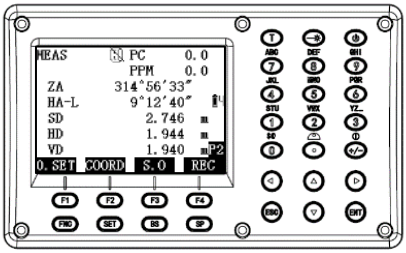
Total Station

Quick Manual - AXIS 1

STEC

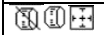
1 Introduction

1.1 Keyboard

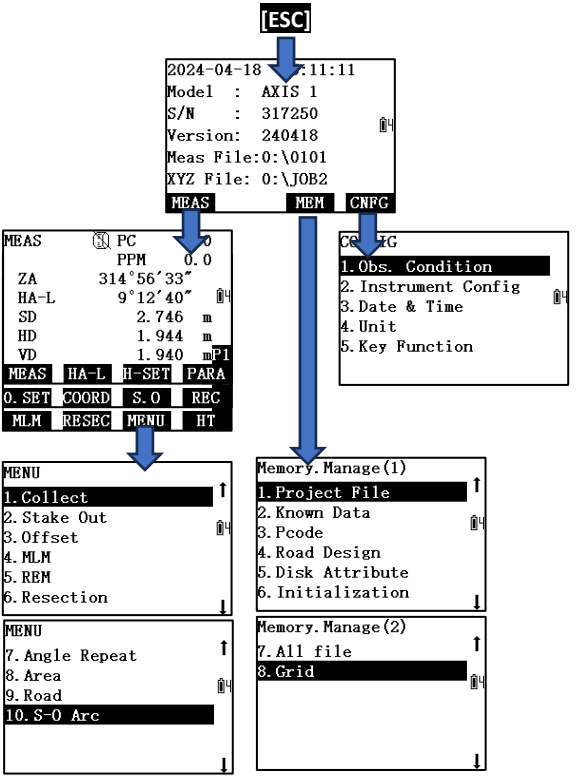


Keys	Description
T	Switch the target (Prism/ Non-Prism/ Sheet)
☼	Turns on/off the backlight
⏻	Power key (On/Off).
FNC	Function key. Turn the pages. Input target height in Stakeout, MLM, REM, etc.
SET	Shift key. Switch input mode between alphabets and numbers
BS	Backspace.
SP	Space; Modify EDM parameters in the non-input status.
F1	Function keys (F1, F2, F3, F4). Responds to display messages
△ ▽ ◁ ▷	Navigation keys. Controls the cursor in 4 directions.
1	Alphanumeric keys, 0-9
.	Input dot. Enter the tilt compensator and turn on the laser plummet.
+/-	Input */+/-; Turn on or off the laser pointer in measure mode.

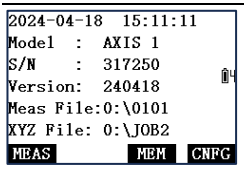
1.2 Icons

Keys	Descriptions
	Battery icon. Level from 1 to 4.
	Target status. Click to switch between non-prism, prism, or sheet.
	Tilt status
	Input status, numbers or alphabets

1.3 Menu Tree



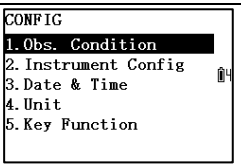
1.4 Information



Press **[ESC]** key to check the information. Including model, SN, version, measured file and coordinate file.

Keys	Descriptions
[F1] MEAS	Back to OBS (Observation) page.
[F3] MEM	Memory management.
[F4] CNFG	Config.
[FNC]	Check the other version. Including the version of mainboard, EDM board, angle board, tilt sensor and T-P sensor.
[SP]	Check the illumination settings.

1.5 Settings



Press **[Esc]\[F4] CNFG** to configure the basic setting as the figure shows.

1.5.1 Observation Condition

Sub Items	Descriptions
C&R Crn	None / k = 0.2 / k = 0.14
VA mode	Zenith / H0 / H90°
Tilt	Off / X / XY
Auto-off	Never / 60min off
NEZ order	ENZ / NEZ
Min angle reading	0.1”/ 1”
Min distance reading	0.1mm / 1mm
Key buzzer	On / Off
Angle buzzer	On / Off
F1/F2 coordinate	Same / Different

1.5.2 Instrument Config

Sub Items	Descriptions
Error display	Index, collimation, tilt error value.

