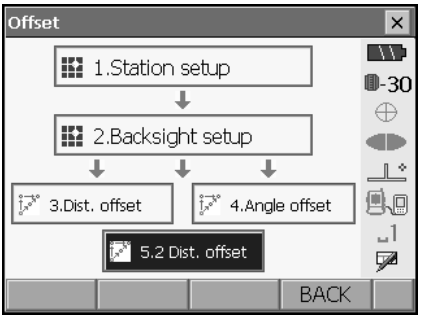
☞"11.1 Auto Pointing Settings"

PROCEDURE

1. Install two offset points (1st target, 2nd target) on a straight line from the target point and use the offset points as the target.

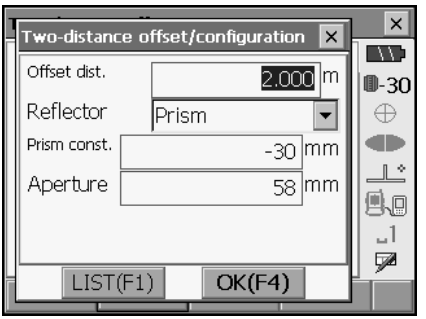
2. Select "Offset" in <Menu> to display <Offset>.

   Select "2 Dist. offset".

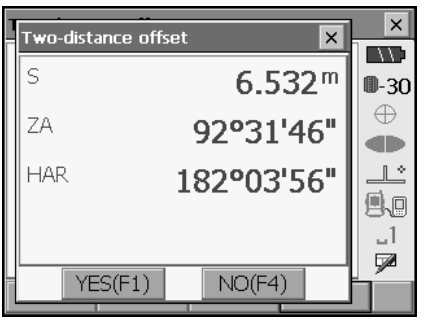


3. Press **[CNFG]** and input the distance from the 2nd target to the target point in "Offset dist.". Set reflector settings and press **[OK]** to confirm.

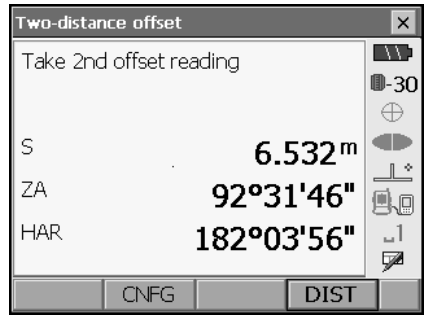
   • Press **[LIST]** to edit the prism constant and aperture in <Reflector setting>.



4. Sight the 1st target and press **[DIST]** to start measurement.
   Press **[STOP]** to stop the measurement. The measurement results are displayed. Press **[YES]** to confirm.

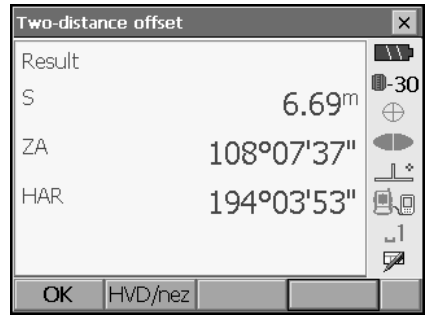


5. Sight the 2nd target and press **[DIST]** to start measurement.
   Press **[STOP]** to stop the measurement. The measurement results are displayed.



6. Press **[YES]** to display results for the target point.

   Press **[HVD/nez]** to switch results for the target point between distance/angle values and coordinate/elevation values.

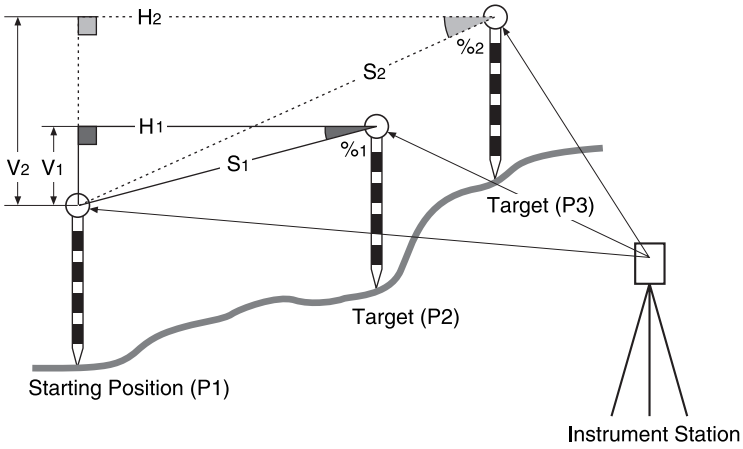


7. Press **[YES]** in the screen in step 4 to return to <Offset>.

19.MISSING LINE MEASUREMENT

Missing line measurement is used to measure the slope distance, horizontal distance, and horizontal angle to a target from the target which is the reference (starting point) without moving the instrument.

- It is possible to change the last measured point to the next starting position.
- Measurement results can be displayed as the gradient between two points.



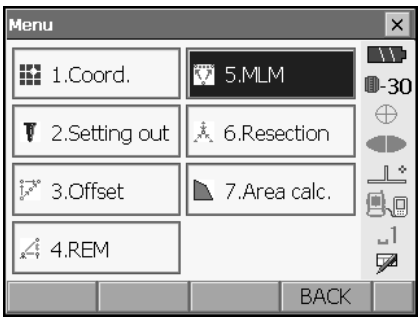
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.

☞"21.6 Allocating Key Functions"

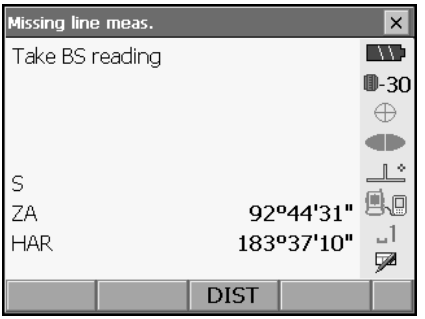
19.1 Measuring the Distance between 2 or more Points

PROCEDURE

1. Select "MLM" in <Menu>.

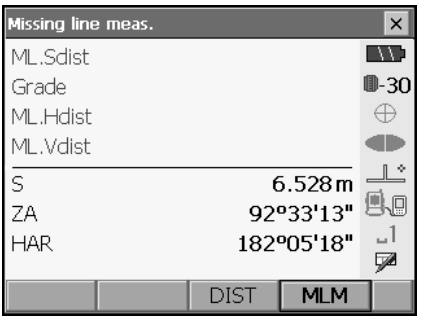


2. Sight the second target, and press **[DIST]** to start measurement.
   Press **[STOP]** to stop measurement.
   The following values are displayed:
   S : Slope distance of the starting position and 2nd target.
   H : Horizontal distance of the starting position and 2nd position.
   V : Height difference of the starting position and 2nd target.



Note

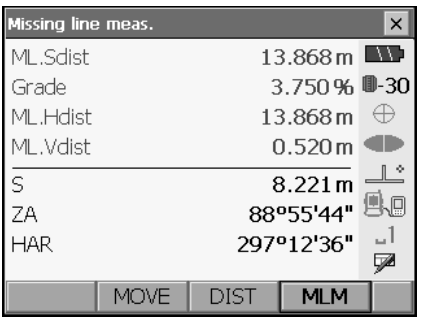
- When measurement data already exists the screen of step 3 is displayed and measurement starts.



3. Sight the next target and press **[MLM]** to begin observation. Slope distance, horizontal distance and height difference between multiple points and the starting position can be measured this way.

   - Press **[DIST]** to re-observe the starting position. Sight the starting position and press **[DIST]**.
   - When **[MOVE]** is pressed, the last target measured becomes the new starting position to perform missing line measurement of the next target.

Results for measurement between starting position and second target



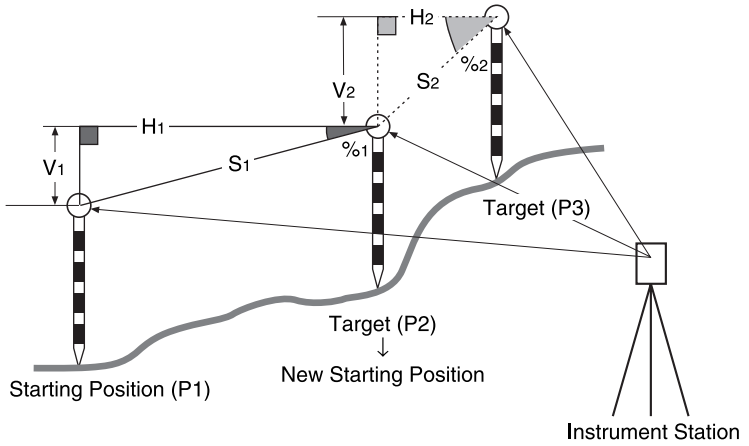
Results for current point

4. ☞ "19.2 Changing the Starting Point"

5. Press **{ESC}** or tap the cross in the top-right corner to end missing line measurement.

19.2 Changing the Starting Point

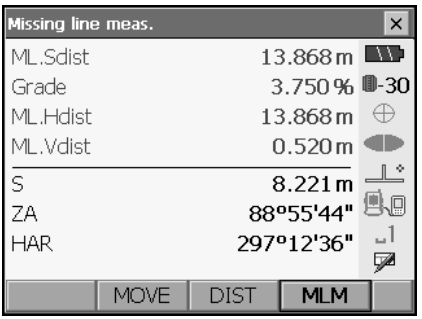
It is possible to change the last measured point to the next starting position.



PROCEDURE

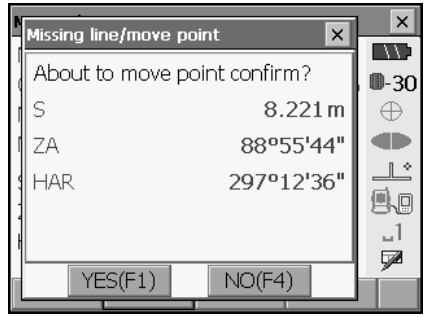
1. Observe the starting position and target following steps 1 to 5 in "19.1 Measuring the Distance between 2 or more Points".

2. After measuring the targets, press **[MOVE]**.



Press **[YES]** in the confirmation message window.

- Press **[NO]** to cancel measurement.



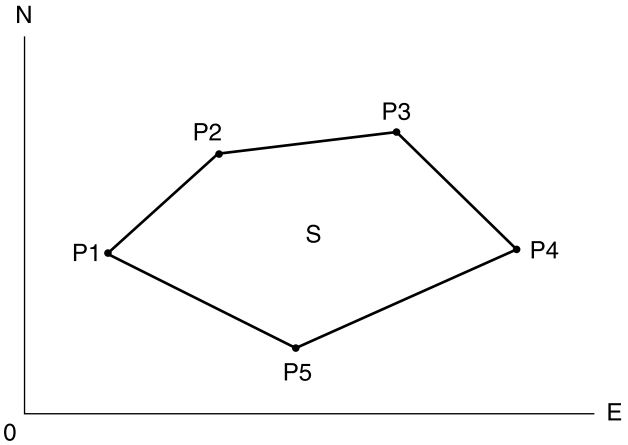
3. The last target measured is changed to the new starting position.

4. Perform missing line measurement following steps 3 to 5 in "19.1 Measuring the Distance between 2 or more Points".

20.SURFACE AREA CALCULATION

You can calculate the area of land (slope area and horizontal area) enclosed by three or more known points on a line by inputting the coordinates of the points

Input		Output	
Coordinates:	P1 (N1, E1, Z1) P2 (N2, E2, Z2) P3 (N3, E3, Z3)	Surface area:	S (horizontal area and slope area)



- Number of specified coordinate points: 3 or more, 30 or less
- Surface area is calculated by observing in order the points on a line enclosing an area or by reading in the previously registered coordinates and using it as known point data.
- It is possible to allocate softkeys in measurement menus to suit various applications and the ways that different operators handle the instrument.

☞"21.6 Allocating Key Functions"

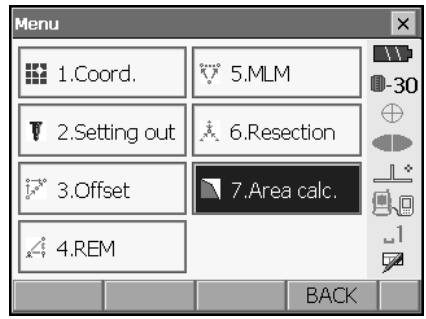
- An error will occur if only two points (or less) are entered (or recalled) when specifying an enclosed area.
- Be sure to observe (or recall) points on an enclosed area in a clockwise or counterclockwise direction. For example, the area specified by entering (or recalling) point numbers 1, 2, 3, 4, 5 or 5, 4, 3, 2, 1 implies the same shape. However, if points are not entered in numerical order, the surface area will not be calculated correctly.

Slope area

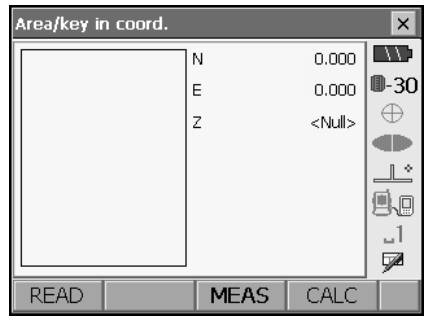
The first three points specified (measured/read-in) are used to create the surface of the slope area. Subsequent points are projected vertically onto this surface and the slope area calculated.

PROCEDURE Surface area calculation by measuring points

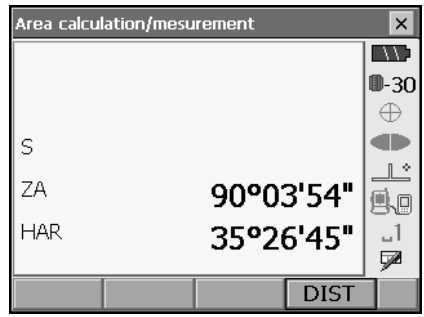
1. Select "Area calc." in <Menu>.



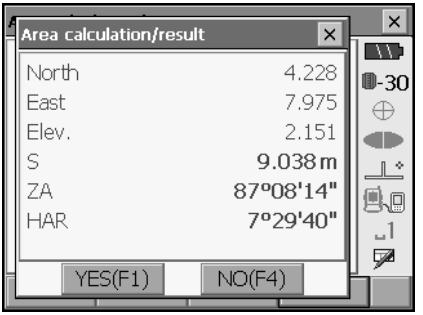
- When **[READ]** is pressed, registered coordinates can be recalled and used in subsequent measurements.
  ☞ "PROCEDURE Surface area calculation using registered coordinate data"

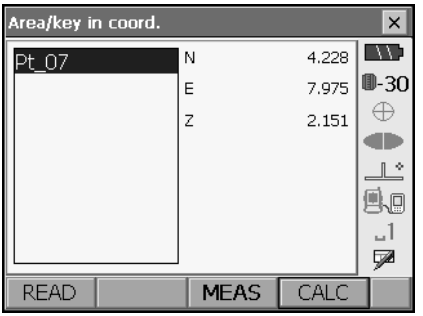


2. Press **[MEAS]** to display <Area calculation/ measurement>. Sight the first point on the line enclosing the area, and press **[DIST]**. Measurement begins and the measured values are displayed. Press **[STOP]** to stop measuring.

