N1

Users Manual

SOUTH

Target your success

PRECAUTIONS

Congratulations on your purchase of N1 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 exposed 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 Group when you find the equipment abnormal.

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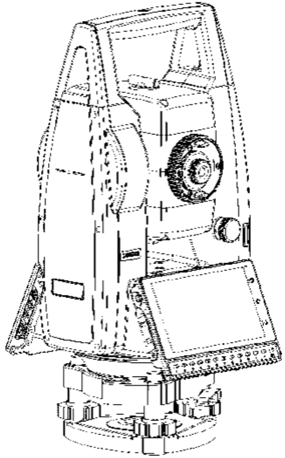
1. INTRODUCTION

1.1 FEATURES

South Android Total Station N1 features open interface, available for any 3rd party software. 5.0-inch TFT screen with numeric 17 keys, ideally suit for your daily task.



- ✧ Up to 2000m reflectorless EDM
- ✧ Intelligent workflow under Android 6.0
- ✧ Large and high-resolution display
- ✧ Cable-free connection
- ✧ Intuitive onboard software

1.2 MEASURING 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, place the instrument into the case with the vertical clamp screw and circular vial upwards (lens towards tribrach

1.3 SETTING UP

Setup and Levelling the instrument precisely to ensure the best performance.

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.

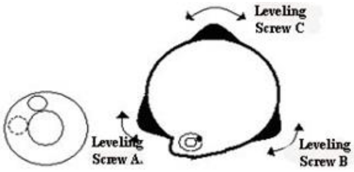
Instrument setup

A. Extended the tripod legs in a stable position.
B. Place and lock the instrument carefully on the tripod
C. Turn on the instrument and activate the laser plummet under the Quick-Set. Hold the two free 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 the left 2 legs.

D. Leveling the instrument by 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.

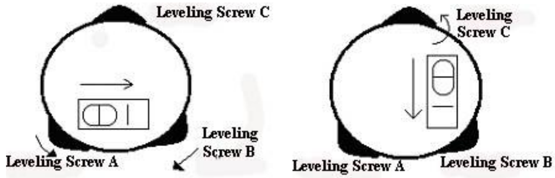


E. Precisely leveling by plate vial

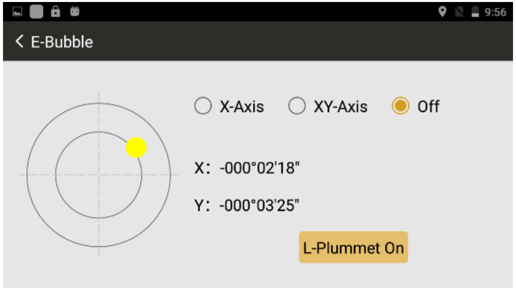
a)Rotate the instrument horizontally by loosening the horizontal clamp unit and place the plate vial parallel to the line connecting rotating the foot-screw A and B, and then bring the bubble to the center of the plate vial by rotating the foot-screw A and B.

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 dot doesn't keep the center position, please slightly loosen the screw under the tripod head and move the instrument (don't rotate the instrument) until the laser dot is on the station point. Tighten the screw and level the instrument again. Repeat these steps until the instrument is precisely centered and leveled.



Tips: You can also level the instrument precisely adjust by the E-bubble.

[X]: The compensating value on X direction
[Y]: The compensating value on Y direction
[TILT-OFF]: Turn off tilt sensor
[TILT-X]: Turn on sensor in X direction only
[TILT-XY]: Turn on X&Y sensor in dual directions.

1.4 BATTERY INFORMATION

Inserting Battery

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

Replacing Battery

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.

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

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 level, regarding to the current measure mode. In normal, the consumption of distance measurement mode is higher than angle measurement mode. When switching the measurement mode from angle to distance in a low battery voltage, it might interrupted the operation.

Charging

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

The battery LB-01 should be charged only by the official charger NC-10, which packed together with the instrument. Please connect the power supply in 220V, under 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.

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

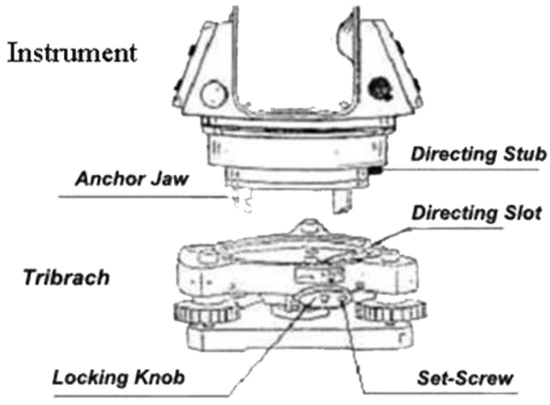
1.5 DISMOUNTING/MOUNTING THE TRIBRACH

Dismounting

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

Mounting

Insert three anchor jaws into holes of tribrach and line up the directing stub with the directing slot. Turn the locking knob about 180° clockwise to mounting the instrument.

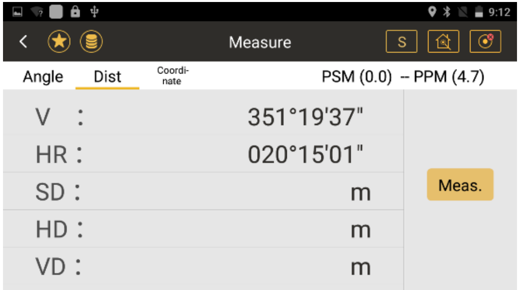


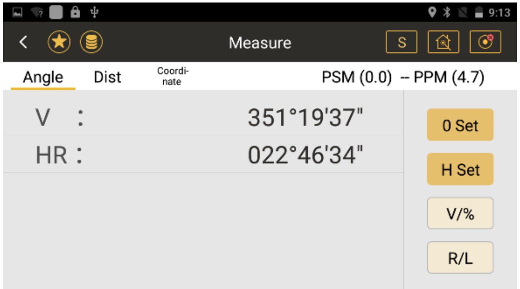
1.6 EYEPIECE FOCUSING

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. OPERATION

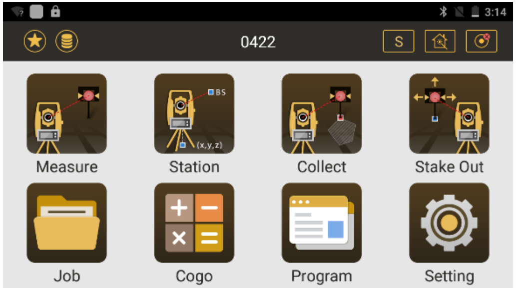
2.1 SYMBOLS

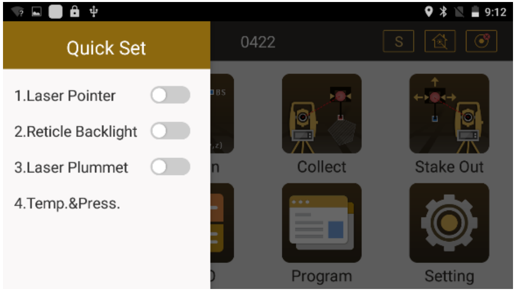




V/V%	vertical angle/(gradient display)
HR/HL	horizontal angle right/ left
HD	horizontal distance
VD	vertical difference
SD	slide distance
N	north coordinate
E	east coordinate
Z	elevation coordinate
m/ft	Meter/Feet, distance unit
dms	degree/ minute/ second
Mil	unit of angle measure
Gon	unit of angle measure
PSM	prism constant value
PPM	atmosphere correction value

2.2 TOOL BAR





☞ *Quick set*

[Quick Set]: Including the setting of laser pointer, cross light, laser plummet and temp.&press.

[Data]: Including raw data, coordinate data, code and graphic data.