Index Angle	Calibrate I Angle.
Collimation	Calibrate the 2C collimation
Contrast	Adjust screen contrast (1-13).
Tilt adjustment	Calibrate tilt sensor.

1.5.3 Time & Date

Set the date and time in 24 hours.

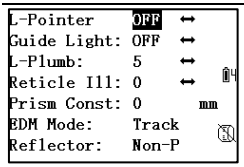
1.5.4 Unit

Sub Items	Descriptions
Error display	Index, collimation, and tilt error value.
Index Angle	Calibrate I Angle.
Collimation	Calibrate the 2C collimation.
Contrast	Adjust screen contrast (1-13).

1.5.5 Key Function

Items	Descriptions
Define	Define F1-F4 functions.
Key allocation	User 1 / User 2
Recall	User 1 / User 2 / Default

1.6 Illumination Config



Press **[SP]** to set the laser pointer, guide light, laser plumb, reticle illumination, etc.

Items	Descriptions
L-Pointer	Use [◄][►] to turn on or off the laser pointer.
Guide Light	Use [◄][►] to turn on or off the guide light.
L-Plumb	Use [◄][►] to set the brightness from level 1 to 5.
Reticle Light	Use [◄][►] to set reticle light from level 0 to 10.

Prism constant	Manually input the prism constant
EDM Mode	Use [◄][►] to select 1-time/ 3-times/ Track/ Repeat.
Reflector	Use [◄][►] to select Prism/ Sheet/ Non-prism mode.

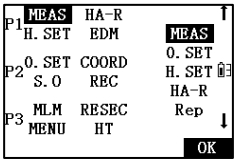
1.7 Allocating Key Functions

Axis 1 allows allocating the definition of softkeys [F1], [F2], [F3], [F4] in OBS mode.

The current softkey allocations are retained until they are revised again.

1.7.1 Define Soft Keys

1) Press **[ESC]\[F4]** CNFG**[5]** Key Function**[1]** Define.



Default definition:

[MEAS] [HA-R] [H-SET] [PARA] [0.SET] [COORD] [S.O] [REC] [MLM] [RESEC] [MENU] [HT]

2) Use **[◄][►]** to move the cursor and select the function key, which you want to change on P1, P2, P3.

3) Use **[▲][▼]** to move the cursor on the selectable list, press **[ENT]** to confirm.

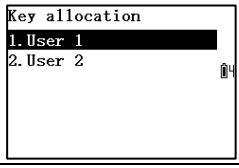
4) After revise, press **[F4] OK** to record.

5) In OBS page, press **[FNC]** to switch the page (P1, P2, P3) of soft-keys.

Items	Descriptions
[MEAS]	Measure, without record.
[0.SET]	Set the horizontal angle to 0.
[H SET]	Set the horizontal angle.
[HA-R]/[HA-L]	Switch between horizontal right and horizontal left.
[REP]	Angle repetition measurement.
[HOLD]	Hold or release horizontal angle.
[ZA/%]	Switch the display of zenith angle

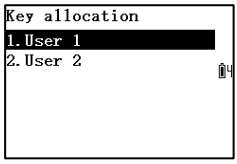
	between angle and percents.
[HT]	Set the instrument height and target height.
[REC]	To check job data records.
[REM]	Remote height program.
[MLM]	MLM (Tie distance) program.
[LAST]	Check the last data in the job.
[VIEW]	Check the data list.
[PARA]	Set EDM config.
[COORD]	Coordinate measurement.
[S.O]	Stake out program.
[OFSET]	Offset program.
[MENU]	Menu.
[RESEC]	Resection
[OUPUT]	Output data.
[F/M]	Feet or meter.
[AREA]	Area program.
[ROAD]	Road surveying.
[PT PRO]	Point projection program.
[S-O L]	Stake out line.
[NULL]	Empty definition.

1.7.2 Save as User 1 & User 2



Press **[2] Key Allocation** to save the current definition of soft keys under user 1 or user 2.