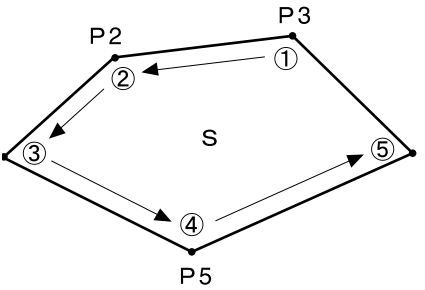


3. The measurement results are displayed. Press **[YES]** to confirm.The value of point 1 is set in "01".

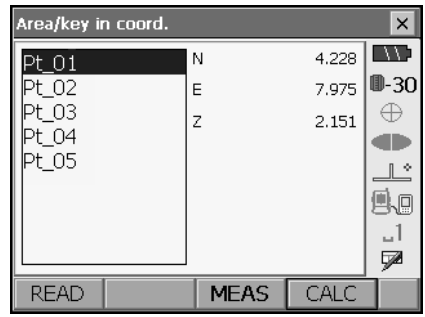


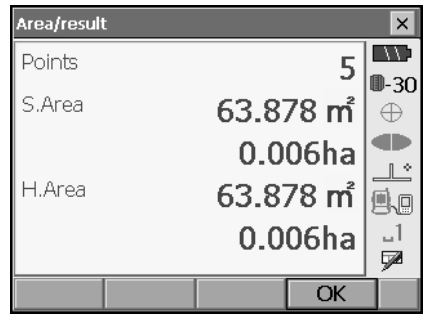


4. Repeat steps 3 to 4 until all points have been measured. Points on an enclosed area are observed in a clockwise or counterclockwise direction.
   For example, the area specified by entering point numbers 1, 2, 3, 4, 5 or 5, 4, 3, 2, 1 implies the same shape.



5. Press **[CALC]** to display the calculated area.





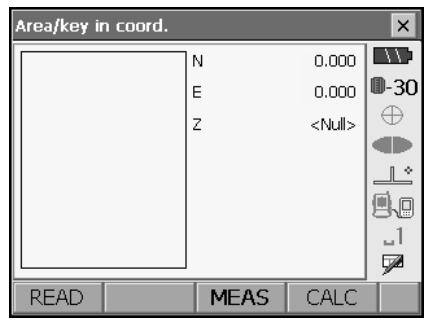
6. Press **[OK]** to return to <Area/key in coord.>. Press **{ESC}** or tap the cross in the top-right corner to quit area calculation.

PROCEDURE Surface area calculation using registered coordinate data

Coordinate data registered in Program mode can be recalled and used for area calculations.
☞ "15.4 Reading in registered coordinate data from Program mode"

1. Select "Area calc." in <Menu>.

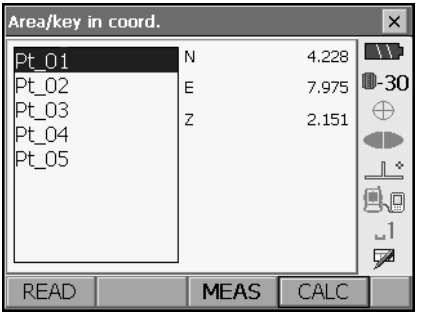
2. Press **[READ]** to read in registered coordinate data from Program mode.



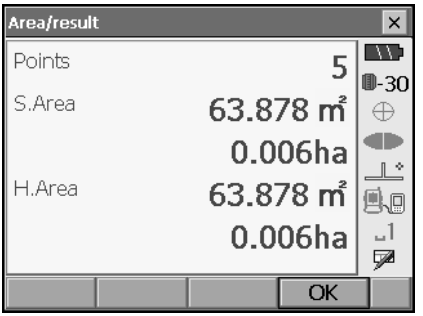
3. Register the first point in the list and press **[OK]**.
   The coordinates of the first point are set as "01".
   ☞ Reading in coordinate data from Program mode: "15.4 Reading in registered coordinate data from Program mode"

4. Read in coordinates of point 2 and onward
   Repeat steps 2 to 3 until all points have been read in.
   Points on an enclosed area are read in a clockwise or counterclockwise direction.
   Press **[OK]** after registering multiple points to read in all simultaneously.

   After all known points necessary to calculate the surface area have been observed, **[CALC]** is displayed.



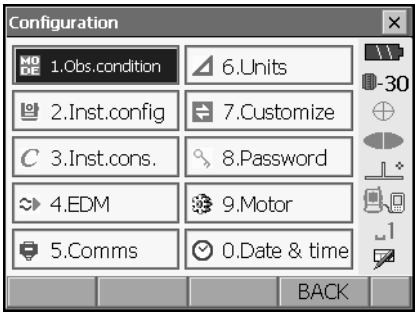
5. Press **[CALC]** to display the calculated area.



6. Press **[OK]** to return to <Area/key in coord.>.
   Press **{ESC}** or tap the cross in the top-right corner to quit area calculation.

21.CHANGING THE SETTINGS

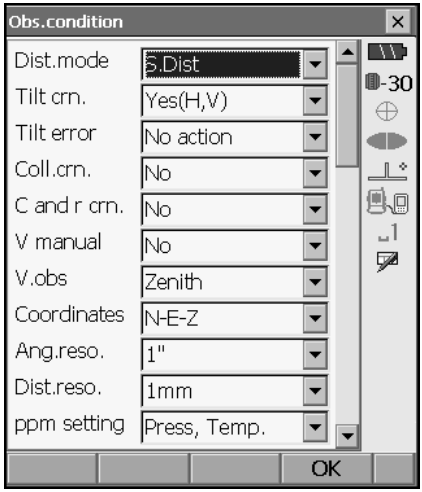
This section explains the contents of parameter settings in Basic mode and how to change these settings.
Each item can be changed to meet your measurement requirements.
<Configuration> can be accessed by pressing the "CONFIG" icon in <Top>.



The following chapters provide details of items in Configuration mode.

- Communication settings ☞"8. CONNECTING TO EXTERNAL DEVICES"
- Motor settings ☞"11.1 Auto Pointing Settings", "12.1 Auto Tracking Settings"
- Instrument configurations ☞"23.3 Tilt Sensor", "23.5 Reticle"

21.1 Observation Conditions



Items set and options (*: Factory setting)

Distance mode:	S.Dist (slope distance)*, H.dist (horizontal distance), V.dist (height difference)
Tilt crn (tilt correction) :	Yes (H,V)*, Yes (V), No
Tilt error:	No action*/Go to Tilt screen
Coll.crn. (collimation correction) :	No, Yes*
C and r crn.:	No*, K=0.142, K=0.20
V manual:	No*, Yes
V.obs (vertical angle display method) :	Zenith*, Horiz., Horiz ±90°
Ang.reso. (Angle resolution):	SRX1/SRX2: 0.5", 1"* SRX3/SRX5: 1"*, 5"
Dist.reso. (Distance resolution):	SRX1/SRX2: 0.1mm, 1mm* SRX3/SRX5: 1mm*
ppm setting:	Press, Temp.*, +Humidity

Note

- When "V manual" is set to "No" the horizontal angle will be automatically set to 0.

☞ Setting V manual to "Yes": "29.2 Manually Indexing the Vertical Circle by Face Left, Face Right Measurement"

- "Dist.reso." can only be selected for SRX1/SRX2. The screen displayed above is that of SRX1/SRX2.

Automatic tilt angle compensation mechanism

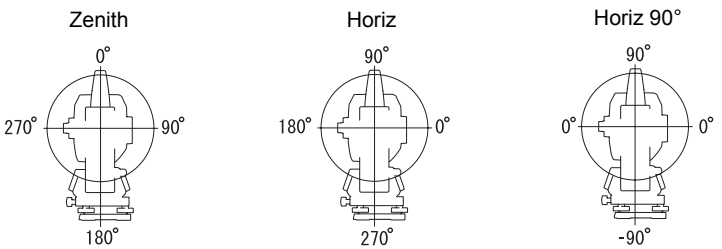
The vertical and horizontal angles are automatically compensated for small tilt errors using the 2-axis tilt sensor.

- Read the automatically compensated angles when the display has stabilized.
- The horizontal angle error (vertical axis error) fluctuates according to the vertical axis, so when the instrument is not completely leveled, changing the vertical angle by rotating the telescope will cause the displayed horizontal angle value to change.
- Compensated horizontal angle = Measured horizontal angle + Tilt in angle/tan (Vertical angle)
- When the telescope is directed close to the zenith or nadir angle, tilt compensation is not applied to the horizontal angle.

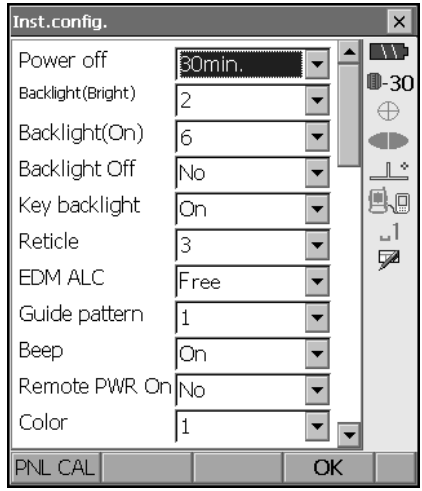
Collimation correction

The SRX has a collimation correction function that automatically corrects horizontal angle errors caused by horizontal axis and leveling axis errors.

V mode (vertical angle display method)



21.2 Instrument Configuration



Items set and options (*: Factory setting)

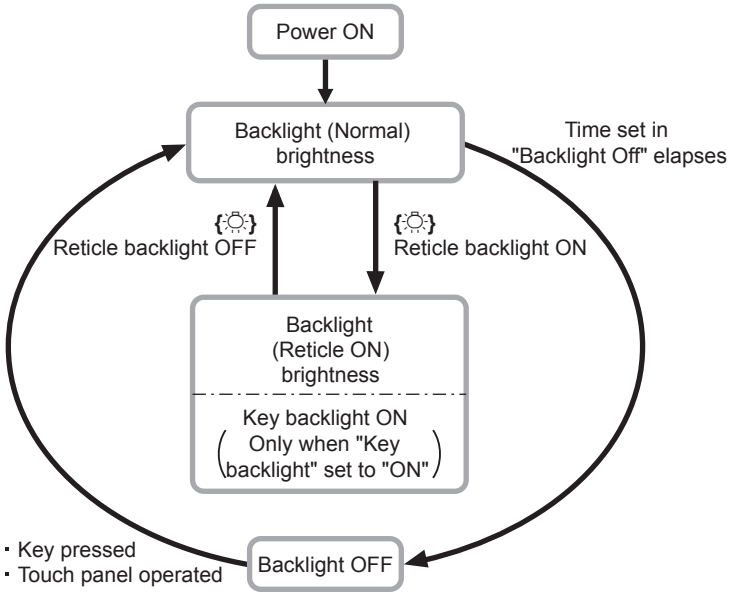
Power off : No/5min./10min./15min./30min.*
Backlight (Reticle ON) :0 to 8 (6*) (Brightness level on pressing **{☼}**)
Backlight (Normal) : 0 to 8 (2*)
Backlight Off : No*/30sec/1min./5min./10min.
Key backlight : Off/On*
Reticle : 0 to 5 level (3*)
EDM ALC : Free*/Hold
Guide pattern: 1* (simultaneous)/2 (alternating)
Beep: On*/Off
Remote PWR-On: Yes/No*
Color: 1*/2 (monochrome)

Note

- Press **[PNL CAL]** to display the touch panel calibration screen.

☞"10.1 Configuring the Touch Panel"

Adjusting backlight brightness/turning the reticle illumination and key backlight ON/OFF
Pressing **{☼}** switches the brightness level of the backlight in conjunction with the ON/OFF status of the reticle illumination/key backlight.
When the SRX is powered ON the brightness level is set to "Backlight (Normal)". "Backlight (Normal)" was set to a higher brightness level than "Backlight (Reticle ON)" when the SRX was shipped but these values can be modified according to user preferences.



Power-saving automatic cut-off/Backlight Off

To save power, power to the SRX is automatically cut off if it is not operated for the set time. The backlight will similarly be turned off if the instrument is not operated for the selected time. However, the backlight will not be turned off when "Backlight" is set to "ON".

EDM ALC

Set the light receiving status of the EDM. While carrying out continuous measurement, set this item according to the measurement conditions.

- When EDM ALC is set to "Free," the instrument's ALC will be automatically adjusted if an error occurs as a result of the amount of light received. Set to "Free" when the target is moved during measurement or different targets are used.
- When "Hold" is set, the amount of light received will not be adjusted until continuous measurement is completed.
- If an obstacle intermittently obstructs the light beam during continuous measurement and the "Signal off" error occurs, each time the obstruction occurs it takes some time for the amount of light received to be adjusted and the measurement value displayed. Set to "Hold" when the light beam used for measurement is stable but is frequently obstructed by obstacles such as people, cars, or tree branches etc. preventing measurement from being performed.

Key backlight

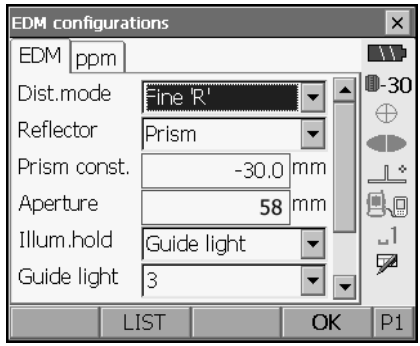
The key backlight can be set to "ON" or "OFF". When "ON" the keys will be illuminated when "Backlight (Bright)" is active.

Note

- When the distance measurement mode is set to "Tracking" (target is moved during distance measurement) the EDM ALC will be adjusted regardless of the EDM ALC setting.

21.3 EDM Settings

• EDM tab



Items set, options, and input range (*: Factory setting)

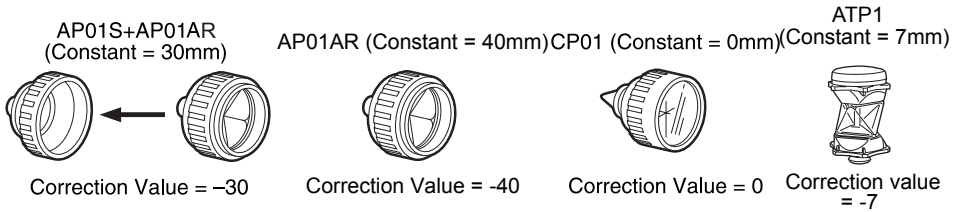
Dist. mode (Distance measurement mode):	Fine “R”*, Fine AVG n= 2 (Setting: 2 to 9 times), Fine “S”, Rapid "R", Rapid “S”, Tracking
Reflector:	Prism*/360° Prism/Sheet/Reflectorless
Prism constant:	-99 to 99 mm ("Prism" is selected: -30*, "360° Prism" is selected: -7, "Sheet" is selected: 0)
Aperture:	1 to 999mm ("Prism" is selected: -58*, "360° Prism" is selected: 34, "Sheet" is selected: 20)
Illum. hold ({☼} function):	Laser-pointer*/Guide light
Guide light (Bright):	1 to 3 (3*)

- The setting for "Fine AVG" distance measurement mode can be increased/decreased using the **[+]/[-]** softkeys.
- Target information can be edited and recorded.
  ☞ "PROCEDURE Recording and editing target information"
- "Prism constant" and "Aperture" will not be displayed when Reflectorless" is selected in "Reflector".
- When "prism constant" and/or "Aperture" values are changed and **[OK]** is pressed, these changes are reflected in the status bar target type display. This display will also change to reflect changes in target information settings made using a data collector. In both of the above cases, changes will not be recorded in <Reflector setting>. To remove added target information from the status bar, perform a cold boot.
  ☞ Status bar: "5.2 Display Functions", <Reflector setting>: "PROCEDURE Recording and editing target information", Cold boot: "10.2 Resolving Software Issues Cold boot"
- The Guide light brightness item ("Guide light (Bright)") will be displayed only when "Illum. hold" is set to "Guide light".