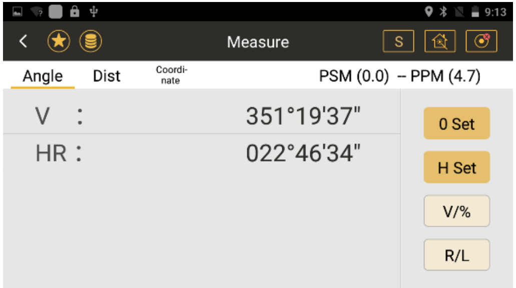
[Mode]: Including fine, N times, continuous or tracking mode.

[Target]: Including sheet, prism or non-prism mode.

[Tilt-sensor]: Electronic tilt sensor, including X-axis, XY-axis or closed.

3. MEASUREMENT

3.1 ANGLE MEASUREMENT

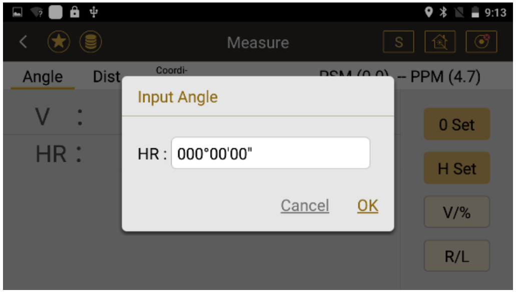


V: Vertical angle

HR/HL: Horizontal right or left

[0 SET]: Set the current horizontal angle to 0. After that the backsight point should be set again.

[H SET]: Set the horizontal angle by entered a certain value

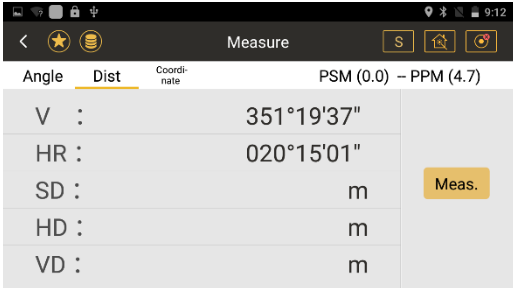


[V/%]: Switch the display of angle between regular vertical angle and slope percentage.

[R/L]: Switch between horizontal right or left.

☞ *H-Set*

3.2 DISTANCE MEASUREMENT



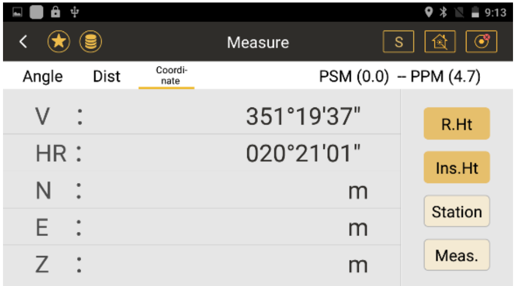
SD: The slide distance.

HD: The horizontal distance.

VD: The vertical distance.

[Meas.]: Measure the distance

3.3 COORDINATE MEASUREMENT



N: North coordinate.

E: East coordinate.

Z: Elevation coordinate.

[R.HT]: Input the reflector height.

[Ins.HT]: Input the instrument height.

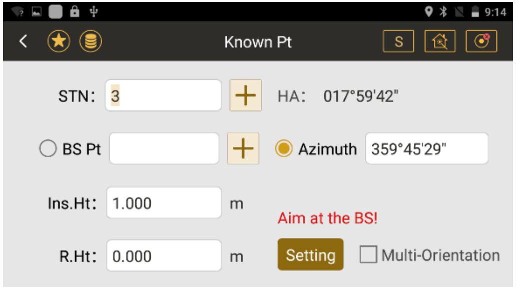
[Station]: Input the coordinate of station

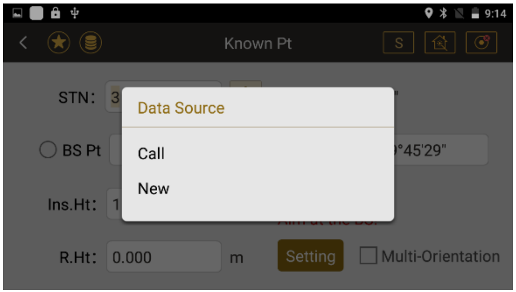
[Meas.]: Measure the distance

4. STATION

Each coordinate computation relates to the currently set station. Please set the station by known points before surveying and stake out,.

4.1 KNOWN POINT





There're two methods to set the backsight point: one is by the coordinates, the other is by the azimuth.

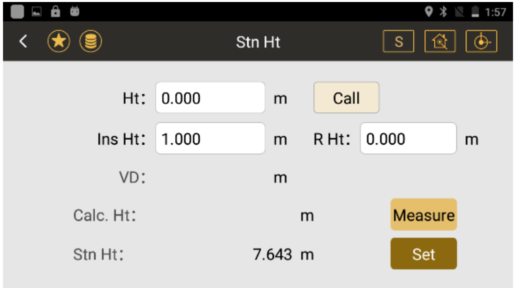
Stn: Input the ID of known point, selected from the memory or entered a new point as station.

[BS Pt]: Input the ID of backsight point, selected from the memory or entered a new point
[Azimuth]: Input the angle of backsight point.

HA: Display the current horizontal angle.
[Setting]: Set the backsight and station.

4.2 STATION HEIGHT

Calculate the station height by measuring a point with known height.



Elevation: Input the elevation of known point, user can selected it from internal memory.

VD: The current vertical angle.

Calc.Ht: The measured height of station.

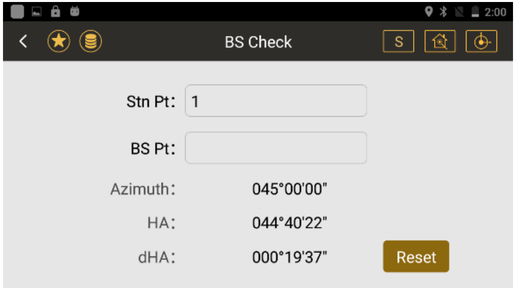
Stn Ht: The current height of station.

[Meas.]: Measure the distance

[Setting]: Set the result as station height.

4.3 BACKSIGHT CHECK

Check whether the current angle coincide with the backsight.



Stn Pt: The ID of station point.

BS Pt: The ID of backsight point. It will be blank if the backsight angle was input by manually.

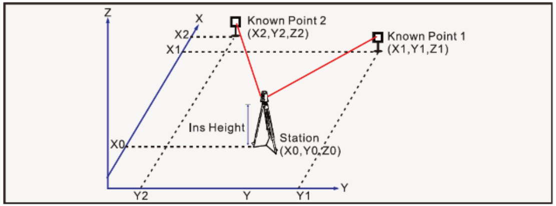
BS: The backsight angle.

HA: the current horizontal angle.

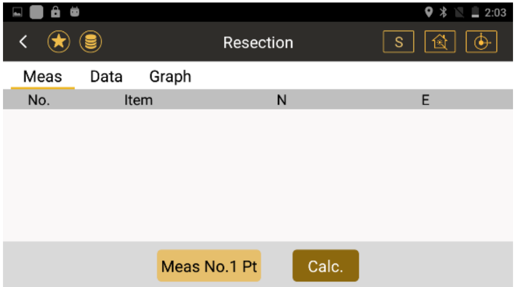
dHA: The difference between BS and HA.

[RESET]: Reset the current angle as the backsight.

4.4 RESECTION



The "Resection" is used for determine the instrument position from measurements to a minimum of two known points.



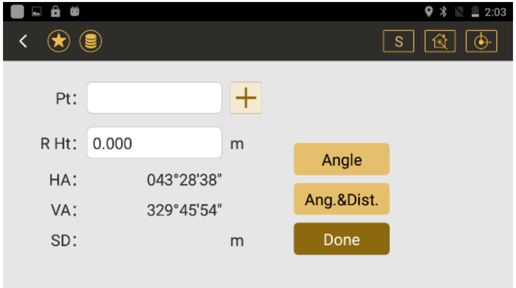
☞ *The list of measured known points.*

Note: a) If the angle between the first measurement point and the second one is too small or too large, it will influent the geometrical accuracy of calculation result. So selecting a geometrical graphic with good structure is important.

b) The calculation requires at least three angle data or two distance data.

c) Basically, the station height is calculated by the distance data. If the distance data was not carried out, the height will be determined by the angle of known point.