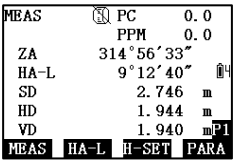
1.7.3 Recall Settings



Press **[3] Recall** to save the current definition of soft keys under user 1 or user 2.

2 Basic Measurement

2.1 [MEAS]



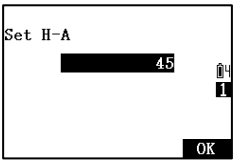
Press **[F1] MEAS** in P1 to measure the distance.

The result of ZA(VA), HA, SD, HD, and VD will show on screen.

2.2 [HA-R]\[HA-L]

Press **[F2] HA-R/HA-**L in P1 to switch between horizontal right and horizontal left.

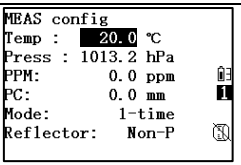
2.3 [H-SET]



Press **[F3] H-SET** in P1 to set the horizontal angle.

For example, enter 45.0000 for 45°00’00”.

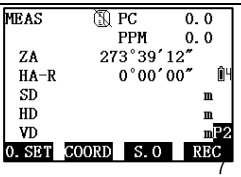
2.4 [PARA]



Press **[F4] PARA** in P1 to set the parameter of measurement.

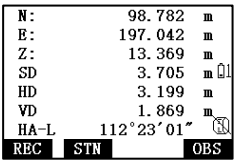
Items	Descriptions
Temperature	Enter the temperature by manual.
Pressure	Enter the pressure by manual.
PPM	Atmospheric parameters.
PC	Enter the prism constant.
Mode	Use [◄][►] to select 1-time/ 3-times/ Track/ Repeat mode.
Reflector	Use [◄][►] to select Prism/ Sheet/ Non-prism mode.

2.5 [0 SET]



Press **[F1] 0 SET** in P2 to set the current horizontal angle to 00°00’00”.

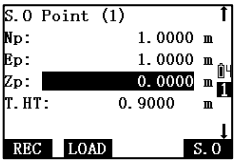
2.6 [COORD]

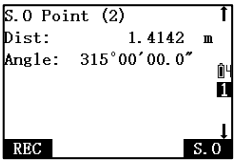


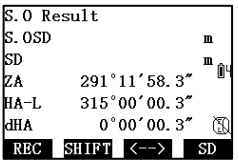
Press **[F2] COORD** in P2, **[1] MEAS** to measure the coordinate (N, E, Z), SD, HD, VD and HA of target.

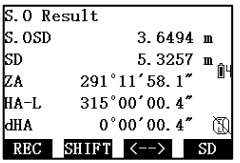
Keys	Descriptions
[F1] REC	Record the data.
[F2] STN	Set the station.
[F4] OBS	Observe (Measure)

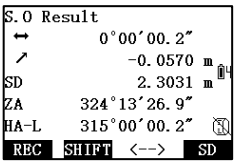
2.7 [S.O]





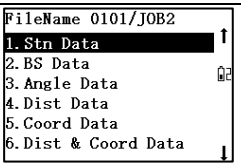






1) Press **[F3] S.O** in P2, select **[2] Stake Out** to stake out by coordinates.
2) Enter coordinates, or press **[F2] LOAD** to select it from the data list.
3) Use **[▲][▼]** to check the horizontal distance and angle of stake out point.
4) Press **[F4] S.O,** and the difference of horizontal angle (dHA) will display.
5) Rotate the EDM till dHA =0°00′00″.
6) Press **[F4]** to measure the prism in this direction.
7) Move the prism based on the direction guidance, also you can press [F3] < - - > to check the stake out guidance with icons until all the value becomes 0m.
8) Press **[F1] REC** to record it.

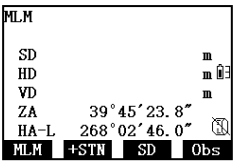
2.8 [REC]

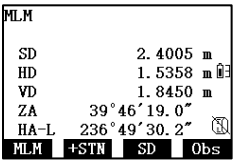


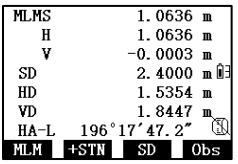
Press **[F4] REC** in P2 to check and record data under current file (e.g. Raw: 0101, Coord: JOB2).

