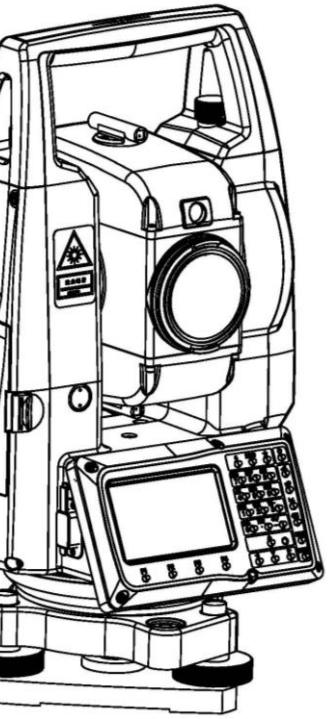
Operation Manual



N3 Series

Mechanical Total Station

SOUTH

Target your success

CONTENTS

PRECAUTIONS

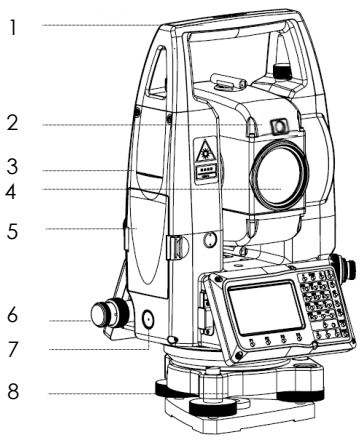
Congratulations on the purchase of SOUTH N3 Total Station!

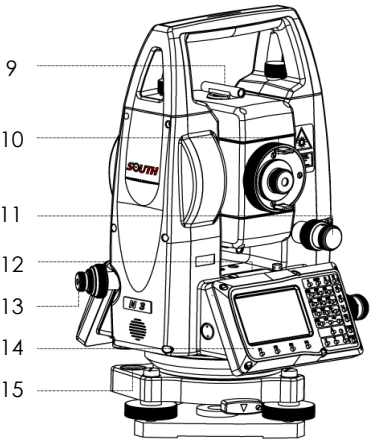
Please read carefully through the User Manual before you switch on the product.

1. Do not collimate the objective lens directly to the sunlight without a filter.
2. Do not stare at the laser beam, or point the laser to the others' eye!
3. Do not store the equipment in extremely high or low temperature.
4. When the equipment is not in use, store it in the case to avoid dust and humidity.
5. If there is a great difference between the temperature in work field or store place, you should leave the equipment in the case until it adapts to the temperature of environment.
6. If the equipment has not been used for a long time, you should remove the battery for separate storage. The battery should be charged once a month.
7. When shipping the equipment, please place it in the carry case. The cushioned material should be used to cover around the case for support.
8. Clean the optical parts by absorbent cotton or lens-paper only!
9. Clean the surface softly with a woolen cloth. If it gets wet, you should dry it immediately before switch-on.
10. Please check the power supply, functions, indications and parameters of the equipment goes well before operation.
11. Do not disassemble the total station by yourself. Please contact your authorized agency or SOUTH Service Team when you find the equipment abnormal.

1. INTRODUCTION

1.1 Appearance

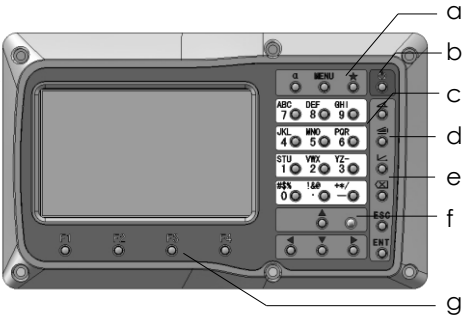




No.	Description
1	Handle
2	Guide Light
3	Objective Lens
4	Center Mark
5	Battery Unit
6	Horizontal tangent Screw
7	EDM Trigger Key
8	Tribrach

No.	Description
9	Collimator
10	Eyepiece
11	Vertical Tangent Screw
12	Vial Bubble
13	Plummet
14	Display Unit with Keypad
15	Circular Bubble

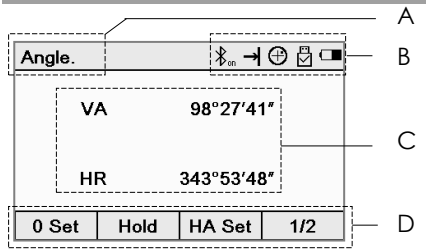
1.2 Keyboard



a) Quick Key
b) Power Key
c) Alphanumeric Keypad
d) Measurement Key
e) Backspace/ESC/ENT
f) Navigation Key
g) Function Keys

Key	Description
α	Quick-access to transfer the input mode between alphabets and numbers
MENU	Quick-access to main menu
★	Quick-access to star key for basic settings
⏻	On/Off key. Turn the instrument on or off.
	Quick-access to angle measurement
	Quick-access to distance measurement
	Quick-access to coordinate measurement
⌫	Delete characters before cursor
ESC	Return to previous page
ENT	Enter. Confirm the operation or record the data
▲▼◀ ▶	Navigation keys. Controls the cursor in four directions
F1—F4	Function keys. Responds to the message displayed

1.3 Screen



The screen can be divide into four parts:

A) Title
B) Status Icon
C) Active Field
D) Function Key

1.4 Status Icon

Icon	Description
123 ABC	Input status. Click to set the input mode.
	Bluetooth status. Click to switch on or off.
	Target status. Click to switch among non-prism, prism or reflective sheet.
	Compensator status. Click to activate the E-Bubble.
	USB status.
	Battery status.

1.5 Abbreviation

Abbr.	Description
HA	Horizontal angle
VA	Vertical angle
HL/HR	Horizontal left/ right
HD	Horizontal distance
VD	Vertical distance
SD	Slope distance
N/E/Z	North/ East/ Elevation

1.6 Function Key

Menu	Function Key	Description
Angle	0 Set	Set horizontal angle to 0
	Hold	Hold the horizontal angle
	HA Set	Input the horizontal angle
	V%	Vertical angle in percent (%) mode
	R/L	Switch between horizontal right or left
	VA	Switch between V0 or H0
Distance	Meas.	Measure
	Mode	Set the measure mode
	S.O.	Stake out points by distance
Coordinate	Meas.	Measure
	Mode	Set the measure mode
	Station	Set station
	R.HT	Set reflector height
	I.HT	Set instrument height
	BS	Set the backsight

1.7 Star Key

Press [★] in any page to access to the quick set. Click or use navigation key to select the item.

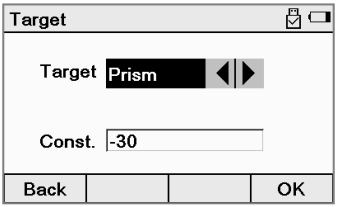
1) Target
2) E Bubble
3) PPM
4) Meas. Mode
5) Laser Pointer
6) Settings
7) Plummet
8) Bluetooth

1.7.1 Target

Check the settings of target.

Click or use the navigation key [◀][▶] to switch the target.

The default value of prism constant is -30. It can be defined by manual.



▶ Target

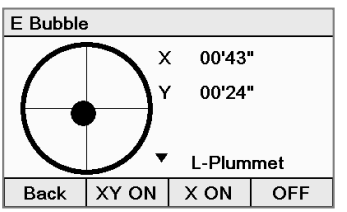
1.7.2 E-Bubble

Check the settings of E-bubble.

[F2]XY ON: Turn on (Under dual axis)

[F3]X ON: Turn on (Under single axis)

[F4]OFF: Turn off the E-bubble

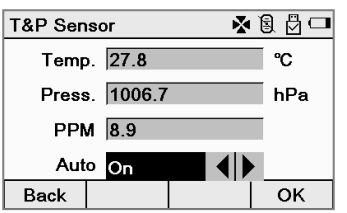


▶ E-Bubble

1.7.3 PPM

Check the settings of T&P sensor.

The value of temperature, pressure and PPM and be detected or calculated by sensor automatically, or inputted by manual.



▶ PPM

<u>Input range:</u>

Temp: -30℃~+60℃ or -22~+140℉

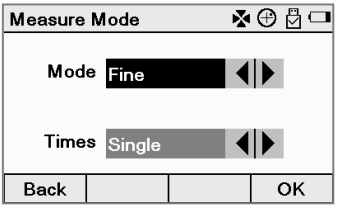
Press.: 560~1066hPa, 420~800mmHg or 16.5~31.5inHg

PPM: -99. 9 to +99. 9, Interval: 0 .1PPM

1.7.4 Meas. Mode

Check the settings of measure mode.

Click or use the navigation key to select the measurement among Fine (Single/ 2times/ 3times/ 4times/ 5times), Repeat or Tracking mode.



▶ Measure Mode

1.7.5 Laser Pointer

Click to turn on or off the laser pointer for easier target aiming.

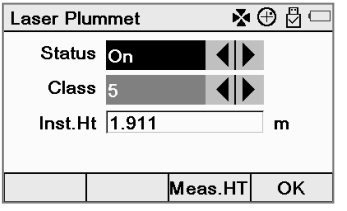
1.7.6 Settings

Quick access to setting page. Please refers to Chapter 13.

1.7.7 Plummet

Check the settings of laser plummet.

Click or use navigation keys to turn on or off the plummet. The illumination can be selected among class 1 to 5.



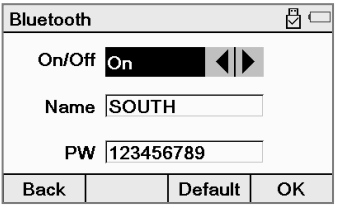
▶ Laser Plummet

If your total station features the Auto Height function, click **[F3]Meas.HT** to measure the instrument height.

1.7.8 Bluetooth

Check the settings of Bluetooth.

The device name and password can be revised for matching and pairing.



▶ Bluetooth

2. OPERATION

2.1 Preparation

Unpacking

Lay down the case lightly with the cover upward. Unlock the case, and take out the instrument.

Storage of Instrument

Cover the cap, put the instrument into the case with the vertical clamp screw tightened and circular vial upwards (lens towards tribrach).

2.2 Instrument Setup

1) Setting up the tripod

A. Loosen the screws on the tripod legs, pull out to the required length and tighten the screws.

B. Make the center of tripod and the occupied point approximately on the same plumb line.

C. Step on the tripod to make sure if it is well stationed on the ground.

2) Instrument setup (Laser plummet)

A. Place and fix the instrument carefully on the tripod

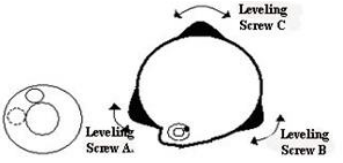
B. Press **[★]** and select **[7]Plummet** to turn on the laser plummet. Hold the two legs which are not fixed on the ground and decide the position to fix according to the laser dot. When the laser dot is roughly on the station point, fix those 2 legs.

Instrument setup (Optical plummet)

Adjust the eyepiece of the optical plummet telescope to your eyesight.

Slide the instrument by loosening the tripod screw; place the point on the center mark of the optical plummet. Sliding the instrument carefully as to not rotate the axis will allow you to get the least dislocation of the bubble.

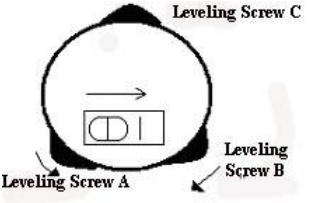
3) Roughly leveling by the circular vial

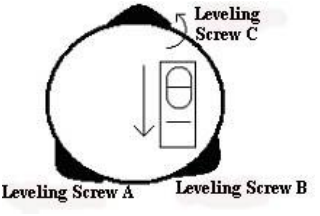


A. Rotate the foot-screw A and B to move the bubble in the circular vial, in which case the bubble is located on a line perpendicular to a line running through the centers of the two leveling screw being adjusted .