The standard deviations and residuals for accuracy assessments are provided.



☞ *The measurement for known points*

Pt: Input the ID of known point.

R.Ht: Input the reflector height.

HA: The measured result of horizontal angle.

VA: The measured result of vertical angle.

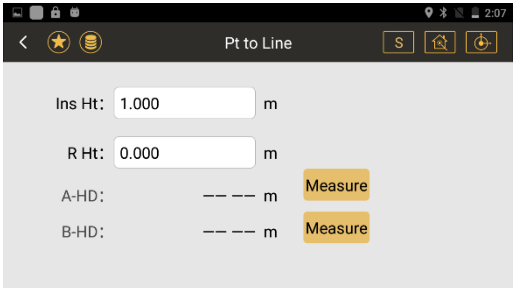
SD: The measured result of slide distance

[Angle]: Only angle measurement.

[Ang&Dist]: Angle & distance measurement.

[Done]: Save the result and back to the point list.

4.5 POINT TO LINE



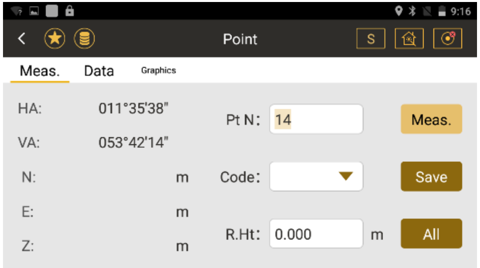
Measure 2 points as A and B, click [next] to calculate the HD/VD/SD between A and B.

Instrument will establish a new coordinate system automatically.

[Stn Set]: Set the station

5. COLLECT

5.1 POINT



Data: Show the data of saved points.

Graph: Show the graphic data of saved points.

Pt N: Input the ID of point. It will add "1" automatically on the point name in each time.

Code: Input or select the code

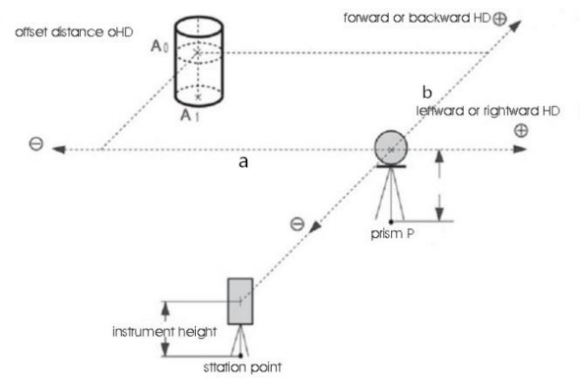
R.Ht: The reflector height.

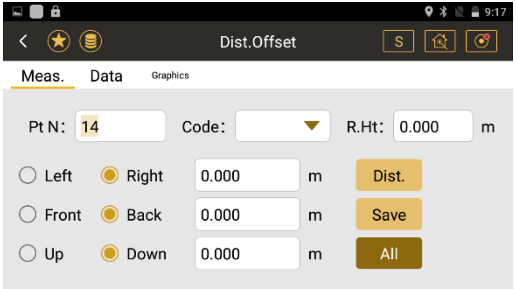
[Meas.]: Measure the point

[Save]: Save the previous result. If the distance measurement was not carried out, the system will save the current angle result only.

[All]: Measure and save.

5.2 DISTANCE OFFSET





The distance offset calculates from measurement or coordinates longitudinal, parallel offset and height differences of the target point relative to the known point.

Note: All directions are correspondent to the visual side of operator.

Pt N: Input the ID of point.

Code: Input or call up the code.

R Ht: Reflector height

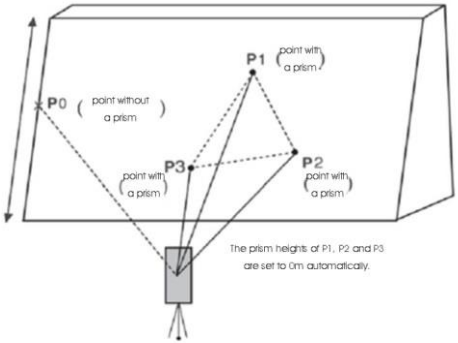
.

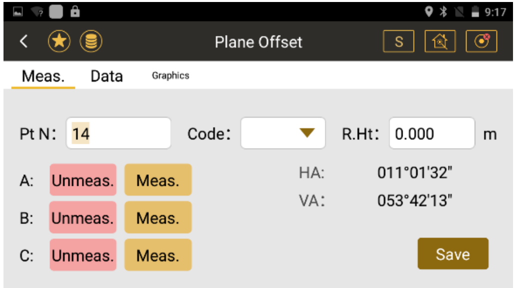
Left/Right: The lateral deviation in left or right

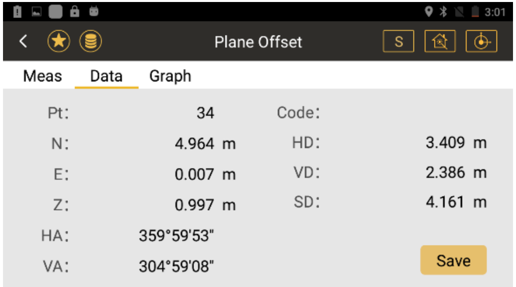
Front/Back: Difference in length.

Up/Down: The altitude deviation in upward or downward

5.3 PLANE OFFSET







Consider that Point P0 is on the edge of a plane, which cannot be measured directly through non-reflector mode.

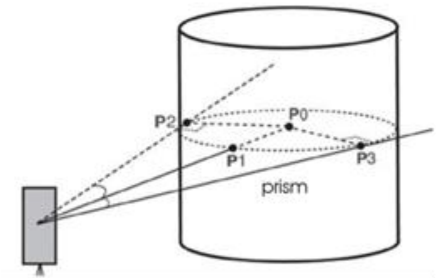
Measure P1/P2/P3, the three random prism points to defines a plane. Then aim at Point P0, it will calculate the coordinate automatically.

[Measure]: Measure the point.

[View]: View the result.

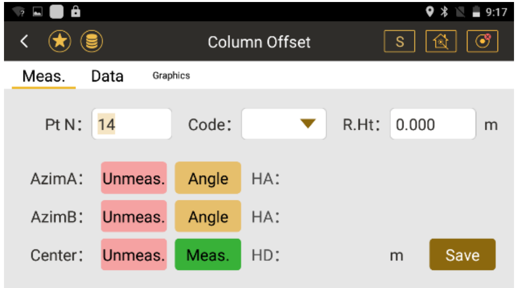
[Save]: Save the calculation result.

5.4 COLUMN OFFSET/ HIDDEN POINT



Column offset is widely used in measuring a hidden point that is not directly visible, for example the center of column as picture shown.

Point P1 is the intersection between the station and column, P2 and P3 are the left and right edge points of the cylindrical diameter.
The equipment will calculate the 3D coordinate of point P0 automatically.

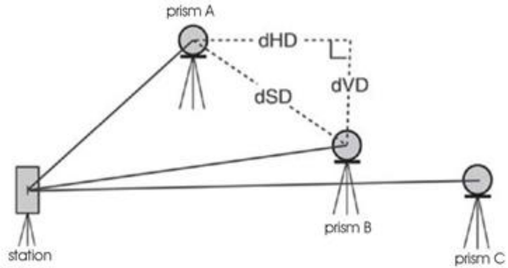


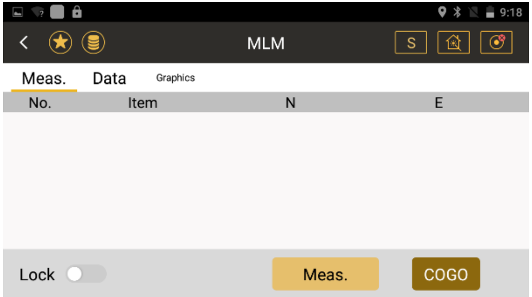
Direc.A: Collimate the side of column.
Direc.B: Collimate the other side of column.
Center: Collimate the center and measure.