2.9 [MLM]

MLM is used to directly measure the slope distance, horizontal distance, and height difference between two points by two methods: 1)A-B, A-C or 2)A-B, B-C.



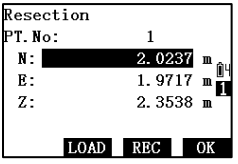


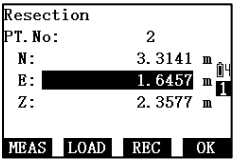


1) Press **[F1] MLM** in P3, or select **[4] MLM** under **[F3] MENU**.
2) Aim at point A then press **[F4] OBS.**
3) Aim at point B then press **[F1] MLM** to check the SD, HD and VD.
4) Repeat to measure between A-B, A-C, A-D.
5) Press **[F2]+STN** to calculate the distance from the last point (A-B, B-C, C-D).

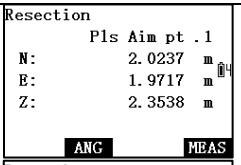
2.10 [RESEC]

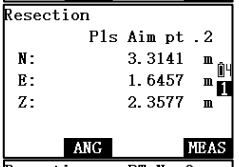
Resection is used by measuring multiple known points to calculate the station which is set up in an unknown position.

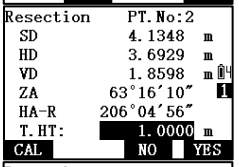


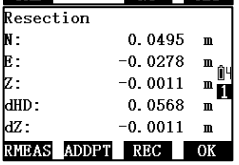


1) Press **[F2] RESEC** in P3. Enter the coordinates by manual, or press **[F2] LOAD** to read points from internal memory.
2) Press **[F4] OK** to add the next point.







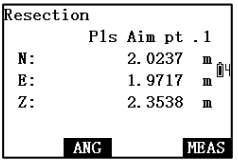


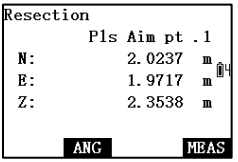
3) When the last point is entered, press **[F1] MEAS** to start measure the points.
4) Press **[F2] ANG** to measure angle (at least 3 points) or **[F4] MEAS** to measure distance (at least 2 points).
5) Press **[F4] YES** to confirm result. Or press **[F3] NO** to remeasure this point.
6) Repeat the measurement, press **[F1] CAL** to calculate the resection result.

Note: If not satisfied with the accuracy, press **[F2] ADD PT** to add more points to measure and improve the accuracy. You can press **[F1] REMAS**, and select remeasure from 1st point or only remeasure the last one.

2.11 [MENU]

Press **[F3] MENU** in P3.





1) Collect
2) Stake Out
3) Offset
4) MLM
5) Resection
6) Angle Repeat
7) Area
8) Road
9) S.O Arc

2.12 [HT]

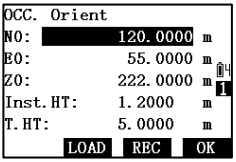
Press **[F4] HT** in P4 to enter the target height and instrument height.

3 Station

3.1 Station Setup

Method 1: **[F2] COORD** in P2\ **[2] STN**;

Method 2: **[F3] MENU** in P3\ **[1] Collect, [F2] Stake Out, [F3] Offset** \ Select STN;



1) Enter the coordinate or press **[F2] LOAD** to read it from internal memory.

2) Press **[F3] REC or [F4] OK** to record or set the station.

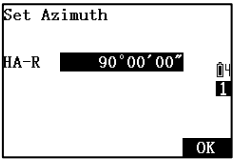
3.2 Orient Backsight by Angle or by Coordinate

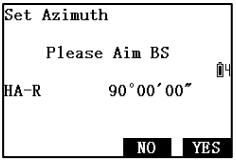
Method 1: **[F2] COORD** in P2\ **[3] BS;**

Method 2: **[F1] MENU** in P3\ **[1] Collect \ [3] BS;**

Method 3: **[F1] MENU** in P3**\ [2] StakeOut\ [1] STN\ [F3] BS**

3.2.1 By Angle



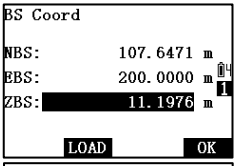


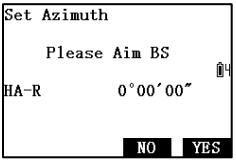
1) Select **[1] Angle.** Input azimuth, press **[F4] OK**.