Prism constant correction

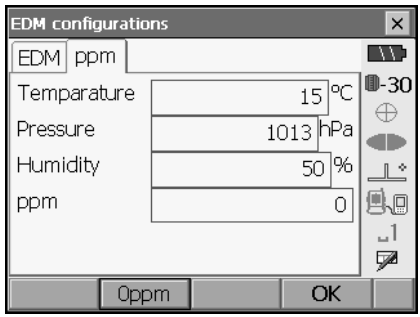
Reflective prisms each have their prism constant.
Set the prism constant correction value of the reflective prism you are using. When selecting "Reflectorless" in "Reflector", prism constant correction value is set to "0" automatically.

•The following are samples of the prism constant correction values of reflective prisms from Sokkia.



Prism constants and aperture settings can be set for each prism. The prism constant and aperture values displayed in the EDM tab will change to reflect the reflector type selected in "Reflector".

● ppm tab



- **[0ppm]**: Atmospheric correction factor returns to 0 and temperature and air pressure are set to the factory settings.
- Atmospheric correction factor is calculated and set using the entered values of the temperature and air pressure. Atmospheric correction factor can also be entered directly.

Items set, options, and input range (*: Factory setting)

Temperature:	-30 to 60°C (15*)
Pressure:	500 to 1400hPa (1013*), 375 to 1050mmHg (760*)
Humidity:	0 to 100% (50*)
ppm (Atmospheric correction factor):	-499 to 499 (0*)

•The "Humidity" item is displayed only when the "ppm setting" in "Obs. condition" is set to "+Humidity".

Atmospheric correction factor

The velocity of the light beam used for measurement varies according to atmospheric conditions such as temperature and air pressure. Set the atmospheric correction factor when you wish to take this influence into account when measuring.

- The SRX is designed so that the correction factor is 0 ppm at an air pressure of 1013 hPa, a temperature of 15°C, and a humidity of 50%.
- By inputting the temperature, air pressure values, and humidity the atmospheric correction value is calculated using the following formula and set into the memory.

Atmospheric Correction Factor (ppm) =

$$282.324 - \frac{0.294362 \times p}{1 + 0.003661 \times t} + \frac{0.04127 \times e}{1 + 0.003661 \times t}$$

t : Air temperature (°C)
p : Pressure (hPa)
e : Water vapor pressure (hPa)
h : Relative humidity (%)
E: Saturated water vapor pressure

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

$$e = h \times \frac{E}{100}$$

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

The SRX measures the distance with a beam of light, but the velocity of this light varies according to the index of refraction of light in the atmosphere. This index of refraction varies according to the temperature and pressure. Near normal temperature and pressure conditions:

With constant pressure, a temperature change of 1°C: an index change of 1 ppm.

With constant temperature, a pressure change of 3.6 hPa: an index change of 1 ppm.

To perform high accuracy measurements, it is necessary to find the atmospheric correction factor from even more accurate temperature and pressure measurements and perform an atmospheric correction.

Sokkia recommends that extremely precise instruments be used to monitor the air temperature and pressure.

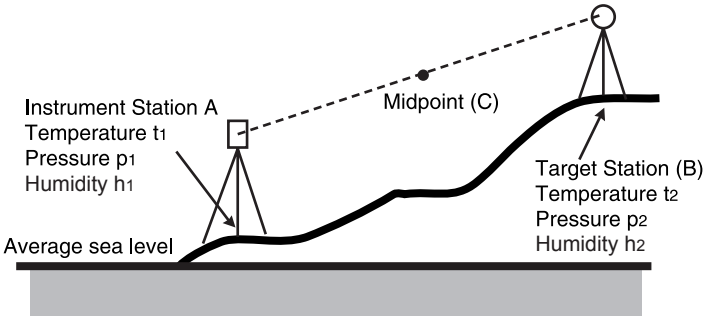
Enter the average temperature, air pressure, and humidity along the measurement beam route in "Temperature", "Pressure", and "Humidity".

Flat terrain	:Use the temperature, pressure, and humidity at the midpoint of the line.
Mountainous terrain	:Use the temperature, pressure, and humidity at the intermediate point (C).

If it is not possible to measure the temperature, pressure, and humidity at the midpoint, take such measurements at the instrument station (A) and the target station (B), then calculate the average value.

Average air temperature	:(t1 + t2)/2
Average air pressure	:(p1 + p2)/2

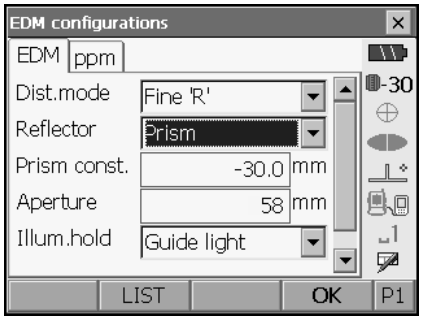
Average humidity :(h1 + h2)/2



•If the weather correction is not required, set the ppm value to 0.

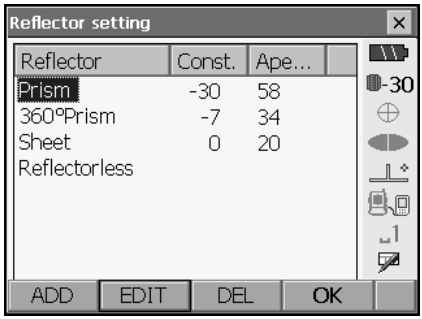
PROCEDURE Recording and editing target information

The **[LIST]** softkey is displayed when either "Reflector" or "Prism const." is selected in the EDM tab of <EDM configurations>.



1. Press **[LIST]** to display a list of all recorded targets.

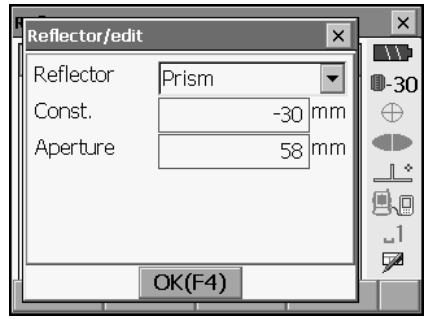
   • **[ADD]**: Displays <Reflector list>. Select the desired target from this list and press **[OK]** to register in the list in <Reflector setting>. Up to a maximum of 6 targets can be recorded.
   • **[DEL]**: Deletes the selected target.



2. To edit a target, select the desired target and press **[EDIT]**. <Reflector/edit> is displayed. Select/input relevant information for the target.

   Target: Prism/mini-Prism/Sheet/ Reflectorless/360° Prism
   Const.: -99 to 99 mm
   Aperture: 1 to 999 mm

   • When selecting "Reflectorless" in "Reflector", prism constant correction and aperture values are set to "0" automatically.



3. Press **[OK]** in the screen of step 2 to save edited information and return to <Reflector setting>. Press **[OK]** to return to <EDM configurations>.

21.4 Allocating User-defined Tabs

It is possible to allocate tabs in Meas mode and Menu mode to suit the measurement conditions. It is possible to operate the SRX efficiently because unique tab allocations can be preset to suit various applications and the ways that different operators handle the instrument.

- The current tab allocations are retained until they are revised again, even when the power is cut off.
- Press **[CLEAR]** in <Customize/Select screen> to return all customized configurations including screen controls and softkey allocations to their previous settings.
- One screen can contain a maximum of 5 tabs.

- When tab allocations are recorded and registered, the previously recorded tab settings are cleared.

● Tab allocations

The following are tabs allocated when the SRX was shipped and tabs that can be defined by the user.

• Basic measurement

Factory settings	User-definable tabs
SHV	SHV
SHVdist	SHVdist
Graphic	SHV + Coord.

• Setting out

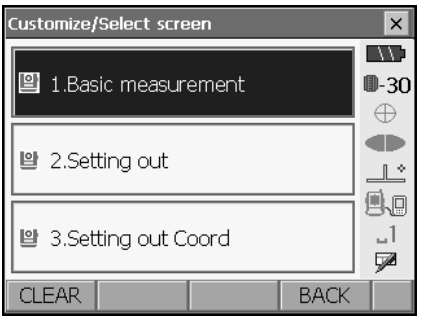
Factory settings	User-definable tabs
Meas.	Meas.
Graphic	

• Setting out Coord.

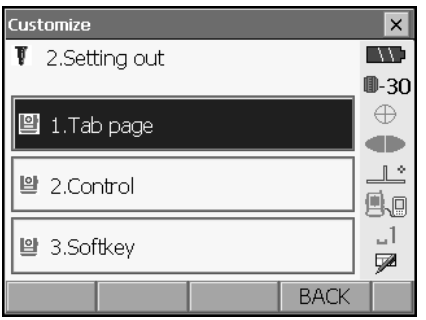
Factory settings	User-definable tabs
SHV	SHV
NEZ	NEZ
Graph1	
Graph2	

PROCEDURE Allocating tabs

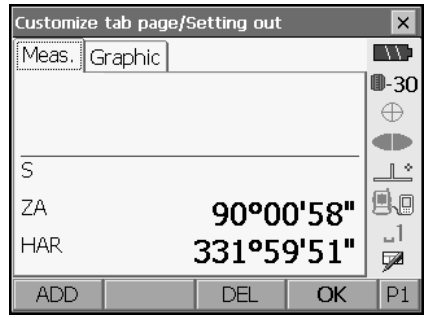
1. Select "Customize" to display <Customize/Select screen>.
   Select the measurement mode in which you want to allocate a tab.



   Select "Tab page".



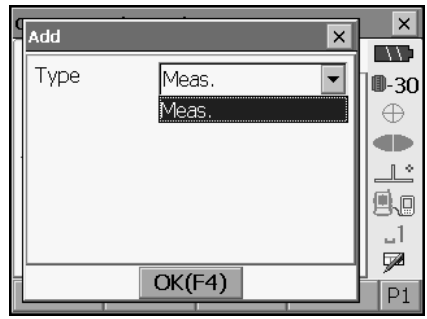
2. Use the softkeys (**[ADD]**, **[DEL]** etc.) in <Customize tab page> to allocate the desired tab page layout.



   - Press **[ADD]** to add the selected tab at the right-hand side of the screen.
   - Press **[INS]** in the second page to insert the selected tab in front of the current tab.
   - Press **[CNFG]** in the second page to replace the current tab with the selected tab.
   - Press **[DEL]** to delete the current tab.

•Tabs, once deleted, cannot be retrieved.

Select a tab type from the "Type" drop-down list.



3. Repeat step 2 to perform further tab allocations.

4. Press **[OK]** to finish allocating tabs. The allocated tabs are stored in memory and <Customize> is displayed. The newly allocated tabs appear in the relevant measurement screen.

21.5 Customizing Screen Controls

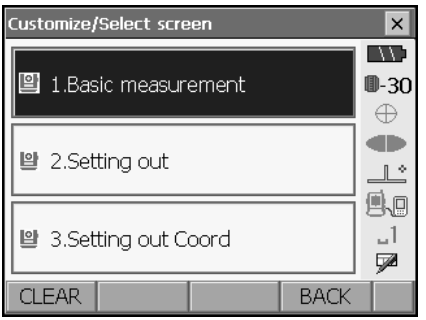
It is possible to customize screen controls in Meas mode to suit the measurement conditions and the different methods employed by different operators.

- The current screen control settings are retained until they are revised again, even when the power is cut off.
- Press **[CLEAR]** in <Customize/Select screen> to return all customized configurations including tab pages and softkey allocations to their previous settings.
- Screen controls cannot be set for the Graphic tab.

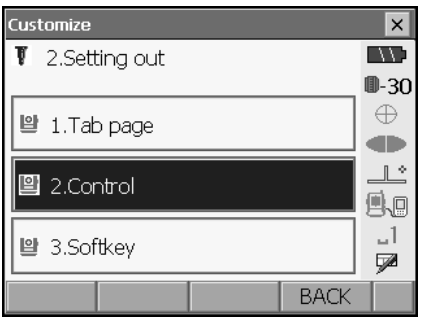
- When screen control settings are recorded and registered, the previously recorded settings are cleared.

PROCEDURE Customizing screen controls

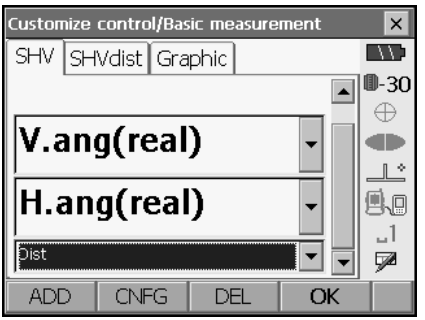
1. Select "Customize" to display <Customize/Select screen>.
   Select the measurement mode in which you want to customize screen controls.



   Select "Control".

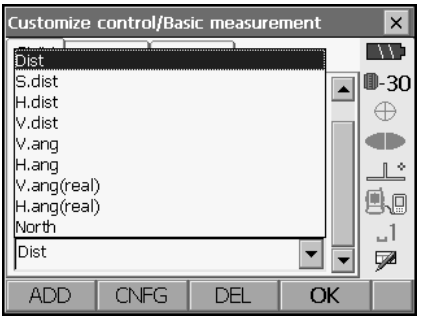


2. Press **[ADD]** to add a control drop-down list.
   • Press **[DEL]** to delete the selected control.



- Controls, once deleted, cannot be retrieved.

3. Select a screen control from the list.



4. Press **[CNFG]** to set the size, thickness, color and spacing of the font.

5. Repeat steps 2 to 4 to customize more screen controls.

6. Press **[OK]** to finish customizing screen controls. The modifications are stored in memory and <Customize> is displayed. The modifications are reflected in the relevant screens.

21.6 Allocating Key Functions

It is possible to allocate the softkeys in Meas mode to suit the measurement conditions. It is possible to operate the SRX efficiently because unique softkey allocations can be preset to suit various applications and the ways that different operators handle the instrument.

- The current softkey allocations are retained until they are revised again, even when the SRX is powered OFF.
- Press **[CLEAR]** in <Customize/Select screen> to return all customized configurations including tab pages and screen controls to their previous settings.

- When softkey allocations are recorded and registered, the previously recorded key settings are cleared.
- Softkeys cannot be allocated to Graphic tabs.