[Angle]:Measure the angle of two sides.
[Meas.]: Measure the distance of column center.

[Save]: Save the result of column center.

5.5 MLM





MLM function is mainly used to compute the HD/ VD/ SD/ azimuth between two target points.

The coordinate of points can be selected from the memory, entered by manual or measured directly.

The user can choose between two methods:

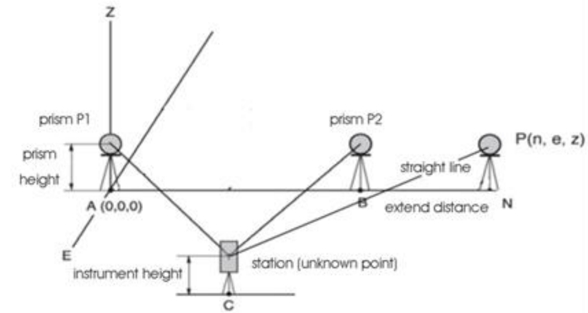
1. MLM (A-B, A-C), lock the start point
2. MLM (A-B, B-C), unlock the start point.

[Meas.]: Measure points into the point list.

[COGO]: Calculation

[Lock]: Click to lock the start point. If unlock the start point, the start point would be the last measured point.

5.6 LINE & EXTEND POINT



The extension function computes extend point from the base line, calculate the unknown coordinate from two known points and the extend distance.

Known:

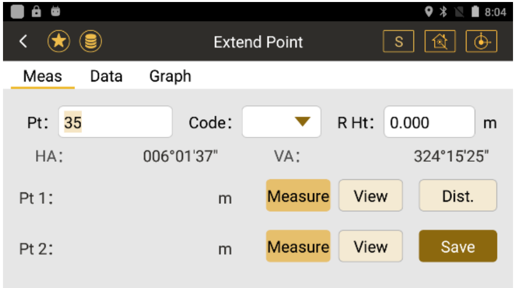
P1, start point

P2, end point

BN, extend distance

Unknown:

P, Extend point



HA: The current horizontal angle.

VA: The current vertical angle.

Pt 1: The slide distance of P1

Pt P2: The slide distance of P2

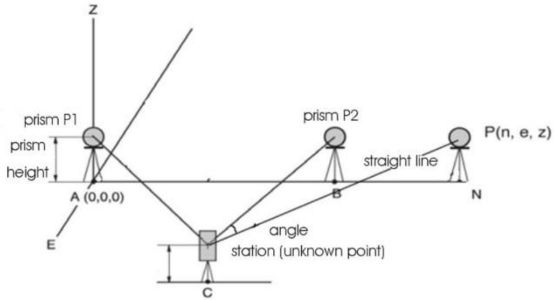
[Measure]: Measure the first or second point.

[View]: View the result.

[Dist]: Input the extended distance

[Save]: Save the extension point.

5.7 LINE & EXTEND ANGLE



The extension function computes extend point from the base line, calculate the unknown coordinate from two known points and the azimuth.

Known:

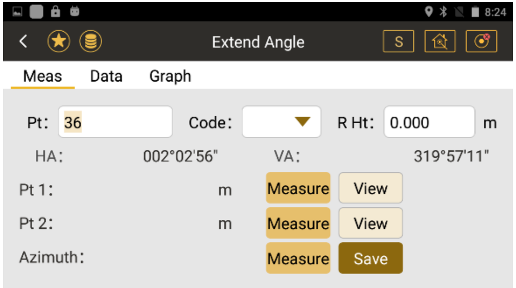
P1, start point

P2, end point

Azimuth between station C and extend point P

Unknown:

P, Extend point



HA: The current horizontal angle.

VA: The current vertical angle.

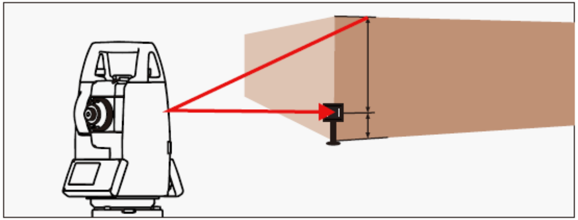
Pt 1: The slide distance of P1

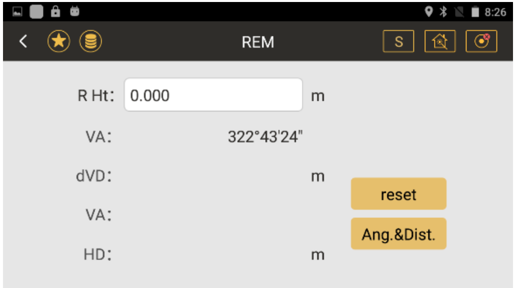
Pt 2: The slide distance of P2

Azimuth: Azimuth between station and extend point.

[Save]: Save the extension point.

5.8 REM/REMOTE HEIGHT





The points directly above the prism can be determined without a reflector at the target point.

When you need the information of a target hang in the air, REM can help you measure the point without a reflector.

In the power industry, this function can be used to measure the height of transmission cable.

R Ht: Reflector height.

VA (the first one): Current vertical angle.

dVD: Vertical difference between measured point and target.

VA: Vertical angle of measured point.

HD: Horizontal distance of measured point.

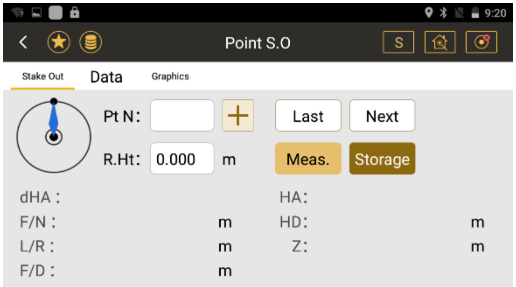
[Reset]: Measure the VA.

[Ang & Dist]: measure the VA and HD.

6. STAKE OUT

6.1 POINT S.O.

☞ *The menu of Stake-out*



☞ *The guidance of Stake-out*

Setting out the coordinates from memory or manually entered

Pt N: ID of the stake-out point.

R.Ht: Reflector height

[Last]: Select the last stakeout point

[Next]: Select the next stakeout point.

[Meas.]: Measure the target

[Storage]: Save the current stake-out point

d HA: Difference of horizontal angle

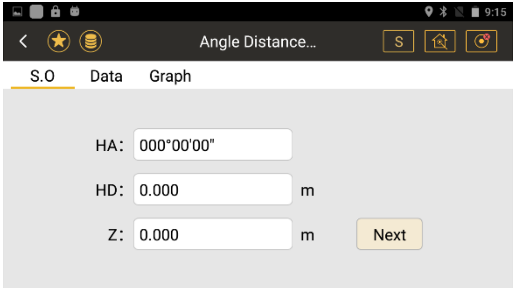
Far/Near: Guide to move forward or backward.

Left/Right: The deviation from the target

Fill/Dig: Guide to move upward or downward.

6.2 ANGLE & DISTANCE S.O.

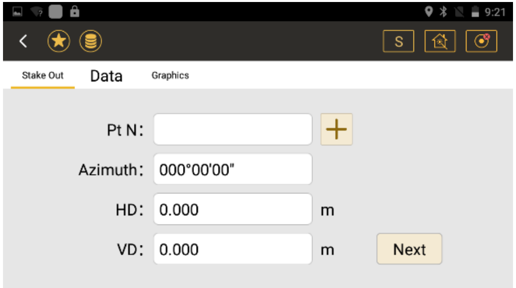
Stake-out the points by entered the value of angle offset (HA), longitudinal offset (HD) or height offset (Z)



Find further details on "Point Stake-out"

6.3 REFERENCE LINE

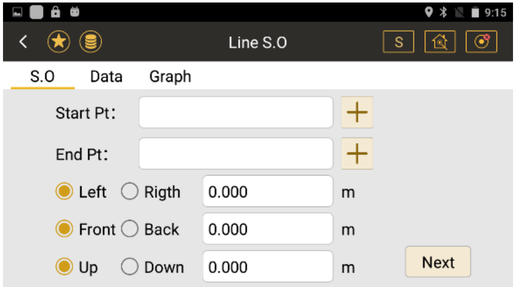
Stake-out the points by entered the value of azimuth, longitudinal offset (HD) and height offset (VD).