2) Aim the back sight point and press **[F4] YES.** Backsight data is recorded.

3) Press to return to the previous menu.

3.2.2 By Coordinate





1) Select **[2] COORD** to input coordinate. or load a point from data list. Press **[F4] OK.**

2) Aim the backsight point and press **[F4] YES.** Backsight data is recorded.

3) Press **[ESC]** to return to the previous menu.

4 Stake Out

4.1 Coordinate Stake Out

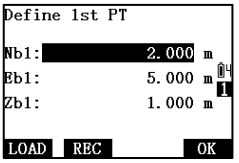
Stake out a point by coordinates.

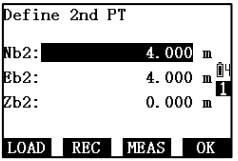
4.2 Line Stake Out

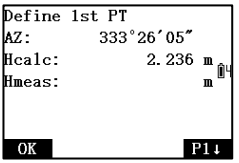
Line stakeout is used to stake out points, which related to the baseline and a preset distance. It also used to find the distance from a baseline to a measured point.

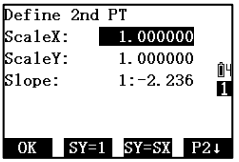
Note: [S.O L] is not displayed in the default functions, please define it to a softkey when necessary.

4.2.1 Define Baseline









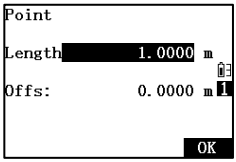
1) Press **[S-O L] \[3] Define Baseline.**
2) Enter, select the first point, press **[F4] OK.**
3) Repeat the step to add the second point, press **[F4] OK.**
4) Press **[F3] MEAS\[F1] OBS\ [F4] YES** to measure.

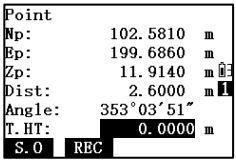
AZ: Azimuth between P1P2.
H Calc: Calculated HD between P1P2.
H Meas: Measured HD between P1P2.
Scale X/Y = H Meas/ H Cacl.
Slope = Elevation/HD

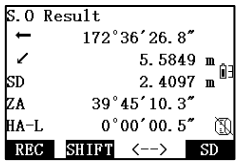
5) Press **[F1] OK** to confirm.

4.2.2 “Point Stake Out” Sub-application

It calculates from the longitudinal (X Direction) and parallel (Y Direction) offsets of the target point relative to the base line.



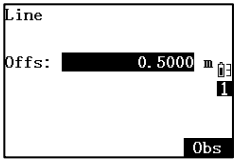


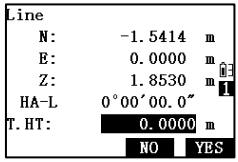


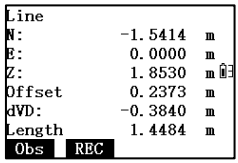
1) Press **[S-O L] \ [4] S-O Pt**.
2) Enter longitudinal (Length) and parallel (Offs) offset from the first point. Input a positive value for right side or a negative value for left. Press **[F4] OK**
3) Enter the target height, press **[F1] S.O** to stake out.
4) Then stake out the point based on the guidance.

4.2.3 “Line Stake Out” Sub-application

It calculates the horizontal and vertical distance between the measured target and the baseline (or reference line).





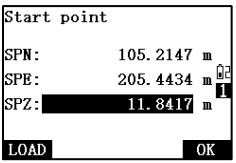


1) Press **[S-O L] \ [5] S-O LINE.**
2) Enter paralle offset. The positive value is for right side and the negative value is for left side.
3) Aim at the target, press **[F4] OBS** to measure.
4) Press **[F4] YES.**
   Offset: Parallel offset.
   d VD: Vertical difference.
   Length: Longitudinal offset.