B. Rotate the foot-screw C to move the bubble to the center of the circular vial.

4) Leveling by the plate vial





A. Rotate the instrument horizontally by loosening the horizontal clamp unit and place the plate vial parallel to the line connecting rotating the foot-screw A and B, and then bring the bubble to the center of the plate vial by rotating the foot-screw A and B.

B. Rotate the instrument in 90° (100gon) around its vertical axis and turn the remaining leveling screw or leveling C to center the bubble once more.

C. Repeat the steps and check whether the bubble is correctly

centered in all directions.

If the laser or optical plummet doesn't stay at the center position after levelling, please slightly loosen the screw under the tripod head and move the instrument (don't rotate the instrument) until the equipment is on the station point. Tighten the screw and level the instrument again. Repeat these steps until the instrument is precisely centered and leveled.

2.3 Battery

Inserting

Put the battery into the instrument, push it. Check and insert it correctly to side into the housing.

Replacing

Press the battery lock on both sides, remove the battery. When the remaining voltage is less than one grid, please stop your operation and charge it as soon as possible.

Before remove the battery from the instrument, make sure that the power is turned off. Otherwise, the instrument may be damaged.

Charging

The battery must be charged prior to using before the first time operation.

The battery LI-30 should be charged only by the official charger NC-III, which packed together with the instrument. Please connect the power supply in 220V, among 0°~±45°C.

When the indicator on the charger is red, the charging process has begun. When indicator turns green, the charging has finished. For safety, please pull out the battery and charger in time.

In order to get the maximum service life, please charge the battery at least once in a month.

Note:

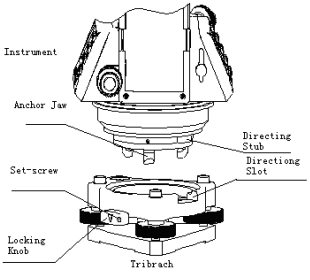
a) The operating time depends on the outside conditions, such as ambient temperature, charging time, the cycles of charging, etc. It is recommended for safety to charge the battery beforehand or to prepare spare full-charged batteries.

b) The remaining voltage of battery shows the power regarding to the current measure mode. The consumption of distance measurement is higher than angle measurement in normal. When switching the measurement mode from angle to distance in a low battery voltage, the equipment might be interrupted.

2.4 Tribrach

Dismounting

If necessary, the instrument can be dismounted from tribrach. Turn the locking knob in 180° counter-clockwise to disengage anchor jaws, and take off the instrument.



Mounting

Insert three anchor jaws into holes of tribrach and line up the directing

stub. Turn the locking knob about 180° clockwise to mounting the instrument.

2.5 Eyepiece Focusing

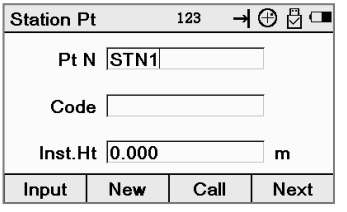
Sight the Telescope to bright place and rotate the eyepiece tube to make the reticle clear. Roughly collimate the target by the top of the triangle mark on EDM cover.

Rotate the focusing screw on eyepiece to make the image clear.

2.6 Input Mode

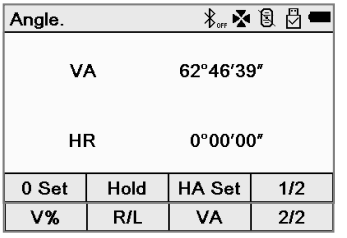
When ABC is displayed on the status bar, you can input alphabets;
When 123 is displayed, you can input numbers.

Swift the input mode between numbers and alphabets by **[a]**.
Press navigation key **[▲] [▼]** to move the cursor up or down.



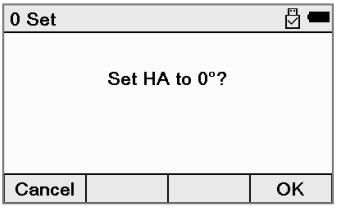
3. ANGLE MEASUREMENT

Press ∠ under basic measurement page to activate the function of angle measurement.



3.1 [F1] 0 Set

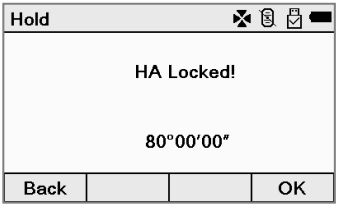
Set the horizontal angle of the first target as 0°00'00". Then aim at the other target to measure the HA between two points.



[F1] 0 Set: Set the current HA as 0.

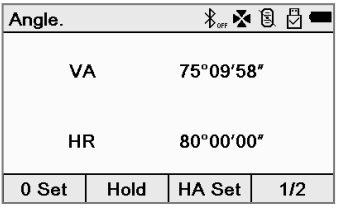
3.2 [F2] Hold

Define and hold the horizontal angle of target as previous value



[F2] Hold: Lock the previous horizontal angle

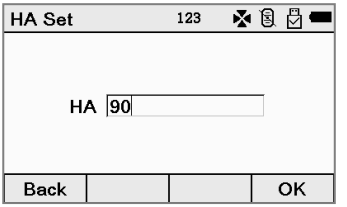
[F4] OK: Define the horizontal angle of target as previous holding value.

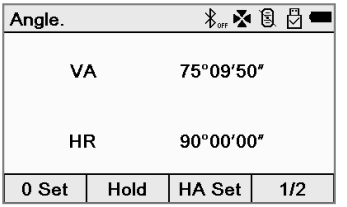


3.3 [F3] HA Set

Input the horizontal angle by manual. The value will apply to the target.

[F3] HA Set: Input the requested value

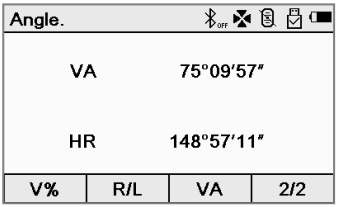


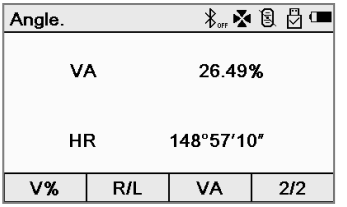


3.4 [F1] V%

[F1] V%: Switch the display method of vertical angle between degree and percent.

[F4]1/2, **[F4]2/2**: Switch the page of function keys



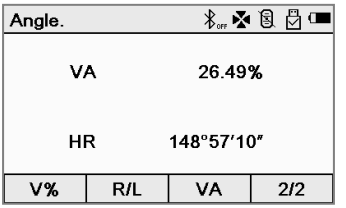


Note:

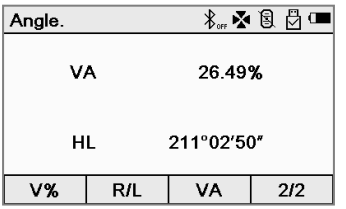
When the vertical angle is over 45°(100%) from the horizontal direction, N3 will show "---------" on the screen, which means overrange.

3.5 [F2] R/L

Measure the target in both two side (Face 1/2) will effectively cancels out the operation error to obtain maximum accuracy for measurement.

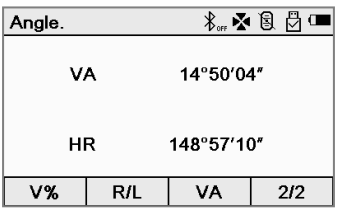


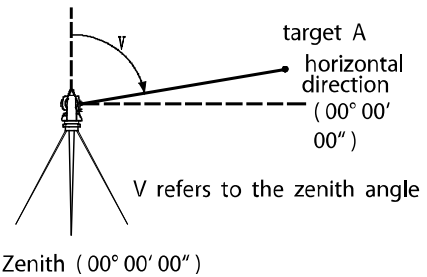
[F2] R/L: Switch the horizontal angle between HR (horizontal right) and HL (horizontal left).

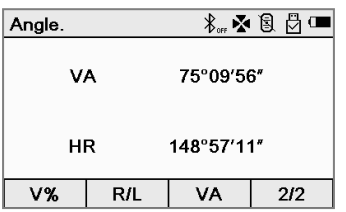


3.6 [F3] VA

The vertical angle can be defined by horizontal zero or vertical zero.



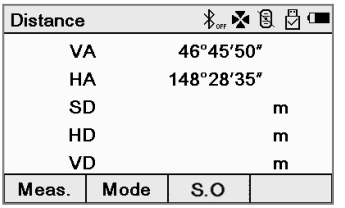




[F3] VA: Switch between V0 and H0

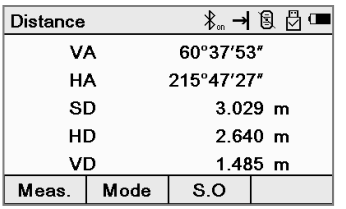
4. DISTANCE MEASUREMENT

Press  under basic measurement page to activate the function of distance measurement.



4.1 [F1] Meas.

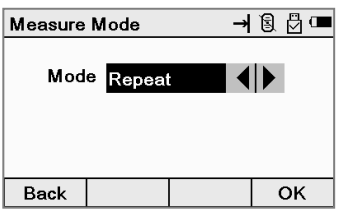
Measure the target to get the data of SD, HD and VD.
The unit is "m" (meter) in default.



[F1] Meas.: The result of measurement will be updated after the beeping.

4.2 [F2] Mode

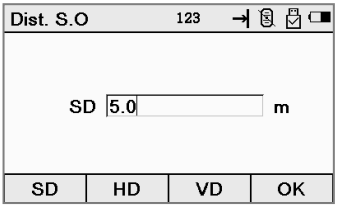
Change the mode of measurement among fine (N times), repeat or tracking mode.



[F2] Mode. : Switch the mode of measurement.

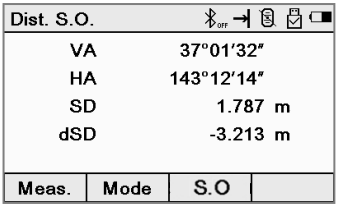
4.3 [F3] S.O

This function calculates the distance elements (SD/HD/VD) to stakeout points.



[F3] S.O: Click to enter the page of distance stake out

[F1] SD : Slope distance
[F2] HD : Horizontal distance
[F3] VD : Vertical distance
[F4] OK: Confirm the stake-out value



[F1] Meas. : Find the stake-out point until the dSD becomes 0.

5. COORDINATE MEASUREMENT

Press ∠ under basic measurement page to activate the function of coordinate measurement.

Coordinate			
VA		37°07′52″	
HA		138°51′53″	
N			m
E			m
Eleva.(Z)			m
Meas.	Mode	Station	1/2
R.HT	I.HT	BS	2/2

The coordinates of the unknown point are calculated as shown below:

Station: (N0, E0, Z0)

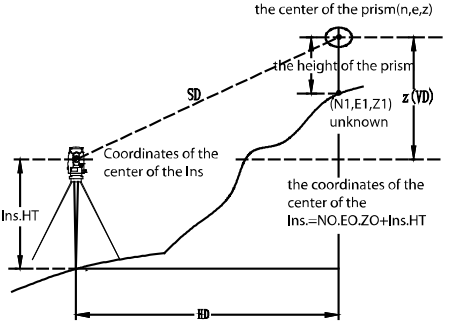
Prism center: (n, e, z)

Unknown point: (N1, E1, Z1)

N1=N0+n

⇨ *E1=E0+e*

Z1=Z0+INS.HT+Z −R.HT



5.1 [F1] Meas.

[F1] Meas.: Measure the point to get the N, E and Z coordinate based on the occupied point.