● **The following are the screens that can be customized and softkey allocations when the SRX was shipped.**

1. SHV and SHVdist tabs of <Basic measurement>
   Page 1 **[AT On] [MOTOR] [0SET] [DIST]**
   Page 2 **[SRCH] [EDM] [H.ANG] [COORD]**
   Page 3 **[OFFSET] [RESEC] [REM] [S-O]**

2. Meas. tab of <Setting out>
   Page 1 **[AT On] [/shvR] [H.ROTA] [DIST]**
   Page 2 **[CNFG] [---] [---] [REM]**
   Page 3 **[---] [---] [---] [---]**

3. SHV and NEZ tabs of <Set out Coords>
   Page 1 **[OK] [AT On] [H.ROTA] [DIST]**
   Page 2 **[---] [---] [---] [---]**
   Page 3 **[---] [---] [---] [---]**

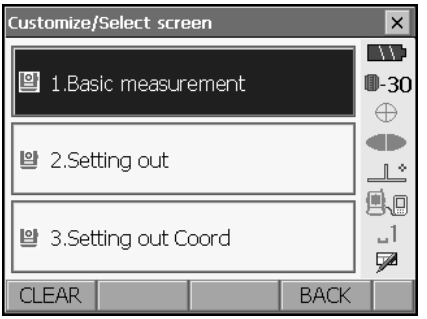
● **The following functions can be allocated to the softkeys.**

[---] : No functions set
[DIST] : Distance and angle measurement
[H.ROTA] : Rotate SRX to the entered horizontal angle. Rotate horizontally to the angle for the setting out point when performing setting out.
[CNFG] : Set setting out accuracy (can only be allocated to 2 above)
[/SHV] : Switch Distance input mode between slope distance (S)/horizontal distance (H)/height difference (V). The capitalized letter in the softkey indicates the currently selected mode.
[/SHVR] : Switch distance mode between slope distance (S)/horizontal distance (H)/height difference (V)/REM (R) in setting out screens. The capitalized letter in the softkey indicates the currently selected mode (can only be allocated to 2 above).
[OK] : Terminate setting out measurement for the selected setting out point and return to <Key in coord>. This setting out point will be removed from the list (can only be allocated to 3 above).

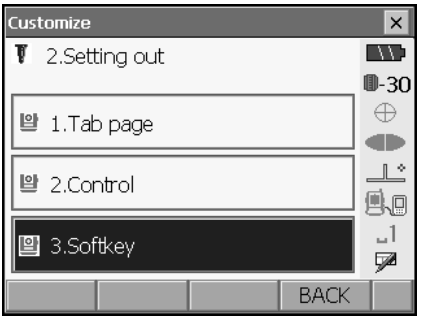
[0SET] : Set horizontal angle to 0°
[H.ANG] : Set required horizontal angle
[R/L] : Select horizontal angle right/left. The capitalized letter in the softkey indicates the currently selected mode.
[ZA / %] : Switch between zenith angle/slope in %. The capitalized letter in the softkey indicates the currently selected mode.
[HOLD] : Hold horizontal angle/release horizontal angle
[RCL] : Display final measurement data
[HV out] : Output angle measurement results to an external device
[HVD out] : Output distance and angle measurement results to an external device
[ft/M] : Switch distance units between meters/feet
[HT] : Set the instrument station, coordinates, instrument height and target height
[AIM] : Return signal
[TILT] : Display tilt angle
[MOTOR] : SETTINGS mode Motor tab
[TURN] : Rotates SRX 180°
[SRCH] : Automatically sights the center of the target
[RC] : Rotate in the direction specified by the On-demand Remote Control System
[<-RC] : Rotate in a counterclockwise direction (from the point of view of the RC controller)
[RC->] : Rotate in a clockwise direction (from the point of view of the RC controller)
[RC Cont] : Nullify the current measurement position and continue Turning operation
[Fix Vel] : Fixed velocity rotation around vertical and horizontal axes
[AT On] : Start Auto Tracking (Auto Tracking model only. **[AT Off]** during Auto Tracking)
[EDM] : EDM settings
[MENU] : Display <Menu> (coordinate measurement, setting out measurement, offset measurement, REM measurement, missing line measurement, Resection, area calculation)
[COORD] : Coordinates measurement
[S-O] : Setting-out measurement
[OFFSET] : Offset measurement
[A-OFS] : Angle offset menu
[D-OFS] : Distance offset menu
[2D-OFS] : Offset/2D menu
[MLM] : Missing line measurement
[REM] : REM measurement
[RESEC] : Resection measurement
[AREA] : Surface area measurement

PROCEDURE Allocating a softkey

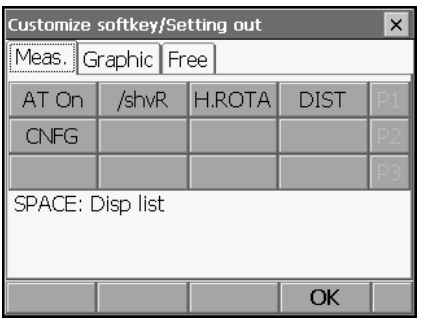
1. Select "Customize" to display <Customize/Select screen>.
   Select the measurement mode in which you want to allocate a softkey.



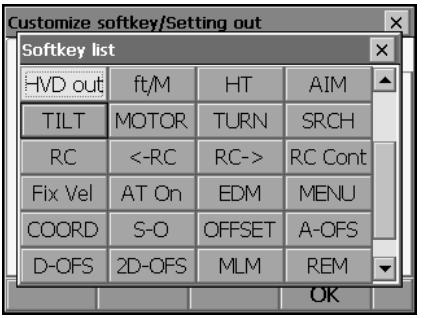
   Select "Softkey".



2. Select the desired tab. All softkeys currently allocated to each page of that tab are displayed.



3. Select the softkey whose allocation you want to change. Tapping a softkey, or pressing **{SPACE}** when the cursor is aligned with a softkey, will display <Softkey list>.

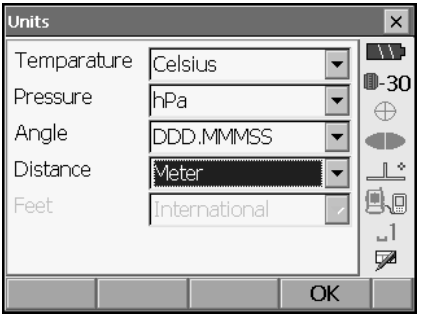


4. Select the desired softkey from <Softkey list> to allocate to the position specified in step 3.

5. Repeat steps 2 to 3 to perform further key allocations.

6. Press **[OK]** to finish allocating keys. The allocated keys are stored in memory and <Customize> is displayed. The newly allocated keys appear in the relevant measurement screen.

21.7 Units

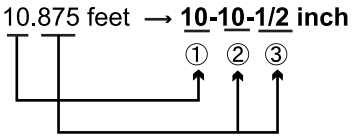


Items set and options (*: Factory setting)

Temperature:	Celsius*/Farenheit
Pressure:	hPa/mmHg/InchHg
Angle:	Degree (DDD.MMMSS)*/Gon/Mil
Distance:	Meter*/Feet/Inch
Feet (only displayed when "Feet" or "Inch" selected above):	International*/US

Inch (Fraction of an inch)

"Fraction of an inch" is the unit used in the United States and expressed like the following example.



① **10**.000 feet
② 0.875 feet x 12=**10**.5 inch
③ 0.5 inch=**1/2** inch

- Even if "inch" is selected in this setting, all the data including the result of area calculation are output in "feet" and all the distance values must be input in "feet". In addition, when the "inch" display exceeds the range, it is displayed in "feet".

21.8 Changing Password

Setting a password allows you to protect important information such as measurement data and e-mail addresses.
No password was set when the SRX was shipped. When setting a password for the first time, leave the "Old password" box blank.
When a password has been set, the password screen will appear when the SRX is powered ON. Input the password to continue.

Items set

Old password:	Input current password
New password:	Input the new password
New password again:	Input the new password again

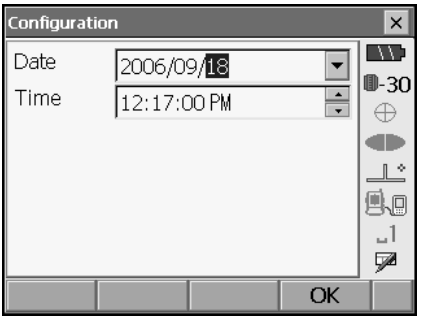
- Password can be up to 16 characters in length. Input characters will be displayed as asterisks.
- To deactivate the password function, perform the new password setting procedure but enter a "space" in the "New password" box.

Note

- An e-mail address is necessary when using the Series SRX SFX Dial-Up Program.
  ☞ SFX Dial-Up Program Explanations (Series SRX and NET05/NET1)

- The password function will not be canceled when a cold boot is performed.
- The password must be input after powering ON the SRX from an external device when a password has been set.
  ☞ "10.3 Powering the SRX ON/OFF from an External Instrument"

21.9 Date and Time



Items set

Date:	Manually input date or select from the drop-down calendar by tapping ▼.
Time:	Manually input time or set using **[▲]/[▼]**. Pressing **{SPACE}** will increment the selected section by 1.

Date and Time
The SRX includes a clock/calendar function.

21.10 Restoring Default Settings

Perform a cold boot to return all items to factory settings. A cold boot will not erase surveying data in Program mode. However, if the data in the memory is important, **BE SURE TO TRANSFER IT TO A PERSONAL COMPUTER BEFORE PERFORMING A COLD BOOT.**

To perform a cold boot, while holding **{F3}, {F1},** and **{BACKSPACE}**, press **{ ⏻ }**. The following message appears.

"All Settings will be cleared. Are you sure?"

Press **[YES]** to continue. Press **{ESC}** to cancel.

After **[YES]** is pressed the instrument powers ON as normal.

•The password function will not be canceled.

22.WARNING AND ERROR MESSAGES

The following is a list of the error messages displayed by the SRX and the meaning of each message. If the same error message is repeated or if any message not shown below appears, the instrument has malfunctioned. Contact your Sokkia agent.

Backup battery dead. Clock display may no longer be correct.

The voltage supplied by the lithium battery either declines or is completely discharged. Ask your Sokkia agent to replace the battery for you.

Bad condition

The air is shimmering a lot, etc., measuring conditions are poor.

The center of the target cannot be sighted.
Resight the target.

Unsuitable distance measurement conditions when reflectorless measurement is set. When reflectorless measurement is set, distance cannot be measured because the laser beam is striking at least two surfaces at the same time.
Choose a single surface target for distance measurement.
☞ Precautions for setting prism: "11. TARGET SIGHTING"

Calculation error

During resection measurement the same point is registered multiple times. Set another known point so that the known point coordinates do not coincide.

During surface area calculation, conditions necessary for calculations are not met. Check conditions and try again.

Cannot changing TS <==> SDR!!

Cannot switch to Program mode.
Perform a warm boot then power ON as normal. If this error message appears frequently, contact your Sokkia agent.

Device list is full !!

No more *Bluetooth* devices can currently be registered. Delete unnecessary devices from the list and try again.

Error: Read Build Info.
Error: Read sysflg
Error: Self check

Press **[OK]** to cancel the message. If this error message appears frequently, contact your Sokkia agent.

Incorrect password.

Input password does not match set password. Input correct password.

Input device name !!

Bluetooth device name not input. Input device name and complete device registration.

Input over 3 letters !

The input password consists of less than 3 characters. Input a password at least 3 characters in length.

Job data is not developed. Or job may have broken.
Program mode JOB data lost or cannot be read in. Create JOB data again.

Light detected too strong!!
Sighting has been canceled due to sunlight or extremely strong light entering the telescope along the sighting direction. Avoid such light when performing measurement.

Motor error EXXX
A problem has occurred with the motor drive and operation stops.
Power the SRX OFF then ON to correct the problem.
If this error message appears frequently, contact your Sokkia agent.

Need base pt. obs
During REM measurement, the observation of the target was not completed normally.
Reset and sight the prism and perform measurement again.

Need 1st obs
During missing line measurement, the observation of the starting position was not completed normally.
Sight the starting position accurately and press **[OBS]** to perform the measurement again.

New password Diff.
During new password setting, the passwords input twice are different. Input new password twice correctly.

No data
When searching for or reading in coordinate data or searching for code data, the search stopped either because the item in question does not exist or the data volume is large.

North/East is null
Coordinates cannot be read in when either the northing or easting value is set to "Null".

No solution
The calculation of the instrument station coordinates during resection does not converge.
Access the results and if necessary, perform the observations again.

Not exist point
When reading in coordinate values during instrument station registration etc., there is no coordinates data registered in the memory and in the selected JOB. Register coordinate data first.

Out of range
During gradient % display, the display range (less than ± 1000%) has been exceeded.
During REM measurement, either the vertical angle has exceeded horizontal ±89° or the measured distance is greater than 9999.999m.
Install the instrument station far from the target.

The instrument station coordinates calculated during resection are too high.
Perform the observation again.

During area calculation, results exceeded the display range.

Reflectorless not supported !!

Auto Tracking cannot be performed in reflectorless mode.
Use the prism to carry out automatic sighting.

Remote Control communication err !!

Communication between the On-demand Remote Control System RC controller and the SRX failed. Check the status (communications setup, power supply, cable connections etc.) of the RC controller, wireless modem and cables.

Sheet not supported !!

Auto Tracking cannot be performed with the sheet.
Use the prism to carry out automatic sighting.

Signal off

The reflected light is not observed when distance measurement begins. Or, during measurement, the reflected light has weakened or is blocked.
Either sight the target again or, when using a reflective prism, increase the number of reflective prisms.

Target not found !!

The prism cannot be found within the Search area range.
Reset and sight the prism and perform measurement again.

Temp Rnge OUT

SRX is outside useable temperature range and accurate measurement cannot be performed.
Repeat measurement within the appropriate temperature range.

Tilt over range !!

The tilt angle exceeds the tilt angle compensation range of the sensor.
Level the instrument again.
☞ "9.2 Levelling"

Time out !!

Measurement is not carried out in the allotted time.
Reset and sight the prism and perform measurement again.

When designating the angle of rotation or automatically sighting the prism, there is a problem with the positioning of the prism or the operation of the instrument and measurement is not obtained within the fixed time.
Check the positioning of the instrument and prism and perform measurement again.
If observation is still not possible, sight the target manually.

When the telescope turns to zenith/nadir, it is not possible to search !!

The SRX cannot perform a search during Auto Pointing or Auto Tracking when the telescope is directed to the zenith or nadir angle. Set the telescope position within the range 70° (elevation angle) to 40° (depression angle) and perform the operation again.

23.CHECKS AND ADJUSTMENTS

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

- Always perform checking and adjustment in the proper sequence beginning from "23.1 Plate Level" to "23.8 Additive Distance Constant".
- In addition, the instrument should be inspected with special care after it has been stored a long time, transported, or when it may have been damaged by a strong shock.
- Make sure the instrument is securely set up and stable before performing checks and adjustments.

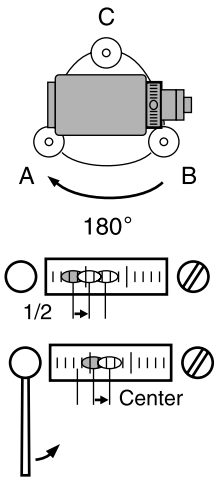
23.1 Plate Level

The bubble tube is made of glass, so it is sensitive to temperature changes or to shock. Check and adjust it as outlined below.

PROCEDURE Checking and adjusting

1. Level the instrument and check the position of the bubble of the plate level.
   ☞"9.2 Levelling", steps 3 to 5

2. Turn the upper part of the SRX through 180° and check the bubble position.
   If the bubble is still centered, no adjustment is necessary.
   If the bubble is off-center, adjust as follows.



3. Correct half of the bubble displacement using levelling foot screw C.

4. Correct the remaining half of the displacement by using the adjustment pin to rotate the plate level adjustment screw.
   When the plate level adjustment screw is turned in the counterclockwise direction, the bubble moves in the same direction.

5. Rotate the top of the instrument and continue adjustments until the bubble remains centered for any position of the upper part.
   If the bubble does not move to the center even when the adjustment has been repeated, ask your Sokkia agent to adjust it.

23.2 Circular Level

Check and adjust it as outlined below.

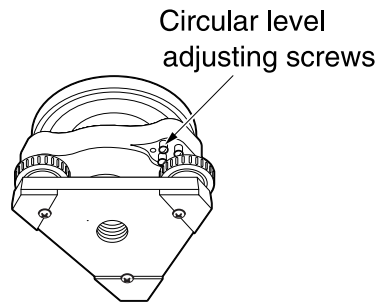
- Be careful that the tightening tension is identical for all the adjusting screws.
- Also, do not over-tighten the adjusting screws as this may damage the circular level.

PROCEDURE Checking and adjusting

1. Perform the plate level inspection and adjustment or carefully use the plate level to level the instrument.
   ☞ "9.2 Levelling", steps 1 to 2

2. Check the position of the bubble of the circular level.
   If the bubble is not off-center, no adjustment is necessary.
   If the bubble is off-center, perform the following adjustment.

3. First confirm the off-center direction.
   Use the adjusting pin to loosen the circular level adjustment screw on the side opposite to the direction the bubble is displaced to move the bubble to the center.



4. Adjust the adjusting screws until the tightening tension of the three screws is the same to align the bubble in the middle of the circle.

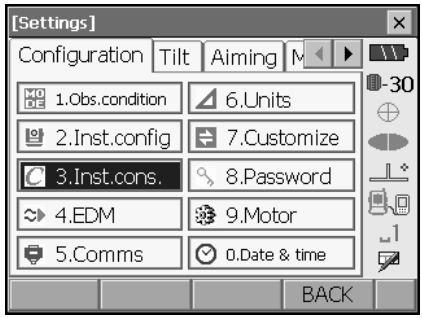
23.3 Tilt Sensor

If the tilt angle shown on the display shifts from tilt angle 0° (zero point), the instrument is not correctly levelled. This will adversely affect angle measurement.
Perform the following procedure to cancel the tilt zero point error.

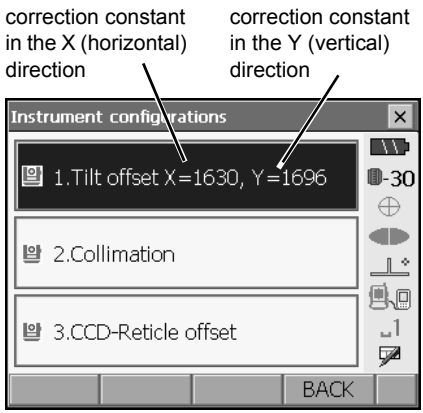
PROCEDURE Checking and adjusting

1. Carefully level the SRX. If necessary, repeat the procedures to check and adjust the bubble levels.

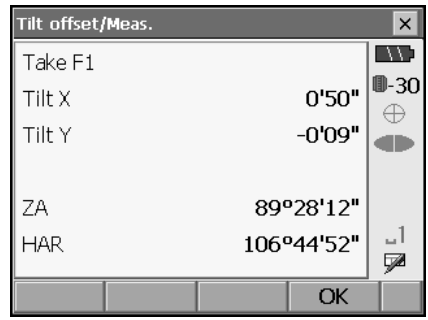
2. Select "Inst. cons." in <Configuration>



3. Select "Tilt offset".



4. Level the instrument until the X/Y tilt angles are ±1'. Wait a few seconds for the display to stabilize, then read the current tilt angle in the X (sighting) direction and Y (horizontal axis) direction.

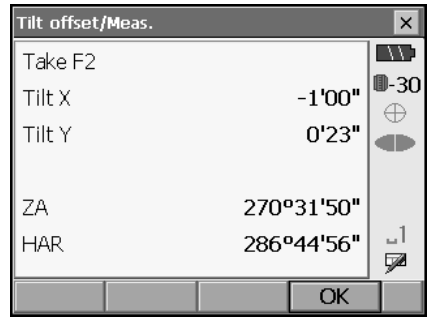


5. Press **[OK]**. The top of the instrument and telescope rotate 180° from the current position.

6. Wait a few seconds for the screen to stabilize, then read the automatically compensated angles X2 and Y2.

7. In this state, calculate the following offset values (tilt zero point error).
   Xoffset = (X1+X2)/2
   Yoffset = (Y1+Y2)/2

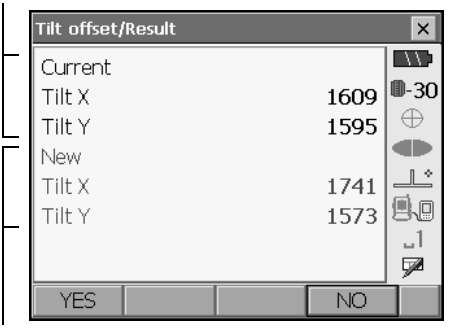
   If one of the offset values (Xoffset, Yoffset) exceeds ±10", adjust the value using the following procedure.
   When the offset value falls within the range ±10", adjustment is not necessary.
   Press **{ESC}** to return to <Instr. const>.



8. Press **[OK]** to automatically rotate the top of the instrument and telescope through 180°.

9. Confirm that the values are in the adjustment range.
   If both correction constants are within the range 1600 ±360 (SRX1: 6400 ±1440), select **[YES]** to renew the correction angle. <Instrument configurations> is restored. Continue to step 11.
   If the values exceed the adjustment range, select **[NO]** to cancel the adjustment and restore <Instrument configurations>. Contact your Sokkia agent to perform the adjustment.

Results for target point



Results for offset point

PROCEDURE Recheck

10. Select "Tilt offset".

11. Wait a few seconds for the display to stabilize, then read the automatically compensated angles X3 and Y3.

12. Press **[OK]** to automatically rotate the top of the instrument and telescope through 180°.

13. Wait a few seconds for the display to stabilize, then read the automatically compensated angles X4 and Y4.

14. In this state, the following offset values (tilt zero point error) are calculated.
    Xoffset = (X3+X4)/2
    Yoffset = (Y3+Y4)/2
    When both offset values fall within the range ±10", adjustment is completed.
    Press **{ESC}** to return to <Instr. const>.

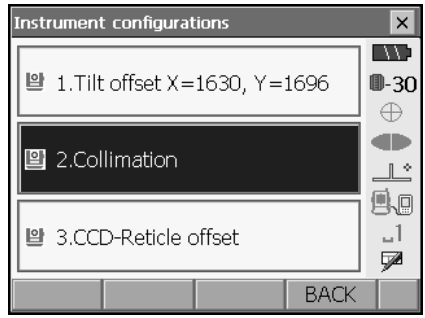
    If one of the offset values (Xoffset, Yoffset) exceeds ±10", repeat the check and adjustment procedures from the beginning. If the difference continues to exceed ±10" after repeating the check 2 or 3 times, have your Sokkia agent perform the adjustment.

23.4 Collimation

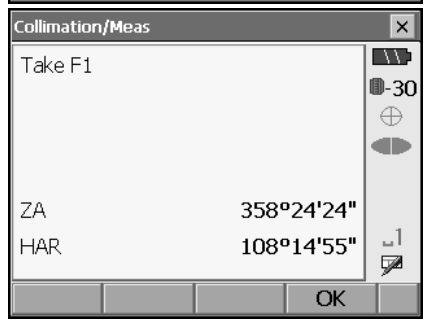
With this option you can measure collimation error in your instrument so that the SRX can correct subsequent single face observations. To measure the error, make angular observations using both faces.

PROCEDURE

1. Select "Inst. cons." in <Configuration>.
2. Select "Collimation".

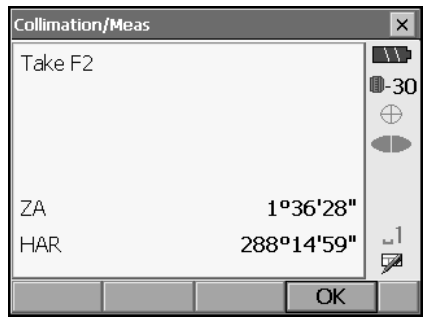


3. Sight the reference point in Face 1 and press **[OK]**. Telescope rotates and vertical circle is indexed.



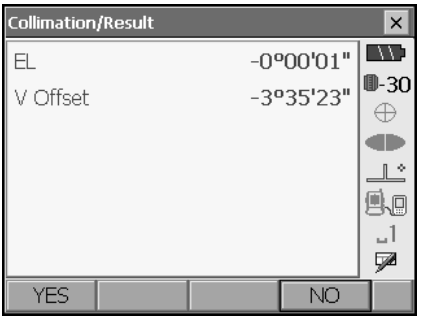
- Do not look through the telescope eyepiece while the motor drive is in operation. An eye could be struck by the telescope and cause injury.

4. Sight the reference point in Face 2 and press **[OK]**.



5. Press **[YES]** to set the constant.

   • Press **[NO]** to discard the data and return to <Instrument configurations>.



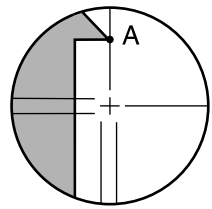
23.5 Reticle

With this option you can check the perpendicularity of the reticle and the horizontal/vertical positions of reticle lines.

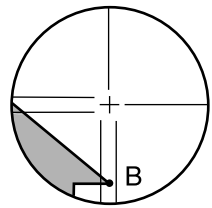
- Check the telescope reticle by manually sighting the target.

PROCEDURE Check 1: Perpendicularity of the reticle to the horizontal axis

1. Carefully level the instrument.
2. Align a clearly visible target (the edge of a roof for example) on point A of the reticle line.



3. Use the Jog dials to align the target to point B on a vertical line.
   If the target moves parallel to the vertical line, adjustment is unnecessary. If its movement deviates from the vertical line, have your Sokkia service representative adjust it.



PROCEDURE Check 2: Vertical and horizontal reticle line positions

1. Carefully level the instrument.
2. Install a target at a point about 100m in the horizontal direction from the SRX.

3. While the Meas mode screen is displayed and the telescope is in face left, sight the center of the target and read out the horizontal angle A1 and the vertical angle B1.
   Example:
   Horizontal angle A1 = 18° 34' 00"
   Vertical angle B1 = 90° 30' 20"

4. While the telescope is in face right, sight the center of the target and read out the horizontal angle A2 and the vertical angle B2.
   Example:
   Horizontal angle A2 = 198° 34' 20"
   Vertical angle B2 = 269° 30' 00"

5. Do the calculations: A2-A1 and B2+B1
   If A2-A1 is within 180°±20″and B2+B1 is within 360°±20″, adjustment is unnecessary.
   Example:A2-A1 (Horizontal angle)
   =198° 34' 20"- 18° 34' 00"
   =180° 00' 20"
   B2-B1 (Vertical angle)
   =269° 30' 00" + 90° 30' 20"
   =360° 00' 20"
   If the difference is large even after repeating the check 2 or 3 times, have your Sokkia service representative perform the adjustment.

23.6 CCD reticle

The internal CCD sensor is used for automatic sighting. The offset value is set to correct the position of the CCD sensor in relation to the telescope reticle, but if for whatever reason the telescope reticle and CCD camera become misaligned, automatic sighting of the center of the prism cannot be performed correctly. Check and adjust it as outlined below.

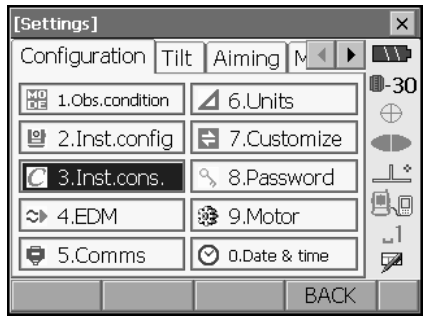
- Perform check and adjustment in weak sunlight and no scintillation.
- It may take up to 20 seconds for an offset value based on the measurement results to appear.
- Use Standard prism AP01AR or Compact prism CP01. Using other prism types may result in adjustment inaccuracies.

PROCEDURE Checks and adjustments

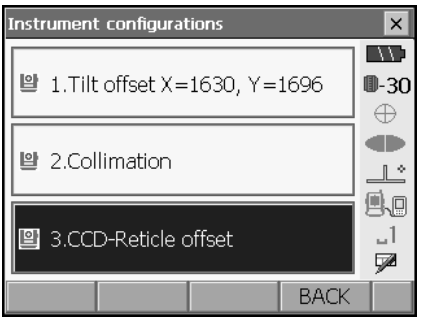
1. Carefully level the instrument.

2. Position the prism in a horizontal direction approximately 50 meters from the SRX.

3. Select "Inst.cons." in <Configuration>.



4. Select "CCD-Reticle offset".

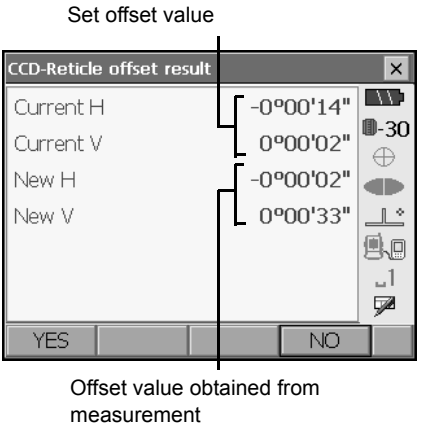


5. Use manual sighting to accurately sight the target.
   ☞"11.3 Manually Sighting the Target"

6. Press **[OK]**.
   Press **[STOP]** to cancel the measurement.

7. Offset value (H, V) (New) is obtained from the set offset value (H, V) (Current) and the measurement results. The offset value is a constant value that indicates the number of degrees of misalignment between the center of the telescope reticle and the center of the CCD sensor. If the offset value obtained from the measurement result is significantly larger than the set offset value, press **[ESC]** and resight the target.
   If the offset value (H, V) obtained from the measurement results continues to be significantly large after repeated checks, adjustment is necessary. Go to step 8.

   If one of the offset values exceeds the range, an error message appears on the screen. Contact your Sokkia agent to perform the adjustment.



8. Press **[OK]** to renew the offset value.

   • Press **[INIT]** to return to the default settings.

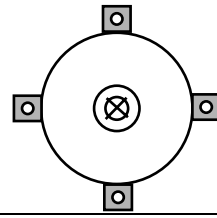
23.7 Optical Plummet

- Be careful that the tightening tension is identical for all the adjusting screws.
- Also, do not over-tighten the adjusting screws as this may damage the circular level.

PROCEDURE Checking

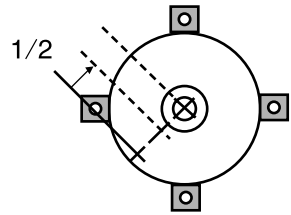
1. Carefully level the SRX and center a surveying point precisely in the reticle of the optical plummet.

2. Turn the upper part through 180° and check the position of the surveying point in the reticle.
   If the surveying point is still centered, no adjustment is necessary.
   If the surveying point is no longer centered in the optical plummet, perform the following adjustment.



PROCEDURE Adjustment

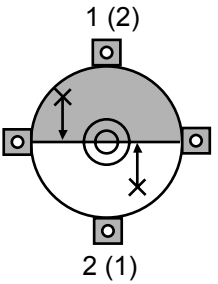
3. Correct half the deviation with the levelling foot screw.

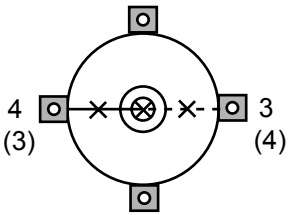


4. Remove the optical plummet reticle cover.

5. Use the 4 adjusting screws of the optical plummet to adjust the remaining half of the deviation as shown below.
   When the surveying point is on the lower (upper) part of the illustration:
   Loosen the upper (lower) adjusting screw slightly, and tighten the upper (lower) adjusting screw the same amount to move the surveying point to a point directly under the center of the optical plummet.
   (It will move to the line in the figure on the right.)

   If the surveying point is on the solid line (dotted line):
   Loosen the right (left) adjusting screw slightly and, tighten the left (right) adjusting screw by the same amount to move the surveying point to a point in the center of the optical plummet.





6. Check to make sure that the surveying point remains centered on the reticle even if the upper part of the instrument is rotated.
   If necessary, perform the adjustment again.

7. Replace the optical plummet reticle cover.

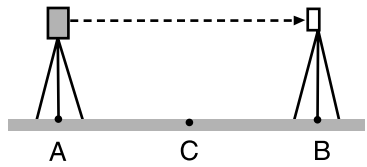
23.8 Additive Distance Constant

The additive distance constant K of the SRX is adjusted to 0 before delivery. Although it almost never deviates, use a baseline with a known distance precision to check that the additive distance constant K is close to 0 several times a year and whenever the values measured by the instrument begin to deviate by a consistent amount. Perform these checks as follows.

- Errors in setting up the instrument and reflective prism or in sighting the target will influence the additive distance constant. Be extremely careful to prevent such errors when performing these procedures.
- Set up so that the instrument height and the target height are identical. If a flat place is not available, use an automatic level to make sure the heights are identical.

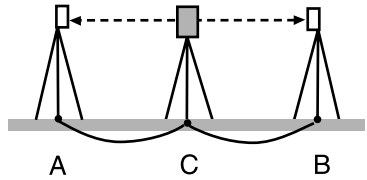
PROCEDURE Check

1. Find an area of flat ground where two points 100m apart can be selected.
   Set up the Instrument at point A and the reflective prism at point B. Establish a point C half way between points A and B.



2. Precisely measure the horizontal distance between point A and point B 10 times and calculate the average value.

3. Place the SRX at point C directly between points A and B and set up the reflective prism at point A.



4. Precisely measure the horizontal distances CA and CB 10 times each and calculate the average value for each distance.

5. Calculate the additive distance constant K as follows.
   K = AB - (CA+CB)

6. Repeat steps 1 to 5 two or three times.
   If the additive distance constant K is within ±3mm even once, adjustment is unnecessary.
   If it always exceeds this range, have your Sokkia service representative perform an adjustment.

23.9 *Bluetooth* Wireless Communication

Handles RC-TS3 and H-BT1 incorporate a *Bluetooth* wireless communication device.
If more than 1 minute passes without a *Bluetooth* connection being established between the SRX and On-demand Remote Control System (RC-PR3), regardless of communication conditions, there may be dust particles on the contacts between the SRX and the handle. Detach the handle and wipe the contacts clean with a dry cloth. Re-attach the handle.
Once cleaning is complete, attempt to establish a connection again. If the problem persists the contacts may be malfunctioning. Contact your Sokkia agent.
☞ "8.2 Communication between the SRX and Companion Device"

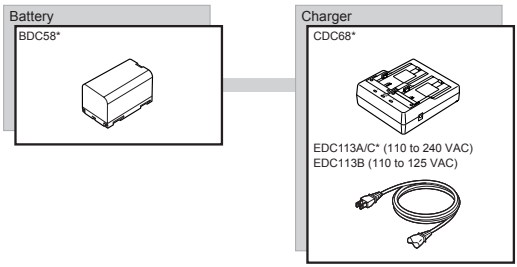
24.POWER SUPPLY SYSTEM

Operate your SRX with the following combinations of power equipment.

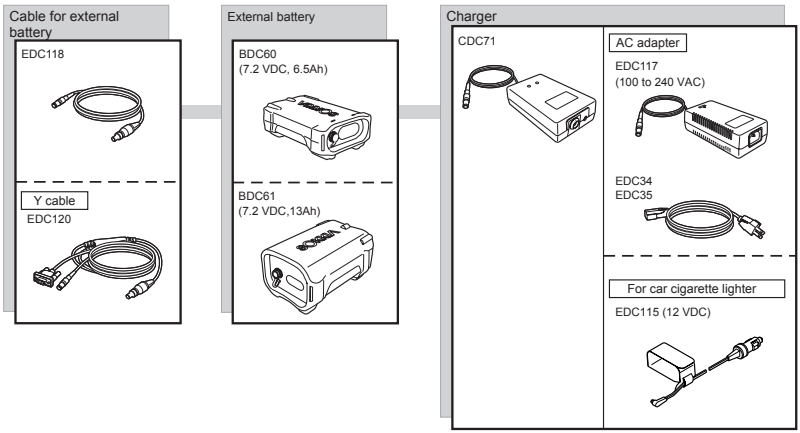
- When using BDC60, BDC61 and EDC117, mount the BDC58 in place to maintain the balance of the instrument.
- Never use any combination other than those indicated below. If you do, the SRX could be damaged.

Those indicated by * are standard accessories. Others are optional accessories (sold separately).

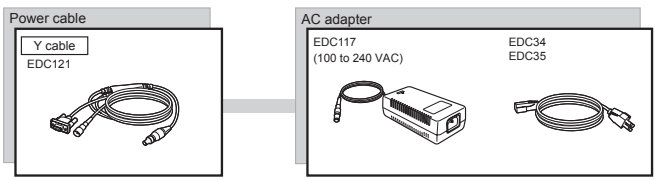
●Battery



●External battery



●AC adapter



Note

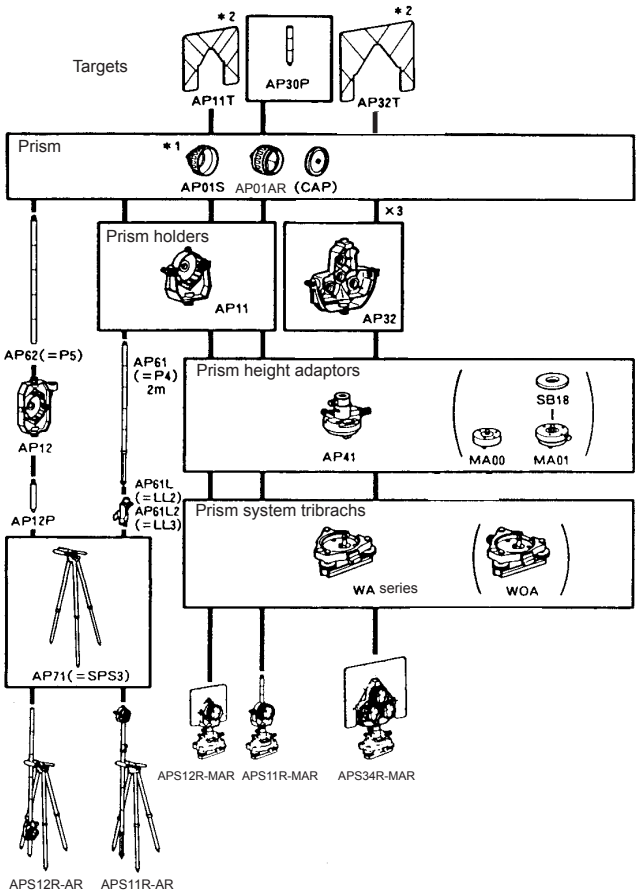
•By using the Y cable the SRX can perform RS232C communication (D-sub 9-pin) at the same time as connecting to an external power source.

25.TARGET SYSTEM

The following are all special accessories (sold separately).

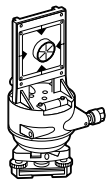
- Because all Sokkia reflecting prisms and accessories have standardized screws, it is possible to combine these prisms, accessories, etc. according to your objectives.
- Because these targets (*2) are coated with fluorescent paint, they reflect when there is little light.

- When using a reflecting prism equipped with a target for distance and angle measurements, be sure to direct the reflective prism correctly and sight the center of the prism target accurately.
- Each reflective prism (*1) has its own prism constant value. When changing prisms, be sure to change the prism constant correction value.
- To use the triple prism assembly AP31 or AP32 as a single prism for short distance measurements, mount the single reflective prism AP01AR in the center mounting hole of the prism holder.

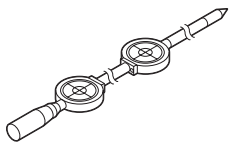


● **360° Prism (ATP1)**
This column-shaped prism reduces the possibility of "losing" the prism during Auto Tracking measurement.
3D positioning accuracy (standard deviation): 3mm (Horizontal acceptance andgle: 360° (full transit). Angles of elevation and inclination both less than 20°)

● **High-precision reflecting prism (CPS12)**
Prism constant: -27



● **2-point target (2RT500-K)**
This target is used for two-distance offset measurement.
Prism constant: 0



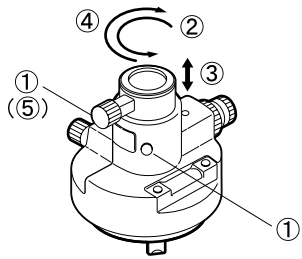
● **Instrument height adaptor (AP41)**
This device is used to adjust the height of the target.

- The height of the AP41 instrument height adaptor can be adjusted using two fixing screws. When used with the SRX, make sure that the instrument height "236" (mm) is displayed in the instrument height adjustment window.

- Loosen the screws ① and rotate SRX counterclockwise ②.
  Move the part ③ up or down until the desired instrument height is displayed in the adjustment window ③, then rotate SRX clockwise and tighten the screws ⑤.

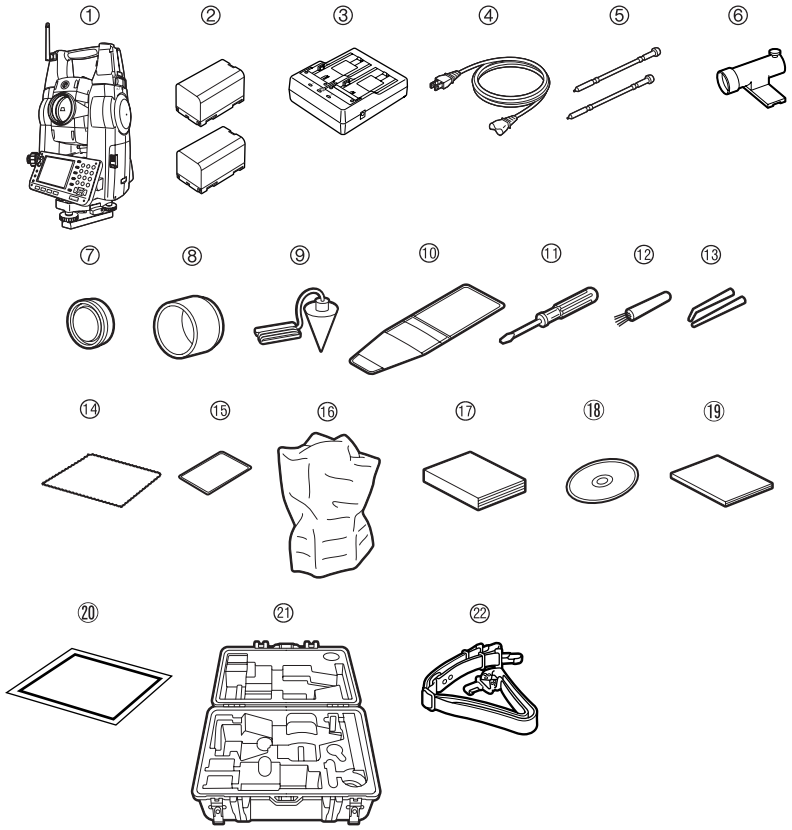
- Adjust the level of the AP41 instrument height adaptor following the checking and adjustment methods of plate level.
  ☞ "23.1 Plate Level"

- Adjust the optical plummet of the AP41 instrument height adaptor following the checking and adjustment methods of optical plummet.
  ☞ "23.7 Optical Plummet"



26.STANDARD EQUIPMENT

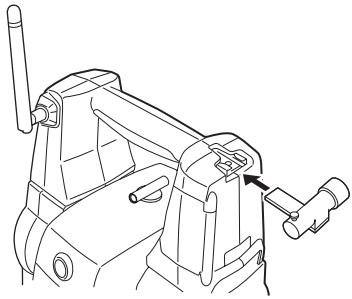
Please verify that all equipment is included.



1	SRX main unit	1
2	Battery (BDC58)	2
3	Battery charger (CDC68)	1
4	Power cable (EDC113A/113B/113C)	1
5	Stylus pen	2
6	Tubular compass (CP9)	1
7	Lens cap	1
8	Lens hood	1
9	Plumb bob	1
10	Tool pouch	1
11	Screwdriver	1
12	Lens brush	1
13	Adjusting pin	1
14	Cleaning cloth	1
15	Protective film (PF1) (Instrument with optional Face 2 display)	1 2
16	Vinyl cover	1
17	Operator's manual	1
18	CD-ROM (operator's manuals)	1 1
19	Quick Start Guide (Series SRX and NET05/NET1)	1
20	Laser caution sign-board	1
21	Carrying case (SC219)	1
22	Carrying strap	1

● **Tubular compass (CP9)**

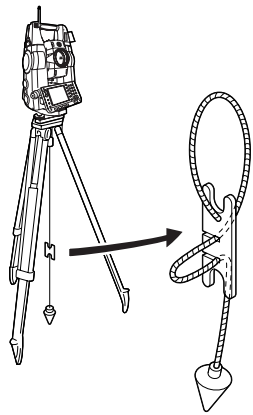
Slide the tubular compass into the tubular compass slot, loosen the clamp screw, then rotate the top part of the instrument until the compass needle bisects the index lines. The telescope's face 1 sighting direction in this position will indicate magnetic north. After use, tighten the clamp and remove the compass from the slot.



- The tubular compass is susceptible to the influence of nearby magnets or metal. Such influence could cause it to fail to accurately indicate magnetic north. Do not use magnetic north as indicated by this compass for base line surveying.

● **Plumb bob**

The plumb bob can be used to set up and center the instrument on days when there is little wind. To use the plumb bob, unwind its cord, pass it through the cord grip piece as shown in the figure to adjust its length, then suspend it from the hook attached to the centering screw.



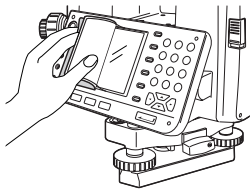
● **Protective film (PF1)**

PF1 is a protective film for the 3.5 inch (55 x 72.6mm) LCD screen of your surveying instrument. Once applied to the display this film is designed to protect against damage, such as scratching with the stylus pen, during operation. The film will need to be replaced when it becomes scratched or damaged. No residue is left when the protective film is removed.

Applying the film

1. Wipe the display clean of any dust or dirt with the wiping cloth for your surveying instrument. Particles on the display create air bubbles under the film preventing the film sticking properly.

2. Peel off the backing sheet and carefully apply the adhesive side of the film to the display. Make sure no air bubbles are created under the film. In the event that air bubbles enter under the film, peel the film off and start again.



- Make sure the film does not enter the slight clearance gap between the casing and the display. Intrusion of the film into this part of the instrument may cause softkeys to malfunction.

3. When the film has been applied to the display, wipe firmly with the wiping cloth, carefully pushing out any trapped air bubbles.

27.OPTIONAL ACCESSORIES

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

☞ Power supply and target optional accessories: "24. POWER SUPPLY SYSTEM", "25. TARGET SYSTEM".

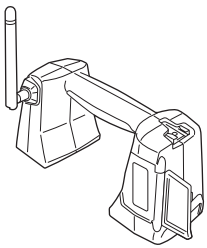
● Handle

Your SRX will come equipped with one of the following handle types upon purchase.

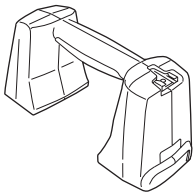
☞ Removing/attaching the handle; *Bluetooth* antenna; Beam detector for On-Demand Remote Control System: "4.2 Parts of the Instrument"

- Software settings may need to be reconfigured when changing from one handle type to another. Consult your Sokkia agent when changing handles.

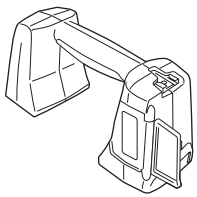
- **RC Handle with *Bluetooth* (RC-TS3)**
  Incorporates both On-demand Remote Control System/*Bluetooth* functionality



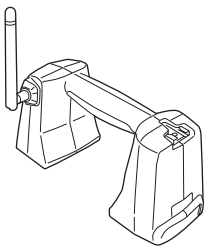
- **Basic Handle (H-BC1)**
  Incorporates neither of the functions mentioned above



- **RC Handle (RC-TS3A)**
  Incorporates On-demand Remote Control System functionality only



- ***Bluetooth* Handle (H-BT1)**
  Incorporates *Bluetooth* functionality only

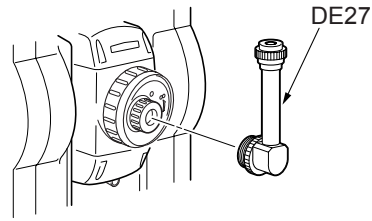


● **Telescope eyepiece lens (EL7)**

Magnification: 40X
Field of view: 1° 20'

● **Diagonal eyepiece (DE27)**

The diagonal eyepiece is convenient for observations near the nadir and in narrow spaces.
Magnification: 30X

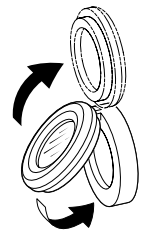


After removing the handle from the SRX loosen the attachment screw to remove the telescope eyepiece. Then screw the diagonal lens into place.
☞ Handle removal method: "4.2 Parts of the Instrument Removing the handle"

- Do not perform automatic vertical rotation of the telescope when using the diagonal eyepiece. The diagonal eyepiece may strike the SRX causing damage.

● **Solar filter (OF3A)**

When sighting targets where glare is present, solar observations for example, attach it to the objective lens of the SRX to protect its interior and the eyes of its operator. The filter part can be flipped up without being removed.



- Do not perform automatic vertical rotation of the telescope when using the solar filter. The solar filter may strike the SRX causing damage.

● **Interface cable**

Connect the SRX to a host computer using the following cables.

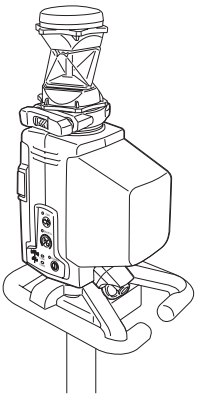
Cable	Notes
EDC120 (Y cable)	Pin number and signal level : RS232C compatible
EDC121 (Y cable) DOC129	D-Sub connector : 9 pins (female)
EDC131 (Y cable)	Length : 5m Pin number and signal level : RS232C compatible No connector for attachment to a computer or AC supply

Note

- By using the Y cable the SRX can perform RS232C communication (D-sub 9-pin) at the same time as connecting to an external power source.
  DOC25/26/27/1 are necessary when connecting EDC120/121 or DOC129 to DOC128.

● On-demand Remote Control System (RC-PR3)

This system points the SRX in the direction of the prism with speed and precision.
☞ On-demand Remote Control System Manual



- This system cannot be used with SRX instruments incorporating either the H-BC1 or H-BT1 handle.

28.SPECIFICATIONS

Except where stated, the following specifications apply to all SRXs.

Telescope

Length:	173mm
Aperture:	45mm (1.8 inch) (EDM/Auto Tracking:48mm (1.9 inch))
Magnification	30X
Image:	Erect
Resolving power	2.5"
Field of view	1°30' (26m/1,000m)
Minimum focus:	1.3m (4.3ft)
Focussing screw:	1 speed
Reticle illumination:	5 brightness levels

Angle measurement

Horizontal and Vertical circles type:		
	Rotary absolute encoder scanning	
IACS (Independent Angle Calibration System)		
	SRX1/SRX2 only	
Angle units:	Degree/Gon/Mil (selectable)	
Minimum display:	SRX1/SRX2:	0.5"(0.0001gon/0.002mil)/1" (0.0002gon/0.005mil) (selectable)
	SRX3/SRX5:	1" (0.0002gon/0.005mil)/5" (0.0010gon/0.020mil) (selectable)
Accuracy:		
	SRX1:	1" (0.0003gon/0.005mil)
	SRX2:	2" (0.0006gon/0.010mil)
	SRX3:	3" (0.001gon/0.015mil)
	SRX5:	5" (0.0015gon/0.025mil)
	(ISO 17123-3 : 2001)	
Collimation compensation:	On/Off (selectable)	
Measuring mode:		
Horizontal angle:	Right/Left (selectable)	
Vertical angle:	Zenith/Horizontal/Horizontal ±90°/% (selectable)	

Tilt angle compensation

Type:	Liquid 2-axis tilt sensor
Minimum display	Same as setting for angle measurement
Range of compensation	±4' (±0.0741gon)
Automatic compensator	ON (V & H/V)/OFF (selectable)
Compensation constant	Can be changed

Distance measurement

Measuring method:	Coaxial phase-contrast measuring system
Signal source:	Red laser diode 690nm Class 3R (IEC60825-1 Amd. 2: 2001/FDA CDRH 21CFR Part1040.10 and 1040.11 (Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No.50, dated July 26, 2001.)) (When the prism or reflective sheet is selected in Config mode as target, the output is equivalent to Class 1).

Measuring range: (Using Sokkia's reflective prism/reflective sheet target during normal atmospheric conditions ***1**)

Reflective sheet RS90N-K[*3]	1.3 to 500 m (1,640ft)
360° Prism ATP1[*4]	1.3 to 1,000m (3,281ft)
Standard prism AP01AR X 1	1.3 to 5,000 m (16,400ft) (to 6,000 m[*2]) (19,680ft)
Standard prism AP01AR X 3	to 8,000 m (26,247ft) (to 10,000 m[*2]) (32,808ft)
Mini pole prism OR1PA	1.3 to 500 m (1,640ft)
Compact prism CP01	1.3 to 2,500 m (8,202ft)
Reflectorless (White)[*5]	0.3 to 500m (1,640ft)
Reflectorless (Gray)[*6]	0.3 to 250m (820ft)

Minimum display

Fine measurement: SRX1/SRX2: 0.0001(0.001ft/ 1/16 inch)/0.001 m (0.01ft/ 1/8 inch) (selectable)
SRX3/SRX5: 0.001 m (0.01ft/ 1/8 inch)

Rapid measurement: 0.001 m (0.01ft/ 1/8 inch)

Tracking measurement: 0.01 m (0.1ft/ 1/2 inch)

Maximum slope distance display: 19,200.0000 m (using prism or reflective sheet target), 800.0000 m (reflectorless measurement)

Distance unit: m/ft/US ft/inch (selectable)

Accuracy: (Under normal atmospheric conditions[*1])(ISO 17123-4 : 2001)

(Using prism or using 360° Prism ATP1[*4])

Fine measurement SRX1/SRX2/SRX3/SRX5: (2 + 2ppm X D) mm
SRX1: (1.5 + 2 ppm X D) mm (however, distance is more than 4 m when using CPS12)
(2 + 2 ppm X D) mm (distance is less than 4m)

Rapid measurement (5 + 2 ppm X D) mm

(Using reflective sheet target)[*3]

Fine measurement: (3 + 2 ppm X D) mm

Rapid measurement: (6 + 2 ppm X D) mm

(Reflectorless (White))[*5]

Fine measurement

(3 + 2 ppm X D) mm (0.3 to 200m)
(5 + 10 ppm X D) mm (200 to 350m)
(10 + 10 ppm X D) mm (350 to 500m)

Rapid measurement:

(6 + 2 ppm X D) mm (0.3 to 200m)
(8 + 10 ppm X D) mm (200 to 350m)
(15 + 10 ppm X D) mm (350 to 500m)

(Reflectorless (Gray))[*6]

Fine measurement:

(3 + 2ppm X D) mm (0.3 to 100m)
(5 + 10ppm X D) mm (100 to 170m)
(10 + 10ppm X D) mm (170 to 250m)

Rapid measurement:

(6 + 2ppm X D) mm (0.3 to 100m)
(8 + 10ppm X D) mm (100 to 170m)
(15 + 10ppm X D) mm (170 to 250m)

(D: measurement distance; Unit: mm)

Measurement mode: Fine measurement (single/repeat/average)/Rapid measurement (single/repeat)/Tracking (selectable)

Measuring time (fastest time under good atmospheric conditions*2, no compensation, EDM ALC at appropriate setting, slope distance):

Fine measurement	less than 1.5 sec + every 0.9 sec or less
Rapid measurement	less than 1.3 sec + every 0.6 sec or less
Tracking measurement	less than 1.3 sec + every 0.4 sec or less

Atmospheric correction Temperature, pressure, humidity input/ppm input (selectable):
Earth curvature and refraction correction:
No/Yes K=0.14/Yes K=0.20 (selectable)

***1**: Slight haze, visibility about 20 km, sunny periods, weak scintillation.
***2**: No haze, visibility about 40 km, overcast, no scintillation.
***3**: Figures when the laser beam strikes within 30° of the reflective sheet target.
***4**: Figures when both the elevation and depression angles of the laser beam are within 15° and the SRX is facing the 360° Prism.
***5**: Figures when using Kodak Gray Card White side (reflection factor 90%) and brightness level is less than 30000 lx (a little cloudy).
***6**: Figures when using Kodak Gray Card Gray side (reflection factor 18%) and brightness level is less than 30000 lx (a little cloudy).

Auto Tracking (Auto Tracking model only)

Measuring method	Pulse laser transmitter and CCD detector with co-axial optics
Signal source (emittted beam)	infrared laser diode (830nm)
	Class 1 (IEC60825-1 Amd. 2: 2001/FDA CDRH 21 CFR Part 1040.10 and 1040.11 (Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No.50, dated July 26, 2001.))
Viewing angle:	± 45’
Measuring range:	
	H: 360° (full transit)
	V: Elevation angle 70°, Depression angle 40°

Maximum Auto Tracking measurement range*7:

360° Prism ATP1:	500m (1,640 ft)
Mini pole prism OR1PA:	400 m (1,312 ft)
Compact prism CP01:	600 m (1,969 ft)
Standard prism AP01	800 m (2,625 ft)

Auto Tracking speed*7	14°/sec (Prism moving at 5m/sec. at 20m distance)

Auto Pointing

Measuring method	Pulse laser transmitter and CCD detector with co-axial optics
Signal source (emittted beam)	infrared laser diode (830nm)
	Class 1 (IEC60825-1 Amd. 2: 2001/FDA CDRH 21 CFR Part 1040.10 and 1040.11 (Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No.50, dated July 26, 2001.))
Viewing angle:	± 45’
Measuring range:	
	H: 360° (full transit)
	V: Elevation angle 70°, Depression angle 40°

Auto Pointing measurement range[*7]:

360° Prism ATP1[*4]:	600m (1,969 ft)
Mini pole prism OR1PA:	500 m (1,640 ft)
Compact prism CP01:	700 m (2,297 ft)
Standard prism AP01	1,000 m (3,281 ft)
Reflective sheet[*8*9] RS90N-K	50m (164 ft)

Minimum Auto Pointing measurement range:

Mini pole prism OR1PA/Compact prism CP01:	1.3 m
Standard prism AP01/360° Prism ATP1[*4]:	2 m
Reflective sheet[*9] RS90N-K	5 m

Time to completed Auto Pointing[*7] (When prism in field-of-view, at 100m distance)/(using RS90N-K, at 50m distance)
4 to 8 sec.

Sighting accuracy (standard deviation)[*7] (fine measurement)

Prism:	2 mm or less (equivalent angle) (to 100 m), 3" or less (equivalent angle) (100 m and over)
360° Prism ATP1[*4]:	2 mm or less (equivalent angle) (to 100 m), 3" or less (equivalent angle) (100 m and over)
Reflective sheet[*8*9]:	2 mm or less (equivalent angle) (to 50 m)

***7**: No haze, visibility over 20 km, slightly overcast (less than 30000 lx), no scintillation.
***8**: When using a reflective sheet for Auto Pointing, the size of sheet (10 to 90 mm) must be selected to correspond to the distance being measured. Use smaller reflective sheets for shorter distances.
***9**: Figures when the Auto Pointing beam strikes within 15° of the reflective sheet target.

Motor

Type	DC motor drive
Motion range	360°(Vertical and horizontal)
Rotation speed	45°/sec (at 20°C) (Rotating time: about 10 sec. (when rotating 180°, tilt compensation off, at 20°C))
Fine motion	Jog dials

Setting accuracy (after rotation to specified angle)
± 5" (no tilt compensation, no vibration, wind, or influence of other external factors)

Overcurrent detection function Yes

Guide Light

(Slight haze, visibility about 20 km, sunny periods, weak scintillation)

Light source:	LED (red 626 nm/green 524 nm)
	Class 1

(IEC60825-1 Amd. 2: 2001/FDA CDRH 21 CFR Part 1040.10 and 1040.11 (Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No.50, dated July 26, 2001.))

Distance:	1.3 to 150m[*1]
Visible range:	Right and Left/Upward and Downward: ± 4° (7m/100m)
Resolving power at center area (width):	4' (about 0.12/100m)
Brightness	3 levels (bright/normal/dim)

Internal memory

Capacity	64 MB (including a minimum of 1MB for data storage)

External memory

CF card (up to 1 GB, 3.3V type only)
USB flash memory (up to 1 GB)

Data transfer

USB	USB Ver. 1.1, Host (Type A) and Client (Type miniB)
Card slot	Compact Flash Type II-compatible
SFX Dial-Up function	Yes

Handle

On-demand Remote Control System Beam Detector (RC-TS3/RC-TS3A handles)

Operable range (Slope distance when using RC-PR3 under normal atmospheric conditions[*1])

Standard mode	2[*10] to 100 m[*11]
Far mode	2[*10] to 250 m[*12]
	2[*10] to 300 m[*11]

Maximum detecting area (vertical angle)
-40° to +30° (on the basis of horizontal direction)

***10**: When there is almost no vertical interval between instrument height and the target height, SRX instrument height is 1.5 m, target height is 0.10 m at a horizontal distance of 1.8 m
***11** When the vertical interval between SRX and the beam emitter of RC-PR3 is no more than 20m
***12**: When the vertical interval between SRX and the beam emitter of RC-PR3 is no more than 40m

On-demand Remote Control System Turning operation time (RC-TS3/RC-TS3A handles)
Less than 15 sec (until completion of rapid (single) measurement when "Accu. search" set to "Rapid")

***Bluetooth* wireless communication** (RC-TS3/H-BT1 handles)

BT Qualification ID	B03489
Transmission method:	FHSS (*Bluetooth* Specification Ver.1.2 compatible, Telec-approved)
Modulation:	GFSK (Gaussian frequency shift keying)
Frequency band:	2.402 to 2.48GHz
Bluetooth profile	SPP, DUN
Power class	Class 1
Usable range	to 300m (When using SWT9)

	(No obstacles, few vehicles or sources of radio emissions/ interference in the near vicinity of the instrument, no rain)
Authentication	Yes/No (selectable)

Power Supply

Power source:	Rechargeable Li-ion battery BDC58
Nominal voltage:	7.2V
Storage temperature range (long-term):	-20 to 35°C
Working duration at 20 °C	(Fine distance measurement (single) using Auto Pointing, repeated every 30 sec in both Face 1 and Face 2): BDC58: about 3.5 hours BDC60 (external battery, optional accessory): about 5 hours BDC61 (external battery, optional accessory): about 10 hours (after continuous Auto Tracking/tracking distance measurement): BDC58: about 2.5 hours BDC60 (external battery, optional accessory): about 3.5 hours BDC61 (external battery, optional accessory): about 7 hours
Battery state indicator	4 levels
Auto power-off:	5 levels (5/10/15/30 min/Not set) (selectable)
Remote PWR-On function	Yes (Via serial or *Bluetooth* connection (when RC-TS3/H-BT1 attached). (*Bluetooth* connection: up to 30 min only))
External power source:	7.2 to 12V

General

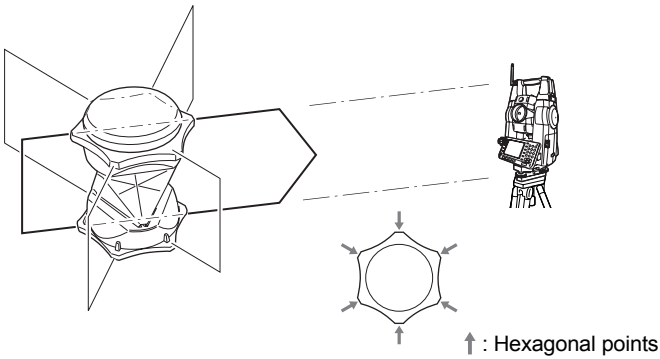
Operating system	Windows CE Ver. 5.0
Display:	3.5 inch Transflective TFT QVGA color LCD
Backlight	LED: Bright/Dim (selectable)
Touch panel	Resistance-sensitive analog type
Keyboard	32 keys (power, edit, direct, cursor, numeric, soft function, operations, power on, light)
Key backlight	Yes
Trigger key	Yes (right side)
Sensitivity of levels	
Plate level:	SRX1: 20"/2 mm SRX2/SRX3/SRX5: 30"/2 mm
Electronic level	
Graphic	4’
Circular level:	10'/2 mm
Optical plummet	
Image	Erect
Magnification	SRX1: 5.5X SRX2/3/5: 3X
Minimum focus	0.3 mm
Calendar/clock function	Yes
Laser-pointer function	ON (Automatically switches OFF after 5 minutes)/OFF (selectable)
Laser radiation warning indicator	Yes (lit continuously while laser emitted)
Operating temperature	-20 to 50°C (no condensation)
Storage temperature range	-30 to 70°C (no condensation)
Dust and water resistance	IP64 (IEC 60529:2001)

Instrument height:	236 mm from tribrach bottom
Instrument size (with RC-TS3):	201 (W) X 220 (D) X 375 (H) mm (display on each face, handle attached, excluding protruding sections)
	201 (W) X 202 (D) X 375 (H) mm (display on Face 1 only, handle (RC-TS3) attached, excluding protruding sections)
Handle size (RC-TS3/H-BC1/RC-TS3A/H-BT1)	
	180 (W) X 68 (D) X 86 (H) mm
Instrument weight (with BDC58 and RC-TS3):	
Display on both sides:	7.9 kg (17.4 lb)
Display on one side:	7.7 kg (17.0 lb)
Handle weight	
RC-TS3	550g (1.2 lb)
H-BC1	447g (1.0 lb)
RC-TS3A	504g (1.1 lb)
H-BT1	478g (1.1 lb)

29.EXPLANATION

29.1 High Accuracy with the 360° Prism

Sighting can be more accurately performed by facing the 360° Prism toward the SRX. The 360° Prism should be set up so that a pair of diametrically-opposed hexagonal points on its rubber flanges are aligned with the sighting direction of the SRX (see the diagram below).



29.2 Manually Indexing the Vertical Circle by Face Left, Face Right Measurement

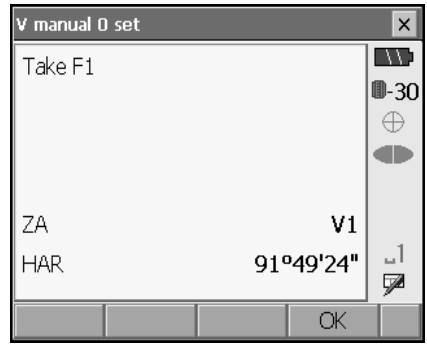
The 0 index of the vertical circle of your SRX is almost 100% accurate, but when it is necessary to perform particularly high precision angle measurements, you can eliminate any inaccuracy of the 0 index as follows.

- If the power is cut off, the vertical circle indexing is ineffective. Do it again every time the power is turned on.
- When indexing the vertical circle, sight the target manually.

PROCEDURE

1. Select “Obs.condition” in <Configuration>. Set “V manual” (vertical circle indexing method) to “Yes”.
   ☞ "21.1 Observation Conditions"

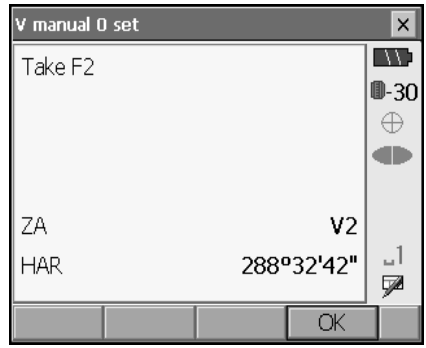
   <V manual 0 set> is displayed.



2. Carefully level the instrument.

3. Accurately sight a clear target with a distance of about 30m in the horizontal direction with the telescope in face left.
   Press **[OK]**. The SRX rotates 180°.

4. Accurately sight the same target and press **[OK]** to rotate the SRX 180°. The vertical angle is displayed.
   This concludes the vertical circle indexing procedure.



30.REGULATIONS

Users must ensure that their instrument is compliant with the relevant regulations and legal restrictions in place in the country of use.

For users in the US

WARNING: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful inter-ference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

This equipment complies with FCC radiation exposure limits set forth for uncontrolled equipment and meets the FCC radio frequency (RF) Exposure Guidelines in Supplement C to OET65. This equipment should be installed and operated with at least 20cm and more between the radiator and person's body (excluding extremeties: hands, wrists, feet and ankles).

For users in Canada

This Class A digital apparatus meets all requirements of Canadian Interference-Causing Equipment Regulations.
Cet appareil numérique de la Class A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

This class A digital apparatus complies with Canadian ICES-003.
Cet appareil numerique de la classe A est conforme a la norme NMB-003 du Canada.

Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device.

This equipment complies with IC radiation exposure limits set forth for 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 extremeties: hands, wrists, feet and ankles).

For users in the European Economic Area (EEA)

CE Conformity Declaration

in accordance with EMC Directive 89/336/EEC and R&TTE Directive 1999/5/EC of the European Community

We herewith declare that the undermentioned instrument, in view of its design and type of construction, fully complies with the relevant basic radio interference requirements of the EMC and R&TTE Directive.
Should the instrument be modified without agreement, this declaration becomes invalid.

Instrument Description: Total Station with Bluetooth (Surveying Instruments)

Model Name : SRX1 (with handle (RC-TS3) and SM-BT1)
SRX2 (with handle (RC-TS3) and SM-BT1)
SRX3 (with handle (RC-TS3) and SM-BT1)
SRX5 (with handle (RC-TS3) and SM-BT1)

Relevant EC Directive: EMC Directive(89/336/EEC)
R&TTE Directive(99/5/EC)

Applied Harmonized Standard:

SRX (with handle):
EMC EN 55022:1994+A1:1995+A2:1997(ClassB)
EN 55022:1998/A2:2003(ClassB)
EN 61000-6-2:2001

SM-BT1:
Radio EN 300 328 2004-11
EMC EN 301 489-17 2002-08
EN 301 489-1 2002-11
LVD EN 60950-1 2001

Date: 7 nov 2006

Firm: SOKKIA B.V.

Address: Industrieterrein De Vaart, Damsluisweg 1, NL-1332 EA Almere

Representative's Signature:

Name of Representative : Gerben Wolsink

Representative's position : European Service Manager

Series SRX Total Station

Česky [Czech]

Sokkia BV potvrzuje, že výše uvedené zařízení je v souladu se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.

Dansk [Danish]

Undertegnede, Sokkia B.V. erklærer herved, at følgende udstyr det ovennaevnte udstyr overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.

Deutsch [German]

Sokkia B.V erklärt., dass die oben genannten Instrumente in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.

Eesti [Estonian]

Käesolevaga kinnitab Sokkia B.V., seadme ülal mainitud varustus direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.

English

Hereby, Sokkia B.V., declares that the above-mentioned equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Español [Spanish]

Por medio de la presente Sokkia B.V., declara que el equipo arriba mencionado cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.

Ελληνική [Greek]

ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ Sokkia B.V., ΔΗΛΩΝΕΙ ΟΤΙ ο προαναφερόμενος εξοπλισμός ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.

Français [French]

Par la présente Sokkia B.V., déclare que l'équipement mentionné ci-dessus est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.

Italiano [Italian]

Con la presente Sokkia B.V., dichiara che questo Il sopra menzionato equipaggiamento è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.

Latviski [Latvian]

Ar šo Sokkia B.V., deklarē, ka augstāk minētā iekārta atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.

Lietuvių [Lithuanian]

Šiuo Sokkia B.V., deklaruoja, kad šis auksciau mineta iranga atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.

Magyar [Hungarian]

Alulírott, Sokkia B.V. nyilatkozom, hogy a a fent említett eszköz megfelel a vonatkozó alapvető követelményeknek és az 1999/5/EC irányelv egyéb előírásainak.

Malti [Maltese]

Hawnhekk, Sokkia B.V., tiddikjara li t-tagħmir imsemmi hawn fuq hu konformi mal-ħtiġijiet essenzjali u provvedimenti rilevanti oħrajn ta' Direttiva 1999/5/KE.

Nederlands [Dutch]

Hierbij verklaart Sokkia B.V., dat bovengenoemd toestel in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.

Polski [Polish]

Niniejszym Sokkia B.V. oświadcza, że sprzet wymieniony powyzej jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.

Português [Portuguese]

Sokkia B.V. declara que este o equipamento acima mencionado está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.

Slovensko [Slovenian]

Sokkia B.V. izjavlja, da je ta zgoraj omenjena oprema v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.

Slovensky [Slovak]

Sokkia BV potvrdzuje, že vyššie uvedené zariadenie je v súlade so základnými požiadavkami a všetky príslušné ustanovenia Smernice 1999/5/ES.

Suomi [Finnish]

Sokkia B.V. vakuuttaa täten että ylläoleva laite tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.

Svenska [Swedish]

Härmed intygar Sokkia B.V. att den ovan nämnda utrustningen står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Íslenska [Icelandic]

Hér með staðfestir Sokkia B.V. að áðurnefndur búnaður er í samræmi við grundvallarskilyrði og aðrar viðeigandi kröfur í fyrirmæli Evrópusambandsins 1999/5/EC.

Norsk [Norwegian]

Sokkia B.V. erklærer herved at utstyret nevnt ovenfor oppfyller de ubetingede krav og andre relevante bestemmelser i Direktiv 1999/5/EC.

For users in Mexico

Este equipo opera a titulo secundario, consecuentemente, debe aceptar interferencias perjudiciales incluyendo equipos de la misma clase y puede no causar interferencias a sistemas operando a titulo primario.

COFETEL + RCPSOSM07-290

For users in the People's Republic of China (RC-TS3 only)

1. 标明附件中所规定的技术指标和使用范围，说明所有控制、调整及开关等使用方法；

■使用频率：2.4 - 2.4835 GHz

■等效全向辐射功率(EIRP)：

天线增益 < 10dBi 时：≤100 mW 或≤20 dBm

■最大功率谱密度：

天线增益 < 10dBi 时：≤20 dBm / MHz(EIRP)

■ 载频容限：20 ppm

2. 不得擅自更改发射频率、加大发射功率(包括额外加装射频功率放大器)，不得擅自外接天线或改用其它发射天线；

3. 使用时不得对各种合法的无线电通信业务产生有害干扰；一旦发现有干扰现象时，应立即停止使用，并采取措施消除干扰后方可继续使用；

4. 使用微功率无线电设备，必须忍受各种无线电业务的干扰或工业、科学及医疗应用设备的辐射干扰；

5. 不得在飞机和机场附近使用。

For users in Singapore (RC-TS3 only)

Complies with IDA Standards DB101547

For users in the Republic of Korea

당해 무선설비는 전파혼신 가능성이 있으므로 인명안전과 관련된 서비스는 할 수 없습니다

A 급 기기 (업무용 정보통신기기)
이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는 구입하였을 때에는 가정용으로 교환하시기 바랍니다.

For users in Taiwan

低功率電波輻射性電機管理辦法 (930322)

第十二條　經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條　低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信法規定作業之無線電通信。

低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

For users in the United Arab Emirates

Approved by TRA

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