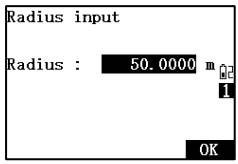
4.3 Arc Stake Out

4.3.1 Define an Arc

Before stake out a point on the arc, we should define it by the coordinate of start point, end point and a radius.



1) Press **[Menu]\[10] S.O Arc\[4] Define Arc.**

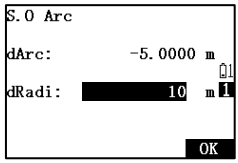


2) Enter the coordinate of a start point, an end point and radius.

3) Press **[F4] OK.**

4.3.2 Stake Out an Arc

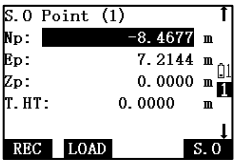
Determine the coordinates of points along an arc by the arc length and an offset value.

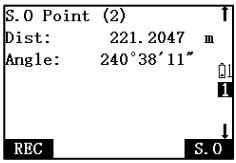


1) Press **[Menu]\[3] S.O Arc.**

2) Enter **d Arc** (arc distance) and **d Radi** (radius offset from the stake out point to the arc).

A positive arc distance indicates the direction to the right, and a negative value indicates the left.





3) Press **[F4] OK** to check the coordinate of the stake out point.

4) Press **[F4] S.O** to stake out.

5 Offset

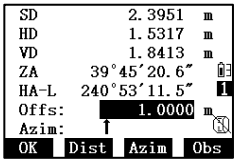
Offset measurement is used to measure the distance and angle from the survey station to a point with clear sight but where a prism cannot be set up, or from the survey station to a point with no clear sight.

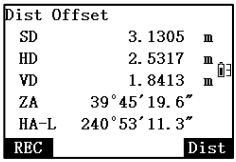
Access Press **[F3] MENU** in P3, select **[3] Offset.** Or press **[OFSET]** in functional keys.

Note: [OFSET] is not displayed in the default functions, please define it to a softkey when necessary.

5.1 Distance Offset

It calculates the offset coordinates from a measured point with horizontal distance offsets.



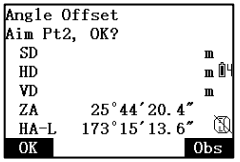


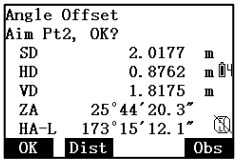
1) Press **[1] Distance Offset**.
2) Input offset value, press **[F3] AZMTH** to select the direction.
3) Press **[F4] OBS** to measure the prism.
4) Press **[F1] REC** to record it.

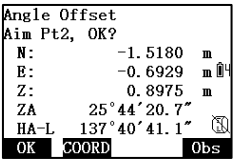
5.2 Angle Offset

For angle offset, the offset point (prism) should be set as close as possible to the left or right side of the target point, and the target height should be the same.

The distance from the offset point to the station should be approximately equals to the distance from the target point to station.





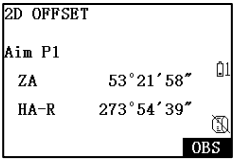


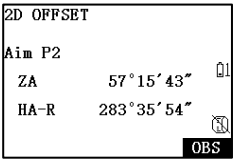
1) Press **[2] Angle Offset.**
2) Aim at offset point and press **[F4] OBS**.
3) SD, HD, VD of the offset point distance will be shown.
4) Press **[F2] DIST** to switch the display.
5) Rotate the EDM to aim at the target.
6) Press **[F1] OK\[F1] REC** to record the target.

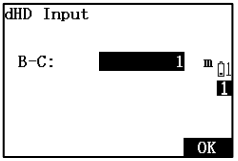
5.3 2-Dist Offset

Set the offset points P1 and P2 on the straight line passing from the target point. Determine the target by

measuring the offset points P1 and P2 and inputting the distance between point P2 and the target.

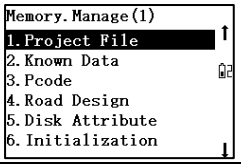






1) Press **[3] 2D OFFSET.**
2) Aim at offset point P1 and press **[F4] OBS.**
3) The coordinate will be shown. Press **[F4] YES** to the next step, press **[F3] NO** for remeasurement.
4) Aim at offset point P2 and press **[F4] OBS.**
5) The coordinate will be shown. Press **[F4] YES** to the next step, press **[F3] NO** for remeasurement.