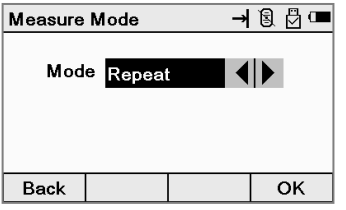
Coordinate			
VA		37°01′42″	
HA		138°43′17″	
N		99.139	m
E		100.646	m
Eleva.(Z)		8.335	m
Meas.	Mode	Station	1/2

Note: Please setup the station with instrument height and target height, define the backsight orientation before measurement.

When lacking the data of occupied point, N3 will use the value you inputted last time as the current station point.

5.2 [F2] Mode

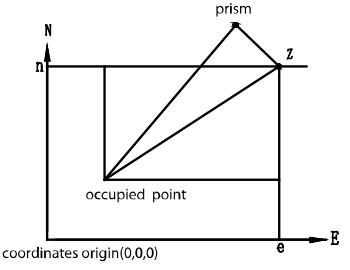
Change the mode of measurement among fine (N times), repeat or tracking mode.



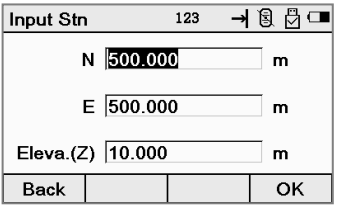
[F2] Mode. : Switch the mode of measurement.

5.3 [F3] Station

Set the occupied point as Station before measurement. N3 can automatically converts and displays the coordinate of unknown point (prism) under the existed coordinate system.



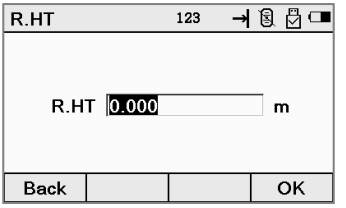
N3 will remain the data of station point after power off.



[F3] Station : Input the coordinate of station by manual.

5.4 [F1] R.HT

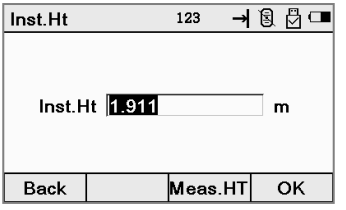
Under prism mode, it's necessary to set the reflector height.



[F1] R.HT: Input the height of reflector by manual

5.5 [F2] I.HT

[F2] I.HT: Set the height of instrument by manual.

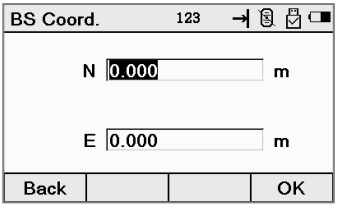


If your N3 total station features LPDM module for Auto Height:

[F3] Meas.HT: Activate the function of auto height, from 0.5m to 3m. The result will apply to the current station automatically.

5.6 [F3] BS

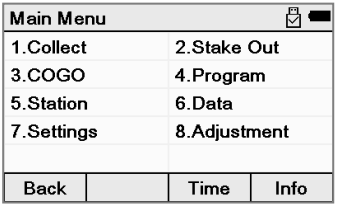
[F3] BS: Simply set the backsight by coordinate (N/E)



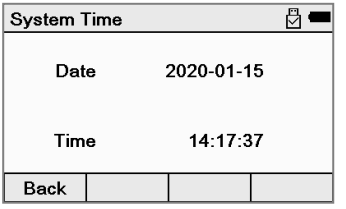
6. MENU

Press **[MENU]** under basic measurement screen to enter the menu of N3. Click or use navigation key to select the item.

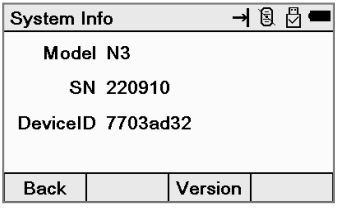
1) Collect
2) Stake Out
3) COGO
4) Program
5) Station
6) Data
7) Settings
8) Adjustment



[F3] Time: Check the current time and date



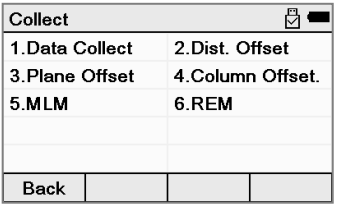
[F4] Info: Check the information of total station, including model name, serial number, device ID and system version



7. COLLECT

7.1 Data Collect

Collect and record the point by angle, distance or coordinate measurement.

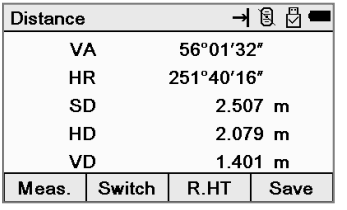


[F1] Meas.: Click or press EDM trigger key for measurement

[F2] Switch: Switch the measurement among angle, distance and coordinate

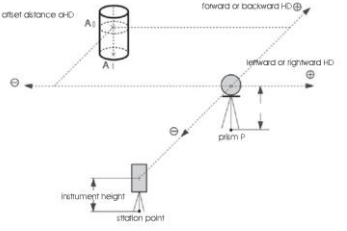
[F3] R.HT: Reflector height

[F4] Save: Save the current data as a new point



7.2 Distance Offset

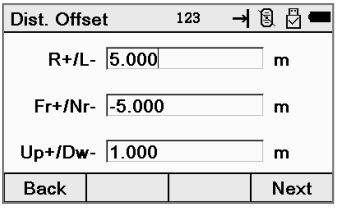
This function calculates the coordinate of point based on lateral and longitudinal offset or height difference of the target.



R+/L-: Lateral offset. Input positive number means right (refers to station); otherwise, left

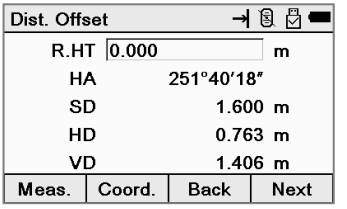
Fr+/Nr-: Longitudinal offset. Positive number means far; otherwise, near

Up+/Dw-: Altitude deviation. Positive number means up; otherwise, down



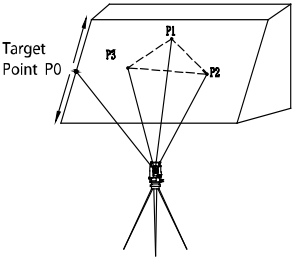
[F1] Meas.: Measure the target

[F2] Coord.: Check the coordinate of offset point

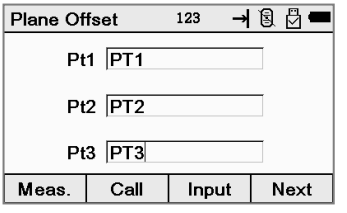


7.3 Plane Offset

This function calculates the point which cannot be measured directly from the other three points in same plane.



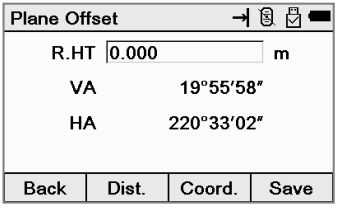
Those three points (P1/P2/P3) can be measured, inputted or selected from the data list to define a plane. Then aim at the target (P0) to calculate the coordinate and SD/HD/VD from station.



[F1] Meas.: Measure the point

[F2] Call: Call/Select point from list

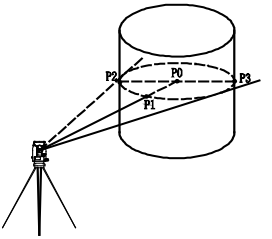
[F3] Input: Input the coordinate directly



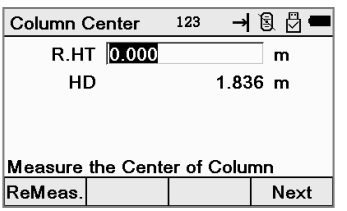
Note: No intersection means those three points cannot define a plane.

7.4 Column Offset

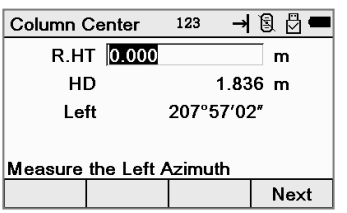
This function calculates the coordinate of a hidden point (P0) that is not directly visible inside from the center (P1) and edge (P2/P3) of column.



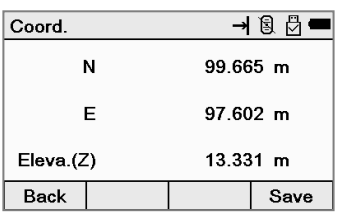
[F1] Meas./ReMeas.: Measure the center or edge of column



[F4] Next: Aim at the left and right edge based on the guidance

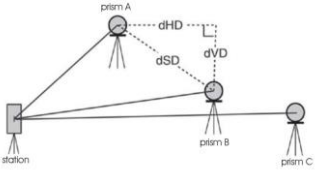


[F4] Calc.: Calculate the coordinate of hidden center

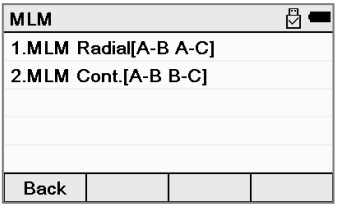


7.5 MLM

MLM, is mainly used to compute the HD/ VD/ SD/ azimuth difference between two target points, and this function can be selected under two methods:



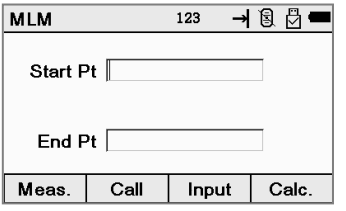
1) MLM Radial(A-B, A-C) , lock the start point
2) MLM Cont. (A-B, B-C) , unlock the start point.



[F1] Meas.: Measure the target as start point or end point.

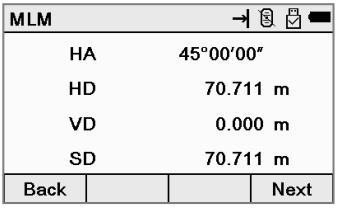
[F2] Call: Select the data from memory as start point or end point.

[F3] Input: Input the data as start point or end point.



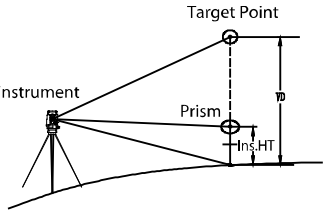
[F4] Calc.: Calculate the horizontal distance, vertical distance, slope distance and horizontal angle between the selected points

[F4] Next: Add the third point.

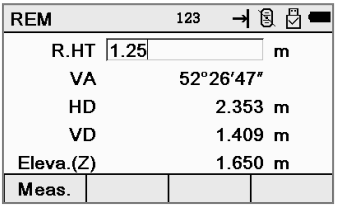


7.6 REM

When you need the information of a target which is hard to reach or hang in the air, REM can help you measure the point. Set a reflector perpendicular to target to finish the job.



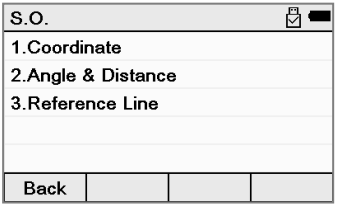
[F1] Meas.: Input the reflector height before measure the prism.



Then loosen the vertical tangent screw, rotate the telescope to aim the target and check difference in vertical height (Z).

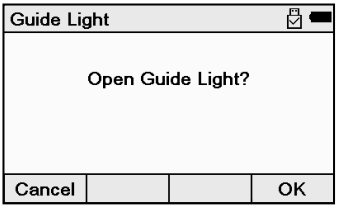
8. STAKE OUT

This program calculates the required elements to stakeout points from reference line, coordinates or angles, horizontal distances and heights.



8.1 Guide Light

Red/Yellow guide lights are built into the telescope as a standard feature, enhancing working efficiency in a range of 20m to 200m (in best conditions)

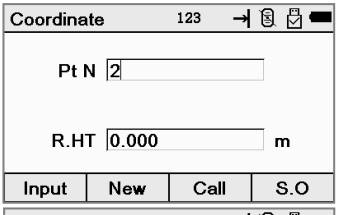


[F1] Cancel: Cancel the guide light

[F4] OK: Activate the guide light.

8.2 Coordinate

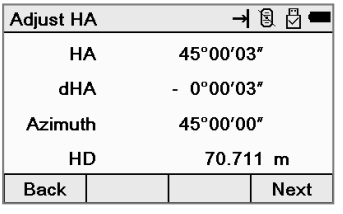
The coordinate can be inputted, created or selected from data list.



[F1] Input: Input coordinate directly

[F2] New: Create and save a new point with coordinate to stake out

[F3] Call: Call/Select point from data list



Adjust the horizontal angle to find the

direction until it becomes 0.

[F1] Meas.: Measure to find the stake out point on site based on the guidance

Coordinate S.O			
Turn L	0°00′03″		
Far	69.219	m	
Move R	0.001	m	
Down	3.308	m	
Meas.	Back	1/3	Next Pt

Far/Near: The reflector should move far or near to the station

Move R/L: The reflector should move right or left to the station

Up/Down: The reflector should move up or down to the station

8.3 Angle & Distance

Stake out the angle (azimuth) and distance (HD, VD) by inputting the relative position between stakeout point and station point.

Angle & Dist. 123			
Azimuth	45		
HD	10	m	
VD	1	m	
R.HT	0.000	m	
Back			S.O

Adjust the horizontal angle to find the direction until the value of dHA becomes 0.

Adjust HA			
HA	45°00′00″		
dHA	0°00′00″		
Azimuth	45°00′00″		
HD	10.000	m	
Back			Next

[F1] Meas.: Measure to find the stake out point on site based on the guidance

[F2] Back: Back to previous page

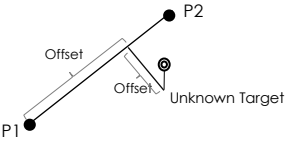
[F3] 1/3: Switch the display of guidance

[F4] Next Pt: Start to stake out the next point

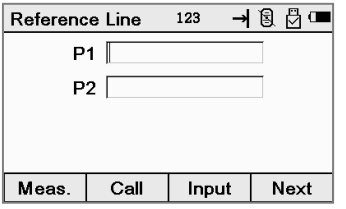
Coordinate S.O			
Turn L	0°00′00″		
Far	8.507	m	
Move L	0.000	m	
Down	2.308	m	
Meas.	Back	1/3	Next Pt

8.4 Reference Line

This function calculates the coordinate of unknown point through two known points (P1, P2) and the offset distance from reference line (P1-P2).

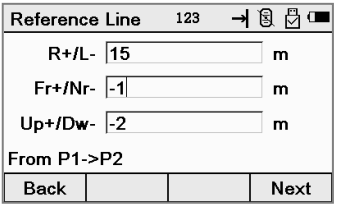


P1 and P2 can be measured, inputted or selected from data list.

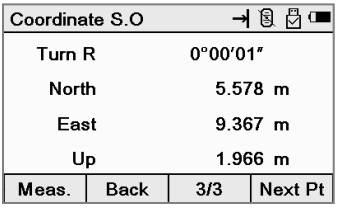


[F1] Meas.: Measure the point as P1, P2
[F2] Call: Select the point from memory
[F3] Input: Input the coordinate as P1, P2

R+/L-: The latitudinal deviation from target to reference line
Fr+/Nr-: The longitudinal deviation from target to reference line
Up+/Dw-: The elevation deviation from target to reference line

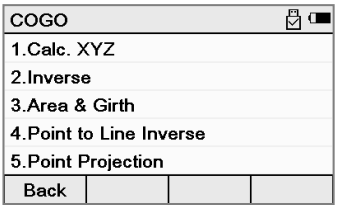


Find the stake-out point until the guidance becomes 0.



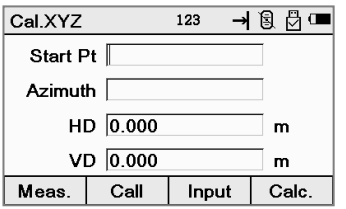
9. COGO

COGO in N3 total station included the functions of coordinate calculation, inverse calculation, area & girth, point to line and point projection.

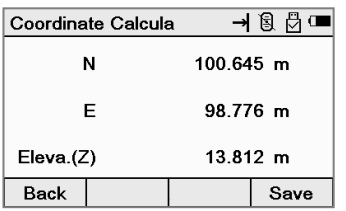


9.1 Calc. XYZ (Coordinate)

Calculate the unknown coordinate of target based on the known relationship (azimuth, HD, VD) from two points.



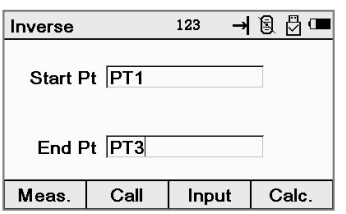
The start point can be measured [F1], inputted [F3] or selected [F2] from data list.



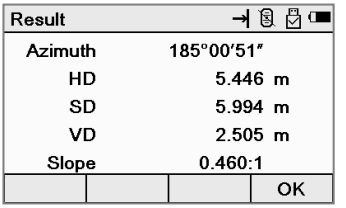
[F4] Save: Save the coordinate as a new point

9.2 Inverse

Calculate the unknown relationship (azimuth, HD, SD, VD and slope rate) between two known points.

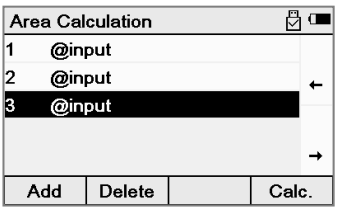


Those two points can be measured, inputted or selected from data list.

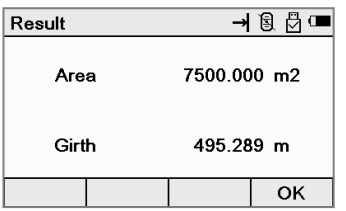


9.3 Area & Girth

Calculate the area and girth by at least 3 points.



The points can be added by measurement, data select or manual input.

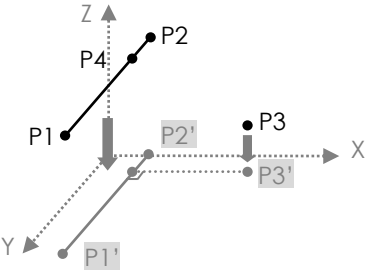


[F1] Add: Add a new point in the list
[F2] Delete: Delete the selected point
[F4] Calc.: Calculate the area and girth

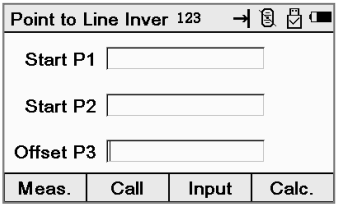
Note:
Area calculation in this function calculates area of the graphic which created by all of the projection points onto the horizontal plane

9.4 Point to Line Inverse

Define a straight line by start point P1 and P2, then P3 as offset point.
This function calculates the coordinate and horizontal distance of the perpendicular point P4 between offset point P3 and Line P1-P2.

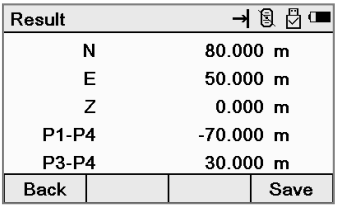


The known point P1, P2 and P3 can be measured, inputted or selected from data list.



[F4] Calc.: Calculate the coordinate and distance between P1-P4/P3-P4.

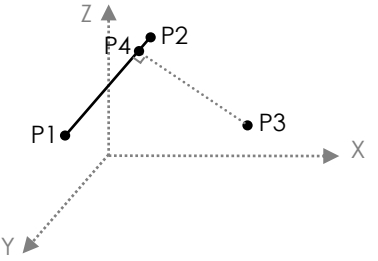
[F4] Save: Save the coordinate of P4.



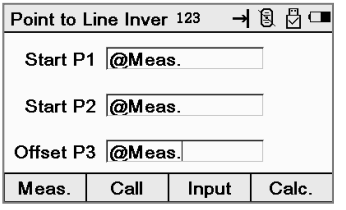
Note: The result actually is calculated the horizontal distance of P1-P4 and P3-P4.

9.5 Point Projection

Define a straight line by start point P1 and P2, then P3 as offset point.
This function calculates the coordinate and distance of perpendicular point P4 between offset point P3 and line P1-P2.

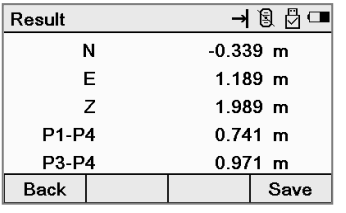


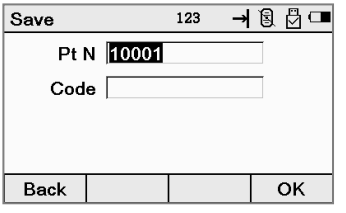
The known point P1, P2 and P3 can be measured, inputted or selected from data list.



[F4] Calc.: Calculate the coordinate and distance between P1-P4/P3-P4.

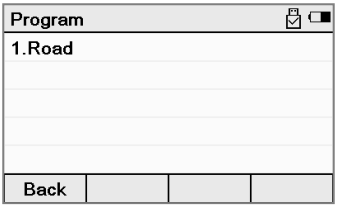
[F4] Save: Save the coordinate of P4.



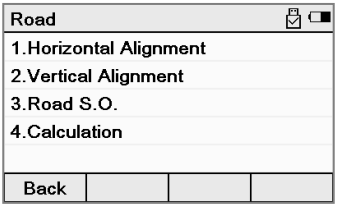


10. ROAD

This program enables users to easily define a line, curve or transition curve as a reference to measure or stake out. It supports chainages, as well as incremental stake-outs and offsets.



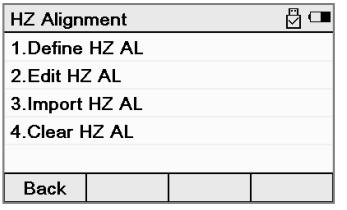
Before starting road program to design and stake-out, please set job, station and backsight at first.



10.1 Horizontal Alignment

10.1.1 Define Horizontal Alignment

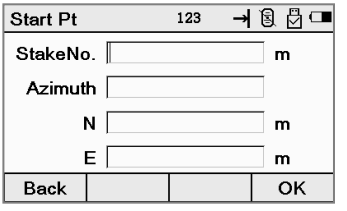
Horizontal alignment consists of the following elements: start point, straight line, curve and transition curve and intersection points.



1) Start Point

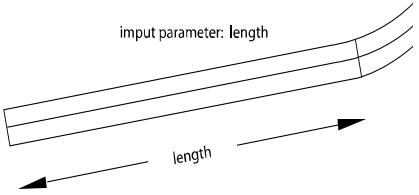
The elements, like straight line, curve and transition curve, can be defined after input the start point.

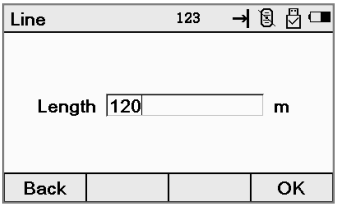
The parameter of start point included the stake number, azimuth angle and initial coordinate.

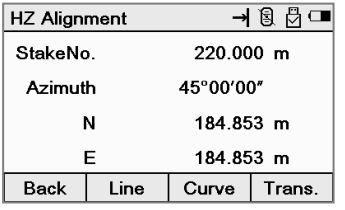


2) Straight Line

The parameter of straight line only included the length.



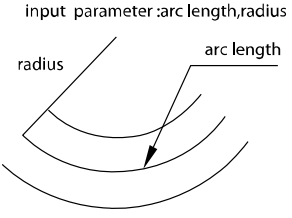


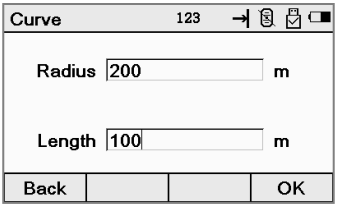


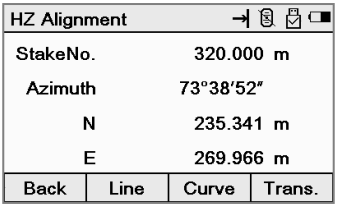
Note: The value should be positive

3) Curve

The parameter of curve included the radius and length.







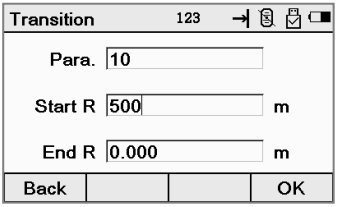
Note:

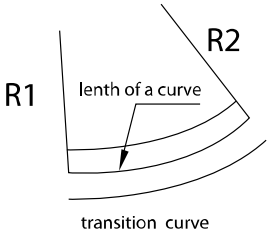
The value of radius depending on the direction. When the curve turns right, the value should be positive; otherwise, it should be negative.

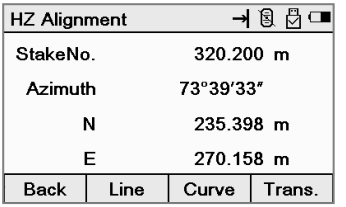
The value of length cannot be negative, also cannot be larger than the radius.

4) Transition Curve

The parameter of transition curve included parameter of transition, start and ending radius.







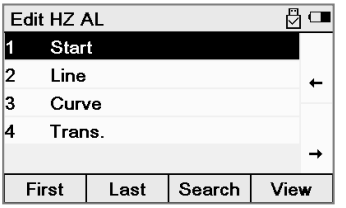
Note:

When the value of radius is positive, the transition parameter A will be a symbolic number. The value of parameter A is depending on the forward direction of curve. When the curve turns right, the value should be positive; Otherwise, it should be negative.

If the radius is ∞, please keep 0 as it's value.

10.1.2 Edit Horizontal Alignment

View and edit the existed elements of road.



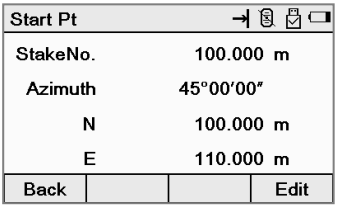
[F1] First: Check the first page

[F2] Last: Check the last page

[F3] Search: Search the element

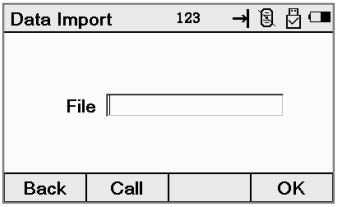
[F4] View: View the selected element

[F4] Edit: Edit the selected element



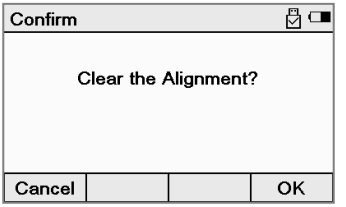
10.1.3 Import Horizontal Alignment

[F2] Call: Select the file from USB



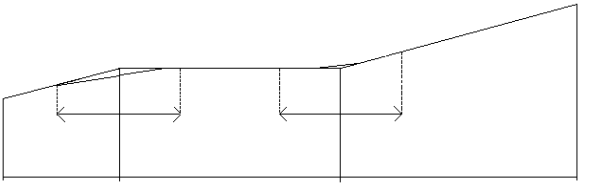
10.1.4 Clear Horizontal Alignment

Clear all the horizontal alignment



10.2 Vertical Alignment

A vertical alignment consists of a series of intersections, including a chainage, elevation and curve length. The length of start point and end point must be zero.

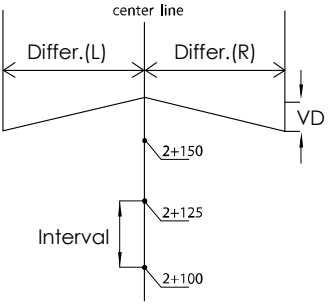


Stake	1000	1300	1800	2300
Height	50	70	60	90
Length	0	300	300	0

Vertical alignment can be defined by stake number, height and length.

10.3 Road S.O

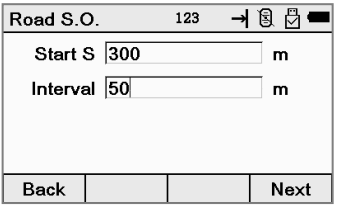
In the Roads stake-out, user should stake-out points on the center line at first, then the chainage for both sides.



Interval: Interval between the current stake to next stake.

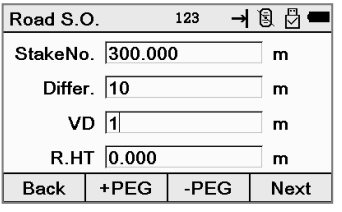
Differ.: The left and right difference (offset) from the central line

VD: Vertical difference between left and right chainage and the center line



Start S: Starting point for road stake-out.

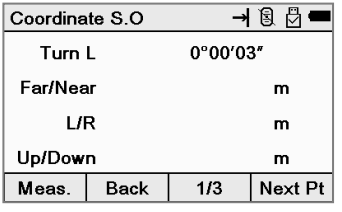
Stake No.: The current point



[F2] +PEG: Next stake out point on center line.

[F3] -PEG: Last stake out point on center line

Finish the stake out of each chainage based on the guidance.

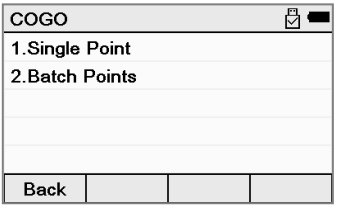


Note: The vertical alignment data is unnecessarily to be defined, unless it is required to compute dig and fill.

10.4 Calculation

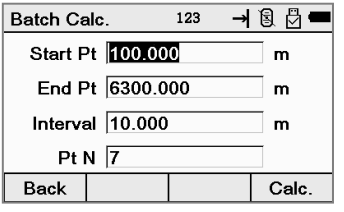
10.4.1 Calculate the coordinate of single point

Enter the mileage and point name to calculate the coordinate of point



10.4.2 Calculate the coordinate of multi-points

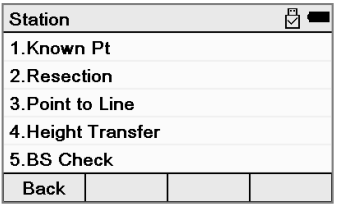
Enter the mileage of start point and end point, with interval and point number. N3 will calculate the coordinate of all the points which matches the requirements in once.



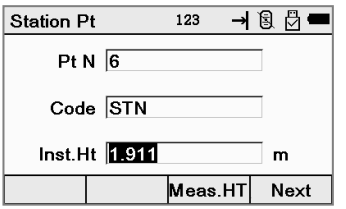
11. STATION

11.1 Known Point

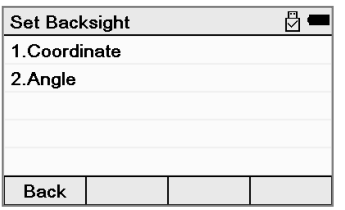
Input, create or select a point from the memory with instrument height as the station point.



If your N3 features the LPDM module, you can activate the auto height function by [F3].

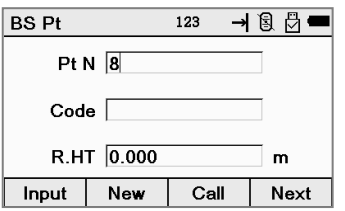


[F4] Next: Click to select the orientation method (by coordinate or angle).

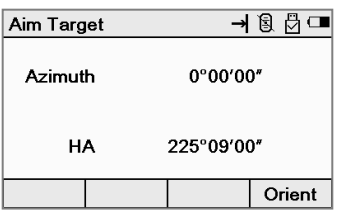


11.1.1 By Coordinate

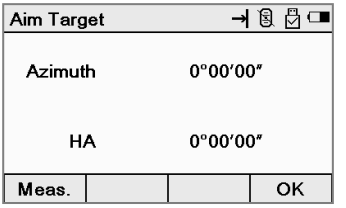
Input, create or select a point from memory as backsight point.



[F4] Orient: Aim the backsight point and the current HA will be set by the azimuth.

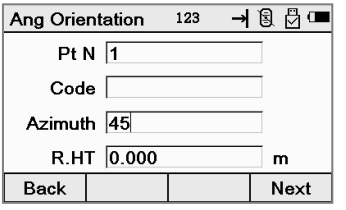


If necessary, measure the backsight with angle, distance and coordinate for double check.



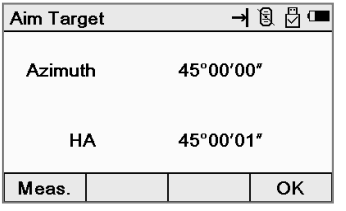
11.1.2 By Angle

Input the point name, code, azimuth angle and reflector height as backsight.



[F4] Orient: Sight the HA of current HA as azimuth.

If necessary, measure the backsight with angle, distance and coordinate for double check.

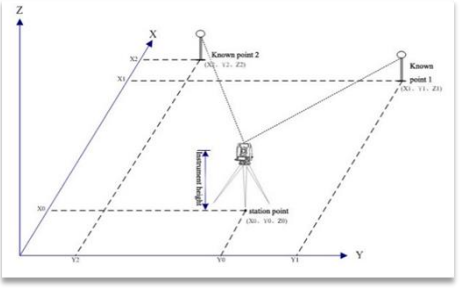


11.2 Resection

A resection sets up the station by using the angle and distance measurements from 7 points in maximum.

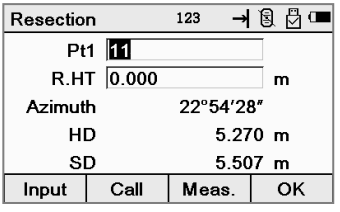
--- Calculation will start automatically when enough measurements are taken.

--- The intersection angle among known points should less than 180 degrees.



Input, select or measure the points for calculation.

[F4] OK: Confirm to add the next point.



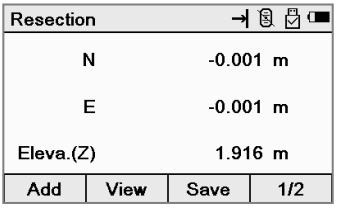
After calculation:

[F1] Add: Add another point for resection

[F2] View: View the details

[F3] Save: Save the result as station

[F4] 1/2, 2/2: Switch the display of result between coordinate and the deviation

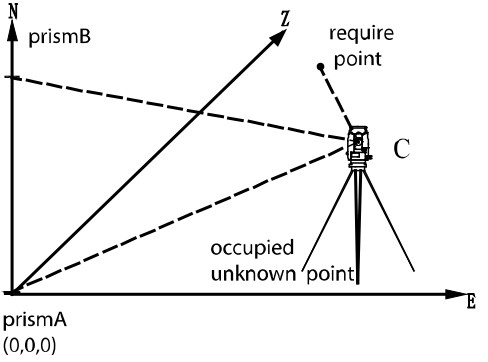


11.3 Point to Line

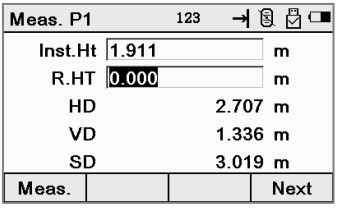
This function calculates the coordinate of unknown occupied point from two known points.

Measure two known points A & B to define a coordinate system.

Point A as (0,0,0), and Line A-B as N axis.

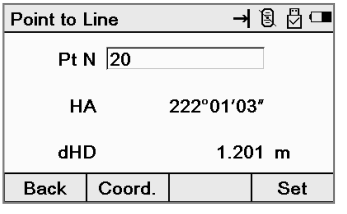


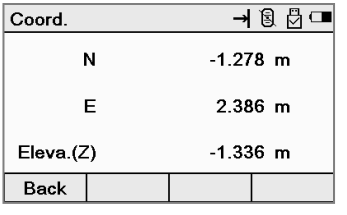
[F1] Meas.: Measure two points to define the axis N.



[F2] Coord.: View the coordinate of occupied point

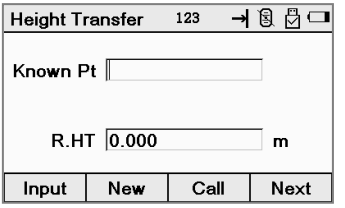
[F4] Set: Save point and set the station





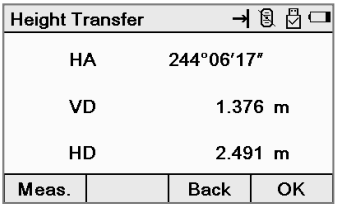
11.4 Height Transfer

This function is used for adjusting the height of station, transferred by the coordinate of known point.

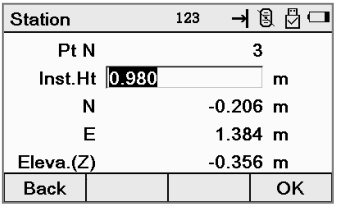


The known point can be inputted, created or selected from the data list.

[F1] Meas.: Measure the value of horizontal and vertical distance.

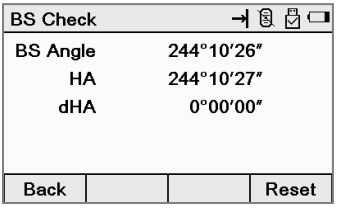


[F4] OK: Save the changes and set the station with the calculated instrument height.



11.5 BS Check

Double check the backsight by angle.



BS Angle: the preset angle of backsight

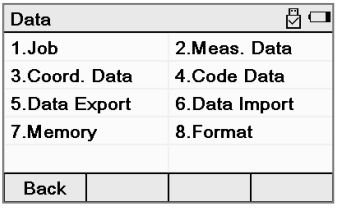
HA: current horizontal angle

dHA: the difference between current angle and backsight angle

12. DATA

12.1 Job

Click or use the navigation key to select the job.

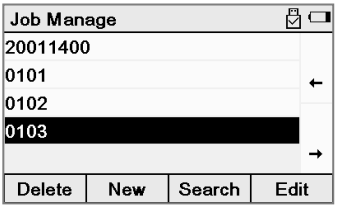


[F1] Delete: Delete the selected job

[F2] New: Create a new job

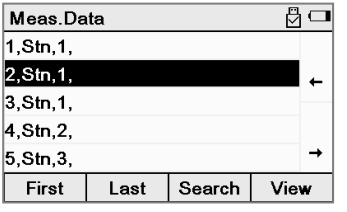
[F3] Search: Search the job in memory

[F4] Edit: Edit the selected job



12.2 Meas. Data

Click or use the navigation key to select the measured data.

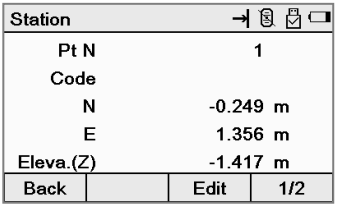


[F1] First: Switch to the first page

[F2] Last: Switch to the last page

[F3] Search: Search the point in memory

[F4] View: View the details



[F3] Edit: Edit the selected job

[F4] 1/2: View the further information

12.3 Coord. Data

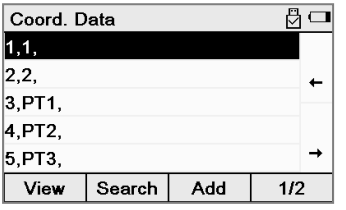
Click or use the navigation key to select the coordinate data.

[F1] View: View the details.

[F2] Search: Search the point in memory

[F3] Add: Add a new point with coordinate

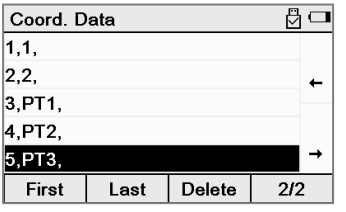
[F4] 1/2, 2/2: Switch to the next/last page



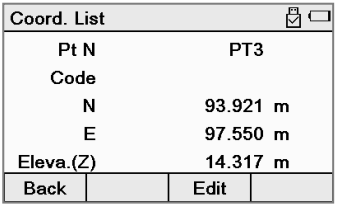
[F1] First: Switch to the first page

[F2] Last: Switch to the last page

[F3] Delete: Delete the selected point



[F3] Edit: Edit the selected point



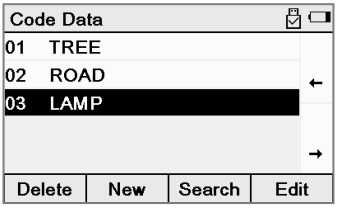
12.4 Code Data

[F1] Delete: Delete the selected point

[F2] New: Add a new code

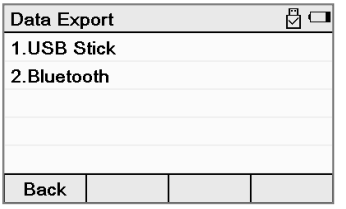
[F3] Search: Search the code in memory

[F4] Edit: Edit the selected code



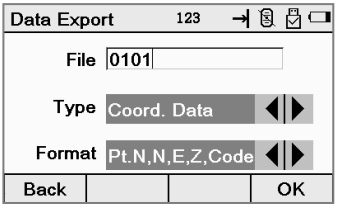
12.5 Data Export

This function is used to transfer the coordinate data or raw data, via USB or Bluetooth.



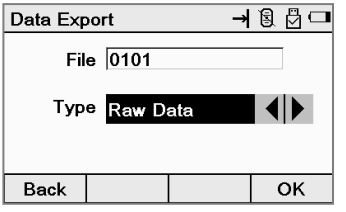
Use 1.USB Stick as an example.

Input the file name, which will be saved under the root directory of USB Stick.



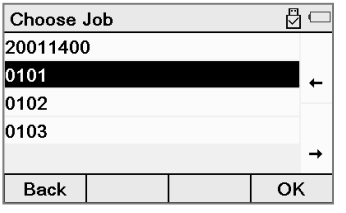
Select the data type between raw data and coordinate data. The coordinate data can be selected by the order below:

a. Point number, N, E, Z, Code
b. Point number, E, N, Z, Code
c. Point number, Code, N, E, Z
d. Point number, Code, E, N, Z



Select the job you want for data export.

[F4] OK: Start to export the data under the selected job



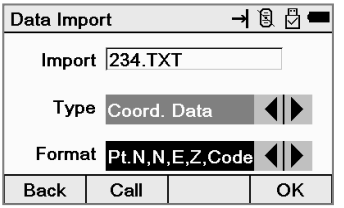
12.6 Data Import

Import the data from USB

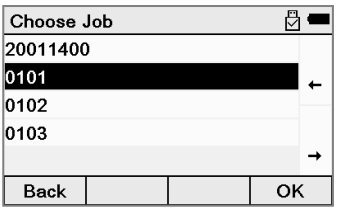
[F1] Back: Return to last page

[F2] Call: Select the file

[F4] OK: Confirm the type and order

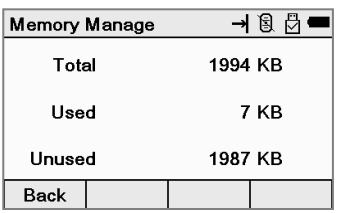


Select the job to import the data from USB stick to the internal memory.



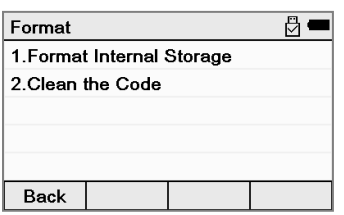
12.7 Memory

Check the status of internal memory, with the information of used, unused and total capacity.



12.8 Format

Clear all the format of internal storage, or clear all the codes.

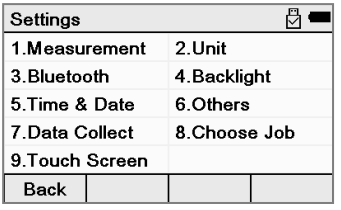


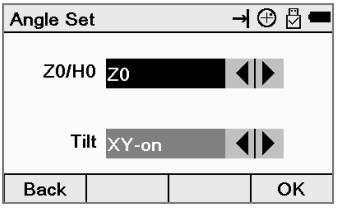
13. SETTINGS

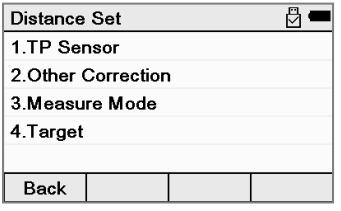
13.1 Measurement

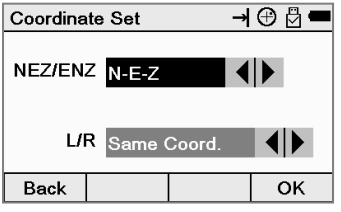
Change the setting of angle, distance and coordinate measurement.

Angle	**Z0/H0**	Horizontal 0
		Zenith 0
	Tilt	X-ON
		XY-ON
		Off
Distance	**TP Sensor**	Temperature
		Pressure
		PPM
		Auto: On/Off
	Other	Scale
		Elevation (Z)
		Grid
		TP Sensor
		Constant K
	Measure Mode	Mode
		Times
	Target	Prism/ Sheet/ Non-prism
Coordinate	**NEZ/ENZ**	N-E-Z
		E-N-Z
	L/R	Same
		Symmetry





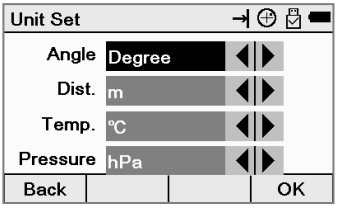




13.2 Unit

Change the setting of display unit, including angle, distance, temperature and pressure unit.

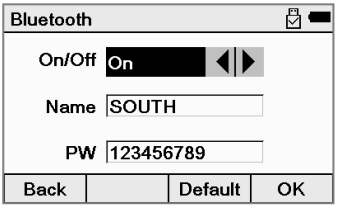
Unit	**Angle**	Degree
		Gon
		Mil
	Dist.	M
		ft
	Temp.	C°
		F°
	Pressure	hPA
		mmHg
		inHg



13.3 Bluetooth

Change the setting of Bluetooth.

Bluetooth	**On/Off**	On
		Off
	Name	Input Name
	PW	Password

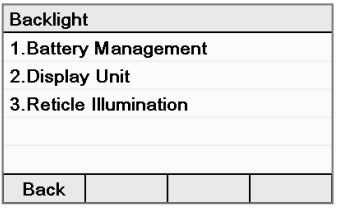


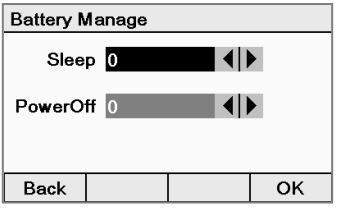
[F3] Default: Reset the settings of Bluetooth as default.

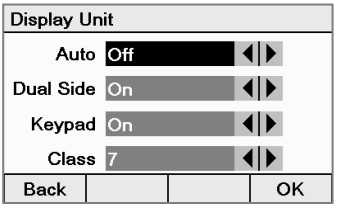
[F4] OK: Confirm the settings.

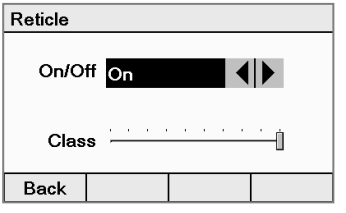
13.4 Backlight

Change the setting of backlight, including battery manage, backlight of display unit and the reticle illumination





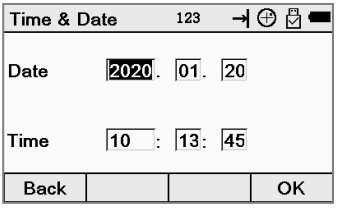




Battery Manage	**Sleep**	0-9 mins
	Power Off	0-60 mins
Display Unit	**Auto**	On
		Off
	Dual Side	On
		Off
	Keypad	On
		Off
	Class	0-7
Reticle Illumination	**On/Off**	On
		Off
	Class	Optional

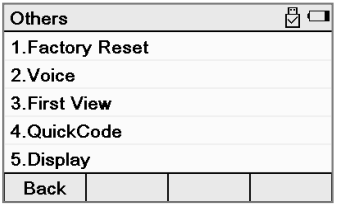
13.5 Time & Date

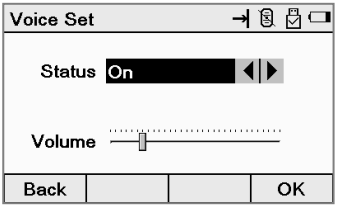
Change the setting of date (Year/ Month/ Day) and time (Hour / Month/ Second).

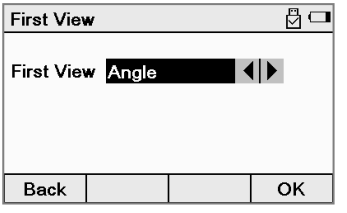


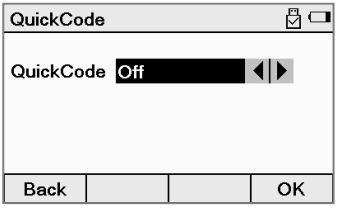
13.6 Others

The others included the setting of Factory Reset, Voice (on or off), First View (after power on), Quick Code (on or off) and Display.







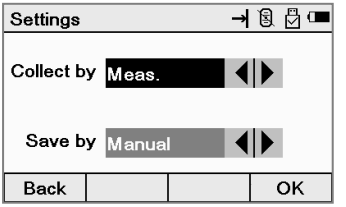


Factory Reset	Resume to default factory mode.	
Voice	**Status**	On
		Off
	Volume	Optional
First View	**First View of N3**	Angle
		Dist.
		Coord.
Quick Code	**Quick Code**	On
		Off
Display	**Display**	Enter/Quick/Normal/Slow/null

13.7 Data Collect

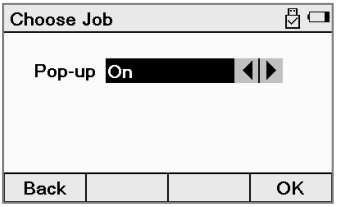
Change the settings of data collect by manual or measurement.

Data Collect	**Collect By**	Measure
		Input
	Save By	Manual
		Auto



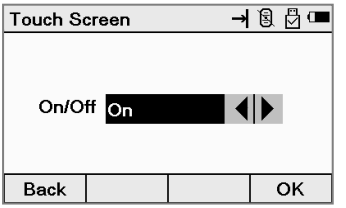
13.8 Choose Job

Change the setting of job chosen. When activate the function of job chosen, N3 will pop-up the job list before each steps. It will be useful when you need to select the data via the other job.



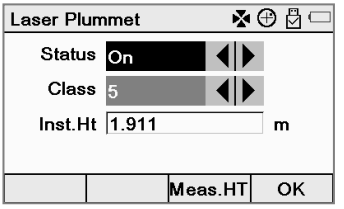
13.9 Touch Screen

Turn on or off the sensor of touch screen.



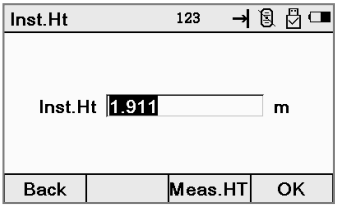
14. AUTO HEIGHT

In order to eliminate the errors of manual reading and typing, auto height enables operators to get the instrument height with a simple press. This revolutionary function is now available in South N3 Series total station.

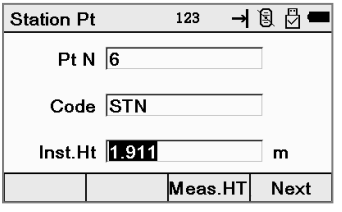


▶ Star Key, chapter 1.6.7

The function can by activated under the setting page of laser plummet, instrument height and station set-up.



▶ Inst. Ht, chapter 5.5



▶ Station, chapter 11.1

Laser Plummet	
Diameter	2.0mm
Coincidence	0.6mm
Wavelength	635nm
Laser Class	Class 2; P<1mW
Auto Height	
Working Range	0.5m-3m
Min. Reading	1mm
Accuracy	±1.5mm *

* Under good conditions, Kodak Gray card, 90% reflectance

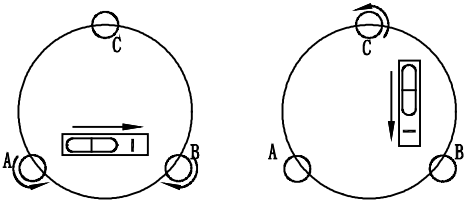
15. INSPECTION & ADJUSTMENT

The instrument has passed the procedure of inspection and adjustment before shipping to your side. However, after long periods of transportation or the changeable environment, some influences may occur to the internal structure. Before the instrument is used for the first time, please check and adjust the functions we introduced in this session to ensure the precision of the job.

15.1 Plate Vial

Inspection

Rotate the instrument after set-up (Refers to Chapter 2.2) to see whether the bubble is in center, if not, please adjust the vial bubble.



Adjustment

1. If the bubble of the plate vial moves away from the center, bring it half way back to the center by adjusting the screws, which is parallel to the plate vial. Adjust the remaining half by adjusting pin.
2. Rotate the instrument in 180° to check whether the bubble is in the center. If not, repeat Step 1.
3. Rotate the instrument in 90°, adjust the third screw. Repeat the steps until the bubble remains in the center in any direction.

15.2 Circular Vial

Inspection

It is not necessary to adjust the circular vial, except the bubble is not in the center after the adjustment of plate vial.

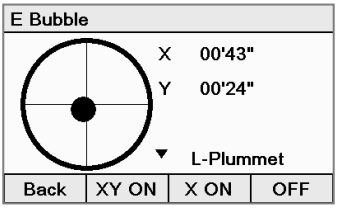
Adjustment

If the bubble of the circular vial is not in the center, adjust the bubble to the center by using the adjusting pin or hexagon wrench.

First, loosen the screw opposite to the offset side, and then tighten the other adjusting screw on the offset side, bringing the bubble to the center. When the bubble stays in the center, keep the tightness of the three screws uniformly.

15.3 Compensator

Inspection



1. Leveling instrument accurately.
2. Turn on the setting page of e-bubble
3. Read the value of X & Y as X1 & Y1; Check the position of bubble.
4. Rotate 180° to read the value of X & Y as X2 & Y2.
5. Calculate the value of deviation as below:

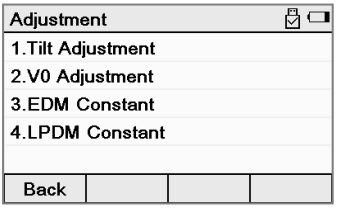
Average Deviation of X=(X1+X2)/2

Average Deviation of Y=(Y1+Y2)/2

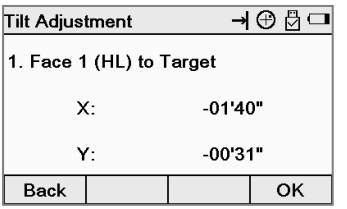
It is not necessary to adjust the compensator if the value is under ±20"; Otherwise, please adjust it as below steps.

Adjustment

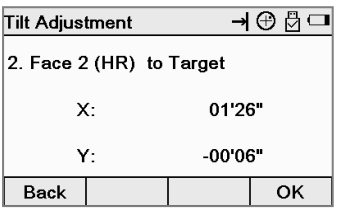
1. Enter the page of tilt adjustment under Menu.8 Adjustment.



2. Aim at a target in Face 1 (HL)



3. Aim at the same target in Face 2 (HR)



4. If the value of X and Y are within the adjustment range, then press **F4 [OK]** to update the correction value; Otherwise, please contact your local dealer for further help.

5. Repeat the steps 1-4 for double check. If the deviation value still overrange, please contact your local dealer for further help.

15.4 Inclination of Reticle

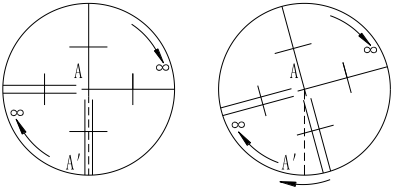
Inspection

1. Sight object A after leveling the equipment, lock the horizontal and vertical tangent unit and confirm the target A is in the center of reticle.

2. Move object A to the edge of the field of view, point A' by rotating the vertical tangent screw.

3. Adjustment is not necessary if object A moves along the vertical line of the reticle and point A' still in the vertical line.

Otherwise, as picture shown, A' is deviate to the center of the vertical cross-hair, it is necessary to adjust.



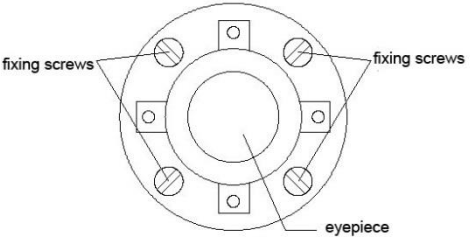
Adjustment

1. Remove the eyepiece cover to expose the four reticle adjusting screws, as picture shown.

2. Loosen the four reticle adjusting screws uniformly by the adjusting pin. Rotate the reticle around the sight line and align the vertical line of the reticle with point A'.

3. Tighten the adjusting screws slightly. Repeat the previous steps to see whether the position is correct.

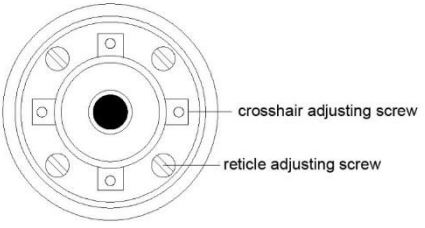
4. Assemble the eyepiece cover back.



15.5 Perpendicularity between Sight of View & Horizontal Axis (2C)

Inspection

1. Set object A at a far distance at the same height as the instrument, leveling the instrument and turn on the power (e.g. HL=10°13'10").
2. Sight object A in horizontal left and read value of HA. (e.g. HR= 190°13'40").
3. Loosen the vertical and horizontal tangent unit and rotate the telescope. Sight object A in horizontal right and read the HA.
4. 2C =HL-HR±180°=-30"⩾±20", overrange. So it is necessary to adjust 2C.



Adjustment

1. Use the tangent screw to adjust the horizontal angle to the right reading which has been eliminated C:

R+C=190°13'40"-15"=190°13'25"

2. Take off the cover of the reticle between the eyepiece and focusing screw. Adjust the left and right adjusting screws by loosening one and tightening the other. Move the reticle to sight object A exactly.
3. Repeat inspection and adjustment until | 2C | < 20".
4. Replace the cover of the reticle.

Note: After adjustment, please check the photoelectricity coaxially.

15.6 Vertical Index (I Angle) & V0 Adjustment

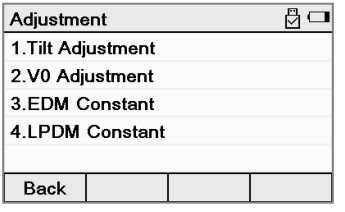
Inspect this parameter after chapter 15.3 and 15.4

Inspection

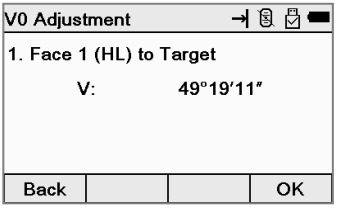
1. After leveling the instrument, collimate at any target A in HL. Record the value as L.
2. Rotate the EDM and aim at the target A in HR. Record the value as R.
3. If the vertical 0°in zenith, I =(L + R - 360°)/2. If the vertical 0 in horizon, I= (L + R - 180°)/2 or (L + R - 540°)/2.
4. If |i| ⩾10", it's necessary to adjust the Vertical 0.

Adjustment

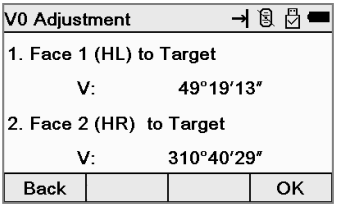
1. Enter the page of V0 adjustment under Menu.8 Adjustment.



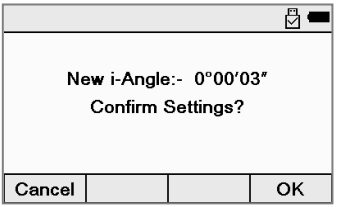
2. Aim at a target in Face 1 (HL)



3. Rotate the telescope and then aim at the same target in Face 2 (HR)



4. Press [F4]OK to confirm the revised I-Angle



5. If the Index Difference does not meet your requirements, please redo the steps above.

Please carefully repeat these steps to ensure the proper result. Or contact your local dealer for further help.

15.7 Optical Plummet

Inspection

1. Set the instrument on the tripod and place a piece of white paper with a cross lines on it below the equipment.
2. Adjust the focus of optical plummet. Move the paper until the intersection point of the crossline on the paper comes to the center of optical plummet.
3. Adjust the leveling screws and keep the center mark of the optical plummet coincides with the intersection point of the crossline precisely.
4. Rotate the instrument and check whether the position of center mark coincides with the intersection point of the crossline in every 90°.
5. If the center mark always coincides with intersection point, it is not necessary to adjust.

Adjustment

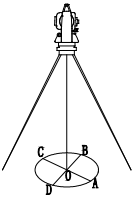
1. Take off the protective cover between the plummet eyepiece and focusing knob.
2. Rotate the instrument and mark the point of the center of optical

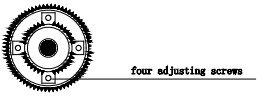
plummet which falls on the paper in every 90°. Point A, B, C, and D.

3. Draw lines that attach AC and BD and mark the intersection point of the two lines as O.

4. Adjust the four adjusting screws of the optical plummet with an adjusting pin until the center mark coincides with Point O.

5. Repeat the steps to make the instrument meets the requirements.





15.8 Laser Plummet

Inspection

1. Activate the laser plummet, from star key - 7.Plummet
2. Repeat the steps as Chapter 15.7
3. If the laser point always coincided with the intersection point, it is not necessary to adjust.

Adjustment

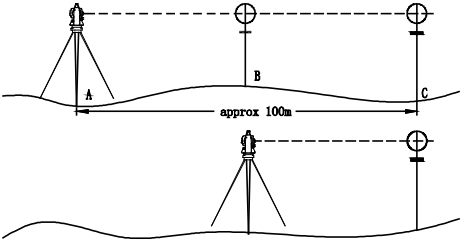
If the laser plummet was broken, please contact your local dealer to change a new one.

15.9 Instrument Constant (K)

The Instrument constant has been checked and adjusted in the factory, and K=0. Please do not modify the constant without permission.

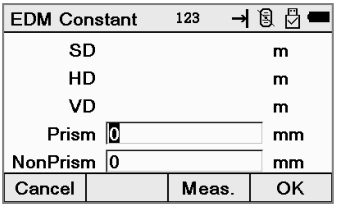
Inspection

1. Mount and level the instrument on Point A on flat ground. Use the vertical hair to mark Point B and Point C with the distance of 50m on the same line, and collimate the reflector accurately.
2. After setting temperature and pressure value, measure the horizontal distance of AB and AC accurately.
3. Setup the instrument on Point B and center it accurately. Measure the horizontal distance of BC.
4. Then you can get the Instrument Constant: K = AC - (AB + BC). The value of K should be close to 0. If |K|>5mm, the instrument should be strictly inspected on the base alignment, and adjust it according to the inspection value.



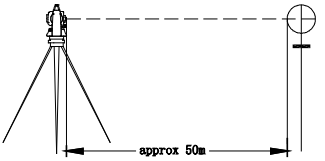
Adjustment

If Constant K was changed, the operator should modify the constant by manual (after the precise inspection). Press [Menu] - 8. Adjustment - 3. EDM Constant to change the settings.



15.10 Coincidence between Sight of View & Emitting Axis

Inspection



1. Set a target 50m away from the instrument.
2. Aim and measure the center of target.
3. Rotate the tangent screw to launch electric collimation and make the light path of EDM unblocked. In the bright zone, find the center of emitting photoelectric axis.
4. Check whether the center of reticle coincide with the center of emitting photoelectric axis. If yes, the instrument is eligible.

Adjustment

If there is any difference between sight of view and emitting axis, please send the instrument to your local dealer for repair and maintenance.

15.11 Levelling Screws on Tribrach

If any one of those leveling screws was loosed, please tighten the adjusting screws on the side of leveling screw appropriately.

16. SPECIFICATIONS

TELESCOPE		
Image		Erect
Tube length		152mm
Effective aperture		45mm (DTM: 47mm)
Magnification		30x
Field of view		1°30'
Resolving power		3"
Minimum focus		1.5m
Reticle illumination		10 brightness level
ANGLE MEASUREMENT		
Accuracy		2"
Measuring method		Absolute encoding
Diameter of disk		79mm
Minimum reading		1"
Detection method		Horizontal: dual; Vertical: dual
Unit		360 degree/ 400 gon/6400 mil
Vertical angle 0°		Horizontal 0/ Vertical 0
DISTANCE MEASUREMENT		
Range	Reflectorless	1000m
	Prism	5000m
Accuracy	Reflectorless	3+2ppm
	Prism	2+2ppm
	Sheet	3+2ppm
Measure interval		Fine: 1.2s; Tracking: 0.2s

Atmospheric correction		Manual input, auto correction
Prism constant		Manual input, auto correction
Temperature correction		Sensor reading
Distance reading		Max: 99999999.999m; Min: 1mm
COMPENSATOR		
System		Liquid, dual axis
Working range		±6'
Accuracy		1"
GUIDE LIGHT		
Wave Length		635nm/590nm
Color		Red/ Yellow
PLUMMET		
Laser plummet	Accuracy	±1.5mm @1.5m
	Brightness	5 brightness level
	Wavelength	635nm
	Laser class	Class 2
	Laser power	0.5mW
LPDM module	Range	0.5m-3m
	Min. reading	1mm
	Accuracy	±1.5mm*
Optical plummet	Image	Erect
	Magnification	3x
	Min. Focusing	0.5m
	Field of view	5°
KEYBOARD AND DISPLAY		
Keyboard		Alphanumeric 30 keys

Display	3.0 inches, color touch
Resolution	240*400 dpi
Position	Face 1, face 2
INTERFACE	
Data interface	USB flash disk, Bluetooth
BATTERY	
Type	Lithium, 7.4V
Operating time	8 hours
VIAL	
Plate vial	30"/2mm
Circular vial	8'/2mm
GENERAL	
Storage	16000 points
IP	IP54
Size	206*195*353mm
Weight	Approx. 6.0kg

** Under good conditions, Kodak Gray card, 90% reflectance*

17. SAFETY GUIDE

17.1 INTERNAL DISTANCE METER (VISIBLE LASER)

Warning

The total Station is equipped with an EDM of Laser Class 3A/III a and it is verified by these labels as follows:

There's an indication label "CLASS III LASER PRODUCT" above the vertical clamp screw on Face Left as well as on the Face Right.

The product is classified as Class 3A laser product, according to the standards as follows:
IEC60825-1:2001 "SAFETY OF LASER PRUDUCTS"

The product is classified as Class III a laser product according to the standards as follows:
Class 3A/III a laser product: It is harmful to observe the laser beam continuously. Users should avoid staring at the laser directly. It can reach as much as 5 times the emitting limit of Class 2 / II with a wavelength between 400nm and 700nm.

Warning

It is dangerous to continuously look straight at the laser beam.

Prevention

Do not stare at the laser beam, or point the laser beam at others. Reflecting laser beam is also valid.

Warning

When the laser beam emits on prism, mirror, metal surface, window, it might be dangerous to look directly by the reflecting light.

Prevention

Do not stare at the direction which the laser beam might reflects. When the laser is opened, do not look at it near to the optical path or the prism. It is only allowed to observe the prism through the telescope of the total station.

Warning

It is dangerous to make improper use of the Class IIIa laser equipment.

Prevention

To avoid injury, all the users should take safety precautions, and must make sure that everything is under control within the distance that might bring dangers (according to IEC60825-1:2001)

There are explanations of some principle points of related standard as follows:

Class 3R laser product is used in outdoors and construction site (measuring, defining alignment, leveling, etc.). The laser equipment can only be installed, adjusted and operated by those persons who have taken related training course and got the authentication.

a. Set related laser warning marks on site.

b. Prevent anyone from looking straight at the laser beam directly or through optic instrument.

c. To avoid the harm brought by laser, users should block the laser beam at the end of the working route. When the laser beam passes through the restricted area (harmful distance*), and there are persons

taking activities, users must stop the laser beam in time.

d. The optical path of the laser beam should be set higher or lower than the line of sight.

e. When the laser instrument is not in use, users should keep it well. It is not allowed for operation unless the user is authenticated.

f. Prevent the laser beam from accidentally emitting at mirror, mental surface, window, etc. Especially pay attention to the surface of plane mirror or concave mirror.

* Harmful distance suggests that the maximum distance from the start point of the laser beam to the point which the laser beam is weakened to a certain degree that doesn't harm people.

The internal distance measure product which is equipped with a Class3R/III a Laser Product has a harmful distance of 1000m (3300ft). Beyond this distance, the laser strength is weakened to Class I (It is not harmful to look straight at the laser beam.

17.2 LASER PLUMMET

The internal laser plummet sends out a ray of red visible laser beam from the bottom of the instrument.

This product is classified as Class 2/II laser product.
Class 2 laser product is in accordance with the following standard:
IEC 60825-1:2014 “SAFETY of LASER PRODUCTS”
EN 60825-1:12014 “SAFETY of LASER PRODUCTS”.

Class 2/II Laser Product:
Do not stare at the laser beam or point it at others. Users should prevent the laser beam and the strong reflecting light from impinging into eyes so as to avoid incurring harm.