The point can be selected from memory of inputted by manual.

6.4 LINE S.O.

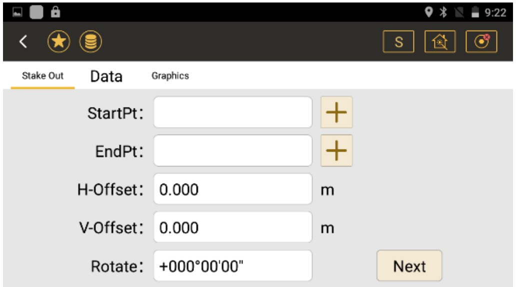
It will calculate the coordinates of the stake-out point through two known points (Start Pt and End Pt) and the offset distance (left or right, forward or backward, up or down) based on the line which is formed by the known points



6.5 REFERENCE LINE S.O.

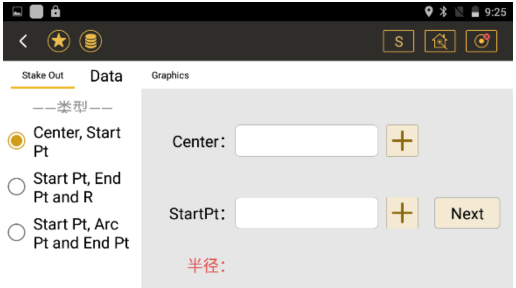
Stake out points by a known base line (defined by two known points), and the related offset.

The reference line can be offset either longitudinally, in parallel or vertically to the base line, or be rotated around the first base point as required.

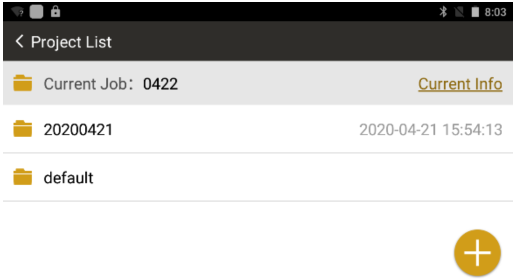


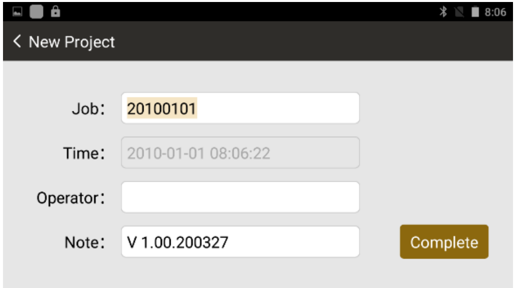
6.6 ARC S.O

Stake out an arc by center/start point, start point/end point/radius and the others factors.



7. JOB



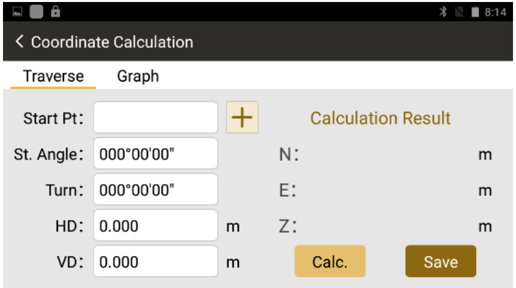


Press the "+" on the right corner to create a new job.

8. COGO

8.1 Calc. XYZ

Calculate the coordinates with a known point, based on the direction and distance offset.



Start Pt: Start point, which can be selected, measured or inputted by manual.

Start Angle: Angle of start point

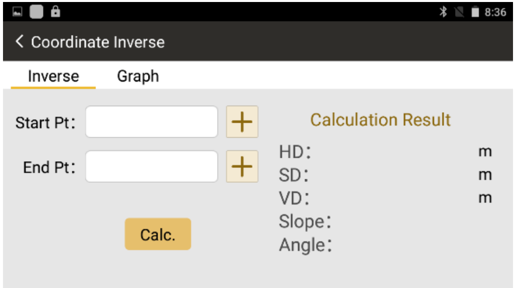
Turn Angle: The turning direction of start point.

[COGO]: Calculate the coordinate

[Save]: Save the result

8.2 INVERSE

Calculate the relationship between two points



Start Pt: Start point.

End Pt: End point, which can be selected, measured or inputted by manual.

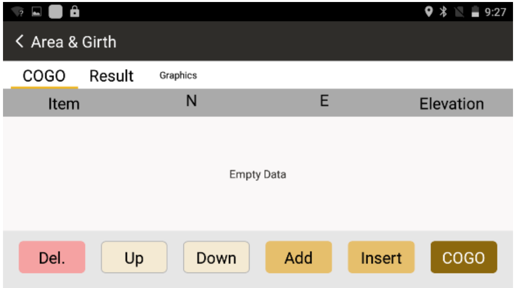
[Calc.]: Calculate

Slope: Slope of two points.

Angle: Angle between two points.

8.3 AREA & GIRTH

Calculate the area and girth of known points.



[Add]: Add a point to the end of point list

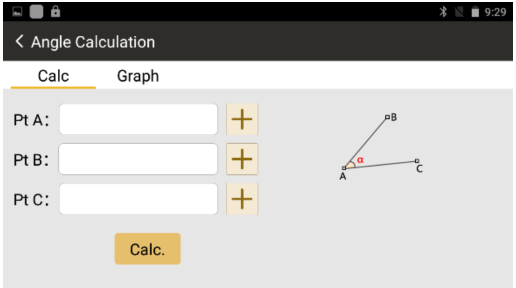
[Insert]: Insert a point to the point list

[Delete]: Delete a chosen data on the list

[Calc]: Calculate

8.4 ANGLE

Calculate the included angle from 3 points.

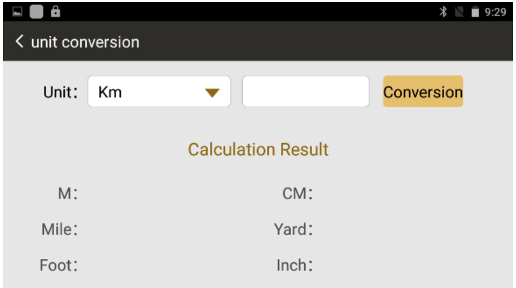


Pt A, B and C can be selected, measured or inputted by manual.

[Calc]: Calculate

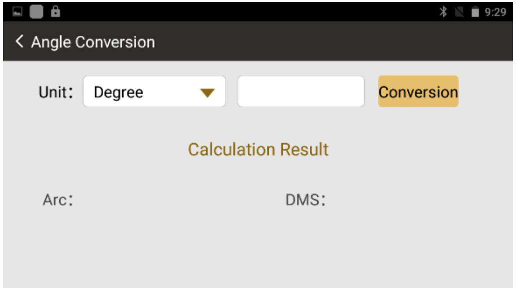
8.5 UNIT CONVERSION

Convert the unit of distance.



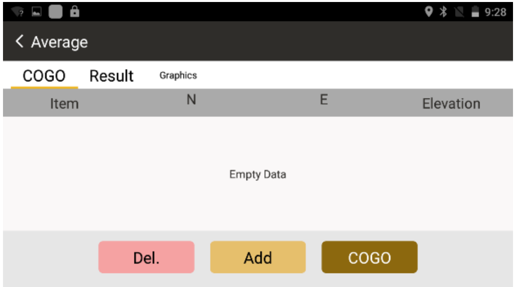
8.6 ANGLE CALCULATION

Convert the unit of angle.



8.7 AVERAGE

Calculate the average value of known points.



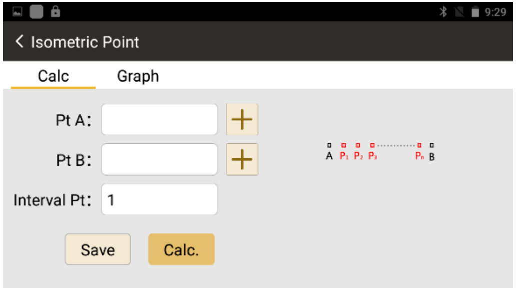
[Delete]: Delete a chosen data on the list

[Add]: Add a point to the end of point list

[COGO]: Calculate

8.8 EQUIDISTANT POINTS

Define a line by two known points. According to the interval, divide the line into several parts.



Pt A and B can be selected, measured or inputted by manual.

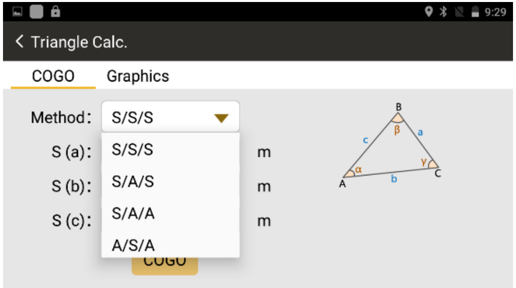
Interval Pt: The interval between point A and B.

[COGO]: Calculate

[Save]: Save the result

8.9 TRIANGULAR COMPUTATION

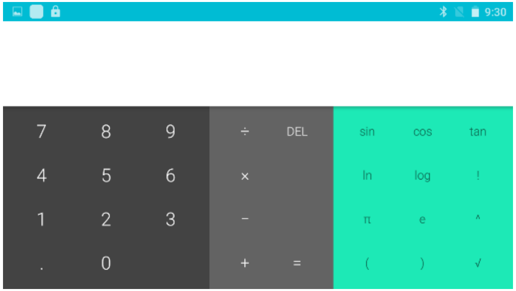
Calculate the triangle based on the inputted angle or length.



Method: Calculate by S/S/S, S/A/S, S/A/A, A/S/A or Pt/Pt/Pt

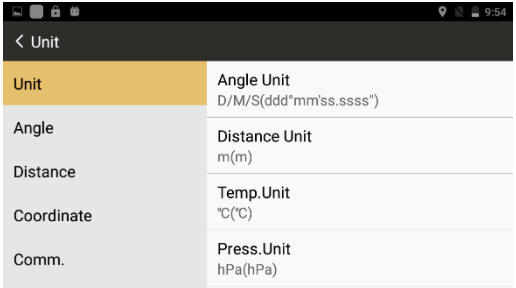
[COGO]: Calculate

8.10 CALCULATOR



9. SET

9.1 UNIT



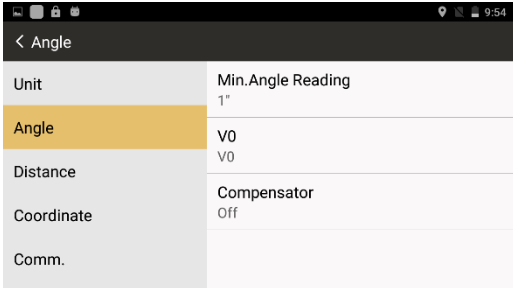
Angle Unit: degree, gon, mil, DMS

Distance Unit: meter, feet, feet-inch

Temp. Unit: ℃ , ℉

Press. Unit: hPa, mmHg, inHg

9.2 ANGLE

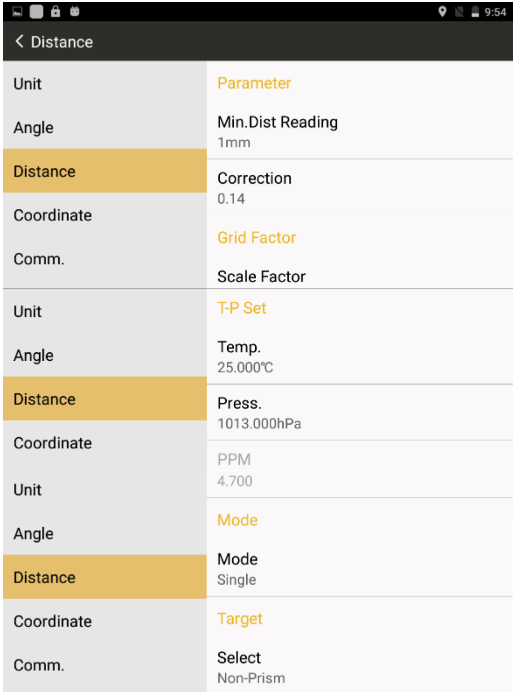


Angle Minimum Reading: 5”, 1”, 0.1”

H0/V0: horizontal 0 or vertical 0.

Tilt Sensor: off, single or dual axis

9.3 DISTANCE



Constant:

Distance Minimum Reading: 1mm, 0.1mm

Correction (K): 0.14, 0.2 or close

Grid Factor:

Scale Factor: Set the scale of measurement

Average Elevation: Set the elevation of current station.

T-P Set:

Temp: Set the current temperature.

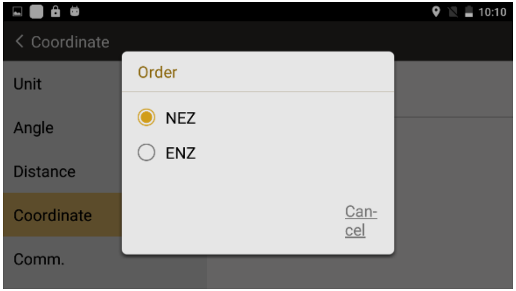
Pres: Set the current pressure.

PPM: The atmosphere correction value.

Mode: N times, continuous, tracking or single.

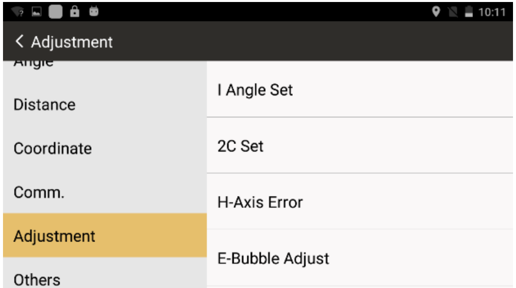
Target: Set the target among prism, reflector sheet and non-prism.

9.4 COORDINATE



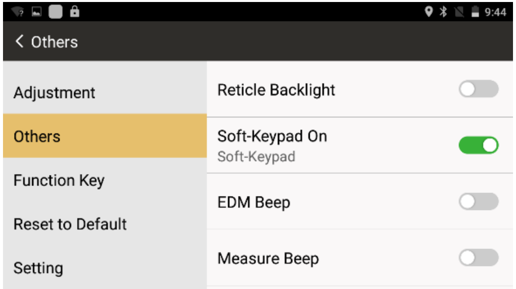
Order: the order of coordinate display. By N-E-Z or E-N-Z.

9.5 ADJUSTMENT



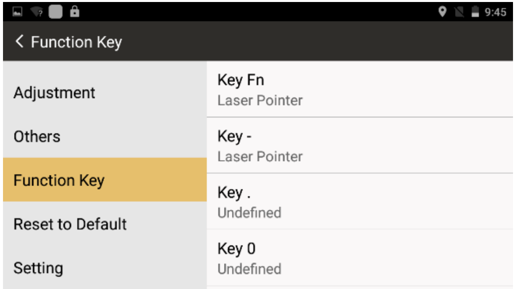
Adjust the I-Angle, 2C, Horizontal Axis, Electronic Bubble, Parameter (constant K, addictive constant) and Display Error.

9.6 OTHERS



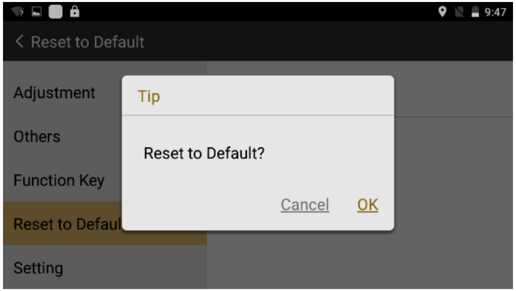
Activate the backlight of reticle, soft-keypad, beeping sound of EDM, beeping sound of measurement, and the function of quick code.

9.7 FUNCTION KEY



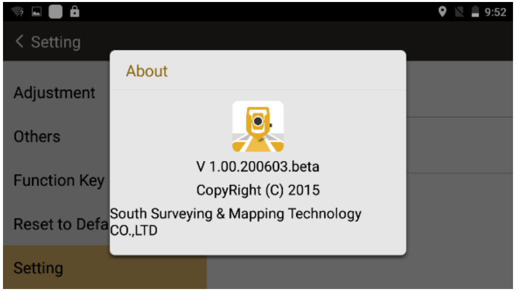
Define the function of keys, like FN, -, . and the other numeric keys, to activate the laser pointer, reticle illumination, laser plummet and soft-keypad.

9.8 RESET TO DEFAULT



Reset the settings of total station back to initial mode.

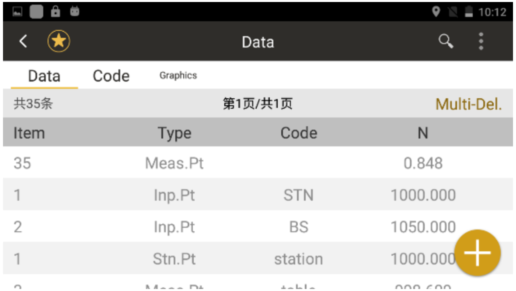
9.9 SETTING

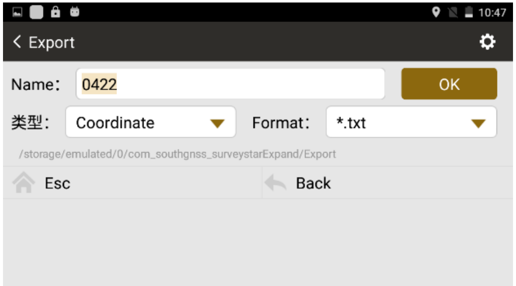


Software Info: View the software information.

10. DATA

10.1 DATA





View the raw data. For further data format, please check the Appendix in the last page.

Clear the data list, import the txt/dat file to total station, or export the raw data, coordinate to external memories.

Search the point from the data list.

Set the order of data

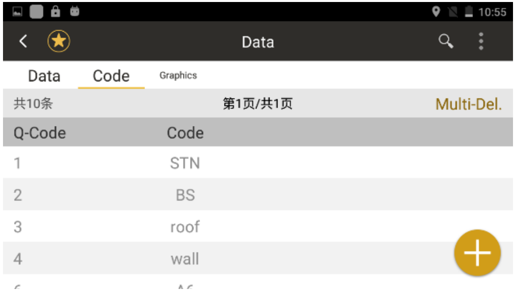
Add a new point with code and coordinate into the data list.

Multi-del: Delete multiple data from data list.

10.2 CODE

View the code data.

Click the code in once to edit or delete the data.

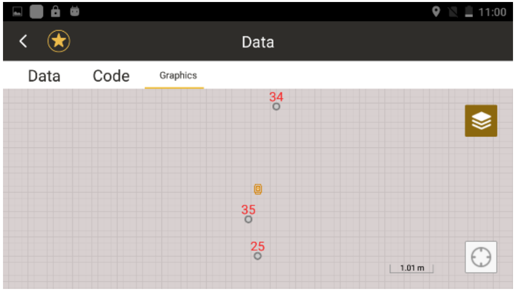


Clear the code list, import or export the codes

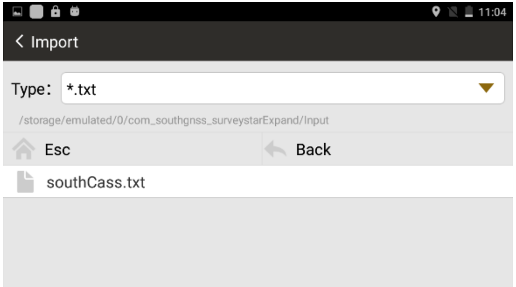
Search the code from the list.

10.3 GRAPHICS

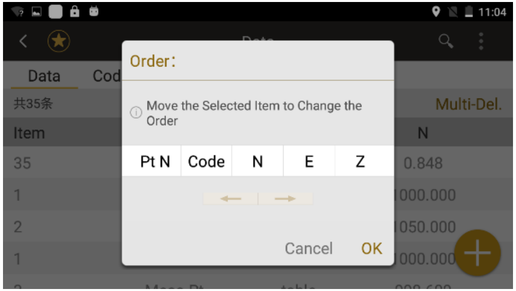
View the graphic data.



10.4 DATA IMPORT

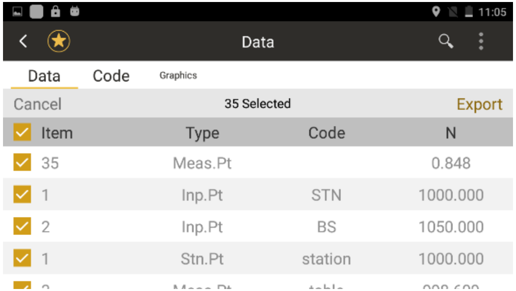


Click [Import], then select the file from internal memory.

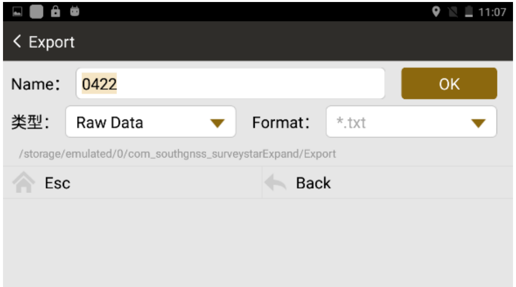


Choose the data type (Coordinate/ Code data) and display order (Point name, code, N, E, Z), then click **[OK]** for import.

10.6 DATA EXPORT



Click **[Export]** to choose the data type (Coordinate/ Code/ Raw Data) and the format, then click **[OK]** for export.



The file name can be defined.

11. INSPECTION & ADJUSTMENT

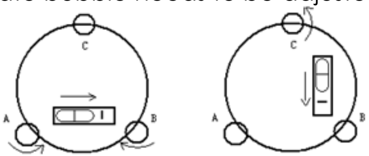
The instrument has passed the procedure of inspection and adjustment before releasing to the market, which ensures that it meets quality requirement. However, after long periods of transportation or the changeable environment, some influences may occur to the internal structure.

Therefore, before the instrument is used for the first time, user should check and adjust the functions we introduced in this session to ensure the precision of the job.

11.1 PLATE VIAL

Inspection

Loosen the horizontal tangent screw, rotate the equipment to ensure that the plate vial is parallel to the direction of foot screw AB. Adjust the screw A/B in opposite direction to move the bubble in the center. Rotate the instrument to 180° to see whether the bubble is in center, if not, the plate bubble needs to be adjusted.



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. Correct 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.

11.2 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.

11.3 TILT-SENSOR

Adjust the plate vial at first, leveling the equipment. Then enter the adjustment page of electronic bubble. Press **[setting]** to set the sensor as 0 in the current state.

11.4 RETICLE UNIT

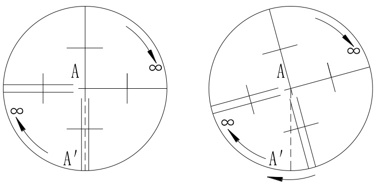
Inspection

1. Sight object A after leveling the equipment, lock the horizontal and vertical tangent unit and make sure that target A is in the center of cross-hair.

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.



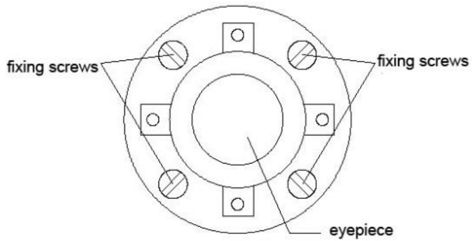
Adjustment

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.



11.5 PERPENDICULARITY BETWEEN SIGHT OF VIEW & HORIZONTAL AXIS (2C)

Inspection

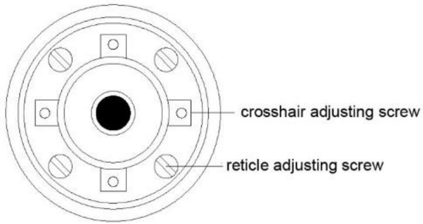
1. Set object A at a far distance at the same height as the instrument, leveling the instrument and turn on the power (eg. HL=10° 13'10").
2. Sight object A in horizontal left and read value of HA. (eg. HR= 190° 13'40").
3. Loosen the vertical and horizontal tangent unit and rotate the telescope. Sight 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 horizontal tangent screw to adjust the reading of HA.

HR+C = 190° 13'40" – 15" = 190° 13'25"

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



11.6 COMPENSATION OF VERTICAL INDEX DIFFERENCE

Inspection

1. After leveling the instrument, make the EDM parallel with the line connecting the center of the instrument to any one of the screws. Lock the horizontal clamp screw.

2. Switch on the equipment, zero the vertical index. Lock the vertical clamp screw and the instrument will display the vertical angle value.

3. Rotate the vertical tangent unit slowly in either direction about 10mm in circumference, and the overrange message appears. It means that the tilt of vertical axis is larger than 4', over the range of compensation. When rotate the vertical tangent unit in opposite direction back to the original place, the instrument will show the vertical angle again, it means that the compensation of vertical index difference works well.

Adjustment

If the compensation function is not working, please send the instrument back to the authorized agency for maintenance.

11.7 VERTICAL 0 (I ANGLE)

The adjustment of vertical index difference (the so-called i-angle).This item must be adjusted after finishing the adjustment of tilt-sensor and crosshair.

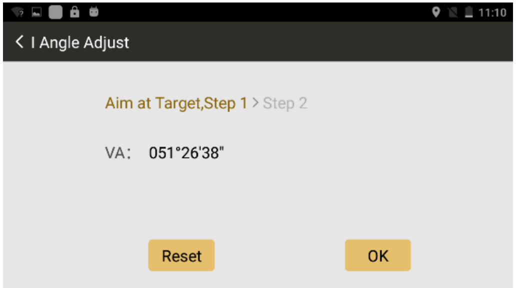
Inspection

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.

5. If |i| ≥10”, it need to reset the Vertical 0.



Adjustment

1. Aim at target A in same height with the instrument in HL.

2. Aim at the same target A on HR.

3. After setting the angle in both HL and HR, it will display the index difference, press **[Reset]** to confirm the adjustment.

4. Repeat the inspection steps to check the Index Difference (i angle). If the difference still cannot meet the requirement, please check whether the steps you did are correct. Then reset again.

5. If the Index Difference still fails to meet the requirement after repeated operation, the instrument should be returned to our authorize service center for inspection and repair.

Note: The value of vertical angle is not adjusted and compensated, just for a reference in adjustment.

11.8 CONSTANT K

The Instrument constant has been checked and adjusted in the factory, and K=0. It seldom changes and it is suggested to check once or twice in a year.

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 accurately.
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 be adjusted according to the inspection value.

Adjustment

Set the orientation through the vertical hair to make Point A,B, and C on the same line strictly. There must be a fixed and clear centering mark under the Point B.

The coincidence of the center of the prism and the center of the instrument is very essential to the measuring accuracy. Therefore, it’s best to use a tripod or a common-used tribrach on the point B. If we replace it with a three-foot adapter and a tribrach, make sure that they are stable and fixed. It is possible to reduce the inconsistency if we just replace the upper part of the prism and the upper part of the instrument.

11.9 COINCIDENCE BETWEEN SIGHT OF VIEW AND EMITTING AXIS

Inspection

1. Set the reflector 50m away from the instrument. Aim at the center of prism precisely.
2. Activate the laser pointer. Check whether the center of reticle coincides to the laser pointer. If no, please adjust the emitting axis.

Adjustment

If there is a huge deviation between the sight of view and emitting axis, please send the instrument to authorized service center for maintenance.

11.10 LEVELING SCREWS ON TRIBRACH

If any of the leveling screws becomes loose, tighten the adjusting screws on the side of leveling screw appropriately.

12. SPECIFICATIONS

12.1 DISTANCE MEASUREMENT

Model		N1
RANGE	**Non-Prism**	800m/1500m/2000m
	Prism	5000m
ACCURACY	**Non-Prism**	2+2ppm
	Sheet	3+2ppm
	Prism	3+2ppm
OTHERS	**Measure Intervals**	Fine Mode: 0.3s Tracking Mode: 0.1s
	Distance Unit	M, FT
	Distance Reading	Max: 99999999.999m Min: 1mm
	Basic Frequency	70-150MHz
	Constant	Manual Input,
	Atmos. Correction	Auto Correction

12.2 ANGLE MEASUREMENT

ANGLE MEASUREMENT	**Accuracy**	2”
	Minimum Reading	1”
	Measure Method	Absolute Encoding
	Diameter of Disk	79mm
	Angle Unit	Degree, Gon, Mil
	Vertical 0	H0, V0

12.3 OPERATION SYSTEM

OPERATION SYSTEM	**O.S**	Android 6.0
	Processor	MT6753
	Memory	RAM: 3GB, ROM: 32GB

12.4 HARDWARE

TELESCOPE	**Image**	Erect
	Magnification	30x
	Effective Aperture	45mm (DTM: 50mm)
	Resolution Ratio	3”
	Field of View	1° 30’
	Minimum Focus	1.2m
	Tube Length	154mm
	Reticle Illumination	4 Levels Adjustable
VIAL	**Plate Vial**	30”/2mm
	Circular Vial	8’/2mm
SENSOR	**System**	Dual-axis
	Compensate Range	± 6’
	Resolution Ratio	1”
PLUMMET	**Laser Level**	Level II, red laser
	Accuracy	1.5mm (InsHt 1.5m)
	Wave Length	630-670nm

KEYBOARD	**Keyboard**	Numeric, 17 Keys
	Display Unit	Graphic, 5.0 Inch TFT LCD Screen
	Resolution	720*1280 dpo
	Position	Face 1, Face 2
INTERFACE	**Comm Port**	6-Pin Serial Port
	Data Interface	USB Type C (OTG), Bluetooth, TF Card
	SIM Card	Available
	WLAN	Available
POWER	**Battery**	7.4V DC, Li-ion battery
	Working Hours	8 hours
OTHERS	**IP RATE**	IP55
	Working Temperature	-20℃ to + 50℃
	Dimension	200*170*350mm
	Weight	5.7kg

13. SAFETY GUIDE

13.1 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:

FDA21CFR ch.1 § 1040:1998 (U.S. department of Health and Human Services, Code of Federal Regulation)

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 harmful 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 at the reflecting light.

Prevention

Do not stare at the direction which the laser beam is reflected. When the laser is turned on (under distance measure mode), do not look at it near 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 incurring harm, 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

13.2 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 60825-1:1993 "SAFETY of LASER PRODUCTS"

EN 60825-1:1994+A II:1996 " SAFETY of LASER PRODUCTS"

Class II laser product is in accordance with the following standard:

FDA21CFR ch.1 § 1040:1998 (U.S. Department of Health and Human Services, Code of Federal Regulations)

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 har