6 Memory Management



Press **[ESC]** in OBS page\ **[F3] MEM** to enter the memory management.

6.1 Project Data

Press **[1] Project File** to enter the file management.

Item	Descriptions
1. Select Meas File	Select the measure file.
2. Select Coord File	Select the coordinate file. The current file will be marked with an asterisk.
3. Export Meas Data	Export the raw data (***.csv, *.txt, *.sdr)** by USB.
4. Import Coord Data	Import the coordinates (***.csv, *.txt, *.sdr)** by USB.
5. Send Meas Data	Send the measure data by Bluetooth and data transfer

	software.
6. Receive Coord Data	Receive the coordinate data by Bluetooth and data transfer software.

6.1.1 Export Measure Data by USB Flash Disk

1) Press **[3] Export Meas File \[F2] Load** to select a measure file, e.g. JOB1.
2) Press **[ENT].** Put the USB flash disk on TS.
3) Press **[F4] OK or [ENT]** to export data to USB flash disk.
4) The raw data (*.csv, *.txt, *.sdr) will be saved in your USB flash disk.

Sample

00NMSDR33 V240220 14:57 2024-03-04 000000
10NM0:JOB1.PTS
06NM1.00000000
01NM:AXIS 1 240220 317250

08TP	14	99.400	197.749	12.282
09F1	14	2.933	37.2522	255.0430
08TP	15	99.400	197.749	12.282
09F1	15	2.933	37.2522	255.0429
08TP	16	100.485	201.847	12.386
09F1	16	2.684	44.3827	255.1700
08TP	D1	100.485	201.847	12.386

6.1.2 Import Coordinate Data by USB Flash Disk

1) Press **[4] Import Coord File \[F2] Load \[ENT]** to select the file. The data will be imported into this job.
2) Put the USB flash disk on TS.
3) Please note the USB file format should be FAT32.
4) Select the file (***txt, *csv, *.sdr**) in the USB flash disk.
5) Press **[ENT]** to import data.

Sample

*txt: 08KI Point ID N E Z Code

08KI 1 1.123 2.234 1.333 STN

08KI 2 2.234 3.456 1.444 BS

*csv:

Point ID	Code	N	E	Z
INP1	River	103.471	2564746	17.742
INP2	Building	99.687	204.363	11.783
INP3	House	95.712	198.012	12.297

6.2 Known Data

Press **[2] Known Data** under [MEM] page to manage the known points.

Item	Descriptions
1. Input Coord Data	Enter point ID, code, N, E, Z by manual.
2. Import Coord Data	Export the coordinates (***.csv, *.txt, *.sdr)** by USB.
3. Export Coord Data	Import the coordinates (***.csv, *.txt, *.sdr)** by USB.
4. Receive Coord Data	Receive the coordinates by Bluetooth and software.
5. Send Coord Data	Send the coordinates by Bluetooth and software.
6. Delete Coord Data	Delete all the coordinates.

6.3 PCode

Press **[3] PCode** under **[MEM]** page to manage codes.

Keys	Descriptions
1. Input Pcode	Enter point ID, code, N, E, Z by manual.
2. Import Pcode	Import the codes (*.txt, *.csv) by USB flash disk.
3. Export Pcode	Export the codes (*.txt)by USB flash disk.
4. Receive Pcode	Receive the codes by Bluetooth and software.

5. Delete All	Delete all the codes

Sample

Tunnel

River

Building

House

6.4 Dist Attribute

Press **[5] Disk Attr** to enter the disk attribute mode.

Disk: 0 is internal memory.

Disk: 2 is the external USB memory.

Keys	Descriptions
[F1] ATTR	Check the attribute of disk, including file system, used, free and total capacity.
[F2] FORMAT	Format the memory.
[F4] QUIT	Escape to the last page.

6.5 Initialization

Press **[6] Initialization\[ENT]\[F4]Yes** to reset the parameter to the initial settings.

6.6 All File

Check the measured data, coordinate data and codes.

For more information and sales contacts:
www.stecprecision.com

Specifications might be changed without notice.

Contact your local dealer: